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LA GRANDE ALLIANCE

Transportation Infrastructure Program
Feasibility Study, Phase I
Prefeasibility Study, Phases II-III

VOLUME 4 - MARKET STUDY

Consultant Reference: LGA-1-GN-F-FRN-RT-0004_03_EN

2024-03-20

Vision Eeyou Istchee
• Connect • Develop • Protect

Stantec ▪ DESFOR ▪ SYSTRA
WSP
with subconsultant KPMG

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Approvals

Prepared by:

Michel SIMARD, M.A.
VEI Transport Economist

Philippe LATULIPPE BEAULIEU
WSP Economist

Reviewed by:

Catherine LAPLANTE, M.Sc.
VEI Transport Economist

Ha DAO
WSP Economist

Approved by:

Alessandro CIRELLA, P.Eng.
VEI Project Director

François BOIVIN
WSP Project Director

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ABBREVIATIONS

Acronym	Definition
$	Canadian dollar
US$	American dollar
AANDC	Aboriginal Affairs and Northern Development Canada
acc/Mv-km	accident per million vehicle kilometres
AEDC	Aboriginal Economic Development Corporation
Ag	Silver
AITQ	Alliance de l'industrie touristique du Québec
ARBJ	Administration régionale de la Baie-James
AREMA	American Railway Engineering and Maintenance of Way Association
As	Arsenic
ATT	Average Travel Time
Au	Gold
B	Billion
BCF	Bus Carrier Federation
BDH	Billy Diamond Highway
BDHR	Billy Diamond Highway Railway
BEV	Battery Electric Vehicle
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CBC	Canadian Broadcasting Corporation
CBHSSJB	Cree Board of Health and Social Services of James Bay
CBTC	Computer-Based Track Warrant System
CCAB	Canadian Council for Aboriginal Business
CCDC	Cree Construction Development Corporation
CDC	Cree Development Corporation
CDE	Corporation de développement économique
Ce	Cerium
CEC	Critical Elements Corporation
CENUL	Centre d'études nordiques de l'Université Laval
CETI	Centre d'expertise en transport intermodal
CFIL	Chemin de fer d'intérêt local (short line railway)
CFILNQ	Chemin de fer d'intérêt local du Nord-du-Québec
CFR	Cost and Freight
CGCC	Century Global Commodities Corporation
Ch	Chemin

Acronym	Definition
CHTISB	Cree Hunters and Trappers Income Security Board
CIF	Cost Insurance and Freight
CIM	Canadian Institute of Mining, Metallurgy, and Petroleum
CIM	Chibougamau Independent Mines
CIO	Community Information Officer
CICFM	Commission indépendante sur les caribous forestiers et montagnards
CLIC	Centre de logistique intermodale de Chibougamau
cm	Centimetre
CMEB	Cree Mineral Exploration Board
CN	Canadian National Railway
CNACA	Cree Native Arts & Crafts Association
CNG	Cree Nation Government
CNYC	Cree Nation Youth Council
COTA	Cree Outfitting and Tourism Association
CP	Canadian Pacific Railway
CPQ	Conseil du patronat du Québec
CQLR	Consolidated Quebec Laws Registry
Cr	Chromium
CRA	Cree Regional Authority
CRCR	Canadian Rail Operating Rules
Cr_2O_3	Chromium oxide
CRM	County Regional Municipality
CSB	Cree School Board
CSM	Critical and strategic materials
ct	Carat
CTA	Cree Trappers Association
CTM	Centre de transbordement de Matagami
CTQ	Commission des transports du Québec
Ctr	Container
Cu	Copper
CWR	Continuously Welded Rail
d	Day
D	Dry
Diam	Diamond
dwt	Dry Weight
Dy	Dysprosium

Acronym	Definition
E	Empty
EDA	Economic Development Agent
EDO	Economic Development Officer
EIBJ	Eeyou Istchee Baie-James
EIJBRG	Eeyou Istchee James Bay Regional Government
EPCM	Engineering Procurement Construction Management
Er	Erbium
ESIA	Environmental and Social Impact Assessment
ESSS	Environment Services System Services
ETD	End of Train Device
Eu	Europium
EV	Electric Vehicle
EVI	Economic Vitality Index
FBM	Foot Board Measure
FCCQ	Fédération des chambres de commerce du Québec
FCNQ	Fédération des coopératives du Nouveau-Québec
Fe	Iron
FEU	Forty-Foot Container Equivalent Unit
FOB	Free on Board
FPQ	Fédération des pourvoiries du Québec
FS	Feasibility Study
FSPL	Fir Spruce Pine Larch
ft	Foot
G	Gravel
g/t	Gram per tonne
G&A	Genreral & Administration
GA	Garantie d'approvisionnement
GACIO	Grande Alliance Community Information Officer
GCC	Grand Council of the Cree
GCR	Grevet Chapais Railway
GMR	Gross Metal Royalty
GPS	Global Positioning System
GQ	Government of Quebec
GST	Good and Service Tax
ha	Hectare
HBC	Hudson Bay's Company

Acronym	Definition
HEV	Hybrid electric vehicle
HQ	Headquarters
HSLA	High strength low alloy
HV	Heavy vehicle
HVPD	Heavy vehicle par day
IBA	Impact and Benefit Agreement
IQ	Investissement Québec
IRR	Internal Rate of Return
ITK	Inuit Tapiriit Kanatami
JBNDC	James Bay Native Development Corporation
JBNQA	James Bay and Northern Quebec Agreement
JECDC	Joint Economic and Community Development Committee
JV	Joint-Venture
k	Thousand
KEQC	Kativik Environmental Quality Commission
km	Kilometre
KP	Kilometric Point
kph	Kilometre per hour
KRG	Kativik Regional Government
kT	1,000 metric tons
KWREC	Kuujjuarapik-Whapmagoostui Renewable Energy Corporation
lb	pound
LCE	Lithium carbonate equivalent
Ld	Load
LFP	Lithium iron phosphate
LGA	La Grande Alliance
Li	Lithium
LMO	Lithium manganese battery
LOM	Life of Mine
LTCTC	Light Traffic Centralized Traffic Control
m	meter
m^3	cubic metre
M	million
MAMH	Ministère des Affaires municipales et de l'Habitation du Québec
Max	maximum
MBJ	Municipalité de la Baie-James

Acronym	Definition
MELCC	Ministère de l'Environnement et de la Lutte aux changements climatiques du Québec
MERN	Ministère de l'Énergie et des Ressources naturelles du Québec
MFBM	Million Feet Board Measure
MFFP	Ministère des Forêts, de la Faune et des Parcs du Québec
MGT	Metric Ton of Green
MGTPA	Metric Ton of Green per Annum
mi.	mile
Min	Minimum
mn	Minute
Mo	Molybdenum
MOU	Memorandum of Understanding
MP	Mile Point
mph	Mile per hour
MRE	Mineral Resource Estimate
MRNF	Ministère des Ressources naturelles et des Forêts du Québec
MRT	Minimum Running Time
MS	Market Study
MSSS	Ministère de la Santé et des Services sociaux du Québec
MT	Million metric tons
MTkm	Million metric ton-kilometres
MTPA	Million of metric tons per annum
MTMD	Ministère des Transports et de la Mobilité durable du Québec
MW	megawatt
NA	Nation Archives
Nb	Niobium
NCA	Lithium nickel cobalt aluminum battery
Nd	Neodymium
NE	North East
Ni	Nickel
NI	National Instruments
NMC	Lithium Nickel Manganese Cobalt battery
NPV	Net Present Value
NQ	Nord-du-Québec
NW	North West
OPEX	Operating Expenditure

Acronym	Definition
oz	ounce
P	Paved
PADTC	Programme d'aide au développement du transport collectif
Pb	Lead
Pd	Palladium
PDA	Pre-Development Agreement
P&DA	Partnership and Development Agreement
PEA	Preliminary Economic Assessment
PER	Permitted Production Volume
PGE	Platinum Group Elements
PHEV	Plug-in electric vehicle
PPB	Parts per billion
PRA	Permis de récolte de bois pour approvisionner une usine
PSO	Permanent Slow Order
Pt	Platinum
QAQC	Quality Assurance Quality Control
QC	Quebec
QCG	Quebec Copper & Gold
QNSLR	Quebec North Shore and Labrador Railway
q/q	Quarter to quarter
R	Route
RCM	Regional County Municipality
Rd	Road
RFP	Request for Proposal
S&T	Signalling and Train Control System
SDBJ	Société de développement de la Baie-James
SEBJ	Société d'exploitation de la Baie-James
SPN	Société du Plan Nord
sq. mi.	Square mile
Subd	Subdivision
T	Metric ton
TBJ	Tourisme Baie-James
TC	Transport Canada
Te	Tellurium
TEU	Twenty-Foot Container Equivalent Unit
TFT	Transport ferroviaire Tshiuetin

Acronym	Definition
Tkm	Metric ton-kilometre
TNO	Unorganized territory (territoire non organisé)
TOR	Top of Running Rail
TPD	Metric Ton per Day
TPA	Metric Ton per Annum
TSO	Temporary Slow Order
TVQ	Taxe de vente du Québec
UIC	Union internationale des chemins de fer
UMQ	Union des municipalités du Québec
US	United States
V	Vehicle
VEI	Vision Eeyou Istchee
VPD	Vehicle per day
VRB	Vanadium Redox Batteries
VTEM	Versatile Time Domain Electromagnetic
W	Wagon
WKHPPP	Whapmagoostui Kuujjuarapik Hybrid Power Plant Project
y/y	Year-to-year
Zn	Zinc

EXECUTIVE SUMMARY

OBJECT

The Memorandum of Understanding (MOU)[1] *on the Cree-Quebec Sustainable Infrastructure Program for the Eeyou Istchee-James Bay Region*, otherwise known as La Grande Alliance (LGA), was signed between the Grand Council of the Crees (GCC)/Cree Nation Government (CNG) and the government du Québec (GQ) in February 2020. The MOU proposes to develop infrastructure as a means to promote and foster economic development in Eeyou Istchee Baie-James in a sustainable and inclusive manner, notably by ensuring more employment opportunities and better accessibility to Cree and Jamesian communities and preserving the environment and culture. In this sense, the program seeks to embrace the principles first laid out in Chapters 22 (Environmental Protection Regime) and 28 (Economic and Social Development) of the James Bay and Northern Quebec Agreement (JBNQA).

A major component of LGA consists of a series of feasibility studies on upgrades to the transportation infrastructure currently found on the territory, divided into three phases over a span of 30 years:

- The upgrading and paving of access roads to Waskaganish, Eastmain, Wemindji, and Nemaska (Phase I);
- The construction of a new secondary access road for Mistissini (Phase I);
- The extension of the Billy-Diamond Highway to Whapmagoostui/Kuujjuarapik (Phase II);
- Construction of a BDH Railway line parallel to the Billy Diamond Highway (BDH), hereafter identified as the Billy Diamond Highway Alignment Railway (BDHAR), between Matagami and Whapmagoostui/Kuujjuarapik (Phase I: KM 257-Rupert River; Phase II: Rupert River-KM544; Phase III: KM 544-Whapmagoostui/Kuujjuarapik);
- The rehabilitation of the Grevet-Chapais Railway (GCR) line (Phase I);
- The implementation of transshipment centres along the above-mentioned railway lines (Phase I);
- The upgrading and paving of the Route du Nord (Phase I);
- The extension of Route 167 (R167) northbound up to the Transtaiga Road (Phase II);
- A deep-sea port in Whapmagoostui/Kuujjuarapik (Phase III).

The Cree Development Corporation (CDC), on behalf of the GCC/CNG and the GQ, has been mandated to oversee the study. In turn, they have assigned Vision Eeyou Istchee (VEI), a consortium formed by STANTEC, DESFOR and SYSTRA, to carry out a Feasibility Study on the technical, socio-environmental, and economic components in Phase I of the LGA infrastructure program, covering years 1-5 from the beginning of construction. The CDC appointed WSP to perform a pre-feasibility study of Phases II-III of the program (covering years 6-15 and subsequently years 16-30).

This Market Study, which forms a part of these assignments, covers all components in the three phases and has been carried out jointly by the study teams.

This market study covers Eeyou Istchee Baie-James and, for some economic activities, the neighboring regions of Nunavik to the north as well as Abitibi-Témiscamingue and Saguenay-Lac-Saint-Jean to the south. From reviewing and analysing a wide array of documentation and use of a survey with potential users, shippers and communities, the study provides insight into a profile of communities, economic sectors, projects and outlook. It also provides a

[1] Abbreviations are listed before this text.

projection of population and economic growth as well as an assessment of economic needs relating to the proposed infrastructure, a forecast of freight and passenger traffic and revenue on LGA components.

RATIONALE OF THE PROGRAM

The goals of the upgrading of community access roads and regional roads such as the construction of the route 167, the extension of the BDH to Whapmagoostui/Kuujjuarapik, as well as the upgrading of the Route du Nord include:

- Ensuring safe, reliable and cost-efficient travel for the local communities; and
- Integrating the communities into the regional economy.

The long-term transportation goals for the Billy-Diamond corridor railway and the re-commissioning of the Grevet-Chapais railway are:

- To provide an integrated railway that links the communities and the Eeyou Istchee territory to the existing national railway network;
- To provide a link that is safe, efficient and reliable for the movements of goods and people;
- To identify roads when possible to avoid negative impacts on the sensitive natural and social environment, and enhance cultural, social, and economic conditions; and
- To maintain sustainable development of the region.

SURVEY

A survey combining online-based questionnaire and interviews was conducted with different potential users, carriers, and communities. A total of 60 organizations responded (or 78% of the targeted sample). Figure 0-1 presents a breakdown of the respondents by sector, for all respondents and Figure 0-2 presents the subset for Cree respondents.

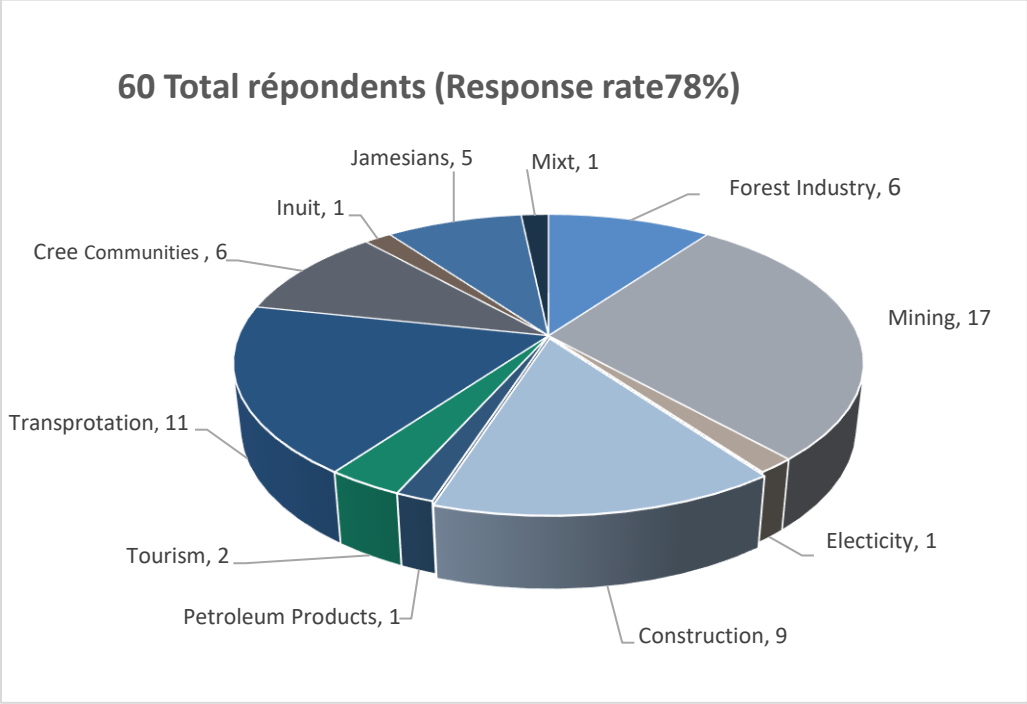


Figure 0-1: Breakdown of total respondents to the Market Survey

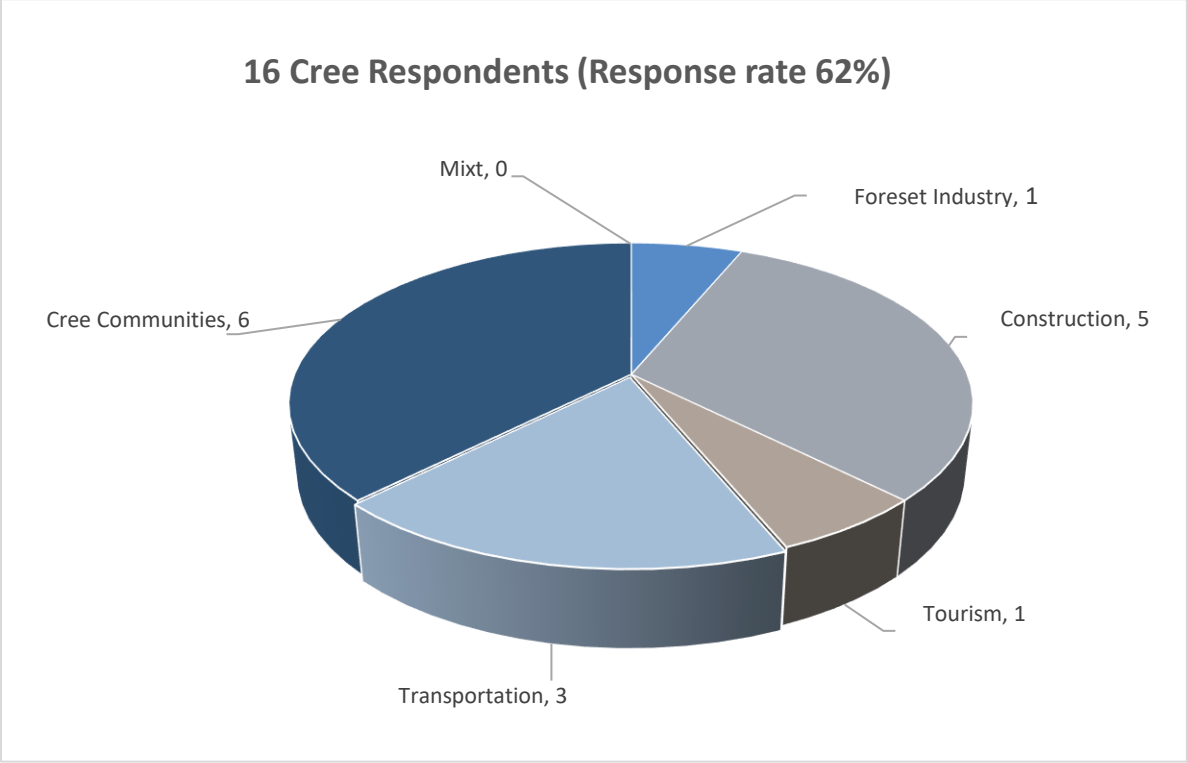


Figure 0-2: Breakdown of Cree respondents to the Market Survey

POPULATION AND DEVELOPMENT

The territory of Eeyou Istchee Baie-James is vast, the climate is harsh, and the distances are significant. The region has approximately 32,000 inhabitants, of which 18,700 (58%) are Cree and 13,400 (42%) are Jamesian. The Cree population is young and rapidly growing, while the Jamesian population has tended to decrease. If the trends continue, the regional population is forecasted to increase to up to increase up to 38,500 inhabitants, with 27,000 Cree people and 11,500 Jamesians by 2051.

The level of education amongst the Cree has improved considerably over the last few decades, with half of the population now holding a high-school diploma. The health and quality of life of the population has increased greatly since the creation of the Cree Board of Health and Social Services of James Bay (CBHSSJB) in 1978. Although hunting and traditional activities remain important, the Cree's participation in the labour market has risen significantly. The implementation of local public services has provided a large number of jobs for the Cree. As the economy of Eeyou Istchee Baie-James relies mainly on hydroelectricity, mining and forestry production, aboriginal and regional hiring policies in these sectors have contributed to provide direct jobs to the Cree workers whilst many Cree entrepreneurs have been established mainly in construction and transportation to support these activities. This has allowed Cree workers to develop their skills.

The current strong international demand for base metals, precious metals and strategic minerals, lithium in particular, the development of new activities in the forest industry by both Cree and Jamesian companies, the ambition to develop joint Cree-Jamesian regional tourism, as well as the housing, consumption and service needs of a growing population are factors that should be driving an economic growth and employment in Eeyou Istchee

Baie-James for the next 10-20 years. The ongoing development of skills and capabilities, companies and joint-ventures, and the consideration of the Crees in planning economic and human resource development, in concordance with the preservation of the environment and culture, is considered to enhance the employment and welfare in the population.

The long-term stability or growth of employment and of local communities might be limited by several factors such as: the cyclical nature of the basic economic activities focused on natural resources ; the reliance on fly in fly out schedule ; the remaining small share of the Cree in the workforce of natural resource companies active in the region ; the lack of housing development projects ; lack of funding ; and high transportation costs and skills to be developed.

TRANSPORT NETWORK

All communities, except Whapmagoostui which is the northernmost Cree village with its neighboring Inuit community Kuujjuarapik, are connected by access roads to the regional road network comprising the Billy-Diamond highway, routes 113 and 167, as well as the Route du Nord. The road network is under the responsibility of various jurisdictions, which complexifies its coherence and exploitation. The BDH, built 51 years ago, has just been rehabilitated. The SDBJ now impose more restrictive load limits, especially in the thaw period, to extend the service life as much as possible. The Route du Nord is graveled on all its 400-km length, with an alignment and structures posing safety and comfort problems that dissuade the users, either leading them to use a much longer route or to avoid making a journey. Although this road is geographically an important link for intraregional and interregional exchanges, its features do not fully satisfy this function. Although the accident rate is less in Eeyou Istchee Baie-James than in Quebec in general, the average severity of accidents is higher. This could be explained by the isolated nature typical for most of the region.

Canadian National (CN) provides rail transportation up to Matagami via Barraute-Senneterre and to Chibougamau-Chapais via Saint-Félicien. The railway lines are used mostly by the transport of lumber and pulp and paper, and less importantly for minerals and petroleum products. Due to the low traffic on these lines, the track maintenance has been minimal for some time and the load limit is consequently low. The current traffic on the Matagami subdivision (and the west segment of the Chapais subdivision), even lower with the recent closing of the Glencore nickel zinc mine, prevents a strong justification for the continuation of service on this line. The Matagami multimodal transshipment yard plans to develop services for the future lithium mines in the Nemaska area, which would increase the traffic on the Matagami subdivision. Chibougamau intends to develop a transshipment yard to serve the inbound and outbound freight movements in the eastern part of Eeyou Istchee Baie-James. VIA operates 3 passenger trains per week between Montreal and Senneterre via La Tuque with a journey duration of 13.5 hours for a fare of $110 in economy class.

Air transportation, mainly provided by Air Creebec and Air Inuit, serves workers' journeys under a fly in fly out regime, business trips, outfitting and, the northernmost and isolated communities, particularly with regard to perishable foodstuffs. Air fares remain high for personal matters. Although seven Cree communities have an airport nearby, lack of air support services coupled with limited length runway make the development of air transportation difficult.

In Eeyou Istchee Baie-James, the maritime infrastructure is limited to small community wharfs in Wemindji and Whapmagoostui.

TRANSPORT DEMAND

The forestry sector is an export-oriented harvesting and industry, with many companies located south of Eeyou Istchee Baie-James. Forest exploitation activities are expected to remain relatively constant due to harsh climate, young forests, the mandated cut allowances and long distances. The opening of the Nordic Kraft plant at Lebel-sur-Quévillon and the future activity of Mistuk at Waswanipi are intended to create demand for freight by rail. Since Resolute did not respond to the survey, their potential demand for the proposed transport infrastructure (possibly between their sites in Lebel-sur-Quévillon, Abitibi and Lac-Saint-Jean) has not been included within this study.

The region is rich in mineral deposits of base metals (e.g., iron, copper, zinc), strategic minerals (e.g., lithium) and precious metals (e.g. gold, silver, diamond). Out of one hundred of exploration sites in Eeyou Istchee Baie-James, many will be exploited in the near future or could be operated on the long term. The copper projects (QC Copper & Gold, Doré Copper, Yorbeau) in the Chapais-Chibougamau area shall generate traffic on the Grevet-Chapais railway towards Rouyn-Noranda while the traffic generated by iron mining projects (Orion) in the same area will go eastward by the CN Cran subdivision. The major Duncan Lake iron mining project located southeast of Chisasibi, if it is realized, would generate an outstanding annual volume of 12 million tonnes per year (MTPA) on Phase II BDHR.

There are several lithium spodumene projects (Moblan, Whabouchi, Rose, James Bay) planned to be implemented over the next 3 years. These projects sum up to more than 1 MTPA of shipments southward or eastward to maritime ports, Bécancour or Abitibi. This demand would be attracted by LGA proposed railway lines. Other explored sites could be exploited in the future.

There are a multitude of gold sites under exploration that could be extracted from in the long-term future. There are a few gold mining development projects in the region notably Osisko near Lebel-sur-Quévillon and Waswanipi. Gold output shall continue to use trucking while a marginal volume of inputs such as oil products and materials, either during construction or operation, could use rail, but under specific conditions and according to the supply chain possibilities. Materials could be transported partly by rail during construction although the necessity of transshipment rail-truck may limit this possibility.

Stornoway should extend the operation of the Renard mine for an extra decade. They are concerned by the dangerousness of the Route 167 during winter due to maintenance practices, which lead to issues in hiring trucking services. As the Renard mine is not served by Hydro-Québec and the energy must then be produced from oil products, the northern extension Route 167 could be interesting if it is combined with the construction of an electricity distribution line.

The construction sector relies on the demand from local housing and building, forestry, mining and electricity sectors. Cree and Jamesian entrepreneurs and workers have a strong and proven record in the construction sector, in particular the CCDC's capacity in numerous fields such as civil engineering, roads, and buildings. The procurement of goods and oil product procurement to communities and companies is provided mainly by native-owned companies including ADC, Kepa Transport, Petronor and the FCNQ.

The future volumes for the maintenance and rehabilitation of hydroelectricity installations should remain rather constant in the short and medium terms. Hydro-Québec could not provide a specific long-term plan for the needs of the rehabilitation and construction of installations in Eeyou istchee Baie-James. Considering that equipment infrastructure (transformer substations, turbines, etc.) lasts for about 50 years, this indicates that there should be a need for the transport of these pieces over the 2030-2060 period. Furthermore, as the demand for electricity should increase greatly due to economic growth, electric vehicles and the general decarbonization of economies,

the upgrading or construction of hydroelectric production plants could be envisioned over the 50-year period considered. These development projects will require the consent of the Crees.

Because of the remoteness, the tourism attendance in Eeyou Istchee Baie-James remains low. The visitors come from the neighboring regions to see their family and friends, or for outfitting. The Robert-Bourassa dam near Radisson is an important tourism attraction. The Cree culture is unique, and each community has its own traditional activities. The obsolete transportation infrastructure, especially the BDH which has just been rehabilitated, and the lack of journey services have limited the development of tourism in the region. The Cree Outfitting and Tourism Association (COTA) and Tourisme Baie-James (TBJ) work closely together to develop several attraction and circuit projects to enhance the tourism supply in the region.

Overall, several stakeholders have expressed the view that the existing transportation infrastructure is obsolete and needs to be upgraded (which is partly solved with the rehabilitation of the BDH), and that future socio-economic development in Eeyou Istchee Baie-James relies greatly on the efficiency of the transportation infrastructure. The poor condition, safety risks and the lack of transport services along the road network may result in a lower share of the regional firms in outsourcing from basic economic activity such as mining or hydroelectricity, or in higher transportation and global costs for regional companies. Trucking costs have been increasing because of the increase in prices and taxes on oil products and shortage of manpower. Furthermore, the presence of major transportation infrastructure may contribute to the realization of major economic projects that could have been less attractive for financial decision-makers.

Freight Traffic and Revenue Forecasts

Traffic forecasts suggest that the freight traffic would amount realistically to approximately 2.4 MTPA globally on projected railway lines in Phase I under the realistic assumptions, as shown in Table 0-1. This would be a volume of around 1.4 MTPA on the BDHR (Matagami-Rupert) and around 1.0 MTPA on the Grevet-Chapais line.

Table 0-1: Freight Traffic Forecast, Railways, Phase I, 2030 (TPA)

Infrastructure / direction	Pessimistic	Realistic	Optimistic
Billy Diamond Highway Railway	***940,000***	***1,381,000***	***1,915,000***
Southbound	840,000	1,270,000	1,749,000
Northbound	100,000	112,000	165,000
Grevet-Chapais Railway	***627,000***	***1,008,000***	***1,368,000***
Eastbound	126,000	167,000	209,000
Westbound	502,000	840,000	1,159,000
Total	**1,567,000**	**2,389,000**	**3,283,000**

Note: Totals may differ slightly from the sums of elements due to rounding.

The commodities carried on the considered railway lines would include mostly mining ore (lithium and copper) and forest materials (logs, chips) and products. Out of the 2.4 MTPA of estimated base case traffic, 1.3 MPTA are related to the mining industry, and of which 1.15 MTPA come from strategic metals. The predominance of mining and forest materials in the forecast traffic explains the great directionality, southbound from the lithium deposit area in the case of the BDHR and westbound towards Lebel-sur-Quévillon and Rouyn-Noranda for the GCR. Over time the overall freight traffic would remain relatively constant since for basic sectors, the production shall be stable while good procurement, which should grow along with the increase in population, constitutes a small share of total railway traffic.

The potential traffic levels were evaluated for pessimistic, realistic (base case) and optimistic levels. The base case is a likely achievable traffic level given the current economic activities and economic projects which should materialize, with a feasibility study for example, or interest shown during the survey. The pessimistic case applies a probability of risk of some projects not being achieved or with smaller production, while the optimistic traffic reflects the materialization of potential mining. Table 0-2 displays the traffic forecast by the economic sector and by the demand level assumption case. The range of values in the forecast can be wide given the uncertainty regarding the materialisation of specific projects.

Phase II in isolation does not add more tonnage on railway lines compared to Phase I. Phase II however, in conjunction with Phase I would allow for a use of the train on a greater distance for some Phase I users. Moreover, if major iron ore projects such as Duncan Lake (Century) with an annual production of 12MTPA take place, then the potential traffic would be much bigger on Phase I-II BDHR, or on Phase III BDHR-seaport combination. Furthermore, the presence of major transportation infrastructure increases the feasibility of the project since the construction of a private port near Chiasibi included in Duncan Lake project would then not be required.

Table 0-2: Annual Rail Freight Forecast, by Sector, Line and Demand Level

TPA	Matagami-Rupert	Matagami-La-Grande	Grevet-Chapais
Forest Sector	319,000	319,000	480,000
Mining	1,041,000	4,641,000	517,000
Others	22,000	22,000	10,000
Total - Realistic	**1,381,000**	**4,981,000**	**1,008,000**
Pessimistic	940,000	940,000	627,000
	-31.9%	-81.1%	-37.8%
Optimistic	1,915,000	15,283,000	1,368,000
	38.7%	206.8%	35.7%

Note: Totals/percentages may differ slightly from the sums/divisions of elements due to rounding.

Tariffs for the railway operation have been projected as being significantly below the current trucking tariffs to account for the distances to and from Eeyou Istchee Baie-James, as shown in Table 0-3. Comparison of overall container transport costs between Waskaganish yard and the final destination shows potential savings ranging from 12% to 67%.

Table 0-3: Typical Industry In-Quebec Freight Rates

($/t-km)	Rail	Truck
Forest products	0.075	.
Mining	0.089	.
Other	0.091	.
Average	**0.09**	**0.23**

The future traffic forecasts are subject to large uncertainty and unpredictability on the medium and long run, notably because of the cyclical nature of the regional economy which depends on the difficulty to predict future international economic conditions, conditions over which the regional and national actors have little to no control

and conditions that determine the financial feasibility of major projects that could justify the implementation of a railway or of a port on economic grounds.

Table 0-4 presents the annual revenue the transport of freight on the two railway lines under study using the rates in Table 0-3. The annual revenue is estimated at $49.8 million in total, with $33.9 million for the BHDR and $15.9 million for the GCR ($2020).

The future traffic forecasts are subject to large uncertainty and unpredictability on the medium and long run, notably because of the cyclical nature of the regional economy which depends on the difficulty to predict future international economic conditions, conditions over which the regional and national actors have little to no control and conditions that determine the financial feasibility of major projects that could justify the implementation of a railway or of a port on economic grounds.

Table 0-4: Annual Freight Railway Revenue, Phase I

	Payload-distance (MT-km)	Revenue ($M)
BDH Railway	396.4	33.9
Grevet-Chapais Railway	187.8	15.9
Total	**584.2**	**49.8**

Furthermore, the market survey revealed that many stakeholders had difficulty projecting their needs in the distant future. Also, the choices of modes and routes (for example via Matagami or Chibougamau-Chapais) by shippers and suppliers depend upon the overall transportation infrastructure and services offered and the selection with regards to future infrastructure which shall influence their choice. Finally, the presence of the infrastructure could induce new opportunities that companies or entrepreneurs can take advantage of and therefore generate new, different or more economy and transport activities, which cannot be assessed here.

PASSENGER TRAFFIC

Railway passenger traffic has been projected for the years 2036 to 2081 to account for the anticipated population growth in the Eeyou-Istchee Baie-James. Passenger service is expected to be extended to Senneterre and Jonquière, allowing passenger connections to other services in the East-West axis. Figure 0-3 presents the anticipated ridership for the BDHR and GCR lines over time. The total annual anticipated ridership is expected to grow from 6,100 passengers per year (PPY) in the first year of operation to 8,400 PPY in 2080.

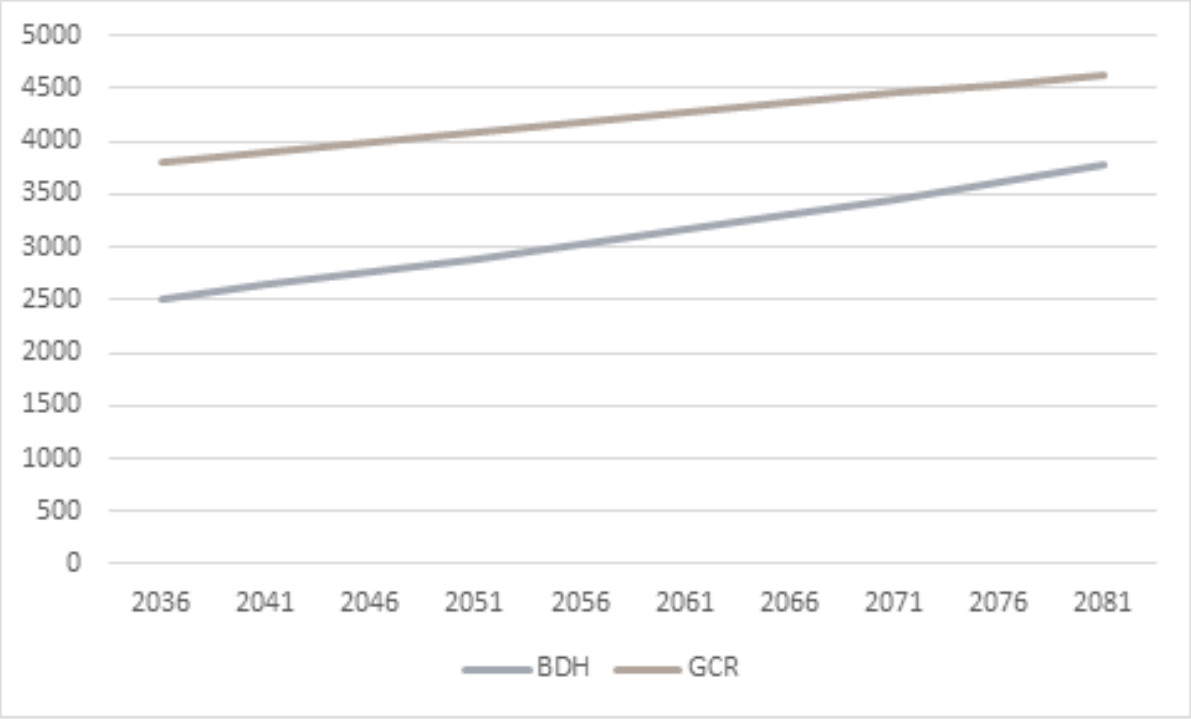


Figure 0-3: Projected Traffic Growth over Project Life

REVENUE ON RAILWAY SEGMENTS

Traffic and revenue forecast for railway segments are summarized in Table 0-5. Fright values are constant over time while passenger values shown here are for the corridor in 2036. While including segments on CN network, the passenger revenues amount to $1.0M for Phase I and $3.6M for Phases I-II.

Table 0-5: Railway Annual Traffic and Revenue Forecast, Realistic Case

Traffic	Passengers	Freight (T)	
A1 - Matagami-Rupert	2,106	1,381,000	
A2 - Rupert-La-Grande	5,103	-	
A2 - Rupert-La-Grande (Duncan Lake)		3,600,000	
B1 - Grevet-Chapais	3,762	1,008,000	
Total	**10,971**	**5,989,000**	
Revenue ($)	**Passengers**	**Freight**	**Total**
A1 - Matagami-Rupert	93,000	33,909,000	34,002,000
A2 - Rupert-La Grande (excl Duncan Lake)	520,000	20,385,000	20,905,000
B1 - Grevet-Chapais	107,000	15,932,000	16,039,000
Total	**720,000**	**70,226,000**	**70,946,000**

TRANSPORTATION CORRIDORS

The economic needs and demand forecast lead to some remarks regarding the selection of infrastructure corridors to be upgraded or:

- Access roads are critical for the success and sustainability of Cree communities. Therefore, any development project should prioritize the development of efficient and safe access roads that facilitate the transportation of goods and people.
- The Route du Nord and the Billy-Diamond Highway have the potential to play a significant role in the regional development of Cree communities. It is essential to ensure that these roads are designed and built in a way that corresponds to their function.
- Freight traffic is vital to railway revenue. Since most populated communities to the North are not served by rail in Phase I, it is crucial to ensure the development of efficient access roads that allow for the safe and reliable transportation of goods and people to all communities and enable them to take part in economic development.
- The developing mining sector lithium and other minerals mining sector could create economic opportunities for local communities. Therefore, it is crucial to have access to economic activities that drive job creation. Access and regional roads as well as railway infrastructure can play a vital role in facilitating this development.
- An adequate condition and sufficient bearing capacity of the existing railway network accessing Matagami, Chapais and Chibougamau is essential to the development of the railway lines in Eeyou Istchee Baie-James.
- The presence and development of road and railway networks in Eeyou Istchee Baie-James increase the economic opportunities in several sectors, especially for Cree community various activities including lumber and tourism, and also for mining exploration and projects, making them more profitable and likely.
- The rehabilitation of the Grevet-Chapais Railway could contribute to the development of the Cree wood industry, copper mines, and a better integration of the forestry industry.
- The phasing of the BDHR could be more optimal if Phase I extended to KP 381, north of the junction with the Route du Nord. In Phase II, the railway could be further extended to Radisson if the Duncan Lake mine project moves forward.
- The market study did not find any significant evidence of freight traffic through the deep-sea port in Whapmagoostui-Kuujjuarapik.

SOCIAL AND ECONOMIC BENEFITS

This project is an opportunity to create a beneficial position for the Cree population by creating targeted programs to ensure the growing population has access to the job opportunities to come. The first opportunities could come from the construction of the LGA infrastructure and then after, induced construction projects associated with the augmented attractiveness of the area. The second source of opportunities is associated with the operations and maintenance of the transport infrastructure as well as other induced developed activities. The final benefits are intended to come from secondary induced activities associated with the increased attractiveness of the area such as restaurants, hotels, and stores may be established to serve the needs of the growing population. Both employees and employers can develop highly skilled competencies and hence a cumulative causation effect.

Hence, the LGA program with its several components will not only address the current issues related to transportation such as emissions, road safety, accessibility, and reduction in transportation costs, but also induce many latent opportunities for both the population living in the area and the companies offering their service.

Clearly, the proposed LGA program will increase the supply side of transportation to a great extent and consequently lead to wider benefits.

In the current context, the forecasted demand was found to be limited for rail transportation. The upgrade of the Route du Nord to a really interregional link serving the main economic generators in the region may reveal to be a sensible long-term investment, like the recent rehabilitation of the BDH. With a logical sequence of the realization and maintenance of the LGA nine infrastructure components and with a more precise evaluation of the robustness of their future anticipated use, the development could be seen as a strategic investment to position the Cree population in the management of their land and the resources they hold.

In the case a component of the LGA program is retained for development, involving Cree entrepreneurs and workers in the construction and operation of the infrastructure is the key factor to make the project socially, economically, and culturally viable, in conformity with the spirit and legal requirements of the JBNQA.

10. MARKET STUDY

10.1 INTRODUCTION

10.1.1 Background and Assignments

The Grand Council of the Crees (GCC)/Cree Nation Government (CNG)[2] and the government du Québec (GQ) signed in February of 2020 the *Memorandum of Understanding* (MOU) *on the Cree-Quebec Sustainable Infrastructure Program in the James Bay - Eeyou Istchee Region*. This is a joint plan to protect, connect and develop the Eeyou-Istchee Baie-James territory. The MOU includes a study of La Grande Alliance (LGA) transport infrastructure program. This program, divided in three phases, encompasses the renewal, improvement or extension of community access and regional roads, the implementation of north-south and east-west railway lines, and a deep-sea port in Whapmagoostui/Kuujjarapik. The program organization involves Cree communities to ensure community engagement and respect of the traditional way of life and values of the Cree people.

The Cree Development Corporation (CDC), on behalf of the GCC/CNG and the GQ, assigned Vision Eeyou Istchee (VEI), a consortium of professionals formed by STANTEC, DESFOR and SYSTRA, to study the technical, socio-environmental and economic feasibility of components initially defined in Phase I of LGA infrastructure program. This assignment includes a market study for components which were initially included in both Phases I and II. Meanwhile, the CDC awarded WSP Global a mandate to study the pre-feasibility of Phases II and III of the same program, including the market study for Phase III. VEI and WSP have worked together to perform a combined market study comprising all components and phases of LGA infrastructure program.

Phase I of LGA includes (CDC, 2021a):

- The rehabilitation of local road connections to the Cree communities of Waskaganish, Eastmain, Wemindji and Nemaska;
- The construction of a North-South Railway hereinafter the Billy Diamond Highway Railway (BDHR) line, parallel to the Billy Diamond Highway (BDH) between Matagami and the Rupert River;
- The rehabilitation of the Grevet-Chapais railway (GCR) line; and
- The implementation of transshipment centres along these railway lines (namely one near kilometric point (KP) 257 of the BDH).

During project execution, the CDC added the renewal of the Route du Nord and the construction of a new access road to Mistissini to VEI's mandate (CDC, 2021b). For analysis purposes, all these components are assumed to begin construction in 2030.

Phase II of LGA includes:

- The extension of the Billy Diamond Highway (BDH) between Radisson and Whapmagoostui/Kuujjuarapik;
- The extension of Route 167 (R167) northbound to the Transtaiga Road as well as the renewal of the existing road section between Chibougamau and the Renard mine; and
- The extension of the railway between Rupert River and KP 544 of the BDH (south of the La-Grande River).

For the purposes of analysis, these components are assumed to begin in 2035.

[2] The list of abbreviations is presented before the text.

Phase III of LGA includes:

- The extension of the railway from La-Grande to Whapmagoostui-Kuujjuarapik; and
- A port connection in Whapmagoostui/Kuujjuarapik on Hudson Bay.

For the purposes of analysis, these components are assumed to begin construction in 2040[3].

10.1.2 Object

This document presents the market analysis and forecast for all components of LGA infrastructure program. It includes a summary which is to be included in the comprehensive study report along with the socioenvironmental, technical, and economic studies.

10.1.3 Market Study Objectives

The objectives of the market study in this report include:

- To assess the economic needs of the region relating to the proposed infrastructure, detailing regional economic sectors that could use the new infrastructure to foster economic growth;
- To assess market potential and forecast freight and passenger traffic and revenue for the different transport components of the infrastructure program; and
- To assess and propose means to enhance regional impacts given the expected demographic, social and economic growths with and without the LGA infrastructure program.

The specific objectives include the following:

- To provide a detailed socioeconomic profile of the Eeyou Istchee Baie-James region, including Cree and Jamesian communities, economic sectors, projects and outlook;
- To consult and interview potential users and communities to determine their current and future needs;
- To analyze the strategic development opportunities related to the LGA infrastructure program, considering protected areas, culture, communications, energy and human resource;
- To project population and economic growth on the territory over a given time horizon;
- To project vehicle traffic of the status quo without the LGA infrastructure projects, as well as the traffic of LGA proposed infrastructure component;
- To quantify user-specific economic benefits associated with the infrastructure projects and collective economic benefits through synergistic opportunities created by the proposed infrastructure program; and
- To provide recommendations for key crucial data to be collected in subsequent stages of the infrastructure to track their economic benefits.

10.1.4 Methodology

The general approach to the Market Study (MS), based on the guidelines defined in the Request for proposal (RFP) (CDC, 2021a), consists of:

- The review and analysis of documentation and secondary data pertaining to the relevant factors that will influence the use of the proposed infrastructure and stimulate development in the region;

[3] The timeline was moved this up by 5 years relative to the directives of the MOU. This was to enable more effective analyses for the entire time horizon contemplated in the study.

- A survey with the main economic agencies (companies in forest, mining, transport and tourism) and consultation with stakeholders and community groups; and
- The development of an economic model to gather, calculate and forecast the population and economic output growth, and the traffic of the different transportation components of the LGA infrastructure program, including a comparison to similar projects.

An evaluation of the potential market, consisting of a forecast of freight and passenger traffic for each segment of LGA infrastructure program over a 50-year lifespan and the quantification of the required resources for the technical and economic analyses.

The study elements include:

- A socio-economic assessment of the territory, the land categories and their use, the legal framework, local organizations and the stakeholders;
- A transport network analysis of the following components: roads, railways, intermodal stations, air, ports and carriers. Their analysis will consist of their complementary or competitive position to the LGA infrastructure in the region and in a broader context. Key elements include infrastructure capacity, current state, fares and demand by market segment;
- The characterization of the socio-demography factors such as population size, gender, age and structure, natality and migration, trends, education, labour force, employment, social needs and income;
- The local and regional socio-economic development in both Cree and Jamesian communities; and
- The review of main economic sectors in the study area and in a wider context namely forestry, mining, hydroelectricity, procurement of goods, fuel and equipment, tourism, in terms of major companies, transport uses and needs, future market trends and growth perspective.

The most recent available information and Client documentation, including regional, community and sectoral profiles and datasets, annual reports, press releases, project feasibility and environmental studies, web sites, were used as the basis for the survey, consultation, analyses and forecasts. This information was in many cases analyzed before consulting the stakeholders. Both freight and passenger needs were investigated.

Three sets of stakeholders were separated into the following consultation groups:

(A) Shippers or transport movement generators
(b) Carriers or infrastructure managers
(c) Communities and groups

Set A includes production companies in different economic sectors that generate demand including forestry, mining, electricity, construction, consumption goods and equipment procurement, and tourism. Set B comprises trucking, bus/shuttle companies, railways, intermodal facilities, airlines and water carriers. Set C corresponds to regional, band and municipal councils and regional/local officers including economic development agents (EDA) or officers (EDO) and sectoral economic associations. Different questionnaires and interview grids were used for these three sets if stakeholders. The list of targeted respondents came from the Appendix VI of the RFP (CDC, 2021a). Additional respondents were targeted following the regional analysis and understanding of the study area. The list of interviewees is shown in **Erreur ! Source du renvoi introuvable.** for shippers and carriers and in Table 10.1-1 for communities. The response level by category is illustrated in Table 10.1-1for all respondents and in Table 10.1-2 for Cree respondents. The questionnaires are provided in Appendix A.

Table 10.1-1:List of Interviewees, Group A – Shippers and Group B - Transportation

	Answered	No answer
A - Shippers		
Forest industry		
Chantiers Chibougamau	Chapais Énergie (Nexolia)	Resolute
Résolu Comtois	MFFP	Eenatuk Forestry Corp / Eskan
Eacom Timber	Mishtuk / Cree Lumber	
Barrette-Chapais		
Mining		
Quebec Copper & Gold	Fénélon (Wallbridge)	Troilus Gold
Doré Copper Mining	Éléonore (Newmont)	Métaux BlackRock
Critical Elements (Rose Lithium)	MERN	
Century Global (Lac Duncan)	Allkem (James Bay Lithium)	
Bonterra (Lac Bachelor, Barry)	Sayona (Moblan Lithium)	
Vanadium Corp. (Lac Doré, Iron-T)	Stornoway Diamond	
Nio Strategic Metals (Great Whale)	Nemaska Lithium	
Voyager Metals (Mont-Sorcier)	Patriot Battery Metals	
Osisko Mining (Windfall)		
Electricity		
Hydro-Québec		
Construction		
Pavage Wemindji	Blais et Langlois	Eenou Eeyou Construction
Vieux-Comptoir Construction	Entreprises Alain Maltais	
CCDC	Équipements JVC	
Construction Stajune	CCQ	
Nemaska Eenou Company		
Oil Products		
Pétronor		Distribution Signal
		Pétroles MJ
Tourism		
COTA	Tourisme Baie-James	CNACA
B - Transportation		
Whapchiwem	NEAS	VIA
Air Creebec	Desgagnés Transarctick	
Kepa Transport	Canadian National	
Transport Auger	MTMD	
SDBJ	Transbordement Matagami	
FEDNAV		

Table 10.1-2: List of Interviewees, Group C – Communities

Answered	No answer
C- Communities	
Cree	
Wemindji	Waswanipi
Chisasibi	Oujé-Bougoumou
Whapmagoostiui	Mistissini
NCG - CI	Waskaganish
GCC	Eastmain
CREECO	Nemaska
Inuit	
Kativik	Kuujjuaraapik
Jamesians	
Matagami	Lebel-sur-Quévillon
Chapais	Chibougamau
Radisson	
Cree and Jamesians	
	GREIBJ
Société Plan Nord (SPN)	

Due to the Covid-19 pandemic and the related sanitary restrictions, it was not possible to go on-site and meet in person with the different communities and stakeholders at the beginning of the mandate, as initially planned. Thus, a large part of the survey and consultation with stakeholders and communities took place virtually. Contacts and communications with Cree representatives and communities were initiated via the Grande Alliance Community Information Officers (CIO) in each community. Follow-up visits in the communities allowed for a satisfactory response rate and the gathering of sufficient information to estimate and forecast demand. Despite several recent company transactions, changes in management teams and in start-up/operation planning in the mining and forestry industries, it was possible for the survey team to gather recent current valid information.

Comparables and similar case studies were used to derive applicable patronage rates for the LGA demand forecasting. These cases involved different transportation infrastructures (road, rail and port) in remote locations with indigenous and non-indigenous populations and a natural resource-based economy, which is essential traits in the context of the LGA project.

The synthesis of gathered information allowed to identify transportation needs. Population projections were based on long-term forecasts by the community and region compiled by the Institut de la statistique du Québec (ISQ, 2021). The status quo was analyzed over a long period by extrapolating trends and assuming the realization of the most probable economic projects. The traffic, transport conditions and revenue for the different infrastructure scenarios were estimated and forecasted using potential user and community information provided during the survey and the economic profile and outlook, especially for freight. For passenger service and vehicle traffic, similar case factors and population forecasts served as the base for estimates.

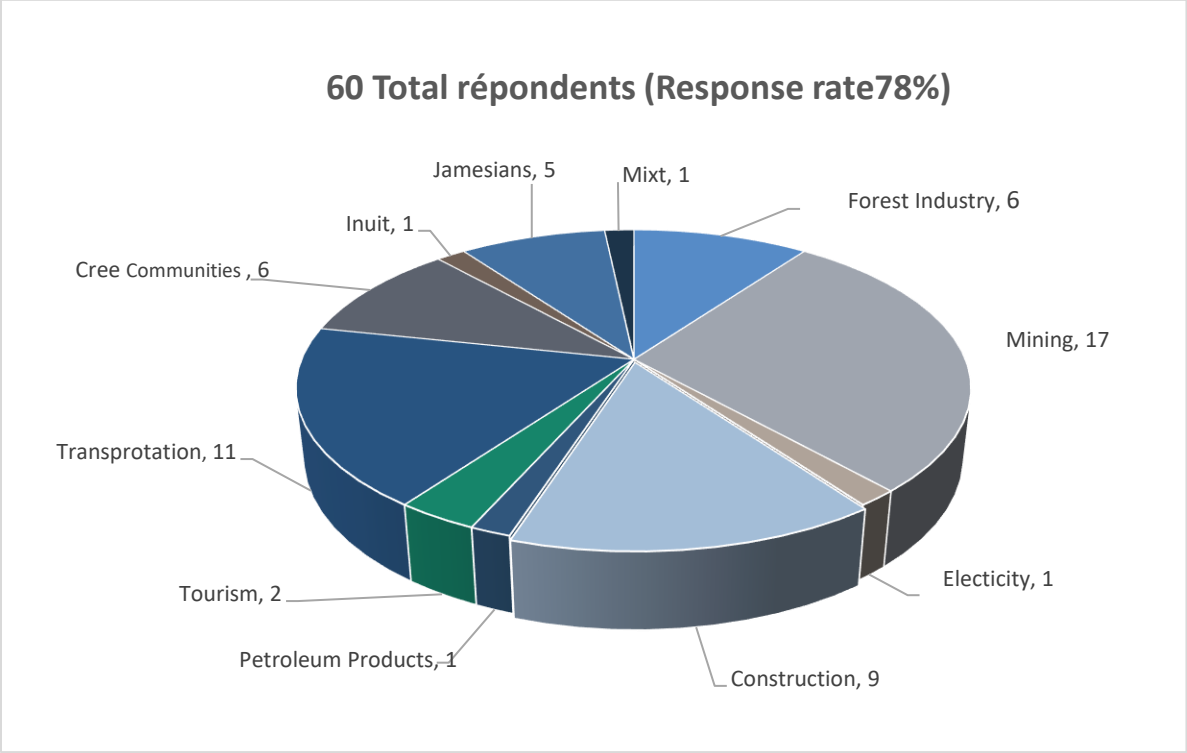


Figure 10.1-1: Breakdown of Total Respondents to the Market Survey

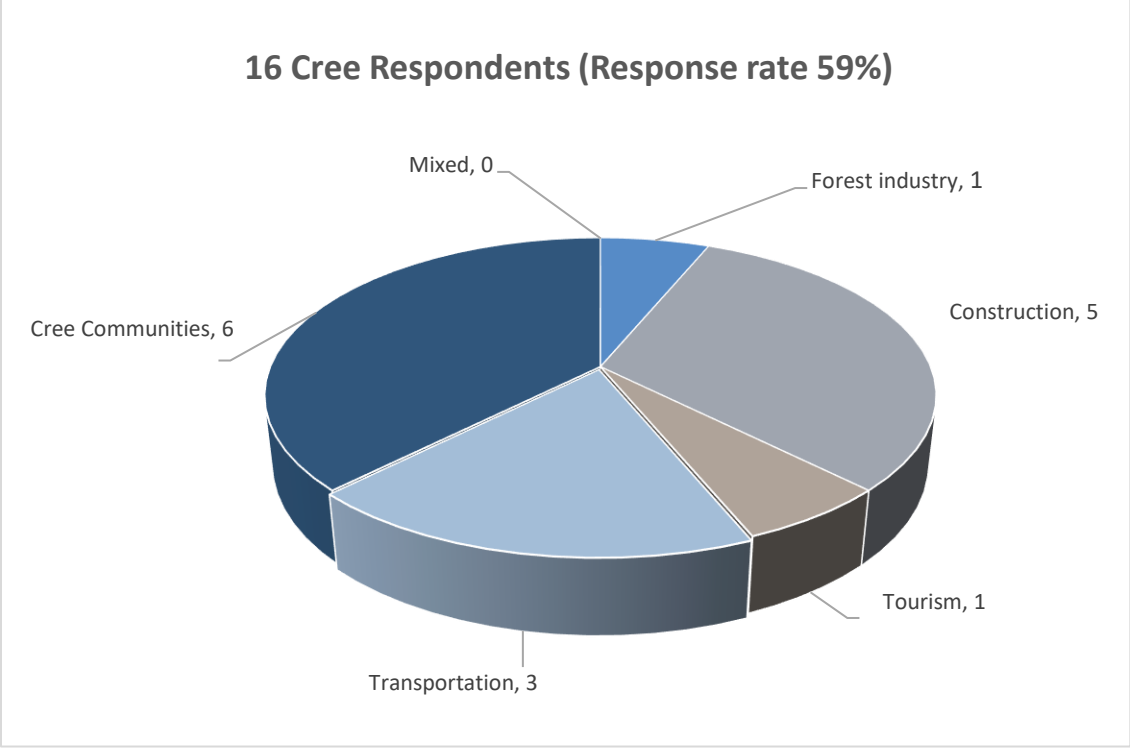


Figure 10.1-2: Breakdown of Cree Respondents to the Market Survey

An economic model was developed from the relevant data (territory, transport infrastructure, population, economic activity, projects) collected in previous tasks, estimation parameters and infrastructure program elements. The model was used to forecast population, employment, transport freight and passenger demand for the status quo (without project) and for the different infrastructure elements of the program under three level scenarios (pessimistic, realistic, optimistic), allowing for sensitivity analyses. Potential economic spinoffs of the projected traffic may be considered.

10.1.4.1 General Considerations

General remarks are to be made here regarding the LGA study and its particular approach. The long-term timeline of LGA infrastructure program (operation starting in the 2030-2040s) is of a strategic nature and should be understood with a long-term vision of the development of Eeyou Istchee Baie-James. Thus, the development of the territory of Eeyou Istchee Baie-James must include the planning and acceptance of projects with the Cree Nation and communities, the equilibrium of the environment, the preservation of the Cree culture and a substantial participation of Cree workers in the development of natural resources and other economic activities.

The development philosophy and the long-term horizon of LGA transportation infrastructure program imply that the potential demand should also be considered within a more global development strategy, integrating synergistic development opportunities with the other components of LGA, and training and capacity-building opportunities, to maximize local involvement in these opportunities (CDC, 2021a). Although this market study cannot and does not pretend to sketch choices or outcomes of national, regional and local comprehensive strategic development planning processes (which do not exist), the general development philosophy is considered in the qualitative analysis and forecast parameters for economy and demography. Given the focus on sustainable development and shared value, the evaluation shall include criteria not only related to transportation and technical and financial feasibility but also to employment, preservation of territory, tradition, and social welfare over the long-term.

Cree communities need to be “partners in development projects […] as long as their concerns are addressed, their rights are recognized and benefits are allocated fairly,” in relationships based on “integrity, […] humility, respect, reciprocity, community empowerment, sharing, mutual learning, and sustained and long-term engagement, making decisions transparently [and] focusing on multifaceted outcomes [with] meaningful participation and consultation” (CDC, 2021a).

Also, as the horizon of the infrastructure program goes beyond or at an advanced level of the lifecycle of projected economic activities, especially mining, it is difficult for potential users, communities or stakeholders to envisage clearly and positively the novelty and intensity of the potential and induced development in a structurally upgraded transport environment that opens up the region in the very long-term. In other words, the demand forecast by traditional methodology could lead to an underestimation for the sole reason that LGA transport infrastructure program is a major project and is in the distant future. Moreover, the geographic distances and intermodality of the components being studied can lead to substantial changes in how individuals interact with the transportation network in the future. This could result in a range of positive and negative potential outcomes which are challenging to forecast given the current context. However, analyzing such impacts is beyond the scope of this study.

It is to be noted that according to the usual planning process for transportation infrastructure projects, the first step is the opportunity study which comes before the prefeasibility and feasibility studies. The opportunity study is composed of a need study and a solution study. The need study must define precisely what justifies an action or a project, following an analysis of the problems (obsolete infrastructure, lack of capacity, congestion, safety issues, pollution and climate changes, environmental disturbances, nuisances, operating concerns, growing demand,

community needs, economic development project), their causes and their consequences in the future if not solved and to define operating objectives as well as the potential solutions intended to meet those objectives. The solution study's objective is to develop, analyze and assess various solutions to address the problems defined in the need study, and to determine the solution that responds best to the objectives and is feasible technically and financially. The solutions are assessed in terms of the response to objectives, compliance to strategic planning, environmental issues, traffic volumes, speeds and journey times, technical conditions, design, operation, maintenance, sustainability, cost, cost benefit analysis, multi-criteria assessment, comparative analysis, timeline, stakeholder and community consultation (MTMD, 2022b).

The Grande Alliance transportation infrastructure studies are a critical component of an MOU signed between the Government of Québec and the James Bay Cree Nation. As a result, certain steps were intentionally bypassed to fast-track the studies to the Pre-Feasibility/Feasibility phases. Although this approach has presented challenges for the study team, the CDC has provided guidance by directing those certain elements typically included at earlier stages is to be incorporated at this level.

The vast territory of Eeyou Istchee Baie-James, the several communities and activities, and the large scale of infrastructure under study brings a complexity in the analysis and assessment.

Finally, it is plausible that only a part of the infrastructure under study is achieved. Since the routes potentially used and preferred may differ with different sets of components of infrastructure, some of which shall be complementary, act as a substitute or independent to each other, in which case the traffic shall be affected differently if a component coexists with another one or not.

10.2 PROJECT, TERRITORY AND COMMUNITIES

10.2.1 Objective and Approach

This chapter presents the timeline of LGA transportation infrastructure components under study, as well as the rationale and target markets for the LGA program. It also defines the market study area. The historic agreements that rule the development and use of the territory are then summarized. Finally, the region is described. This summary was prepared from a synthesis of existing documentation and discussions with the CDC.

10.2.2 LGA Program and Rationale

10.2.2.1 Components and Timeline

The transportation infrastructure components of the LGA program are shown in Table 10.2-1. The market survey was then developed on the basis of the project components as defined in the RFP (CDC, 2021a).

Table 10.2-1: Components of Phase I, II & III of the La Grande Alliance Infrastructure Program

Infrastructure	Phase I	Phases I and II	Phase III
Rail Infrastructure			
A Billy Diamond Highway Railway (north-south)	**A1.** Matagami-Rupert River (257 km), including intermodal facility near Rupert River	**A2.** Rupert River-La Grande River (287 km) loading/intermodal facilities	**A3.** Rupert River-Kuujjuarapik (225 km), including intermodal facility at the port
B East-West Railway	**B.** Grevet-Chapais (225 km) including loading/intermodal facility		
Access Road Infrastructure			
C New Mistissini access road	**C.** Additional Mistissini access road to the Route du Nord		
D Improvement of Local Access Roads	**D. a.** Wemindji (96 km) **b**. Waskaganish (102 km) **c.** Eastmain (104 km) **d.** Nemaska (20 km)	-	
Regional Road Infrastructure			
E Extension of Billy Diamond Highway		**E.** La-Grande River-Whapmagoostui-Kuujjuarapik (175 km)	
F Extension and Improvement of Route 167		**F1.** Chibougamau / Stornoway (400 km)* **F2.** Stornoway - Transtaiga Road (125 km)	
G Improvement of the Route du Nord	**G.** Junction R167 (Chibougamau) - Junction BDH (407 km)		
H Extension of the Transtaiga Road (excluded)			
Port Infrastructure			
I Port			**I.** Whapmagoostui-Kuujjuarapik Port

It should be noted that all alignments shown in this report are indicative as they are being developed concurrently. Their characteristics are those of the tender documents and may differ from the final technical solutions. The timeline given for each Phase is the approximate expected year of the beginning of operations. Some projects may have been moved to a Phase different to the one in which they were initially included.

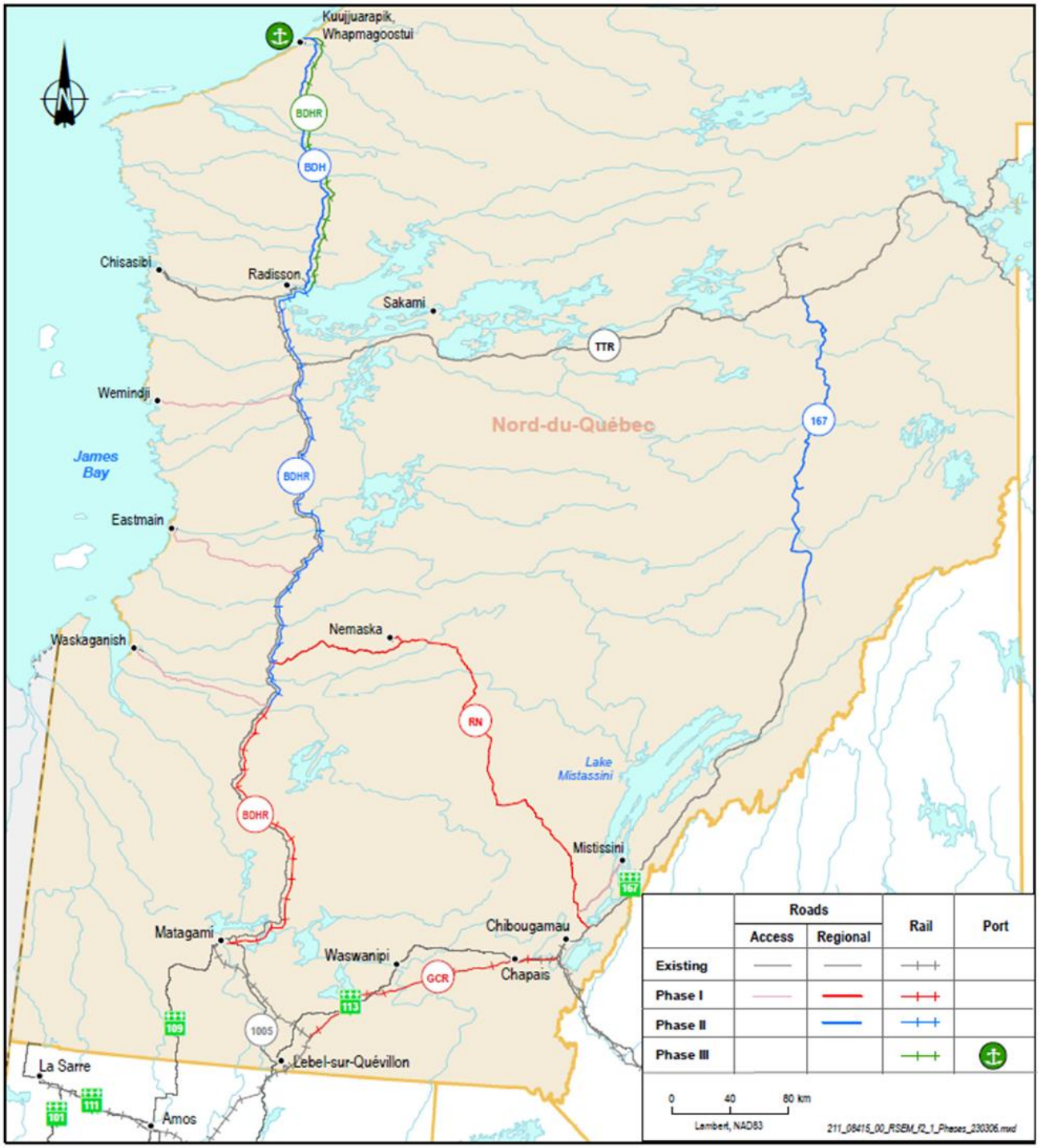


Figure 10.2-1 : Transportation Infrastructure Components of the LGA Program

10.2.2.2 Project Rationale

The goals of the upgrading of community access roads and regional roads such as the Route du Nord include:

- Ensuring safe, reliable and cost-efficient travel for the local communities as well as for the transport of goods to and from the community; and
- Further integration of the communities to the regional economy.

The long-term transportation goals for the Billy-Diamond Highway corridor railway (BDHR) and the re-commissioning of the Grevet-Chapais railway (GCR) are (LGA, 2020):

- To provide an integrated railway that links the communities and the Eeyou Istchee territory to the existing national railway network;
- To provide a link that is safe, efficient, and reliable for the movements of goods and people;
- To locate roads, when possible, to avoid negative impacts on the sensitive natural and social environment and enhance cultural, social and economic conditions; and
- To maintain sustainable development of the region.

10.2.2.3 Target Market Segments

In terms of markets, the following elements must be noted:

1. The upgrading and paving of local access roads from the BDH to the communities of Wemindji, Waskaganish and Eastmain, for approximately 100 km on each of these local roads and from the Route du Nord to Nemaska for 20 km, could increase the running speed, reduce the average travel time, increase reliability, and reduce damages to vehicles.
2. The rehabilitation and reactivation of the Grevet-Chapais Railway (GCR) line for 225 km would provide railway services to the eastern part of Eeyou Istchee Baie-James, connect the regions of Abitibi and Lac-Saint-Jean and reduce travel distances on the northern railway network.
3. The proposed first two sections of the extension northward of the Matagami subdivision of CN railway, first to Rupert River (KP 258 of the BDH) and then to La Grande River (KP 544 of the BDH) will connect to the existing Senneterre-Lebel-sur-Quévillon Matagami railway. If the abandoned Chapais subdivision line is also brought back into operation, it will connect with the port of Saguenay via the existing Cran subdivision. In either case, the new line could be of interest to economic activities and populations located in the western part of Eeyou Istchee Baie-James territory for the South.
4. The intermodal yards would be the endpoint of the rail service to the North. Along the Billy Diamond Highway Railway (BDHR), an intermodal yard is currently located at Matagami, allowing for mineral shipments by truck to be loaded onto CN trains. Along the same railway line, a yard could be located at the intersection of the access road to Waskaganish (although identified as km 257 in the RFP). For the Market Study, the intermodal facility project promoted by Développement Chibougamau is considered in the market analysis for consistency, although not in the geographical scope of the technical analysis of the LGA program.
5. Road projects include the extension of the BDH between Radisson and Whapmagoostui-Kuujjuarapik, and the extension of Route 167 between Stornoway and the Transtaiga Road. Although this road network is quite extensive in length (175 km and 125 km, respectively), the area served by the additional roads includes the communities of Whapmagoostui-Kuujjuarapik, and the territory alongside the road, and appears to be relatively local. The improvement and extension of R167 could serve Stornoway and Hydro-Québec installations.

6. The Hudson Bay Port at Whapmagoostui-Kuujjuarapik along with the extension of the BDHR up to this port provides the facilities for transport to and from the region's further north, the Arctic Ocean and overseas. This new transportation node could modify continental and intercontinental movements. The market catchment area might then be quite large and lead to a significant increase in the use of other LGA program components. More specifically, some north-south movements could be attracted through Hudson Bay, the deep-sea port and the BDHR, notably: (1) southbound the shipments from the mines in Nunavik, Labrador, and Nunavut; (2) northbound the supply shipments to the same regions; (3) northbound shipments from mining sites in Quebec or Ontario. The annual duration of availability and reliability of the northern water routes are major determinants of the attraction of these infrastructure projects.

In summary, the market catchment area of Phase I/II remains rather regional (Eeyou Istchee Baie-James) except for the Grevet-Chapais Railway, which may attract inter-regional movements. Phase III addresses a much larger market catchment area including northern regions and overseas.

10.2.3 Alignment and Operating Considerations

The access roads to the coastal communities of Waskaganish, Eastmain and Wemindji from the BDH, the access road to the Cree community of Nemaska from the Route du Nord, as well as the Route du Nord and R167 north, are currently graveled and will be paved under the LGA infrastructure program. The secondary access to the community of Mistissini connects the Route du Nord to this locality over a 42 km alignment (VEI, 2022).

10.2.4 Study Area

For socio-demographic and regional matters, the study area covers the Eeyou Istchee Baie-James territory, which includes Cree and Jamesian communities, as well as the Kuujjuarapik Inuit community.

For inter-regional economic activities, the study area is extended to include Abitibi and Lac-Saint-Jean regions.

10.2.5 Historic and Legal Framework

The territory is governed under a legal framework and different agreements between the First Nations and the government of Québec which have been developed over a long period. The areas covered by the different agreements vary greatly, as illustrated on Figure 10.2-2 (Simard, 2017).

10.2.5.1 James Bay and Northern Québec Agreement (JBNQA)

The James Bay and Northern Québec Agreement (JBNQA) were signed in 1975 by Canada Québec governments and Cree and Inuit representatives[4] and later modified in 1978 to include the Naskapi people. This agreement includes many safeguards to protect the environment and the Indigenous Peoples who continue to live and depend on the resources from their environment. The Agreement is intended to allow for continuing a traditional way of life and for engaging as equal participants in the modern economy.

In addition to settling aboriginal land claims and providing financial compensation, the JBNQA defines aboriginal rights and established regimes for future relations between Aboriginal peoples and non-Aboriginals in the region and among local, regional, provincial, and federal governments. Harvesting rights are provided, land categories set

[4] Signatories to the JBNQA include the Government of Québec, SEBJ, SDBJ, Hydro-Québec, the Grand Council of the Cree (GCC), the Northern Quebec Inuit Association, and the Government of Canada.

out and resource management regimes set up. School boards were created, health services were restructured, and regional governments were established. This foundation has led to achieving other important agreements including the Sanarrutik Partnership Agreement and The Agreement Concerning the New Relationship between the Gouvernement du Québec and the Crees of Québec (the Paix des Braves), both massive economic development agreements making Inuit and Cree partners in decision-making and sharing of benefits.

Source: Gouvernement du Québec
Carl Brisson, LERGA-UQAC, 2016

Figure 10.2-2:Boundaries and Sub-Regions of Northern Québec

Land Administration

The Nord-du-Québec (NQ) administrative region, which comprises Eeyou Istchee Baie-James and Nunavik and, includes towns, northern villages, Cree, Inuit and Naskapi villages, and lands reserved for Aboriginal people. Different regulatory terms and conditions apply to the territories in the region. Sections 5 and 6 of the JBNQA define the territorial regime. The territory management is under the responsibility of the CNG for Category II lands and of the Eeyou Istchee Baie-James Regional Government for Category III lands (Desfor, 2014).

"*Cree individuals have the right to harvest throughout the JBNQA territory, so long as it is subject to the principle of conservation and does not conflict with other physical activity or public safety (Section 24.3.5).*" (CDC, 2021a). Appendix B provides more details regarding land categories.

Environmental and Social Protection

Sections 22 and 23 of the JBNQA specify the environmental and social protection regime for the Cree and Inuit people, their society, economy, and communities in relation to the territory. *"All future development on the territory is subject to an Environmental and Social Protection Regime that seeks to minimize the negative impact of development upon the Native people and the wildlife resources of the Territory*" (Section 22.2.2a) (CDC, 2021a).

Economic Development

Section 28 on Social and Economic Development "*provides for all programs and benefits to promote economic development is accessible to Crees to promote their participation in the modern economy through their own entities and associations (Sections 28.2-28.7), as well as to prioritize the hiring of Crees on the territory (Section 28.9).*" (CDC, 2021a).

The Cree have access to a range of services and programs to which the federal and provincial governments contribute on an annual basis. The implementation of the JBNQA requires the participation of a number of federal departments and agencies, most of which, as part of their respective mandates, provide funding for the government programs to which the beneficiaries continue to have access in accordance with the Agreement.

Section 28 also states the importance of the establishment of the Joint Economic and Community Development Committee (JECDC) which is composed of a body of the Cree people, Québec, and Canada jointly. The purpose of the Committee is to review and make recommendations in regard to the establishment, expansion, operation and effectiveness of government economic development, community development and other programs related to the economic and social development of the Cree people. Section 28 stipulates that both governments are responsible for developing training programs to stimulate Cree employment. Furthermore, any projects initiated by their entities on the territory should give priority to Crees in terms of employment and contracts (Section 28.10.3). Finally, Cree entities have established "succession plans" that outline the gradual replacement of all skilled personnel by Cree youth entering the job market as they become increasingly qualified to take on such roles.

Chapter 28 prescribes that the James Bay Native Development Corporation (JBNDC) can, on occasion, submit projects to the Federal and Gouvernement du Québec for public funding within certain limits. The project must be justified in terms of economic benefits provided to the Cree communities of the James Bay area. This funding will not be with prejudice to any other source of funding and will be subject to the general conditions of the JBNQA.

The JBNDC objectives are:

- To promote economic, business, and industry development and diversification with a view to maximize the general economic prospects of the Crees and their general economic well-being;
- To assess and prioritize the Corporation's contribution to promote measures and foster economic development;

- To foster cooperation between the Corporation and the James Bay Crees with respect to the development of their territory.

According to Chapter 8 of the Paix des Braves Agreement, CDC is meant to take over the mandate of the JBNDC, which would subsequently be dissolved. This process is slowly occurring as other administrative matters is currently being settled.

10.2.5.2 Sustainable Forest Development Act

The Canadian and Quebec Forest laws, known as some of the strictest in the world, are designed to ensure sustainable development of the Country's forests while protecting Aboriginal interests. The forest laws are held under the jurisdiction of the provinces and territories, with federal laws applying to federal land to protect the resource through land-use planning, wildlife habitat protection, and timber harvesting. The law requires that Aboriginal interest be protected, and that the government has a duty to consult with affected communities prior to any new or modified policy decisions. The federal law applies to federal land and seeks to protect the resource through land-use planning, wildlife habitat protection and timber harvesting. Other specific laws such as the *Indian Timber Harvesting Regulations* and the *First Nations Land Management Act* further protect the land.

One important law related to forest management in Québec is the Law on Sustainable Forest Development (LADTF), which was adopted by the Québec National Assembly. The LADTF sets out principles, guidelines and measures for the sustainable development of Québec's forests. The law plays a critical role in ensuring that Québec's forests are managed in a way that respects environmental, social and economic needs, including the needs and rights of Indigenous communities.

The LADTF aims to promote sustainable development in Québec's forests while respecting Indigenous rights and conservation. The law recognizes that the forest is a complex ecosystem that provides ecological, economic and social benefits to Québec society. Therefore, it seeks to maintain forest productivity while preserving biodiversity, protecting wildlife habitat and mitigating the effects of climate change. It outlines the responsibilities of forest owners, users and managers, and set rules for forest management, planning and monitoring. It requires forest managers to prepare forest management plans that balance conservation and economic objectives and provide for consultation with Indigenous communities. It also sets standards for forest operations, such as logging and road building, to minimize their impacts on the environment.

10.2.5.3 Paix des Braves

The Paix des Braves, or *Agreement Concerning a New Relationship between the Government of Québec and the Crees of Québec* (Québec-ARC, 2002), signed in 2002, is a renewal of the commitments made during the JBNQA. It includes specific provisions to continue forestry (chapter 3), hydroelectricity (chapter 4) and mining (chapter 5) in Eeyou Istchee Baie-James, guaranteeing Cree participation in those developments. It is a nation-to-nation agreement that affirms that the Cree Nation must remain "*rich in its cultural heritage [...] and its traditional way of life in a context of increasing modernization*". The Agreement thus charts a course of greater autonomy for the Cree Nation and allows it to become more involved in economic development activities in the territory.

This Agreement also led to the withdrawal of the Rupert Diversion project, a comparably smaller project that integrates into the existing La-Grande hydroelectric complex.

Chapter 3 of the Agreement defines an "Adapted Forestry Regime" for the territory "*to better take into account the Cree traditional way of life*" (Section 3.1). This includes the use of traplines as the basis for delimiting territorial

units, the coordination of information sharing between the CNG and the GQ, as well as the joint management of forestry activities within the territory.

Chapter 4 of the agreement covers economic coordination, benefit-sharing and the fulfillment of past obligations for hydroelectric development. Chapter 5 covers economic coordination for the mining sector, in particular the creation of the Cree Mineral Exploration Board (CMEB).

The governance model originally proposed in the Paix des Braves led to the 2013 *Agreement on Governance in the Eeyou Istchee James Bay Territory between the Cree of Eeyou Istchee and the Government of Québec* that established, in replacement of the previous Municipality of Baie-James (MBJ), the Eeyou Istchee James Bay Regional Government (EIJBRG), presented in Section 10.2.6.1.2 of this report (EIJBRG, 2014). This Agreement seeks to provide for greater participation of Crees in the governance of Category III lands on the territory, among other things.

10.2.5.4 La Grande Alliance

The above legal framework facilitated the Cree Nation to sign the La Grande Alliance MOU with the GQ to develop an infrastructure plan that would respect Cree land, values and way of life, and foster economic development. More specifically, La Grande Alliance agreement objectives include*: "(a) Consolidate transportation infrastructure in an orderly and cost-effective manner through a railway […] and deep-sea port […]; (b) The electrification of certain industrial projects; (c) Professional training of the local labour force ; (d) New protected areas to promote connectivity of wildlife habitats"* (CDC, 2021a).

10.2.6 Territory and Sociopolitical Structure

10.2.6.1 Eeyou Istchee Baie-James

The territory of Eeyou Istchee Baie-James corresponds approximately to the southern part of the region of Nord-du-Québec, between the 49th and 55th parallels, as shown in Figure 10.2-3. The area covers 335,818 km^2. It is limited to the West by the shoreline of James Bay and Hudson Bay, to the North by Nunavik which forms the administrative region of Nord-du-Québec along with Eeyou Istchee Baie-James, to the East by the Regional County Municipalities (RCM) of Caniapiscau in the administrative region of Côte-Nord, and of Maria-Chapdelaine in the administrative region of Saguenay-Lac-Saint-Jean, and to the South by the RCMs of La Vallée-de-l'Or, Abitibi and Abitibi-Ouest in the administrative region of Abitibi-Témiscamingue.

Cree Regional Entities

The Grand Council of the Crees and the Cree Nation Government are two distinct legal entities, but they both have identical membership, Board of Directors and governing structures. The Grand Council of the Crees represents the nine Cree communities of Eeyou Istchee united under the JBNQA, as well as two associations representing the Cree communities of Washaw Sibi and MoCreebec[5].

[5] The Washa Sibi community is recognized by the Crees but is not necessarily legally recognized by the GQ. In the lens of the study, the community of Washaw Sibi was considered equivalent to all other participating Cree communities. The study team does not allude to make any legal statements regarding their status, but this is rather an initiative to be as inclusive as possible. MoCreebec community, also without a recognized territory, represents JBNQA beneficiaries currently residing mainly in northeastern Ontario. This community is not included in the study.

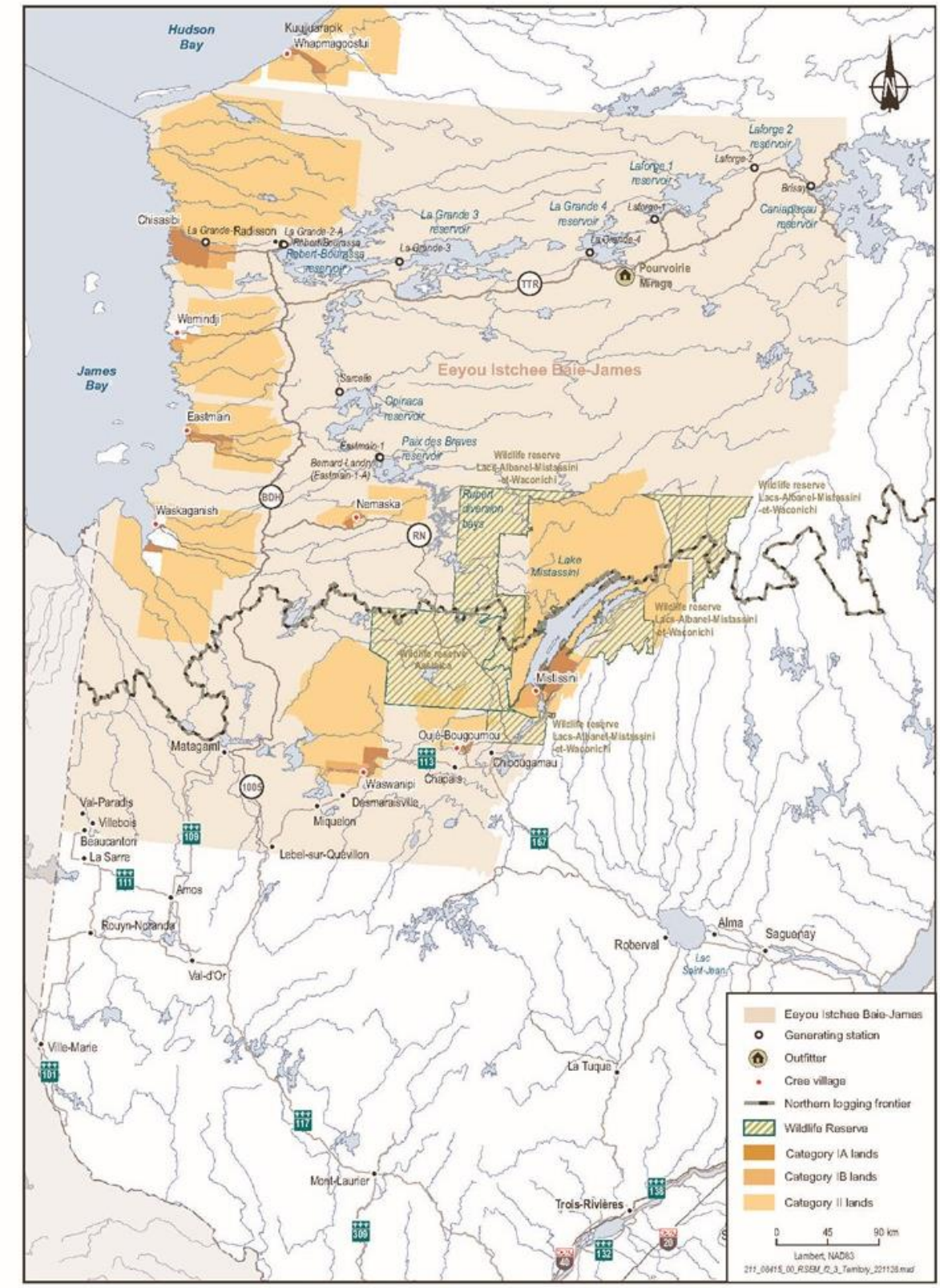


Figure 10.2-3 : Eeyou Istchee Baie-James Territory

The Cree Nation Government exercises governmental and administrative functions on behalf of the Cree Nation and is responsible for the management of Category II lands. The Cree Nation Head Office is in Nemaska, although there are also satellite offices in local communities and in Montreal. The Embassy of the Cree Nation has two offices located in Ottawa and Quebec City.

Community local councils elect members to the Board of the Grand Council of the Crees, whose role is to facilitate regional decision-making and provide support to local governments through the Regional Cree Nation Government. In addition to local council members, representatives from regional and governmental organizations such as the Cree Regional Authority (CRA), Cree Trappers' Association (CTA), Cree Nation Youth Council (CNYC), and Cree Hunters and Trappers Income Security Board (CHTISB) are also represented in each community.

Eeyou Istchee James Bay Regional Government

The Eeyou Istchee James Bay Regional Government (EIJBRG) took office in 2014 (EIJBRG, 2014). The EIJBRG includes nine established Cree communities and nine Jamesian communities.

The EIJBRG is directed by a council composed of 11 Cree representatives, 11 Jamesian representatives and one non-voting representative of the Government of Québec. Regarding Cree representatives, the Grand Chief of the Cree Nation Government sits on the EIJBRG Council, along with ten people appointed by the Board of the Cree Nation Government from among its elected members. Each member is entitled to two votes. The Ministère des Affaires municipales et de l'Habitation (MAMH) appoints the 11 Jamesian representatives from among the elected members of the councils of the enclosed municipalities and non-Crees residing within the EIJBRG territory. Collectively, these representatives are entitled to 22 votes, which are allocated among them based on the relative demographic weight of the population they represent. The Government of Québec's representative is appointed by the Deputy Minister of the MAMH, from among its staff members. The chairmanship of the Council of the EIJBRG alternates every two years between the Cree Grand Chief and a Jamesian Mayor.

The EIJBRG is governed under Québec law and exercises the same jurisdictions, functions, and powers over Category III lands in the municipality of Eeyou Istchee James Bay (approximately 277,000 km^2) as those formerly attributed to the James Bay municipality (EIJBRG, 2022b). As mentioned above, these lands are public lands in the domain of the State in which the Cree hold exclusive trapping rights (with some exceptions in the South) and certain non-exclusive hunting and fishing rights. The Regional Government has the authority to affirm its jurisdiction as an RCM.

Within the framework of the harmonization of the *Adapted Forestry Regime under the Sustainable Forest Development Act* implemented in 2013, a collaborative regime has been put in place for the management of forest resources on Category II and III lands in Eeyou Istchee-James Bay. The Cree Nation Government and the EIJBRG collaborate, in the form of concerted action, in the forest plan development, consultation and monitoring process.

10.2.6.2 Cree Communities

Eeyou Istchee includes ten Cree local communities. Four are located along the James Bay coast at the mouth of the main tributaries (Waskaganish, Chisasibi, Eastmain, Wemindji), one is on Hudson Bay at the mouth of the Great Whale River (Whapmagoostui), four are inland (Waswanipi, Oujé-Bougoumou, Mistissini, Nemaska), and one does not have a physical attributed territory although based in Amos area in Abitibi-Témiscamingue (Washaw Sibi). The Cree communities are governed by their respective local councils, which are elected through a system of universal suffrage. The length of terms for council members varies across communities but is typically four years.

As defined by the JBNQA, Cree communities entail Category 1-A and Category 1-B lands. The Category 1-A land is the reserve land, where the community land band is as per the definition in the federal *Indian Act* (1985). The

category 1-B, incorporated as Cree village under the Quebec *Cree Villages and Naskapi Village Act* (, is uninhabited land next to the reserve. Note that one portion of Category I-B lands for the Cree Nation of Chisasibi is allotted to the Inuit residents of this community, as per Section 5.1.3 of the JBNQA.

10.2.6.3 Jamesian Communities

The Jamesians are mainly grouped in the municipalities of Matagami, Lebel-sur-Quévillon, Chapais and Chibougamau. These municipalities are ruled by the Cities and Towns Act. A small portion of Jamesians live in the rural areas of Valcanton and Villebois, the isolated hamlets of Desmaraisville and Miquelon, and in the vicinity of Radisson. These localities are located in the territory of the municipality of Eeyou Istchee Baie-James. Valcanton and Villebois are located immediately to the southwest of Matagami and are directly connected to Abitibi-Ouest RCM.

10.2.6.4 Kuujjuarapik and Nunavik

Nunavik is managed by independent regional administrative bodies established pursuant to the JBNQA. They include the Kativik Regional Government (KRG), Kativik Ilisarniliriniq (the Kativik School Board), and the Nunavik Regional Board of Health and Social Services (NRBHSS) (Ives et al., 2011). The Makivik Corporation also plays an important role as the organization is established to administer the funds received from the JBNQA (Makivik, 2021).

The Kativik Regional Government (KRG) is a public organization created to deliver public services to the Nunavimmiut, the Inuit of Nunavik. Many of the KRG's responsibilities are stipulated in the Act respecting Northern Villages and the Kativik Regional Government (Kativik Act). Other mandates have been delegated to the KRG by the region's municipalities and the Québec government. The organization has jurisdiction over the territory of Québec north of the 55th parallel. Its authority covers municipal matters, transportation, the environment, policing, employment, labour training, income security, childcare services, renewable resources, land-use planning, civil security and economic development (KRG, 2021).

The Makivik Corporation's mandates include owning and operating large profitable business enterprises and generating jobs, social economic development, improved housing conditions and protection of the natural environment, Inuit language and culture. In carrying out its mandates, Makivik works within the Nunavik region with the main organizations created because of the JBNQA, with the Government of Quebec and the Government of Canada. It also represents Nunavimmiut in Inuit political processes, at the national level at the Inuit Tapiriit Kanatami (ITK) organization, and the international level at the Inuit Circumpolar Council (ICC) (Makivik, 2021).

10.2.7 Local Communities

10.2.7.1 Cree Communities

Washaw Sibi was recognized as the 10th Cree nation in 2003 at the annual general assembly (AGA) of the Grand Council of the Crees. Its name means "*the river that runs into the bay*". There is no permanent community location yet, but the cultural camp is temporary settled at Joulac, 115 km north of Amos. Its head office is in Nemaska, and the administrative office is in Amos (Washaw Sibi, 2022).

Waswanipi means "*reflection on the water*" and refers to the tradition of night-time fishing. It is the most southern Cree community in the James Bay area. The village was originally founded in 1819 by the Hudson's Bay Company (HBC) as a trading post. In 1976, the community moved from its original trading post location on Waswanipi Island, which is 45 km west of its new location, across the Waswanipi River along Highway 113. The community's population in 2021 was 1,827 (ISQ 2021). In the 1950's, the Waswanipi region opened up to outside utilization as

the Chibougamau copper boom resulted in opening of highways and railways. Thousand workers migrated to the surrounding region with the opening of the Matagami and Desmaraisville mines and the Miquellon sawmill. Thanks to highways which now connect Abitibi to the Lac-St-Jean, the cost of goods and transportation is lower than in other communities. Currently, the Waswanipi Mishtuk Corporation and the Waswanipi chief and council are working on the reopening of the sawmill, which closed in 2005 (Waswanipi, 2022).

Oujé-Bougoumou meaning "*the place where people gather*", was rebuilt in the 90s after decades of dispersal and at least seven relocations. In the early part of the last century, the Ouje-Bougoumou people escorted early prospectors to the territory, and as the mining mineral deposits increased, the Ouje-Bougoumou people were seen as a threat to industrial growth. Since being rebuilt in 1992, the community location is near the Opelika Lake and 37 km north of Chapais. The community hosts the "Aanischaaukamikw" Cree Culture Institute, the Capassisit lodge, the cultural village, and Cree culture tours and became a United Nations organization (UNO) award community. The aboriginal architect Mr. Douglas Cardinal designed the major public institutions in the new community with an innovative energy system. In the community, Oujé Bougoumou Enterprises Inc. manages and finances, for a fee, a portfolio of enterprises inside the community including Staacun Enterprise (forestry), Meekan Drilling (mining), Kagoose Construction and Econord Construction (Ouje, 2022).

Mistissini meaning "*big rock*" in Cree, takes its name from a massive boulder that was a reference point for many generations. Mistissini is the second-largest Cree community in terms of population in the James Bay area with 3,731 people living in the community according to the 2021 census. It is located in the south-east corner of Lake Mistissini, the largest natural lake in Québec, and is 90 km north-east of Chibougamau. In the 1800s, the Hudson Bay company built a fur-trading post here. The main offices of the Cree School Board, the James Bay Cree Communications Society and the Cree Human Resources Development Department are all located in Mistissini. There are fishing excursions on the lake and many snowmobile trails with a modern lodging hotel which holds 20 rooms all facing the lake. Currently, housing availability is the biggest challenge for Mistissini community with a current shortage of at least 170 new homes (Mistissini, 2022). Eskan, a development corporation, is a 100% community-owned business located in Mistissini. The company owns three subsidiaries: Ace Hardware, Eenatuk Forestry and Makaahiikan Construction. (Eskan, 2022).

Nemaska meaning "*place of the fish*" is the home of the Cree Nation government, and the old Nemaska, Nemiscau was the site of a Hudson Bay Company fur-trading post. A Hydro-Québec project, in which the community would be flooded, resulted in the dismantling of the community, and the Nemaska Eenouch were moved to the communities of Mistissini and Waskaganish. In 1977, with the approval of the elders, the community was relocated around Lake Champion, near the original settlement. Since the Hydro-Québec project's cancellation, Nemiscau, across the lake is used as a summer encampment. In 2021, the census reported a population of 832 people. There is an annual gathering each summer at the Nemaskau Sagaheegan with fishing activities (Nemaska, 2022).

Waskaganish meaning "*small house*" or "*small encampment*" and is the oldest Cree community in James Bay and celebrated its 350th birthday in 2018. Waskaganish was the birthplace of the Hudson Bay company and the British fur trade in western Canada. It is the first Cree community from the South, linked to the BDH. The population of Waskaganish was 2,536 in the 2021 census. Waskaganish was the home of Billy Diamond, the son of former Cree Chief Malcolm Diamond. He took a leadership role in organizing the Cree response to the James Bay mega-hydroelectric project, which obtained an injunction against Hydro-Québec from the superior court of Québec that ultimately led to the James Bay and Northern Québec Agreement. He promoted Cree rights throughout his life and contributed to the Cree's economic viability by creating Air Creebec, Cree Construction Company Limited and Cree Yamaha Motors. To honour him, the highway between Matagami and Radisson was given his name. Waskaganish

is a growing and vibrant community with trapping remaining an important contributor to the local economy (Waskaganish, 2022).

Eastmain, referring to the eastern mainland of James Bay, was established in the early 18th century. It is a Cree village situated on the east coast of the James Bay south of the Eastmain River. The community is connected to the Billy Diamond Highway by a 103 km gravel road. The junction of the roads is situated at km 237 of the Billy Diamond Highway. Based on data from the 2021 census, Eastmain has one of the smallest populations of the Eeyou Istchee area, with 924 people. The master development plan for proposed urban extension areas, provided by the stakeholders following a focus group, presents several industrial and infrastructure development projects. The plan identifies new areas for residential, commercial, industrial, and public activities. Parks and a walking path network throughout the village were also proposed. Details of the proposed development can be found in the Eastmain master development plan (EPC, 2017).

Wemindji, meaning "*Painted Hills*", was relocated from an island in the Old Factory Bay to the eastern shore of James Bay in 1959. Situated where the Maquatua River flows into the James Bay, Wemindji is 96 km west of the Billy Diamond highway. An unpaved road connects the Cree community to the highway at km 518. In 2021, it had a population of 1,562 people. The majority of the Wemindji workforce works in the services sector (including public service) and the food retail industry (including grocers, restaurants and coffee shops). According to the information obtained from the focus group, Tawich Development Corporation hires a significant number of Wemindji residents (about 200 employees) for its several business activities. The Tawich Development Corporation owns seven subsidiaries: Tawich Business, Tawich Construction, Waptum, Wemindji Paving, the Wolfcamp Corporation, Eeyou Lumberjack and Kepa Transport. Like other Cree communities, Wemindji is a net importer of goods as production is low. The focus groups also identified housing as a priority, while the need for both light and heavy commercial sites is also growing. To accommodate future residential development projects, a new wastewater treatment plant, including its lagoons, has already been planned and is currently awaiting approval. According to WAPTUM (2019), “Due to the local housing crisis and urban planning constraints, the community’s existing wastewater treatment lagoons need to be closed and replaced with a new system in a location north of the community. Future residential developments will be delayed until the lagoons are operational, and the old ones can be closed.” The community stakeholders expressed their concerns about infrastructure development as building infrastructure on top of rock and swamp presents many challenges. Additionally, the rocks contain high levels of radon, which implicates the creation of new development sites as rocks would need to be blasted before construction work.

Chisasibi meaning "*Big or Great River*" is the biggest Cree village of Eeyou Istchee in terms of population and territory. Formerly located on Fort Georges Island, it was relocated to the mainland in 1981. Now located at the mouth of La Grande Rivière, archeological digs have found signs of Indigenous habitation dating back to more than 5,000 years. Chisasibi is the most northern Cree community accessible by road, being connected to the Billy Diamond Highway by an east-west 90 km paved road, starting at km 600 of the highway. Its 2021 population was 4,985. A focus group with stakeholders identified the following main economic sectors: construction, hospitality, retail, transportation, fuel and government. Efforts have also been put towards developing the tourism and real estate industries. Discussions about building a college to develop professionals and human resources have been initiated, and stakeholders have specifically identified human resources as a key driver for the economic development of the community. A community master plan exists; however, a copy of the plan has been requested but not yet received.

Whapmagoostui means "*the Place of the Whales*". It is located at the mouth of the Great Whale River on the coast of the Hudson Bay in Nunavik. It is the northernmost Cree community in Québec and the last remaining Cree community without road access. According to Statistics Canada's 2021 Census, it is home to 1,022 Crees. It is served by a FCNQ branch jointly with the community of Kuujjuarapik (FCNQ, 2022). Fishing and hunting are the most important parts of the community's economy. Information obtained from a focus group with stakeholders revealed that every development project must overcome transportation cost issues. In fact, all the imported materials come in by a barge in the summer months and by plane otherwise. Although shipping by plane is faster, it is more expensive as size and weight are limited. This makes the development projects more complex and costly and limits the community's economic development. For this reason, stakeholders in the focus group were not able to name a specific future development project.

10.2.7.2 Jamesian Communities

Beaucanton, ***Villebois*** and ***Val-Paradis*****,** in the Turgeon Valley**,** are three small localities located in the southwestern part of the municipality of Eeyou Istchee Baie-James.

Matagami town was founded in 1963, 181 km north of Amos and 620 km south of Radisson. It is at the end of R109 which then becomes the BDH. The local economy has been based on mining and forest industries (WSP, 2021a). The population was at a maximum in 1981 with 3,700 inhabitants and now has fewer than 1,500 people. With the closing of the Glenmore mine in 2022, the future of the community relies on the activity of the Eacom Timber sawmill, the intermodal centre and tourism.

Radisson is situated on the south shore of La Grande Rivière, 5 km from LG-2 Robert-Bourassa hydroelectric complex. The community was created in 1974, during Phase 1 of Hydro-Québec's James Bay hydroelectricity works. It is included in the territory of the municipality of Eeyou Istchee Baie-James (WSP, 2021a), at the most northern point of the BDH, 620 km from Matagami, 462 km from Nemaska and 106 km from Chisasibi. At its peak in 1977, the local population was 2,000 people. The current population is approximately 300 inhabitants, including 200 permanent residents and 100 Hydro-Québec temporary workers. Aside from Hydro-Québec activity, the local economy is based on LG2 airport and Nunavik community procurement (consultation), tourism and terrain works by the Centre d'études nordiques de l'Université Laval (CÉNUL) (WSP, 2021a).

Lebel-sur-Quévillon is located on the shore of Lake Quévillon. It is 88 km north of Senneterre and 213 km southeast of Chapais and served by R113. After a sharp decrease from 3,700 inhabitants in 1981, this community's population has remained constant at 2,100 inhabitants since 2016. The town was created with the construction of the Domtar pulp mill which ceased the activity in 2005 (WSP, 2021a). The mill was acquired recently by Chantiers Chibougamau in 2017 and should provide a better economic prospect for the community.

Desmaraisville and ***Miquelon*** are two hamlets along R113, located 93 km and 69 km north-east of Lebel-sur-Quévillon and 122 km and 145 km west of Chapais respectively.

Chapais is located on Route 113, 37 km from Oujé-Bougoumou, 44 km from Chibougamau and 251 km from Saint-Félicien. It was founded in 1955 when the Opemiska mine opened. After the mine closed in 1991, the local economy and population declined from 3,100 inhabitants in 1981 to 1,600 in 2016. Through its strategic planning, the community and the Corporation de développement économique (CDE) de Chapais hope to attract additional residents, to improve the quality of life, to enhance local development and to develop partnership with the Cree community of Oujé-Bougoumou (Chapais, 2017). Chapais Énergie is presently the largest co-generation plant in Québec (WSP, 2021a). Today it is the basis of the towns' economy, and its presence has stabilized the population. Several economic development projects are planned, which would maintain or increase the local population in the

future (Consultation). These include the Boré A essential oil plant (15 jobs), agroforestry extractable and mining site development notably Springer, Perry, Scott and Monster Lake (Chapais, 2017 ; WSP, 2021).

Chibougamau is located along Lake Gilman and is the largest community in Eeyou Istchee Baie-James with 7,500 inhabitants. Developed primarily by the mining and forest industries, its economy is also based on services, energy and tourism. It is a service centre for Cree inland communities. The biggest employer is Chantiers Chibougamau (WSP, 2021a).

10.2.7.3 Kuujjuarapik

Kuujjuarapik, which means "*little great river*", is Nunavik's southernmost village. The community is only accessible by air, through Kuujjuarapik Airport and, in late summer, by boat. During World War II, the United States built a military base and airport in Kuujjuarapik, which they turned over to the Canadian government in 1948. The village is now home to 792 Inuit living next to the Cree Whapmagoostui community. Together they are served by the FCNQ for their economic activities which include retail sales, distribution of petroleum products, cable television, accommodation and adventure tourism. Similar to that of Whapmagoostui, developing any project within the Kuujjuarapik community is quite daunting due to the high cost of transportation.

Community profiles are provided in Appendix C.

10.2.8 Summary

The LGA program includes a set of road, rail and port infrastructure components to be implemented in 3 Phases from 2030 to 2046. The goals of upgrading of community access roads and regional roads (Route du Nord) are to ensure safe, reliable and cost-efficient travel for the local communities and to integrate the communities to the regional economy. The goals of the BHDR and the Grevet-Chapais Railway are to link Eeyou Istchee Baie-James to the national railway network, provide safe, efficient and reliable for the movements of goods and people, to avoid negative impacts and to maintain sustainable development of the region.

The study area corresponds mostly to Eeyou Istchee Baie-James, a vast territory where 10 Cree communities, 9 Jamesian communities and one Inuit community live. This territory is ruled by the JBNQA and the Paix des Braves, which allows for the continuation of the Cree traditional lifestyle and culture, as well as their integration in the economic opportunities offered by the regional natural resources in a partnership between the Cree nation, the GQ and the base economy companies.

10.3 TRANSPORT NETWORK

10.3.1 Global Structure

All the communities in Eeyou Istchee Baie-James are serviced by road, with the exception of Whapmagoostui. The road network is generally connected to Amos in Abitibi or Saint-Félicien in Lac-Saint-Jean. All Eeyou Istchee Baie-James communities, including Whapmagoostui, is served by air during part or the full year, although in coastal communities, the presence of fog during spring and autumn can limit accessibility. Some Jamesian towns are also serviced by rail as they are at the terminals of the CN local networks in Abitibi southbound or in Lac-Saint-Jean eastbound. The five coastal Cree communities and the Inuit communities benefit from boat transportation during the summer months when the James, Hudson and Ungava bays are navigable.

10.3.2 Road Transportation

10.3.2.1 Road Network

Configuration

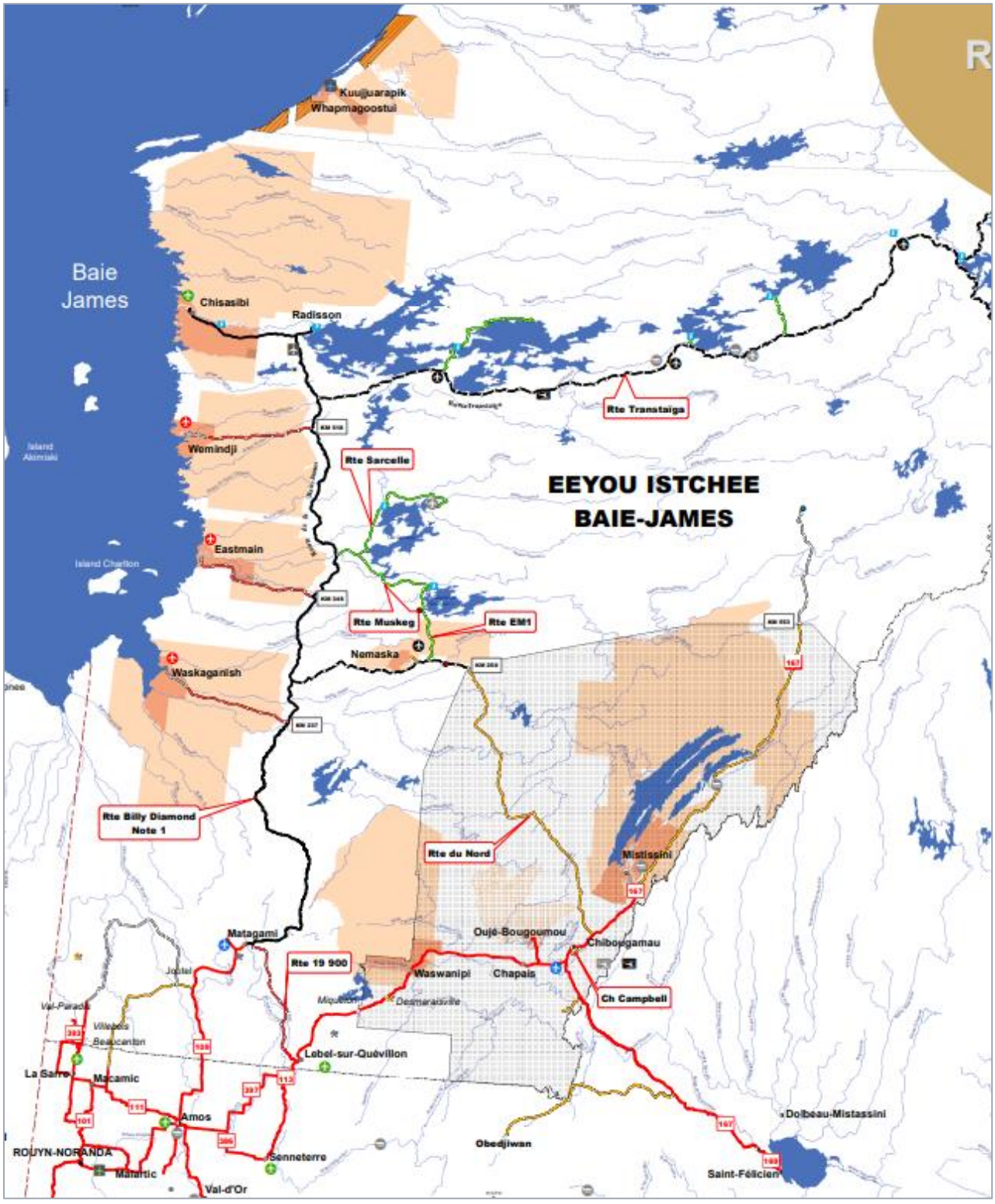
The Eeyou Istchee Baie-James Road network is illustrated in Figure 10.3-1. This network is linked to the Québec Road network via Routes 109 (R109) and 113 (R113) South to Abitibi-Témiscamingue and Route 167 (R167) to Saguenay-Lac-Saint-Jean. The Billy Diamond Highway and the Route du Nord constitute the networks' backbone connecting all the different communities but not the most northern communities in the study area (Whapmagoostui and Kuujjuarapik).

In Eeyou Istchee Baie-James, the network segments are managed and maintained by different organizations, mostly by the Ministère des Transports et de la Mobilité durable du Québec (MTMD), Hydro-Québec and the Ministère des Ressources naturelles et des Forêts du Québec (MRNF), or else management is delegated by these organizations to the Société de développement de la Baie-James (SDBJ) on their behalf.

The MTMD is responsible for numbered roads (R109, R113, R167), the Matagami-Lebel-sur-Quévillon road (R1000-1005), the Macamic-Joutel road, the southwest section of the Route du Nord, and five community access roads to Waskaganish, Eastmain, Wemindji, Nemaska and Oujé-Bougoumou. Meanwhile, Hydro-Québec is the primary entity responsible for the northwest section of the Route du Nord, the Transtaiga Road, the EM1-Muskeg-Sarcelle roads and the access road to the Cree nation of Chisasibi (MTMD, 2022). The BDH is under the responsibility of Hydro-Québec, although managed by. the SDBJ. The three access roads to Waskaganish, Eastmain and Wemindji, although under the MTMD jurisdiction, are maintained by the SDBJ.

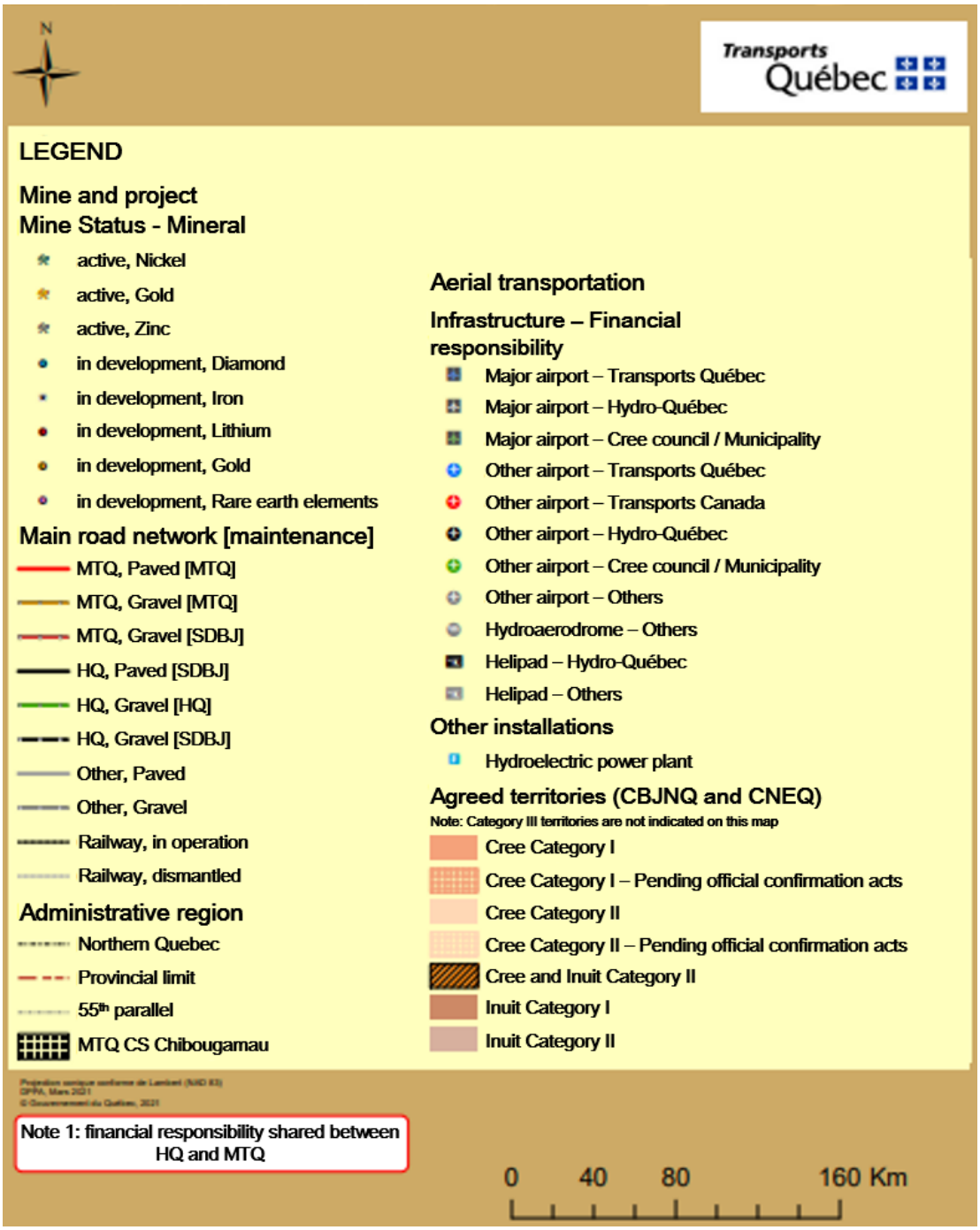
The *Act Respecting the Domain of the State* (SRQ, c. T-8.1) stipulates that all roads located on public lands are owned by the GQ. For the network under the MTMD jurisdiction, the regulation and maintenance of the road is the sole responsibility of the MTMD and usually follows the rules and standards of the public road network. In other cases, a public entity is responsible for identifying the party accountable for maintaining each specific road.

Figure 10.3-1 summarizes the main features of major roads in Eeyou Istchee Baie-James.



Source: MTMD.

Figure 10.3-1: Eeyou Istchee Baie-James Road and Air Transportation Infrastructure



Source: Translated from MTMD.

Figure 10.3-2 : Legend of Figure 10.3-1

10.3.2.2 Jurisdictions

The BDH links Radisson to Matagami, in the continuation of the R109, which links Matagami to Amos and Rivière-Héva, and from there by the R117 North to Rouyn-Noranda, Northern Ontario, Témiscamingue and North Bay. From Amos, Route 111 provides access to Val-d'Or and from there by the R117 South to Mont-Laurier, Gatineau-Ottawa and Montreal.

Table 10.3-1: Road Network Features, Eeyou Istchee Baie-James

Road	Segment	Juris-diction	Length (km)	Width (m)	Maximum Speed (kph)	Surface & Load limit	Use
Route du Nord	R167-BDH	MTMD	405	8	70	Gravel 32 T, 54 T, 62 T	Resource access road (Éléonore, Eastman, La Grande), mining projects, Oujé-Bougoumou residents, Cree communities, fishing and access to wildlife reserves
Billy-Diamond Highway	Matagami - Route du Nord	SDBJ	275	12	100	Asphalt Up to 500 T	Hydro-Québec, forestry companies, mining projects, Cree community residents and local traffic
Route 1000	Lebel-sur-Quévillon to route 1005	MTMD	22	9,6	70	Gravel	Mainly forestry companies
Route 1005	Route 1000 to Matagami	MTMD	85	9,6	70	Gravel	Mainly forestry companies
Route 113	Route 1000 / Lebel-sur-Quévillon to route 167	MTMD	245	12	90	Paved	Various
Route 167	Route 113 and route du Nord	MTMD	32	12	90	Paved	Various
Route 167	Route du Nord to Mistissini	MTMD	52.5	13	90	Paved	Various
Mistissini Rd	R167 -Mistissini	MTMD, Mistissini	16	10,6	80	Paved	Various
Chemin Campbell	Chibougamau bypass	MTMD	11.5	10	70	Gravel / Paved	Bypass, mine access
Oujé-Bougoumou Rd	Route 113 to Oujé-Bougoumou	MTMD	23.5	12	80	Important intersections paved	Residents, forestry trucks
Chemin forestier R1029	Route Oujé-Bougoumou to route du Nord	MRNF	44	N/A	30	Gravel	Forestry trucks and workers, residents of Oujé-Bougoumou

Source : Intervia (2019).

The SDBJ manages the funds contributed by a group of user-payers, who are responsible for financing the maintenance and development of the road network. The user-payers in this consortium are primarily led by Hydro-Québec, who plays a significant role in funding and decision-making for the road network. As the manager of these funds, SDBJ is responsible for ensuring that the resources are allocated effectively, and that the necessary maintenance and development work is carried out on the roads within their jurisdiction. Overall, this arrangement reflects a shared responsibility for the road network between different organizations and stakeholders, with SDBJ playing a critical role in coordinating the funding and management of these resources. The BDH up to Chisaibi and the Trans-Taiga Road, the northwest section of the Route du Nord, and EM1-Muskeg-Sarcelle roads are managed under this agreement.

Typically, the part of the network outside of the MTMD's jurisdiction is not intended for heavy transportation, which means that the shipper is responsible for inspecting structures and road conditions to ensure safety conditions. Additionally, shippers must obtain wide-load transport permits for each shipment.

Load Limits

As prescribed in the MTMD's *Vehicle Load and Size Limits Regulation* (C-24,2, r.31, s III,14) (MTES, 2022), the MTMD and municipal road networks are subject to weight limits. These limits are more stringent during the spring thaw. Trucks using Route 109, 113 or 167, for example, must comply with these rules.

The BDH is subject to load limits according to a. 21-23 and Appendix C of the Regulation. The maximum gross load is 60 T for A40-A69 combinations (2 units) and 100 T for road trains (3 units). Historically, there was no prescribed load restriction for the thaw period. However, in light of the recent repairs and renewal work of the BDH, the SDBJ started imposing additional load limits during the spring thaw to mitigate further damage to the road. These restrictions are set by monitoring road bearing capacity and weather conditions.

In some cases, exemptions may be given to allow for complete heavy or oversized trucking. The 7-km link on Route 109 between the Centre de transbordement de Matagami (CTM) and the BDH is an example of where this occurs (VEI-WSP, 2022).

10.3.2.3 Specific Roads

The ***Billy Diamond Highway*** is vital as the infrastructure for the region provides the only way to access the western communities and the La Grande Complex area. Originally built in 1971, the 600 km of 10 m wide paved road (Intervia, 2019), was designed to accommodate high loads and wide trucks used for the movement of equipment during the construction of the La-Grande complex and all subsequent hydroelectric projects. The SDBJ has rehabilitated half of its length and the other half is currently being rehabilitated. Several access roads extend from Cree localities and various hydroelectric infrastructure to the BDH, while gravel roads extend westward from the BDH to the Cree communities of Waskaganish, Eastmain and Wemindji. Table 10.3-2 specifies the different points along this highway.

Table 10.3-2: Points, Billy-Diamond Highway

Points	KP (km)
Billy-Diamond Highway	
Matagami	0
Waskaganish Road	237
Rupert River Bridge	257
Route du Nord	301
Eastmain Road	237
Le Relais	381
Wemindji Road	518
Trans-taiga Road	544
La Grande Airport Access Road	589
Chisasibi	600

The BDH mainly serves:

- Private trips generated by the populations in the west of Eeyou Istchee Baie-James region, including Waskaganish, Eastmain, Wemindji, Chisasibi, Nemaska (MERN, 2020a) and Radisson;
- Journeys by the Cree to other communities, and access to traplines and other traditional sites (WSP, 2016);
- Tourism in Eeyou Istchee Baie-James;
- Shipping goods to the Waskaganish, Eastmain, Wemindji, Chisasibi and Nemaska communities which would otherwise be shipped by air or by boat in the case of Wemindji;
- Shipping goods, equipment and materials to Hydro-Québec power stations and substations as well as shipping goods to Hydro-Québec employees in living in different communities including Radisson, Némiscau and Eastmain (WSP, 2016);
- Transportation of oversized equipment from rail terminals in Matagami and Chibougamau (WSP, 2016);
- Transportation of supplies, inputs and outputs, mainly by the forest industry (Scierie Landrienne and Nordbord), and by mining companies (Eleonore); and
- Transportation of air carriers' cargos to Nord-du-Québec from the La Grande-Rivière Airport, located at the northern end of this highway (Radisson, 2022).

The speed limit is 100 km per hour (KPH). In 2016, the average annual daily traffic (AADT) was 155 vehicles per day (VPD), from which 48 were heavy vehicles per day (HVPD) or 31% of total volume (Intervia, 2019).

The ***R-1005*** (R-1000/R-1005), under MTMD jurisdiction, is a 108 km gravel forest road linking Lebel-sur-Quévillon and Matagami. It serves Résolu Comtois sawmill and intraregional journeys. This road follows the same corridor as the Matagami CN railway subdivision. Even though this gravel road runs north from Quévillon to Matagami, it provides a nominal east-west link acting as a bypass for vehicles wanting to avoid Val d'Or. It can also be used as a link on the Montreal-Abitibi-Matagami route via the R117 and R113, as it is shorter in time and avoids Amos. Given its structure, this road cannot be used for oversized trucks (VEI-WSP, 2022).

The AADT on this road is approximately 500 VPD, from which 200 heavy vehicles. The AADT has fluctuated between 600 and 400 VPD from 2016 to 2020 (MTMD, 2016, 2018, 2020b ; Intervia, 2019). This road has the highest volume in the region after the R113-R167 segment between Chapais, Chibougamau and Mistissini.

Route 113 links the R117 from nearby Val-d'Or to Senneterre, Lebel-sur-Quévillon, Desmaraisville, Chapais and the R167 near Chibougamau. It is a paved road with a speed limit of 90 KPH. The R117 allows journeys to Rouyn-Noranda, Ontario, Gatineau-Ottawa and Montreal. Routes 113 and 167 form a direct east-west link between Saguenay-Lac-Saint-Jean and Abitibi-Témiscamingue.

Route 167 extends from Saint-Félicien to Chibougamau, Mistissini and the Renard mine site, operated by Stornoway. The last 100 km leading to the Stornoway site is categorized as a resource road. The R167 connects to Route 169 and from there to La Tuque and Trois-Rivières, to Saguenay and Baie-Comeau, or to Quebec City.

The ***Route du Nord*** (RN) was inaugurated in 1993. It is an unpaved 406 km road operated by Hydro-Québec, the MTMD and SDBJ that extends between R167 (15 km northeast of Chibougamau), Nemaska and James Bay sector at the KP 275 junction of the BDH. Nemaska is connected to the Route du Nord at KP 300 by a 10 km-access road. The Route du Nord has a bridge at KP 19 and a major crossing over the Rupert River at KP 238. The road was key to providing access to companies from eastern Quebec to the Hydro-Québec job sites during the construction of the La-Grande complex. Currently, the road is primarily used by members of Cree communities, forestry and mining

industries, and tourists heading to the Assinica and Nibiischii wildlife reserves in the area (CDC, 2021b). Some gravel replacement has been planned for the section between PK102 and PK129.

The speed limit is 70 KPH. Although the Troilus mine used this road from the mid-1990s until its closure in 2010, this road is not designed for heavy or oversized trucks. When such trips are required, the user bears specific load capacity inspections which may significantly increase the transport cost. The inspections are meant to measure maximum weight for safe passage without risking damage to the infrastructure or endangering public safety. Under the current conditions, this corridor may not fully serve as an interregional road link (VEI-WSP, 2022).

The ***Trans-taiga Road*** is the northmost connected road in Quebec (Shields, 2012). This gravel road, operated by Hydro-Québec, extends eastward from KP 542 of the BDH 666 km to the Caniapiscau Reservoir. Brisay, located far east, is accessible by this road.

Access roads connect the Cree communities to the regional roads (BDH, R113, RDN), except for Waswanipi and Chisasibi, which are directly served by R113 and the BDH respectively, and Whapmagoostui-Kuujjarapik which are isolated. These access roads are described below.

The Waskaganish access road, built in the early 2000s, connects the Cree community of Waskaganish to KP 235 of the BDH, on a length of 102 km. Approximately 25 km are paved in the western section from the community, and the other section of 77 km between this point and the junction with the BDH are graveled. The road includes no major bridge (CDC, 2021a).

The Eastmain access road, built in the 1990s, connects the Cree community of Eastmain to KP 350 of the BDH. Out of the total length of 104 km, the western section of the road near the community is paved on 30 km while the remaining 74 km are graveled. This road has no major bridges (CDC, 2021a). Some improvement work has been planned.

The Wemindji access road connects Wemindji to KP 518 of the BDH. Built in the mid 1990s this 96 km long road, of which 80 km is graveled, has a one-lane major bridge over Maquatua River 4 km east of Wemindji (CDC, 2021a).

The Nemaska access road connects Nemaska to KP 298 of the Route du Nord. This 10 km long road, built in the 1990s, is graveled with a series of culverts at the *Narrows* / Champion Lake 5 km from the community of Nemaska (CDC, 2021a).

The Mistissini access road, a 15 km paved road, connects Mistissini to KP 304 of R167.

The Oujé-Bougoumou access road is a 26 km paved way and connects Oujé-Bougoumou to R113.

10.3.2.4 Routes, Distances, and Travel Times

There are two routes that link southern Québec and Eeyou Istchee Baie-James, one from Abitibi via Routes 117, 111, 109 and BDH, and the other from Lac-Saint-Jean via Routes 169, 167 and Route du Nord. To the North, Route Transtaiga connects west to the BDH and runs 660 km east to Caniapiscau. On intercommunity road travel distances and times are based on summer driving conditions. Winter conditions could extend travel time considerably. The travel times also assume that personal vehicles are equipped with extra fuel capacity to accommodate extensive inter-area distances.

Table 10.3-3: Intercommunity Regional Car Travel Distances and Travel Times

Road - km / Travel time hh:mm	Brisay	Chapais	Chibougamau	Chisasibi	Eastmain	Lebel-sur-Quévillon	Matagami	Mistissini	Nemaska	Oujé-Bougoumou	Radisson	Waskaganish	Waswanipi	Wemindji	La Grande 3
Brisay	-	1426	1470	720	875	1230	1122	1321	956	1277	655	989	1335	692	-
Chapais	21:13	-	45	988	757	223	315	133	361	37	923	644	93	908	-
Chibougamau	21:44	0:33	-	1026	795	257	360	89	248	673	770	681	137	946	-
Chisasibi	12:58	11:28	12:15	-	438	790	684	1115	518	1019	106	550	892	254	-
Eastmain	16:34	10:23	11:10	7:00	-	558	453	884	287	788	373	318	660	357	-
Lebel-sur-Quévillon	19:06	02:18	2:49	9:23	8:18	-	116	345	488	250	725	446	122	709	-
Matagami	17:44	03:39	4:10	8:20	7:11	1:34	-	448	383	352	620	339	224	64	-
Mistissini	22:09	01:35	1:05	12:30	12:15	3:53	5:15	-	366	148	819	613	226	803	-
Nemaska	16:19	5:51	3:20	6:35	5:28	6:13	5:00	5:56	-	332	366	1170	440	438	-
Oujé-Bougoumou	21:38	0:28	8:10	12:10	11:00	2:44	4:15	1:50	5:36	-	775	673	130	780	-
Radisson	12:13	10:43	11:11	1:14	6:05	8:37	7:15	11:40	5:50	11:08	-	487	832	189	-
Waskaganish	16:56	8:00	8:15	6:45	5:40	5:55	4:20	9:20	13:30	8:10	6:27	-	546	469	-
Waswanipi	20:17	1:03	1:35	10:50	9:45	1:23	2:42	2:40	6:50	1:30	9:47	06:50	-	811	-
Wemindji	13:28	11:20	12:10	3:40	6:50	9:14	8:16	12:15	6:30	12:10	2:58	06:50	10:45	-	-
Interregional															
Baie-Comeau	29:00	-	07:37	19:14	-	10:07	11:28	08:40	-	-	-	15:02	8:36	-	20:20
Gatineau/Ottawa	25:00	-	08:26	14:57	-	05:42	07:08	09:28	-	-	-	11:00	6:52	-	16:16
Montreal	26:00	-	07:54	16:10	-	06:55	08:21	08:56	-	-	-	12:36	8:28	-	17:52
North Bay	23:52	-	08:42	14:09	-	05:58	06:14	09:44	-	-	-	10:16	7:11	-	15:33
Quebec City	27:00	-	05:33	17:10	-	08:00	09:21	06:35	-	-	-	13:11	6:44	-	18:27
Rouyn-Noranda	20:44	-	05:37	11:01	-	02:50	03:06	06:39	-	-	-	7:07	4:02	-	12:24
Saguenay	25:00	-	04:04	15:42	-	06:32	07:53	05:06	-	-	-	11:41	5:12	-	16:56
Val-d'Or	20:28	-	04:31	10:45	-	01:47	02:50	05:33	-	-	-	6:53	3:00	-	12:09

Source: Google Maps, VEI compilation.

10.3.2.5 Road Traffic Volumes

Traffic volumes are compiled from MTMD datasets (2016, 2018, 2020b) for the 2016-2020 period. These datasets include annual average daily traffic (AADT), and the percentage of which is trucking on MTMD's network. However, it should be noted that volume data is not collected on roads under SDBJ, Hydro-Québec and MFFP responsibility. The AADT is presented in Table 10.3-3 and in Figure 10.3-3.

The AADT was 155 vehicles per day (VPD) on the BDH in 2016. More recent data is not available. The traffic volume on R113 between Lebel-sur-Quévillon and Waswanipi amounted to 480 VPD in 2020, an increase of 45% compared to 2016. Between Waswanipi and Chapais, the traffic volume was 930 VPD in 2020, 22% higher when compared to 2016. In 2020, the AADT volume on R167 between Chibougamau and the Route du Nord was 1,100 VPD and 660 VPD between the Route du Nord and Mistissini access road (rue Principale). On this latter road between the R167 and Mistissini Beach the volume was approximately 1,000 VPD. The traffic volumes on these three segments remained constant or fluctuated between 2016 and 2020. The traffic volume on the eastern segment of the Route du Nord was approximately 250 VPD in 2020, compared to 100 VPD in 2016 (150% increase). The most frequently

used road segments are between the two significant communities of Chibougamau and Chapais with a 4,200 VPD recorded in 2020 on R167 south of Chibougamau. This traffic, which is predominantly local, increased by 8-10% between 2016 and 2020. The traffic volumes on the roads that exit Eeyou Istchee Baie-James amounted to 590 VPD on R109 to Amos, 1,000 VPD on R113 to Senneterre and 930 VPD on R167 to Saint-Félicien. These volumes were stable on R109 and R167 over the 2016-2020 period.

Table 10.3-4: Annual Average Daily Traffic Volumes, Eeyou Istchee Baie-James, 2016-2020

Road and Location	KP	2016	2018	2020
R109 Route 810 - Rte de l'Aéroport	158-215	590	600	590
BDH Rue Nottaway - Route du Nord		155	.	.
R113 R397 - Ch du Moulin	106-124	820	830	1,010
R113 Bd Quévillon - Miquelon	124-190	410	410	.
R113 Desmaraisville - Rivière Waswanipi	194-242	330	450	480
R113 Waswanipi East - West Chapais	244-334	760	850	930
R113 East Chapais - Faribault CN Crossing	338-366	2,100	2,190	2,260
R167 Rte Chibougamau Explorers - R113	192-220	940	950	930
R167 R113 - Bd Hamel	220-230	3,800	4,000	4,200
R167 Hôpital de Chibougamau - Ch Copper Rand	230-238	1,390	1,440	1,420
R167 Ch Copper Rand - Route du Nord	238-252	1,120	1,130	1,100
R167 Route du Nord - Mistissini Access Road	254-304	690	710	660
R167 Mistissini Road - Route de la Mine-Renard	304-410	70	70	70
Oujé-Bougoumou Road Forest Road - Road to Lake Dadson	21-22	-	410	440
R1005 Comtois - Matagami	44-106	560	630	440
RDN R167 - Lake Châtillon	10-107	100	250	260
RDN Lake Châtillon - Lake Lezal (end of MTMD Road)	110-258	70	220	230
Mistissini Road R167 - Mistissini Beach	1-4	970	1,110	990

Source: MTMD (2016, 2018, 2020b), Intervia (2019).

The traffic volumes are estimated at 150 to 250 VPD on the BDH and the Route du Nord, with a possible increase over the short term. In the vicinity of Waswanipi and Mistissini, the traffic volumes would approach 1,000 TPD, a part which is due to regional traffic and the remainder of local journeys. Daily volumes exiting the region corresponds to approximately 2,500 VPD. The medium-term evolution of traffic volumes has differed, with stability or fluctuations in some areas, and moderate or significant growth in other areas. The growth might be explained by increased economic activity, notably mining exploration. This impact is proportionally more influential on low-volume roads.

In the absence of data on traffic volumes on access roads and the BDH, the level and evolution of road traffic may be approached by indirect variables such as the number of registered cars in Eeyou Istchee and the car use rates based on data for remote communities.

The number and rate of registered light vehicles are presented in Table 10.3-5 for Eeyou Istchee, Jamésie (Baie-James) and similar RCMs or equivalent territories (TE) in 2016 and 2021. The amount of light registered vehicles

and the number of drivers' licenses are almost equivalent in this category of regions. Note that in urban areas, the number of registered light vehicles is less than the number of drivers' licenses, because of the use of transit. The situation in 2021 reveals that the rate of registered light vehicles per capita is 0.29 among the Cree communities, less than half of that of the Jamesian communities with 0.70 per capita. The overall rate for Eeyou Istchee Baie-James (0.49) is comparable to that of another remote RCMs/TE in Québec, such as Caniapiscau (0.51) and Golfe-du-Saint-Laurent (0.51). The Jamesian rate is similar to that in Abitibi (0.67-0.74) and Maria-Chapdelaine (0.73) (Lac-Saint-Jean) areas. It should be noted that data is not available for the BDH, access roads or for a portion of the RDN.

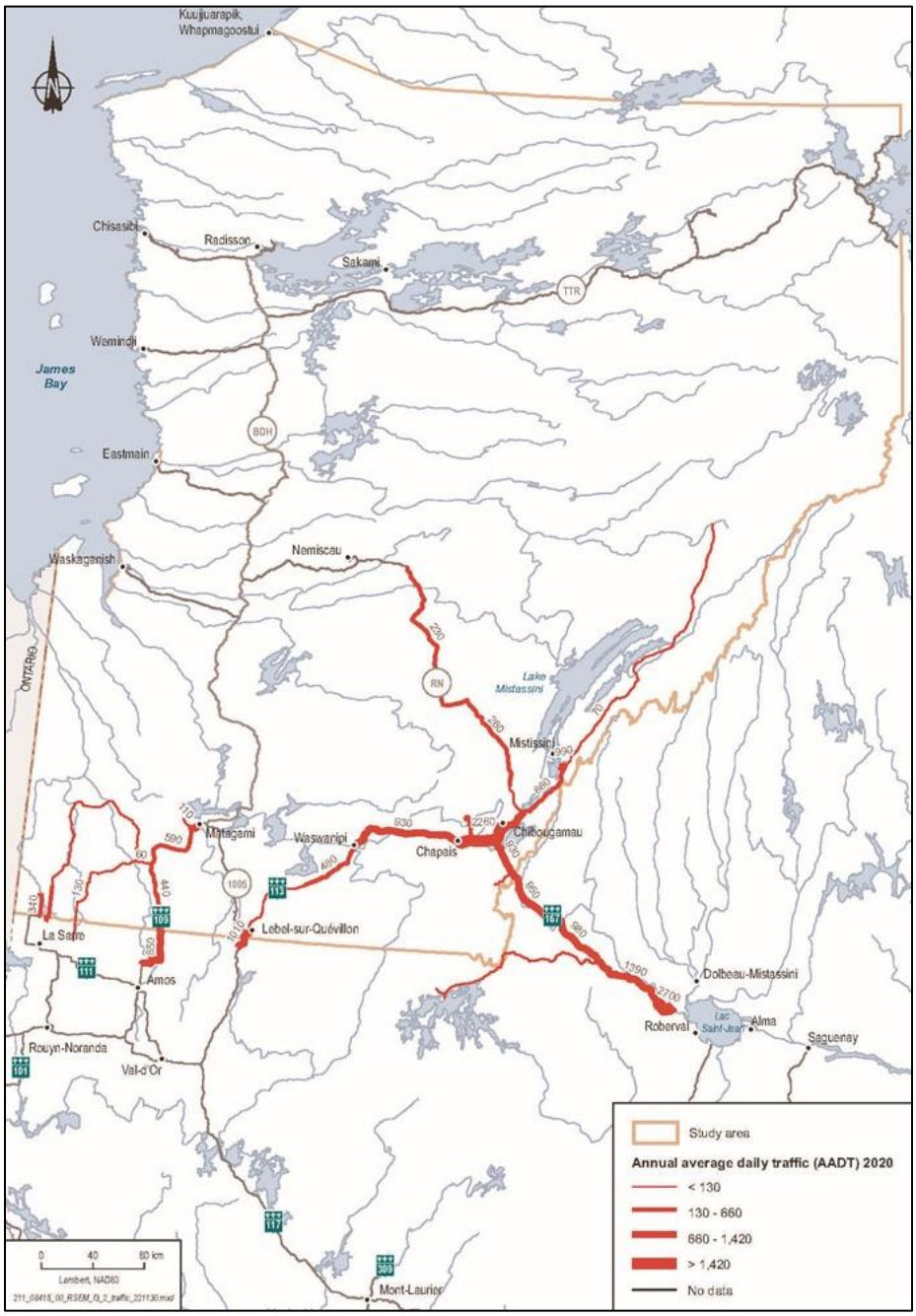


Figure 10.3-3: Road Annual Average Daily Traffic Volumes, Eeyou Istchee Baie-James, 2020

Table 10.3-5: Number and Rate of Registered Light Vehicles, RCMs and TEs, 2016 and 2021

2016			
RCM/TE	**Population**	**Registered light vehicles**	**Light vehicle per capita**
Eeyou Istchee	17,700	4,738	0.27
Jamésie	13,965	9,415	0.67
Nunavik	13,530	264	0.02
Abitibi	24,820	17,341	0.70
Abitibi-Ouest	20,925	14,822	0.71
Vallée-de-l'Or	43,870	28,635	0.65
Maria-Chapdeleine	25,080	17,327	0.69
Golfe-du-Saint-Laurent	4,850	2,202	0.45
Minganie	6,595	3,899	0.59
Caniapiscau	4,060	1,891	0.47
Quebec	8,325,540	4,671,968	0.56
2021			
RCM/TE	**Population**	**Registered light vehicles**	**Light vehicle per capita**
Eeyou Istchee	18,679	5,415	0.29
Jamésie	13,418	9,390	0.70
Nunavik	14,576	293	0.02
Abitibi	24,943	17,794	0.71
Abitibi-Ouest	20,580	15,144	0.74
Vallée-de-l'Or	43,765	29,207	0.67
Maria-Chapdeleine	24,469	17,825	0.73
Golfe-du-Saint-Laurent	4,633	2,358	0.51
Minganie	6,458	4,025	0.62
Caniapiscau	3,849	1,952	0.51
Quebec	8,604,495	4,994,612	0.58
Variation 2016-2021 (% CAGR)			
RCM/TE	**Population**	**Registered light vehicles**	**Light vehicle per capita**
Eeyou Istchee	1.1%	2.7%	1.6%
Jamésie	-0.8%	-0.1%	0.7%
Nunavik	1.5%	2.1%	0.6%
Abitibi	0.1%	0.5%	0.4%
Abitibi-Ouest	-0.3%	0.4%	0.8%
Vallée-de-l'Or	0.0%	0.4%	0.4%
Maria-Chapdeleine	-0.5%	0.6%	1.1%
Golfe-du-Saint-Laurent	-0.9%	1.4%	2.3%
Minganie	-0.4%	0.6%	1.1%
Caniapiscau	-1.1%	0.6%	1.7%
Quebec	0.7%	1.3%	0.7%

Source: Compiling and calculation from SAAQ (2017, 2022).

The growth in car ownership, defined as registered light vehicles per capita between 2016 and 2021, has been higher in more remote territories than where people already have more cars or light vehicles. The Compounded Annual Growth Rate (CAGR) was 1.6% for Crees and 0.7% for Jamesians. The same pattern is observed when comparing Caniapiscau and Golfe-du-Saint-Laurent to Abitibi. The combination of growth in car ownership and population changes have led to a higher growth in the number of registered light vehicles in the Cree population. This means that the trip generation from Cree communities should increase significantly in the future.

Different isolated communities were compared to the traffic volumes generated on the only road that links them to any other place. This was used to estimate a trip generation rate for Cree communities and their access roads for which no traffic data is available. Table 10.3-6 details such rates for four different groups of communities for which population and car AADT data were available for year 2021.

Table 10.3-6: Car AADT per capita, Isolated Communities in Quebec, 2021

Local Community	Population	Car AADT (VPD)	Car VPD per capita
East Cree Communities	**6,499**	**2,150**	**0.33**
Oujé-Bougoumou	814	374	0.46
Mistissini	3,858	1,120	0.29
Waswanipi	1,827	656	0.36
Jamesian Communities	**12,194**	**8,710**	**0.71**
Matagami	1,402	1,100	0.78
Lebel-sur-Quévillon	2,091	990	0.47
Chibougamau	7,233	4,600	0.64
Chapais	1,468	2,020	1.38
Peripheral Communities	**5,174**	**6,658**	**1.29**
La Reine	307	390	1.27
Duhamel	569	780	1.37
L'Ascension	899	900	1.00
Lamarche	467	610	1.31
Notre-Dame-de-Lorette	159	270	1.70
Lac-Édouard	220	240	1.09
Albertville	228	249	1.09
Sainte-Marguerite-Marie	177	287	1.62
L'Ascension-de-Patapédia	158	273	1.73
Saint-André-de-Restigouche	156	150	0.96
Saint-Ludger-de-Milot	637	910	1.43
Saint-Alphonse-de-Caplan	730	1,029	1.41
Saint-Elzéar-de-Bonaventure	467	571	1.22
Remote Communities	**6,307**	**1,393**	**0.22**
Belleterre	299	158	0.53
Winneway	210	195	0.93
Kegaska	167	124	0.74
Fermont	2,354	230	0.10
Wemotaci	1,142	504	0.44
Opitciwan	2,135	182	0.09

Source : Compiling and calculation from MTMD (2022c), ISQ (2021).

These groups include:

1. East Cree communities.
2. Jamesian communities.
3. Peripheral Communities located in regions such as Abitibi-Témiscamingue, Laurentides, Mauricie and the Gaspé Peninsula are characterized by their relative isolation as they can only be accessed by a single road from another nearby community. However, the distance between these communities is practical for daily travel, meaning that people can make the journey between the two communities in a reasonable amount of time.
4. Remote communities located in areas such as East Témiscamingue, Haute-Mauricie, Caniapiscau and Basse-Côte-Nord are located far from any other service community and can only be accessed by a single road. However, unlike the first edge communities, the distance between these remote communities is such that it barely allows for daily journeys. This suggests that the travel time required to reach these communities is quite significant, making regular travel to and from them difficult. For some of these remote communities (specifically, 1 Cree and 4 Jamesian communities), there are two directions from which the community can be accessed by the road. As a result, the AADT has been adjusted to consider transit traffic, or the amount of traffic passing through these communities on their way to/from other destinations.

The trip generation per person rate in the East Cree communities is globally 0.33 VPD per capita but varies between communities. Specifically, the rate is higher in Oujé-Bougoumou and Waswanipi compared to Mistissini, which may be due to the fact that these communities are not entirely enclaved (isolated), and the road access serves other users.

For Jamesian communities, the rate is estimated at 0.71 VPD per capita and varies depending on the community. Edge communities, which were previously described, have a higher rate on average of 1.27 VPD per capita with low variability. In remote locations such as Opitciwan and Fermont, the rate can be very low (0.09 and 0.10, respectively). Distance appears to be a factor in explaining the trip generation, which is consistent with observations in transportation planning. However, in some cases, the rate may be higher due to tourism or other factors, such as the example of Kegaska.

AADTs shown in Table 10.3-7 for 2021 were estimated using 0.33 VPD per capita generation factor for the coastal Cree communities. In the absence of recent MTMD data regarding the BDH, the AADT for this road has been adjusted in view of the increase in traffic on the Route du Nord and R113 and trucking data in WSP (2021a) and SNC-Lavalin (2021).

10.3.2.6 Trucking and Freight

Part of the supply chain to Inuit communities is trucking on the BDH, with transshipment to airplane at the Radisson airport or to boat at Wemindji (Radisson, 2021). The Fédération des coopératives du Nouveau-Quebec (FCNQ) and Kepa Transport provide the majority of road transportation in the study area (WSP, 2021a). Kepa Transport, a Cree joint venture company, provides road transport for consumable goods for the FCNQ and for several businesses in the region, including Hydro-Québec.

In 2007, the last year available of the Canadian roadside trucking survey, the highest volume of freight traffic was found on highways 167, 170 and 155, mainly between Chibougamau and Trois-Rivières or Saguenay, but also Québec City and Montreal, as shown in Figure 10.3-4Figure 10.3-3. Movements to North Bay via New Liskeard were also significant. Up north, the Route du Nord seems to be the road used for Hydro-Québec sites while the BDH between Matagami and the Route du Nord would be less used by truck. It is worth noting that 2007 was a year of

intense construction of the EM-1/EM-1A hydroelectric projects, which may explain the high use of the Route du Nord. The thick blue line shows the origins and trajectory for trucks whose final destination is Eeyou Istchee-Baie-James. Note also that the information dates, so this may have changed significantly since then.

Table 10.3-7: Estimated AADT Volumes, Cars and Trucks, Eeyou Istchee Baie-James, 2021

Road and Location	KP	AADT	% Trucks	Cars	Trucks	
BDH Matagami – Route du Nord (2016)		155	31%	107	48	(1)
BDH Matagami – Route du Nord (2021)		415	45%	227	188	(4)
R1005 Lebel-sur-Quévillon - Matagami	44-106	540	40%	324	216	(2)
R113 Lebel-sur-Quévillon - Miquelon	124-190	414	25%	310	104	(2)
R113 Desmaraisville – Waswanipi	194-242	480	23%	370	110	(3)
R113 Waswanipi - Chapais	244-334	930	18%	763	167	(3)
R113 Chapais – Faribault CN Crossing	338-366	2,260	18%	1,853	407	(3)
R167 R113 – Chibougamau	220-230	4,200	11%	3,738	462	(3)
R167 Chibougamau – Route du Nord	238-252	1,160	14%	1,000	160	(2)
R167 Route du Nord – Mistissini Access Road	254-304	710	11%	635	75	(1)
R167 Mistissini Access Road – Route de la Mine-Renard	304-410	70	50%	35	35	(3)
Rte du Nord R167 – Lake Châtillon	10-107	260	33%	175	85	(3)
Rte du Nord Lake Châtillon – end of MTQ Road	110-258	230	33%	155	75	(3)
Waskaganish Road		90		78	12	(4)
Nemaska Road		39		28	11	(4)
Eastmain Road		43		32	11	(4)
Wemindji Road		63		52	11	(4)
Mistissini Road R167 - Mistissini Beach	0-4	1,120	4%	1,080	40	(2)
Oujé-Bougoumou Road		510	7%	474	36	(2)

(1) Data 2016 last available.

(2) Data 2020 or 2021 used (constant or growing trend).

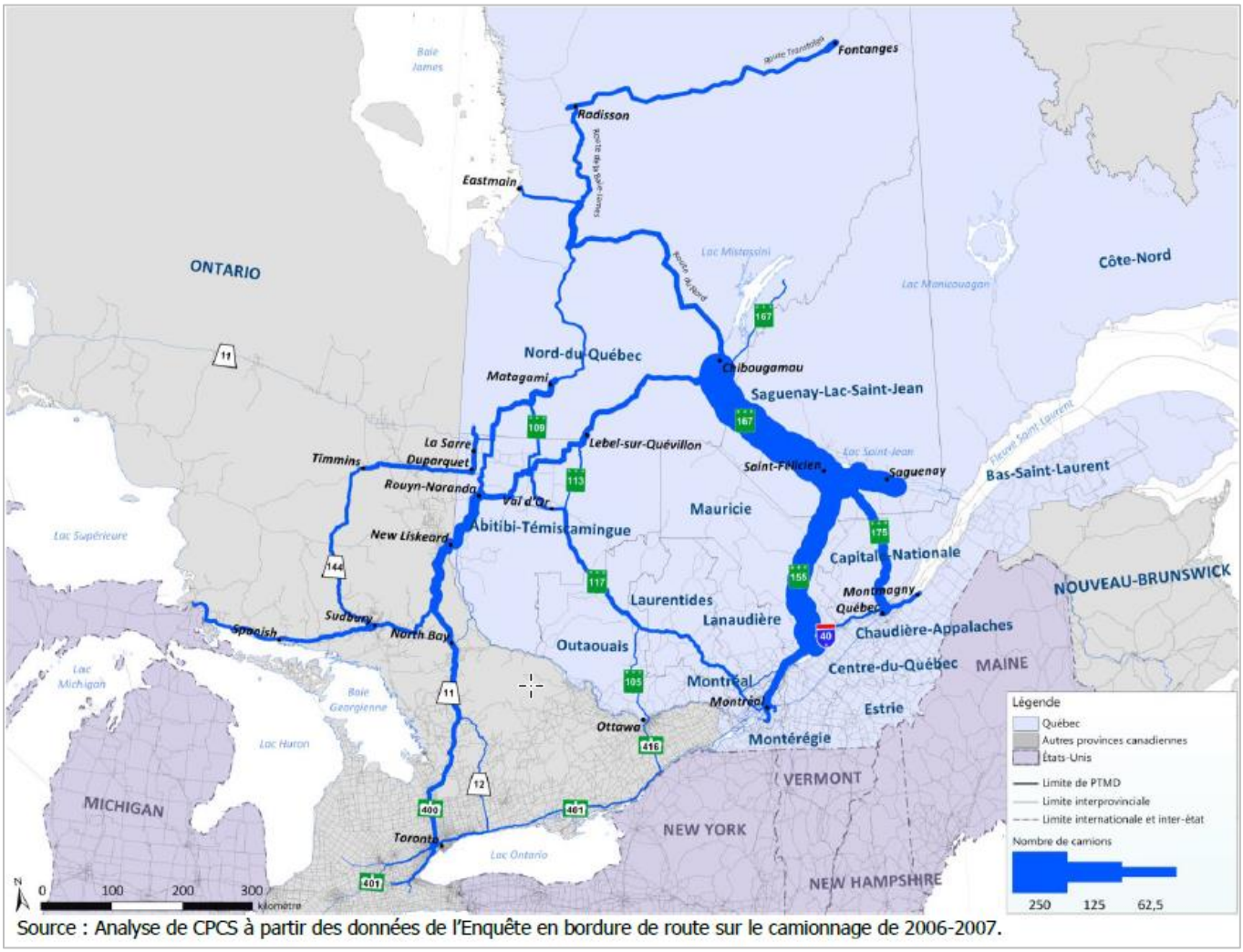
(3) Average 2016-2020 (fluctuating trend).

(4) Estimate. *Values in italics are estimated.*

Source: Compiling MTMD (2020b, 2022c) and estimates

Traffic counts on the different roads, shown in Figure 10.3-4 Table 10.3-8 indicate the following volumes: 50 heavy vehicles per day (HVPD) on the BDH, 100 on the R113 west of Waswanipi, 170 on the R113 west of Chapais, 75 on the Route du Nord, and 40 on Mistissini access road.

The destination of trucks using the BDH north of Matagami was registered until 2014. Table 10.3-8 shows that approximately 90 HVPD (in both directions) used the BDH by that period. Half of this traffic was generated by forest activity, thus south of the KP 150. The trucking volume to/from Cree communities amounted to 12 HVPD, 1 or 2 HVPD per community except for Chisasibi with 4 HVPD. Hydro-Québec generated 10 HVPD by this road.



Source : Analyse de CPCS à partir des données de l'Enquête en bordure de route sur le camionnage de 2006-2007.

Figure 10.3-4: Eeyou Istchee Baie-James Truck Traffic Volumes, 2006-2007

Table 10.3-8: Truck Traffic, Annual and Daily, Billy Diamond Highway (route de la Baie-James), by Destination, 2005-2014

	Annual	Daily	Trend	Dates covered
HQ Sites	1,927	5.3	Constant	2012-2014
– *Significant site: LG-2*	*1,077*	*3.0*	*Constant*	*2007-2014*
Opinaca Mine	2,737	7.5	Increasing	2012-2014
Forestry Sites	8,543	23.4	Fluctuating	2005-2014
– *Significant site: km 60*	*2,004*	*5.5*	*Fluctuating*	*2010-2014*
– *Significant site: km 105*	*923*	*2.5*	*Fluctuating*	*2010-2014*
Pourvoirie Mirage	48	0.1	Decreasing	2008-2014
Others	678	1.9	Fluctuating	2008-2014
Total - Economic activities	**13,932**	**38.2**		
Communities				
Cree Community	Annual	Daily	Population	Annual Trucks/capita
Waskaganish	584	1.6	2,115	0.28
Nemaska	125	0.3	716	0.17
Eastmain	270	0.7	773	0.35
Wemindji	413	1.1	1,366	0.30
Chisasibi	753	2.1	4,504	0.17
Total / Average	2,144	5.9	9,474	0.23
Radisson	535	1.5	200	2.68
Total - Communities	***2,679***	***7.3***	***9,674***	***0.28***
Total - Companies and Communities	**16,611**	**45.5**		

Note: Unidirectional trips. For AADT, the volumes must be multiplied by 2.
Source: WSP (2019).

10.3.2.7 Bus and Shuttle Services

The passenger coach service in Eeyou Istchee Baie-James is provided by two companies, Maheux and Intercar. Autobus Maheux provides passengers coach service in Abitibi-Témiscamingue as well as in the R109-BDH and R113 corridors in Eeyou Istchee Baie-James (AITQ et al., 2020). The link between Chibougamau and Saguenay-Lac-Saint-Jean is provided by Groupe Intercar (BCF, 2022). The coach network structure is presented in Figure 10.3-5.

Autobus Maheux has provided intercity bus services in Abitibi-Témiscamingue since 1994. The company offers two services daily there and back between Rouyn-Noranda / Val-d'Or and Montreal for a journey time of approximately 8.5 and 7 hours, respectively. Bus services are provided weekly between Val-d'Or and Chisasibi for a total journey time of 11 hours, as detailed in Table 10.3-9. Since the bus route follows the BDH, the communities of Waskaganish, Eastmain, Nemaska and Wemindji are not directly served, and bus users must drive or be driven to the stop at the junction with BDH. Between Val-d'Or and Matagami, the trip duration is approximately 3 hours. The connection with the Montreal Service is possible with a 3–4-hour layover (Maheux, 2022).

The average travel speed of the Val-d'Or-Chisasibi bus service is approximately 84 kph. The 1,000 km trip from Val-d'Or to Chisasibi takes over 11 hours, which is efficient in terms of driver schedule allocation. The before taxes fare for a ride between Val-d'Or and Waskaganish Junction is $104, whilst up to Chisasibi this amounts to $201. The journey between Val-d'Or and Montreal costs $99.

Figure 10.3-5: Coach Service Network Structure, Eeyou Istchee Baie-James

Autobus Maheux also provides a Sunday to Friday coach service between Val-d'Or and Chibougamau. This route serves Senneterre, Lebel-sur-Quévillon, Waswanipi and Chapais. The journey takes 2 hours to Lebel-sur-Quévillon, 4 hours to Waswanipi and 6 hours to Chibougamau. The service to Montreal is possible with a varying connection between 1 and 4 hours (Maheux, 2021). The average travel speed is approximately 69 kph, the travel time between Val-d'Or and Waswanipi is just over 4 hours, and it takes around 6 hours up to Chibougamau. The adult fare (before GST-TVQ) is approximately $58 to Waswanapi and $71 between Val-d'Or and Chibougamau.

The average distance fare lies between $0.21 and $0.25 per km, before taxes (GST and TVQ).

Autobus Maheux reported an average of 7.2 passengers per trip in 2018, a reduction of 7.2% from 2017 (CBC, 2019). The parcel service has seen significant growth since it was first offered. In 2019 it brought in $112,000, up from $88,000 in 2018. The rates are cheaper than those offered by Canada Post and other courier services (Bell, 2019).

Table 10.3-9: Autobus Maheux Travel Times and Rates from Val-d'Or, 2021

Stop	Distance (km)	Travel time (h)	Average Speed (kph)	Northbound ↓			Southbound ↑		
				Wed., Sat.	Adult Fare (1)	Fare/km	Thur., Sun.	Adult Fare (1)	Rate ($/km)
Val-d'Or - Chisasibi									
Val-d'Or ●	0			8:00			19:04	201 $	0.215 $
Amos ●	67	0:45	89	8:45	17 $	0.251 $	18:18	186 $	0.215 $
Matagami ●	251	2:42	93	10:42	61 $	0.242 $	16:22	147 $	0.215 $
		3:12		11:12			15:52		
Jct Waskaganish	486	5:42	85	13:42	104 $	0.213 $	13:22	97 $	0.218 $
Camp Rupert (KM257)	506	5:54	86	13:54	108 $	0.213 $	13:09	93 $	0.217 $
Jct Nemaska (RDN)	524	6:05	86	14:05	112 $	0.213 $	12:59	89 $	0.219 $
Jct Eastmain	599	7:00	86	15:00	130 $	0.217 $	12:04	71 $	0.213 $
Relais 381	629	7:12	87	15:12	134 $	0.213 $	11:51	67 $	0.221 $
		7:42		15:42			11:21		
Jct Wemindji	767	9:00	85	17:00	160 $	0.208 $	9:55	41 $	0.248 $
Jct LG3-Transtaiga (KM 544)	793	9:25	84	17:25	168 $	0.212 $	9:38	33 $	0.234 $
Aéroport La Grande	838	10:01	84	18:01	180 $	0.215 $	9:03	21 $	0.219 $
Chisasibi	933	11:04	84	19:04	201 $	0.215 $	8:00		
Val-d'Or- Chibougamau									
				North-bound ↓			**South-bound ↑**		
Stop	**Distance (km)**	**Travel time (h)**	**Average Speed (kph)**	**Sun.-Fri.**	**Adult Fare (1)**	**Fare/km**	**Sun.-Fri.**	**Adult Fare (1)**	**Rate ($/km)**
Val-d'Or ●	0			9:30					
Louvicourt	34	0:25	82	9:55	10 $	0.294 $	22:00	84 $	0.205 $
Senneterre ●	68	1:05	63	10:35	14 $	0.200 $	21:18		
Lebel-sur-Quévillon ●	156	2:10	72	11:40	31 $	0.200 $	20:55	79 $	0.232 $
		2:45		12:15			19:50	65 $	0.256 $
Miquelon	221	3:30	63	13:00	47 $	0.211 $	19:30		
Desmaraisville ●	245	3:50	64	13:20	52 $	0.210 $	18:45	50 $	0.270 $
Waswanipi ●	274	4:10	66	13:40	58 $	0.212 $	18:25	45 $	0.273 $
Chapais ●	365	5:20	68	14:50	65 $	0.179 $	18:00	37 $	0.277 $
Chibougamau ●	409	5:55	69	15:25	71 $	0.175 $	16:55	13 $	0.309 $
							16:25		
Other Lines / Connection at Val-d'Or									
From/to	**Distance (km)**	**Travel time (h)**	**Average Speed (kph)**	**Daily (2)**	**Adult Fare (1)**	**Fare/km**	**Daily (2)**		
Grand-Remous ●	253	2:50	89	5:20	57 $	0.224 $	23:35	57 $	0.224 $
Montreal ●	525	7:05	74	5:20	99 $	0.188 $	23:35	99 $	0.188 $

● Stop, ticket and service

Note 1: All fares exclude GST and TVQ. Adult fare one way. Discount of 30% for children (5-12 years) and 15% for students and elderly people.

Note 2: Service twice a day on Montreal - Grand-Remous - Val-d'Or - Rouyn route.

Source: Calculation from Maheux (2021).

The regional coach service in Abitibi is unprofitable and the regional county municipalities (RCM) subsidize the service provided by Maheux on a punctual basis. The carrier advocates for a more reliable and sustainable funding (Deshaies, 2019). In Eeyou Istchee Baie-James, the ridership is low and unprofitable. The coach service is provided by Autobus Maheux but under the patronage of the CNG, which obtains grants from the MTMD via the rural transit aid program (VEI-WSP, 2022).

Intercar provides a coach service between Chibougamau and Saint-Félicien. One return trip is offered per week, on Thursdays from Saint-Félicien to Chibougamau, and on Fridays from Chibougamau to Saint-Félicien, as indicated in Table 10.3-10. This service stopped during the Covid pandemic and has since resumed.

Table 10.3-10: Intercar Travel Times and Rates, 2022

	Northbound ↓	Southbound ↑					
	Thursday	Friday	Distance (km)	Travel time (h)	Average Speed (kph)	Adult Fare	Fare/km
Quebec City	15:00	13:15	542	7:12	75	$125	$0.231
Alma	18:00	10:15	314	4:12	75	$80	$0.254
Saint-Félicien	19:30	8:35	232	2:37	89	$57	$0.246
Chibougamau	22:10	6:00					

Notes:

1. All data concern link between Chaibougamau and the different cities.
2. Italics = Quebec City - Alma - Saint-Félien route. Quebec City Downtown.
3. Connection at Saint-Félicien.
4. All fares exclude GST and TVQ. Fare discount 15% for students and senior, 30% for children 3-13 years, 50% for children 0-2 years.

Source: Calculation from Intercar (2022).

The journey lasts just over 2.5 hours for between Chibougamau and Saint-Félicien, with a nominal speed of 89 kph. The fare for an adult is $57 with a distance rate of $0.25 per km, which is similar to the Maheux service on the BDH and on other Intercar routes.

At Saint-Félicien, a connection with the Dolbeau – Alma – Quebec City route is possible. The service on this route is offered daily. The journey time is a little more than 4 hours up to Alma and 7:12 up to Quebec City's downtown, the coach. The nominal speed is 75 kph, including the waiting time at Saint-Félicien and the stop time at Alma. The rate is between $0.23 and $0.26 per km, in the same range as the services previously described.

Kepa Transport, a Cree joint venture, provides shuttle services on demand to several companies in the region, including Hydro-Québec and mining corporations (WSP, 2021 ; VEI-WSP, 2022).

10.3.2.8 Road Safety

Road safety conditions are assessed in Eeyou Istchee Baie-James over the 5-year period between January 1, 2015, and December 31, 2019, using the SAAQ (2021) accident dataset completed with MTMD (2021c) subset together with ISQ (2021) population dataset and MTMD (2022a) road network dataset. The situation in the region is compared with the global case in Québec and with similar analysis conducted 20 years previously (1995-1999) by the MTMD (2005b). The different indicators calculated are the frequency of road accidents, their rates, severity, location, and circumstances.

The ***road accident frequency*** amounted to a total of 2,938 registered accidents over the 2015-2019 period (588 per year on average) in Nord-du-Québec, as displayed in Table 10.3-11. Out of this number, 2,669 (534 per year) or 90.8% happened in Eeyou Istchee Baie-James and 269 or 9.2% in Nunavik. This is partly explained by the road

network in Nunavik not being very extensive. The accident rate per capita was slightly less in Nord-du-Québec compared to Québec but it was much less during the 1995-1999 period. Between the two periods, the accident rate per capita in Québec reduced by 17.7%.

Table 10.3-11: Frequency and Rate of Accidents, Eeyou Istchee Baie-James, 1995-2019

			Accidents/100 inhab/yr	
Period	Accidents per year	Population	Nord-du-Québec / EIBJ	Quebec
1995-1999 NQ	647	38,993	1.66	2.14
2015-2019 NQ	588			
2015-2019 EIBJ	534	32,255	1.65	1.76
Variation	-17.4%	-17.3%	-0.3%	
Variation in Quebec	-8.0%	11.7%	-17.6%	-17.6%

Note: Average population over the period.

Source: 1995-1999: MTMD (2005b); 2015-2019: SYSTRA calculations from SAAQ (2021), MTMD (2021c) and MTMD (2005b).

The locations of the accidents are shown in Figure 10.3-6**.** The sections where the most accidents occurred are the R167 near and crossing the town of Chibougamau. The road in this section crosses the town of Chibougamau, and the R113 between Waswanipi and the R167 junction, with low human presence and with long straight roads.

The higher number of reported accidents between Chibougamau and Chapais may be due to either higher traffic volumes or longer road segments. The accident rate is a typical indicator to compare accident sites, providing an accident probability by removing the volume and length effects. The road section with the highest accident rate in Eeyou Istchee Baie-James is the 3^{e} Rue (R167) in the urban area of Chibougamau. Other segments with accident rates around 1 accident/Mv-km are: road 109 leading to Matagami and road 113 leading to Waswanipi. These results suggest that accident rates are higher in or near communities.

Accident severity analysis distinguishes fatal accidents (with death), severe injury accidents, light injury accidents, and accidents with material damage only Table 10.3-12 summarizes the number and severity of accidents. In the reference period, 56 (2%) out of 2,669 accidents occurred in Eeyou Istchee Baie-James who had fatal or seriously injured victims. An annual average of 11 fatal and serious accidents occurred over the period. A higher rate of accidents with fatal or seriously injured victims (near 5%) are observed on the R167, on the R113 and in Chapais.

Table 10.3-12: Road Accident Severity, Nord-du-Québec, and Quebec, 1995-1999 and 2015-2019

	Deaths	Severe Injuries	Light Injuries	Material Damage Only	Total Accidents	Victims
2015-2019						
Accidents 5 years, NQ	12	53	460	2,413	2,938	525
% accidents, NQ	0.4%	1.8%	15.7%	82.1%	100%	
Accident rate, NQ	0.7	3.3	28.5	149.5	182.0	32.6
Accident rate, EIBJ						
Accident rate, QC	0.4	1.8	41.8			43.9
1995-1999						
Accidents, NQ	35	221	683	904		939
% accidents, NQ	1.1%	6.8%	21.1%	71.0%		
Accident rate, NQ	1.8	11.3	35.0			48.2
Accident rate, EIBJ						
Accident rate, QC	1.1	7.5	56.0			64.6

Note: Accident rate = Annual number of accidents / 10,000 inhabitants.

Source: 1995-1999: MTMD (2005b) ; 2015-2019: SYSTRA calculations from SAAQ (2021), MTMD (2021c) and MTMD (2005b).

Figure 10.3-6: Road Accident Locations (fatal and severe accidents) Eeyou Istchee Baie-James, 2015-2019

In Nord-du-Québec, thus essentially in Eeyou Istchee Baie-James, the 2015-2019 period had a dramatic decrease in fatal and in severe injury accidents, compared with the 1995-1999 period (MTMD, 2005b), of 65.7% and 76.0% respectively. This fall in fatal and severe accidents is even more important than the decrease in the total number of accidents in the region of 44.0%. During both periods, the Nord-du-Québec has a lower total accident rate per capita than Québec in general but the death rates and number of severe injures are higher. This is potentially due to the nature of the road network in rural locations in Eeyou Istchee Baie-James compared to more urban journeys in Québec as a whole.

A total of 12 fatal accidents (2.4 per year on average) occurred on the Eeyou Istchee Baie-James Road network while 44 accidents (8.8 per year) involved serious injury, as shown in Table 10.3-13. The fatalities occurred mostly on main highways (3 on R167 and 2 on R113) and in Chisasibi area (3). These locations would require specific attention. Over five years, one fatal accident also occurred on each of the following roads: BDH, Trans-Taiga Road, Oujé-Bougoumou access road and Chapais rural road.

Table 10.3-13: Accidents with Fatal and Serious Injury Victims per Type of Road and Location, Eeyou Istchee Baie-James, 2015-2019

Location	Fatal Accidents	Serious Injury Accidents	Fatal and Serious Injury	%
Main Highways (numbered)	***5***	***16***	***21***	***38%***
Route 109		1	***1***	2%
Route 113	2	8	***10***	18%
Route 167	3	7	***10***	18%
Main Rural Roads	***2***	***9***	***11***	***20%***
Billy-Diamond Highway	1	5	***6***	11%
Route du Nord		1	***1***	2%
Transtaiga	1	3	***4***	7%
Access Roads	***3***	***10***	***13***	***23%***
Chapais	1		***1***	2%
Chibougamau		3	***3***	5%
Chisasibi	1	1	***2***	4%
Mistissini		1	***1***	2%
Oujé-Bougoumou	1		***1***	2%
Waskaganish		1	***1***	2%
Forest Road		1	***1***	2%
Other		3	***3***	5%
Local / Urban	***2***	***9***	***11***	***20%***
Route 113		1	***1***	2%
Chapais		1	***1***	2%
Chibougamau		4	***4***	7%
Eastmain		1	***1***	2%
Chisasibi	2	2	***4***	7%
Total	***12***	***44***	***56***	***100%***

Source: Calculation from SAAQ (2021).

A share of 80% of accidents with seriously injured victims happened on a number of rural roads, where the speed, the volume and geometric features of the roads may have, or will, contribute to the severity of accidents when they occur, compared to local roads and urban streets. More than a third of all severe accidents occurred on Routes 113 and 167, with 2 severe accidents per year on average. The BDH and the Transtaiga Road displayed an average of approximately 1 severe accident per year. Chisasibi area and Chibougamau streets also have an average of about 1 severe accident per year.

Fatal or severe accidents on the community access roads under study are infrequent and sporadic. Over a period of five years, one severe accident occurred on the Waskaganish access road, one on the Mistissini access road and one on the Route du Nord. During the same period, no fatal or severe accidents were reported on the Eastmain, Wemindji, or Nemaska access roads.

Vehicle collisions and rollovers/going off-road were the most common causes of serious or fatal accidents, accounting for 30% and 34% of such incidents, respectively. These accidents were more likely to occur on numbered and rural roads. On local or private roads, serious or fatal injuries were mainly caused by collisions with fixed objects or by incidents involving pedestrians, bicycles, or trains.

Table 10.3-14: Fatal and Severe Injury Accidents, per Collision and Road Types, Eeyou Istchee Baie-James, 2015-2019

Type of road	Collision: Animal	Collision: Fixed Object	Collision: ped/ bike/ train	Collision: vehicle	Other	Rollover/ Off-road	Total	%
Numbered Road	1	6	-	8	-	8	23	41%
Private Road/Street	-	1	-	-	-	-	1	2%
Private Road/Street/Terrain	-	2	-	-	-	-	2	4%
Rural Road	-	3	1	6	1	11	22	39%
Urban Artery	-	-	-	1	-	-	1	2%
Local Road/Street	-	1	4	2	-	-	7	13%
Total	1	13	5	17	1	19	56	100%
%	**2%**	**23%**	**9%**	**30%**	**2%**	**34%**	**100%**	

Accident features include a variety of elements such as the surface of the road, weather conditions, lighting, and speed limit. Although most accidents of all severities occurred on surfaces with snow/ice (52%), fatal accidents occurred with similar frequency whether the surface was covered with snow/ice (36%) or when it was dry (36%). In 50% of accidents with seriously injured victims, the road surface was dry. Most accidents, with all degrees of severity, happen when the weather was clear (Table 10.3-16) and under bright light.

Out of the 56 accidents with fatal or seriously injured victims, 50 had information on the authorized speed of the road. Twenty-one out of 50 (42%) happened on numbered roads where authorized speeds were 90 km/h and 16 (32%) occurred on rural roads with speeds superior to 70 KPH.

Most accidents with fatal or severely injured victims happened on numbered (R113 and R167) or rural roads under clear weather and with conditions for good visibility. Total accident rates were more elevated on roads near urban areas.

Table 10.3-15: Severity of Accident Based on Surface Conditions, Eeyou Istchee Baie-James, 2015-2020

Surface	Only material		Light		Serious		Fatal		TOTAL	
	qty	%	qty	%	qty	%	qty	%	qty	%
Dry	713	32.2%	120	38.0%	22	50.0%	4	36.4%	859	33.2%
Other	13	0.6%	-	0.0%	1	2.3%	-	0.0%	14	0.5%
Sandy	76	3.4%	15	4.7%	6	13.6%	1	9.1%	98	3.8%
Snow/Ice	1,191	53.8%	137	43.4%	12	27.3%	4	36.4%	1,344	52.0%
Wet/Mud	221	10.0%	44	13.9%	3	6.8%	2	18.2%	270	10.4%
TOTAL	**2214**		**316**		**44**		**11**		**2,585**	
%	85.6%		12.2%		1.7%		0.4%			

Table 10.3-16: Severity of Accident Based on Weather Conditions, Eeyou Istchee Baie-James, 2015-2020

Weather	Only material		Light		Serious		Fatal		TOTAL	
	qty	%	qty	%	qty	%	qty	%	qty	%
Storm	5	0.2%	4	1.3%	-	0.0%	-	0.0%	9	0.3%
Clear	1,699	76.7%	227	71.8%	40	90.9%	8	72.7%	1,974	76.4%
Snow/Ice	346	15.6%	61	19.3%	4	9.1%	3	27.3%	414	16.0%
Rain	110	5.0%	22	7.0%	-	0.0%	-	0.0%	132	5.1%
Wind	13	0.6%	3	0.9%	-	0.0%	-	0.0%	16	0.6%
TOTAL	**2,173**	**317**	**44**	**11**	**2,545**		**TOTAL**	**2,173**	**317**	**44**

Table 10.3-17: Severity of Accident Based on Light Conditions, Eeyou Istchee Baie-James, 2015-2020

Light Condition	Only material		Light		Serious		Fatal		TOTAL	
	qty	%	qty	%	qty	%	qty	%	qty	%
Day: Bright	1,491	67.3%	209	66.1%	33	75.0%	8	72.7%	1,741	67.4%
Day: Semi-dark	113	5.1%	21	6.6%	2	4.5%	-	0.0%	136	5.3%
Night—Illuminated	237	10.7%	15	4.7%	2	4.5%	1	9.1%	255	9.9%
Night—Dark	364	16.4%	71	22.5%	7	15.9%	2	18.2%	444	17.2%
TOTAL	**2,205**		**316**		**44**		**11**		**2,576**	
%	85.3%		12.2%		1.7%		0.4%			

Table 10.3-18: Number of Fatal or Severe Injury Accidents based on Limit Speed, EIBJ, 2015-2020

	Limit Speed (km/h)							
Type of road	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
Local Road/Street	1	1	4					
Numbered Road						1	21	
Rural Road	1	1	1		7	3		6
Private Road				1	1			
Urban Artery			1					

Source: MTMD (2021c) and MTMD (2005b).

Table 10.3-19 provides a summary on the road accident occurrence on specific roads in Eeyou Istchee Baie-James between 2015 and 2019. The Route du Nord and the Billy Diamond Highway are the locations where most accidents occur, largely due to higher traffic volume. Adverse weather conditions, such as snow and ice, are also significant factors. Whilst accidents on access roads typically result in only material damage, a considerable proportion of incidents on the Route du Nord (36%) and the BDH (23%) involve light injuries. Over a five-year period, there were five severe injury accidents and one fatal accident on the BDH.

Table 10.3-19: Accidents, Access Roads, Route du Nord and Billy-Diamond Highway, 2015-2019

	Nemaska Access Road	Waskaganish Access Road	Eastmain Access Road	Wemindji Access Road	Mistissini Access Road	Route du Nord	Billy-Diamond Highway
Number of accidents	6	6	7	4	19	33	155
Severity	Material damages only	Mostly material damages, 1 accident light injury	Material damages only	Material damages only	Material damages 94%, 1 accident light injury	Material damages only - 61%, light injury - 36%, 2 heavy injury	Material damages only - 74%, light injury - 23%, 5 heavy injury, 1 fatal ac cident
Location (KP)	No data available	2 accidents at KP 54, and accidents at KP 6, 71, 238	KP - 1.5, 12.3, 16, 22, 64, 73.7	KP - 4, 20, data incomplete	3 accidents at KP 12 4 accidents at KP 8-9 1 acc at KP: 3, 4, 10, 11, 13	KP 80 (2 accidents), KP 150 (2 accidents)	KP 5 (4 accidents), KP 52 (4 accidents), KP 60 (3 accidents), KP 381 (5 accidents), KP 590 (3 accidents)
Road surface	Mostly poor conditions: snow/ice/mud	Mostly poor conditions: snow/ice	Often poor conditions: snow/ice, but data incomplete	Mostly poor conditions: snow/ice, but 1 accident on a dry surface	Poor conditions 74% of the time: snow/ice/mud ; 2 accidents on dry surface	Often poor conditions: snow/ice/mud - 61% of the time	Often poor conditions: snow/ice/mud - 66% of the time
Weather conditions	Snow/rain 50% of the time and clear 50% of the time	Snow/rain 50% of the time and clear 50% of the time	Snow/rain 30% / clear 70% of the time	Clear 100% of the time	Clear 79% of the time, snow/rain for 3 accidents	Snow/rain/poor 33% of the time	Snow/rain/poor 30% of the time
Number of vehicles	1-2 vehicles at a time	Only 1 vehicle most of the time	1-2 vehicles at a time	1-2 vehicles at a time	Single vehicle only 79% of the time, 2 vehicles for the rest	Single vehicle only 85% of the time, 2 vehicles 15% of the time	Single vehicle only 76% of the time, 2 vehicles 23% of the time, 1 accident involving 3 vehicles
Types of vehicles	Mostly cars or light trucks 1 accident involving an emergency vehicle	Mostly cars or light trucks 1 accident involving 4 vehicles (involves a tractor or heavy truck, material damages only)	Mostly cars or light trucks 2 accidents involving heavy trucks and 1 involving other type of equipment	Mostly cars or light trucks	Mostly cars or light trucks 1 with a heavy truck, 1 with a tractor, 1 with other equipment, 1 with emergency vehicle, 1 with a snowmobile	85% of the time car/light truck, 8 accidents with heavy trucks involved, 1 accident with a motorcycle	35 accidents involving heavy trucks, 1 with other equipment, 1 involving a bus/minibus, 3 with a motorcycle, 6 involving an emergency vehicle
% of the accidents with heavy vehicles	0%	17%	29%	0%	5%	24%	23%
Collision / impact	1 x collision with an object 3 x collision between vehicles 1 x "rollover" 1 x other	2 x collision with an object 2 x collision between vehicles 2 x "rollover"	2 x collision with an object 2 x collision between vehicles 1 x "rollover" 2 x other	2 x collision with an object 1 x "rollover" 1 x other	2 x collision with an object 8 x collision between vehicles 3 x "rollover" 6 x other	4 collision with object 9 collision between vehicles 4 collisions with animals 12 "rollover"	15 x collision with an object 32 x collision between vehicles 31 x collisions with animals 62 x "rollover" 15 x other

Source : Compiling from SAAQ (2022).

10.3.2.9 Road Projects

The primary focus of road transportation projects in the study area is to enhance the existing network. Table 10.3-20 provides a summary of these projects. One significant ongoing project is the rehabilitation of the BDH, which has a total budget of $333.9M (MERN, 2020a). This joint venture covers 620 kilometers of the BDH, with over half of the road undergoing pavement rehabilitation. Other aspects of the project include improvements to access roads and R1005, gravel renewal, bridge reconstruction, culvert replacement and the installation of road safety features like signs and guardrails (SPN, 2017).

Table 10.3-20: Main Planned Road Investments, Eeyou Istchee Baie-James

Municipality	Location	Description
Eastmain	Eastmain access road	Improvement work
Lebel-sur-Quévillon, Eeyou Istchee Baie-James	R1005	Improvement work, gravel renewal and culvert replacement
Eeyou Istchee Baie-James	BDH - Phase 1	On-going improvement work
Eeyou Istchee Baie-James	BDH - Phase 2	On project - improvement work
Chibougamau	Chemin Campbell -km7 à 11	Gravel renewal
Chibougamau	R167 - Multiple sections	Asphalt paving
Chibougamau	R113 - Multiple sections	Reconstruction and asphalt paving
Chibougamau	Bridge over lac aux Dorés	Reconstruction
Eeyou Istchee Baie-James	R167 - km 193-197	Asphalt paving
Eeyou Istchee Baie-James	R113 - Multiple section between 196 and 365	Asphalt paving
Eeyou Istchee Baie-James	R167 - km 341-384	Gravel renewal
Eeyou Istchee Baie-JamesFigure 10.3-7	Route du Nord - km 102-129	Gravel renewal
Eeyou Istchee Baie-James	Routes: 113, 167 Conquérants	Culverts replacement
Eeyou Istchee Baie-James	R113, Bridge over Waswanipi and Chibougamau river	Reconstruction
Territoire non organisé	Bridge over Takwa River on Route 167	Reconstruction

Source: VEI compilation – MERN (2020a), SPN (2017).

10.3.3 Rail Transportation and Intermodal Facilities

10.3.3.1 General Network

There are 230 km of railroads in Northern Québec, all located in Eeyou Istchee Baie-James and operated by the Chemin de fer d'intérêt local du Nord du Québec (CFILNQ), a subsidiary of the Canadian National Railway (CN). All lines in the network are single track and use a track occupancy control signal system. The CFILNQ operates rail lines in Mauricie and Abitibi regions, to which the Matagami rail line connects, and the rail network in Saguenay-Lac-Saint-Jean region to which the Chibougamau-Chapais rail line connects, as illustrated in Figure 10.3-7.

10.3.3.2 Western Québec

The CN Matagami Subdivision, 61 miles (98 km) long, connects Matagami to Franquet, located north of Lebel-sur-Quévillon. The Matagami subdivision services Harnois Énergies, Eacom Timber and the Matagami transshipment yard (WSP, 2021a). The line has historically been used by the mining and forestry industries whose product volumes

fluctuates according to economic cycles. The Glencore nickel zinc mine used to be a CN customer on this railway line but as it closed definitely recently. This closure has made the future profitability of the service uncertain. Due to low traffic, track maintenance has been minimal for some time and the load limit is consequently low. The current traffic (approximately 30 carloads per week) would not be sufficient to justify the continuation of service on this subdivision (VEI-WSP, 2022).

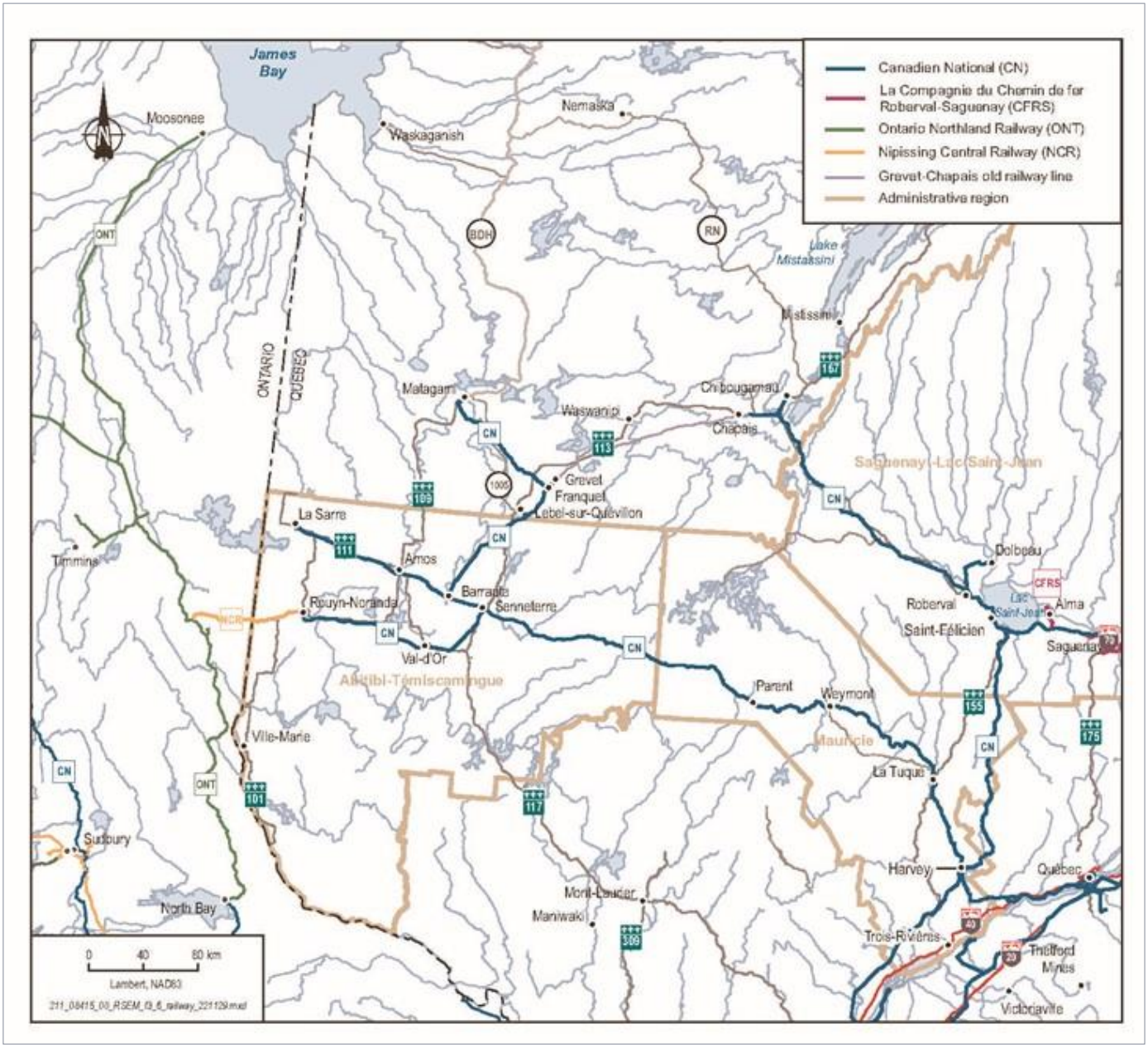


Figure 10.3-7: Northwestern Quebec Railway Infrastructure

At Franquet, the Matagami subdivision connects to the Chapais subdivision. Previously the Chapais subdivision linked Barraute to Chapais but most of it (between Grevet and Chapais) is no longer in service. There remains a short 10 km track going north from the Franquet junction to Grevet, at a former mine site. The 116 km west branch

of the CN Chapais Subdivision links the Matagami Subdivision to Barraute. This branch serves Chantiers Chibougamau's Nordic Kraft pulp mill in Lebel-sur-Quévillon.

The CN marshalling yard at Senneterre is the main junction point of the railway network in western Quebec. This node connects four subdivisions, Chapais (Matagami) between Matagami and Barraute, Tachereau between Barraute and La Sarre, Val-d'Or between Senneterre and Rouyn-Noranda, and St. Maurice

The 257 miles (414 km) of the CN St.-Maurice Subdivision stretches from La Tuque to Senneterre. The track is approximately 50% Class 3, with a max. freight speed of 40 mph (64 kph), max. passenger speed of 60 mph (97 kph), and 50% Class 4, max. freight speed of 60 mph (97 kph), max. passenger speed of 80 mph (129 kph). However, the maximum permitted speed anywhere on the subdivision is 45 mph (72 kph) (CN, 2015).

The CN Taschereau Subdivision runs from Seneterre to a mile point (MP) 99.5 (KP 160) near La Sarre. In the past, the line connected Senneterre to Cochrane in Ontario. Its maximum operating speed is 45 mph (72 kph).

The CN Val d'Or Subdivision connects Senneterre to Rouyn-Noranda, passing through Val d'Or. The 100-mile (161 km)-subdivision is Class 2, with a maximum operating speed of 30 mph (48 kph).

The Nipissing Central Railway, a subsidiary of Ontario Northland, connects to CN Val-d'Or subdivision at Rouyn-Noranda. Its 60 miles (97 km) of track connects to the Ontario Northland network and passes from Québec to Ontario (CN, 2015).

The Centre de transbordement de Matagami (CTM), owned by the town of Matagami, is a transfer yard located at the end of the Matagami subdivision and at the beginning of the Billy Diamond Highway, with an advantageous location for intermodal transport. The facility includes 4 km of the rail line, 1,500 m² of warehouse capacity, 270,000 m² of outdoor storage space with an additional of 200,000 m² available; and an outdoor storage dome (Matagami, 2019). This transshipment yard is currently used for 35,000 TPA of non-metallic minerals and hydroelectric plants on punctual demand (WSP, 2021a).

10.3.3.3 Northern Quebec

The CN Chapais Subdivision, extending from Barraute to Chibougamau, previously linked Abitbi to Lac-Saint-Jean. It was partially abandoned in 1994 when the track was removed between Grevet and Chapais. Now there are two ends of the subdivision, Grevet to Barraute and Chapais to Chibougamau. The segment between Chapais and the Cran subdivision is Class 1, with a loading capacity of 268,000 lbs, or 30.4 metric tonnes per axle and a maximum speed of 10 mph (16 kph) for freight trains (CETI, 2007). The subgrade of the former railway between Grevet and Chapais is currently used by overweighted trucks to carry wood logs to sawmill plants and by snowmobile.

The 133 miles (213 km) CN Cran Subdivision connects Chibougamau to Roberval in the Lac-Saint-Jean region. The standard loading capacity is 286,000 lbs (32.4 tonnes per axle) between Saint-Félicien (MP 0) and MP 42 (KP 67) (CETI, 2007). Beyond this point on 91 miles (146 km), the loading capacity is 268,000 lbs (30.4 tonnes per axle).

The Lac-St-Jean Subdivision is the CN link between Southern and Northern Québec, and the Port of Saguenay. It starts at the Garneau Marshalling yard north of Shawinigan and travels for 210 miles (338 km) around part of Lac-Saint-Jean, passing through Chambord and Saint-Gédéon before ending in Saguenay, where there used to be an intermodal rail yard (CN, 2015).

The Roberval and Saguenay Railway, created in 1924 and owned by Rio Tinto, links the industrial sectors of Saguenay, including the aluminum plants and yard, to the Grande-Anse terminal in the Port of Saguenay. This link has become vital for mining and forestry products produced in Northern Québec which are then shipped globally

(TC, 2015). In 2015, it was the official opening of the rail link connecting the Grande-Anse terminal in the Port of Saguenay to the Roberval-Saguenay rail line and of the intermodal rail yard at the Port of Saguenay. This 12 km rail link project costing $37M helps facilitate the transfer of goods from the railway network to the ship docks at the Grand-Anse marine terminal (GOC, 2015).

From the St-Maurice and Lac St-Jean Subdivisions, there is the CN La Tuque Subdivision that goes to Québec City, and the Joliette Subdivision that goes to Montreal. Both subdivisions are class 3, with a limited freight train speed of 60 mph (97 kph). However, the maximum permitted speed on both subdivisions is 40 mph (64 kph). From the Lac St-Jean subdivision it is approximately 80 miles (129 km) on the Joliette subdivision between Shawinigan and Montreal. The 122 miles (196 km) La Tuque Subdivision is crossed by the Lac St-Jean Subdivision, as it runs from La Tuque to Québec City. This crossing is known as Hervey Junction, and it is the location where trains can travel from the Lac St-Jean Subdivision to the northbound La Tuque Subdivision. There is no direct connection to allow trains to go southeast towards Québec City from the Lac-St-Jean Subdivision (CN, 2015).

10.3.3.4 Train Passenger Service

There is currently no train passenger service in Eeyou Istchee. Via Rail operates a service between Montreal and Senneterre, located 90 km south of Lebel-sur-Quévillon. The service connects Montreal to Senneterre passing Hervey on a 717 km route that takes approximately 13.5 hours. This route, mostly in a forest environment, serves 60 stops of which more than 80% of those are served upon passenger requests (so-called flag stops). The service is currently offered 3 times per week in both directions. The train departs from Montreal on Mondays, Wednesdays and Fridays at 7:30 in the morning and arrives at Senneterre at 9:00 PM. From Senneterre, the train departs on Tuesdays and Thursdays at 6:00 AM to arrive at Montreal at 19:45 PM, and on Sundays departs at 9:00 AM and arrives at 22:45 PM (VIA, 2022). The area between La Tuque and Senneterre is not accessible by the public road network and only accessible by forest resource roads.

The fare between Montreal and Senneterre is $110 in economy class (no business class offered), or $0.15 per km. Based on the fare cost, annual revenue and ridership numbers, average distance traveled by a passenger is estimated at 268 km per journey (VIA, 2019). Since this distance is far shorter than the overall length of the route, this suggests that most passengers travel over shorter distances, for example between localities in the Saint-Lawrence Valley. Table 10.3-21 summarizes the Montreal-Senneterre passenger train service features.

Table 10.3-21: VIA Rail Montreal-Senneterre Passenger Service Features, 2019-2022

Section	Number of stops	Travel time	Length (km)	Price[2]	Annual Ridership (PPY)	Annual Revenue
Montreal - La Tuque	13	5:41	303	$46	10,388	$417,000
La Tuque - Senneterre	47	7:41	413	$62		

Source: 1 VIA (2019), 2 VIA (2022).

10.3.3.5 Rail and Intermodal Projects

The ***Barrette-Chapais transshipment yard*** at the west end of the Chapais eastern railway line, still functioning, could be used, assuming upgrading, as a multi-user facility, including for the mining products and ores (Chapais, 2017; WSP, 2021).

The ***Centre de logistique intermodale de Chibougamau*** (CLIC) is a rail/intermodal transportation project under study which will establish links between the eastern entrance of Northern Québec and the Saguenay-Lac-Saint-Jean

region, southern and eastern Québec, and the US East Coast. In the first phase, the project aims to meet the needs of the Nemaska mining project (WSP, 2021a).

The ***QcRail project*** is a feasibility and viability study to develop a new railway corridor between Dolbeau-Mistissini in Lac St-Jean to Baie-Comeau in Côte-Nord. The new 370 km corridor would be a new route for northern companies to access the deep-water port of Baie-Comeau. This route would be made to bypass the Windsor-Quebec City corridor and linking Manitoba's railways to Eastern Québec (Qmi, 2022).

The QcRail Project was initiated by Innovation and Développement Manicouagan to link Western Canada to the deep-water port of Baie-Comeau via Dolbeau-Mistassini. It comprises construction of a 370 km railway from Dolbeau-Mistassini to the industrial park of Baie-Comeau to facilitate access to European markets. When combined with the reopening of the Grevet-Chapais segment, which provides a link to the northern corridor, this new route could optimize the shipment of goods. This improvement to the proposed route would provide optimized access to the deep-water port of Baie-Comeau for Abitibi mining companies (QcRail, 2021).

The technical and economic feasibility study officially began in July 2021 and is expected to continue over the next two years. This analysis should determine the best alignment between Dolbeau-Mistassini and Baie-Comeau, as well as its technical economic and environmental feasibility. The study should also validate the interest of potential financial and commercial partners. Throughout the process, QcRail has committed to taking into consideration the concerns of users of the territory through which a potential rail corridor would pass. As such, Mashteuiatsh has an observer representative on the Board of Directors of QcRail. The project cost is estimated at $1.6B. The implementation of such a project could have a significant impact for Nord-du-Québec on the organization of transportation chains for various mineral substances involving overseas markets (WSP, 2021a).

The ***Canadian Northern Corridor*** (CNC) research program assesses the benefits and challenges of the CNC implementation. It is composed of eight specific themes including: Basic studies, economic implications, environmental impacts, financial aspects, geography and engineering, regulatory and legal aspects, organization and governance, social advantages, cost, and commercial and strategic aspects. Since the start of the program, six of the eight listed themes have been covered. The study « Constraints in the Canadian Transport infrastructure grid » highlights that the core aim for this corridor is to maximize the density of flow along an axis and to identify and mitigate bottlenecks. There is limited latent demand from the northern corridor except punctual resources development making it a case-by-case scenario. It is also challenging to integrate new to existing infrastructure. Developing a latitudinal corridor eventually reinforced by longitudinal ones is indicated to be a more effective strategy. Private sectors have little incentive to provide infrastructure in a low-density area. Also, supporting the CNC, the report « Arctic Shipping Status Report – Shipping in the Northwest Passage » collected data on the Arctic traffic flow and cited « over a six-year period from 2013 to 2019, the number of unique vessels entering the waterway increased by 44%, from 112 vessels in 2013 to 160 vessels in 2019 » (Quinn, 2022).

10.3.4 Air Transportation

10.3.4.1 Airports

Airports in Cree communities are usually owned by Transport Canada and operated by the local community. They include gravel runways approximately 3,500 feet long and 100 feet wide, like most airports in Nunavik villages. The airport at Kuujjuarapik, owned by the MTMD and operated by the KRG, has a 5,000 ft runway. The four Hydro-Québec airports, situated in Némiscau, LG3, LG4 and Fontanges have 5,000 ft gravel runways. To ensure the safety

of employees, Stornoway opened Clarence & Abel Swallow Airport in 2015 with a 4,920 ft runway at its Renard diamond mine. Table 10.3-22 details the characteristics of airports in the study area.

Table 10.3-22: Features of Airports in Eeyou Istchee Baie-James

Airport	Owner / Operator	Length X Width (ft)	Surface
Chisasibi	TC / Chisasibi	3,593 X 100	G
Eastmain	TC / Eastmain	3,512 X 100	G
Waskaganish	TC / Waskaganish	3,511 X 100	G
Wemindji	TC / Wemindji	3,511 X 100	G
Némiscau	Hydro-Québec	5,000 X 150	G
Kuujjuarapik	MTMD / KRG	5,082 X 100	G
Matagami	MTMD	5,001 X 100	P
Chibougamau	MTMD	6 495 X 150	P
Lebel-sur-Quévillon	Level-sur-Quévillon	4,212 X 100	P
La Grande Rivière	SDBJ	6,487 X 150	P
La Grande 3	Hydro-Québec	5,009 X 150	G
La Grande 4	Hydro-Québec	5,009 X 150	G
Fontanges	Hydro-Québec	4,890 X 150	G
Éléonore	Newmont	3,930 X 120	G
Renard	Stornoway	4,920 X 100	G

G = Gravel, P = Paved.

Source : Nav Canada (2019), Sky Vector (2019).

10.3.4.2 Air Service

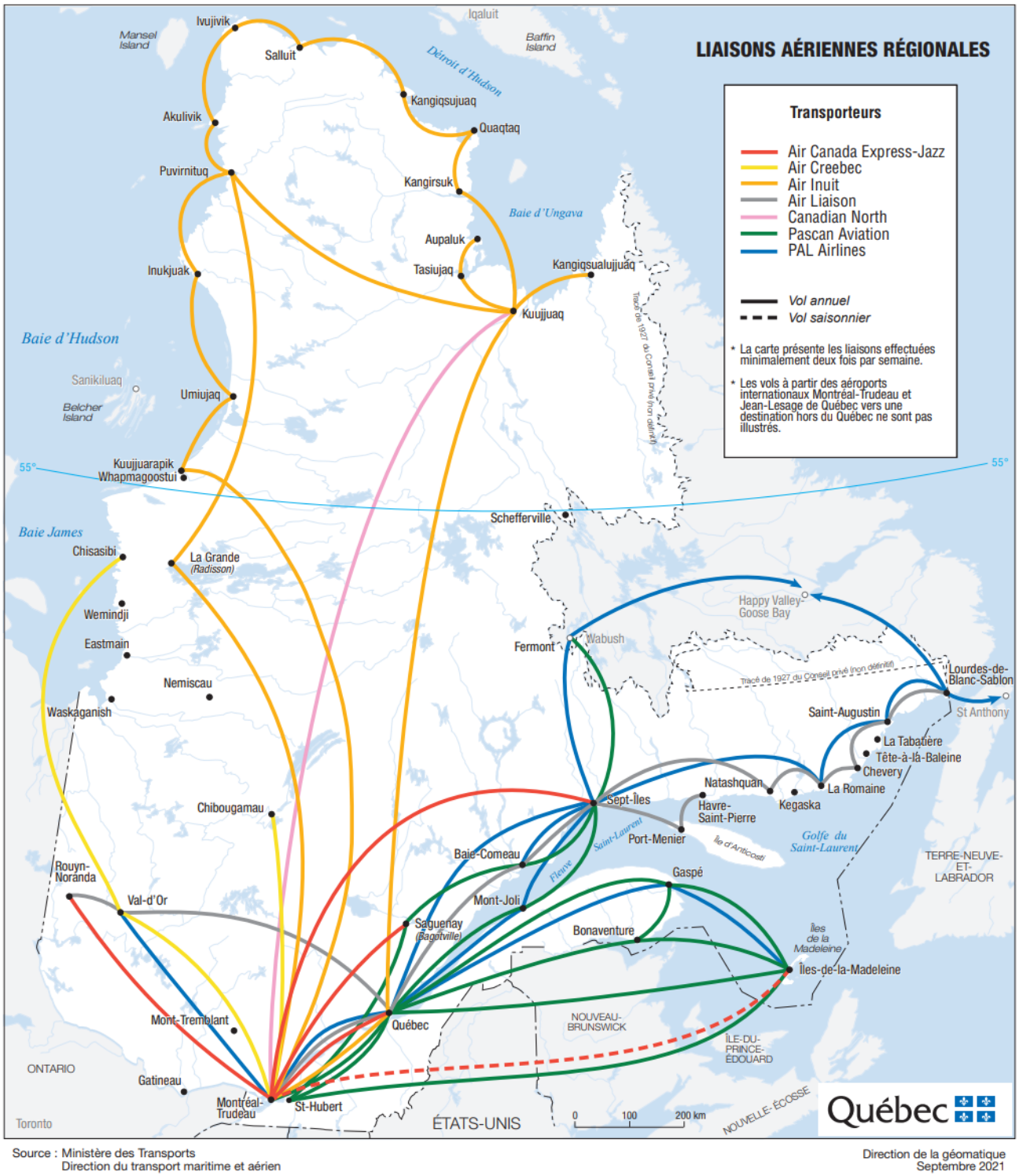
The Cree communities of Eeyou Istchee Baie-James are served by Air Creebec while Radisson (La Grande Rivière) and Kuujjuarapik are also served by Air Inuit, as illustrated in Figure 10.3-8. Note that the map shows only air services operated by airlines providing at least two flights per week. Therefore, flights to/from a number of communities such as Wemindji, Eastmain, Waskaganish and Némiscau are not shown in the map. In addition, a number of airports near mine sites such as Éléonore (Goldcorp), and Renard (Stornoway) also are not shown.

Air Creebec flights are connected to Val-d'Or and Chibougamau and then Montreal, while Air Inuit flights are connected to Montreal. La Grande Airport, near Radisson, serves as a connection with BDH and the air service up north serves the Inuit communities (Radisson, 2022).

Air Creebec is a regional airline created in 1982 which became 100% Cree-owned in 1988 as a subsidiary the Cree Regional Economic Enterprises Company Inc. (CREECO). It is based in Waskaganish and with a fleet of 18 planes, it offers northbound and southbound flight services on Mondays and Wednesdays. The company operates scheduled flights, as well as charters for fly-in fly-out commissioned by different companies, and freight services to 16 destinations mainly in Val-d'Or, Montreal, and Timmins, with hubs in Waskaganish, Chisasibi, and Moosonee (CREECO, 2022).

Air Inuit was founded in 1978 and is collectively owned by the Inuit of Nunavik through the Makivik Corporation. It operates passenger and cargo flights serving 21 destinations including Nunavik's 14 coastal villages and offers daily passenger flight services to the Hudson Bay, Ungava Coast and Côte-Nord regions. Air Inuit is an important player

in the transport of perishable and non-perishable foodstuffs intended for community supply through FCNQ supply, which is trucked from the South to LG2 airport at Radisson (WSP, 2021a).



Note: Air routes with daily service only.

Figure 10.3-8: Regional Air Transportation Services in Nord-du-Québec and Vicinity Regions

Hydro-Québec has chartered flights each week with their own airline for direct employees and uses Air Inuit for outsourced employees who offer at least one flight to and from La Grande airport every day (HQ, 2022d). Stornoway has five flights per week.

10.3.4.3 Air Fares

Table 10.3-23 shows different air fares in Eeyou Istchee Baie-James. Flight fares between the different Cree communities and Montreal are over $1,000. Within the region, the price is approximately $200 to $400, and around $900 for between Chisasibi and Val-d'Or or Chibougamau.

The Airfare Reduction Program (ARP)'s objective is to promote and reduce the cost of air travel for residents of Québec's remote regions, by offering a reimbursement ranging from 30% to 60% of the cost of the airfare. The program also stimulates the demand for air travel and induces air carriers to increase service within remote regions (MTMD, 2022).

Table 10.3-23: Air Creebec Passenger Fares, 2021

From Chisasibi to		From Montreal to	
Chibougamau	$912	**Chibougamau**	$793
Eastmain	$320	**Chisasibi**	$1,229
Montreal	$1,889	**Eastmain**	$1,110
Nemaska	$617	**Nemaska**	$1,056
Val-d'Or	$898	**Val-d'Or**	$764
Waskaganish	$414	**Waskaganish**	$1,056
Wemindji	$224	**Wemindji**	$1,195
Whapmagoostui	$268	**Whapmagoostui**	$1,274

Prices for Y1 Fare Type, regular full fare one way, taxes included. Dollar rounded.

10.3.4.4 Other Air Services

Helicopters and seaplanes use many temporary sites in the region for their daily operation and also use permanent base operations with developed maintenance garages and refueling points. For many years, helicopters have taken over the traditional role of seaplanes in the exploration and development of forestry, mining and hydroelectric resources. However, smaller companies still use seaplanes from time to time, even though it is mainly used for the transportation of trappers to their trapping grounds, and of hunters and fishermen to the outfitters of the region.

Whapchiwem helicopters, based in Radisson and open all year-round, is a company in James Bay that offers passenger transportation services and conducts aerial work. It also offers recreational flights for hunting and fishing.

Innukopteres is an entirely Aboriginal company that began operations in 2010 and provides helicopter transportation services. The company's main shareholders are the Innu Council of Ekuanitshit (Mingan) and Nunavik Rotors Inc. (a subsidiary of Air Inuit - Makivik Corporation), based in Kuujjuaq (Nunavik). The company operates in multiple sectors, including public services, various maintenance infrastructure, mining support and exploration, search and rescue, and environmental conservation. Other companies that can provide service in the area include Héli Mistral, specializing in aerial work, and Héli-Boréal which offers mineral exploration, geophysical surveying, wildlife surveys, passenger transport, construction and line patrol, and forest fire fighting.

Valpiro was founded in 1971 in Val-d'Or and purchased by CREECO in 1988. The company originally provided baggage handling and fuel services for airlines at the Val-d'Or airport, then expanded into several services including: cargo handling, to meet the needs of the Cree communities of the La Grande project. It offers different airport services in Val-d'Or, including ramp services, cargo preparation and handling, aircraft ground fueling, ground power units, AC units, de-icing and anti-icing, and fuel. It offers similar services at La Grande airport (CREECO, 2022).

10.3.5 Water Transportation

10.3.5.1 Port Infrastructure

Marine facilities in the James Bay area primarily serve the needs for local travel and fishing. Marine facilities vary greatly between villages and are generally limited to access ramps, floating docks and storage areas (CIRRELT, 2017). Aids to navigation are primarily the responsibility of the Canadian Coast Guard. Table 10.3-24 provides an overview of the marine facilities available in the communities of Eeyou Istchee Baie-James (including Kuujjuarapik).

In James Bay, the communities of Waskaganish, Eastmain, Wemindji and Chisasibi are equipped with access ramps. Moosonee Transport operates a small port in Wemindji with service to Whapmagoostui. Eastmain also has a floating dock. These facilities are not served by regular supply services. For a part of supply of Inuit communities uses trucking on the BDH with transshipment to boats at Wemindji. Since the diversion of the Eastmain River in 1980 and the Rupert River in 2009, the water near the ramps in Eastmain and Waskaganish have become too shallow for commercial vessels to enter, other than at high tide. The roads are now the preferred mode of transportation of goods for these communities.

Table 10.3-24: Marine Infrastructure in Eeyou Istchee Baie-James

Site	Boat Ramp	Breakwater	Floating Pontoon
Waskaganish	X		
Eastmain	X		X
Wemindji	X		
Chisasibi	X		
Kuujjuarapik	X	X	X

Source: WSP (2021A).

In Nunavik, Inuit communities are all equipped with small craft harbour and breakwaters which can be used for seasonal supply to the communities. The transshipment of goods requires complex logistics involving ship cranes, pontoons/barges, workboats and shore-based traction equipment. The deep-water wharf in Deception Bay serves the mining industry.

The Port of Saguenay (Grande-Anse) is located 300 km southeast of the Chibougamau-Chapais area to which it is linked by the CFIL Nord-du-Québec (CSA, 2020). With exports expected to increase over the coming years at Grande-Anse deep-sea port, the federal government made an additional $33M investment in 2021 to improve the performance and functions of facilities at the port. Specifically, a new mechanized transport system was used to transport bulk materials from rail cars directly to docked ships in the port. The hope is that these new systems will attract future users of the port to build processing plants onsite (TC, 2021).

10.3.5.2 Water Transport Services

NEAS is a maritime transporter in the construction industry that transports modular and prefabricated houses from Bécancour to its Kuujjuarapik store, and other northern Canadian communities, providing houses and housing construction material for both Whapmagoostui and Kuujjuarapik communities. NEAS provides two scheduled trips per year, one in the summer and another in the fall.

Desgagnés Transarctick supplies the Whapmagoostui and Kuujjuarapik communities with consumer goods (food, clothes, packages, etc.) and equipment (transportation equipment, machinery, etc.). Also, the company moves transportation equipment and other heavy equipment from Kuujjuarapik to the South. Desgagnés Transarctick make two annual round trips, from Sainte-Catherine Port to Kuujjuarapik.

FEDNAV provides maritime services to mines and communities through the Baie-Déception port. The company supplies goods to and from the mines and moves metals extracted in the Raglan mines from the North to the South. One vessel does the trip all year-round, the FEDNAV's icebreaker bulk carrier MV Arvik I. FEDNAV employs 300 office people, operates 120 bulk carriers and owns 60 of them.

Taqramut Transport is a water transportation supplier of general goods. The company supplies the 14 Nunavik communities through the stores affiliated to the FCNQ in each of those communities. Taqramut Transport and the FCNQ are also close business partners with Desgagnés Transartick.

Moosonee Transportation Limited operates warehousing facilities in Wemindji and offers marine freight transportation services mainly to communities to the North not connected to the road network (MTL, 2023).

10.3.5.3 Water Transport Outlook and Projects

The Stromness Island port project, infrastructure included in the Duncan-Lake iron mine project, is located near Chisasibi, approximately 40 km from the iron pellet plant. The recommended format includes a: "*…structure for the wharf is gravity full-face type structure, sheet piles cellular design completes with intermediate arcs. The cell design is a proven construction design for harsh conditions. The access dykes will be built with rock fill available in the area and from construction. The two will be located on the inside face of the wharf and will incorporate a breakwater on the outside. The design integrates both the wharf and the breakwater and serves as an access structure for the conveyors, pipelines, and truck traffic. The impact of waves will be minimized. Two high-capacity 12,000 tph ship loaders were selected for loading the 12 MTPA of iron pellets*." (…) The capital cost was estimated at 2013 $725M, including indirect costs and contingencies. The direct capital costs estimated for the port are shown in Table 10.3-25. The iron ore would be transported by a pipeline from the Duncan Lake concentrator site to the pellet plant, located beside the port. This project has been at the preliminary economic assessment (PEA) level for some time and has not moved forward since (Met-Chem, 2013).

Table 10.3-25: Direct Capital Cost Estimates, Stromness Island Port Project, 2013

Item	$M 2013
Pellet Storage and Reclaim	304
Port Ship Loading and Wharf	250
Services	1
Camp (installation, leasing)	4
TOTAL	**559**

Source: Met-Chem (2013).

10.3.6 Summary

The access roads are a vital link from the main highways to their respective communities, connecting the remote regions of the Eeyou Istchee James Bay area with the rest of Quebec. Without these access roads, the communities would be cut off from critical supplies, services and economic opportunities. The road network serves as the primary mode of transportation for residents and workers to travel between communities and to access essential goods and services such as medical facilities, schools and grocery stores. In addition, the road network plays a crucial role in supporting the mining and forestry industries, which are important sources of employment and economic activity in the region. The access roads are also essential for the transportation of equipment and materials to the Hydro-Québec power stations, which provide electricity to the province. Overall, the access roads serve as a critical lifeline for the communities in the Eeyou Istchee James Bay area, connecting them to the rest of Quebec and supporting the economic, social and cultural development of the region.

Data from 2014 shows that the main driver of traffic on the Billy-Diamond Highway is forestry (approximately 50% of 90 HVPD in both directions, restricted to the southern end of the BDH), followed by the hydroelectric, community delivery trucks and mining. No recent traffic data was found for this corridor.

Air transportation, for its part, plays an important role in serving the northernmost communities, particularly with regard to perishable foodstuffs. Air transportation services to the region are mainly provided by Air Creebec and Air Inuit, but air fares are still very high. Although seven Cree communities have an airport nearby, lack of air support services coupled with limited length runway makes the development of air transportation difficult. Helicopters are typically used for activities related to exploration and development of forestry, mining and hydroelectric resources, while seaplanes are now used for the transportation of trappers to their trapping grounds, and of hunters and fishermen to the outfitters of the region.

With regard to rail transportation, Canadian National (CN) provides services up to Matagami and Chibougamau, but the quantity shipped by rail is relatively low compared to shipping by truck. A multimodal transhipment yard has been built next to the town of Matagami and another one is currently under plan to be built next to the town of Chibougamau. The latter is expected to increase the volume of goods transported by rail to and from the region.

Maritime transportation is a fundamental element for supplying Nunavik communities and serving mining sites. However, apart from the deep-water port located in Deception Bay which essentially serves the needs of the mining industry, the maritime infrastructure in the study area is limited for the purpose of community use and is not for industrial use. In fact, on the other sites, there are no facilities which allow for the docking of ships in the various communities.

10.4 SOCIO-DEMOGRAPHY

10.4.1 Objective and Approach

This section describes the historic, current, and projected population, socio-economic conditions (labour, welfare, income) for the various populations found within the study area, namely Crees, Jamesians and Inuit (Kuujjuarapik) communities. The data was retrieved from the Statistics Canada (Statcan) 2016-2021 census, Institut de la Statistique du Quebec (ISQ) data and forecasts[6], local organizations, and planning documents and aboriginal studies.

10.4.2 Demography

10.4.2.1 Current Total Population

The total population of Eeyou Istchee Baie-James[7] was estimated at 31,680 inhabitants in 2021 according to the Canadian Census (Statcan, 2022), slightly less than the ISQ estimate of 32,041 people (ISQ, 2021). The population total includes 18,664 Crees and 13,377 allophones or non-indigenous inhabitants (ISQ, 2021).

Table 10.4-1: Land Area and Population by Community, Eeyou Istchee Baie-James and Kuujjuarapik, 2021

	Land Area (km²)			Population 2021	
Community	**Land reserved to Cree or Nordic Village (1A) (note 1)**	**Cree Village or Inuit Land (1B) (note 1)**	**Municipality or Community (note 2)**	**ISQ**	**Census**
Waswanipi	386	213	599	1,827	(note 3) 459
Oujé-Bougoumou	96	…	96	814	797
Mistissini	808	488	1,296	3,858	3,731
Nemaska	98	48	146	843	832
Waskaganish	497	274	771	2,349	2,536
Eastmain	149	318	467	972	924
Wemindji	387	169	556.49	1,557	1,562
Chisasibi	825	480	1,305.4	5,356	4,985
Whapmagoostui	191	121	311.69	1,088	1,022
Cree	**3,437**	**2,111**	**5,548.95**	**18,664**	**16,848**
Lebel-sur-Quévillon			44.41	2,073	2,091
Matagami			75.12	1,375	1,402
Chapais			62.31	1,540	1,468
Chibougamau			694.87	7,361	7,233
Eeyou Istchee Baie-James			283,123	1,028	(note 3) 2,638
Jamesians			**284,000**	**13,377**	**14,832**
Cree and Jamesians	**284**	**3,169**	**289,549**	**32,041**	**31,680**
Kuujjuarapik	**8**	**290**	**297**	**x**	**792**

Note 1 - The Cree people live on 1A lands (Land reserved to Cree). 1B lands, identified as “villages cris” by the MAMH.
Note 2 - For Cree communities, the community land area has been defined as equal to land 1A and 1B areas.
Note 3 - The populations of Waswanipi and of the municipality/regional government of Eeyou Istchee Baie-James seem to have a change in location or definition between the 2016 and 2021 Censuses.
Source:Statcan (2022), ISQ (2021).

[6]ISQ forecast from 2021 to 2041.
[7] Including Whapmagoostui.

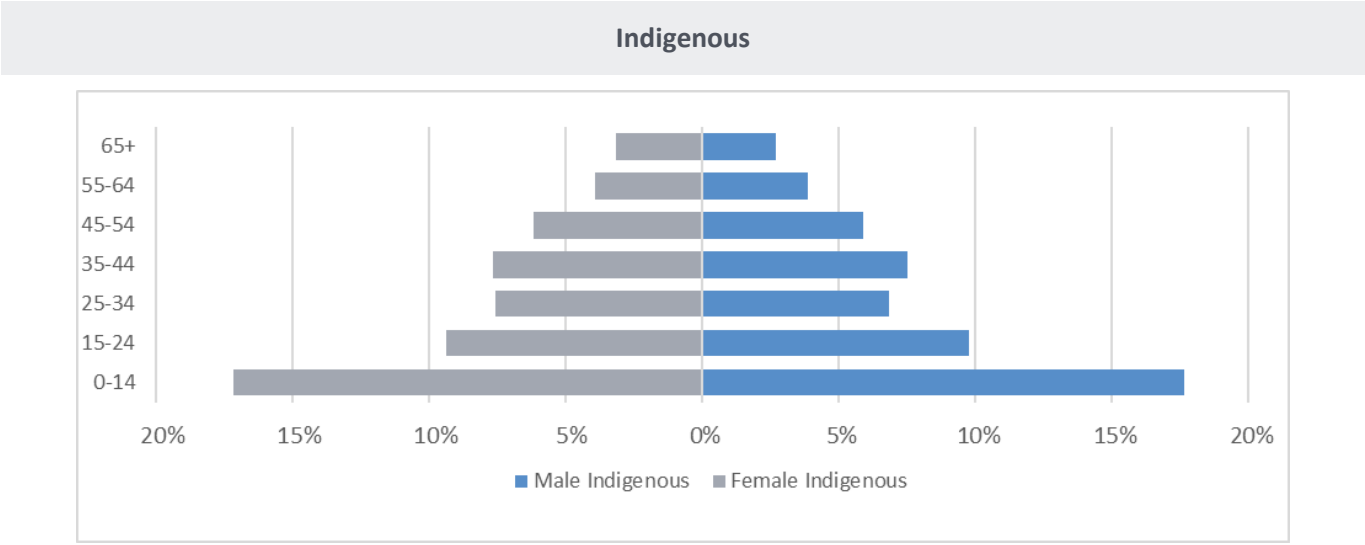
In Eeyou Istchee, Chisasibi is the most populated community with 4,985 people, followed by Mistissini with 3,731 inhabitants. Together, they account for nearly half of the total population of the Cree communities in Eeyou Istchee. Waskaganish, Waswanipi, Wemindji and Whapmagoostui each have a population of between 1,000 and 2,500 people. Nemaska, Oujé-Bougoumou and Eastmain are the least populated communities with fewer than 1,000 inhabitants each.

Chibougamau is by far the largest allophone community in Baie-James, comprising more than half of its population, with a population of 7,233 people. It is the largest community in the Nord-du-Québec region. Three other towns, Lebel-sur-Quévillon, Chapais and Matagami, each have populations of between 1,400 and 2,100 inhabitants. The localities of Beaucanton, Val-Paradis, Desmaraisville, Miquelon and Radisson have low populations.

10.4.2.2 Age Structure

The age structure of the Eeyou Istchee Baie James population is unique: in 2016, 34% of the population are under 20 years old, whereas this share does not exceed 23% in the rest of Quebec. By contrast, there are significantly fewer people aged between 20 and 64 years in the region (57.3%), and the share of people 65 years and over (8.8%) is the lowest of the regions in Quebec. Over the last twenty years, the proportion of people aged 65 has doubled in Eeyou Istchee Baie-James.

The Indigenous population pyramids depict a very young and growing population, as illustrated in Figure 10.4-1. The Indigenous population is significantly younger than the non-Indigenous population, as the 0–24-year cohort represents 54% of the population compared to 27% of the Jamesian population, shown in Figure 10.4-2.



Note: Aboriginal identity includes persons who are First Nations (North American Indian), Métis or Inuk (Inuit) and/or those who are Registered or Treaty Indians.

Source : Statcan, Census 2016

Figure 10.4-1: Indigenous Population Distribution by Gender and Age Group, Eeyou-Istchee Baie-James, 2016

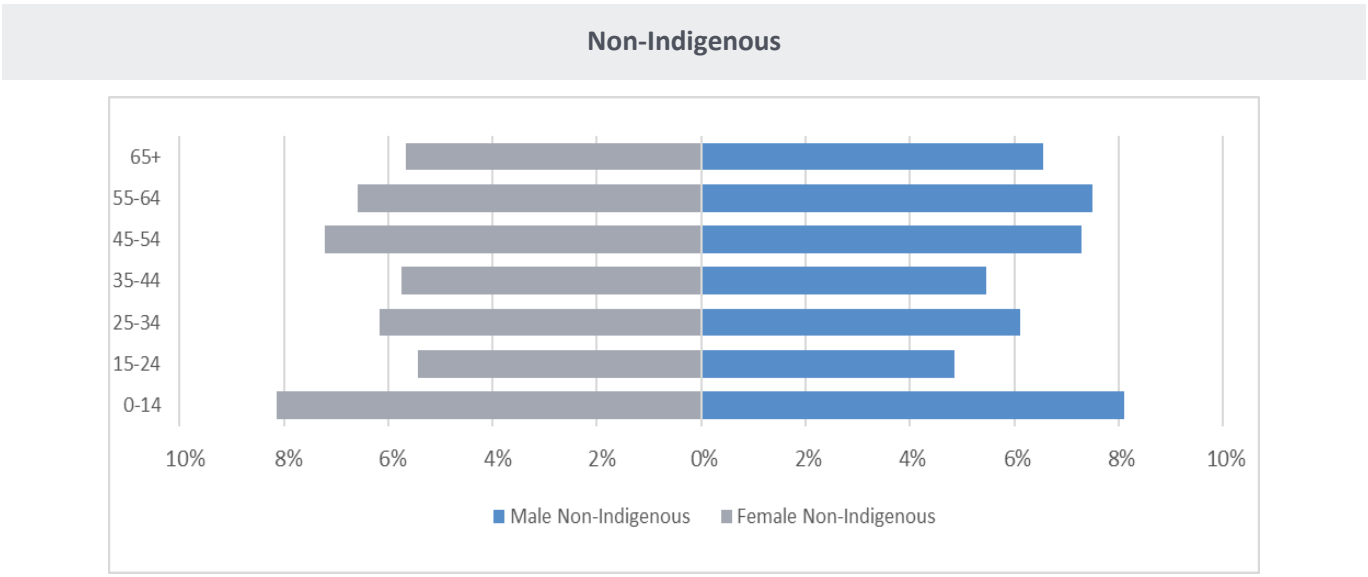


Figure 10.4-2: Non-Indigenous Population Distribution by Gender and Age Group, Eeyou-Istchee Baie-James, 2016

Source : Statcan, Census 2016.

10.4.2.3 Population Growth Dynamics

The entire population of Eeyou Istchee Baie-James has slightly grown at a compound annual growth rate (CAGR) of 0.4%, growing from 29,497 to 32,041 people between 2001 and 2021 (ISQ, 2021). The population growth rates are very different between Cree and Jamesians, as shown in Table 10.4-2. The Cree population has increased from 12,890 to 18,570 people between 2001 and 2021, a global increase of 44%, with the population doubling over the last 28 years. Since 2001, the growth of the Cree population sits at 1.9% per year on average whereas the Jamesian population dropped by 1.1% per year on average during this same period.

10.4.2.4 Population Forecasts

According to the ISQ population forecasting models, the expected population growth in Eeyou Istchee Baie-James is approximately 11% over the next 20 years. This corresponds to a compound annual growth rate of 0.5%, bringing the population to 36,528 in 2041, including Kuujjuarapik.

The Cree population is expected to continue growing steadily over the next two decades, with an average annual growth rate of 1.2%. This growth is expected to remain positive in all the Cree communities, with Eastmain and Whapmagoostui projected to grow at a faster rate of 1.8% per year and Nemaska at 1.6% per year, as shown in Table 10.4-3. On the long run, the population is expected to grow from approximately 18,700 inhabitants in 2021 to more than 23,600 people in 2041, more than 29,200 in 2061, and more than 34,500 in 2081, or global growth rate of 26.6%, 56.5%, and 81.5% respectively. The global forecast for the JBNQA Cree Beneficiary List population (CDC, 2021a, GD 7.1) is similar to that of the ISQ.

The Jamesian population is not expected to experience growth over the next two decades. Instead, a slight annual decline of approximately 0.5% is projected. The decline of the Jamesian population is attributable to ageing, with an increase of 4 percentage points in the 65+ age group. This increase is mainly fueled by a reduction in the 15-64 years age group.

Table 10.4-2: Population by Community, Eeyou Istchee Baie-James and Kuujjuarapik, 2001-2021

Community	2001	2006	2011	2016	2021	CAGR (2021-41)
Waswanipi	1,292	1,496	1,796	1,780	1,827	1.7%
Oujé-Bougoumou	566	616	732	753	814	1.8%
Mistissini	2,641	2,960	3,465	3,575	3,858	1.9%
Waskaganish	1,735	1,896	2,226	2,224	2,349	1.5%
Nemaska	579	653	722	773	843	1.9%
Eastmain	625	660	781	878	972	2.2%
Wemindji	1,122	1,234	1,401	1,463	1,557	1.7%
Chisasibi	3,535	4,026	4,538	4,947	5,356	2.1%
Whapmagoostui	795	822	873	1,000	1,088	1.6%
Cree	**12,890**	**14,363**	**16,534**	**17,393**	**18,664**	**1.9%**
Lebel-sur-Quévillon	3,272	2,744	2,164	2,202	2,073	-2.3%
Matagami	1,958	1,563	1,534	1,469	1,375	-1.8%
Chapais	1,819	1,643	1,616	1,616	1,540	-0.8%
Chibougamau	8,119	7,595	7,601	7,640	7,361	-0.5%
Eeyou Istchee Baie-James	1,439	1,399	1,333	1,103	1,028	-1.7%
Jamesians	**16,607**	**14,944**	**14,248**	**14,030**	**13,377**	**-1.1%**
Eeyou Istchee Baie-James	**29,497**	**29,307**	**30,782**	**31,423**	**32,041**	**0.4%**
Kuujjuarapik (Inuit)	566	577	670	691	762	34.6%

Source : ISQ (2021).

The Jamesian population shall be a tributary of the economic activity. The multiple projects in the region may reduce or offset the past decreasing trends observed over the last two decades, in which case the population sizes could be higher than projected. There are expected to be changes in the relative sizes of different communities within the region. By 2041, it is anticipated that Chisasibi would become the largest community in the region, surpassing Chibougamau in terms of population size.

Important methodological limits for population projections must be noted. First, there are important variations in population size across communities within the same sub-group, which may influence the spatial distribution of transport movements, both for passengers and procurement freight. In this sense, the use of an average growth rate could allow more reliable long-term forecasting.

For example, based on previous trends, the Cree communities of Eastmain and Whapmagoostui are expected to have higher population growth whereas Wemindji, Waskaganish and Waswanipi are expected to have a slower growth. Meanwhile, the previous decline of the Lebel-sur-Quévillon population resulting from the closing of Domtar Mill is reflected in ISQ population projections by a greater reduction than for other Jamesian communities such as Matagami, Chapais or Chibougamau. The recent closing of the mine in Matagami could result in greater population decline of this community in the short term.

Table 10.4-3: Forecasted Population, by Community, Eeyou Istchee Baie-James and Kuujjuarapik, 2021-2081

Community	2021	2031	2041	2051	2061	2071	2081	CAGR 2021-41	CAGR 2041-81
Waswanipi	1,827	1,990	2,173	2,413	2,610	2,807	3,004	0.9%	0.8%
Oujé-Bougoumou	814	936	1,061	1,184	1,307	1,429	1,551	1.3%	1.0%
Mistissini	3,858	4,338	4,677	5,300	5,803	6,307	6,810	1.0%	0.9%
Waskaganish	2,349	2,542	2,772	3,057	3,303	3,548	3,794	0.8%	0.8%
Nemaska	843	989	1,128	1,260	1,396	1,532	1,668	1.5%	1.0%
Eastmain	972	1,199	1,378	1,575	1,772	1,969	2,166	1.8%	1.1%
Wemindji	1,557	1,708	1,806	2,030	2,200	2,371	2,541	0.7%	0.9%
Chisasibi	5,356	6,335	7,143	8,087	8,989	9,890	10,791	1.4%	1.0%
Whapmagoostui	1,088	1,303	1,494	1,660	1,845	2,029	2,214	1.6%	1.0%
Crees	**18,664**	**21,340**	**23,632**	**26,566**	**29,224**	**31,882**	**34,541**	**1.2%**	**1.0%**
Lebel-sur-Quévillon	2,073	1,911	1,780	1,638	1,495	1,351	1,207	-0.8%	-1.0%
Matagami	1,375	1,305	1,264	1,204	1,148	1,093	1,037	-0.4%	-0.5%
Chapais	1,540	1,445	1,394	1,311	1,234	1,157	1,080	-0.5%	-0.6%
Chibougamauz	7,361	7,029	6,789	6,470	6,173	5,875	5,578	-0.4%	-0.5%
Eeyou Istchee Baie-James (RG)	1,028	887	805	805	805	805	805	-1.2%	0.0%
Jamesians	**13,377**	**12,577**	**12,032**	**11,428**	**10,854**	**10,280**	**9,707**	**-0.5%**	**-0.5%**
Kuujjuarapik	762	825	864	971	1,051	1,131	1,211	0.6%	0.8%
Total	**32,803**	**34,742**	**36,528**	**38,965**	**41,129**	**43,294**	**45,459**	**0.5%**	**0.5%**

Source: ISQ (2021) and extrapolation.

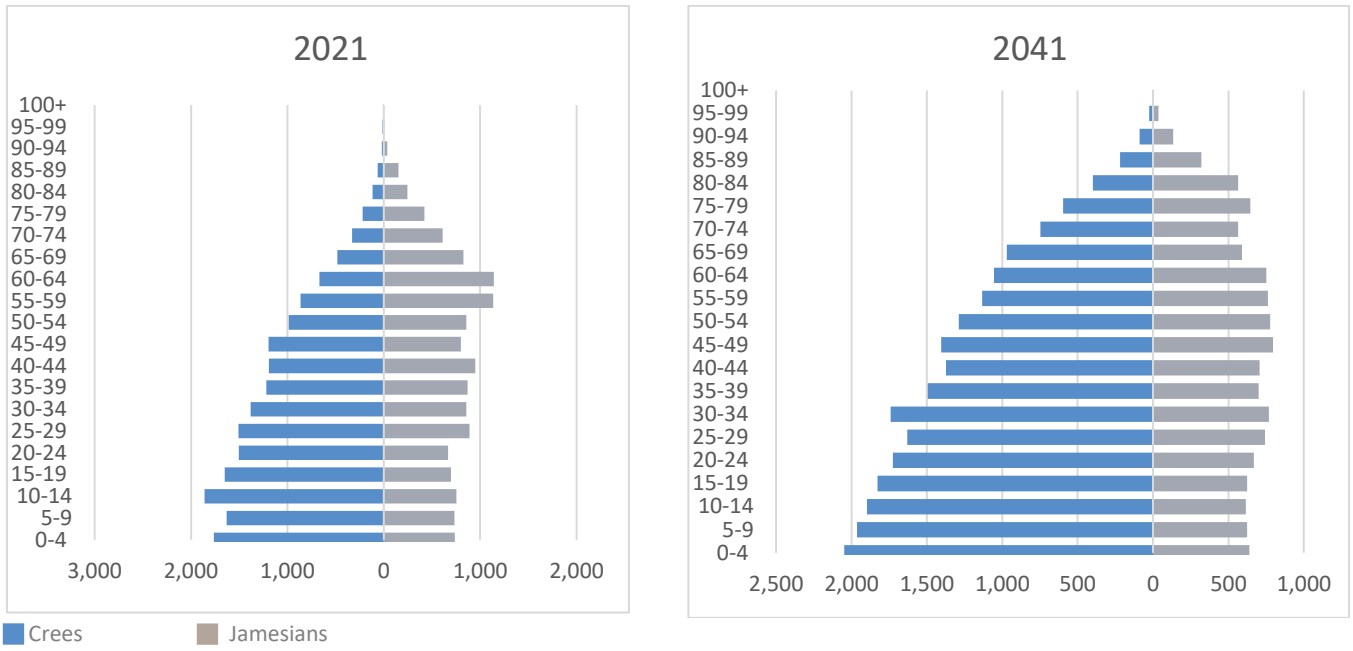
The decline of the Jamesian population is attributable to ageing, with an increase of 4 percentage points in the 65+ age group. This increase is mainly fueled by a reduction in the 15 to 64 years age group, as shown in Table 10.4-4.

Table 10.4-4: Population by Age Groups, Cree and Jamesians, 2021-2041

	0-14	15-64	65+
Jamesians 2021	17%	66%	17%
Crees 2021	28%	65%	7%
Jamesians 2041	16%	61%	24%
Crees 2041	25%	62%	13%

Source: ISQ, 21 juillet 2021.

Figure 10.4-3 shows that elderly people will make up 24% of the population pyramid in 2041 while elderly people make up 17% of the Jamesian population in 2021. In this case, the working-age population (15 to 64), remains stable at approximately 65% of the population pyramid. The biggest difference between the Cree population pyramid and the Jamesian population in 2021 is for those under 15, as this group accounts for 28% of the Cree population pyramid compared to 16% of the Jamesian pyramid and should remain stable through to 2041.



Source : ISQ (2021).

Figure 10.4-3: Population Pyramids, Crees and Jamesians, 2021 and 2041

10.4.3 Socio-Economy

10.4.3.1 Education and Training

The Cree School Board (CSB), created via Section 16 of the JBNQA, manages Cree education in Eeyou Istchee in a manner that protects the Cree language, culture, and traditional pursuits.

According to Table 10.4-5, in 2016, the proportion of non-Indigenous residents aged 15 and over with at least a high school diploma was 70.7%, which is significantly higher than the 48.7% for the Cree population. Additionally, as of 2016, there were 4,786 Crees aged 15 and over without a high school diploma, which represents 51.3% of the Cree population in that age group. This proportion is significantly higher than the Jamesian population, where 36.8% of the population aged 25 to 64 had not completed high school, according to Table 10.4-5.

Despite this gap, there has been a significant increase in education levels among Crees over the last decades. Between 1991 and 2016, the percentage of Crees aged 15 and over with at least a high school diploma increased by more than 20 percentage points. This increase is a positive trend which may have significant impacts on the future development of the Cree communities.

The distribution of the level of education amongst high school graduates (aged 15 and over) shows a slightly higher representation in apprenticeship programs and in CEGEP (4 and 7 basis points) and a 4-basis point gap in university degrees. The proportion of university graduates in 2016 (all levels combined) was lower in Cree communities (8.8%) compared to the Quebec population (24.1%). The situation has been improving, as the number of university graduates rose from 880 in 2011 to 1,030 in 2016.

As college and university institutions are far from the Cree and Jamesian communities, this stands as a vital barrier to higher education and to technical and scientist. while technical or professional programs can be offered more easily in the region.

Table 10.4-5: Education Level, Indigenous and Non-indigenous, Eeyou Istchee Baie-James, 2016

Highest Degree	Indigenous	Non-Indigenous
No Degree	6,175	2,785
High School	1,440	2,125
Apprenticeship or Trade Certificate/Diploma	1,940	2,735
College/CEGEP	1,530	1,640
University Certificate (Below Bachelor)	275	430
University Degree (Bachelor or higher)	425	1,255
Total	**11,785**	**10,970**

Source: Statcan (2016).

The availability of local labour is a key challenge identified by several stakeholders which is hindering the economic and social development of the Cree Nation. To address this issue, significant investment is needed in education and training programs to fill the gaps in the labour market. Without such investment, the problem will persist and potentially worsen as more development and investment projects are planned or underway (Survey).

To effectively train Cree labour, it is important to have continuous and direct contact with Cree communities and to provide a customized approach that includes monitoring, companionship, and mentoring. Cooperative education, on-the-job learning programs and promoting Cree employability in accordance with the Cree reality are also important factors in successful training (Desfor, 2022).

In recent years, the Cree Nation has made significant progress in training its labour force for the forestry and construction sectors. Between 2013 and 2020, 181 Cree individuals graduated from training programs, which is twice the number of graduates between 1995 and 2012. Out of these graduates, 74 were in heavy equipment operations, 33 in truck driving, 20 in forestry activities (harvesting, processing, surveying, and topography), and 28 in business administration (Desfor, 2022).

10.4.3.2 Employment

The ***participation*** to the labour market included approximately 7,200 active workers in Cree population compared to 4,555 inactive people, as of the 2021 Census shown in Table 10.4-6. This corresponds to a participation rate (ratio of active people/population aged 15 years and more) of 61%. Inactive people usually include young people still in school (15–24-year-old), the elderly and retiree people, and adults who have not been working for long and who aren't looking for a job anymore. Out of the active population, 560 were unemployed for an unemployment rate (unemployed people/active people) of 8% and an employment rate (ratio of employed people over people aged 15 years and more) of 56%. The participation rate was higher in Nemaska, Eastmain and Whapmagoostui, and less in Waskaganish, Oujé-Bougoumou and Waswanipi. The unemployment rate was less in Oué-Bougoumou and Mistissini, and higher in Waskaganish and Eastmain. As a result, the employment rate was the highest in Nemaska (65%), and the lowest in Waskaganish (48%).

In Jamesian communities, there were more than 7,700 active people and 4,115 inactive people, for a participation rate of 65%, as shown in Table 10.4-7. There were 350 unemployed people with an unemployment rate of 5%. Chibougamau had the best employment statistics with an employment rate of 67%.

Table 10.4-6: Participation and Employment, Cree Communities, 2021

	Waswanipi	Oujé-Bougoumou	Mistissini	Waskaganish	Nemaska	Eastmain	Wemindji	Chisasibi	Whapmagoostui	Cree
Reference population (age 15+)	325	525	2,675	1,670	570	630	1,110	3,430	690	**11,625**
Employed	175	290	1,510	805	370	385	645	1,900	430	**6,510**
Unemployed	15	15	100	100	30	45	55	165	35	**560**
Inactive	140	225	1,060	760	170	205	405	1,360	230	**4,555**
Participation rate	57%	56%	60%	55%	70%	68%	63%	60%	67%	**61%**
Employment rate	54%	55%	56%	48%	65%	61%	58%	55%	62%	**56%**
Unemployment rate	8%	5%	6%	11%	8%	11%	8%	8%	8%	**8%**

Note: In the 2021 Census, Waswanipi data doesn't include all members of the community.

Source: Statcan (2022).

Table 10.4-7: Participation and Employment, Jamesian Communities, 2021

	Lebel-sur-Quévillon	Matagami	Chapais	Chibougamau	Eeyou Istchee Baie-James	Jamesians
Reference population (age 15+)	1,740	1,150	1,130	5,805	2,005	**11,830**
Employed	1,075	680	685	3,870	1,060	**7,370**
Unemployed	40	35	40	150	85	**350**
Inactive	630	430	410	1,790	855	**4,115**
Participation rate	64%	63%	64%	69%	57%	**65%**
Employment rate	62%	59%	61%	67%	53%	**62%**
Unemployment rate	4%	5%	6%	4%	7%	**5%**

Note: In the 2021 Census, data for the territory of the regional government of Eeyou istchee Baie-James data may include some members of Waswanipi community.

Source: Statcan (2022).

Occupations have evolved over the last few decades as the Cree have moved from a subsistence economy complimented by government transfer payments to a wage economy driven by the service sector. Although hunting, fishing and trapping activities remain important, many people have transitioned to other activities as their main source of income.

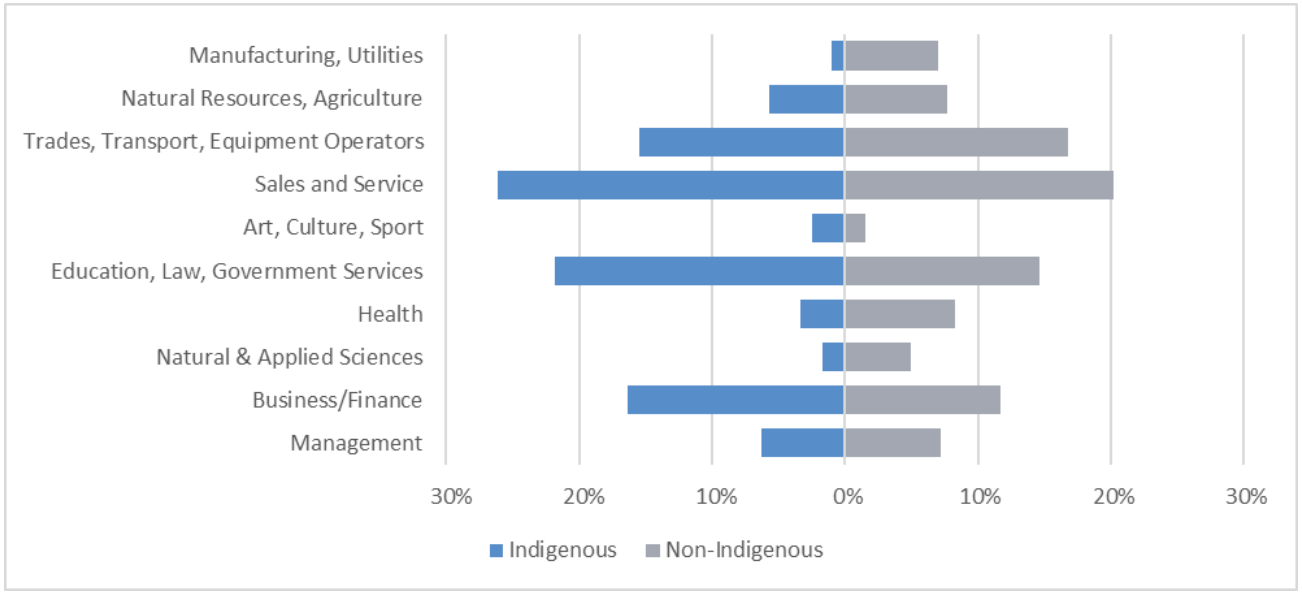
Over the past 30 years, the creation of Cree institutions and the devolution of government services have generated many permanent and well-paid jobs in the public services sector (municipal services, education, health and social services) where the Councils of the various Cree Nations, the Cree Nation Government, the Cree School Board and the Cree Board of Health and Social Services of James Bay are the main employers.

In 2016, occupations in management, business, finance, education, law, government services, sales and service accounted for 80% of jobs, as shown in Table 10.4-8 and Figure 10.4-4. Occupations in the trades, transportation and equipment operation accounted for 15% percent of jobs.

Table 10.4-8: Occupation Type, Indigenous and Non-Indigenous, Eeyou Istchee Baie-James, 2016

	Indigenous		Non-Indigenous	
Occupation Type	**Workers**	**%**	**Workers**	**%**
Management	455	6%	595	7%
Business/Finance	1,180	16%	970	12%
Natural & Applied Sciences	120	2%	410	5%
Health	240	3%	690	8%
Education, Law, Government Services	1,580	22%	1,215	15%
Art, Culture, Sport	175	2%	125	2%
Sales and Service	1,890	26%	1,681	20%
Trades, Transport, Equipment Operators	1,120	15%	1,395	17%
Natural Resources, Agriculture	410	6%	635	8%
Manufacturing, Utilities	70	1%	585	7%
Total	**7,240**	**100%**	**8,301**	**100%**

Source: Aboriginal Population Profile, 2016 Census.



Source: Aboriginal Population Profile, 2016 Census.

Figure 10.4-4: Indigenous and Non-Indigenous Population by Occupation type - Total Eeyou Istchee Baie-James and Quebec, 2016

There is some disparity in employment between Indigenous and Non-Indigenous population, for a few occupations. Cree workers are more involved than Jamesian workers in induced activities (generated by the needs of the population), including sales and service (26% compared to 20%), as well as education and government services (22% compared to 15%). Health is an exception with 3% in Cree employment compared to 8% for Jamesians. The Jamesian workforce is more involved in basic activities (goods sent outside the region) such as manufacturing and utilities

(7% of non-indigenous workers compared to 1% of indigenous workers), natural and applied sciences (3% compared to 1%), and primary sector including forestry, hunting, fishing, agriculture) (8% compared to 5%).

Table 10.4-9 displays employment statistics for the Cree communities by sector. The largest employment sectors for the Cree are Healthcare and social assistance (25%), public administration (22%) and Education (14%), with a total of 4,310 people employed. In the private economy, the main sectors of employment for the Cree are Construction (7%), retail trade (7%), accommodation and food services (4%) and other services (2%), with a total of 1375 people. The primary sector, which includes agriculture, forestry, fishing and hunting[8], total only 3% of the Cree labour (220 people), especially in Chisasibi (140 workers).

Table 10.4-9: Employment by Sector, Cree Communities, 2021

Sector	Waswanipi	Oujé-Bougoumou	Mistissini	Waskaganish	Nemaska	Eastmain	Wemindji	Chisasibi	Whapmagoostui	Cree
Reference population (age 15+)	185	300	1,610	910	395	425	695	2,065	465	**7,050**
Agriculture, forestry, fishing & hunting			30	35			15	140		**220**
Mining, oil and gas extraction	10	15	55	10	10		15	25		**140**
Utilities			20	10		10	10	20		**70**
Construction	15	10	90	55	15	20	45	190	20	**460**
Manufacturing			15					10		**25**
Wholesale trade								15		**15**
Retail trade	10	10	105	60	15	20	40	175	40	**475**
Transportation and warehousing			25	10	10	10	10	30	15	**110**
Information and cultural industries			20	10		10	10	25	10	**85**
Finance and insurance				10	10					**20**
Real estate, rental and leasing	10		30	10			10	10	10	**80**
Professional and technical services	10		25	10	10		20	25	10	**110**
Management of companies			10							**10**
Waste management & remediation services	10		35	15		30	45	50	15	**200**
Education	20	35	240	155	50	70	105	270	40	**985**
Health care and social assistance	45	70	440	190	85	95	150	565	125	**1,765**
Arts, entertainment and recreation	10	20	25		10	20	25	30	15	**155**
Accommodation and food services		10	65	45	15	15	40	90	20	**300**
Other services		10	35	15	15	10	15	25	15	**140**
Public administration	45	100	325	250	155	100	145	315	125	**1,560**

Note: In the 2021 Census, Waswanipi data don't include all members of the community.
Source: Statcan (2022).

[8] These figures do not include the traditional activities that are retributed by the Cree Hunters and Trappers Income Security Board.

Table 10.4-10: Employment by Sector in percentage, Cree Communities, 2021

Sector	Waswanipi	Oujé-Bougoumou	Mistissini	Waskaganish	Nemaska	Eastmain	Wemindji	Chisasibi	Whapmagoostui	Cree
Agriculture, forestry, fishing & hunting			2%	4%			2%	7%		**3%**
Mining, oil and gas extraction	5%	5%	3%	1%	3%		2%	1%		**2%**
Utilities			1%	1%		2%	1%	1%		**1%**
Construction	8%	3%	6%	6%	4%	5%	7%	9%	4%	**7%**
Manufacturing			1%					1%		
Wholesale trade								1%		
Retail trade	5%	3%	7%	7%	4%	5%	6%	9%	9%	**7%**
Transportation and warehousing			2%	1%	3%	2%	1%	2%	3%	**2%**
Information and cultural industries			1%	1%		2%	1%	1%	2%	**1%**
Finance and insurance				1%	3%					
Real estate, rental and leasing	5%		2%	1%			1%	1%	2%	**1%**
Professional and technical services	5%		2%	1%	3%		3%	1%	2%	**2%**
Management of companies			1%							
Administrative, waste management and remediation services	5%		2%	2%		7%	7%	2%	3%	**3%**
Education	11%	12%	15%	17%	13%	17%	15%	13%	9%	**14%**
Health care and social assistance	24%	23%	27%	21%	22%	22%	22%	27%	27%	**25%**
Arts, entertainment and recreation	5%	7%	2%		3%	5%	4%	2%	3%	**2%**
Accommodation and food services		3%	4%	5%	4%	4%	6%	4%	4%	**4%**
Other services		3%	2%	2%	4%	2%	2%	1%	3%	**2%**
Public administration	24%	33%	20%	28%	39%	24%	21%	15%	27%	**22%**

Note: In the 2021 Census, Waswanipi data doesn't include all members of the community.
Source: Statcan (2022).

Jamesians work more in basic sectors including: manufacturing, mainly the wood industry, which employs 1,055 people (14%) ; mining with 695 workers (9%) ; forestry, agriculture, hunting and fishing 185 workers (2%) ; transport and warehousing 240 workers (3%) for a total of 2,175 workers (28%). Construction occupies 350 Jamesian workers (5%). Public sector represents a major share of employment for the Jamesian people as well - Healthcare and social assistance (17%), public administration (10%) and Education (7%) with a total of 2,555 people (34%). The private service sector, corresponding to retail trade (11%), accommodation and food services (5%), and other services (4%), totaling 1,910 jobs (19%). The detailed data is presented in Table 10.4-11.

"*A large and competitive skilled labour force, including mining personnel, is available in Chibougamau [Chapais Matagami] area, which is also well served by heavy equipment service and maintenance providers. Several companies specialize in mining services*" (CSA, 2020). This is seen as an asset for regional economic development.

Table 10.4-11: Employment by Sector, Jamesian Communities, 2021

Sector	Lebel-sur-Quévillon	Matagami	Chapais	Chibougamau	Eeyou Istchee Baie-James	Jamesians
Reference population (age 15+)	1,110	720	720	4,015	1,150	**7,715**
Agriculture, forestry, fishing & hunting	40	15	25	65	40	**185**
Mining, oil and gas extraction	70	170	60	245	150	**695**
Utilities	20		30	100	10	**160**
Construction	55	25	30	185	55	**350**
Manufacturing	215	45	165	615	15	**1,055**
Wholesale trade	25			50		**75**
Retail trade	95	115	90	470	75	**845**
Transportation and warehousing	50		40	105	45	**240**
Information and cultural industries	10			30	10	**50**
Finance and insurance	15	10		80	10	**115**
Real estate, rental and leasing	10			30	10	**50**
Professional and technical services	35	10	15	145	30	**235**
Management of companies						
Administrative, waste management and remediation services	30	15	15	100	35	**195**
Education	65	45	20	255	130	**515**
Health care and social assistance	155	105	90	755	185	**1,290**
Arts, entertainment and recreation				80	10	**90**
Accommodation and food services	30	25	60	225	40	**380**
Other services	65	35	20	160	55	**335**
Public administration	125	75	40	275	235	**750**

Note: In the 2021 Census, data for the territory of the regional government of Eeyou istchee Baie-James data may include some members of Waswanipi community.

Source: Statcan (2022).

Table 10.4-12: Employment by Sector in percentage, Jamesian Communities, 2021

Sector	Lebel-sur-Quévillon	Matagami	Chapais	Chibougamau	Eeyou Istchee Baie-James	Jamesians
			(%)			
Agriculture, forestry, fishing & hunting	4%	2%	4%	2%	4%	**2%**
Mining, oil and gas extraction	6%	24%	8%	6%	13%	**9%**
Utilities	2%		4%	3%	1%	**2%**
Construction	5%	4%	4%	5%	5%	**5%**
Manufacturing	19%	6%	23%	15%	1%	**14%**
Wholesale trade	2%			1%		**1%**
Retail trade	9%	16%	13%	12%	7%	**11%**
Transportation and warehousing	5%		6%	3%	4%	**3%**
Information and cultural industries	1%			1%	1%	**1%**
Finance and insurance	1%	1%		2%	1%	**1%**
Real estate, rental and leasing	1%			1%	1%	**1%**
Professional and technical services	3%	1%	2%	4%	3%	**3%**
Management of companies						
Administrative, waste management and remediation services	3%	2%	2%	3%	3%	**3%**
Education	6%	6%	3%	6%	11%	**7%**
Health care and social assistance	14%	15%	13%	19%	16%	**17%**
Arts, entertainment and recreation				2%	1%	**1%**
Accommodation and food services	3%	4%	8%	6%	4%	**5%**
Other services	6%	5%	3%	4%	5%	**4%**
Public administration	11%	10%	6%	7%	20%	**10%**

Note: In the 2021 Census, data for the territory of the regional government of Eeyou istchee Baie-James data may include some members of Waswanipi community.

Source: Statcan (2022).

10.4.3.3 Income

Annual individual income in Cree communities lied between $33,600 in Waswanipi and $40,400 in Eastmain in 2019[9], as measured by the median indicated in Table 10.4-13. The greatest part of this income came from work (between 70% and 80%). Government transfers other than the employment insurance, presumably mostly from the Economic Security Program, generated between 17% (Eastmain) and 26% (Chisasibi) of individual income. Employment insurance provided 2% to 4% of individual income as the unemployment rate was low.

[9] Income level and source were not used for 2020 because of the COVID-19 pandemic. The prevalence of low income was available only for 2020.

Table 10.4-13: Income, Cree Communities, 2019-2020

	Waswanipi	Oujé-Bougoumou	Mistissini	Waskaganish	Nemaska	Eastmain	Wemindji	Chisasibi	Whapmagoostui
Individual income, 2019									
Median total income ($)	33,600	36,400	37,600	30,800	34,000	40,400	39,200	36,400	38,000
Median after-tax income ($)	32,400	36,400	37,200	30,800	33,200	40,400	38,800	35,600	37,600
Source of individual income, 2019 (%)									
Employment	76%	75%	78%	72%	79%	80%	78%	70%	72%
Another market income	2.0%	2.5%	1.8%	0.8%	1.0%	1.5%	1.2%	1.4%	1.5%
Employment insurance benefits	1.6%	1.8%	2.9%	4.0%	2.6%	2.4%	3.1%	2.4%	3.0%
Other government transfers	20.4%	20.8%	17.3%	23.6%	18.2%	16.8%	18.3%	26.2%	24.0%
Low-income and income inequality, 2020									
Prevalence of low income	6.4%	6.4%	7.7%	5.0%	4.8%	2.2%	3.7%	4.3%	5.6%
Total low-income status	460	795	3,710	2,530	825	925	1,560	4,975	1,020

Note: In the 2021 Census, Waswanipi data does not include all members of the community.

Source: Statcan (2022).

In 2019, the median total individual income amounted to a bracket of $45,000-$47,000, or $40,000-$42,000 after tax, in the Jamesian communities of Matagami, Lebel-sur-Quévillon and Chibougamau, as shown in Table 10.4-14. The median income was less in Chapais ($39,600 before tax/$36,000 after tax) where government transfers and low income were more prevalent (12% of the population in 2020).

Table 10.4-14: Income, Jamesian Communities, 2019-2020

	Lebel-sur-Quévillon	Matagami	Chapais	Chibougamau	Eeyou Istchee Baie-James
Individual income, 2019					
Median total income ($)	47,200	46,800	39,600	45,600	35,600
Median after-tax income ($)	41,600	41,200	36,000	40,400	33,200
Source of individual income, 2019 (%)					
Employment	79%	76%	76%	78%	76%
Other market income	8.8%	10.4%	4.4%	8.4%	5.2%
Employment insurance benefits	1.8%	2.5%	1.9%	2.3%	2.5%
Other government transfers	10.6%	11.3%	17.5%	11.6%	16.7%
Low-income and income inequality, 2020					
Prevalence of low income	6.8%	5.4%	11.9%	9.1%	11.4%
Total low-income status	2,070	1,395	1,440	7,150	2,605

Note: In the 2021 Census, data for the territory of the regional government of Eeyou istchee Baie-James data may include some members of Waswanipi community.

Source: Statcan (2022).

The ***Economic Security Program*** (ESP), outlined in Chapter 30 of the JBNQA (OSRCPC, 2017), is intended to allow Cree people who want it to maintain their traditional way of life by harvesting in the bush. The beneficiaries of the program must go to the trapline for hunting, fishing and trapping at least 120 days during the year. Thus, the

program also allows Cree members to occupy the territory. The allowance is determined according to the duration of stay in the forest, the remoteness, the family size and the family income (CHESB, 2023).

The ESP provides financial support to around 2,400 adults belonging to 1,400 families in the Cree communities. The majority of the beneficiaries are either 18–24-year-old or 50 years and older. Adults between 25 and 50 years of age are more likely to participate in the labour market as they require additional income to support their families. Despite population growth, the number of Cree community members receiving benefits from the ESP has remained steady over time. However, the relative share of this group among the population has been declining, from 31% in 1990-1991 to 12.9% in 2019-2020. (OSRCPC, 2020).

When the JBNQA was signed, it was assumed that full-time land users would benefit from a wide range of revenue streams such as the sale of furs and guiding for outfitters which would supplement a subsistence lifestyle. The ESP program was designed to act as a revenue floor to mitigate low fur prices or decreases in other revenues. However, due mainly to the decline of fur prices that began in the 1980s, economic benefits for land users have become limited and, in many cases, ESP benefits are often their lone source of revenue. The limited benefits of this program are a likely cause for its inability to keep up with Cree population growth. Nevertheless, the benefits remain the backbone of the subsistence lifestyle, especially for the older generation and underemployed youth entering the job market. The key to the program's future, and that of the subsistence way of life for that matter, will surely be the development of additional revenue streams that land users can tap into, as originally intended in the JBNQA, namely land-based seasonal work. Small-scale deforestation contracts related to infrastructure development in forested areas are an example.

10.4.3.4 Housing

Table 10.4-15 provides insight into the diverse housing situations within the Cree communities. The total number of dwellings occupied by usual residents varies greatly across these communities, ranging from 160 in Waswanipi to 1,281 in Chisasibi. Mistissini has the highest number of dwellings occupied by usual residents, with 1,019, while Waswanipi has the lowest at 127. The number of vacant dwellings and secondary homes also varies significantly, from 23 in Whapmagoostui to 225 in Chisasibi.

The highest percentage of dwellings with five or more residents is in Chisasibi at 50%, while Oujé-Bougoumou has the lowest at 28%. The percentage of dwellings with five or more residents in Chapais and Chibougamau is 11% and 7%, respectively. Interestingly, a significant proportion of dwellings in Cree communities have five or more residents, representing 39% of all dwellings. This figure is in stark contrast to Jamesian communities, where only 6% of dwellings have five or more residents.

Table 10.4-16 shows that the Jamesian communities exhibit a wide range of total dwellings. The highest number is in Chisasibi at 1,281, followed closely by Lebel-sur-Quévillon at 1,161 and Mistissini at 1,210. In contrast, the lowest numbers of total dwellings are found in Whapmagoostui at 251, Nemaska at 291, and Eastmain at 280. When looking at the number of dwellings occupied by usual residents, Chisasibi still comes out on top with 1,056, followed by Mistissini with 1,019 and Wemindji with 397. Meanwhile, the lowest number of dwellings occupied is found in Nemaska with 221, closely followed by Eastmain with 223 and Waswanipi with 127. Regarding the number of dwellings with 5 or more residents, Chisasibi is again at the top with 530, followed by Waskaganish with 235 and Mistissini with 320. On the other hand, Nemaska has the lowest number of dwellings with 5 or more residents at only 75, followed by Eastmain with 95 and Waswanipi with 40. Overall, these statistics show a varied picture of housing in Eeyou Istchee Bay-James, with some having a greater number of total dwellings, more occupied dwellings, or more large households than others.

Table 10.4-15: Dwellings and Families, Cree Communities, 2021

	Waswanipi	Oujé-Bougoumou	Mistissini	Waskaganish	Nemaska	Eastmain	Wemindji	Chisasibi	Whapmagoostui	Total
Total families	115	190	935	630	220	235	400	1,220	260	**4,205**
Total dwellings	160	277	1,210	626	291	280	493	1,281	251	**4,869**
Dwellings occupied by usual residents	127	218	1,019	563	221	223	397	1,056	228	**4,052**
Vacant dwellings and secondary homes	33	59	191	63	70	57	96	225	23	**817**
Households with 5 residents or more	40	60	320	235	75	95	140	530	100	**1,595**
Single-family households	70	155	670	310	140	120	240	550	155	**2,410**
Multigenerational households	10	10	100	130	35	55	55	275	35	**705**
Multiple family households	20	15	75	40	15	5	35	90	15	**310**
Non-family households (one or multiple people)	25	35	175	75	35	40	65	140	10	**600**
(% of dwellings)										
Vacant dwellings and secondary homes	21%	21%	16%	10%	24%	20%	19%	18%	9%	**17%**
Households with 5 residents or more	31%	28%	31%	42%	34%	43%	35%	50%	44%	**39%**
Single-family households	55%	71%	66%	55%	63%	54%	60%	52%	68%	**59%**
Multigenerational households	8%	5%	10%	23%	16%	25%	14%	26%	15%	**17%**
Multiple family households	16%	7%	7%	7%	7%	2%	9%	9%	7%	**8%**
Non-family dwellings (one or multiple people)	20%	16%	17%	13%	16%	18%	16%	13%	4%	**15%**
Household/family size (persons)										
Average household size	3.6	3.7	3.6	4.5	3.7	4.1	3.9	4.7	4.5	**4.1**
Average family size	3.6	3.8	3.6	3.7	3.4	3.6	3.5	3.7	3.7	**3.6**

Note: In the 2021 Census, Waswanipi data doesn't include all members of the community. The number of families and the family size correspond to the census family. A household is a person or a group of persons living usually in the same dwelling. By definition, a household corresponds to an occupied dwelling.

Source: Statcan (2022).

In the Cree communities, the total number of dwellings is 4,869 and the number of dwellings occupied by usual residents is 4,052 (83.2%). In the Jamesian communities, the total number of dwellings is 7,496 and the number of dwellings occupied by usual residents is 6,303 (84.1%).

Cree communities have a greater share of multiple family and multigenerational households (25%) and a less share of non-family households (15%) combined with an average household size (4.1) greater than the average family size (3.6), which supposes a certain overcrowding of dwellings. This is more marked in Chisasibi, Whapmagoostui, and Waskaganish. Housing overcrowding is often cited as a primary social and health issue in many First Nations.

In Jamesian communities, the situation is inverse as the third (33%) of the households are not composed of families and only 3% of households are multiple families or multigenerational, resulting in an average household size (2.3) less than the averaged family size (2.7).

Table 10.4-16: Dwellings and Families, Jamesian Communities, 2021

	Lebel-sur-Quévillon	Matagami	Chapais	Chibougamau	Eeyou Istchee Baie-James RG	Total
Total families	640	405	415	2,120	695	**4,275**
Total dwellings	1,161	736	711	3,557	1,331	**7,496**
Dwellings occupied by usual residents	942	617	648	3,190	906	**6,303**
Vacant dwellings and secondary homes	219	119	63	367	425	**1,193**
Households with 5 residents or more	60	40	45	155	130	**430**
Single-family households	625	385	405	2,045	545	**4005**
Multigenerational households	5	5	5	15	45	**75**
Multiple family households	5	15	10	45	45	**120**
Non-family households (one or multiple people)	310	215	235	1,080	270	**2110**
(% of dwellings)						
Vacant dwellings and secondary homes	19%	16%	9%	10%	32%	**16%**
Households with 5 residents or more (%)	6%	6%	7%	5%	14%	**7%**
Single-family households	66%	62%	63%	64%	60%	**64%**
Multigenerational households	1%	1%	1%	0%	5%	**1%**
Multiple family households	1%	2%	2%	1%	5%	**2%**
Non-family dwellings (one or multiple people)	33%	35%	36%	34%	30%	**33%**
Household/family size (persons)						
Average household size	2.2	2.3	2.2	2.2	2.9	**2.3**
Average family size	2.7	2.8	2.9	2.8	3.2	**2.9**

Note: In the 2021 Census, data for the territory of the regional government of Eeyou istchee Baie-James data may include some members of Waswanipi community.

Source: Statcan (2022).

10.4.3.5 Health and Community Services

The Cree Board of Health and Social Services of James Bay (CBHSSJB) was founded in 1978, following the JBNQA. The CBHSSJB is responsible for the administration of health and social services for all persons residing permanently or temporarily in Region 18, the administrative region of the Ministry of Health and Social Services of Quebec corresponding to the Cree territory of James Bay (CBHSSJB, 2021). Its head office is in Chisasibi (CBHSSJB, 2021).

In each of the nine communities of Eeyou Istchee, the CBHSSJB operates a Community Miyupimaatisiiun Centre (CMC), which resemble Integrated Health and Social Services Centres (CISSS) elsewhere in Quebec. CMCs offer services in general medicine, mental health, home and community care, dentistry, pharmacies (in Chisasibi, Mistissini and Waskaganish), social services and allied health (CBHSSJB, 2021).

The CBHSSJB also operates the Chisasibi Regional Hospital which provides primary and secondary health-care services to the population of Eeyou Istchee. The medical team includes 7 doctors and 27 registered nurses. The hospital has 29 beds, of which 17 are for acute care (5 for pediatric), 9 for chronic care, and 3 for respite care. Specialist services are provided through a partnership with the Réseau Universitaire Intégré de Santé et Services Sociaux (RUISS). Through this partnership, specialists from the McGill University Health Centre (MUHC), and the

Jewish General, St. Mary's, and Douglas Hospitals visit Chisasibi Regional Hospital and provide telemedicine services in obstetrics, surgery, pediatrics, orthopedics, internal medicine, ophthalmology, otolaryngology and psychiatry.

The Hospital manages regional programs for Infection Prevention and Control and Telemedicine. In 2019, an announcement for a new 20,000 m^2 and 52-bed hospital facility with a community Miyupimaatisiiun center in Chisasibi was made. The 300M$ project is scheduled to be completed by 2025 and will replace the current hospital, open since 1980 (CNB, 2022). This new hospital project is part of the Cree Nation's long-term plan to improve health services in the Eeyou Istchee territory. It will feature advanced medical technology, more space for patients and staff, and will allow the Cree Nation to deliver a wider range of health services to its communities.

Additionally, CBHSSJB operates three group homes for at-risk youth, a Regional Public Health Department and Program Planning unit, and a recruitment office in Montreal. The CBHSSJB also includes a unit focused on developing and implementing land-based healing and traditional medicine (CBHSSJB, 2021).

In addition to the social services offered by CBHSSJB, the Nemaska, Waskaganish, Eastmain and Wemindji communities have access to social and community services offered by wellness centres.

10.4.3.6 Quality of Life and Socio-economic Vitality

The economic vitality index (EVI) compares communities based on their economic vitality relative to each other. In terms of vitality, a negative value indicates that the community is behind other communities. Conversely, a positive value indicates economic overshoot. The EVI represents the geometric mean of the standardized values of three indicators, namely the median income, the rate of workers aged 25 to 64 and the five-year average annual growth rate of the population.

In 2018, Nord-du-Québec was the only administrative region far from major urban centres where most communities showed positive EVI. Eastmain is one such community with positive EVI, such as shown in Table 10.4-17. A higher income, a higher proportion of workers aged 25 to 64, and a rapid growth in population explain its good performance in comparison with Quebec. Inversely, the index of Jamesian communities indicates that the economic activity has been declining, making the population decrease.

Abitibi-Témiscamingue and surrounding areas have increased their relative positioning on the regional economic vitality scale between 2008 and 2018. The significant rise in mineral prices and the revitalization of several mines drive this trend. On the other hand, the decline in the forestry industry has been hard felt during this same period.

10.4.4 Local and Regional Development

10.4.4.1 Development Factors and Issues

The Canadian Strategy for the economic development of Indigenous people (CNDEA, 2019) notes a growth in Indigenous entrepreneurship and in collegial graduation since 2006, although it is not sufficient to bring the level of development up to the Canadian average in the short or medium term. The successful development of Indigenous communities lies on the constant effort and coordination of Indigenous NATIONS, different levels of government, and the industry and private sector.

Table 10.4-17: Economic Vitality Index, Communities in Eeyou Istchee Baie-James, 2008-2018

	Index		Mean total Income* ($)		Active population aged 25-64 (%)		5-year average population growth rate (per 1,000)	
2008/2018	2008	2018	2008	2018	2008	2018	2008	2018
Eeyou Istchee	19	28	27,959	36,043	76.9	77.7	24.3	10.8
Chisasibi	171	296	27,883	36,740	71.7	72.3	23.7	16.8
Eastmain	51	21	30,158	42,397	88.2	86.6	24.2	24.1
Mistissini	44	134	31,667	40,537	82.5	80.7	33.2	9.2
Nemaska	134	184	27,046	32,620	86.4	85.9	11	16.4
Oujé-Bougoumou	105	96	29,518	40,322	78.9	81.6	18.1	14.9
Waskaganish	261	668	23,765	29,667	73.3	76.5	23.7	-1.4
Waswanipi	371	636	21,919	33,767	69.8	72.6	25.8	-1.8
Wemindji	83	180	28,525	38,271	81.8	82.3	23.3	6.7
Whapmagoostui	197	177	28,662	33,986	75.4	79.3	9.2	24
Baie-James	43	31	33,067	44,981	76.9	80.8	-17.5	-5.9
Chapais	401	264	31,136	40,253	74.3	78.9	-13.4	1.3
Chibougamau	252	189	33,756	45,245	79.6	83.3	-7.5	-1.4
Lebel-sur-Quévillon	619	381	30,562	47,573	72.2	76.5	-40.6	-9.7
Matagami	311	242	38,821	49,899	81.0	82.8	-30.5	-8.7

*Median total income of individuals 18 years of age and over

It is worth noting that the territory is rich in natural resources, including vast forested areas, mineral deposits, and a large network of rivers and lakes. These resources have provided the Cree with opportunities for economic development, particularly in primary industries such as forestry, fisheries, and energy production. Agriculture is also seen as a potential industry, although the harsh climate and limited growing season present challenges.

However, there are also challenges that can hinder economic development, such as the region's low population density, remoteness, and lack of adequate transport infrastructure. Access to financing and investment can also be a barrier, as well as limited growth in companies and entrepreneurship. Developing skills and education, as well as building partnerships with other organizations, are also important factors in promoting economic growth and development in the Cree territory (CNDEA, 2019).

The concept of economic development is becoming broader. The development measurement index, which included only income, employment, education, and housing, now include infrastructure and gender equality as well, and will include health, language, tradition and culture in the future (CNDEA, 2019).

Overall, economic development in Indigenous communities should be viewed as a collaborative process that involves partnerships between governments, industry, and Indigenous peoples. It should prioritize the values and needs of the community and support the long-term sustainability of the environment and culture.

The involvement of forestry, mining, and energy companies in the development of Cree and Jamesian communities can greatly impact the future of these communities. The interaction between these companies and the local communities, through measures such as preferred employment, procurement, and partnerships, as well as the economic return to the Cree and Jamesians, will play a significant role in future development.

In addition to external opportunities from natural resource development, it is important for regional and local corporations to respond to local consumers needs to maximize internal development opportunities.

The Canadian Council for Aboriginal Business (CCAB, 2020) recommends many actions to enhance business development in First Nation communities and the effectiveness of Aboriginal Economic Development Corporations (AEDC). These include the following recommendations:

1. To increase the involvement of AEDCs in government supply chains, using public and non-public procurement, set aside, inclusive initiatives, and tracking and reporting. This would allow AEDCs to have more opportunities to participate in government contracts.
2. To set a public target of 5% of Government of Canada business to be granted to Indigenous companies across all federal departments and agencies and publicly release progress towards this goal. This would ensure that Indigenous businesses have a fair chance to compete for government contracts and receive a reasonable share of government business.
3. To enforce Indigenous procurement by primary contractors. If a large contract is awarded to a non-Indigenous business, then they should be held accountable to purchase goods and services from Indigenous businesses. Primary contractors should also be responsible for tracking Indigenous spend. This would promote the participation of Indigenous businesses in the supply chain and help to ensure that Indigenous spend is tracked and reported.
4. To tailor programs and funding support to larger AEDCs and the development of good governance. Financing and business support decisions by the government should ensure that Indigenous businesses that operate between $1-15M annually - representing almost half of all AEDCs - are considered. This would help to ensure that smaller Indigenous businesses have access to funding and support.
5. To consider reducing the performance bond requirement to less than 100 percent of the contract value to attract qualified Indigenous bidders and ensure fairness in the procurement process. Alternatively, offer assistance and training services to obtain the necessary bond coverage. This would help to reduce the financial burden on Indigenous businesses and ensure that they have a fair chance to compete for government contracts.

If these conditions are not satisfied, it may limit development, such as prioritizing a fly-in fly-out labour force rather than a permanent one, if local housing issues are not addressed.

To achieve the original objectives set forth as part of La Grande Alliance, stakeholders interviewed believe that there should be a concerted effort to ensure the legitimacy of Cree-non-Cree business partnerships created to bid on these projects, as well as an assurance that a good portion of the revenue generated will be returned directly to the communities and families affected by these projects. The attribution of these contracts would result in the creation of many spinoff businesses at the local level, inducing effects such as an increase in the local demand for goods and supplies, health care, social services, housing, education, etc.

These comments are elaborated on below.

- Legitimate Cree-non-Cree business partnerships: This is important because such partnerships can provide the Cree with access to technical expertise, financial capital, and business networks that can help them compete for and secure contracts. However, there is a risk that these partnerships may not be fully equitable, with the non-Cree partners having more power and control over the partnership. Ensuring legitimacy means that the partnership is based on mutual respect and trust, and that there is an agreement on how profits, risks, and decision-making will be shared.

- Assurance of a return of revenues to impacted communities and families: This is important because it ensures that the benefits of the projects are distributed fairly and equitably, and that the Cree communities are able to benefit from the economic opportunities generated. Without such assurances, there is a risk that the benefits will flow primarily to the non-Cree partners or to the government, leaving the Cree communities with few tangible benefits.
- Attribution local contracts and development of spinoff businesses: This is important because it generates additional economic activity and employment opportunities at the local level, beyond the direct benefits of the contracts themselves. For example, if a forestry contract is awarded, this could lead to the creation of new sawmills, pulp and paper mills, and other related businesses in the local area, which in turn would create jobs and generate additional economic activity. This can help to create a more diversified and sustainable local economy.
- Induced effects such as an increased local demand: This is important because it can create additional economic opportunities beyond the direct benefits of the contracts and spinoff businesses. For example, if there is an increase in the local demand for goods and supplies, this could lead to the creation of new retail businesses, distributors, and suppliers in the area. This can help to create a more robust and self-sufficient local economy, with a range of goods and services available to meet the needs of the local population.
- The sharing of profit on a 50/50 basis: This refers to a condition where the revenue generated from the project is shared equally between the company and the local community. This condition ensures that the local community benefits from the economic development project, and it incentivizes companies to work closely with local communities.
- The hiring, training, and career path development of the local labour force: This condition emphasizes the importance of employing and training the local labour force, which benefits the local community by creating jobs and providing skills training. It also ensures that the labour force is adequately prepared to participate in future economic development projects.
- The use and development of local construction and transportation services during the construction phase: This promotes the use of local construction and transportation services, which provides opportunities for local businesses to participate in the economic development project. This can also contribute to the development of the local economy by promoting the growth of local businesses.
- The contracting of regional or local suppliers or joint ventures during the operation phase: This emphasizes the importance of continuing to work with local businesses beyond the construction phase. By contracting with regional or local suppliers or joint ventures during the operation phase, the economic benefits of the project can continue to accrue to the local community.

Overall, these measures aim to ensure that the economic benefits of the project are shared with the local community and that the local community is involved in the project's development and implementation. The importance of environmental and social impact assessments and cultural acceptance also underscores the need for responsible and sustainable economic development practices.

Entrepreneurship and the creation of new companies are limited by the access to capital in Indigenous communities since individuals do not own personal assets since lands reserved to Cree are public, which prevents the existence of private sizeable guarantees that lenders usually demand for lending.

Several studies, such as Desfor (2022) and Proulx et al. (2016), have identified the development of the quality of local human resources, access to capital and access to resources as critical factors influencing Cree development. Most importantly, the Cree insist on the results of environmental assessments, as well as the social and cultural

acceptance of economic development projects, in terms of contribution to the region and to the Cree Nation (Jolicoeur, 2022c).

10.4.4.2 Development Planning Framework

Under the terms of the JBNQA's Section 28 Social and Economic Development – Cree, the Cree have access to a range of services and programs to which the federal and provincial governments contribute on an annual basis. The implementation of the JBNQA requires the participation of a number of federal departments and agencies, most of which, as part of their respective mandates, provide funding for the government programs to which the beneficiaries continue to have access in accordance with the Agreement. Section 28 also states the importance of the establishment of the Joint Economic and Community Development Committee, which is composed of a body of the Cree people, Quebec, and Canada jointly. The purpose of the Committee is to review and make recommendations in regard to the establishment, expansion, operation and effectiveness of government economic development, community development and other programs related to the economic and social development of the Cree people. Section 28 also states that training courses, job recruitment and job placement must be given equally to Cree candidates if they are qualified for the positions. The section requires equal opportunities for Cree candidates in training, job recruitment and job placement. Therefore, any future development projects must adhere to these requirements in compliance with the JBNQA.

10.4.4.3 Development Planning Entities

The entities listed are related to the topic of economic and social development in Quebec, specifically in the Nord-du-Québec region, which is the area where the Cree Nation of Quebec is located.

***Creeco*,** founded in 1982, is a holding company for investments made by the Cree Nation of Quebec as a whole, with several subsidiaries including CCDC (construction), Air Creebec (air transportation), Quality Inn & Suites Val-d'Or (hospitality), ADC (catering and janitorial services), Valpiro (ground handling and aircraft fueling), and EERP (property development and management). It is also a holding company for partnerships such as underground mining services.

The ***Société du Plan Nord*** (SPN) was created in 2012 by Bill 27. Its goal is to enhance development in Nord-du-Québec, by opening the territory to facilitate mining exploration and exploitation (Shields, 2012). Plan Nord is a 25-year, $80B development project initiated in 2011 by the Government of Quebec. The aim of the Plan Nord is to promote the potential for mining, energy, tourism, and social and cultural development in Quebec, north of the 49th degree of latitude. It provides a four-fold funding strategy where private sector partners will participate in the funding of infrastructure development. Government revenues resulting from economic development initiatives, along with direct and indirect tax spinoffs from public infrastructure projects will be reinvested in the Plan Nord. Investissement Quebec, the investment branch of the Government of Quebec, will take equity stakes in mining companies and other businesses as part of Plan Nord. Hydro-Québec will also contribute annually to development projects in the region as part of this plan.

10.4.4.4 Development of Human Resources

The development of Cree human resources is an essential factor to succeed in improving the standard of living and the quality of life in the communities, to maximize the employment and income benefits from the development activities in the region, to optimize the use of the territory and to preserve the environment and the Cree culture. The agreements encourage the companies that exploit natural resources to hire Cree people and suppliers. Nonetheless, the share of Cree people in the employment of these companies remains congruent.

Appropriate training is mandatory to enable the Cree people to fulfill a greater proportion in those positions. Awareness activities in the communities and local schools are means to develop the interest for these occupations they are training for. Training can be done at work by special programs or activities, such as companionship and apprenticeship, to make it more real concrete world, enhance the attractiveness of the future occupation, ensure the involvement and persistence of the trainee, increase learning and competency. Training in educational institutions or professional training centres, adapted to Cree culture and society and to the regional economy, for example by the CSB, Niskamoon Corporation, Apatisiiwin Skills Development, CFP of Chibougamau, the CEGEP Saint-Felicien and the University du Québec en Abitibi-Temiscamingue (UQAT). Work schedule and work organization in the base sector companies are also important factors that impact the presence of regional human resources among their staff. Such activities already exist but must be developed to enhance the participation of Cree manpower in the economy of Eeyou Istchee Baie-James, including the construction and exploitation of new transportation infrastructure.

One of the major challenges in developing Cree human resources is the need to balance the demands of economic development with the preservation of traditional Cree culture and values. It is important that any training programs or investments in human resources development take into account the unique cultural and social context of the Cree people, and that they are designed in consultation with local communities and elderly people. Another challenge is ensuring that the benefits of economic development are shared equitably among all members of the community, including women and youth. This may require targeted investments in training and education programs that address the specific needs and challenges faced by these groups. Finally, there is a need to address the persistent barriers to achieving economic self-sufficiency and prosperity by autonomous economic activities.

10.4.5 Summary

The study area is home to about 32,000 inhabitants with over half being Cree. The Cree population is characterized by its youthfulness and rapid growth when compared to the non-Cree population, which is declining. This trend is expected to continue in the coming decades. The education level among the Cree has also significantly improved in recent years, with 49% of those aged 15 years and above holding a high-school diploma.

The structures established as part of the JBNQA have contributed immensely to enhancing the quality of life on the territory. In the early 1970s, most Crees either lived on the land or in tents in their communities, and the economy solely relied on transfer payments, fur trade revenues, and a small public service. Over two generations, significant changes have been witnessed, with communities now fully equipped with basic infrastructure and a majority of the population (61%) employed by the public service. However, despite the employment rate being higher than that of other indigenous communities in Canada and Quebec, it still remains lower than that of Quebec. With the demographic increase, the public sector will be unable to absorb the new entrants into the job market, hence the need to seek out new revenue sources. ESP numbers indicate a steady decline in the traditional way of life, which will always have a place in the communities but will occupy a small role in the overall dynamic.

The establishment of the CBHSSJB as per Section 14 of the JBNQA has been instrumental in providing quality healthcare services to the Cree population. Prior to its creation, healthcare services were limited and often inaccessible, leading to poor health outcomes for many community members. The CBHSSJB has been able to provide a comprehensive range of healthcare services, including primary care, specialized care and mental health services. This has significantly improved the health and well-being of the Cree population. In addition, the CBHSSJB has also played a key role in promoting cultural safety and respect for Cree traditions and practices in healthcare delivery. This has been important in building trust between healthcare providers and the community and has resulted in better health outcomes.

It is important to note that the changes and developments as mentioned previously, have not been without challenges. The shift from a traditional way of life to a more modern, industrialized economy has brought about changes in social structures and cultural values and has resulted in a loss of traditional knowledge and practices. There have also been environmental concerns with the development of mining and hydroelectric projects, which have impacted the land and wildlife. It is important that the local economy with the traditional ways be maintained.

In terms of seeking out new sources of revenue, there have been efforts to diversify the economy through initiatives such as tourism, renewable energy projects, and the development of small and medium-sized enterprises. However, these efforts face challenges such as limited access to capital, a lack of infrastructure in some areas, and a shortage of skilled labour.

Investments in education and training programs are crucial to address these challenges and to ensure that Cree people are able to fully participate in the regional economy. This includes programs that are adapted to Cree culture and society, and that provide opportunities for skill development and career advancement. The costs of these programs can be significant and require sustained investment from both government and private sector partners.

Overall, while there have been significant improvements in the quality of life and economic opportunities for Cree people since the signing of the JBNQA, there are still challenges that need to be addressed in order to ensure sustainable economic development and preserve Cree culture and traditions.

Lack of housing development projects is the greatest issue for both Cree and Non-Cree communities in the study area. Lack of funding and high transportation costs, particularly for the northernmost communities, are the key factors limiting housing development for these communities.

The average age of housing in Cree communities is around 35 years old, with many homes in need of repairs and upgrades. The lack of new housing developments contributes to overcrowding, which can have significant health and social impacts. Moreover, the high cost of transportation to remote areas makes it more expensive to build homes and bring in building materials.

The issue of housing development is not unique to the Cree communities, as non-Cree communities in the study area also face similar challenges. In some cases, non-Cree communities may have even fewer resources to address these issues.

Addressing the lack of housing development will require significant investments and resources from governments and other stakeholders. It will also require innovative approaches to reduce the costs of transportation and building in remote areas. The CNG has been actively working on housing development initiatives, including the implementation of a housing strategy, but more support is needed to address this critical issue.

It is expected that over the next few years, with a young, growing, and more skilled and diversified labour force, the Cree will change the dynamics of Eeyou Istchee Baie-James economy. Due to their capacity in the construction and transportation sectors, they will play a major role in the development of infrastructure projects. The development of training programs and partnerships with educational institutions could help to build a pool of skilled labour that is able to meet the needs of infrastructure projects in the region.

In addition, diversifying the economy beyond the traditional resource-based industries could help to create new job opportunities and attract a wider range of skilled workers to the region. This could include investing in sectors such as renewable energy, tourism and technology.

Overall, the key to ensuring a skilled and diversified labour force in Northern Quebec will be a combination of targeted training programs, investment in new sectors, and partnerships with educational institutions to attract and retain talent in the region.

10.5 ECONOMY

10.5.1 Objectives and Approach

This chapter presents the main economic sectors that could provide demand and revenue for the different types of transportation infrastructure under study. These sectors include the forest industry, mining, subsistence activities, fisheries, electricity, construction, the supply of equipment and goods and tourism. For each sector, the historic and current conditions of the regional, national, and/or global market and the main companies operating in the area, as well as those planned under the LGA project, are presented. The information was gathered using economic sectoral documentation, company websites, the survey and discussion with stakeholders.

10.5.2 Forest Industry

10.5.2.1 Forestry and Logging

Regional Resource

The territory of Eeyou Istchee Baie-James is mainly composed of spruce moss forest south of Eastmain and spruce lichen forest north of Eastmain. The territory of the neighboring Abitibi, Haute-Mauricie and Lac-Saint-Jean regions is mainly covered by a boreal fir-birch forest. The territory of Eeyou Istchee Baie-James is shire among four management units by the Ministère des forêts, de la faune et des parcs MFFP 102-Chibougamau, 105-Mont-Plamondon, 106-Harricana-Nord, and 107-Quévillon (MFFP, 2021a)[10].

The Gouvernement du Québec sets a limit on the amount of wood that can be harvested by the forestry industry. This limit is known as the allowable cut or AAC. The AAC is set by the Gouvernement du Québec and represents the maximum volume of wood that can be harvested annually in a given forest management unit without compromising its long-term productivity. The AAC is calculated based on a variety of factors, including forest age, species composition, growth rates and ecological considerations. The exact AAC for each management unit is determined through a comprehensive forest inventory and modeling process that takes into account both economic and environmental factors. The forest in Eeyou Istchee Baie-James is susceptible to frequent fires, which also limit the harvest.

The allowable harvest in the public forest in Nord-du-Québec (including all the public forest in Eeyou Istchee Baie-James) amounts to 4.4 million gross cubic metres for the period of 2020-2023. This corresponds to 12.4% of the total allowable harvest in public forests in Quebec, as shown in Table 10.5-1. With increases in the allowable harvest, mostly between 2013 and 2018 (causing an increase in the volume of lumber permitted of 8.8% for the 2013-2023 period in Eeyou Istchee Baie-James), the proportion of the region within Quebec has been maintained. The allowable cut in the public forest in Eeyou Istchee Baie-James is comparable to those in the neighboring regions of Abitibi-Témiscamingue and Mauricie, while that of Saguenay-Lac-Saint-Jean, by far the most important forestry region in Quebec, is much greater. The allowable cut in Abitibi-Témiscamingue has been increased more than in the other three regions, while that in Saguenay-Lac-Saint-Jean has not significantly increased. These four regions are the most important in Quebec with approximately 60% of total allowable cut in Quebec.

[10] After the new Cabinet was appointed in October 2022 the Forest Sector has been placed under the responsibility of the ministère des Ressources naturelles et des Forêts, whereas the Wildlife and Parks Sectors are now accountable to the ministère de l'Environnement, de la Lutte aux changements climatiques, de la Faune et des Parcs.

Table 10.5-1: Annual Allowable Cut in Public Forest, Northern Quebec Regions, 2013-2023

Region	2013-2015	2015-2018	2018-2020	2020-2023	Variation
	(m^3)	(m^3)	(m^3)	(m^3)	7 years
Saguenay-Lac-Saint-Jean	7,003,900	6,989,100	7,216,700	7,216,700	3.0%
Mauricie	4,163,500	3,977,500	4,587,300	4,587,300	10.2%
Abitibi-Témiscamingue	3,620,400	4,154,700	4,275,600	4,275,600	18.1%
Nord-du-Québec	4,029,100	4,301,000	4,434,500	4,381,800	8.8%
4 regions	**18,816,900**	**19,422,300**	**20,514,100**	**20,461,400**	**8.7%**
Quebec	30,601,600	32,649,900	34,200,400	34,147,700	11.6%
Share Nord-du-Québec / Quebec	13.2%	13.2%	13.0%	12.8%	
Share 4 regions / Quebec	61.5%	59.5%	60.0%	59.9%	

Note: In these regions, the allowable cut is almost entirely located in the public forest. For the 2013-2015 period, figures are available only for the public forest.

Source: Compilation and Calculation from MFFP (2021a).

A total of 730 km^2 covering 300 forest sectors was auctioned in Quebec in 2020-2021, at the price of \$14/m^2 (\$21/m^2 for SPEM). The price increased sharply in 2021-2022, to \$37/m^2 for SPEM (MFFP, 2021a).

Western and Central Northern Quebec wood and pulp plants may use conifer wood material coming from Ontario, essentially Northern Ontario. The average volume amounts to approximately 750,000 TPA, and generally remains constant with some fluctuations, between 550,000 and 1,000,000 TPA. It is worth noting that Quebec and Ontario are among the largest producers of forest products in Canada, with Quebec being the largest producer of softwood lumber and hardwood lumber, and Ontario being the largest producer of pulp and paper products. The interprovincial trade in forest products, including wood fiber, helps to support the competitiveness of these industries and contributes to the economic growth of both provinces.

While the available cut was 4.4 million m^3 in Nord-du-Québec (essentially Eeyou Istchee Baie-James), the harvest amounted to 2.8 million m^3 in 2020-21, and the average annual consumption by regional industry was only 2.4 million m^3, as shown in Table 10.5-2. The region seems to have higher harvesting rates than consumption rates. The productive area of Nord-du-Québec is large with 16.4% of Quebec total productive area but the gross trade volume share is comparable to that of allowable cut, because of less productivity.

Table 10.5-2: Forestry Indicators, Northern Quebec Regions, 2020

Region	Allowable Cut (m^3)	Plants	Productive Area (km^2)	Gross Trade Volume (000 m^3)	Harvest 2020-21 (m^3)	Annual Consumption 2011-20 (m^3)
Saguenay-Lac-Saint-Jean	7,216,700	43,113	52,458	342,011	5,893,500	5,228,175
Mauricie	4,587,300	10,930	17,095	184,312	2,176,000	1,970,746
Abitibi-Témiscamingue	4,275,600	20,393	27,393	235,524	1,651,400	3,219,059
Nord-du-Québec	4,381,800	21,748	41,805	297,416	2,809,200	2,338,254
4 regions	**20,461,400**	**96,185**	**138,751**	**1,059,262**	**12,530,100**	**12,756,234**
Quebec	**34,147,700**	**122,433**	**255,461**	**2,372,522**	**17,220,900**	**21,848,122**
Share Nord-du-Québec	12.8%	17.8%	16.4%	12.5%	16.3%	10.7%
Share 4 regions	59.9%	78.6%	54.3%	44.6%	72.8%	58.4%

Source: MFFP (2021a).

Table 10.5-3: Forestry Industry Harvest and Consumption Indicators, Northern Quebec Regions, 2020

Region	Volume/ Land Area (m^3/km^2)	Harvest/ Allowable	Consumption/ Harvest
Saguenay-Lac-Saint-Jean	6.5	82%	89%
Mauricie	10.8	47%	91%
Abitibi-Témiscamingue	8.6	39%	195%
Nord-du-Québec	7.1	64%	83%
4 regions	**7.6**	**61%**	**102%**
Quebec	9.3	50%	127%
Index NQ / Quebec	0.77	1.27	0.66
Index 4 regions / Quebec	0.82	1.21	0.80

Source: Compilation from MFFP (2021a).

The lower productivity compared to neighboring regions could be explained by the climatic conditions but also by the age of the forest, which is younger in Eeyou Istchee Baie-James compared to the average in Quebec, as shown in the Table 10.5-4. The Nord-du-Québec has more land with forests aged less than 40 years and less land with forests aged 41-80 years, comparable to the age of the forests in Saguenay-Lac-Saint-Jean. Meanwhile, the Abitibi-Témiscamingue region and the southern regions of Quebec have comparatively older forest. The presence of older forest is an important issue in Eeyou Istchee Baie-James to ensure a proper environment for the maintenance of caribou populations.

Table 10.5-4: Land Area of Accessible Public Forest, by Age of Public Forest, 2020

Region (km^2)	Age of Forest (years)						
	0-20	21-40	41-60	61-80	81-100	100+	Total
Saguenay-Lac-Saint-Jean	18,605	12,237	5,973	12,696	6,759	14,013	**70,283**
Mauricie	4,784	2,731	3,061	7,977	4,602	1,743	**24,898**
Abitibi-Témiscamingue	7,218	5,898	5,963	11,577	7,062	6,122	**43,840**
Nord-du-Québec	11,949	12,427	2,461	6,209	9,331	12,760	**55,137**
4 regions	**42,556**	**33,293**	**17,458**	**38,459**	**27,754**	**34,638**	**194,158**
Quebec	59,763	52,359	30,701	63,834	57,478	69,871	334,006
Share Nord-du-Québec / QC	20.0%	23.7%	8.0%	9.7%	16.2%	18.3%	16.5%
Share 4 regions / QC	71.2%	63.6%	56.9%	60.2%	48.3%	49.6%	58.1%
(% km^2)							
Saguenay-Lac-Saint-Jean	26.5%	17.4%	8.5%	18.1%	9.6%	19.9%	***100%***
Mauricie	19.2%	11.0%	12.3%	32.0%	18.5%	7.0%	***100%***
Abitibi-Témiscamingue	16.5%	13.5%	13.6%	26.4%	16.1%	14.0%	***100%***
Nord-du-Québec	21.7%	22.5%	4.5%	11.3%	16.9%	23.1%	***100%***
4 regions	**21.9%**	**17.1%**	**9.0%**	**19.8%**	**14.3%**	**17.8%**	**100%**
Quebec	17.9%	15.7%	9.2%	19.1%	17.2%	20.9%	100%

Source: Compilation and Calculation from MFFP (2021a).

The age of the forest is an important factor that affects forest productivity. In general, older forests tend to have greater biomass and carbon storage, and therefore provide more ecosystem services. The age of the forest can also

affect the types of species that are present, with older forests typically having a greater diversity of species. In the case of Eeyou Istchee Baie-James, the younger age of the forest could be contributing to the lower productivity of the forestry sector. However, as the forest continues to mature, it is possible that productivity will increase over time. Additionally, the unique climatic conditions in the region, such as the long winter season, may also play a role in the lower productivity of the forestry sector. It is important to consider these factors when developing strategies to improve the productivity of the forestry sector in Eeyou Istchee Baie-James.

According to historic harvests and allowable cuts of supply units in the BDR corridor (MFFP, 2020), annual wood harvests are estimated at 341,000 m^3 per year. Using a density of 0.95T per m^3, this corresponds to a tonnage de 324,000 TPA. In regards with the major forest fires occurred in summer 2023, these values must be reduced by 25%, following the MRNF's indications.

In 2017-2020, an annual average of 21.7 M conifers were planted in Nord-du-Québec, which is 17.8% of reforestation in Quebec, as shown in Table 10.5-5. This share is higher than the regional share in Quebec allowable cut. Reforestation efforts in the regions of northern Quebec is, in general, higher than their relative allowable cut, especially in Saguenay-Lac-Saint-Jean (35.0% against 21.1%), except for Mauricie, where planting volume is relatively less.

Table 10.5-5: Reforestation, Northern Quebec Regions, 2017-2020

Region (Plants)	2017-2018	2018-2019	2019-2020	Annual Average	Variation (3 years)
Saguenay-Lac-Saint-Jean	44,155	42,650	42,534	43,113	-3.7%
Mauricie	11,785	10,730	10,276	10,930	-12.8%
Abitibi-Témiscamingue	19,512	20,881	20,786	20,393	6.5%
Nord-du-Québec	23,703	22,864	18,678	21,748	-21.2%
4 regions	**99,156**	**97,125**	**92,273**	**96,185**	**-6.9%**
Quebec	119,793	126,035	121,472	122,433	1.4%
Share Nord-du-Québec / Quebec	19.8%	18.1%	15.4%	17.8%	
Share 4 regions / Quebec	82.8%	77.1%	76.0%	78.6%	

Source: Compilation and Calculation from MFFP (2021a).

A share of 14% of the silviculture, or forest management, budget for Nord-du-Québec was awarded to Cree owned companies (Desfor, 2014). The Cree communities involved in forestry activities would like the allocated volumes to be higher, especially Waswanipi with Nabatatuk. "*Few Cree companies are active in the forest sector and few of those own the required equipment for forest operations. Access to capital for the purchase of equipment is difficult. Historically, [Cree] entrepreneurship was pretty well developed for silviculture works, but that sector, even though it represents a good source of revenues, generates few labour spinoffs.*" Cree companies participating in silviculture work benefit from good incomes but employ few Cree workers ; as seasonal work has little appeal to workers (Desfor, 2022).

The total annual allowable cut on Category I land is 80,000 m^3 (Desfor, 2014) and 1.2 million m^3 on Category II lands in Eeyou Istchee Baie-James, as shown in Table 10.5-6. This allowable cut represents approximately 28% of the allowable cut in Nord-du-Québec. From the Category II lands, 350,000 m^3 (28.3%) is reserved for the Cree according to the Paix des Braves. In total, the allowable cut for Cree communities is approximately 430,000 m^3.

Table 10.5-6: Annual Allowable Cut, Category I and II Lands, Eeyou Istchee

(m^3)	Paix des Braves	Not Paix des Braves	TOTAL	% Paix des Braves
Eenatuk (Mistissini)	125,000	97,401	222,401	56.2%
Waswanipi PRAU	155,000	318,674	473,674	32.7%
Nabakatuk (Waswanipi)	70,000	470,568	540,568	12.9%
Total - Category II	**350,000**	**886,643**	**1,236,643**	**28.3%**
Category I	80,000			
Grand total	**430,000**	**886,643**	**1,236,643**	**28.3%**

Source: Compilation and Calculation from Desfor (2014 ; 2022).

A total of 255,000 m^3 is harvested on an annual basis. The largest share of the allowable cut which is not harvested is the potential allocated to Nabakatuk, which is not operating. On the other hand, 90% of Eenatuk Mistissini and Waswanipi PRAU's allowable cut is harvested. The Cree Forest sector is most developed in Waswanipi, where harvest is 70% of all the Paix des Braves Category II land. Mistissini and Oujé-Bougoumou are the other communities involved in the forest sector.

Table 10.5-7: Annual Harvested Wood, Paix des Braves Category II Lands, 2013-2018

(m^3/yr)	Category II, Paix des Braves
Allowable Cut	350,000
Harvested	254,635
Not harvested	95,365
% harvested	***72.8%***

(m^3/yr)	Harvested	%
Waswanipi	178,000	70%
Mistissini	38,000	15%
Oujé-Bougoumou	36,000	14%
Nemaska-Waskaganish	3, 000	1%
Total	**255,000**	**100%**

Less than 50% of the annual allowable cut in Nord-du-Québec is harvested. In Saguenay-Lac-Saint-Jean, the harvest represents approximately 85% of the allowable cut, while it is 78% in Abitibi-Témiscamingue, and 67% in Mauricie (MFFP, 2021a). There are possibilities for growth of the regional forestry industry, should the correct infrastructure and demand be in place to do so. With some of the mills designing, building and maintaining their own forestry roads and bridges to access new areas, a significant increase in production would be attainable, notably the mill production in Waswanipi.

Regional Production

Rexforêt, a subsidiary of Investissement Quebec, is in charge silviculture work by appointment of MFFP. In 2020-21, the budget allocated to silviculture in Nord-du-Québec amounted at $24.1M or 13.3% of the total Quebec budget. The majority was allocated to land preparation ($8.8M) and planting ($7.9M) (Rexforêt, 2021). Forestry

works are often supplied by regional companies such as Mishtuk, Eenatuk, Maltais, and Eacon Timber. These companies are usually involved in civil and building construction as well as forestry.

Mishtuk is a Cree harvesting company in Waswanipi. The Cree annual allowed cut in category 2 land allowed cut from the Paix des braves is 225,000 m^3 for the Cree community of Waswanipi. Mishtuk has a partnered agreement with Chantiers Chibougamau and Scierie Landrienne where they ship the cut lumber (VEI-WSP, 2022).

Eenatuk, established in 1987 in Mistissini, is a forestry corporation and subsidiary of Eskan. It carries out in harvesting, slashing, tree planting, scarification, camp construction and road construction. Eenatuk receives a guaranteed timber allocation of 125,000 m^3 on an annual basis on Category II/III land and an additional 34, 000 m^3 on category I land. Eenatuk has a collaborative partnership with Chantiers Chibougamau which receives logs to their mills in exchange for helping Eenatuk with engineering, certification expertise, and Cree employee training (Eenatuk, 2018).

Waska Ressources, founded in 2003, is based in Waskaganish. It is a joint venture (JV) between the Diamond family and Desfor. The company has been involved in forest clearing, worker camp construction, trapper work, snowmobile, or all-terrain vehicle (ATV) trail projects, in studies for Hydro-Québec, as well as in construction projects (Waska, 2021).

Eeyou Lumberjack is a subsidiary of Tawich based in Wemindji. Native workers from various communities in Eeyou Istchee make up 95% of the employees. Eeyou Lumberjack works closely with all the tallymen in their traplines on which they intervene. The company is committed to continuously training workers to support the local community. They participate in slashing, brush cutting, mechanical wood chipping, mining site restoration, short- and long-term mobile camps, and fixed accommodation with meal service. Their main clients are Cree communities, Hydro-Québec, and the SDBJ (Eeyou Lumberjack, 2022).

Preservation and Outlook

The mission of the MFFP 2019-2023 strategic plan is to ensure a sustained management, conservation and enhancement of Quebec Forest, wildlife and national parks and contribute to the quality of life and prosperity of Quebecers. There are approximately 130 million trees that are replanted annually and 755 preserved areas. In the environmental scan, the external context is politics, economic, social, technological, environmental and legal. The internal context is outlined in four objectives:

- To contribute to the forest and wildlife economic development with the objective of stimulating forestry innovation and enhancing economic benefits within Quebec;
- To ensure the contribution of the forestry and wildlife sectors to the quality of the environment by improving the forest part to reduce the climate changes and promote a better perception of forests and wildlife;
- To focus on citizen-centric communication to promote a better forest and wildlife perception and assess stakeholder participation in the forest and wildlife management; and
- To rely on creativity and commitment by implementing innovative approaches (MFFP, 2022).

The MFFP strategy intends to double the wood production by 2080 (Mcevoy, 2022). The continuation and development of forest products in Eeyou Istchee Baie-James, and in the rest of Quebec, depends on the ability to renew the resource, to preserve the natural environment, and to increase the capital gains of production. An increase in capital gains is possible through the addition of secondary and tertiary processing of wood products, wood residue reclamation and construction material recovery (Waridel, 2022).

The preservation of Boreal woodland caribou populations is a major objective in the development and use of the territory, especially in the Cree culture.

Growth forest is important to woodland caribou because it provides the necessary habitat for their survival. Woodland caribou rely on old-growth forests for their food, shelter, and breeding habitat. Old-growth forests have a diverse structure with a range of vegetation types, including mature trees, young trees and dense understory cover, which provides food and shelter for caribou throughout the year.

Additionally, old-growth forests are important for maintaining the caribou's population size and genetic diversity. The trees in old-growth forests provide shade and cool temperatures in the summer, which reduces stress on caribou and increases their reproductive success. The complex structure of old-growth forests also helps to reduce predation by wolves, which can easily ambush caribou in more open areas.

This species is recognized as endangered and requires the creation of natural reserves and a proper territory management as old-growth forests are crucial for the survival of woodland. The forest industry can adjust when the future of the territory is more predictable (Lamontagne, 2022) Quebec Forest industry actors believe that, in addition to industrial innovation, a sufficient level of forest operations and silvicultural work is required. Together, they would provide the basic supply of raw material, enable the renewal of forest resources, and consequently produce jobs and fight climate change. Government financing for wood planting would be insufficient to reach these environmental and socioeconomic objectives (Pelletier, 2022). The forest industry claims that the planting budget has been too low ($250M in 2020) and declining in real terms since the implementation of the new forestry regime in 2013. More importantly, the reforestation activity is considered as not optimally planned, and the current regime is not capable of maintaining the forest possibility. The growth objective of the MFFP strategy is therefore currently unachievable (Mcevoy, 2022).

The Fédération des pourvoiries du Québec (FPQ) considers that the coexistence between the forestry industry and outfitting is difficult. This coexistence will get more challenging as the MFFP allows for larger harvesting area and extends the forest road network. The current forest management policies of the Gouvernement du Québec do not comply with the Sustainable Forest Development Act (CQLR, c. A-18.1) in spirit. The FPQ advocates for mandatory integrated sustainable development plans for each territory (Caron, 2022).

In the long run, the effects of climate change may affect the allowable amount of forest to be harvested, as deciduous volumes could significantly increase especially in northern locations.

Community groups believe that in many cases the current environment strategic planning process of the Gouvernement du Québec excluded the involvement of preservation and citizen groups, notably regarding protected river areas and caribou, in favor of short-term exploitation interests (Jacob & Desjardins, 2022).

The Gouvernement du Québec is developing a strategy to ensure the sustainability of forest and mountain caribou and the vitality of Quebec and its regions. The Gaspé Caribou Conservation Plan proposes several measures to protect the caribou population, including habitat restoration, the establishment of protected areas and the promotion of sustainable forestry practices.

The strategy aims to establish territories where habitats will be preserved or restored and where forestry activities will be regulated. The approach is based on large territories of 5,000 km² or more, which will maintain large forest areas with minimal disturbance. In the winter of 2022, a series of regional public hearings were held to gather opinions on two proposed scenarios for the caribou habitat and the findings were presented in Mistissini and in Chibougamau.

The proposed measures include reducing the disturbance caused by industrial activities such as mining and forestry, establishing protected areas and corridors, and implementing measures to control the predation of caribou by wolves and coyotes. The plan also proposes the creation of a recovery team to oversee the implementation of these measures and to coordinate research and monitoring efforts.

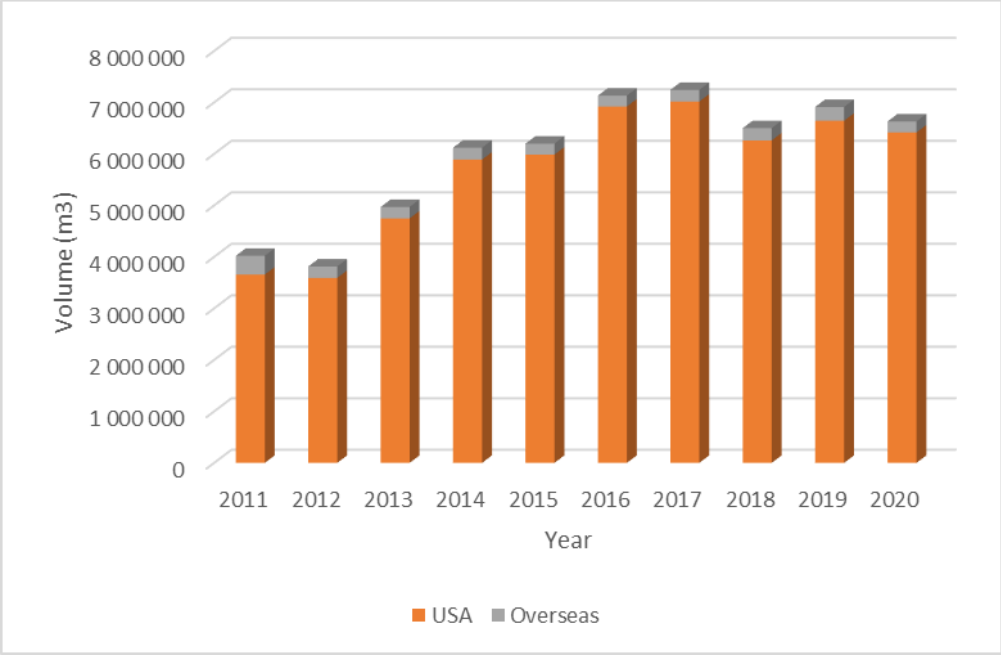
A Cree and Innu agreement has been signed over caribou harvest in Cree territory. This agreement allows Innu hunters to harvest 300 Caribou in 2022-2023 winter on the Cree territory east of Chisasibi. It is the first nation to nation agreement based on conservation and preservation of species. This 300 caribou ift from the Leaf River herd is a part of the 850 caribou harvest guarantee to Crees from the JBNQA (CBC, 2022). The issuance of a provincial policy on caribou protection is imminent.

10.5.2.2 Wood Product Manufacturing

Market

There are more than 40 mills and plants in and around the study area involved in the production of lumber boards and studs, remanufactured products (recut lumber), engineered wood products (plywood, fibreboard, particle board, etc.), wood pellets, craft pulp, and paper (MFFP, 2019). These products are used in all construction areas, but mainly as structural elements for residential housing such as flooring or roof beams. Most clients of mills are located within Quebec, Ontario, and the United States (NRCAN, 2019).

Quebec international shipments of lumber are largely sent to the United States, with similarly sized shares going to the Northeast, Central North, and the South. Two thirds of lumber exports out of Quebec are shipped by train. From Eeyou Istchee Baie-James, the distances make rail the most appropriate mode of transport even for the closest regions. After a sharp increase in lumber shipments in the first half of the 2010s essentially due to the North Central US market capture, the volumes have been relatively constant (MFFP, 2021a).

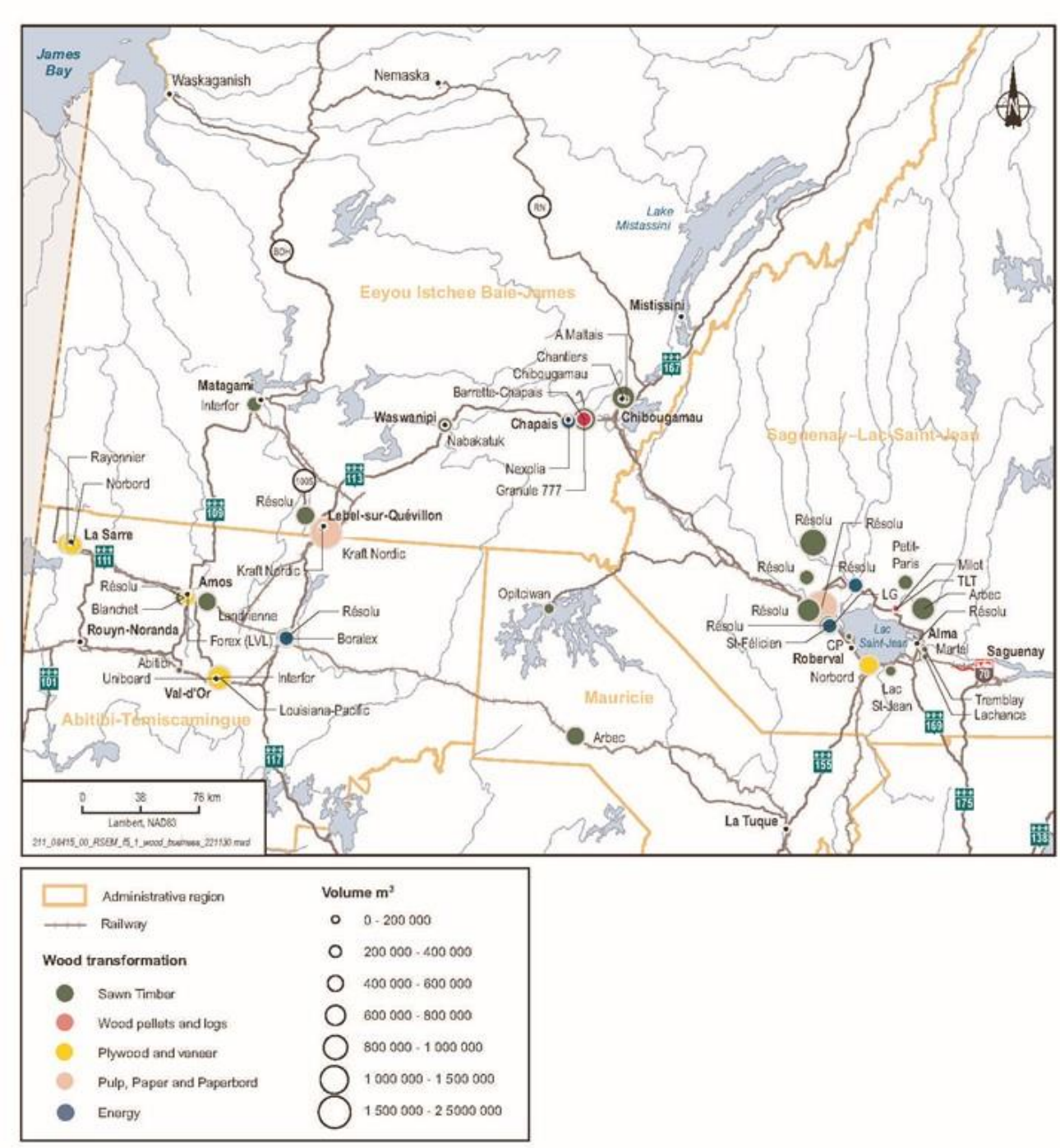


Source: MFFP (2021a).

Figure 10.5-1: Quebec International Lumber Shipments, 2011-2020

Regional Production

Table 10.5-8 and presents a summary of the wood industry in Eeyou Istchee. Resolute Forest Products (RFP), Barrette-Chapais, Chantiers Chibougamau and Arbec, account for more than half of the total cut lumber within the study area.



Source: Compilation VEI from MFFP.

Figure 10.5-2: Wood Transformation Businesses, Northern Quebec Regions

Table 10.5-8: Wood Transformation Businesses, Eeyou Iscthee Baie-James and Abitibi, 2020

Company	Locality	Product	PER (m^3)	GA (m^3)
Eeyou Istchee Baie-James				
Eacom Timber (Interfor)	Matagami	Softwood lumber	540,000	307,300
Kraft Nordic	Lebel-sur-Quévillon	Thermal energy	93,750	-
Kraft Nordic	Lebel-sur-Quévillon	Pulp, paper and cardboard	1,575,000	-
Résolu Comtois	Lebel-sur-Quévillon	Softwood lumber	660,000	413,600
Cree Lumber	Waswanipi	Softwood lumber	*Note 1*	540,568
Barrette-Chapais	Chapais	Softwood lumber	980,000	588,450
Granules 777	Chapais	Energy, pellets	474,240	-
Chapais Énergie (Nexolia)	Chapais	Electricity	500,000	-
Chantiers Chibougamau	Chibougamau	Softwood lumber	843,600	398,600
Alain Maltais	Chibougamau	Softwood lumber	-	400
		Softwood lumber	***3,023,600***	***2,248,918***
		Pulp and paper	***1,575,000***	***-***
		Energy and pellets	***1,067,990***	***-***
		Eeyou Istchee Baie-James	**5,666,590**	**2,248,918**
Abitibi				
Rayonnier	La Sarre	Softwood lumber	635,000	344,050
Norbord	La Sarre	Chipboard	-	361,000
Scierie Landrienne	Landrienne	Softwood lumber	746,000	319,150
Matériaux Blanchet	Amos	Softwood lumber	530,000	253,650
Forex (LVL)	Amos	Veneer lumber	-	83,750
Résolu	Amos	Pulp, paper and cardboard	500,000	-
Résolu	Senneterre	Softwood lumber	744,000	539,700
Boralex	Senneterre	Energy	500,000	0
Eacom Timber	Val-d'Or	Softwood lumber	806,000	467,550
Louisiana-Pacific	Val-d'Or	Chipboard	-	-
Uniboard	Val-d'Or	Chipboard	504,500	-
Produits forestiers miniers Abitibi	Rivière-Héva	Softwood lumber	9,100	6,200
		Softwood lumber	***3,470,100***	***1,930,300***
		Veneer lumber, etc.	***504,500***	***444,750***
		Pulp and paper	***500,000***	***0***
		Energy and pellets	***500,000***	***0***
		Abitibi	**4,974,600**	**2,375,050**

Note: 1. Allowable cut under the Paix des Braves and outside the Paix des Braves on Nabakakuk Waswanipi Category II Lands. 2.PER Permitted Production Volume. GA Garantie d'approvisionnement.

Source: MFFP (2021).

Table 10.5-9: Wood Transformation Businesses, Lac-Saint-Jean and Haute-Mauricie, 2020

Company	Locality	Product	PER (m3)	GA (m3)
Lac-Saint-Jean				
Résolu	La Doré	Softwood lumber	820,100	498,200
Résolu	Saint-Félicien	Softwood lumber	680,000	385,250
Résolu (Fibrek)	Saint-Félicien	Pulp, paper and cardboard	1,900,000	-
Granules L.G.	Saint-Félicien	Energy pellets	302,500	-
Société de cogénération de Saint-Félicien	Saint-Félicien	Electricity, Thermal energy	370,146	-
Résolu	Saint-Thomas-Didyme	Softwood lumber	478,000	259,950
Résolu	Girardville	Softwood lumber	1,093,000	542,550
Résolu	Dolbeau-Mistassini	Pulp, paper and cardboard	327,500	-
Résolu	Dolbeau-Mistassini	Electricity	516,000	-
Groupe CP	Mashteuiatsh	Softwood lumber	4,000	-
Norbord	Chambord	Chipboard	-	388,500
Scieries du Lac-Saint-Jean	Métabetchouan - Lac-à-la-Croix	Softwood lumber	340,000	161,950
Produits forestiers Petit-Paris	Saint-Ludger-de-Milot	Softwood lumber	500,000	298,750
Énergie Milot	Saint-Ludger-de-Milot	Thermal energy	-	-
TLT	Sainte-Monique	Densified firelogs	-	-
Arbec	L'Ascension-de-Notre-Seigneur	Softwood lumber	958,500	620,650
Scierie Martel	Alma	Softwood lumber	80,000	-
Résolu	Alma	Pulp, paper and cardboard	725,000	-
Tremblay Sciage	Alma	Softwood lumber	118,000	60,600
Scierie Lachance	Saint-Bruno	Softwood lumber	15,000	6,350
		Softwood lumber	***5,086,600***	***2,834,250***
		Veneer lumber	***-***	***388,500***
		Pulp and paper	***2,952,500***	***-***
		Energy and pellets	***1,188,646***	***-***
		Lac-Saint-Jean	**9,227,746**	**3,222,750**
Haute-Mauricie				
Opticiwan	Opitciwan	Softwood lumber	276,000	137,650
Arbec	Parent	Softwood lumber	735,000	457,850
		Haute-Mauricie	**1,011,000**	**595,500**
Total - 4 regions				
		Softwood lumber	**12,591,300**	**7,608,968**
		Veneer lumber	**2,079,500**	**833,250**
		Pulp and paper	**4,520,490**	**-**
		Energy and pellets	**7,355,236**	**2,248,918**
		TOTAL – 4 regions	**26,546,526**	**10,691,136**

Note: PER Permitted Production Volume. GA Garantie d'approvisionnement.

Source: MFFP (2021).

***Barrette Chapais*,** located in Chapais, is the most important sawmill in Nord-du-Québec with a capacity of 300-million-foot board measures (MFBM) (Desfor, 2014). The company has 450 employees when including its affiliate Granule 777. This is the quantity shipped annually and it should remain stable over time. The lumber is shipped by truck or by rail to different locations in Canada and the United States. Companies like Barrette Chapais benefit from the flexibility of trucking. The lack of rail wagons is an important issue the company has raised concerning rail transport by CN to Montreal. The 1,000,000 m^3 of wood coming from different locations in Nord-du-Québec and Mauricie are carried by over-dimensioned trucks on forest roads, including the former Grevet-Chapais railway subgrade. Since this section of the railway was dismantled, Barrette Chapais has invested significant amounts of money to upgrade and maintain roads and bridges to access the forest resource. The company will use this infrastructure for several years given the quantity of suppliable timber in Eeyou Istchee Baie-James.

Chantiers Chibougamau operates three sites: a sawmill in Chibougamau, the Scierie Landrienne in Amos, and Nordic Kraft pulp mill in Lebel-sur-Quévillon. The sawmill in Chibougamau has a capacity 200 MFBM (Desfor, 2014), and its permitted consumption of wood is 844,000 m^3 (MFFP, 2021). Scierie Landrienne, located east of Amos, was purchased in 2015 by Chantiers Chibougamau (CC, 2021). Chantiers Chibougamau employs 700 people in Chibougamau area and over 100 people in Amos. The company sends its sawmill output to several locations by train, mainly to the United States. The company considers new or improved transportation links as an opportunity to develop new geographical or product markets and to optimize its inter-site logistics (CC, 2022). The company is cited as an example of higher-value forest production that could reconcile environmental and economic objectives (Waridel, 2022). Multilam products are specialty wood products which are produced by bonding multiple thin layers of wood veneer together. They are used in a variety of applications such as flooring, furniture and architectural panels. Chantiers Chibougamau's leadership in the production of multi-lam products on the territory is significant because it adds value to the forest products produced in the region and creates local jobs. Additionally, the fact that this is the only processing that occurs in the region, highlights the need for continued investment in the forest sector to create additional value-added processing opportunities and jobs.

Resolute Forest Products (RFP) was recently sold to Paper Excellence (Jolicoeur, 2022a). The company operates several plants in the enlarged study area and accounts for a third of the wood volumes used in production. Resolute has the biggest volume of wood-cutting rights in Quebec, with 4.1 million m^3 (Larocque, 2022b). The Comtois sawmill in Lebel-sur-Quévillon is part of RFP. This site is connected to the CN (CFILNQ) railway line. The company has increased the production capacity of its Saint-Félicien pulp and paper mill by 50,000 green metric tonnes of chips and of its Alma mill by 90,000 tonnes. In 2012, it also bought Fibrek, a pulp mill in Saint-Félicien.

The ***Cree Lumber*** sawmill in Waswanipi is set to open its doors in 2023 as a result of a new partnership between Mishtuk and Chantiers Chibougamau. With a $20 million investment to optimize processing operations and make the installations profitable, the sawmill will become one of the most modern in Quebec. This project holds immense significance for the Cree nation as it will go a long way in addressing their housing needs (Ph, 2023). The sawmill will offer employment opportunities to 30 people while adhering to traditional commitments and sustainable development principles. The lumber products produced by the sawmill will be utilized for constructing homes in Cree communities (Jolicoeur, 2022b) but most of the production will be shipped on Canadian and American markets. The lumber should be shipped for drying to Chantiers Chibougaumau's plant in Chibougamau while the chips shall be used by Nordic Kraft in Lebel-sur-Quévillon. While the sawmill is located in Waswanipi, which is easily accessible by the R113 road, is 14 km away from the GCR alignment and would require a solution such as transshipment or spur if the railway were to be used for the chips and lumber.

Matériaux Blanchet operates two lumber mills, at Saint-Pamphile and at Amos. The Amos plant, built in 1972, employs 180 people with a production capacity of 150 but m MFBM per annum. The wood supply for the Amos plant comes from the public domain in Quebec, notably in Eeyou Istchee Baie-James, as well as from private Quebec and northern Ontario suppliers. Their output is shipped by truck and by rail and overseas from the port of Montreal (Blanchet, 2022).

Arbec is a part of Rémabec Group, and operates eight lumber mills in Mauricie, Saguenay-Lac-Saint-Jean, and Côte-Nord. With a total workforce of 800 employees, the company has an annual capacity of 700 million board feet (FBM). The Parent sawmill, located in Haute-Mauricie, employs 121 people and produces 150 MPMP per year. Rémabec's forestry operations division, Rébec, operates two camps in Oriskany and Kamwaie in Haute-Mauricie that can accommodate 225 workers, as well as a camp for 200 workers in Noel, in the north of Saguenay-Lac-Saint-Jean (Arbec, 2022). Arbec has the second-largest timber harvest volume in Quebec after RFP (Larcoque, 2022b).

Petit-Paris is an integrated forestry cooperative based at Saint-Ludger-de-Milot in Lac-Saint-Jean (Petit Paris, 2021). Founded 50 years ago, the cooperative has 325 employees (Paradis, 2022).

Outlook and Projects

The ***Mistissini local wood supply for a housing project*** is a project that should be implemented in 2022 and should create 25 direct jobs. This project is intended to optimize the value chain to stimulate forest operations conducted by Cree companies on Category II lands producing the raw material needed for housing. It also plans to improve the efficiency of transporting materials to work sites or buyers (Desfor, 2022).

The ***Ouje Bougoumou manpower use in wood plants project*** was initiated by the community of Ouje-Bougoumou. It recently received funds from the MFFP to create jobs in the forest sector. The community discussed with Chantiers Chibougamau and Barrette-Chapais regarding hiring Cree workers with customized integration measures and awarding contracts to Cree companies to help their development (Desfor, 2022).

10.5.2.3 Pulp and Paper

Market

Over the last decade, the pulp and paper market has dropped in volume due to a cyclical decline combined with structural changes. The digitization of media and office work has significantly impacted the demand for paper. Innovative products such as new building materials, biofuels and biochemical have allowed for some production growth (NRC, 2020).

After several years of stagnant or steadily dropping pulp and paper prices in North America, and the closing of several mills in Quebec and in the region, the demand in the industry has been stabilizing or increasing over the past few years. With the recent rise in demand for tissue and packaging paper in general, particularly in markets outside North America, several mills have reopened, or are in the process of reopening, to meet this demand. The region produces a type of pulp that is highly sought after in the United States and Asia in comparison with other sources around the world due to its superior quality.

The per capita consumption of tissue in North America is five times the average consumption in the world. The demand for packaging paper, paper materials bleached hardwood and softwood craft pulp is increasing at a CAGR of more than 2%. The Quebec pulp and paper industry has traditionally been mainly oriented to graphic papers. It faces the challenge of converting mills and production plants to packaging papers in competition with increased production in the United States and Europe (RISI, 2019).

Regional Production

Nordic Kraft, owned by Chantiers Chibougamau, recently resumed the production of kraft pulp in the former Domtar mill in Lebel-sur-Quévillon with an annual capacity of 280,000 TPA and 300 employees (Devoir, 2019). The production will be sent to Cascades, Kruger, and outside Quebec, to respond to the increasing demand for toilets, industrial and wrapping papers (CC, 2021 ; WSP, 2021). The company estimates that approximately 600,000 green metric tonnes of chips will be used annually to supply this paper mill. These chips come from its sawmill located in Chibougamau and from Scierie Landrienne. Based on the volumes allocated, it is estimated that 70% would come from its Chibougamau facilities and 30% from its Landrienne facilities (WSP, 2021a). The chips could also come from other sources or companies (CC, 2021). The company prefers to use rail transport when it is satisfactory.

10.5.2.4 Wood Biomass

Market

Wood biomass is a form of energy produced from leftovers or low-quality material making up an important subsector of the forestry industry in Quebec. The Gouvernement du Québec has been investing in several programs to develop biomass as a means of reducing greenhouse gas emissions. Although the technology is less advanced in Canada, biomass energy production is common in Europe, mostly due to short transportation distances between harvest locations and end users. Although not without its challenges, the production of biomass energy could be increased with appropriate transport infrastructure in Quebec. In 2015, biomass power accounted for approximately 2% of the power generated globally and 1.9% of power generated in Canada. British Columbia, Ontario, and Alberta are the three largest producers in Canada while Quebec ranks 4th. In Ontario, biomass production plants are mostly located in North Bay, Thunder Bay, and Kenora areas. Production in Ontario increased significantly in 2014 while Quebec has remained relatively constant.

Traditionally, sawmills use approximately 45% of each log. The pulp, paper and biomass industries can use the remaining waste. Due to the recent increase in demand for Quebec's pulp and paper industry, the amount of wood biomass available for electricity generation has been relatively limited up to this point. Biomass has a lower energy density than coal or petroleum, which means that more biomass is required to generate one unit of electricity, thus requiring comparatively large facilities and high transportation costs.

Regional Production

Chapais Énergie**,** bought by Nexolia in 2019 (Martel, 2019), operates a 28 MW cogeneration plant located in Chapais. In 2013, the company was buying over 30,000 TPA of forest biomass (bark, chips, sawdust, etc.) from Eeyou Istchee Baie-James companies, notably from the Nabakatuk sawmill in Waswanipi (Desfor, 2014). The plant can use a maximum of 500,000 TPA of woody material (MFFP, 2021) and employs approximately 30 people (Martel, 2019). The company has a project for a greenhouse that would use the steam energy produced from the locally provided forest biomass (Martel, 2019). The produced vegetables would be distributed to communities in Nord-du-Québec (Nexolia, 2016). Savoura may commercialize the distribution of 1,800 TPA of tomatoes produced in Chapais by Les Serres Bleues, a branch of Nexolia (Laplante, 2020).

Granule 777, created in 2017 and affiliated to Barrette-Chapais, is located near Chapais in Eeyou Istchee Baie-James. Its production capacity is 200,000 TPA of wood pellets (Granule 777, 2022). Materials are locally provided, and the product is shipped to Saguenay by truck (Barrette-Chapais, 2021).

Boralex has a 35 MW cogeneration plant located in Senneterre. This site has a residual forest biomass allocation of 150,000 metric tonnes of green (MGT) par annum.

Outlook and Projects

Although the biomass industry faces several challenges, the potential for further development in Quebec and Canada is not in doubt. Finland is one of the world leaders in biomass power. Canada has proposed a partnership with Finland's biomass industry to gain expertise and learn bioenergy best practices. Upgrades in the transportation network in the region would alleviate many of the challenges faced by the industry. Biomass energy facilities are already connected to the Hydro-Québec electric grid, making further expansion a less formidable task.

The theoretical potential for residual forest biomass from logging residues is enormous. In 2014, the Chief Forester for Region 10 estimated that 946,000 metric tonnes of green per annum (MGTPA) was available from branches and 842,000 MGTPA from foliage for a total of 1.8 M MGTPA. It is estimated that more than 40% of this volume, about 716,000 MGTPA can be recovered. WSP (2021b) estimated the regional available biomass in Nord-du-Québec (essentially Eeyou Istchee Baie-James) at 1.0 M dry metric tons per year, from which 330,000 dry metric tons from forest residues and 590,000 dry metric tons from wood first transformation, mainly lumber and pulp mills. The profitability of a forest biomass recovery project is contingent on supply costs which act as the primary limit on the demand for residual forest biomass. The Gouvernement du Québec's aim to increase bioenergy projects from renewable biomass by 50% could create new forest biomass recovery projects.

The recovery of forest biomass from branches and discarded wood could increase transportation volumes. Additionally, the ***Boreal Group*** has an allocation of 11,000 MGPA, and ***Les Huiles Nordic*** 5,000 MGTPA.

Oujé-Bougoumou forest thinning and biomass recovery is a project submitted by the community to NRCAN on a 3-year period. The project includes semi-commercial mechanical thinning and the sale of biomass generated outside the community (Desfor, 2022).

10.5.3 Mining

10.5.3.1 Mining Industry

In Quebec, the value of mineral shipments from its 27 active mines amounted to $11.9B 2019. The Quebec mining sector maintains close to 19,000 jobs and a wage bill of $2.1B or approximately $110,000 per job. The Nord-du-Québec region accounted for 26.5% of these mineral shipments worth $3.15B in 2019 and 4,048 jobs with an average annual wage of $135,000. Gold mines employ 34% of this regional mining workforce (ISQ, 2019).

The traditional mining activity in the Matagami and Chibougamau areas focused on iron, copper and zinc have been declining. The Renard diamond mine operated by Stornoway, opened in 2017, and gold mines (Eleonore, Casa Berardi) are the main mining activities in Eeyou Istchee Baie-James, set to continue operating for at least 5 to 10 years. The spodumene lithium sites are planned to begin operations around 2024-2027 in Nemaska area, while two iron magnetite sites in Chibougamau area and several new gold mine sites in the region could start extracting before the end of the 2020s (TJCM, 2018).

Mining sites and potential projects include:

1. Sites currently operated;
2. Older, disused sites that might reopen;
3. development projects that, given their stage of development, could have a quantifiable impact on transportation demand;
4. Prospective projects that are too preliminary to estimate transportation demand and quantitatively determine the period of operation.

The level of progress of a mining project is defined as:

1. Preliminary if no preliminary economic assessment (PEA) has been performed;
2. Advanced if a PEA or feasibility study has been completed but not the environmental and social assessment;
3. Assessed, if the economic, environmental, and Social Impact Assessment as per Section 22 of the JBNQA has been completed, with or without an ensured financing of the project.

Figure 10.5-3 illustrates the location of mining sites in the study area. More than 100 sites have been identified in Eeyou Istchee Baie-James, from which 3 have been classified as closed or closing (Langlois, Bracemac-McLeod, and Vezza), 3 are active mines, all in precious metals (Casa Berardi, Renard, and Eleonore), 3 are partly or fully assessed projects in base metals in Chibougamau and Radisson areas (Blackrock, Mont-Sorcier, and Duncan Lake), 4 are assessed lithium projects in the Nemaska/Eastmain area (Wabouchi, Moblan, Rose, and James Bay), 3 are lithium not assessed lithium projects ; 4 are partly or fully assessed gold projects in Lebel-sur-Quévillon-Chibougamau range (Gladiator & Barry, Windfall, Bachelor Lake & Moroy, and Troilus). Most sites are associated with precious metals, particularly gold. However, their economic viability is yet to be demonstrated.

In its development plan, the MERN (2021) intends to: enhance the private investment in the mining industry, both exploration and extraction ; promote more ecological ways of doing and rehabilitation of sites ; ensure economic development and social acceptability ; participate to the energy transition using renewable natural resources and provide minerals to increase the use of renewable natural resources ; improve the quality of life and enlarge the access to public territory notably by authorizing more resort leases.

10.5.3.2 Base Metals

Market

The principal base metals in the region are iron (Fe) ore, copper (Cu), nickel (Ni), and zinc (Zn). It was the traditional mining activity that led to the creation of Jamesian communities, notably Matagami, Chapais and Chibougamau. Nowadays, the ancient mine sites have closed, including lastly Glencore in Matagami. This type of mineral production has thus almost disappeared in Eeyou Istchee Baie-James. However, in this region, there are currently at least seven projects that are in an advanced stage, notably iron ore and copper ore, and in total 20 exploration sites.

Main ***iron*** deposits that might be developed are located to the east of Chibougamau, where it could be shipped to Saguenay. Iron ore can be processed in several locations, including Northeast Ontario. Major iron ore deposits located near La Grande Rivière could be interesting for massive production to be shipped overseas.

Iron is used in steel production. Despite wide fluctuations, iron ore prices have followed an increase trend due to short-term factors such as shortages in Australia and flood-related problems in Brazil which affected 70% of the seaborne iron ore market. Although this trend could continue in the short period, for the medium and long terms due to planned increase in production in Australia, Brazil, Canada, and Liberia, and the weak growth in China, the main consumer prices are expected to stabilize and even decrease greatly by 2030-2031 (Wulandari, 2023). If the Chinese steel production provides a growing demand, the prices could remain stable (WB, 2022).

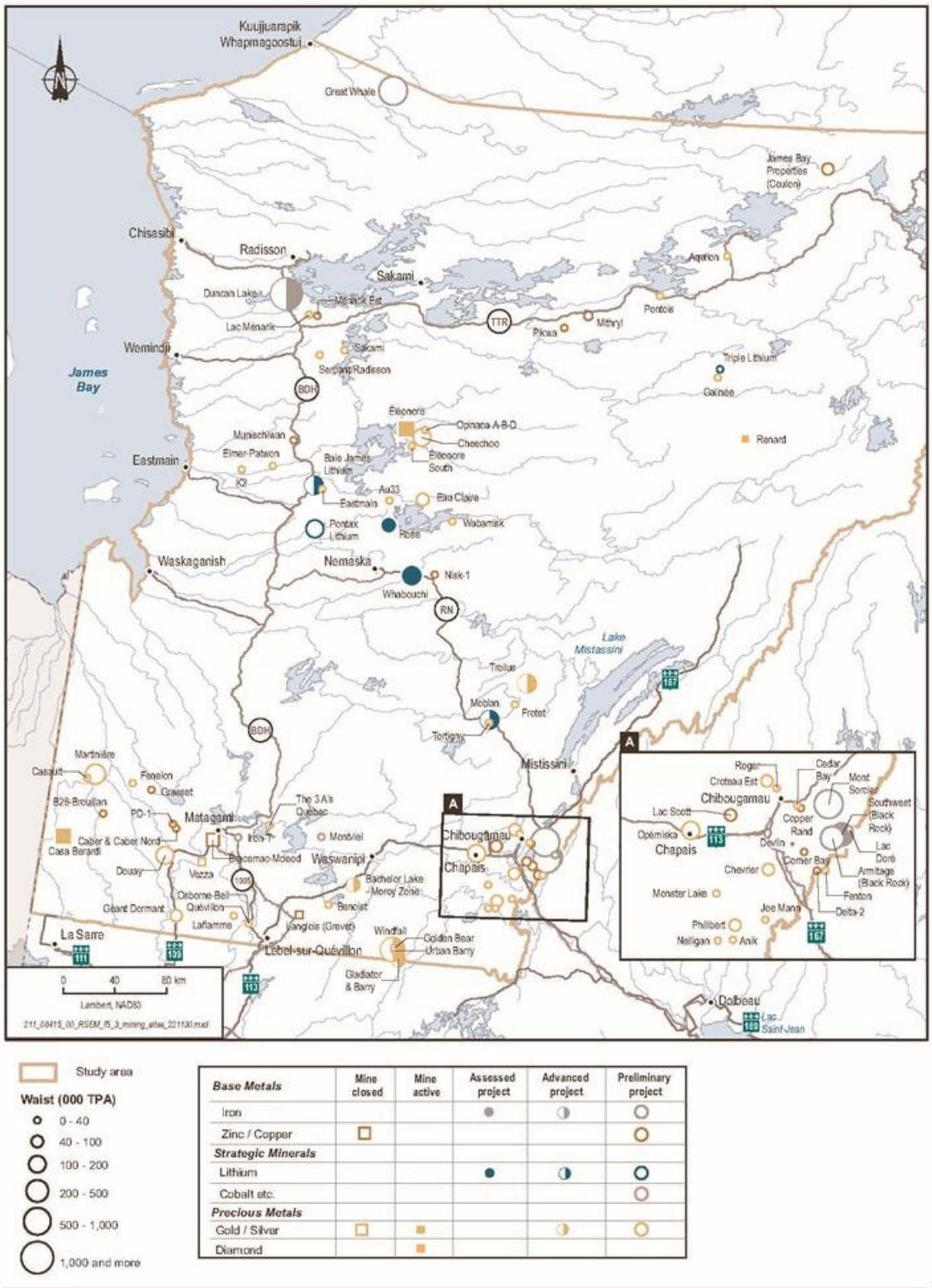


Figure 10.5-3: Mining Sites, Eeyou Istchee Baie-James

Copper ore is processed at the Horne foundry owned by Glencore and located in Rouyn-Noranda. This is the destination for extracted copper ore. The health impacts of arsenic and pollutants have raised major issues which must be solved either by closing the plant, as many are requesting, or by rapid technical improvement aimed at reducing the plant's emissions. This location makes it appealing for the transport of copper ore on the regional railway network.

The prices of copper have experienced significant fluctuations in the short and long term with high volatility. In the long term, the demand for copper is expected to rise due to its use in building construction, infrastructure, photovoltaics, and electric vehicles (EVs). EVs require up to 3.5 times more copper than traditional combustion vehicles, with no substitute with equivalent conductive (Woodmac, 2022a). Copper prices are expected to remain high over the long period, due to the high demand resulting from sustained durable goods consumption and shortage in production, at least until 2030, and should rise at least moderately until 2035 (WB, 2022; Shin, 2023). The upside risk is additional disruption from Russia that would reduce global supply and the downside risk is a severe slowdown in global growth which could reduce global demand. Nonetheless, the current context is favorable for the opening of new copper mine sites.

Nickel is present in a few locations in Eeyou Istchee Baie-James, but especially to the south of Matagami with high potential although in an early stage of development. However, this location is not a relevant demand for the LGA transportation infrastructure development otherwise than to enhance the sustainability of the CN Matagami subdivision.

Stainless steel is responsible for 70% of global nickel consumption (McKinsey, 2022a). Nickel prices rose sharply recently: 35% in the first quarter of 2022, quarter to quarter (q/q). Because high-grade nickel is used for Electric Vehicle (EV) batteries and China is by far the largest consumer for now, the global demand shall increase greatly with sustained increases in prices after 2025 and until 2040 (WB, 2023). Nickel is also in demand due to its use in lithium nickel manganese cobalt (NMC) batteries, likely to become more popular due to the limited supply of cobalt (McKinsey, 2022a) and because lithium nickel manganese cobalt (NMC) batteries are preferable in the long term to lithium iron phosphate (LFP) batteries due to their cell's energy density limitations (Kedglobal, 2022).

Zinc ore is usually shipped to CEZinc refinery in Salaberry-de-Valleyfield for processing. The zinc ore would be shipped mostly by rail either by the Matagami/Chapais CN subdivisions through Abitibi and Haute-Mauricie or by the Cran subdivision through Lac-Saint-Jean area and Mauricie, if new mines are operated. Only such a few projects still at a preliminary stage and of limited volumes exist in Eeyou Istchee Baie-James.

Copper and zinc are crucial components of the global economy, widely used construction, infrastructure, and various industrial applications. Zinc consumption is also expected to rise due to the demand for galvanized steel, which accounts for over 50% of zinc's demand, as it is used in batteries and other industrial applications (WB, 2022). After a sharp although fluctuating increase in zinc price since 2020, the long-term perspective is a stability with fluctuations in zinc prices until 2030 (WB,2023).

The increasing demand for these metals is being driven by factors such as the electrification of transportation and the development of renewable energy infrastructure. This presents opportunities for mining companies to explore the potential of the Eeyou Istchee Baie-James territory.

However, the viability of mining projects in the region will depend on several factors such as the availability of resources, economic feasibility and environmental and social impacts. The positive correlation between the increase of lithium extensive projects in the James Bay region and the increase of base metals projects means that opportunities may exist for mining companies to explore the potential of the Eeyou Istchee Baie-James territory.

However, any potential mining projects in the region must be evaluated and managed sustainably to ensure their benefits to local communities and the environment.

Exploitation and Projects

Base metal mining sites and projects are presented in Table 10.5-10.

Table 10.5-10: Mining Exploitation and Exploration Sites, Base Metals, Eeyou Istchee Baie-James

Site	Company	Near	Mineral	Annual Production (t)	Start	Closure	Means of transportation
Base Metals							
Langlois	Nystar	Lebel-sur-Quévillon	Zn	23,800	2012	2019	Railway
Bracemac-McLeod	Glencore	Matagami	Zn-Cu-Ag	Zn: 37,364 Cu : 6,968	2013	2022	Railway
Southwest	Orion - IQ	Chibougamau	Fe-Ti-Va	830,000	2025	2081	Railway/Maritime
Armitage	Orion - IQ	Chibougamau	Fe-Ti-Va	830,000	2025	2081	Railway/Maritime
B26-Brouillan	SOQUEM	La Sarre	Cu-Zn	27,250			
Caber	Glencore	Matagami	Zn-Cu	.			
PD-1	Glencore	Matagami	Zn-Cu	.			
Scott Lake	Yorbeau	Chibougamau	Zn Cu	. 40,900	1970 2030	2016 2045	. Railway/Road
Mont Sorcier	Voyager	Chibougamau	Fe (Va)	5,000,000	2028	2048	Railway/Road
Copper Rand, Corner Bay, Devlin	Doré Copper	Chibougamau	Cu-Au	80,000	2026	2037	
Coulon	Osisko	La Grande-4	Zn-Cu-Ag	46,000			
Duncan Lake	Century Global	Radisson	Fe	12,000,000	.		Railway/Maritime
Grasset	Wallbridge	Matagami	Ni-Cu	84,805			
Opémiska	Qc Cooper Gold	Chapais	Cu-Au	300,000	2030	2045	
Mythril	Midland		Cu-Au-Mo-Ag	.			
Munischiwan	SOQUEM Azimut		Cu-Au-Ag	.			
Pikwa	SOQUEM Azimut		Cu-Au	.			
Delta-2	Delta	Chibougamau	Cu-Au	.			
Great Whale	Niocan	Radisson	Fe	.			
Ménarik Est	Harfang	Radisson	Cr-Ni-PGE-Au	.			
Nisk -1	Power Nickel	Chibougamau	Ni-Cu-PGE	.			
Estrades	Galway Metals	La Sarre	Zn-Cu-Au -Ag	.			

The ***Estrades*** project owned by Galway Metals is located 95 km north of La Sarre and east of the Casa Berardi mine. The stratigraphy of the Estrades Unit is over 5 km wide and known as the Joutel-Raymond Basaltic-Rhyolite Domain, and the lithology is generally east-west striking and vertically dipping. The mineral resource update published in 2018 stated an indicated 1.5 Mt at 7.20% Zn and 3.55 grams per tonne (g/t) Gold (Au) with an inferred 2.2 Mt at 4.72% Zn and 1.93 g/t Au. The total indicated and inferred estimated resources are 307,315 oz of gold and 211,576 Mt of Zn (Galway, 2022).

Bracemac-McLeod underground mine in Matagami is closing. It is owned by the Glencore Canada Corporation and began commercial production in 2013. It was a major client of Canadian National (CN) Matagami subdivision, with a recent annual production of zinc and copper of approximately 44,000 TPA (WSP, 2021a).

The ***Langlois*** zinc underground mine is owned by Nyrstar Canada Resources and located at Grevet in the Lebel-sur-Quévillon area. It operated intermittently between 1996 and 2008, restarted in 2012, and ceased production at the end of 2019 (Langlois, 2021). Nyrstar claims that rock conditions at the mine have deteriorated to the point that continued mining is not economical (Scales, 2019). Even though the site could be economical for a short 2-year (TCJM, 2020), the transport demand would be over before LGA program is effective.

The ***Grasset*** project is a polymetallic mineral resource mainly composed of nickel with an indicated resource of 5.5 Mt at 1.22% Ni and inferred 0.2 Mt at 0.82% Ni. Located 50 km west-northwest of Matagami and adjacent to the Fénelon mine, this site is one of the largest nickel sulphide deposits in Canada (Wallbridge, 2022b).

The ***Opémiska*** mine is located at the western extremity of Chapais. The site was active and operated by Falconbridge between 1953 and 1991. In 2018, Power Ore, now known as QC Copper & Gold, signed an agreement with Ex-In inc., the owner since 1993, to acquire the property. In 2021, the total measured and indicated National Instruments (NI) 43-101 mineral resource estimate is 1.17 billion (B) Cu lbs at 0.65% and 816 k gold ounces at 0.31 g/t. The Opemiska pit constraint deposit consists of 81.7 Mt @ 0.88% Copper (Cu) equivalent. The company anticipates doing more drilling to increase the mineral resource (QCG, 2022). The exploitation is planned to start in 2026 and last at least for 11 years at a copper output volume of 80,000 TPA to be shipped to Rouyn-Noranda.

The ***Devlin*** mine is located 18 km south of Chibougamau and was mainly exploited from the mid-1970s to early 1980s. In 1981, it was accessed by a 305-meter ramp which descends 55 m below the surface. No past production was reported although a bulk sample of 2,700 tons was processed at the mill. The mineral inferred resources are 0.48 Mt @ 1.79% Cu and 0.17 g/t Au (Doré, 2022).

The ***Corner Bay*** mine is located 55 km south of Chibougamau and has a 115 m ramp below its surface. This site has no past production reported although an underground bulk development sample of approximately 36,000 T was mined and processed at the Copper Rand mill in 2008. The 2021 inferred resource is 4.54 Mt @ 3.20% Cu and 0.27 g/t Au, containing 320 M lbs of copper and 39,000 oz of gold (Doré, 2022).

The ***Scott Lake*** mine is located approximately 20 km west of Chibougamau. The site was active between the 1970s and 2016. A 2017 preliminary economic assessment (PEA) provided an updated quantity of in-situ materials (1.4B lbs of zinc, 320M lbs of copper, and 14.5M ounces (oz) of silver). The Scott Lake material would be fed to a new 2,500 metric ton per day (TPD) (approximately 900,000 TPA) concentrator plant located at the mine site over a 15-year life of mine[11] (LOM) between 2025 and 2040 (Yorbeau, 2018-2019). The output to be carried from the site is estimated at approximately 34,000 TPA of zinc and 7,000 TPA of copper (TJCM, 2020).

The ***Copper Rand*** mine owned by Doré Copper Mining and located beside a mill 7 km east of Chibougamau is the deepest site at 4,790 feet under the surface. Its operations from 1959 to 2008 resulted in the extraction of 16 Mt at an average grade of 1.8% Cu and 2.8 g/t Au. From the 2007 historical inferred resources, there are 416,000 tonnes at the same historical grades (Doré, 2022).

[11] The life of mine is the time in which, through the employment of the available capital, the ore reserves--or such reasonable extension of the ore reserves as conservative geological analysis may justify--will be extracted.

The ***BlackRock*** iron-titanium-vanadium mine project, developed by BlackRock and now led by Orion and Investissement Quebec (IQ) (Keen, 2018 ; Larocque, 2022a), is approximately 60 km southeast of Chibougamau and 80 km east of Chapais by road. The project is comprised of the Southwest and Armitage zones. The mine is expected to produce ore from the pit over an 80-year period. As of 2019, the volume planned to be carried from the site was estimated at between 600,000 TPA and 700,000 TPA (WSP, 2021a), or 830,000 TPA of iron ore as of 2020, with only the Southwest site project being considered active (TJCM, 2020). The whole project includes a transformation plant to be built in Grande-Anse Port in Saguenay (SRC, 2022). The preferred transport option is rail using the spur to the previous Scierie Gagnon site, which is located at 25 km from the mine site (WSP, 2021a).

The ***Mont Sorcier*** project is located 20 km east of Chibougamau and led by Voyager. It offers potential for iron magnetite, titanium, and vanadium. The ownership of this property, first drilled by Dome Mines in 1929, has changed several times from Raycam Copper in 1955 to Campbell Chibougamau Mines in 1961-1975, Appella Resources in 2010, Globex in 2010-2012, and to Chibougamau Independent Mines (CIM) in 2012-2016 (CSA, 2020). In 2016, it was optioned to Vendôme Resources, renamed Vanadium One Iron Corp in 2017 and now Voyager Metals (Voyager, 2022). In 2019, the company undertook a drilling program that revealed 113.5 Mt of indicated resources and 520.6Mt of inferred resources. In 2021, the inferred resources increased to 953.7Mt (Halle-Sanders, 2021). A 2020 PEA, assuming an average annual output of 5 MTPA in concentrate of iron magnetite over a life of mine (LOM) of 20 years, estimated an after-tax internal rate of return (IRR) of 33.8% with a price of iron pellets 65% of US$92 per dry metric ton (DT) with a premium of US$15 for vanadium, or a free on board (FOB) price of US$86 or $141 in Canada. The output would be transported by train using a new 45 km spur connecting the concentrator and mine site to the CFILNQ Chibougamau rail line up to Saguenay Port for onward sea transport. The train system includes six trains of 120 gondola-type railcars each and a maintenance workshop for rail equipment. The study concluded that it is a potentially economic iron-vanadium project with capital expenditures (CAPEX) estimated at $1.1B (CSA, 2020). The federal environmental impact assessment will be available by April 2023 with the feasibility study finished by 2023. Voyager Metals completed their Hydro-Quebec request for a 125 MW power line to their mining site. The construction shall start in 2026 with operation beginning in 2028 (GW, 2023).

The ***Munischiwan*** project is 100% owned by SOQUEM with a 50% option by Azimut to regain a 50% interest. The property lies at 85 km northeast of Eastmain. The property is a gold-polymetallic project with a well-defined anomaly in lake-bottom sediments within the La Grande region with great geological criteria. Grab samples takin in 2018 yielded up to 100.5 g/t Au, 435 g/t silver (Ag), 156 g/t Tellurium (Te) and 1.67% Cu (Azimut, 2022).

The ***Nisk-1*** site location is approximately 20 km east of the Whabouchi mine site and 45 km east of Nemaska. It is currently owned by Power Nickel (Power Nickel, 2022b) via a series of options payments and work commitments from Critical Elements Lithium (Power Nickel, 2022c). The historical NI-403-101 compliant mineral resource estimate was published in December 2009, and the company is expected to publish a new one in Q2 of 2022 with an additional 5,000-meter drill program. In the historical resources, there is 1.26 Mt of measured at 1.09% Ni and 0.56% Cu, 0.78 Mt of indicated at 1.00% Ni and 0.53% Cu and 1.05 Mt of inferred at 0.81% Ni and 0.32% Cu (Power Nickel, 2022a).

Ménarik-East is a 33 km^2 property owned by Harfang exploration and located 50 km southeast of Radisson. The site exhibits an abundant gold and polymetallic mineralization (Arsenic (As), Cu, Zn, Palladium (Pd), Ag) in shear zones. The non-compliant with CIM standards by the Ni 43-101 historical resources is 6.34 Mt at 7.73% chromium (Cr_2O_3), 398 parts per billion (ppb) Pd, 105 ppb platinum (Pt) and 1.06 Mt at 0.38% Ni and 0.15% Cu. A Winter 2023 drilling campaign could be deployed (Harfang, 2022).

The ***Duncan Lake*** iron mine project was bought by a Century-Augwa JV from Virginia Mine inc. in 2008. The site is located 570 km north of Matagami and 40 km south of Radisson. According to a 2013 PEA, the concentrator would be located near Deslauriers Lake close to the BDH. In 2012, the measured and indicated mineral resources were estimated at 1,045 million tons at 24.4% iron (Fe) and the inferred resources is estimated at 560 million tons at 24.7% Fe. The project involves the production and shipment of 12 million metric tonnes per year (MTPA) of iron acid pellets, using a conventional open pit drill and blast operation. Assuming a price of US$125 per ton, the destination markets include China (70%) and Europe (30%). The project infrastructure includes dedicated port facilities and a pellet plant at Stromness Island near Chisasibi (135 km from the concentrator), tailings dyke construction, the concentrate pipeline from the concentrator to the pellet plant, site roads, maintenance facilities, permanent camps at Radisson and near the pellet plant, administration buildings, warehouses, assay laboratories, and storage areas. At year 6, the BDH would be deviated as the pit is extended (Met-Chem, 2013).

The total CAPEX was estimated at $4.5 B in 2013-I. The average operating expenditure (OPEX) per ton amounted to $59 over the 20-year life of mine. The total mine operation workforce ranged from 251 employees in Year 1 to a maximum of 419 in years 11 to 20. The vessel transport assumptions include the use of Capesize (185,000 dwt) and Suezmax (240,000 dwt) ships during the 4-month ice-free summer season of James Bay. Vessel transport costs were assumed to be US$35/t to Quintero and US$15/t to Rotterdam. The post-tax internal rate of return was estimated at 15.9% with a payback period of 4.8 years and a cost accuracy of ±35%. This economic analysis is preliminary in nature, based on inferred mineral resources and too geologically speculative be categorized as a mineral reserves (Met-Chem, 2013).

The ***Mythril*** project is located 7 km south of the Trans-Taiga Road and 35 km southeast of the LG-4 airport. It consists of a Cu-Au-Molybdenum (Mo)-Ag mineralized system on a 308 km^2 property. In 2019, there have been five significant new mineralized boulder fields located north-northeast. No resources have been published yet, but significant drilling has been reported in 2018 showing 2.74% Cu, 0.44 g/t Au, 0.06% Mo, and 24.3 g/t Ag over 2.7 metres at Celeborn target (Midland, 2022b).

The ***Pikwa*** project is a gold-polymetallic site owned 100% by SOQUEM. Azimut has the option to regain 50% of the interest. The property crosses the Trans-Taiga Road and is 40 km east of the LG-3 hydroelectric generating station. The project is adjacent to the Mythril Property where Midland Exploration Inc. announced the discovery of a mineralized zone. The results acquired to date point to a major copper-gold system centred on a 10-kilometre fault (Azimut, 2022).

The ***Great Whale*** iron property is owned by Nio Strategic Metals and is located about 65 km southeast of the Cree community of Whapmagoostui and the Inuit village of Kuujjuarapik and 150 km north of Radisson. In 2016 the property had a total of 3,509 ha of claims in 3 separated designated claims. In 1960, the first mineral resource published of the 3 deposits were 1.3 BT dry of material and 383 MT of concentrates with a 67.1% grade (Scofeild, 1960). In 1975, Geo-Exp conducted two studies for the proposed infrastructure: one with a 130 km railway assuming a pellet plant would be built at the mine site and one with transportation by sea through the Hudson Bay and across the coast of Labrador. In 2008, Met-Chem was approached to conduct a diamond drilling program and a prefeasibility study (Met-Chem, 2006). The three claims are still active and owned by Niocan inc. The last work on the north-west area of the properties was an aerial geophysical survey in 2021 (Gestim, 2022). Currently, Nio ensure annual minimal required work is done on the property to keep the claims alive and could look for partners to accelerate works on the property (GW, 2023).

10.5.3.3 Critical and Strategic Minerals

Market

The Eeyou Istchee Baie-James is home to significant deposits of Critical and Strategic Minerals (CSM), including lithium, titanium-vanadium, and to a lesser extent niobium, rare earths and the platinum group metals, which comprises cobalt. Platium group metals also includes nickel and copper, presented with base metals. Graphite is the only CSM not present in the region as per exploration.

The ***CSM strategy*** defined by the Gouvernement du Québec aims to succeed the energetic transition in response to climate changes and create economic wealth by valuing CSM in a sustainable and socially acceptable way (MERN, 2021a). This strategy will likely be driving increases in traffic in short to medium term:

- Explore: acquire new geoscientific knowledge and integrate digital innovations into geoscientific data
- Support: protect and foster exploration of the CSM resources of interest to Quebec;
- Develop: integrate, and implement northern transportation, renewable energy and telecommunications networks;
- Recycle: support circular economy projects, develop by-products and recycle CSMs;
- Propel: promotes Québec's mineral potential and attract foreign investment in different phases of the CSM value chain; and
- Explain: develop and implement a communication strategy to stress the importance of CSM (MERN, 2022).

By investing in the knowledge base and infrastructure, Quebec hopes to attract foreign investments and create a hub for the automotive battery sector.

The strategy seeks to promote sustainable practices in the value chains of critical and strategic minerals (CSM) and to leverage Quebec's competitive advantages and knowledge. One of the ways the plan aims to achieve this is by creating hubs that include mining, ore transformation and battery production industries. One such hub is located in the Bécancour, Trois-Rivières, and Shawinigan areas, with major players like General Motors (USA), POSCO chemical (South Korea), and BASF (Germany) investing over $500M in the cathode battery component factory with the creation of 200 jobs (Affaires, 2022).

The city of Bécancour has access to $375M to prepare for new companies, and the plan aligns with the government's Sustainable Development Strategy, 2030 Energy Policy, 2030 Sustainable Mobility Policy and upcoming 2030 Green Economy Plan. The goal is to develop critical and strategic minerals in a sustainable and socially acceptable way while creating economic wealth for the Cree and Jamesian communities.

As demand for these minerals continues to grow, mining companies are increasingly looking to develop Eeyou Istchee's CSM reserves (MERN, 2020a). As such, several mining projects are currently underway in the region, with more planned for the future.

Lithium is mainly used as a component of rechargeable Li-ion batteries. Its use in Li-ion batteries is perhaps its most common and important use today, as it is found in rechargeable batteries that power cell phones, smartphones, laptops, tablets, and other portable electronic devices. Additionally, lithium-ion batteries are widely used in the automotive industry to power electric vehicles (EVs) and hybrid electric vehicles (HEVs). Lithium is also used in various other applications, such as glass and ceramics, lubricants, air treatment, and as an alloying element in aluminum and copper.

In 2015, less than 30% of lithium demand was for batteries, but they are predicted to make up 95% of the demand by 2030. Lithium demand in 2021 was at 500,000 MTPA of lithium carbonate equivalent (LCE)[12]. During 2021 and 2022, the demand for electric vehicles skyrocketed pushing global electric vehicles (EV) sales up by 50% in 2020 and reached 7M units in 2021. Surging EV demand has seen lithium prices increase by 550% y/y in March 2022 and multiplied by 13 over 5 years (Lesage, 2022b).

The demand for lithium is expected to increase significantly due to battery production, and its world trade value is expected to increase ten-fold over the next 15 years (Statista, 2021). With projects underway in 2022, the forecast supply is would be below the expected demand. Intensive exploration and production expansions are expected to increase by 20% each year to meet the unfulfilled demand. The expected demand for lithium might not be met by the available supply by 2030 (McKinsey, 2022b).

However, the current downturn in the Chinese markets, worldwide recession concerns, the end of Chinese stimulus for battery manufacturers, the exploration of new lithium deposits, and new technologies in development that could potentially enable higher extraction efficiency from Salt-lakes in Latin America may impact medium-term lithium future market. The future global demand for new-energy automobiles, to the extent of public subsidies, regulation, and consumers' attitude. Meanwhile, China continues to produce 75% of all lithium-ion batteries, with 70% of production capacity for cathodes and 85% of production capacity for anodes. China processes and refines over 50% of lithium, cobalt, and graphite used in these batteries. In contrast, the United States plays a smaller role in the EV battery supply chain, accounting for only 10% of EV production and 7% of battery production capacity. (IEA, 2022).

While recycling of lithium is expected to be a growing supply source, it is still a small fraction of the total supply. It has the potential to reach only 6% of the total supply in 2030. In addition to lithium, the demand for vanadium redox batteries (VRB) is also expected to increase significantly by 2050, as they are used in energy storage systems. However, the cost of electrolytes and the price volatility of vanadium could pose challenges for the widespread adoption of VRB technology. According to Woodmac (2022c), more research is needed to address these challenges and improve the economy of VRB technology.

On the supply side, the greatest lithium producers in the world are located in Australia and South Africa. Quebec accounts for 13% of the world's lithium reserves, essentially in Eeyou Istchee Baie-James and Abitibi-Témiscamingue. The presence of low-cost ecological hydroelectric source of energy and its location in North America near the automobile industry are comparative advantages for Quebec. Nonetheless, technological advancement in brine extraction may increase the production capability in countries with salt lakes such as Bolivia, Argentina and Chile over the next few years with the development of nanotechnology membrane separation techniques evolving significantly reducing the conventional pond production time of 18 months.

In Quebec, there are currently a hundred lithium exploration projects (Lesage, 2022b) and several in the deposit in central Eeyou Istchee Baie-James, generally of good quality (Lesage, 2022a). Jean-Marc Lulin, CEO of Azimut exploration, cited: "*The analyses we have conducted show that there is a real potential, and that James Bay could*

[12] Lithium Carbonate Equivalent (LCE) is a common unit of measure used in the lithium industry to compare and quantify different lithium compounds, such as lithium hydroxide, lithium carbonate, or lithium chloride. LCE is used to express the amount of lithium contained in a specific lithium compound as if it were in the form of lithium carbonate. This is because lithium carbonate is the most common lithium compound used in the production of lithium-ion batteries, and it is easier to compare different sources of lithium using a common base. For example, if a spodumene ore contains 1% lithium oxide (Li2O), this would be equivalent to 5.32% lithium carbonate (Li2CO3) based on the molecular weights of the two compounds. Therefore, the LCE of the spodumene ore would be 5.32%.

become a major source of supply for lithium in North America the international EV industry wants to secure its supply in lithium, Quebec will then become one of only two lithium-producing states in North America, along with Nevada (Larocque, 2022c). Quebec has the largest lithium reserves in Canada (Ibarra-Gutiérrez and al, 2021). James Bay area has four high potential lithium projects showing proven mineral reserves and advanced projects, along with two sites in Abitibi-Témiscamingue (MERN, 2020a). However, the grand chief of the Cree nation Mandy Gull-Masty said in interview, last autumn: "*I wouldn't say we are ready to fully commit to these developments yet. Rather, I would say that we are exploring what lithium mining could become in our territory*" (Larocque, 2023).

In the short term, shipments of lithium spodumene[13] should go to lithium carbonate and hydroxide plants in Asia, before the industry gets developed in North America (Lesage, 2022a). In Canada, the EV battery industry is being implemented mainly in Ontario with the $5B investment of a joint venture (JV) between Stellantis (Fiat Chrysler PGA) and LG Energy Solutions in a new 45-gigawatt hours (GWh) lithium-ion battery plant in Windsor, a first in Canada. The plant should begin operating in 2024, creating 2,500 jobs in the area (Stellantis, 2022). Stellantis plans to open 5 such joint venture plans in Canada by 2030, as well as one in the US soon (Hawkins, 2022). In Quebec, a GM-POSCO JV announced an investment of $500M in a new plant in Bécancour with 200 jobs, notably because of the low-cost of electricity (Halin, 2022). GM will implement the first Canadian lithium battery plant in Ingersoll in southern Ontario (CP, 2022). Sayona will start the production with a rehabilitated concentrator for the initial crushing and grinding of spodumene in La Corne in 2023. The company is also planning at the feasibility study stage a lithium carbonate plant in the region. These installations would be unique in North America (QMI, 2022d).

The general structure and freight movements of the lithium industry in Quebec are being determined by the opportunity strategies and partnerships of individual companies. For example, during the EA (COMEX, 2019b), the Moblan lithium site output was assumed to be shipped overseas to China by a port on the St. Lawrence River. Transportation scenario assumes the use the railway from Matagami because the CTM already existed while the transshipment centre was still under project stage at Chibougamau although this route was thought to be preferred from the environmental point of view. The study also considered a possible lithium 2nd transformation plant (lithium carbonate) in Chibougamau instead of in China (COMEX, 2019b). Since this site has become Sayona's property which intends to implement lithium 2nd transformation plant in Quebec, most probably in Abitibi. In 2019, the traffic from Whabouchi was assumed to go towards Chibougamau and use the CN Cran subdivision (Intervia, 2019).

Bécancour is also planned as the location of possible lithium 2nd transformation plant, notably, by Nemaska Lithium. On the short term, the shipments from the Whabouchi, Rose, and James Bay lithium mine sites could use the CN

[13] The Lithium spodumene is typically processed through a combination of physical and chemical methods to extract lithium from the mineral. The general steps involved in processing lithium spodumene are: 1 Crushing and grinding: The spodumene ore is crushed and ground into a fine powder, making it easier to extract the lithium. 2 Roasting: The spodumene powder is then roasted at high temperatures, typically between 900°C and 1000°C, to convert the lithium-bearing minerals into a form that can be more easily extracted. 3 Acid digestion: The roasted spodumene powder is then treated with sulfuric acid to dissolve the lithium. This creates a lithium sulfate solution. 4 Filtration: The lithium sulfate solution is filtered to remove impurities, such as iron and other metals. 5 Precipitation: Next, the lithium sulfate solution is treated with soda ash (sodium carbonate) to precipitate lithium carbonate. This is the form of lithium that is most commonly used in lithium-ion batteries. .6 -Purification: The lithium carbonate is then further purified to remove any remaining impurities, such as magnesium, calcium, and sodium. 7- Drying and packaging: Finally, the purified lithium carbonate is dried and packaged for sale.

Overall, processing lithium spodumene is a complex and energy-intensive process. However, it is an important source of lithium, which is used in a wide range of high-tech applications, including electric vehicles and renewable energy storage systems.

Matagami subdivision via the CTM installations in Matagami. If the transshipment centre existed in Chibougamau, this could be another possible route by the CN Cran subdivision.

Titanium is used in many niche markets, for example in the medical field to connect bones for surgical applications in joint replacements, as pigment in paint, and as an important alloy agent with many other metals such as aluminum, molybdenum and iron used in aircraft, spacecraft, and missiles. It is also used in golf clubs, laptops, bicycles and crutches (RSC, 2022).

Vanadium is mostly used for high-strength low-alloy (HSLA) steel, but there is also a rise in demand from the battery sector.

Projects

The current mining projects of critical and strategic minerals in Eeyou Istchee Baie-James are listed in Table 10.5-11.

Table 10.5-11: Mining Exploitation and Exploration Sites, Strategic Minerals, Eeyou Istchee Baie-James

Site	Company	Near	Mineral	Annual Production (t)	Start	Closure	Means of transportation
Critical Minerals							
Grasset	Wallbridge	Matagami	Cobalt-Platinum-Palladium	.			
Lac Doré	Vanadium Ress	Chibougamau	Iron-Vanadium-Titanium	.	-	+20 yr	
Iron T	Vanadium Ress	Matagami	Vanadium	.			
James Bay	Allkem / Galaxy	Eastmain	Lithium	448,000	2027	2047	
Moblan	Sayona	Mistissini	Lithium	200,000	2023	2038	-
Pontax	Stria	Chisasibi	Lithium	.			
Rose	Critical Elements	Nemaska	Lithium	236,000	2024	2041	Road/Railway
Whabouchi	Nemaska	Nemaska	Lithium	213,000	2023	2051	Road/Railway
Triple Lithium	X-Terrra	Chibougamau	Lithium	.			
Corvette	Patriot Batery	Chisasibi	Lithium				
Cancet	Winsome	Chisasibi	Lithium				
Adina	Winsome	Chisasibi	Lithium				
Sirmac-Clappier	Winsome	Mistissini	Lithium				

The ***Iron-T*** mine project, currently led by Vanadium Corp Resource, is located adjacent to the mining district of Matagami. In 2019, Vanadium Corp intended to undertake geological explorations and preliminary economic assessments to determine the feasibility of the project (Vanadium, 2019). The site has 14 Mt of inferred vanadium oxide, which could potentially provide one of the highest grades, largest supplies, and best qualities of the mineral anywhere in the world (Vanadium, 2021). Vanadium Corp is open to opportunities to develop this site in a JV. Although the rate of output remains undetermined, the vanadium pentoxide and high-purity iron and titanium could be shipped to Quebec City (TJCM, 2020). However, no news on the advancement of the project has been reported since then, and the timeline for the opening of the mine has yet to be determined.

The ***Lac Doré*** project, actively led by Vanadium Corp Resource, is located 27 km southeast of Chibougamau. This site is one of the most significant undeveloped vanadium deposits globally. It is served by supporting infrastructure, including a 161 kV hydropower, the CN Chapais Subdivision rail link, available water, a local airport, and a mining community (Vanadium, 2020). The 2020 estimates amount to 215 Mt of measured and indicated resources. The predominant resource is iron, followed by titanium, and vanadium in lesser amounts (Lasley, 2020). The life of the mine is expected to be 20 years with an approximate starting operation year in 2026 and an output production of 200,000 TPA, including 20,000 tons of titanium and 8,000 tons of vanadium. As with the IronT project, the vanadium pentoxide and high purity iron and titanium would be shipped to Quebec City (TJCM, 2020).

Chibougamau Independent Mines (CIM), created in 2012 by Globex, focuses on developing new mines in the Chibougamau gold, copper, and zinc mining area. The properties include five Cu-Au mines that were operated in the past, an unmined Cu-Au deposit, an unmined Zn-Au-Ag deposit, the inferred lateral and depth extensions of three of the most significant previously producing mines in the Chibougamau Mining Camp (Portage-Henderson Mines), a large unmined iron titanium near-surface deposit, and numerous zones of drill intersected base and precious metal mineralization. Each of these locations is at varying stages of development (CIM, 2019).

The ***Moblan*** lithium mine project is located 80 km north of Mistissini at KP 114 on the Route du Nord. The site is on Category III lands. The planned capacity of production of a spodumene smelter is 2,600 TPD with a camp for 200 workers. A new 25 kilovolt (kV) electricity line is also planned to provide power to the mine. The 200,000 TPA of spodumene (6% Li_2O) concentrates will go to an undetermined place for second transformation. In October 2021, Guo Ao sold its 60% partnership in the project to the Australian mining company Sayona while the Société québécoise d'exploration minière (SOQUEM) kept its 40% share. An annual extraction of 949,000 TPA is planned over a 15-year period (Citoyen, 2021a) but could be extended to 27 years (Lesage, 2022).

Sayona has other spodumene projects in Abitibi-Témiscamingue including Authier (115,000 TPA over 14 years), Tansim (south of Malartic), and the Lithium Amérique du Nord Complex, bought in 2021, which includes a mine, a smelter, and a hydrometallurgy plant in La Corne between Amos and Val-d'Or and west of Barraute (Sayona, 2021). The concentrator production at this site should start in the beginning of 2023 (QMI, 2022d) with 120 local employees. Half of the output would be for the use of Piedmont Lithium in North Carolina (QMI, 2022c). Sayona targets the North American electric vehicle market and has agreed to transform the lithium in Quebec (Citoyen, 2021a, b). Sayona should publish a prefeasibility study in 2023 regarding a lithium carbonate plant. Thus, they haven't determined how the spodumene concentrate will transit for their second transformation in Quebec or internationally (Sayona, 2022). In the short term, as the second transformation facility has not been implemented yet, the spodumene shall be carried to the port of Trois-Rivières to be shipped to Asia (Larocque, 2022c).

The ***Whabouchi*** lithium open pit mine project, developed by Nemaska Lithium, lies approximately 30 km from Nemaska. This area is expected to be one of the richest lithium spodumene deposits in the world, both in terms of volume and grade (NS Energy, 2020). Nemaska Lithium is 50% owned by Investissement Québec (IQ) and 50% by Livent and has recently secured $160M in funding (MEI, 2022). In May 2021, Livent acquired the participation of the British company Pallinghurst. Livent is a supplier for Tesla and BMW. BASF and GM/POSCO, located in Bécancour, have shown an interest in Nemaska Lithium's supply (Arsenault, 2022). The Whabouchi mine and concentrator project is combined with the project of an electro-chemical plant at Bécancour (initially forecasted at Shawinigan) to process the recovered ore and convert spodumene concentrate into lithium hydroxide, a critical compound in the development of electric batteries (Mining Global, 2020). During the 33-year LOM, Nemaska Lithium will look to convert around 7MT of spodumene concentrate (220,000 TPA) to be shipped to Bécancour. This would be equal to 770,000T of lithium hydroxide batteries and around 361,000T of lithium carbonate batteries. A

total of 410 jobs would be created at the Whabouchi mine site and the Bécancour plant (Arsenault, 2020). The project cost rose from an initial estimate of $875M to $1.5B. The mining site should begin operations in 2025 (Rolland, 2022).

The ***Rose*** lithium-tantalum mine project developed by Critical Elements Corporation (CEC) is located 40 km north of Nemaska, between Nemaska and the Eastmain 1 powerhouse. The mined ore will be processed to produce spodumene and tantalum concentrates. With an expected operating life of 17 years, the mill will process 1.61 MTPA of ore to produce an annual average of 200,000 TPA of technical and chemical grade spodumene concentrates and 429 TPA of tantalite concentrate between 2024 and 2041 (WSP, 2017 ; COMEX, 2018). The project includes an open pit, an ore concentration plant, tailings storage areas, and mining water management facilities. The project requires moving a section of the 315 kV Eastmain-1-Nemaska power line to the east, handled by Hydro-Québec (CECORP, 2020). The transportation of mineral concentrates will require 90 truck movements per week (WSP, 2017) to Matagami yards for transhipment to rail. Trucking will be used for the transport of supplies such as chemical products and residual outputs like scrap.

The ***James Bay*** lithium mine project, developed by Allkem (Galaxy Lithium), is located approximately 100 km east of Eastmain near the BDH. The project involves the construction, operation, and decommissioning of an open-pit lithium mine, as well as the development of a concentrator facility, tailings, waste rock, ore and overburden storage areas, and related infrastructure (IAC, 2019). The mine is expected to have a life expectancy of 15 to 20 years, with an average production rate of 5,480 TPD (1.9 MTPA) of ore. The mill's estimated output is 321,000 TPA of spodumene 6% grade lithium, and the deposit is of excellent quality (CMBJ, 2021). Upon completion, the mine is expected to employ 220 workers.

Extending the existing railway network from Matagami to KP 381 of the BDH would benefit the James Bay project by eliminating the need to transport spodumene concentrate from the mine to Matagami by truck for transport to Galaxy's second transformation plant. The rail transport option would also prevent undue wear and tear on the BDH caused by trucking and improve road safety. To accomplish this, a siding and warehouse would need to be constructed at KP 381 (James Bay Lithium Data Sheet, 2020)

The ***Pontax*** lithium project is owned by Stria lithium which reached an agreement on July 28, 2022, with Cygnus Gold to acquire up to 70% of the property (Stria, 2022). The site is located within a 100 km radius of the James Bay by Allkem, the Rose by Critical Elements, and the Whabouchi by Nemaska Lithium. The Pontax lithium project hosts numerous spodumene bearing pegmatite swarms. The central Pontax is the only one explored with 620 m of strike and is open along strike and depth. 25 diamond drill holes have been made for a total of 3,286 m with drill intersection such as 15.6 m at 1.6% lithium oxide and 13.0 m at 1.4% (Cygnus, 2022). The Central Pontax drilling program remains open in all directions and has yet to reach significant depths, with vertical drilling currently at less than 130 meters.

The Corvette, Adina, Pikwa and Galinée exploration sites from Patriot Battery, Winsome Resources and the Azimut-SOQUEM joint venture could add up to the list of future lithium mines in James Bay with great results (Larocque, 2023).

Corvette is a property fully owned by Patriot Battery Metals located 10 km south of LG-4 airport. It with six distinct lithium pegmatite clusters. The company performed an extensive 2021-2022 drilling program with a 20 km trend explored and a remaining 20 km trend to be explored. Preliminary results indicate a 5.5% Li_2O (lithium oxide) spodumene concentrate with a 75% and higher recovery rate and a low Fe_2O_3 (Iron Oxyde) impurity present at 0.65% in concentrate (Patriot, 2023). These results mean a good long-term potential. The company has additional James Bay grass-roots projects named Pontax, Lac du Beryl and Eastmain with no drilling results.

Cancet is a mining property crossing the Trans-taiga Road at 175 km east of the BDH junction. This property is owned by Winsome Resources in a 200 km^2 area. This property is within a favorable spodumene bearing pegmatite area with additional west and east targets. Cancet is part of a Winsome James Bay asset portfolio that includes Adina and Sirmac-Clappier (Winsome, 2023).

The ***Adina*** lithium project is approximately 100 km southeast of the Cancet lithium project, also owned by Winsome Resources. This project was profiled in 2016 and the 2018 drilling program covered 1726 m on 10 holes. The results show a well-mineralized property with a 2 km potential strike by a pegmatite ridge. Additional prospecting is projected in co-development with Cancet site (Winsome, 2023).

The ***Sirmac-Clappier*** project is located 25 km south-west of the Moblan project. The property is 19.31 km^2 with on-site spodumene crystals samples from 1 cm to 30 cm range, with a 10 cm average and a 5 to 30% volume pegmatite rang. The project is approximately located at 120 km north of Chibougamau with power infrastructure traversing the property (Winsome, 2023).

10.5.3.4 Precious Metals

Market

Gold prices saw a 4.3% increase in the first quarter of 2022 and have since stabilized. Gold is generally known as a safe-haven asset and tends to perform well in periods of geopolitical tension and rising inflation. However, increases in interest rates are a downside risk for gold as an asset. Silver has strong demand from its use in electronics and has a much more modest reputation as a safe-haven asset. However, there have been lower supply and demand in more recent years in response to the slow recovery of the global pandemic, which has caused the price of silver to wane (WB, 2022). In Quebec, precious metals, primarily gold, accounted for 71.5% of total mineral exploration expenses in 2021 (ISQ, 2022). While gold remains, the main mineral explored in the Eeyou Istchee James Bay region, according to Jean-Marc Lulin, CEO of Azimut Exploration, there is a shift due to the increasing demand for electric vehicles (Larocque, 2023).

Exploitation and Projects

The mining sites of gold, silver and diamond, exploited or explored, are listed in Table 10.5-12.

Table 10.5-12: Mining Exploitation and Exploration Sites, Precious Metals, Eeyou Istchee Baie-James

Site	Company	Near	Mineral	Annual Production (oz)	Start	Closure	Means of transportation
Precious Metals							
Vezza	Nottaway	Matagami	Au	--	2016	2021	Road/Air
Éléonore	Newmont	Nemaska	Au	314,000	2015	2027	Road/Railway/Air
Renard	Stornoway	Mistissini	Diamond	1.6 M carats	2017	2031	Road/Air
Casa Berardi	Hecla	La Sarre	Au	177,000	2007	2030	Road/Air
Cedar Bay	Doré Copper	Chibougamau	Au-Cu				
Chechoo	Sirios	Radisson	Au	271,000			
Chevrier	Genesis	Chapais	Au				
Croteau Est	Northern Superior	Chapais	Au				
Douay	Maple Gold/ Agnico Eagle	Matagami	Au	328,000	2025	2040	Road/Air
Eau Claire	Fury Gold	Nemaska	Au	102,000	2029	2035	
Eastmain	Fury Gold	Nemaska	Au				
Gladiator & Barry	Bonterra	Lebel-sur-Quévillon	Au	168,000	2030	2045	
Elmer - Patwon	Azimut	Radisson	Au				
Fenelon	Wallbridge	Matagami	Au	206,000	2025	2027	Road
Martinière	Wallbridge	Matagami	Au				
Sleepy Giant	Abcourt	Matagami	Au	84,800	2022	2024	Road/Air
Joe Mann	Doré Copper	Chibougamau	Au				
Windfall	Osisko	Lebel-sur-Quévillon	Au	238,000	2023	2031	Railway/Road/Air
Quévillon, Urban Barry, Golden Bear	Osisko	Lebel-sur-Quévillon	Au				
Monster Lake, Nelligan	Iamgold	Chapais	Au				
Philibert	SOQUEM	Chapais	Au	90,000			
Roger	QC Copper	Chapais	Au				
Sakami	QC Precious Metal	Wemendji	Au				
Troilus	Troilus Corp	Mistissini	Au-Cu	246,000	2025	2035	Railway/Road/Air
Tortigny	Troilus Corp	Mistissini	Au				
Lac Bachelor Moroy	Bonterra	Waswanipi	Au	105,000	2013	2022	Railway/Air
Opémiska	Qc Copper Gold	Chapais	Au-Cu				
Opiniaca	Azimut	Nemaska	Au				
Frotet	Kenorland Sumitomo	Mistissini	Au				
Lac Ménarik, Serpant, Radisson	Harfang	Radisson	Au				
Anik	Kintavar	Chapais	Au				
K2	Dios	Eastmain	Au				
Au33	Dios	Nemaska	Au				
Wabamisk	Azimut - Newmont	Radisson	Au				

Site	Company	Near	Mineral	Annual Production (oz)	Start	Closure	Means of transportation
Pontois	SOQUEM - Azimut	La Grande-4	Au				
Galinée	Azimut - SOQUEM	Chibougamau	Au				
Wapatik	Azimut-Mont Royal	Mistissini	Au-Cu				
Fenton	Cartier	Chapais	Au				
Benoist	Resource Cartier	Lebel-sur-Quévillon	Au				
Éléonore South	Azimut – Newmont – Fury Gold	Radisson	Au				
Casault	Midland	Matagami	Au				
3 A's Quebec	Tarku	Matagami	Au				
Aquilon	Sirios	Laforge-1	Au				
Laflamme	Midland - Abcourt	Lebel-sur-Quévillon	Au				
Osborne-Bell	Osisko	Lebel-sur-Quévillon	Au				

* Production shutdown for an indefinite period. These two projects have been classified as ongoing projects as they were in production until recently.

The ***Casa Berardi*** gold mine, currently operated by Hecla Mining Company, is located 95 km north of La Sarre. Hecla, based in Idaho, also leads exploration works at Hosco site in Val-d'Or and the Opinaca and Wildcat sites. The Casa Berardi gold and silver mine have been in production since 2016, with a LOM of 10 years (Hecla, 2021). In 2020, the mine produced 24 koz of silver and 121 koz of gold, the lowest production rate since beginning operations. The same year, a new discovery was made on the property which could increase production and extend the LOM (Hecla, 2020).

Éléonore is an operating gold mine located approximately 260 km to the north of Nemaska, and 170 km east of KP 394 of the BDH. It is the second-largest gold mine in Quebec (Dubuc, 2020). Initially owned by Goldcorp, the mine started operating in 2015 with an expected LOM of 15 years (Duddu, 2021). Newmont acquired the mine in 2019. They re-estimated the reserves with a reduction of 43% and revised the LOM to only last to 2026 (Dubuc, 2020). The LOM is currently estimated to last until 2029. Future additional drilling may increase mineral resources and expand the LOM. The current output is 350,000 TPA (Dubuc, 2020). The mine employs 700 direct workers on site and approximately 500 indirect workers. Sixty Cree people (12 from Wemindji) are directly employed, and 82 others occupy indirect positions. Air transportation is supplied by Air Creebec. Newmont has a partnership with the CSB to train new Cree workers on site (VEI-WSP, 2022).

The ***Sleeping Giant*** property, owned by Abcourt Mine inc. since 2016, is located halfway between Amos and Matagami. The site processes ore from the Elder gold mine, which is situated beside Rouyn-Noranda. The site includes a mill with a capacity of 250,000 TPA. The Sleeping Giant's future production will be approximately 325,000 tonnes over a 4-year period. The life of the Sleeping Giant mine could be extended as additional exploration plans have already been established (Abcourt, 2018).

The ***Windfall*** project, promoted by Osisko Mining, is located 115 kilometres east of Lebel-sur-Quévillon, accessible by forest roads. A PEA indicated an average production of 238,000 oz of gold per year over its 18-year LOM (CMJ, 2021b), 300,000 oz per year for the first 7 years (Hiyate, 2019), and 200,000 oz per year for the 11 following years. The project would create approximately 500 jobs during construction (Osisko Mining, 2021) and 400 direct jobs and 200 indirect jobs during its operation (VEI-WSP, 2022b). ***Golden Bear***, a site adjacent to Windfall and property of

Osisko Mining, seems to be a high-grade system with little drilling (Hiyate, 2019). Exploration works shall continue at this location (VEI-WSP, 2022b).

Urban Barry, also in the Windfall area, and ***Quévillon***, just west of Lebel-sur-Quévillon, are also promoted by Osisko Mining with past exploration made (VEI-WSP, 2022).

The ***Osborne-Bell*** gold deposit is fully owned by Osisko Mining inc., and the mineral resource estimate with National Instruments 43-101– Standards of Disclosure for Mineral Projects were disclosed in 2018. The inferred resource is an estimated 62,587,000 tons at 6.13 g/t Au for 510,000 oz of gold. This site is very close to the possible site for a planned future Windfall gold mill in Lebel-sur-Quévillon (Osisko, 2022).

The ***Gladiator, Barry,*** and ***Moroy*** gold sites are parts of Bonterra Resources, which includes the ***Bachelor*** mine mill. Bonterra is developing all three gold projects simultaneously to guarantee a steady, long-term supply of ore to the company's Bachelor mill. The Bachelor mill is currently permitted for 800 TPD and is located approximately 100 km north of the Barry and Gladiator sites and beside the Moroy site. In 2017, Bonterra started the permitting process to increase the mill's ore processing capacity to 2,400 TPD to accommodate the anticipated total volume of ore that will be coming out of the company's three gold mines. At the Barry gold project, the tonnage of indicated and inferred mineral resources for the Barry gold project can currently support 7.4 years of operations at a mining and milling rate of 1,200 TPD (Barry Data Sheet, 2021). At the Gladiator gold project, the duration at the same rate would be 5.8 years (Gladiator Data Sheet, 2021).

The ***Laflamme*** project is approximately 25 km west of Lebel-sur-Quevillon and consists of 436 claims covering a total surface area of about 234 square kilometres. This project is a JV between Midland (77.9%) and Abcourt Mines Inc. (22.1%) which own the Sleeping Giant property. During a prospecting program in 2022, a metre-scale angular erratic boulder was discovered approximately 700 metres southeast of the historical Notting Hill gold showing and graded 28.7 g/t Au. This new discovery is located approximately 12 kilometres northwest of the Osborne-Bell deposit from Osisko Mining Inc. (Midland, 2022a).

The ***Douay*** Gold Project, a Maple Gold / Agnico Eagle joint venture, is located 55 km from Matagami. The existing facilities, including a new 46-person camp, are accessible via a gravel road approximately 10 minutes from Route 109 via Joutel Road (Maple, 2021). The site is served by Hydro-Québec Powerline 6. As of 2015, the expected milling rate is 900 TPD (315,000 TPA) over a 15-year life span.

The ***Vezza*** gold mine, located 12 km east of Douay mine project, was previously operated by Ressources Nottaway and ceased operations in 2019 (Vezza, 2021). It has been purchased by Maple Gold Mines and new drilling programs have been ongoing since 2020, finding new potential gold deposits (Maple, 2020).

The ***Joe Mann*** gold and copper property, owned by Doré Copper Mining, are located 60 km south of Chibougamau. The production from 1956 to 2007 was 1.2 M oz of gold at 8.26 g/t, 607,000 oz of silver at 5 g/t and 1,300 t of copper at a grade of 0.25%. The 2022 reported mineral resource estimate is 608,000 tonnes of gold at an average grade of 6.78 g/t for 133,000 contained oz of gold in the Inferred category (Doré, 2022).

The ***Cedar Bay*** gold and copper property, owned by Doré Copper Mining, is located 8 km south of Chibougamau. From 1958 to 1990, the Cedar Bay mine produced 3,860,707 tonnes grading 1.63% Cu and 3.3 g/t Au. The 2019 reported mineral resource estimate is 230,000 tonnes of gold at an average grade of 8.32 g/t for 61,000 contained oz of gold in the Inferred category (Dore, 2022).

The ***Chevrier*** Gold Property, owned by Genesis Metals, is located 35 km south of Chibougamau in an area that provides the most services necessary for mineral exploration and extraction. The resource is estimated at 912,000

oz of gold (CMJ, 2022). In the coming years, Genesis has expanded its land area in the region to continue running property-wide sampling programs (Eliwah, 2019).

The ***Monster Lake*** gold project, purchased by Iamgold from TomaGold in September 2020, is located 50 km southwest of Chibougamau. The reported mineral resources comprised 1.1 million tonnes of inferred resources as of 2018 (Iamgold, 2020). Additional drilling, geological and geochemical surveys, and regional structural studies were also underway (Mining, 2020).

The ***Nelligan*** gold project is located 60 km southwest of Chibougamau and 15 km south of the Monster Lake project and held under an earn-in option joint venture with IAMGOLD at 75% and Vanstar Mining Resources Inc. at 25%. In October 2019, the company reported a mineral resource comprising 97 mt averaging 1.02 g/t for 3.1 million oz of gold (Iamgold, 2022).

Anik project is a 67 km^2 property owned by Kintavar Exploration inc. 40 km south-east of Chapais and 55 km south of Chibougamau. The project has been optioned to Iamgold as a 75%-part option for up to $6.5M of work on the property and $3M cash payment. Only a technical report has been published with no estimated resources. The property is in the Opawica-Guercheville deformation corridor. It is bordered on the eastern part of the Joe Mann mine fewer than 7 km away. Its western side is located less than 10 km away from Monster Lake. Within less than 1.5 km is the Nelligan property owned by Iamgold and Vanstar Resources (KIN, 2022).

The ***Fénelon*** gold project is located approximately 75 km west-northwest of Matagami. Since its acquisition in 2016, Wallbridge have engaged in exploration activities. In 2021, the Company announced a maiden mineral resource estimate consisting of 2.13 million ounces of indicated and 1.47 million inferred (Wallbridge, 2021). The project aims to extract material at a rate of 235 tons per day (TPD), or approximately 85,000 TPA on average from the existing infrastructure for a rate of 100 koz per year between 2025 and 2029 and 200 koz per annum for the 2030-2039 period. The material will be processed off-site in a plant located in Abitibi-Témiscamingue or in Nord-du-Québec (COMEX, 2019a).

The ***Martinière*** gold project is located 30 km west of the Fénelon site. In 2021, the Company announced a maiden mineral resource estimate consisting of 543 thousand oz of indicated and 256 thousand inferred. The Martinière project is smaller than Fénelon, but its proximity will ensure mill supply (Wallbridge, 2022b).

The ***3 A's Project*** refers to the Apollo, Admiral, and Atlas sites which cover 53 km^2. The gold mineralization shares similarities with the Detour Lake Mine and Kirkland Lake mining camp. In the winter of 2019, a total of 5 drill holes of 796 m, demonstrated the presence of numerous elements consistent with the orogenic gold exploration model. Tarku is looking for partners to advance the project to the next stage (Tarku, 2022).

The ***Troilus*** gold mine, located approximately 200 km north-west of Mistissini, was previously operated by Inmet which closed it in 2010. The mill and camp were sold and subsequently dismantled. Troilus purchased the mine in 2017 and has since maintained or expanded its infrastructure, including 40 km access roads, rail access in Chibougamau, 85 km of operating power lines maintained by Hydro-Québec, high voltage 50MWA substations, permitted tailings ponds (reclaimed and revegetated), a permitted tailings facility, an operating water treatment facility, emergency generators, a 60-person exploration camp, expanded core logging and cutting facilities, and offices at the site. With all necessary equipment in place and an active mining lease, the mine is expected to operate for 22 years and generate a value ranging from US$419M to US$1.156B depending on of the price of gold. The annual production would be an average of 246,000 ounces per annum (OPA) of gold, 100,000 OPA of silver, and 8,000 TPA of copper over the first 14 years of open-pit operation. With a transition to underground operations in the next 8 years, production would slow down.

The J4 and Z87 sites, which are the existing Troilus pits, the ***Tortigny*** site, 30 km South-West of the existing pits and right across the Route du Nord, and the newly discovered ***Testard*** site will sustain Troilus gold mine production (Troilus, 2020).

The ***Frotet*** project is 100 km north of Chibougamau and located right across the east side of the old Troilus mining site. It covers 394 km^2 and is a joint venture owned 80% by Sumitomo Metal Mining Canada Ltd. and 20% by Kenorland minerals with pro-rata funded exploration. The project sits on the Regnault gold system, a green field discovery made by Kenorland and Sumitomo Metal Mining Canada Ltd. in 2020. There are no published mineral resources, but the last field work was in the summer of 2021 with 57 diamond drill holes at 17,792 m on the Regnault gold system (Kenorland, 2022).

The ***Eau Claire*** gold deposit is situated 60 km north of Nemaska, 5 km from the permanent road network. Drill roads currently allow seasonal access to portions of the project (Fury Gold Mines, 2018). Its resources can currently support approximately six years of operations from 2029 to 2035 at a mining and milling rate of 1,500 TPD (Eau Claire Data Sheet, 2020). A PEA outlined a 12-year open-pit and underground operation producing an average of 86,100 oz of gold annually in the first 10 years (CMJ, 2021).

The ***Cheechoo*** gold project, conducted by Sirios, is located approximately 200 km east of Wemindji. In January 2022, Sirios signed a $1.5M investment with a strategic private investor to complete an update for the mineral resource estimates and a PEA (Doucet, 2022). The estimation resulted in an inferred resource count containing 1,955,000 oz of gold, from 93.0 Mt. A significant opportunity to expand the mineral resource is possible but requires an agreement with the neighboring property to access the site (Sirios, 2021). As of June 14^{th,} site update, construction teams are improving the camp infrastructure and the Cheechoo access road. Prospecting work will be carried out during the summer of 2022 in the east area of the 2020 conceptual pit to extend the new gold zone which had been intersected in the meta-sedimentary rocks during the summer 2021 drilling campaign. Typical samples of the Cheechoo gold mineralization will be taken for new metallurgical tests to determine the optimal treatment process for the Cheechoo deposit (Sirios, 2022).

The ***Elmer-Patwon*** project is a gold-polymetallic site (Au-Ag-Cu-Zn) fully owned by Azimut Exploration. It is located 5 km west of the BDH and 60 km east from the Eastmain Cree community. In 2020, Azimut announced a substantial drilling discovery, which it named the Patwon Zone. The highlight was a 102 m interval grading 3.12 g/t Au, including 10.1 g/t Au over 20.5 m. Several drilling programs followed, including the most recent phase currently underway with 15,000 m in 60 holes as of 2021 (Azimut, 2022).

The ***K2*** project is about 45 km northeast of the Eastmain Cree community. It is fully owned by Dios exploration and covers 82 km^2. K2 is centred on gold-silver-copper clues in felsic volcanic rocks that are spatially associated with the northwest-oriented Kali fault. K2 is adjacent to the Elmer-Patwon property, and the 2016 program returned a 64-gold analysis between 0.1 and 8.08 g/t Au with 12 samples with more than 1.0 g/t (Dios, 2022).

The ***Au33*** project is owned 100% by Dios Exploration and located 94 km north of the Nemaska Cree community. A regional gold structure (Chain Lake Break) intersects the property from east to west. The project covers 200 km^2 crossed by the Eastmain River near the EM-1 hydroelectric generating station. The last work on the property was mapping the stripping of the Heberto zone in 2014 (Dios, 2022).

The ***Wabamisk*** gold project is located about 70 kilometres south of Newmont's Eleonore gold mine and has a comparable geological context. In 2011, Azimut announced that Newmont earned 70% interest in the property by funding works programs from 2012 to 2015, included prospecting, a soil geochemistry survey, an IP survey over altered shear zones that warranted additional work, and a high-resolution helicopter-borne magnetic survey. The

latest work on the properties was to fly a heliborne SkyTEM survey in 2018 to enhance target definition by delineating high-quality conductors on the project (Azimut, 2022).

The ***Opinaca/Wildcat*** project, owned by Newmont since 2019, covers 565 claims of 294 km² located on the east side of the Éléonore mine. Both the Opinaca and Wildcat properties cover a highly prospective area and straddle the contact between the Opinaca and La Grande sub-provinces, which is the regional gold geological structure in the James Bay area. Future exploration is planned for prospecting and trenching this gold-favourable structure (Hecla, 2022).

Opinaca A, B, and D are three properties within 20 km of the Éléonore gold mine which is 100% owned by Newmont. In March 2010, Opinaca A and B were 50% owned by Azimut Exploration and 50% by Everton. The parties amended the agreement on November 14, 2014, to exclude the Opinaca A claim. Hecla has the right to acquire 50% of The Opinaca B by making cumulative cash payment of $580,000 and $6M in exploration work over 4 years in which Azimut own 25% of the property. Hecla funded the 2015 to 2018 works, and the best intersects was 0.61 g/t Au over 30.7 m in a chlorotic breccia, including two higher grade intervals of 2.38 g/t Au over 2.0 m and 3.21 g/t Au over 1.7 m. The Opinaca D property is fully owned by Azimut with an anomalies survey made without any drilling completed (Azimut, 2022).

The ***Wapatik*** property is a binding Azimut Exploration and Mont Royal Resources JV since 2020, in which the latest can earn up to 70% interest on this gold-copper project. The property area is 115 km^2 located along the Eastmain greenstone belt at 93 km east of the Eastmain airport and 58 km South-West of Eleonore (Mrr, 2023a). Three power lines cross the property, and a gold exploration program has been launched since the JV creation (Azimut, 2022).

The ***Renard*** diamond mine, operated by Stornoway, is located along Route 167 north from Chibougamau. The reserves are estimated at approximately 36 million karats. The site should be operated for at least 20 years. No processing is done in Quebec, and the raw material is shipped to international markets (Shields, 2012). Stornoway is one of the most important employers in Eeyou Istchee Baie-James with 425 workers. After a temporary shutdown in 2019, the mine ceased its activities and requested for creditor protection in October 2023 after a fall in diamond price and because of its production costs higher than the big diamond mines in the world (Larocque et Halin, 2023; Normand, 2023).

The ***Galinée*** project is a gold exploration project located in the La Grande Sub-province, which is situated about 15 kilometers north of the contact with the Opinaca Sub-province and approximately 50 kilometers to the northwest of the Reand mine. The project is a joint venture between Azimut and SOceased its QUEM, with both companies holding a 50% stake in the project. Previous exploration work in the area has been carried out between 1995 and 2017, including a number of geochemistry surveys conducted by Azimut. The results of a drilling program carried out in 2018 showed grades up to 2.17 grams per tonne of gold and identified a zone measuring 130 meters by 30 meters that is open to extensions. This suggests that there may be significant gold deposits at the Galinée project that could be further explored and developed in the future. (Soquem, 2023). Overall, the Galinée project represents an important opportunity for both Azimut and SOQUEM to explore for and potentially develop gold resources in the region. If successful, this project could contribute to the regional economic development.

The ***Serpant/Radisson*** properties cover a large area of 508 square kilometers and are located about 80 kilometers southeast of Radisson. The project is situated in an under-explored region outside of known greenstone belts, and there is a large gold-in-till anomaly covering over 8 square kilometers in the area. In 2021, Harfang Exploration conducted a drilling program at the Serpant/Radisson properties, drilling a total of 58 holes for a combined length of 10,749 meters. The results of the drilling program were promising, with some of the best intervals including 4.09

grams per tonne of gold over 8.00 meters, 4.33 grams per tonne of gold over 7.00 meters, and 1.64 grams per tonne of gold over 22.40 meters. These results suggest that there may be significant gold deposits in the area, which could be further explored and developed in the future. (Harfang, 2022).

Lake Ménarik is an underexplored property with only 17 drill holes in a small part of the 57 km^2 property. It is located 30 km southeast of the La Grande airport and 45 km south of Radisson. The mineralization is characterized by high-grade gold veins with sample results of 0.89 g/t over 68.25 m and 12.46 g/t and 25.5 g/t Ag over 3.60 m. A drilling campaign may be deployed during the winter of 2023 (Harfang, 2022).

The ***Sakami*** is Quebec Precious Metals (QPM) core asset and is located 80 km south of Radisson and 130 km west of the Wemindji Cree community with an access road from the BDH and across Sakami Lake. The company has the UL 2723 ECOLOGO certification program for responsible development for mineral exploration companies. There is a published NI-403-101 technical report for the Sakami Project from 2021 with a resource estimate planned to be published in 2022 Q3. The site exploration began in the 1950s with numerous programs executed by several major and junior exploration companies including Mines d'Or Virginia inc. In 2013, QPM started to drill in the La Pointe area and encountered significant gold intersections (QPM, 2022).

The ***Aquilon*** property comprises 140 claims over 70 km, located about 490 km east of Radisson, and easily accessible by an all-season road via the Trans-Taiga Road. In September 2021, Sirios announced a structural geology study would be conducted to examine the logistics required to carry out overburden stripping programs (Sirios, 2021).

Pontois is 100% SOQUEM-owned gold property, with an option for Azimut to regain a 50% interest. The property is located a few kilometers south of the LG-4 hydroelectric generating station and is crossed by the Trans-Taiga Road near the Mirage outfitter. The property is situated at the junction of two regional breaks, the Taiga Fault and the South Pontois Fault, both of which follow the margins of the greenstone assemblage. Currently, no historical resource has been published for the property (Azimut, 2022).

Outlook

In the near term, gold and silver demands are expected to decrease from their 2020 peak due to tighter monetary policy in Europe and the United States. However, in the long term, gold and silver remain attractive as political tensions may escalate in Europe, causing recession risks, currency devaluation, and central bank reserves. Silver will also see an increase in demand due to the growth of electric vehicles and photovoltaics and upcoming new capacity from North and South America (WB, 2022). As mining exploration investment varies greatly from year to year, stable gold and silver demand will likely favor underexplored areas like the Eeyou Istchee James Bay region. Therefore, there may be opportunities for exploration and development of gold resources in properties like Pontois, particularly if promising geological features are identified through further exploration and drilling.

10.5.3.5 Secondary Transformation

The Administration régionale Baie-James (ARJ) and the Table jamésienne de concertation minière (TJCM) recommend that plants of mineral secondary transformation for lithium, iron-titan-vanadium and rare earths are built in towns of Eeyou Istchee Baie-James. This industrial infrastructure is thought as to optimize the regional development taking advantage of the unique opportunity brought up by the mineral richness of the area. This strategic structuring development would result in the takeoff of a full region as Abitibi-Témiscamingue and Saguenay-Lac-Saint-Jean were developed (ARJ, 2020).

10.5.3.6 Mining in Nunavik, Labrador and Nunavut

The presence of a port at Whapmagoostui-Kuujjuarapik linked to a railway joining the CN network southward could induce new water-rail routing by Hudson Bay between the northern or western areas, either in Nunavik, in Nunavut, to Quebec, Ontario, or the United States. Mining production from these locations should be shipped to more southern places in North America. This section presents the operating or projected mines in these areas.

The ***Nunavik Nickel*** mine is located approximately 80 km west of Kangiqsujuaq, 140 km southeast of Salluit, 20 km south of Katinniq, and north of Pingualuit National Park. Is owned and operated by Canadian Royalties, a private mining company affiliated to the Chinese company, Jilin Jien Nickel Industry. The mine is operated at a rate of approximately 1.4 MTPA and has an expected mine life until 2025 (Kativik, 2022; Mdo, 2022). The mine concentrator has a capacity of a 1.64 MTPA with operations that started in 2013 and currently employs a thousand people from which 600 are direct employees and 400 subcontractors (CRI, 2022). The approximate mine life is 10 years as of January 2015 (Mdo, 2022).

Raglan includes four underground nickel mines operated by Glencore. The extracted ore is crushed, ground, and processed on site to produce a nickel concentrate. Every year, nearly 1.5 MT of crude ore is processed, providing an annual production of nearly 40,000T of nickel-in-concentrate and 9,000T of copper concentrate. The nickel concentrates travel 100 km by truck from the mine site to the port at Deception Bay where it is then stored in a dome until it begins its 2,600 km sea voyage to the Port of Quebec. The concentrate is then transported by train from the Port of Quebec to the Glencore smelter in Sudbury, Ontario. The product then returns to Quebec City by rail and is shipped to the Nikkelverk refinery in Norway, where the raw nickel is processed into high-quality metals to be sold around the world (Glencore, 2020). The journey from Deception Bay to Sudbury could be rerouted to Whapmagoostui-Matagami if less costly and shorter in time. The LOM ends in 2041.

Hawk Ridge is owned and operated by Nickel North Exploration. The site is a 173 km^2 area 10 km west of Aupaluk with a 50 km belt of Ni-Cu-platinum group elements (PGE). There are three major zones from north to south named Hopes, Gamma, and Pio. A Versatile Time Domain Electromagnetic (VTEM) survey showed 35 anomalous areas. There are two types of targets: a large tonnage intermediate-grade open pit and a high-grade Raglan mine type of mineralization. The resource modelling is planned to begin by the end of 2022 with future drilling program in 2023 (Nnexploration, 2022).

The ***Voisey's Bay*** nickel copper and cobalt mine, located in Labrador, is operated by Vale. The operations began in 2005 with a total production of 2.19 MTPA in nickel-cobalt-copper and copper concentrates. The mine employs 500 people of which 51% are aboriginal. Nickel concentrate is currently processed at the Long Harbour smelter facility in Newfoundland that opened in 2014 and employs 500 people. Vale also owns the copper cliff smelter in western Sudbury in Ontario (Vale, 2022).

The ***Mary River*** site is on the Baffin Island, Nunavut and began mine operations by Baffinland in 2015. In 2018, the company increased its high-grade iron ore production to 6 MTPA with access to the port able to accommodate a 3.5 MT ore stockpile. In the ice-free season from around July to October, ships travel from the port across the Atlantic Ocean to European steel makers (Baffinland, 2022).

The demand potential from these areas, based on existing activities and projects is limited to the Raglan mine.

10.5.3.7 Potential Demand for Transportation

The market segments in the base metals sector that offer potential for the development of LGA transportation infrastructure include:

- Copper ore output from Chapais area to Rouyn-Noranda (GCR, phase I);
- Lithium spodumene from several sites (BDHAR and GCR, Phase I-II);
- Iron ore output from Duncan Lake to a seaport, to China and Europe (BDHAR, Phase II);
- Nickel output from Raglan (Phase III).

10.5.4 Electricity

Electricity production contributes for a significant part to the economy of the Eeyou Istchee Baie-James region, mostly thanks to Hydro-Québec operations. Approximately half of Hydro-Québec's total electricity capacity of hydroelectric power stations are located in Eeyou Istchee Baie-James. The Robert-Bourassa Station (formerly La Grande-2 or LG-2) located near Radisson is ranked 12th amongst the world's largest hydroelectric power stations. During the winter months, when there is less water flow, hydroelectric power stations may have lower production capacity than during the spring or summer when water levels are higher. This means that peak power plants may need to be used to meet the increased electricity demand during the winter months.

It is important to note that peak power plants generally have higher operating costs than baseload power plants that run at a constant rate, and they may also have higher environmental impacts due to the need to ramp up and down production more frequently. However, in regions with seasonal variations in energy demand and production capacity, peak power plants can play an important role in meeting energy needs during periods of high demand, particularly during the winter.

10.5.4.1 La Grande Hydroelectric Complex

History

In 1971, the Gouvernement du Québec launched the La Grande Complex project, a series of hydroelectric power stations on the La Grande River in the James Bay area. It was the world's largest hydroelectric complex at that time and included the construction of a work site covering 350,000 km^2 which took 25 years to complete, from 1971 to 1996. The scope of the project meant that rivers were diverted, and lands historically occupied and used for hunting and fishing by Inuit and Cree would be flooded to create massive reservoirs. By virtue of its size, the project attracted the attention of ecologists all over the world. Construction began while the rights of the Inuit and Cree who lived in James Bay area and northern Quebec were ignored. From an environmental standpoint, the thoroughness of the impact follow-up conducted during construction made James Bay one of the most closely studied regions on the face of the earth. After long negotiations with the Gouvernement du Québec, the Cree and Inuit communities agreed in 1975 to the development of the project by signing the James Bay and Northern Quebec Agreement (JBNQA). It was the first major comprehensive land claims agreement in Canada, heralding in a new era in aboriginal land claims (AANDC, 2008).

Initially, a winter road and ice runways were used to bring in the materials required to start up the enormous work site of the La Grande Complex project. In 1971, the Route de la Baie-James, now the BDH, was built as a permanent road linking the Baie-James area to Matagami (SDBJ, 2016).

The Phase II of the La Grande Complex started in 1987 and ended in 1996. The work led to the commissioning of five generating stations: La Grande-2A, Laforge-1, La Grande-1, Brisay and Laforge-2, making La Grande the most powerful hydroelectric complex in the world. Today La Grande Complex alone provides 44% of electricity produced by Hydro-Quebec, generating 78.3 TWh per year (SEBJ, 2022).

In 2002, the GQ and the GCC signed the Paix des braves, which allowed for the construction of Eastmain-1 generating station, commissioned in 2006, and the Eastmain-1-A-Sarcelle-Rupert complex completed in 2013. Each of these infrastructures are connected to the larger La Grande Complex further north.

Capacity and Operation

HQ owns storage areas in several productions and operation sites including Némiscau, Sarcelle, LG1, LG2, LG3, LG4, and Brisay (VEI-WSP, 2022).Table 10.5-13 shows the capacity and annual production of these installations. The capacity in Eeyou Istchee Baie-James sums to 17,445 MW. The largest sites include LG2 and then LG4, LG3, LG2A, and LG1. On average those stations were operated approximately 4,888 hours per year, thus giving a total production of 85.3 TWh annually (SEBJ). The share of electricity produced in Eeyou Istchee Baie-James region is estimated at 48% of the total Hydro-Quebec production in 2021.

Table 10.5-13: Hydroelectric Power Capacity and Production, Eeyou Istchee Baie-James, 2021

Station	Capacity (MW)	Production (TWh/yr)	Commissioning Date
La Grande-2 (Robert-Bourassa)	5,616	27.4	1981
La Grande-3	2,417	11.8	1984
La Grande-4	2,779	13.6	1986
La Grande-2-A	2,106	10.3	1992
Brisay	469	2.3	1993
Laforge-1	878	4.3	1994
La Grande-1	1,436	7.0	1995
Laforge-2	319	1.6	1996
Eastmain-1	507	2.5	2006
Eastmain-1-A (Bernard-Landry)	768	3.8	2012
Sarcelle	150	0.7	2013
Total - Eeyou Istchee & Baie-James	17,445	85.3	
% of Eeyou Istchee Baie-James in Quebec	46.8%	47.7%	

Sources: Hydro-Quebec Open Data, HQ (2022a), SEBJ.

The BDH facilitates the transportation of supplies (gasoline, food, etc.) to approximately 1,600 Hydro-Québec employees, including 200 at Nemaska substation, 100 at the Eastmain powerhouse, 600 around the Transtaiga highway and 500 at Radisson (WSP, 2016). Materials, fuel, pieces, food is the commodities mostly carried to northern Hydro-Québec installations. This transport usually uses the road route from Montérégie to Rouyn-Noranda, where the commodities are transshipped and then carried by Kepa Transport (VEI-WSP, 2022).

Major Maintenance Outlook

In 2016, there were two major Hydro-Québec projects in Eeyou Istchee Baie-James: the $50M renovation of a transformer station at KP 601 of the BDH and the $20M rehabilitation of the Robert-Bourassa generating station.

(WSP, 2016). The lifetime of La Grande Complex production installations is nominally 100 years[14]. Hydro-Québec does not plan punctual major refurbishment or upgrading works at La Grande Complex. They rather renew the equipment of their installations through a regular and major maintenance program every year. The current transportation volumes and routes should therefore remain constant over the long period (VEI-WSP, 2022).

Over the next 30 years, basically all the generating stations and the related transformer stations within the La Grande complex will reach their end of life.

The renewal of installations requires oversize transport. This requirement is getting more constraining as the loads and combinations are restricted by the capacity of the CN Matagami subdivision as well as by the user cost and physical limits of the Route du Nord. Hydro-Québec is forecasting volumes for the next 15 years in order to set the route and logistics with CN, the CTM, or other actors. Transport normally includes a train segment over the longest distance possible and then transshipment on to specialized lowbed trucks (VEI-WSP, 2022). Specific information from Hydro-Quebec about future transportation demand is not publicly available, estimate was made based on infrastructure lifetime. Figure 10.5-4 presents the location of Hydro-Quebec major infrastructure and equipment in which 11 power stations and 18 transformation stations are found within the study area. Those infrastructure and equipment will reach their end of life over the next decades.

Hydroelectric equipment infrastructure (transformer stations, turbines, etc.) lasts for approximately 50 years. The majority of power stations were constructed in the 1980s to 2000s, end of life years of their equipment should be in the 2030s to 2050s respectively. The materials required for the replacement of these componants will generate transportation demand.

[14] Concrete structures are typically built and maintained to ensure a 100-year service life.

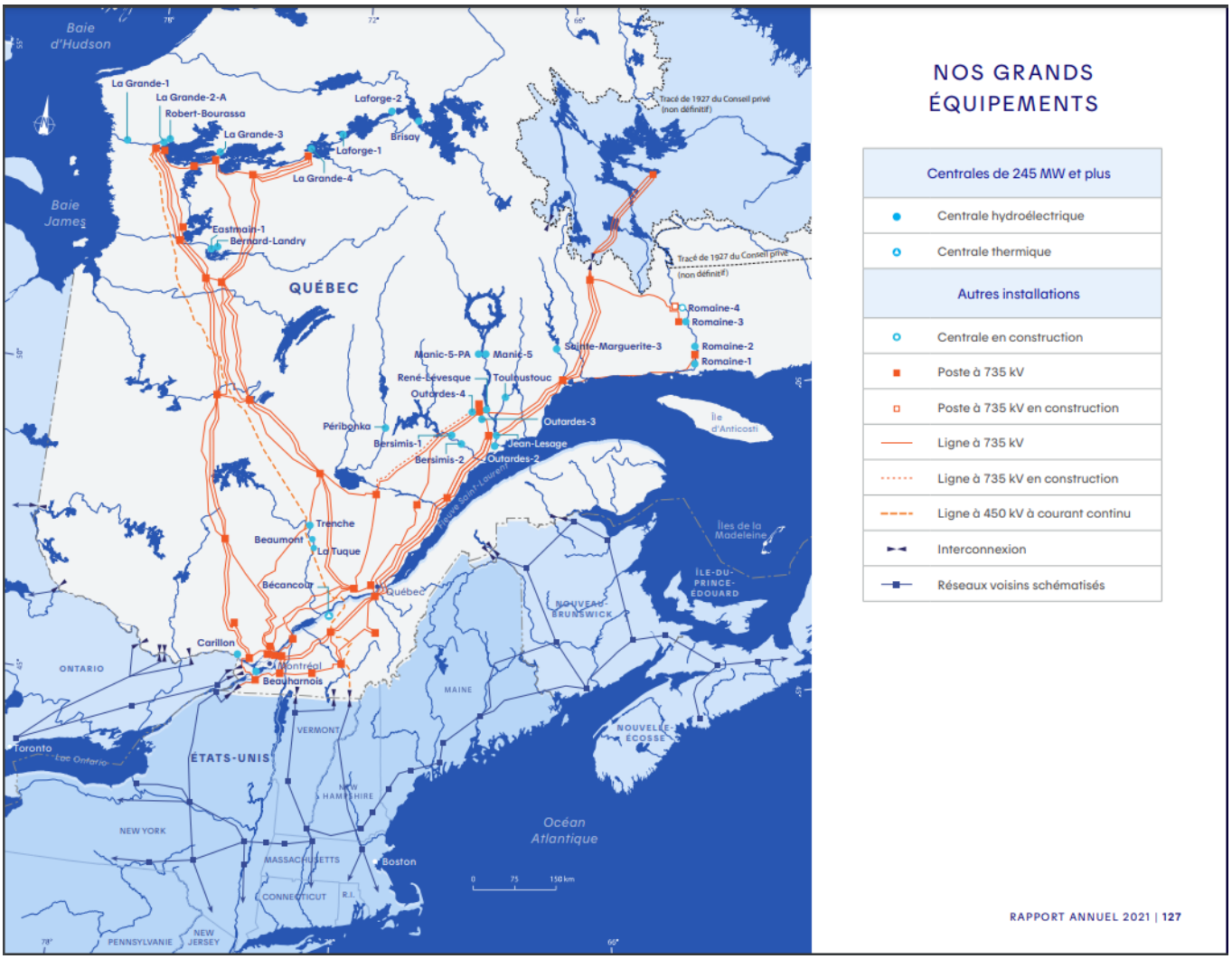


Figure 10.5-4: Hydro-Quebec Major Infrastructure and Equipment

Source: HQ (2022a).

If there are major rehabilitation works, fuel could be carried by road or rail while turbines would likely be carried by water. Hydro-Québec's demand for the transportation of equipment and materials for the rehabilitation of old infrastructure was estimated from the end-of-life years.

Phases I & II of BDHR could be interesting for Hydro-Québec, however, the issues of transshipment of goods between existing networks needs to be addressed. The annual demand for equipment for the rehabilitation of plants and goods procurement for Hydro-Québec's employees is estimated to be 9,000 TPA (VEI-WSP, 2022). Also, for the rehabilitation of plants in its Electricity Generation segment, Hydro-Québec will replace an average of two turbines per year for an estimated 600 TPA. To rehabilitate and refurbish the facilities that transmit the electricity from the plants to the substations, an average of 124 TPA of steel would be needed.

For its Electricity Transmission segment, Hydro-Québec has 18 substations of 315-kV or more in the BDH and the Trans-taiga Road areas. Those substations are built to transport electricity from the production location to substations, close to where it will be consumed. Substations can be connected through one line or more. The substations identified are the main substations in term of transmission power, all being connected to 315-kV and 735-kV lines. A 735-kV line transmits four times more electricity than a 315-kV line. A total of 26 lines of 735-kV and

eight lines of 315-kV have been identified in the study area. From the years they were put in service and the life expectancy of high-voltage electricity transmission lines, it has been determined that all the substations and lines will reach the end of their service life within the next 50 years. The substations and lines will require an average of 16,500 TPA to be rebuilt and rehabilitated, estimated from the tonnage shipped for a similar equipment which is the 735 kV Chamouchouane–Bout-de-l'Île transformation station (HQ, 2019).

As an example, Lemoyne substation is situated between the La Grande 3 and La Grande 4 plants, along the Trans-taiga Road. This substation transmits electricity to the Albanel substation to the South through two 735-kV lines and to the Chissibi substation to the West through a single 735-kV line. From the total kV transmitted and the tons of steel required per kV, the total tonnage of steel needed to rebuild the lines has been calculated. After, proportions of the steel were allocated to the intermodal yards based on the location of the substations and lines. The total tonnage of steel for the transmission segment of Hydro-Québec has been allocated over the next 50 years.

Hydro-Québec's interest in the BDHR is an indicator that shipments by rail would be the preferred option. Furthermore, Hydro-Québec mentioned its interest in the Radisson-Whapmagoostui segments (Phase II & III). The access to a new territory i.e., isolated communities in Nunavik currently powered by the "Reseau autonome" (off-grid network) could bring new opportunities for development that are not being considered due to the limits of the current infrastructure.

Transportation Issues

Hydro-Québec identified some issues regarding the transportation to their sites in Eeyou Istchee Baie-James, notably the need for:

- Upgrading the railway between Lebel-sur-Quévillon and Matagami, allowing for higher load limits;
- Upgrading the transportation corridor between Chibougamau, Némiscau and the BDH;
- Improving and paving the Trans-taiga Road (VEI-WSP, 2022).

10.5.4.2 Future Electricity Production

Demand

Hydro-Québec estimates that reducing the carbon footprint of businesses and electrifying transportation to improve the ecological balance of Quebec would require new energy equivalent to 50% of the current consumption by 2050 (Abran, 2022), or 1.6% per year on average.

Since Hydro-Québec will need to produce much more power to satisfy demand and to improve the ecological balance, they do not intend on extending the low subsidized rate (around 5 cents per kWh compared to a real cost of 11 cents) for energy-intensive projects and users (using more than 50 MW) without an assessment process (Descôteaux, 2022a ; Vailles, 2022). There are approximately 50 such projects that together require an additional electric supply of 15,000 MW or 40% of Hydro-Quebec's current capacity. These projects include green hydrogen, which is not considered as profitable, and aluminum plant upgrades. The GQ could maintain the low-price policy to enhance these projects for economic development purpose (Abran, 2022 ; Vailles, 2022).

The future hydroelectric production of Quebec will depend upon the choice or trade-off between value/decarbonization versus a volume/industrial growth strategy (Abran, 2022). In either case, the demand is set to increase dramatically.

Potential New Production Increase

As the demand for energy increases in Quebec and globally, Hydro-Québec will need to augment its electricity supply and production (Descôteaux, 2022). The production would notably be enhanced with upgraded and new hydroelectric dams. Specific projects have yet to be determined, but Hydro-Québec has committed to studying options collectively with local and First Nations communities (Descôteaux, 2022). Under the JBNQA and HQ's corporate social acceptability policy, any upgrading project or new infrastructure this needs Cree approval on upgrades and new plants (CDC, 2022). Under the 2002 Boumhounan agreement, the Nottaway-Broadback-Rupert complex project will never be built. Hydro-Québec intends to prepare the company's grid for the demand for energy and technology until 2050. One of the solutions to increase production is to upgrade the existing power stations and equipment that were built more than 50 years ago. With these more powerful stations and equipment, Hydro-Quebec predicts an increase of production by 2,000 MW [an increase of 5%] over the next few years. Another solution is to build new power stations in the long run or occur as early as 2026 according to the current 5-year plan. (HQ, 2022c).

10.5.4.3 Off-Grid System and Diesel-Powered Thermal Plants

Although hydroelectric generating stations produce most of the electricity in Québec, some remote communities are supplied by off-grid plants. Those plants provide electricity for off-grid systems, which are power generation and distribution systems that belong to Hydro-Québec, but not connected to the main grid. Off Grid generating stations are located in Nunavik, Haute-Mauricie, Basse-Côte-Nord, Caniapiscau and Magdalen Islands. These stations are all diesel-powered thermal, except Lac-Robertson and Menihek, which operate small-scale hydroelectric power stations. The diesel-powered thermal stations bring high costs for importing fuel as well as constant pollution to fragile ecosystems.

In the study area, the only off-grid generating station serves Whapmagoostui and Kuujjuarapik. In 2011, Whapmagoostui initiated the Whapmagoostui Kuujjuarapik Hybrid Power Plant Project (WKHPPP) to develop clean alternatives to diesel fuel for electricity generation in the dual Whapmagoostui-Kuujjuarapik communities, The installed capacity of 3 MW shall be powered by three wind turbines. The construction was planned to start by 2021, and the operation was targeted by the end of 2022. Due to the pandemic, the construction start date has been pushed back and is as of yet undetermined (KWREC, 2022).

10.5.5 Construction

10.5.5.1 Regional Industry

Since the JBNQA signature, Cree entrepreneurs and workers have developed their skills in the civil engineering and roadwork, building. Over the years, there has been a rise in the creation of Cree construction companies, some owned directly or indirectly by band councils, and some privately owned.

Table 10.5-14: Eeyou Istchee Baie-James Construction Companies

Company	Location	Services	Main Projects	# of Employees
Blais & Langlois	Matagami, Lebel-sur-Quévillon	Crushing, construction of forest and haul roads, general contractor, equipment rental, gravel and mineral transport, and energy.	Hydro-Québec hydroélectric infrastructure, Routes du transport de vrac, SDBJ, Goldcorp, MTMD, Hydro-Québec.	10
Équipements JVC	Chibougamau	Transportation of oil products, machinery, and construction materials.		.
Entreprises Alain Maltais / Washeyaabin	Chibougamau	Forestry, civil and mining works, heavy equipment rental, transportation of oil products, machinery, and construction materials	Aerodrome, Mont Otish.	50
Massenor	Val-d'Or / Wemindji	Residential and institutional construction		.
Vieux-Comptoir (Tawich)	Wemindji	Provide employment and residential construction	Eastmain 1A Complex.	200
Wemindji Paving	Wemindji	Road and municipal infrastructure		.
Cree Construction and Development Company (CCDC)	Chisasibi (1)	Construction project management, civil engineering, residential, commercial, institutional, and industrial construction, building renovation and maintenance	Chisasibi School, Waskaganish airport, a wastewater treatment facility in Eastmain, a telecommunications centre in Chisasibi.	350 – 850
Chee-Bee	Chisasibi			.
Miheku Construction	Val-d'Or			
FCNQ Construction	Baie-d'Urfé (1)	Institutional, commercial, industrial, residential, and civil projects.	Raglan Mine ; Ambulance Entrance, Kuujjuaq ; MTMD Maintenance Garage, Puvirnituq Airport.	

Note 1. Head Office.

The ***Cree Construction and Development Company*** (CCDC), founded in 1976, is a subsidiary of CREECO based in Chisasibi that delivers construction projects in Eeyou Istchee Baie-James (CREECO, 2022). The services provided by the CCDC include civil works infrastructure, building works (commercial, residential, industrial, and institutional), construction management, the decontamination and rehabilitation of contaminated sites, construction management, airport services, road maintenance and snow removal and crushing material aggregates. Since 2014, the CCDC has been involved in projects costing $180M, with $100M reinvested into First Nations communities. It is owned by the James Bay Cree (via CREECO), employs 350 to 850 employees at the peak season. One of its main clients includes Hydro-Québec.

10.5.5.2 Human Resources

To comply with the provision of Section 28 of the JBNQA, which aims at ensuring employment for Cree in project activities, the *Regulation Respecting the Hiring and Mobility of Employees in the Construction Industry* (ANQ, 2022, R. 20, r. 6.1) stipulates under section 36 that preference in hiring must be given to the Indigenous people of James Bay, to those north of this territory and those in other Indigenous territories.

The Quebec construction industry is an important avenue for Indigenous peoples to integrate into the regional economy, with the apprenticeship being a primary means of doing so. In recent years, there has been progress in increasing the competency certificate among the Indigenous workforce, and specific administrative measures have been put in place by the Commission de la construction du Québec to promote their integration. As such the proportion of the Indigenous workforce in the Quebec construction industry had a competency certificate has increased from 78% in 2015 to 85% in 2021. The specific administrative measures of the Commission de la construction du Québec (CCQ) to promote the integration of Indigenous people mean that they hold exemptions in a proportion of 10%, i.e. a little more than twice as often as non-Indigenous people. The competency certificate exemptions offered by the CCQ include: people holding a certificate from Ontario, Newfoundland-and-Labrador or New Brunswick ; persons admitted to a trade apprenticeship program deemed equivalent to that of Québec ; essential workers of particular construction jobs ; employer's children to ensure the succession of business ; labour shortage ; persons who performed a minimum of 300 hours related to the targeted trade, during the 12 months before a new liability (CCQ, 2021-2022).

Among Indigenous people in Quebec, the apprentices are concentrated at 68% in the following 4 trades: carpenter joiner, electricians, iron workers and heavy equipment operators. In 2021, an Indigenous worker worked an average of 771 hours, or 75% of the total hours worked by non-Indigenous people (CCQ, 2021-2022). Since Indigenous people are mainly concentrated in the rural and northern regions of Quebec, their presence in construction has so far depended on major civil engineering and road work sites and less in institutional and commercial sectors. In 2021, 36% of Indigenous workers were in the civil engineering and roads sector, compared to 19% of non-Indigenous workers working in that sector, as shown in Table 10.5-15.

Table 10.5-15: Share of Employees, Indigenous and Non-Indigenous, Quebec, 2021

Sector	Indigenous	Non-Indigenous
Civil Engineering and Roads	36%	19%
Industrial	8%	6%
Institutional and Commercial	34%	54%
Residential	22%	22%

Source: CCQ (2021-2022).

Indigenous people are mainly found working in large companies. The Innu (Montagnais), with 241 workers, and the Cree (195 workers) provide the largest in the construction industry. Only 38 Inuit are construction workers, after a peak of 92 in 2017 (CCQ, 2021-2022)[15]. Between 2005 and 2011, Cree employment in construction was high due to the construction of the Eastmain-1-A–Sarcelle–Rupert complex, and of the Eastmain-1 hydroelectric project. In 2008, Cree employment in construction attained a peak with 433 Cree jobs, or 13% of employees in the construction sector (CCQ, 2008).

10.5.5.3 Construction Projects

For the current period, major construction activity in Eeyou Istchee consists of institutional projects including schools and elderly housing, as listed in Table 10.5-16. These projects are located especially in Chisasibi, the largest Cree community. With the growth in population and the ageing, such projects should occur over the long period in the various Cree communities. Moreover, the demand for housing in Cree communities in Eeyou Istchee is

[15] The share of non-identified nation among the Indigenous workers in construction in Quebec is large (591 workers or 43.1%).

estimated at 5,250 new units over the next 15 years, or the construction of 350 housing units per year on average (Jolicoeur, 2022b). All Cree communities currently face a housing backlog for their members and, as a result, suffer from chronic overpopulation in existing homes.

Table 10.5-16: Major Construction Projects, Eeyou Istchee Baie-James, 2022

Sector	Location	Owner	Description	Value ($M)	Period
Institutional	Chisasibi	CSB	Elementary school	69	2021-2022
Institutional	Chisasibi	CSB	High school	140	2021-2023
Institutional	Chisasibi	MSSS	Maison des aînés	47	2022-2024
Institutional	Waswanipi	MSSS	Maison des aînés	42	2022-2024

Source: CCQ (2022).

10.5.6 Goods Procurement

10.5.6.1 Demand

The *East Side of Lake Winnipeg Large Area Transportation Network Study* estimated the average annual long-distance freight demands to be approximately 4.5 TPA per capita for this area that includes remote and aboriginal communities (ESRA, 2021).

10.5.6.2 Regional General Freight

ADC, a subsidiary of Creeco based in Oujé-Bougoumou and Laval, employs 400 people. The company has developed relationships through a joint venture model. The company offers food service and catering management, remote camp management and logistics support, temporary housing, facilities, infrastructure, security, health and safety services, maintenance services, custodial services and cleaning products, retail food, and fast-moving consumer goods such as grocery and convenience store supplies (Creeco, 2022). Its market includes mining construction projects, including Nemaska Lithium, Osisko and Troilus mining permanent camps, and local community and retail projects. The company employs 20 to 70 employees. Its capacity and scope to provide support services directly benefit the communities. They hire as many local Cree workers as possible, making agreements with most Cree communities. ADC also develops strategic partnerships for others required services or turnkey solutions.

The ***Fédération des coopératives du Nouveau-Quebec*** (FCNQ) offers a bundle of services for the 14 Inuit communities of Nunavik, including Kuujjuarapik. This latter co-op serves both the Inuit community and the Cree community of Whapmagoostui. These services include retail sales, construction materials, petroleum product distribution, hotel services industry, real estate, cable television/Internet, adventure tourism (Inuit Adventures), a restaurant and conference centre, (FCNQ, 2022), as well as banking services, training, Inuit art marketing, a travel agency, hunting and fishing camps, and construction. The FCNQ supplies and transports approximately 300 TPA of food products (WSP, 2021a).

Kepa Transport is a Cree-owned trucking company supplying the James Bay Cree communities that also operates in Ontario and Western Canada (Tawich, 2021). Since 1987, the company has transported all types of consumer goods and equipment from larger urban areas to northern villages. Kepa Transport offers general cargo and refrigerated transportation among other types of transportation as well as logistics and warehousing services. The company has 100 employees. Its corporate clients include the Wemindji Community Store, the Chisasibi Co-op, the Cree Nation of Chisasibi, Hydro-Québec, and Tawich Development Corporation (Kepa, 2021).

Deshaies, based in Amos, is a food wholesaler that owns 3 warehouses totalling a floor area of 20,000 m^2. The company distributes its products in Hautes-Laurentides, Abitibi-Témiscamingue, Northern Ontario, Eeyou Istchee James Bay, Nuvavik, and Nunavut. All means of transportation are used including truck, plane, ship and rail (Deshaies, 2023).

Stakeholders mentioned that adequate storage and proper manipulation of goods at distribution centres are required.

10.5.6.3 Gas Products

Petronor is a Cree-owned gas transportation company supplying Northern Quebec communities mainly by road and partly by train. The company also operates in Abitibi-Témiscamingue. Petronor distributes petroleum products and equipment to residential, commercial, and industrial clients. The company employs 70 people and has a fleet of 30 trucks (Petronor, 2021).

Transport Jacques Auger is a road transportation company operating in the gas industry. The company supplies petroleum products in Quebec, including Northern Quebec and James Bay regions, as well as in Ontario, Newfoundland, and Labrador. It employs 220 people and has a fleet of approximately 120 trucks. Transport Jacques Auger delivers more than 400 shipments annually to Cree communities and companies in Eeyou Istchee Baie-James.

10.5.7 Tourism

10.5.7.1 Attractions

As any region, Eeyou Istchee Baie-James has attractions that are mostly used by external clientele and attractions that are visited by the local or regional population. The most notable include the Aanischaaukamikw Cree Cultural Institute at Oujé-Bougoumou and the LG1 and LG2 hydroelectric infrastructure in Chisasibi and Radisson, respectively (QMI, 2022b).

There are several attractions in communities, including:

- Chisasibi: Cree history of “People of the Grande Rivière”, Fort George Island the former community, Mihtuhkaan and Miichiwaahp elder’s camp with ancestral teachings and traditional activities, Upichiwin-Heritage / First Rapids site, Chisasibi’s Cultural and Heritage Center, Long Point Adventures with a Cree family’s trap line;
- Wemindji: Canoe or kayaking adventures, Wiinipaakw adventure tours;
- Waskaganish: the first Hudson’s Bay Post in Canada, traditional fishing practices at the Smokey Hill rapids, Tim Whiskeychan’s Art Studio, Wiinipaakw adventure Tours, the First Creetopia site;
- Nemaska: the Old Nemaska Post Gathering, Cree Nation Fitness Challenge, Fishing Derby;
- Mistissini: Regional Fitness Challenge, Fishing Derby, Mistissini Cross-Country Challenge;
- Oujé-Bougoumou: Aanischaaukamikw Cree Cultural Institute, Aanischaaukamikw Cree Cultural Institute arts and crafts boutique and bookstore, Nuuchimii Wiinuu Cree cultural ecotourism camp, the “Walking Out Ceremony”, Guided Tours, Maamuitaau music festival, Fishing Derby; and
- Waswanipi: Cultural Village with traditional activities and cuisine, Waswanipi History Day, Chiwehtau Gathering, Fishing Derby.

Jamesian tourist attractions include Hélicoptères Canadiens in Radisson, the LG-2 and LG-1 hydroelectric plants, Motourisme Mythical Route on the BDH and Transtaiga road, Planétarium Quasar in Chibougamau, Chibougamau Aventure, outfitting (e.g., Mirage, Lac Hébert), the Nibiischii fauna reserve (e.g., Assinica, Lacs Albanel-Mistassini-

et-Waconichi), and the historic track in Radisson. The tourism information office is located on the BDH near Matagami. Several rest areas provide services along the BDH, notably at Broadback River and Rupert River.

More local and regional attractions include snowmobile and ATV rallies in Chibougamau-Chapais (e.g., Super rally Minounes, Défi polaire, Folifrets, and CVM), winter festivals (e.g., Folifrets in Chibougamau and Carnaval in Beaucanton), cultural events (e.g., Débâcle musicale, Salon des arts en Nord, and Festival en août in Chibougamau), summer sports festivals (e.g., Festival du doré in Chapais, Circuit SXQC Motocross in Chibougamau, and Festival nautique in Lebel-sur-Quévillon), swimming (e.g., Matagami Beach, one of the biggest in Eeyou Istchee 37 km away from the city), golf courses (e.g., Lebel-sur-Quévillon and Chibougamau), biking, camping, sport fishing, hiking, cross-country skiing and snow showing, hunting, skiing in Chibougamau, and snowmobile trails. Some activities address regional and external demand, for example, interpretation or contact with the wildlife on the territory (e.g., FauENord, Réseau d'observation de la biodiversité, and Écogîtes du lac).

Eeyou Istchee Baie-James has 3 sports fishing zones, 8 outfitters and 2 wildlife reserves (EIBJ,2022).

10.5.7.2 Tourist Services

There are usually one or two accommodating facilities in each community. Matagami has only the Hôtel Caribou after The Quality Inn & Suites Val-d'Or, a subsidiary of Creeco opened in 2011, offers 82 rooms and suites.

The FCNQ offers hotel services, adventure tourism (e.g., Inuit Adventures), restaurant and conference centres (FCNQ, 2022), as well as Inuit art marketing, a travel agency, and hunting and fishing camps in some Inuit communities (WSP, 2021a).

10.5.7.3 Attendance

Before the COVID-19 pandemic, the annual number of overnight stays was approximately 80,000. Visitors predominantly originate from Quebec (TBJ, 2021). The high tourist seasons are summer and winter. The rehabilitation of the BDH had a positive impact on the number of visitors in the region, according to Tourisme Baie-James (VEI-WSP, 2022).

The Parc Assinica is expected to attract 5,000 visitors per year (Intervia, 2019). The Opemiska Lake walleye catching festival near Chapais attracts 800 persons daily and 1,000 fishermen through the 10 days of activities (FDBJ, 2022).

10.5.7.4 Development

There are several tourism projects promoted by the COTA and TBJ, the tourist regional associations. A feasibility study is currently underway, in partnership with Tourisme Eeyou Istchee and the Cree Outfitters and Tourism Association, to assess the potential for creating a UNESCO Global Geopark in the region. The location of the geopark will be selected for its geological significance and will include a central pavilion and at least 20 nearby sites that showcase the history and geomorphological features of the territory. Additional sites will be connected to the geopark by georoutes to highlight the geology of the entire region.

These projects include BDH tourism track, path development, an industrial tour, ecotourism and mycotourism, electric snowmobiles, unusual accommodations, outfitting development, Nordic flavours, river descents, landscape valorization, and historic tracks. Many of these projects occur across the territory. Proper maintenance and upgrading of rest areas along the BDH would improve the tourism travel experience in the region.

The factors favouring tourism attendance and development in Eeyou Istchee Baie-James includes the upgrading of transportation facilities, the collaboration between Cree and Jamesian on major tourism projects, the free access to lands, the growing interest for tourism development by local and regional decision-makers, a desire for balance between residents, tourists, and the environment, and financial aid to tourism projects. On the other hand, the regional tourism industry faces several issues such as high transport and accessibility costs, safety and mobility issues on the territory, land use conflicts, lack of awareness and misconceptions, lack of labour, difficulty in competing with wages in the mining and forest industries, high financial risk due to remoteness, deficient telecommunication network, issues with electric car mobility and recharging, and difficulties in the supply of goods.

An adequate sustainable development plan for the territory is required to ensure the perpetuation of tourism activity, notably for outfitting activities (Caron, 2022).

Besides the aforementioned challenges, it is essential to take into account the issue of community access roads. Considering that the communities are the primary cultural attraction for tourists, the fact that they are separated from the market by around 70 km of gravel roads (not to mention RDN) represents a significant impediment to development. Therefore, the improvement of community access roads is paramount to boost tourism in the region. Furthermore, the implementation of transportation projects outlined in LGA could have a positive impact on tourism in Eeyou Istchee, particularly by enhancing the accessibility to Whapmagoostui, creating interlinked transportation routes, and appealing to European clients by promoting train travel.

10.5.8 Summary

The mining, electricity and forestry sectors are the most important parts of Northern Quebec's economy, creating jobs and economic opportunities for both the Cree and Non-Cree living in the study area. The area is rich in mineral deposits of different substances including Lithium spodumene, iron-ore, copper, and precious metals. Several sites are currently at the project appraisal phase, meaning that the demand for transportation from the mining sector is expected to be significant in the future, in particular in the critical and strategic metals driven mostly by lithium. Hydro-Quebec's power stations and infrastructure are reaching either their useful mid-life or end-of-life, and their demand for the transportation of equipment and materials for rehabilitation works will be higher in the next decades than their current demand.

The forestry sector is an export-oriented manufacturing industry, with many companies located south of the study area. Forest exploitation activities are expected to remain low due to numerous factors such as long distances, harsh climate, young forests, and the mandated cut allowances.

The demand for construction workers, equipment, and materials in Northern Quebec are largely dependent on the mining and electricity sectors. The construction sector has a strong link to the demand from these sectors. The Cree Nation has a proven record in the construction sector, particularly in civil engineering, roads, and buildings, through the CCDC's and other contractor's capabilities. While housing development is essential for communities, it is relatively small compared to the regional economy. Access roads are a significant barrier to integrating the local housing economy with regional projects and development.

To address this issue, a comprehensive approach is needed that takes into account the interdependence of different sectors and ensures the equitable distribution of economic benefits. A possible solution is the establishment of a regional economic development plan that coordinates the activities of various sectors and ensures equitable distribution of economic benefits. This plan can be developed in consultation with the Cree Nation and other stakeholders and can include measures such as investment in infrastructure, training and education programs, and support for local businesses. As the study area is large and communities remain far apart and poorly served by the existing network, there are still a limited number of companies providing goods procurement for the communities. Most are owned by Crees. For example, ADC provides food services and logistics, Kepa Transport provides transportation services of goods, equipment, and materials, and Petronor transports petroleum products. Good procurement for the communities of Whapmagoostui and Kuujjuarapik is coordinated by FCNQ.

There are many tourism attractions in the study area. The most well-known are Hydro-Quebec's LG-1 and LG-2 power stations near Chisasibi and Radisson, respectively. Cree culture is unique, and each community has its own traditional activities. Although interest in Cree culture and attractions is growing amongst the non-Cree population, the inadequate transportation infrastructure in Northern Quebec has thus far limited the development of tourism in the region.

10.6 TRAFFIC AND REVENUE FORECASTS

10.6.1 Methodology

This chapter treats the traffic and revenue forecasts for both passenger and freight movements for the different infrastructures under study, over a 57-year period (2023-2080).

The first forecast considers the status quo, which is the potential future situation if the current transportation network is maintained. The projected population is based on 2016-2041 ISQ demographic projections for the community, extrapolated for the 2046-2080 period. Road traffic forecasts have been projected by extrapolating the local population trips from population projections and factoring in business and tourism trips accordingly to economic projections. For traffic forecasting, three growth level scenarios have been defined: pessimistic, realistic, and optimistic.

The future freight demand forecast was established based on compiled stakeholder survey data, which included information on volumes, origin-destination routes, planned projects, and stakeholder interest in LGA infrastructure components. In some sub-sectors, the data were adjusted according to population forecasts. In the mining sector, the origin is the mine site, while the final destination is either specified in the feasibility study, available documentation, or given by the respondent during the survey. For specific commodities such as zinc in Salaberry-de-Valleyfield, copper in Rouyn-Noranda, or lithium in the Bécancour area, the final destination is a smelter location. In the case of Moblan, the final destination is the Abitibi strategic mineral complex.

10.6.2 Definition of Scenarios

10.6.2.1 Status Quo

The status quo situation over the analysis period is foreseen including the following assumptions:

- The population will follow historic trends projected by ISQ Scenario A and extrapolated after 2046 for Cree and Jamesian communities from the most relevant period for each community.
- Local public administration employment will remain constant while local public service and retail employment varies at the same rate as the population growth.
- The forestry industry will remain at the same level of production in Eeyou Istchee Baie-James, continuing with the same markets while the movements between Abitibi and Lac-Saint-Jean stay marginal.
- The mines currently under the operation will continue their activities until their planned end of life, while the mining projects that have been significantly assessed, underway for financing and served by the existing transportation network, notably BlackRock, Moblan, Wabouchi, Rose and James Bay Lithium.
- Electricity maintenance, rehabilitation and procurement shall be as given by Hydro-Québec.
- Tourism will develop according to the guidelines given by the COTA and TBJ.

In all cases, the existing production sites have been assumed to remain over the entire forecast period, notwithstanding any potential economic slowdowns or financial, environmental and societal changes. More

specifically, the Horne copper foundry is assumed to remain in operation as the destination for copper concentrate[16].

10.6.2.2 Assumptions

Table 10.6-1 presents the main assumptions and estimation rules that have been applied for each scenario.

Table 10.6-1: Population, Economic and Traffic Forecast Assumptions

		With LGA Infrastructure Program		
Item/ Scenario	**Status Quo**	**Pessimistic**	**Realistic**	**Optimistic**
Base Population	ISQ A (Reference)	ISQ A (Reference)	ISQ A (Reference)	ISQ A (Reference)
Workers	Same as current	Same as current	Same as current	Same as current
Forestry	Constant	Constant, interest displayed in survey	Constant, interest displayed in survey	Constant, interest displayed in survey
Mining	Short-term projects are realized	Short-term projects are realized, such as stated during the survey	Short-term projects are realized (surveyed and documented), medium-long term partially assessed projects are probabilistically realized	Short-term projects are realized (surveyed and documented), medium-long term partially assessed projects are fully realized
Electricity	As given by Hydro-Québec	As given by Hydro-Québec	As given by Hydro-Québec	As given by Hydro-Québec
Consumption Goods Procurement	Proportional to population	Proportional to population	Proportional to population	Proportional to population
Tourism	Short-term growth trend maintained and then constant	Short term growth trend enforced and then constant	Short term growth trend enforced and then moderate growth	Short term growth trend enforced and then high growth

10.6.3 Population Forecasts

As described earlier in section 4.2, the total population of the study area is estimated to be around 33,000 inhabitants (ISQ 2021), with 59% being Cree and 41% being Jamesians. Although the Cree and Jamesian populations increased from 2001 to 2021 at a rate of 1.9% and 1.1% per year, respectively, ISQ predicts that the Cree population will continue to grow at a rate of 1.2% between 2021 and 2041, while the Jamesian population will decrease slightly at a rate of 0.5%.

ISQ forecasts are limited to a 20-year horizon. The forecasts in this study were estimated over a 60-year period through linear regression of the transition rate calculated based on a five-year estimate from ISQ from 2021 to 2041. The extended forecasts, summarized in Table 10.6-2, show an annual increase of 0.5% in the Cree population and a slight annual decrease (-0.23%) in the Jamesian population. The net effect would be an increase of approximately 38,000 inhabitants by 2081 (a CAGR of 0.2%).

[16] This would be despite current public discussion on whether to close the plant in the short term due to the emissions of arsenic and pollutants harmful to human health while emission-reducing technologies could be implemented in the medium term (Bourque, 2022 ; QMI, 2022a).

Table 10.6-2: Demographic forecasts, communities of Eeyou Istchee Baie-James, 2021-2081

Community	2021	2031	2041	2051	2061	2071	2081	2001-21	2021-41	2041-81
Waswanipi	1 827	1 990	2 173	2 413	2 610	2 807	3 004	1,7%	0,9%	0,8%
Oujé-Bougoumou	814	936	1 061	1 184	1 307	1 429	1 551	1,8%	1,3%	1,0%
Mistissini	3 858	4 338	4 677	5 300	5 803	6 307	6 810	1,9%	1,0%	0,9%
Waskaganish	2 349	2 542	2 772	3 057	3 303	3 548	3 794	1,5%	0,8%	0,8%
Nemaska	843	989	1 128	1 260	1 396	1 532	1 668	1,9%	1,5%	1,0%
Eastmain	972	1 199	1 378	1 575	1 772	1 969	2 166	2,2%	1,8%	1,1%
Wemindji	1 557	1 708	1 806	2 030	2 200	2 371	2 541	1,7%	0,7%	0,9%
Chisasibi	5 356	6 335	7 143	8 087	8 989	9 890	10 791	2,1%	1,4%	1,0%
Whapmagoostui	1 088	1 303	1 494	1 660	1 845	2 029	2 214	1,6%	1,6%	1,0%
Cris	18 664	21 340	23 632	26 566	29 224	31 882	34 541	1,9%	1,2%	1,0%
Lebel-sur-Quévillon	2 073	1 911	1 780	1 638	1 495	1 351	1 207	-2,3%	-0,8%	-1,0%
Matagami	1 375	1 305	1 264	1 204	1 148	1 093	1 037	-1,8%	-0,4%	-0,5%
Chapais	1 540	1 445	1 394	1 311	1 234	1 157	1 080	-0,8%	-0,5%	-0,6%
Chibougamau	7 361	7 029	6 789	6 470	6 173	5 875	5 578	-0,5%	-0,4%	-0,5%
Eeyou Istchee Baie-James (RG)	1 028	887	805	805	805	805	805	-1,7%	-1,2%	0,0%
Jamésiens	13 377	12 577	12 032	11 428	10 854	10 280	9 707	-1,1%	-0,5%	-0,5%
Eeyou Istchee Baie-James	32 041	33 917	35 664	37 994	40 078	42 163	44 247	0,4%	0,5%	0,5%
Kuujjuarapik	762	825	864	971	1 051	1 131	1 211	1,5%	0,6%	0,8%

Source: 2021-2041 ISQ (2020), 2051-2081 estimated forecast.

It should be noted that there are significant methodological limitations to demographic projections. Firstly, the size of the population varies considerably from one community to another within the same subgroup, which can influence the spatial distribution of transport movements, both for passengers and for the supply of goods. In this sense, the use of an average growth rate could allow for more reliable long-term forecasts.

For example, based on past trends, the Cree communities of Waskaganish, Nemaska, and Oujé-Bougoumou are expected to experience strong population growth, while those of Wemindji, Mistissini, and Eastmain are expected to remain relatively stable. Moreover, the decrease in the population of Lebel-sur-Quévillon resulting from the closure of the Domtar plant is reflected in ISQ's demographic projections with a more significant reduction than for other Jamesian communities such as Matagami, Chapais, or Chibougamau. The recent closure of the Matagami mine could lead to a more significant decline in the population of this community in the short term.

10.6.4 Road Traffic

The traffic on the different roads in Eeyou Istchee Baie-James shall depend upon the future economic development, the journey habits of the inhabitants of the region, the adequacy of the possible overall logistics transportation routes and the management of the road network in the region.

Mining projects should generate the greatest traffic on regional roads. The generation and allocation of trucking movements have been studied. The Moblan lithium spodumene mine project was analysed by COMEX (2019b) and Intervia (2019) when it was promoted by Guo AO before its sale to Sayona. Other traffic studies are included in WSP

(2017), COMEX (2018) and CIAA (2019) for Rose and James Bay projects. Truck traffic generated by Cree communities shall increase significantly due to the combination of increases in both population and car ownership rate. Tourism journeys should increase but remain marginal in the overall road traffic. For example, the Parc Assinica project should attract 5,000 visitors per year (Intervia, 2019), or the equivalent of the adding of 9 VPD with a car occupancy rate of 1.5 persons per vehicle.

The traffic volumes, especially trucking, should increase significantly on the BDH, R1005, R113 and the Route du Nord, as shown in Table 10.6-3, approximately 180 trucks per day would be added on the BDH, 100 on the Route du Nord west, 90 on R113, 50 on the Route du Nord east and on R1005. The road traffic on access roads should increase by 20% between 2021 and 2031 although remain at low levels.

Table 10.6-3: Road Annual Average Daily Traffic, Status Quo, 2031

Road and Location	KP	AADT	% trucks	Cars	Trucks
BDH Matagami – Route du Nord	0-238	697	46%	374	323
R1005 Lebel-sur-Quévillon - Matagami	44-106	620	40%	367	253
R113 Lebel-sur-Quévillon - Miquelon	124-190	718	25%	529	189
R113 Desmaraisville – Waswanipi	194-242	784	23%	589	195
R113 Waswanipi - Chapais	244-334	1 300	18%	1 047	252
R113 Chapais – Faribault CN Crossing	338-366	2 599	18%	2 154	445
R167 R113 – Chibougamau	220-230	4 543	11%	4 041	502
R167 Chibougamau – Route du Nord	238-252	1 372	15%	1 172	200
R167 Route du Nord – Mistissini Access Road	254-304	906	12%	799	107
R167 Mistissini Access Road – Route de la Mine-Renard	304-410	70	50%	35	35
Rte du Nord R167 – Lake Châtillon	10-107	337	26%	220	117
Rte du Nord Lake Châtillon – end of MTMD Road	110-258	293	26%	217	76
Rte du Nord Nemaska - BDH	258-406	323	41%	192	131
Waskaganish Road		111	11%	99	12
Nemaska Road		50	22%	39	11
Eastmain Road		57	20%	46	11
Wemindji Road		79	15%	67	12
Mistissini Road R167 - Mistissini Beach	0-4	1 466	3%	1 425	41

The development of infrastructure for LGA phase I should minimize the road traffic generated by new mining activities, as described in Table 10.6-4, since much of this volume would be transferred to the railway. It is to be noted that most of the trucking removed from the BDH consists of heavy trucks of the forestry and mining sectors. Similar results would apply to phase II, as the basic demand for phase II is similar to that of phase I. The potential for the Duncan Lake iron ore project would generate huge traffic that would require a major transportation solution, far beyond the use of the BDH.

Table 10.6-4: Road Annual Average Daily Traffic, La Grande Alliance Phase I, 2031

Road and Location	KP	AADT	% trucks	Cars	Trucks
BDH Matagami – Route du Nord	0-238	495	36%	319	176
R1005 Lebel-sur-Quévillon - Matagami	44-106	589	38%	367	222
R113 Lebel-sur-Quévillon - Miquelon	124-190	633	16%	529	104
R113 Desmaraisville – Waswanipi	194-242	699	16%	589	110
R113 Waswanipi - Chapais	244-334	1,215	14%	1,047	167
R113 Chapais – Faribault CN Crossing	338-366	2,562	16%	2,154	408
R167 R113 – Chibougamau	220-230	4,504	10%	4,041	463
R167 Chibougamau – Route du Nord	238-252	1,341	13%	1,172	169
R167 Route du Nord – Mistissini Access Road	254-304	906	12%	799	107
R167 Mistissini Access Road – Route de la Mine-Renard	304-410	70	50%	35	35
Rte du Nord R167 – Lake Châtillon	10-107	392	30%	275	117
Rte du Nord Lake Châtillon – end of MTMD Road	110-258	353	21%	277	76
Rte du Nord Nemaska - BDH		383	34%	252	131
Waskaganish Road		111	11%	99	12
Nemaska Road		50	22%	39	11
Eastmain Road		57	20%	46	11
Wemindji Road		79	15%	67	12
Mistissini Road R167 - Mistissini Beach	0-4	1,466	3%	1,425	41

10.6.5 Rail Passengers

10.6.5.1 Rail Passenger Similar Cases

There are several remote passenger train services offered throughout Canada. Such routes include the following: Schefferville-Sept-Îles service in the North Shore region of Quebec; VIA Rail Winnipeg - Churchill line in Northern Manitoba ; Polar Bear Express service between Cochrane - Moosonee in Northern Ontario ; and the previous Vancouver Island Rail Service which ceased its operations in 2011.

The main features for these services are shown in Table 10.6-5. As a basis of comparison, the fare per km on VIA Montreal-Senneterre route is estimated at $0.15/km (VIA, 2019).

These services are critical to the communities that live along the train line. There are no roads leading to each of these locations, and the train is the only means of affordable transportation for most of their populations. Most of the communities along the rail line do not have airports, and those that do, offer only expensive options. For example, a round-trip flight between Winnipeg and Churchill costs on average $1,400. Many of these routes are also tourist attractions for local and international tourists, especially in the summer and fall seasons, to watch polar bears and beluga whales.

Table 10.6-5: Train Passenger Fares, Train Passenger Service in Remote Locations

Route	Departures per week	Trip Duration (hrs)	Length (km)	Average Speed (kph)	Fare 1 Way	Fare per km
Sept-Îles - Schefferville	2	12	579	50	$114 (1)	$0.20
					$174 (2)	$0.30
Cochrane - Moosonee	4	5	300	60	$70	$0.23
Winnipeg - Churchill	2	45	1,697	38	$ 219	$0.13

Note : (1) aboriginal ; (2) non-aboriginal.

Source: Compilation and calculation from Tshiuetin (2022), Ontario Northland (2022), VIA Rail (2022).

Tshiuetin Rail Transportation (TRT) is the first Indigenous owned and operated railway in North America. In 2005, the Quebec North Shore and Labrador Railway (QNSL) had plans to abandon the northern section of its track from Emeril Junction to Schefferville. Instead, several Innu and Naskapi Indigenous communities formed Tshiuetin Rail and bought the 217 km segment for $1. Since the sale, Tshiuetin Rail Transportation has offered a train service twice a week between Sept-Îles and Schefferville. The trip has 39 stops, most of which occur in the first 225 kilometres. Approximately 850 inhabitants populate Schefferville, and the train provides the only access to the rest of the country for these communities. In 2021, the Canada Infrastructure Bank (CIB) and the Government of Quebec provided a $55M loan for modernization efforts, including track rehabilitation, signalling improvements, and station upgrades. Transport Canada will also contribute a minimum of $12M per year for operating and capital expenditures (Luczak, 2021).

The ***Winnipeg – Churchill*** Route is one the long-haul routes offered by VIA Rail Canada. The trip has a total of 55 stops, of which 19 are scheduled while 36 are flag stops, meaning the train only stops if a passenger is getting on or off. According to the 2020 report, this route generated $4M in revenue, while operating at a net loss of $30M. On average, 300 customers use the service weekly, for a total of 15,625 customers for the year (VIA Rail, 2021). In 2021, the Arctic Gateway Group received $40M through Indigenous Services Canada's Strategic Partnerships Initiative, to improve railway infrastructure and reliability between Winnipeg and Churchill (Depatie, 2021).

The ***Polar Bear Express*** train service, between Cochrane and Moosonee offers 6 scheduled and 12-flag stops along its 300 km route. According to the 2019-2020 Ontario Northland report, the Polar Bear Express train service saw an increase of 2.4% in ridership from the previous year with 52,451 passengers. Freight transport services also increased, as passengers and non-train riding customers found the service cheaper than other shipping alternatives (Ontario Northland, 2021). In May 2021, the Ontario government announced that the passenger rail service between Toronto Union Station and Cochrane would return by the mid-2020s after it stopped running and was replaced by coach service in 2012. Service would be offered between four and seven days a week based on seasonal travel demands (CBC, 2021).

The ***Island Rail*** corridor is a 289 km long route that runs between Victoria and Courtenay on Vancouver Island. Although service was cancelled in 2011, several attempts have been made to restore it and provide services to the 14 Indigenous communities and 13 stations along the route. To make the rail service operational, the ties, tracks, bridges, and signalling need to be restored. The capital cost was estimated to be between $227M and $548M in 2020, depending on the desired level of service (Winter, 2021). The project has gained increasing support in recent years as Vancouver Island's population has steadily increased to over 860,000 people in 2021.

The ***Sudbury-White River*** line serves a region with existing roads and rail lines, resulting in fewer trips generated. On the other hand, the Sept-Îles-Schefferville line has the highest trips per person generated as it is the only

transportation link between communities near Schefferville and Sept-Îles. Meanwhile, the ***Polar Bear*** line caters to a low-density population area, with most of its ridership comprising tourists. The number of trips generated per person of these similar cases vary according to the railway location, as shown in Table 10.6-6.

Table 10.6-6: Ridership and Per capita Trip Rate, Train Passenger Service in Remote Locations

Rail line	Population	Annual Ridership	Trips/ Population
Gaspé	47,614	27,000	0.57
Hervey-Senneterre	16,522		
Polar Bear	3,784	13,450	3.55
Sept-Îles - Schefferville	1,013	17,000	16.79
Sudbury - WhiteRiver	24,447	5,943	0.24
Winnipeg - Churchill	58,355	21,129	0.36

Source : Population estimated based on 2016 census dissemination areas. Population was estimated near rail lines based on a factor was applied to the size of dissemination areas and proximity to the line. Canarail (2016), Northern Tacks (2020), CBc (2016), VIA (2019).

The regional population served by the train service varies depending on the phase of La Grande Alliance. The regional population served by and potentially using the rail service was estimated by: identifying the communities situated along the railway (including coastal communities for the railway line adjacent to the BDH) ; applying an attraction rate (per capita ridership) that depends on the nature of the corridor and the proximity of the community to the train station.

The North-South rail line would have lower attraction rate than the Sept-Îles-Schefferville line due to its road connectivity. It will probably have a similar trip generation as Gaspé, The Pas, or Churchill the northern segment of the Winnipeg-Churchill line.

The Grevet-Chapais line is in a region well connected by road and will probably have an attraction in between the Sudbury-White River and the Winnipeg-Churchill lines.

10.6.5.2 Workers

It is assumed that rail will not attract workers as passengers. For local or regional workers, the service does not serve the workplaces. For major industries, it is assumed that the fly-in fly-out system will continue, using air transportation rather than rail.

10.6.5.3 Visitors

The current annual number of excursionists (visitors present for tourism without spending a night in the region) is estimated at 30,000 over the 2017-2019 period on average. Meanwhile, the attendance of tourists (visitors who spend at least a night in the region) is estimated at 92,000 people, for a total of 122,000 visitors per year. The profile of current visitors is particular, with a large share of these journeys is done by women (74%), aged of 50 years and older (65%), from the neighboring regions of Abitibi-Témiscamingue (33%), Saguenay-Lac-Saint-Jean (28%) and the Quebec City area (41%), mostly during the fall season (48%) to visit relatives (60%) or for work reasons (34%) (Beaudoin, 2021).

Capture rates of 3% on tourists for railway lines for Phase I (1% on Matagami-Waskaganish Junction and 2% on Grevet-Chapais) and 3% for Phase II (3% on Waskaganish Junction-Radisson) are assumed, with the annual ridership

of this market segment would then be of 920, 1,840 and 2,760 passengers respectively. An annual growth rate of 1% is assumed over the exploitation period.

10.6.5.4 Passenger Traffic and Revenue Forecasts

Table 10.6-7 summarizes passenger traffic forecast, under the assumption of good connectivity with attraction poles outside the study area. There would be approximately 5,870 passengers at the beginning of Phase I (2036). The extension of the railway up to Radisson in 2040 would attract approximately 5,100 more passengers. The extension to Whapmagoostui-Kuujjarapik would not bring significantly more traffic given the low local population and the absence of any existing or planned tourist attraction.

Table 10.6-7: Forecast Passenger Ridership, by Railway Line and Phase, 2036-2081

Phase	2036	2041	2046	2051	2056	2061	2066	2071	2076	2081
A1 Matagami-Rupert	2,106	2,208	2,317	2,429	2,536	2,644	2,755	2,867	2,980	3,097
B1 Grevet-Chapais	3,762	3,862	3,998	4,136	4,259	4,384	4,511	4,641	4,773	4,908
A2 Rupert-La Grande	5,103	5,358	5,681	6,007	6,321	6,639	6,963	7,292	7,626	7,967
BDHR (A1+A2)	7,209	7,566	7,999	8,436	8,857	9,283	9,718	10,158	10,606	11,063
Phase I (A1+B1)	5,868	6,070	6,316	6,565	6,795	7,028	7,266	7,507	7,753	8,005

Note: Ramp-up effect not included.

As shown in Figure 10.6-1Figure 10.5-4, the Passenger-kms for each railway line (BDHR and GCR) are comparable (approximately 500,000 pass-km) in Horizon I and follow a slight growth over time with the increase in population. On the BHDR, when the railway is extended from Rupert River to Radisson (Phase II), the pass-kms increase by much due to the effect of the wider population being served (ridership is almost multiplied by 4) and to the longer distance covered by each traveller (the average distance is multiplied by 1.5).

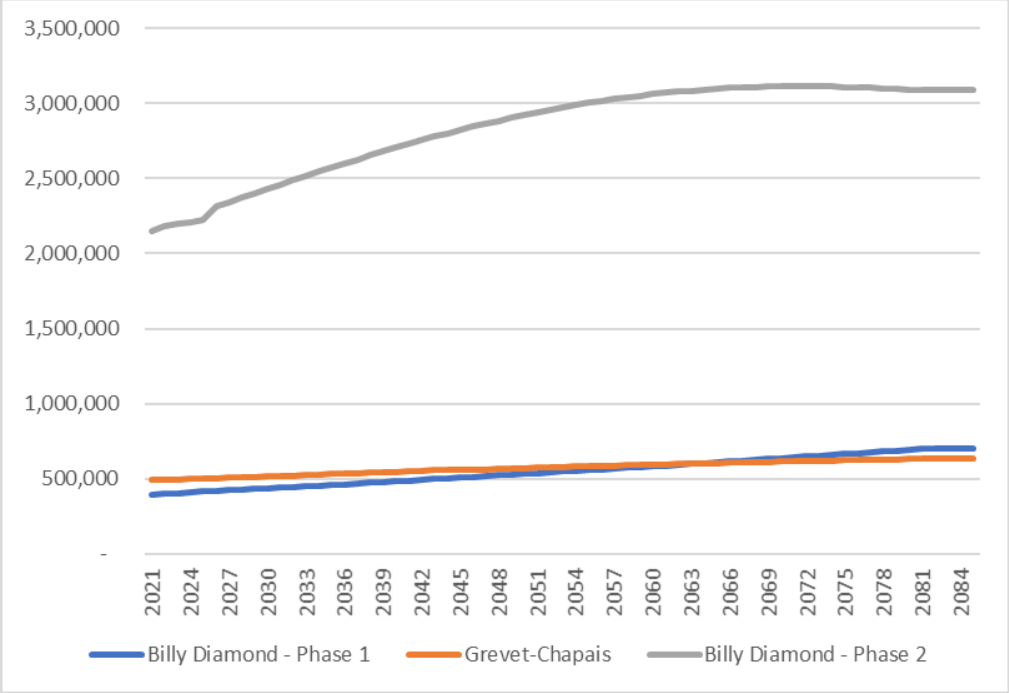


Figure 10.6-1: Forecast Passenger Trip Distance, Railway Lines, 2021-2084

Table 10.6-8: Annual Passenger Trip Distance and Revenue, Railway Lines, Phase I, 2036-2081

Railway Line	2036	2041	2046	2051	2061	2071	2081
Passenger-km	**997,608**	**1,036,912**	**1,082,296**	**1,128,512**	**1,215,570**	**1,305,826**	**1,399,596**
Matagami-Rupert	463,641	488,675	514,984	541,757	593,327	646,616	701,675
Grevet Chapais	533,966	548,237	567,312	586,755	622,244	659,210	697,920
Revenue ($)	**199,522**	**207,382**	**216,459**	**225,702**	**243,114**	**261,165**	**279,919**
Matagami-Rupert	92,728	97,735	102,997	108,351	118,665	129,323	140,335
Grevet Chapais	106,793	109,647	113,462	117,351	124,449	131,842	139,584

Table 10.6-9: Annual Passenger Trip Distance and Revenue, BDHR, Phases I-II, 2036-2081

Railway Line	2036	2041	2046	2051	2061	2071	2081
Passenger-km	**3,063,595**	**3,386,719**	**3,580,000**	**3,767,821**	**4,149,238**	**4,543,925**	**4,598,984**
(A1) Matagami-Rupert	463,641	488,675	514,984	541,757	593,327	646,616	701,675
(A2) Rupert-La Grande	2,599,953	2,898,044	3,065,015	3,226,064	3,555,911	3,897,309	3,897,309
Revenue ($)	**612,719**	**677,344**	**716,000**	**753,564**	**829,848**	**908,785**	**919,797**
(A1) Matagami-Rupert	92,728	97,735	102,997	108,351	118,665	129,323	140,335
(A2) Rupert-La Grande	519,991	579,609	613,003	645,213	711,182	779,462	779,462

Note: Values on local network only. No ramp-up effect included.

The revenue from passenger service is calculated from the distance covered by the passengers on La Grande Alliance railway line segments (i.e., excluding the distance on the CN network even if the rail service conveniently uses both networks). A rate of $0.20/pass-km has been used to estimate the revenue. This value is equivalent to the average of the studied cases but higher to VIA Rail estimated fare rate on the Senneterre-Montreal railway line. In 2036, the total pass-km would be of more than 997,600 pass-km and the annual revenue $199,500, from which 54.1% on the GCR and 45.9% on the Matagami-Rupert railway line, as detailed in Table 10.6-9. In 2036, in the case the BHDR is extended to Radisson, the passenger revenue would increase to approximately $613,000 on the BHDR (compared to $93,000 if not), for a total of $720,000 in Phases I-II.

10.6.6 Freight

10.6.6.1 Rail Freight Similar Cases

The ***Hudson Bay Railway*** opened up to Flin Flon in 1928 and to Churchill in 1929. In 1953, a western branch was extended to the mining camp in Lynn Lake. CN operated the railway until 1997 when it finally sold it to the Hudson Bay Railway (HBRY), a new holding company that also took over operations in the Port of Churchill. The HBRY operated 627 miles (1,009 km) of rail from The Pas to Churchill[17]. Passenger rail service is operated by VIA Rail from Winnipeg to Churchill (Canada Rail, 2022). Churchill is the only Artic deep-sea port in Canada. "*The port and rail line have also long been considered a vital link for Canada's North, taking food, equipment and containers to Churchill for distribution to points further north via Hudson Bay".* At Churchill, the shipping season is typically July through

[17] The distance according to CN is 810 miles (1,300 km). This figure may include branches.

October. Routing this grain out of Saskatchewan and Manitoba through Churchill would shave up to three days off to Europe (Sims, 2017).

In 2009, a $68M investment work to improve the railway and the port installations, funded by the governments of Canada and Manitoba, and by railway operator OmniTRAX, resulted in a 33% improvement on running times. The freight traffic consisted of 640,000 TPA in grains to the port in 2013 with an annual average of 500,000 TPA. At the end of the 2000s and beginning of 2010s, the railway line used to carry shipments of fertilizers from Russia entering the port of Churchill (HBRA, 2020). The main rail-port customer was the Canadian Wheat Board, which in 2012, lost its single marketing monopsony for prairie wheat and barley (market structure in which a single buyer substantially controls the market as the major purchaser of goods and services). After a drastic drop in grain traffic at 184,600 TPA in 2015, OmniTrax shut down port operations (Sims, 2017).

In 2017, severe flooding washed out large portions of the railway line, and service was immediately shutdown, the HBRY could not afford the repair costs. In 2018, a consortium composed of Fairfax Financial Holdings, AGT Limited Partnership, and Missinippi Rail Limited Partnership, a group representing both local First Nations and non-First Nations communities, reached an agreement to purchase the railway, port lands, and other facilities. $117 M in funding was provided by the federal government. Repairs were completed the same year, and the line has operated since (Canada Rail, 2022). In 2019, after the reopening, the grain traffic was 139,000 TPA (HBRA, 2020). If global warming may be seen as a benefactor for water transportation, and also makes the rail line less stable, since most of the railway is built on less stable permafrost soils (Sims, 2017).

10.6.6.2 Forestry

The productivity of the forestry industry in Nord-du-Québec is lower relative to other regions. The cold climate and the younger forests, amongst other factors, contribute to this low productivity level. Additionally, forest products manufacturing activities occur mainly in the southern part of Nord-du-Québec, in the Abitibi-Témiscamingue and Saguenay-Lac-Saint-Jean regions. Many wood processing plants are in the Chibougamau, Saguenay-Lac-Saint-Jean and Abitibi areas.

The freight traffic generated from the LGA infrastructure is expected to be concentrated on the southern sections, particularly on the North-South and Grevet-Chapais railways of Phase I. The wood logs, chips and product volumes would be in magnitude between 50,000 and 175,000 TPA on each line. Main potential forest industry users that were identified include Interfor, Chantiers Chibougamau, Kraft Nordic, Blanchet and Nexolia. Barrette-Chapais has shown no interest in using the proposed railway lines. The traffic generated by Cree Lumber in Waswanipi has been added towards Chibougamau for lumber and towards Lebel-sur-Quévillon for chips.

Note that Resolute did not respond to the survey and their potential traffic are not included, nor the potential intergional movements involving wood product plants in Lac-Saint-Jean, Abitibi and Mauricie since the targeted potential users in those regions have not responded during the survey. It is likely that if the infrastructure is built, this potentially would bring some more traffic than estimated here.

10.6.6.3 Mining

Mining is the most important industry in terms of freight demand for the studied rail infrastructure, especially the strategic minerals, lithium mainly. It is also the activity that would have the greatest impact on road traffic. Many mining sites are expected to start operating in the medium term. This will generate demand for the transportation of goods for a period of 15 to 80 years, mainly using LGA railway lines. The freight demand was estimated based on the mining production figures. Start dates were considered in the forecast, in accordance with the known timeline for projects.

For the realistic case, only projects that have the feasibility study and, in most cases, the environmental assessment, were considered. The output volume was stated as constant as new resource should be found after the end of initial life of mine (LOM). For the pessimistic case, only the likely projects are included with a 90% output probability over the initial LOM. For the optimistic case, some major projects are 100% included as well as the potential strategic mineral deposits, for the duration of the infrastructure.

For strategic minerals, the output traffic of lithium spodumene from Wabouchi (Nemaska Lithium), Rose (Critical Elements) and James Bay (Allkem) mines was allocated to Phase I BHDR via the yard at Waskaganish Junction. The destination of this output shall be in Bécancour or a port to be transshipped overseas, or potentially Abitibi. Optimally in terms of routing, the Waskaganish Junction yard could be located at the junction of the BDH and the Route du Nord, to limit the road segment for these three users, depending on if the short-term cost of extending the rail between KP 235 and KP 301. In Phase II, the uploading of James Bay mine could be just next to the site since it is close to the rail corridor. These traffics would use the BDH the Matagami transshipment yard and the CN Matagami subdivision on the short term.

The output traffic from the Moblan (Sayona) mine site is allocated to the GCR since the road segment is shorter by Chibougamau than via Nemaska. The assumed destination is La Corne in Abitibi and the transshipment at Chibougamau or Chapais. For the realistic and optimistic cases, an output volume from the Ponfax (Stria) mine site has been added to the BHDR line.

The copper mine projects include Corner Bay, Devlin and Joe Mann (Doré Copper), Scott Lake (Yorbeau), and Opémiska (QC Copper). The destination being most probably the Horne fundry in Rouyn-Noranda, where their output volumes have been allocated to the GCR line.

The most probable iron ore mining projects include Southwest-Armitage (Orion, ex-Blackrock), Mont-Sorcier (Voyager) and Lac Doré (Vanadium), near Chibougamau-Chapais. The output volumes from these sites would use the CN rail to Lac-Saint-Jean and would not be customers of the GCR.

The Duncan Lake iron ore project (Century) could generate a massive volume of output (12 MTPA), much greater than other sites susceptible to use the Matagami-Rupert-La Grande railway corridor. The project has been assessed as profitable in a feasibility study. There has not been an environmental assessment of the project. The presence of major transportation such as the BD corridor railway in Phase II just beside the site could increase the likeliness of the project. A volume probability of 20% has been applied in the base case and 100% in the optimistic case.

10.6.6.4 Hydroelectricity

Hydro-Québec's substations and lines rehabilitation would require the transportation of 33,000 T of steel for 735 kV lines and 66,000 T for 1,470 kV.

Hydro-Québec's interest in the Rupert-La Grande railway (Phase I) is an indicator that shipments by rail would be the preferred option. Furthermore, Hydro-Québec mentioned its interest in the La Grande-Whapmagoostui segments (Phase II & III). The access to a new territory could bring new opportunities for development that are not being considered due to the limits of the current infrastructure.

10.6.6.5 Construction

Construction materials include prefabricated modules, cement blocks and oil tanks, amongst other elements. The construction sector is one of the main generators of maritime cargo traffic, preferring it over transport by road. For this sector, the railways of Phases I and II would be used to move materials from East to West and from North to South. Construction entrepreneurs could use the Grevet-Chapais corridor to bring materials and equipment from Chibougamau to Val-d'Or and the surrounding areas and vice-versa. Once the Matagami-Rupert River railway is constructed, construction materials can be transported by rail from Chibougamau northwards using the Grevet-Chapais line. It was estimated that 3,333 tons of construction materials would be shipped through the Grevet-Chapais line and more than 39 thousand tons through the Matagami-Rupert River line. Of this number, close to 20,000 tons would continue north using the Phase II's Rupert River-Radisson line. The James Bay communities would use the closest transfer yard to receive construction equipment and materials shipped by rail. Construction materials from Chibougamau could use the Phase I Franquet to Chapais railway to bring merchandise to Val-d'Or and the surroundings cities and businesses. Also, some of the construction material leaving Chibougamau could head North, using the Franquet to Chapais railway to reach Matagami, then the Phase I Matagami to Rupert River railway to supply the James Bay communities. The Franquet to Chapais railway could be used to move 3,333 tons of construction material and the Matagami to Rupert River railway 1,667 tons. Of those 1,667 tons, 1,136 would continue their way North using the Phase II railway from Rupert River to Radisson. The James Bay communities would use the closest transfer yard to access its supply of construction equipment and materials.

The estimates for the demand for construction material in Whapmagoostui and Kuujjuarapik are based on the annual number of houses constructed in those communities. About four to six manufactured houses are currently shipped by vessel to the communities on an annual basis. Delivery by road is not a viable option for this sector because the houses are pre-assembled before shipment. The distance, the hilly roads, and the convoy of at least 3 trucks per house are some of the reasons the road delivery option is not prioritized. The preferred shipment method is by rail. Once a railway reaches Whapmagoostui from the south, the houses and other construction materials will most likely be transported by train. Until then, the shipments will continue by the sea, as they are now. The construction needs of Whapmagoostui and Kuujjuarapik are marginal (117 TPA).

10.6.6.6 Consumer Goods Supply

The equipment and consumer goods section represents the supplies shipped to the James Bay communities, including gas. Annually, the communities import around 150,000 tons of equipment and goods. For Phase I, an estimate of 6,667 tons of materials would come from Chibougamau and would use the Grevet-Chapais rail corridor. The demand for 8,969 tons of goods per year would be shipped on the Matagami-Rupert River line. This number includes goods originated from the east (Chibougamau) and from the south (Montreal and Val-d'Or). The demand for the Rupert River-Radisson rail corridor in Phase II is estimated at 8,799 tons of goods annually.

The estimated equipment and consumer goods needed for Whapmagoostui and Kuujjuarapik is based on the average supply per capita for the James Bay communities. This estimation method assumes that the demand for consumer goods per capita from Whapmagoostui and Kuujjuarapik combined is equal to the one from these two villages and in the James Bay communities. As a result, 2,132 tons of goods would be shipped annually to Whapmagoostui, and 1,651 tons to Kuujjuarapik. Once the construction of the road from Radisson to Whapmagoostui is completed, the 3,773 tons of consumer goods would be shipped from Matagami to Radisson by rail, and from Radisson to Whapmagoostui by road. Once the construction of the Radisson–Whapmagoostui rail corridor is completed and Whapmagoostui is accessible by train, all goods and equipment will reach Whapmagoostui by rail.

10.6.6.7 Freight Traffic Forecast

Table 10.6-10: presents the annual freight demand forecast by Phase and demand segment. These freight volumes are considered mostly constant over the analysis period. The forest and mining sectors foresee a steady volume of production for each plant or site, while the good supply is expected to grow with the population and remains a small share of total demand.

Table 10.6-10: Annual Rail Freight Forecast, by Demand Segment, in Tons per year (TPA)

Sector/Scenario	Matagami-Rupert Phase I	Grevet-Chapais	Total - Phase I	Matagami-La-Grande (Phase II)
Forest Sector	319,000	480,000	799,000	319,000
Mining	1,041,000	517,000	1,558,000	4,641,000
Others	22,000	10,000	32,000	22,000
Total - Realistic	1,381,000	1,008,000	2,389,000	4,981,000
Pessimistic	940,000	627,000	1,567,000	940,000
% difference	-31.9%	-37.8%	-34.4%	-81.1%
Optimistic	1,915,000	1,368,000	3,283,000	15,283,000
% difference	38.7%	35.7%	37.4%	206.8%

Note: Totals/percentages may differ slightly from the sums/divisions of elements because of rounding.

On the Grevet-Chapais line, planned for Phase I, a total of 1.0 MTPA would be shipped by rail under the realistic scenario. The majority of this volume includes 517,000 TPA of mining ore and 480,000 TPA of wood inputs. Construction equipment and materials and goods procurement amount to a smaller portion of the total volume (10,000 TPA). The directionality of traffic is keen on both lines, the outbound volumes being much higher than the inbound volumes, as shown in Table 10.6-11.

Table 10.6-11: Annual Rail Freight Forecast, Phase I, by Scenario and Direction (TPA)

Infrastructure	Pessimistic	Realistic	Optimistic
Billy-Diamond Highway Railway	940,000	1,381,000	1,915,000
Southbound	840,000	1,270,000	1,749,000
Northbound	100,000	112,000	165,000
Grevet-Chapais Railway	627,000	1,008,000	1,368,000
Eastbound	126,000	167,000	209,000
Westbound	502,000	840,000	1,159,000

Total	**1,567,000**	**2,389,000**	**3,283,000**

Note: Totals may differ slightly from the sums of elements because of rounding.

When the construction of the Billy-Diamond Highway Railway (Matagami-Rupert River) is completed in Phase I, the tonnage of goods on the line would be estimated at 1.4 MTPA under the realistic scenario, mostly mining commodities related to lithium and wood logs with some community goods and Hydro-Québec equipment and materials.

When Phase II of the CFRBD is completed, which extends between Rupert River and La Grande, it will better serve lithium-related mines without significantly increasing overall traffic in the pessimistic scenario. The iron mine project at Lake Duncan, with an estimated annual traffic volume of 12 Mt, would be more feasible if reliable high-capacity transportation infrastructure were available in the region than if there were no railway infrastructure. Therefore, in the realistic scenario, a possible portion of this anticipated production volume could be added, or the entire volume in the optimistic scenario. In these cases, the volume on the railway line would increase to 6.0 MTPA or 15.3 MTPA, respectively.

The two new road corridors of the LGA Program (La Grande-Whapmagoostui and Stornoway-Trans-taiga), as exploiting forest resources in the areas are costly in terms of transportation. These two road corridors may be used to ship goods procurement to the Whapmagoostui and Kuujjuarapik communities (4,000 TPA) and Hydro-Québec stations.

For Phase III, if the La Grande-Whapmagoostui railway line is constructed, a marginal traffic of less than 4,000 TPA is expected for good procurement and construction material for the Whapmagoostui and Kuujjuarapik communities. This would represent a modal shift from trucks and vessels to rail. As rail transportation is generally preferred over water transportation, no demand for the Whapmagoostui port is expected by 2040.

The Phase III BDH Railway line could be of more interest for the Duncan Lake iron ore mine project (up to 12 MTPA) if combined the deep-sea port in Whapmagoostui-Kuujjuarapik. In the event of the realisation of the Great Whale iron ore project 65 km east of Whapmagoostui-Kuujjuarapik, equally more attractive with a high-capacity transport infrastructure, the volume for the port could be 20 MTPA.

10.6.7 Revenue

Tariffs for the railway operation have been projected as being significantly below the current trucking tariffs to account for the distances to and from Eeyou Istchee Baie-James, as shown in Table 10.6-12. Comparison of overall container transport costs between Waskaganish yard and the final destination shows potential savings ranging from 12% to 67%. The rail transport pricing is considered to be competitive against road transport, resulting in a modal shift for all long-haul freight traffic.

Table 10.6-12: Typical Industry In-Quebec Freight Rates

($/Tkm)	Rail	Truck
Forest products	0.075	.
Mining	0.089	.
Other	0.091	.
Average	**0.09**	**0.23**

Table 10.3-13 presents the annual revenue the transport of freight on the two railway lines under study using the rates in Table 10.6-12. In Phase I, the annual revenue is estimated at $49.8 M in total, with $33.9 M for the BDHR and $15.9 M for the GCR ($2022). In Phase II, the annual revenue would be higher by $20.9 M to attain more than $70.9 M on LGA railway network.

Table 10.6-13: Annual Freight Railway Revenue, Phase I

	Payload-distance (MTkm)	Revenue ($M)
BDH Railway	396.4	33.9
Grevet-Chapais Railway	187.8	15.9
Total	**584.2**	**49.8**

The future traffic forecasts on the proposed infrastructure are subject to great uncertainty and unpredictability on the run, notably because of the cyclical nature of the regional economy that depends on the difficulty to predict future international economic conditions, conditions over which the regional and national actors have no control, conditions that determine the financial feasibility of major projects that could justify the implementation of a railway or of a deep-sea port on economic grounds.

10.6.8 Limitations

Furthermore, the market survey revealed that many stakeholders had difficulty projecting their needs in the distant future. Also, the choices of modes and routes (for example via Matagami or Chibougamau-Chapais) by shippers and suppliers depend upon the overall transportation infrastructure and services offered and the selection with regards future infrastructure shall influence their choice. Finally, the presence of the infrastructure could induce new opportunities that companies or entrepreneurs can take advantage of and therefore generate new, different or more economy and transport activities, which cannot be assessed here. The Eeyou Istchee Baie-James region has, historically, been developed as the province's primary supplier of hydroelectricity and, to a lesser extent, forest and mineral projects. The latter two sectors nevertheless remain, as yet, undeveloped. The Grande Alliance marks the first time that infrastructure is contemplated in the context of both economic and social development in the territory. The potential long-term economic consequences of such an ambitious program, if it goes ahead, are very difficult to predict, as numerous feedback loops, positive or negative, that may be activated by the program remain by and largely unknown.

10.6.9 Summary

The demographic projections indicate that the increase in local travel needs for both passenger and freight demand would be substantial and sustainable for the next 20 years and beyond. This would require adequate local access roads to Waskaganish, Eastmain, Wemindji, and Nemaska. The evaluation for a second access to Mistissini requires additional specific analysis.

Meanwhile, the medium-term development of several lithium-related mining sites as well as the intensity of passenger and freight transportation to Hydro-Québec and various northern locations would justify upgrading the Route du Nord to a regional road level.

Traffic forecasts show that the freight traffic would realistically amount to between 1.0 MTPA and 1.4 MTPA on each of Phase I railway lines (BDHR and GCR), mainly for mining ore and forest logs. Phase II by itself does not add more tonnage and is just a longer use of the train for some users of Phase I. However, if major iron ore projects such as Duncan Lake takes place, and the presence of major transportation infrastructure increases the feasibility of the project, potential traffic on Phase I-II BDHR or on Phase III BDHR-seaport combination, will have much larger volumes.

The future traffic forecasts on the proposed infrastructure are subject to very large uncertainty and unpredictability. This is notably due to the difficulty of predicting future international economic conditions, even in the short term. Regional and national actors have no control over these conditions which determine the financial feasibility of major projects that could justify the implementation of a railway or of a deep-sea port.

Half of this traffic was generated by forest activity, thus south of the KP 150. The trucking volume to/from Cree communities amounted to 12 HVPD, 1 or 2 HVPD per community except for Chisasibi with 4 HVPD. Hydro-Québec generated 10 HVPD by this road.

The base case traffic and revenue forecasts for railway segments are summarized in Table 10.6-14.

Table 10.6-14: Railway Traffic and Revenue Forecast Summary, Base Case

Traffic	Passengers	Freight (tonnes)	
A1 - Matagami-Rupert	2,106	1,001,400	
A2 - Rupert-La Grande	5,103	-	
B1 - Grevet-Chapais	3,762	576,400	
Total (excl. Duncan Lake)	**10,971**	**1,577,800**	
A2 - Duncan Lake Project		3,600,000	
Total (incl. Duncan Lake)	**10,971**	**5,177,800**	
Revenue ($)	**Passenger**	**Freight**	**Total**
A1 - Matagami-Rupert	93,000	33,909,000	***34,002,000***
A2 - Rupert-La Grande (1.4 MTPA, excluding Duncan Lake)	520,000	20,385,000	***20,905,000***
B1 - Grevet-Chapais	107,000	15,932,000	***16,039,000***
Total (excl. Duncan Lake)	**720,000**	**70,226,000**	**70,946,000**

10.7 FOLLOW-UP KEY PERFORMANCE INDICATORS

This section on key performance indicators (KPIs) is important as it outlines measurable values that can be used to assess the effectiveness of Cree involvement in transportation infrastructure projects. It is critical to establish measurable values that demonstrates how effectively the proposed project is achieving its key Cree involvement objectives. The following key performance indicators could be used at the different stages of the construction and operation on the different components of the transportation infrastructure:

1. Planning and Designing Stage KPIs:
   - Percentage of Cree participation in the project planning and design process measured in number direct employees and hours.
   - Number of Cree community consultations held to gather input and feedback on the project design.
   - Number of Cree concerns or recommendations incorporated into the final project design.
2. Construction Stage KPIs:
   - Percentage of Cree-owned businesses involved in the construction process (value of contracts, number of employees and hours).
   - Cree joint ventures during construction.
   - Percentage of Cree workforce involved in the construction process (direct employees and hours).
   - Number of training and employment opportunities provided to Cree community members during the construction process.
   - Number of apprenticeships or skills development programs provided to Cree community members during the construction process.
   - Percentage of project expenditures directed towards Cree-owned businesses.
3. Operation Stage KPIs:
   - Percentage of Cree workforce involved in the ongoing operation and maintenance of the transportation infrastructure.
   - Number of training and employment opportunities provided to Cree community members for ongoing operation and maintenance.
   - Percentage of project expenditures directed towards Cree-owned businesses for ongoing operation and maintenance.
   - Number of Cree-owned businesses involved in the supply chain for ongoing operation and maintenance.
   - Number of initiatives or programs established to monitor and address potential environmental or social impacts of the transportation infrastructure on Cree communities.
   - Car and truck traffic on roads.
   - Freight and passenger traffic on railroads.
   - Number of journeys of Cree to other communities in the region (per purpose).
   - Number of journeys of Jamesians to other communities in the region (per purpose).
   - Number and employment (total/Cree/Jamesian) of companies using a transportation infrastructure; and
   - Tourist attendance at sites along or who use a transportation infrastructure.

Compared to other points raised in the document, these KPIs are specifically focused on assessing the effectiveness of Cree involvement in transportation infrastructure projects. While other points in the document may discuss the importance of Cree involvement or the potential impacts of transportation infrastructure on Cree communities, the KPIs outlined in this section provide concrete metrics that can be used to track progress and ensure that the project is meeting its objectives.

10.8 CONCLUSION

10.8.1 Context

This market study was conducted to support the decision of the CDC in planning the development of transportation infrastructure projects in the study area which covers the Eeyou Istchee Baie-James including Whapmagoostui and the Inuit community of Kuujjuarapik. In continuity with the JBNQA chapter 28, the Paix des Braves and the Grande Alliance agreements strengthened the acknowledgement for a greater involvement of Crees in the governance of the territory and its infrastructure. Consequently, the LGA proposed infrastructure should support Cree economic business and industry development, diversification and foster economic development in a sustainable way with regards to the preservation of the natural environment and the respect of Cree culture and values.

The Grande Alliance infrastructure development program including roads and railways aims to provide ensuring ensure safe, reliable, and cost-efficient travel to the local communities as well as for the regional movements of goods and people, integrating the communities into the regional economy, connecting to the continental railway network.

The market study includes first the review and analysis of extensive documentation focused on the contextual elements affecting the demand for freight and passenger transport in Eeyou Istchee Baie-James, including the territory, the jurisdictional framework, local communities, the transport network, sociodemographic and the economic sectors. The second element of the study is a market survey with potential users (shippers), carriers, economic development agencies and communities. The survey allowed to forecast quantitatively future traffic and possible revenues. It also allowed to identify qualitatively general or specific issues and guidelines within La Grande Alliance infrastructure program, or prior to or in addition to it.

All communities, except Whapmagoostui, the northernmost Cree village with its neighboring Inuit community Kuujjarapik, are connected by access roads to the regional road network comprising the Billy-Diamond highway, routes 113 and 167, as well as the Route du Nord (RN). The road network is under the responsibility of various jurisdictions, which complexifies its coherence and exploitation. A review of this framework and a comprehensive planning of the network and its maintenance would ensure better the transportation needs of users and safety issues, including the long-term maintenance capacity.

10.8.2 Transport Network

The Billy Diamond Highway (BDH) built 51 years ago, has just been rehabilitated. The SDBJ now impose more restrictive load limits, especially in the thaw period, to extend the service life. The Route du Nord is graveled on all its length, with an alignment, structures and condition posing safety and comfort problems that dissuade the users, either leading them to use a much longer route or to avoid a journey. Although this road is geographically an important link for intraregional and interregional exchanges, its features do not allow to fully satisfy this function.

The road network is used by rather low volumes in Eeyou Istchee Baie-James, with the exception of routes 113 and 167 in the Chapais-Chibougamau area, due to the presence of these towns. The average daily traffic volumes are

less than 300 on the BDH and RN, with 30-40% consisting of heavy vehicles and possible fluctuations or changes due to economic activities. It is to be noted that historic traffic count data are missing for the BDH and the access roads.

Although the accident rate is less in Eeyou Istchee Baie-James than in Quebec in general, the severity of accidents is higher. The presence of heavy vehicles on the primary roads and the risk of collision with passengers in cars is a major concern. On the BDH, the RN, and the access roads, most accidents occur with snow, ice, or mud surface conditions, with between 20% to 50% of accidents during rain or snow falls. On the BDH and the RN, a quarter to a third of accidents involve injuries. The dust raised on gravel roads remains an issue in terms of safety, electronic devices, and vehicle damages. The quality of access roads and the open up of local communities, especially Whapmagoostui-Kuujjuarapik, have been objectives for long.

Canadian National (CN) provides rail transportation up to Matagami via Barraute-Senneterre and to Chibougamau-Chapais via Saint-Félicien. The railway lines are used mostly by the transport of lumber and pulp and paper, and less importantly for minerals and petroleum products. Due to the low traffic on these lines, the track maintenance has been minimal for some time and the load limit is consequently low. The current traffic on the Matagami subdivision, even lower with the recent closing of the Glencore nickel zinc mine, can hardly justify the continuation of service on this line. The Matagami multimodal transshipment yard plans to develop services for the future lithium mines in Nemaska area, which would increase the traffic on the CN Matagami subdivision. Chibougamau intends to develop a transshipment yard to serve the inbound and outbound freight movements in the eastern part of Eeyou Istchee Baie-James.

Air transportation, mainly provided by Air Creebec and Air Inuit, serves workers' journeys under a fly-in fly-out regime, business trips, outfitting and, the northernmost and isolated communities, particularly with regard to perishable foodstuffs. Air fares remain high for personal matters. Although seven Cree communities have an airport nearby, lack of air support services coupled with limited length runway make the development of air transportation difficult. In Eeyou Istchee Baie-James, the maritime infrastructure is limited to small community wharfs in Wemindji and Whapmagoostui.

10.8.3 Territory and Economy

The territory of Eeyou Istchee Baie-James is vast, the climate is harsh, and the distances are significant. The region has approximately 32,000 inhabitants, of which 18,700 (58%) are Cree and 13,400 (42%) are Jamesians ; 32,800 inhabitants by adding the 760 Inuit living in Kuujjuarapik. The Cree population is young and rapidly growing, while the Jamesian population has tended to decrease. If the trends continue, the regional population should increase up to 36,500 inhabitants, with 23,600 Cree people, 12,000 Jamesians, and 860 Inuit around 2041. Up to 2081, the regional population should increase to 45,500 inhabitants. The growth in Cree population should be approximately 85% over the next 60 years. The Jamesian population shall decrease or maintain, according to how the regional economy will progress since it already quite affluent with low unemployment rates, migration adjusting to employment.

The regional economy is driven by three components: the exploitation of natural resources, notably forestry, mining, and hydroelectricity; services to the population (education, health, public administration, housing, retail) ; support activities including construction, transportation and procurement. The Cree workforce participates mainly to services to the population and support activities. Jamesian workers are involved in natural resources, services to the population and support activities. Forestry output should not vary much in the future although more Cree companies shall produce more. The new Cree Lumber Company in Waswanipi advocates for the need of a spur

linking the mill to the CGR to be able to ship its output by rail and enlarge its market. The mining sector is booming, especially in base metals (iron ore, copper) and strategic minerals (lithium). This sector shall drive most of the growth in the future, with the future renewal and expansion of hydroelectric installations in behind, and a lot of uncertainty. Tourism should grow considering the projects under study, especially if transportation network ease journeys, notably by the road. Although accounting for marginal in economic growth compared to mining, tourism is interesting in terms of possible development of Cree entrepreneurship. Cree participation in the labour market is currently rather limited to local communities with little integration to the regional economy.

The presence of an efficient and more developed transportation network, along with other economic factors such as the presence of the resource and the attractiveness of sufficient and competent workforce (by appropriate lodging and social environment for example) shall augment the probability of realization in the distant future of new economic activities, especially for major mining projects including Duncan Lake, Patriot and Great Whale. Regional promoters should be made aware of the potential presence of rail infrastructure. This could increase their interest in major projects.

10.8.4 Stakeholders

Overall, the majority of stakeholders have expressed the view that the existing transportation infrastructure is obsolete and needs to be upgraded, and that future socio-economic development in Eeyou Istchee Baie-James relies greatly on the efficiency of the transportation infrastructure. The bad condition and safety risks on the road network may result in a lower share of the regional firms in outsourcing from basic economic activity such as mining or hydroelectricity, or in higher transportation and global costs for regional companies.

Furthermore, the market survey revealed that many stakeholders had difficulty projecting their needs in the distant future. Trucking costs have been increasing as well as the fuel price. The lack of maintenance of some roads during winter leads some truck drivers to refuse the journey and the shortage of regional labour in trucking constitutes a handicap to hire regional companies.

This program is an opportunity to position the Cree population by creating targeted programs to ensure the growing population has access to the job opportunities to come. The first opportunities will come from the construction of the LGA infrastructure and then after, induced construction projects associated with the augmented attractiveness of the area. The second source of opportunities will be associated with the operations and maintenance of the transport infrastructure and the other induced developed activities. The final benefits will come from secondary induced activities associated with the increased attractiveness of the area. Both employees and employers can develop highly skilled competencies and hence a cumulative causation effect.

Hence, the LGA program with its several components, will not only address the current issues related to transportation such as mobility, safety, accessibility, and reduction in transportation costs, but also induce many latent opportunities for both the population living in the area and the companies offering service. Clearly, the proposed LGA program will increase the supply side of transportation to a great extent.

Another consideration should be the potential of each corridor to promote economic integration between different communities and regions, including access to markets and employment opportunities. Ultimately, the selection of infrastructure corridors should be guided by a comprehensive economic development plan that takes into account the needs and priorities of all stakeholders, including Indigenous communities, local businesses, and other key players in the regional economy. It is worth remembering that railway alignments have been established to avoid creating more negative impacts on the natural environment by avoiding the development of new corridors.

10.8.5 Demand

The demand for a freight traffic is approximately 1.4 MTPA on the Phase I BDHR and 1.0 MTPA on the GCR line. The pessimistic and optimistic scenarios generate 35%-37% less or more traffic volumes compared to the realistic or base case. Approximately three quarters of this traffic shall come from the mining industry, notably from the lithium and copper mines. Phases II and III do not bring more significant traffic volumes, although Phase II BDHR could bring much more traffic if the Duncan Lake iron ore project is to be realized, up to a maximum output of 12 MTPA. The implementation of any significant mining (base metals and strategic minerals) project could significantly change the forecast volumes and revenues. The revenues generated by freight amount to $49.8M in Phase I ($33.9 M for the BDHR and $15.9M for the GCR) to which would be added a revenue of $20.4M on the BDHR in phase II, excluding the Duncan Lake project. The 6,000 annual passengers in Phase I and another 5,000 passengers in Phase II would bring very marginal revenue compared to freight.

The realistic forecast appears low to justify rail infrastructure. Nonetheless, the development could be seen as a strategic investment to position the Cree population in the management of their land and the resources they hold. Moreover, the presence of enlarged transportation infrastructure improving accessibility to communities and the territory shall increase economic opportunities, including for major projects, that should bring more traffic than the current forecast horizon may include with some certainty.

10.8.6 Infrastructure Corridor Development

The economic needs and demand forecasts highlight the importance of carefully selecting the infrastructure corridors that should be upgraded or built-in priority. One key consideration should be the potential economic impact of each corridor, including its ability to facilitate the transportation of goods and people to and from key economic activities such as mining, forestry, and energy development.

In the case a component of the LGA program is approved for development, involving Cree entrepreneurs and workers in the construction and operation of the infrastructure is a key factor to make the project socially, economically, and culturally viable. in conformity with chapter 28 of the JBNQA.

Another consideration should be the potential for each corridor to promote economic integration between different communities and regions, including access to markets and employment opportunities. Another consideration should be the potential for each corridor to promote economic integration between different communities and regions, including access to markets and employment opportunities. Ultimately, the selection of infrastructure corridors should be guided by a comprehensive economic development plan that consider the needs and priorities of all stakeholders, including Indigenous communities, local businesses, and other key actors in the regional economy. It is worth reminding that the railway alignments were set to prevent creating more adverse impacts on the natural environment by avoiding developing new corridors.

To further detail the considerations:

- The Route du Nord and the Billy-Diamond Highway have the potential to play a significant role in the regional development of Cree communities. It is essential to ensure that these roads are designed and built in a way that corresponds to their function.
- Access roads are critical for the success and sustainability of Cree communities and the railway infrastructure. Therefore, any development project should prioritize the development of efficient and safe access roads that facilitate the transportation of goods and people.

- Since freight traffic is vital to railway revenue and the most populated communities to the North are currently not served, it is crucial to ensure the development of efficient access roads that allow for the safe and reliable transportation of goods and services to all communities and enable them to take part in economic development.
- The developing lithium mining sector could create economic opportunities for local communities. Therefore, it is crucial to have access to economic activities that drive job creation. Access roads and transportation infrastructure can play a vital role in facilitating this development.
- An adequate condition and sufficient bearing capacity of the existing railway network accessing Matagami, Chapais and Chibougamau is essential to the development of the railway lines in Eeyou Istchee Baie-James.
- The presence and development of road and railway networks in Eeyou Istchee Baie-James increase the economic opportunities in several sectors, especially for Cree community various activities including lumber and tourism, and also for mining exploration and projects, making them more profitable and likely.
- The rehabilitation of the Grevet-Chapais Railway could contribute to the development of the Cree wood industry, copper mines, and a better integration of the forestry industry. Access roads can improve the efficiency of transportation and logistics, which can boost economic activity in these industries.
- The phasing of the BDHR could be more optimal if Phase I extended to KP 381, north of the junction with the Route du Nord. In Phase II, the railway could be further extended to Radisson if the Duncan Lake mine project moves forward. Access to the developing lithium mining sector and other economic activities is crucial for the success and sustainability of the railway infrastructure.
- The market study did not find any significant evidence of freight traffic through the deep-sea port at Whapmagoostui-Kuujjarapik. Therefore, it is not necessary to extend the railway to this port at this time.

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APPENDICES

A - SURVEY QUESTIONNAIRES

La Grande Alliance Infrastructure, Feasibility and Pre-Feasibility Studies Shipper Survey (generators of goods movement)

A ***Shipper Survey (goods transportation generators)***

Presentation

Within the framework of La Grand Alliance, the Cree Development Corporation mandated Stantec-Desfor-SYSTRA and WSP to carry out the feasibility and pre-feasibility studies for Phases I, II and III of La Grand Alliance infrastructure in Eeyou Istchee Baie-James. This survey aims to identify the needs of businesses and communities regarding the transportation of goods and people. We thank you for your participation. Please be assured that the information you provide will remain strictly confidential.

I - General Information

1. Provide the following general information.

Name of the company _____ Economic sector _____

Establishment

Address: _____ City: _____ Postal Code: _____ Nb. Employees _____

Respondent _____ Function _____

Tel: _____ Email: _____

II - Production History and Forecast

2. For this facility, please provide the past and current annual production.

Output	Unit (ton/yr., m3/yr.)	Quantity					
		2016	2017	2018	2019	2020	2021*

** In 2021, until month* _____

3. If there was an significant change in production (decrease or increase), indicate the reason. _____

III - Goods Movement

4. For outputs (outgoing) at this facility, specify, volumes by destinations for a representative year, as well as modes, carriers, routes and frequencies.

Output	Unit (ton/yr, m3/yr, etc.)	Quantity	Destination	Mode	Carrier	Route*	No. of shipments/year

** For the route, please specify the main transshipment or transit points.*

5. For inputs (supplies) to this facility, specify, for a representative year, volumes by origin, as well as by mode, carrier, route and frequency.

Input	Unit (ton/yr, m3/yr, etc.)	Quantity	Origin	Mode	Carrier	Route*	No. of shipments/year

** For the route, please specify the main transshipment or transit points.*

6. Specify the reasons justifying the choice of transport (type of goods, volume, accessibility to the site, speed, reliability, frequency, direct delivery, ease of organization, facilities, cost, security, etc.).

7. Specify your loading facilities at your establishment, the modalities of lots and packaging, characteristics of the vehicles or wagons and transshipment places.

8. What is your assessment of alternative transportation services, their strengths and weaknesses?

IV - Future transportation and interest in La Grande Alliance Program

9. For this facility, please provide the expected annual production.

Output	Unit (ton/yr., m3/yr.)	Quantity					
		2022-2024	2025-2029	2030-2034	2035-2039	2040-2044	2045+ *

**Indicate the year when the activities will end, if foreseeable.*

10. What factors explain the future evolution?

11. For future transportation, do you intend to maintain the same organization of outbound and inbound transportation? If so, why? If not, what changes do you plan to make?

12. What components of La Grand Alliance transportation infrastructure program are likely to impact your freight shipments or movement of people? Please indicate how.

		Impacted by (√ if so)	Foreseeable Impact on the Following Elements (Specify)			
			Transport Organization and Conditions	New Served Markets (which ones?)	Transported Volumes (variation in %)	Unit Transport Costs (variation in %)
	Phase 1 - 2030					
a	Improvement of access roads to Cree communities					
b	Railway between Matagami and Rupert River					
c	Railway between Grevet and Chapais					
d	Transfer center at KM 257 of the Billy-Diamond Highway					
	Phase 2 - 2035					
e	Route 167 to Trans-Taiga Road					
f	Railway between Rupert River and Radisson					
g	Billy-Diamond Highway to Kuujjuarapik-Whapmagoostui					
	Phase 3 - 2040					
h	Trans-Taiga Road to Schefferville					
i	Railway between Radisson and Kuujjuarapik-Whapmagoostui					
j	Port in Kuujjuarapik-Whapmagoostui					

13. To what extent are there components of this program that could encourage your company to develop new economic activities or partnerships in Eeyou Istchee Baie-James? Please explain.

14. Which features of the transport infrastructure and services of the program would enhance your interest in using them? What features should have priority?

15. What would be the impact on your economic partners (suppliers, customers, joint ventures, employees, etc.) that could result from the program?

16. What do you think are the benefits to the communities of the various components of the program?

17. What do you think are the disadvantages to the communities of the various components of the program?

18. Comments

La Grande Alliance Infrastructure, Feasibility and Pre-feasibility Studies

B ***Survey of carriers and infrastructure managers***

Presentation

Within the framework of La Grand Alliance, the Cree Development Corporation mandated Stantec-Desfor-SYSTRA and WSP to carry out the feasibility and pre-feasibility studies for Phases I, II and II of La Grand Alliance infrastructure in Eeyou Istchee Baie-James. The survey aims to identify the needs of businesses and communities concerting the transportation of goods and people. We thank you for your participation. Please be assured that the information you provide will remain strictly confidential.

I - General Information

1. Please provide the following general information.

Name of the company: _____ Sector of activity : _____

Address: _____ City: _____ Postal Code: _____ Nb. Employees : _____

Respondent : _____ Function: _____

Tel: _____ Email: _____

II - Transportation Activities

2. Does your company provide transportation services (carrier) or manage transportation infrastructure?

☐ Transportation services □ Infrastructure management (road, rail, airport, transshipment center, etc.)

3. Mode of transport

☐ Road (truck, bus) □ Railway □ Air ☐ Multimodal

4. What type of transportation do you offer?

☐ Solid Bulk □ Liquid Bulk ☐ General/Containers □ Refrigerated transport

☐ Other goods, specify _____ □ Passenger

5. Describe the transportation infrastructure you own or manage.

Type of infrastructure / Installation	Location	Capacity (t/yr, m3/yr, pass/yr; etc.)	Utilization (t/yr, m3/yr, pass/yr; etc.)

6. Describe the fleet you own or manage.

Type of véhicle	Number of vehicles	Capacity of one vehicle (ton, m3, pass, etc.)	Utilization of the fleet* (t/yr, m3/yr, pass/yr; etc.)

* Fleet of all vehicles.

7. Comment on the condition and adequacy of infrastructure, equipment and fleet that you own, manage or use.

III - Travel

8. On an annual basis, indicate the overall number of movements made by your services or infrastructure, according to movements (vehicles) in the Eeyou Istchee Baie-James **r**egion?
Count a round trip as 2 movements.

Mode	2016	2017	2018	2019	2020	2021*
Trucks						
Coaches						
Cars						
Cars						
Planes						
Others						
specify						

** In 2021, until the month of:* _____

9. If there is an anomaly in the volume (decrease or increase), indicate the reason. _____

10. For movements leaving the Region, specify, for a representative year, the number of movements (trucks, railcars, etc.), based on the origin in the region destinations, routes and frequencies. Also provide the net freight tonnage and/or number of passengers per vehicle unit.
For rail transport, indicate the number of units (cars and wagons) per train.

Commodity/Passenger	Movements per year	Origin	Destination	Mode	Route*	Average per vehicle (truck, railcar, airplane)		Cars / train
						Net load (t, m3)	Passengers	

** For the route, please indicate the main transshipment, connecting and transit points.*

11. For movements into the region, specify, for a representative year, the number of trips (trucks, railcars, etc.) by destination in the region, origins, routes and frequencies. Also provide the net freight tonnage and/or the number of passengers per vehicle unit.
For rail transport, indicate the number of units (cars and coaches) per train.

Commodity/Passenger	Movements per year	Origin	Destination	Mode	Route*	Average per vehicle (truck, railcar, airplane)		Cars / train
						Net load (t, m3)	Passengers	

** For the route, please indicate the main transshipment, connecting and transit points.*

12. If you have a detailed historical dataset (per installation, location, traffic category), insert it in an appendix.

IV - Future Outlook and Interest in La Grande Alliance Program

13. How should evolve your traffic and activities in the long-term future? Which factors would explain this evolution?

14 Specify future traffic levels, per component, on an annual basis.

Infrastructure / mode Commodity / passenger	Unit (t/yr, m3/yr)	Quantity					
		2022-2024	2025-2029	2030-2034	2035-2039	2040-2044	2045+ *

*Indicate the year when the activities will end, if foreseeable. _____

15. Which projects do you plan/envision, or which infrastructure changes would you like to satisfy your current or future needs better?

16. What components of La Grand Alliance transportation infrastructure program are likely to impact your freight shipments or movement of people? Please indicate how.

		Impacted by (√ if so)	Foreseeable Impact on the Following Elements (Specify)			
			Transport Organization and Conditions	New Served Markets (which ones?)	Transported Volumes (variation in %)	Unit Transport Costs (variation in %)
	Phase 1 - 2030					
a	Improvement of access roads to Cree communities					
b	Railway between Matagami and Rupert River					
c	Railway between Grevet and Chapais					
d	Transfer center at KM 257 of the Billy-Diamond Highway					
	Phase 2 - 2035					
e	Route 167 to Trans-Taiga Road					
f	Railway between Rupert River and Radisson					
g	Billy-Diamond Highway to Kuujjuarapik-Whapmagoostui					
	Phase 3 - 2040					
h	Trans-Taiga Road to Schefferville					
i	Railway between Radisson and Kuujjuarapik-Whapmagoostui					
j	Port in Kuujjuarapik-Whapmagoostui					

17 To what extent could this program encourage your company to develop new economic activities or partnerships in Eeyou Istchee Baie-James? Please explain.

18 Which features of the proposed infrastructure and services might be of greater interest to you as a user and should be prioritized?

19 How might the program affect your economic partners (suppliers, customers, joint ventures, employees, etc.)?

20 What do you think are the benefits to the communities of the various program components?

21 What do you think are the disadvantages to the communities of the various program components?

22 Comments

La Grande Alliance Infrastructure, Feasibility and Pre-feasibility Studies

C ***Survey of Economic Development Agencies***

Presentation

Within the framework of La Grand Alliance, the Cree Development Corporation mandated Stantec-Desfor-SYSTRA and WSP to carry out the feasibility and pre-feasibility studies for Phases I, II and III of La Grand Alliance infrastructure in Eeyou Istchee Baie-James. The purpose of this survey is to identify the needs of businesses and communities. We thank you for your participation.
Please be assured that the information you provide will remain strictly confidential.

I - General Information

1. Provide general information about your organization.

Name of the organization: _____ Mission _____
Territory : _____ Services provided _____
Related organizations : _____

Establishment

Address: _____ City: _____ Postal Code: _____
Respondent _____ Tel: _____ Email: _____

II - Perspectives and Development Projects

2. Overall, what would be the projections of population and economic development) of your local or regional community over the medium and long terms?
What factors are expected to influence this outlook?

3. What would be the long-term effects of population / economy projections on your local or regional community regarding service needs, training, and employment?
infrastructure, development, etc.?

4. What factors are expected to promote or limit business development in your community in the medium and long term?

5. For planned or contemplated economic development projects, provide the following information.

	Development Project	Sector of activity	Products	Market served	Nb direct employees*	Promoter**	Stage of progress***	Financing	Timeframe for completion	
									Opening	Full Utilization
A										
B										
C										
D										
E										
F										
G										
H										
I										
J										

** Number of full-time equivalent jobs in the company at cruising speed (full volume).*
*** Name of the promoter and its qualification (local, Aboriginal, Band Council/Nation, private outside, government, foreign, etc.).*
**** Market study, feasibility study, bank evaluation, financing obtained, etc.*

6. For the planned or contemplated economic development projects listed in Question 5, indicate the anticipated annual production volumes for the following periods.

	Development Project	Products (outputs)	Units (t/yr, m3/yr, …)	Quantity					
				2022-2024	2025-2029	2030-2034	2035-2039	2040-2044	2045+ *
A									
B									
C									
D									
E									
F									
G									
H									
I									
J									

**If foreseeable, indicate year of cessation of activities.*

III - Future Transportation and Project Interest

7. For these same economic development projects, specify the intended mode(s) of transportation for outbound and inbound shipping (Do not consider La Grand Alliance transportation infrastructure program)

	Development Project	Products (outputs)	Mode of transportation envisaged	Goods received (inputs)	Mode of transportation envisaged
A					
B					
C					
D					
E					
F					
G					
H					
I					
J					

8. For each of La Grand Alliance transportation infrastructure program components, indicate which of the projects identified in Question 5 are of interest for the transportation of goods or movement of people? Indicate how and to what degree.

		Interest	Foreseeable Impact on the Following Elements (Specify)			
		(identify projects by letter in Q5)	Organization and transport conditions	New markets served (which ones?)	Volumes transported (% change)	Unit transport costs (% change)
	Phase 1 - 2030					
a	Improvement of access roads to Cree communities					
b	Railway between Matagami and Rupert River					
c	Railway between Grevet and Chapais					
d	Transfer center at KM 257 of the Billy-Diamond Highway					
	Phase 2 - 2035					
e	Route 167 to Trans-Taiga Road					
f	Railway between Rupert River and Radisson					
g	Billy-Diamond road to Kuujjuarapik-Whapmagoostui					
	Phase 3 - 2040					
h	Trans-Taiga Road to Schefferville					
i	Railway between Radisson and Kuujjuarapik-Whapmagoostui					
j	Port in Kuujjuarapik-Whapmagoostui					

9 What are the people movement needs of your community with respect to the road and rail infrastructure identified in one of the three following components?

*The La Grand Alliance Program

*The road infrastructure

*The rail instructure, communities to be served _____ Frequency of the rail line _____

10 To what extent the program components would encourage business development or economic partnership in Eeyou Istchee Baie-James? If so, please explain.

11 Which features of the proposed infrastructure and services would encourage their use and should be prioritized?

12 What would be the impact on your economic partners (suppliers, customers, joint ventures, employees, etc.) that could result from the program?

13 What do you think are the benefits to the communities of the various program components?

14 What do you think are the disadvantages to the communities of the various program components?

15 Comments

B - LEGAL FRAMEWORK AND AGREEMENTS

LAND CATEGORIES

Under the JBNQA, the territorial regime is a deciding factor in land utilization. It provides for the division of the territory into Category I, II and III lands.

Category I lands are reserved for the exclusive use of the Crees. Those lands may be used for residential, community, commercial, industrial, or other purposes. In addition, the Crees and Inuit have exclusive hunting, fishing, and trapping rights. They also have exclusive rights to operate commercial fisheries and outfitting.

Category II lands are contiguous to Category I lands. Those lands are part of the Québec public domain, but the Crees and Inuit still have exclusive hunting, fishing, and trapping rights. They also have exclusive rights to operate commercial fisheries and outfitting.

Category III lands represent all the lands in the territory covered by the Agreement that are not included in Category I and II lands. Category III lands fall under the domain of the State. To this end, the Ministère de l'Énergie et des Ressources naturelles (MERN) aims to ensure the management and support the development of natural resources and, more broadly, of the territory of Québec in a sustainable development perspective. As such, it participates in the development of the territory and the management of its natural resources. On Category III lands, the mining rights belong to the provincial government. The territory also includes state forests under the responsibility of the Ministère des Forêts, de la Faune et des Parcs (MFFP). On these Category III lands, although hunting and fishing are permitted for both Aboriginal and non-Aboriginal people, certain wildlife species are reserved for Aboriginal hunting and fishing activities. In addition, the Crees have exclusive trapping rights for furbearers.

The application of the JBNQA also introduces the social and environmental assessment process aimed at the privileged participation of communities in the protection of their rights and guarantees, notably through the consultations and representations provided for. With the provisions of the Northeastern Quebec Agreement (NEQA), an environmental protection regime is also applicable to the Naskapi territory (including the Moinier region) while also ensuring community participation in the environmental assessment process for projects.

The Cree and the Inuit hold the rights to the local administration on Category I land (Turcotte, 2019). However, there are differences between Cree and Inuit Category I land.

Cree category I lands may be used for residential, community, commercial, industrial, or other purposes. There are two types of tenure for Cree Category I land. IA lands are reserved for the exclusive use and benefit of Cree local governments. They have been transferred from Quebec to the Government of Canada for governance, administration, and control. Although the federal government manages these lands, Quebec has retained its base ownership. They are therefore considered to be in the public domain of Quebec. IB and Special IB lands are privately owned. They have been transferred by letters patent to the Cree Land Holding Corporations which can only sell or transfer them to the Government of Quebec.

The title to Inuit Category I land was transferred to Inuit Community Corporations, now known as The Landholding Corporations, for Inuit community purposes. Each community was given about 243 square miles (sq. mi.) or 629.4 square kilometres (km^2). Although category I lands are owned by the Inuit communities of Nunavik, the subsurface and the mineral rights are owned by the Gouvernement du Québec. However, Quebec cannot extract minerals in the subsurface without the permission of the local village and without compensation. Category I lands cannot be sold or given up except to the Crown-in-right of Quebec. The total area of Inuit Category I lands may, at no time, be

greater than 3,130 sq. mi. (8,107 km^2) without the consent of Quebec or be less than 3,130 sq. mi. (8,107 km^2) without the consent of Inuit.

The Eeyou Istchee James Bay Regional Government (EIJBRG) is the only regional government in Quebec. It includes ten Cree communities in Northern Quebec (Waswanipi, Ouje-Bougoumou, Mistissini, Nemaska, Waskaganish, Eastmain, Wemindji, Chisasibi and Whapmagoostui, four Jamesian municipalities (Chibougamau, Chapais, Lebel-sur-Quévillon and Matagami) and three Jamesian communities (Valcanton, Radisson and Villebois). This provision was introduced with the Act to establish the Regional Government of Eeyou Istchee Baie-James, which was passed and assented to in June 2013. As such, the EIJBRG can also declare its jurisdiction as a regional county municipality (RCM) (EIJBRG, 2022).

The EIJBRG has adopted the planning regulations applicable to its territory of intervention, i.e., the territory other than Category I and II lands as designated by the Act respecting the land regime in the James Bay and New Québec territories (chapter R-13.1). This regulation indicates the preferred vocations for the various parts of the Category III territory, such as: housing, vacation, businesses and services, recreation and leisure, public and institutional, agriculture, forest, resources and conservation. With its application, the preferred uses of each of these zones are defined while indicating the standards to be considered for these uses (EIJBRG, 2020).

Tradition, Way of Life and Income Security

The JNBQA includes a minimum family income program for the Cree who want to maintain wildlife harvesting way of life (Turcotte, 2019).

The JBNQA provides for accessibility to all development programs and economic benefits for the Crees and Inuit to increase their participation in the modern economy through their own entities and associations, as well as priority hiring of Crees and Inuit.

The JBNQA establishes two separate programs to support harvesting activities of the Cree and Inuit. The Economic Security Program for Cree Hunters (ESP), established in 1975 and previously known as the Cree Hunter and Trapper Economic Security Program (ESP), guarantees annual income, benefits, and other incentives to the Iyiyiwch who choose hunting, trapping, and fishing as their primary activities, as a way of life. This program is delivered by the Cree Hunters Economic Security Board (CHESB), which is a bipartisan organization composed of six members: three are appointed by the government of Quebec and three by the Cree Nation Government. The Board also regroups the ten Cree communities. The program has a maximum number of days payable per adult and an overall limit for all claimants of 350,000 person-days per program year. Generally, the annual limit is 240 payable days per adult, but the limit does not exceed 119 days if the claimant's status is semi-active and 120 days for a new application or re-enrollment (CHTISB, 2021). After almost half of a century of existence, the main outcome of this program has been to "maintain the domestic economy, that is, to preserve and perpetuate a way of life [...] openly threatened by modern hydroelectric projects" (Colette and Larivière 2010, 124) for some communities, by mining or logging for others.

A program of support is established for Inuit hunting, fishing, and trapping, to guarantee a supply of wild food to Inuit who are disadvantaged and who cannot engage in harvesting activities for themselves or otherwise obtain such produce. The program facilitates exchanges of wild food among Inuit communities, access to remote areas, and the conduct of search and rescue operations for the benefit of Inuit hunters, fishermen and trappers in the Territory.

Finally, the JBNQA defines the regime for the protection of the Cree and Inuit social and natural environments and their heritage, as well as their economy in relation to development activities affecting the JBNQA territory. It aims to minimize the negative impacts of development occurring in the JBNQA territory or affecting the JBNQA territory, the Cree and Inuit, or the wildlife upon which they depend. Finally, the application of the JBNQA also introduces a social and environmental assessment process that privileges participation of Indigenous communities in the protection of their rights and guarantees, notably through required consultations and representation processes.

In terms of traditional governance, Eeyou Istchee, the ancestral territory of the Crees, is composed of community territories, which are divided into extended family-based hunting grounds called *nhodo istchee* (Feit, 1989 ; Scott, 1988). The Crees refer to them in English also as traplines in an interchangeably manner in the context of the "contemporary cohabitation of land tenure systems" and the entanglement of "varied forms of territoriality" (Chaplier and Scott 2018, 51) on their ancestral territory. Family hunting territories are important markers of the political and cultural identity of Cree communities and the Cree Nation.

Each *nhodo istchee* is managed by and is overseen by a tallyman, *nhodo uchimaw* (or *uuchiimaauch),* also referred to as the 'hunting boss' (Scott, 1986, 1988), a name that is interchangeable for the Crees with tallyman[18] (Chaplier and Scott 2018, 51).

The Crees who occupy these territories are part of the immediate and distant kin of the nhodo uchimaw, i.e. the nuclear family and the extended family. The Tallman's responsibility is to ensure the proper management of the traditional hunting, fishing and trapping activities to guarantee their long-term practice. Their responsibilities also include oversight of compensation measures related to hydroelectric, forestry and mining exploitation, such as maintenance of mining and forestry roads, assumption of responsibility for any material deterioration in the hunting camps or sharing of firewood and impacts related to the presence of non-resident such as vacationing, sport hunting and fishing, etc.

Another criterion for occupation is the principle of rotation of the *ndoho istchee*. This rotation consists of allowing members of a family to let their *ndoho istchee* or part of it regenerate for one or more years. In that case, they could be invited to the ndoho istchee of one or more other families during this period, before returning the favor in subsequent years. Specific individuals, outside of any family connection to the *nhodo uchimaw*, may also be invited to occupy the *ndoho istchee*, and this factor appears to have contributed most to the growth in occupancy of the southern *ndoho istchee* (Chaplier and Scott 2018).

The criteria for an individual to be invited may be the individual's knowledge of a particular area, hunting skills, friendship, or the need for additional labour in times of abundance or scarcity of certain resources or in the absence of regular family members. It may also be the case that a person is allowed to set up a camp because of the inaccessibility of his or her own camp due to the lack of an access road, physical inability to get there, or remoteness, often coupled with insufficient economic resources.

The transmission of the nhodo istchee and the responsibilities that go with it is done within the kinship of the nhodo uchimaw. The new nhodo uchimaw is the one whose knowledge of the territory is the most recognized within the kinship to guarantee its good management. This is usually the eldest son of the nhodo uchimaw, but younger sons, cousins, and even women (elders, juniors, or cousins) may be recognized as the future nhodo uchimaw. There may be conflicts in the transmission of nhodo istchee, with one relative claiming the title against the advice of the nhodo

[18] The term "tallyman" represents the responsibility acquired by the uchimaw nhodo during the fur trade period, i.e., managing the fur inventory, which required tallying up the furs before they were delivered to the traders at the trading posts (GNC 2002, 6).

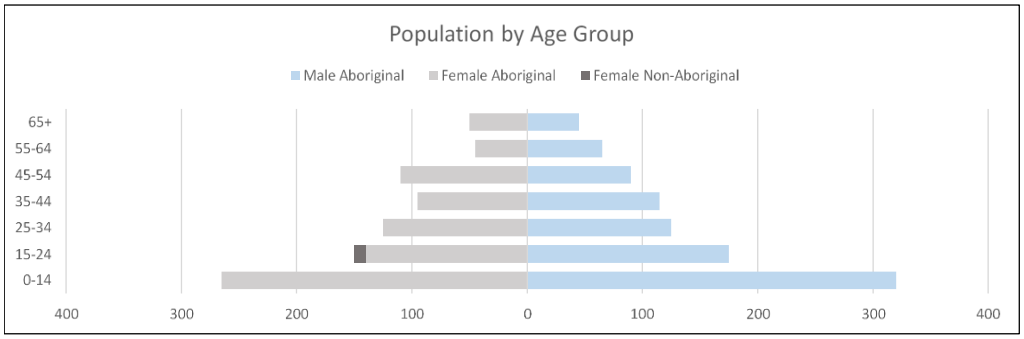
uchimaw or the family. These conflicts over the transfer of territorial authority may have been exacerbated by the subdivision of family hunting territories after 1975 and the setting of family hunting territory boundaries for the James Bay and Northern Quebec Agreement and in subsequent decades under the pressure of population growth.

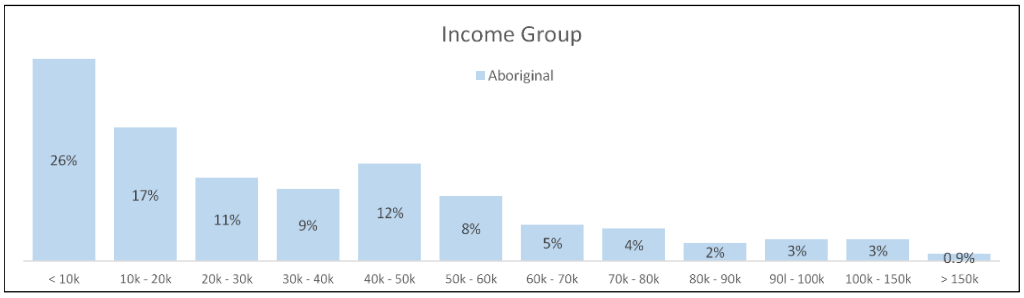
Traditional hunting grounds were given official recognition and registered as “traplines” in the 1930s and 1940s following a collapse in beaver population triggered by trapping by settlers (Scott, 1988). At the time, the government recognized that this customary system would ensure the conservation of fur resources. Despite the imposition by the State of other institutions (e.g. rules proceeding from the Band Council), the hunting territory system remains legitimate and relevant (particularly on the land but increasingly in contexts of formal, shared jurisdiction between Crees and the State), reinforced in recent years through its recognition in the James Bay and Northern Quebec Agreement (JBNQA) and the more recent Agreement Respecting a New Relationship between the Cree Nation and the Government of Quebec (CQA) which gives the *uuchimaau* a formalized role (Scott, 2002).

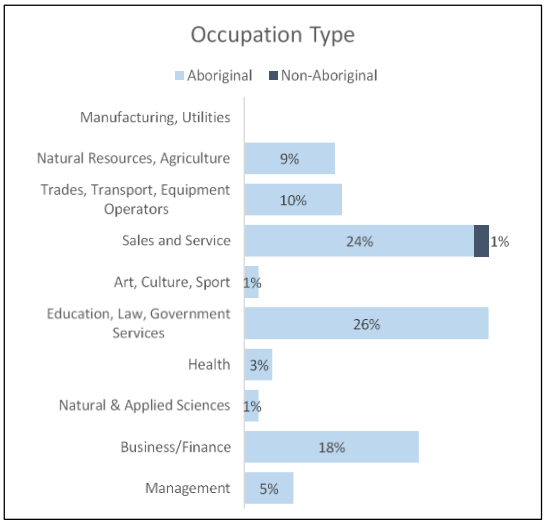
C - COMMUNITY PROFILES

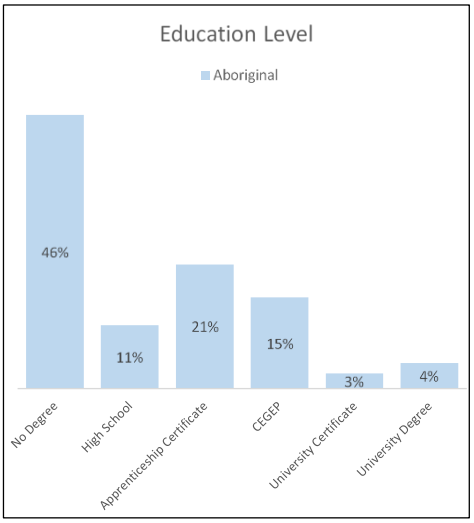
WASWANIPI "Light on the Water"

Key Stats (2016) | Population: 1,760 | Med. Age: 23.9 | Med. Income: $26,736 | Aboriginal Population: 98%







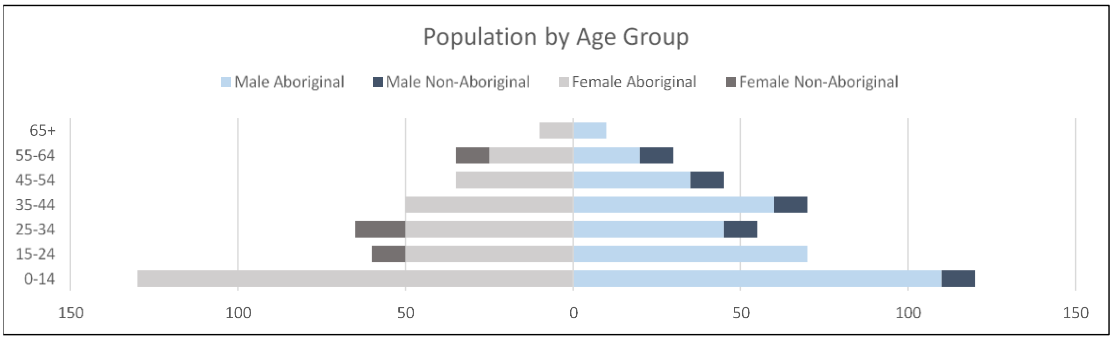


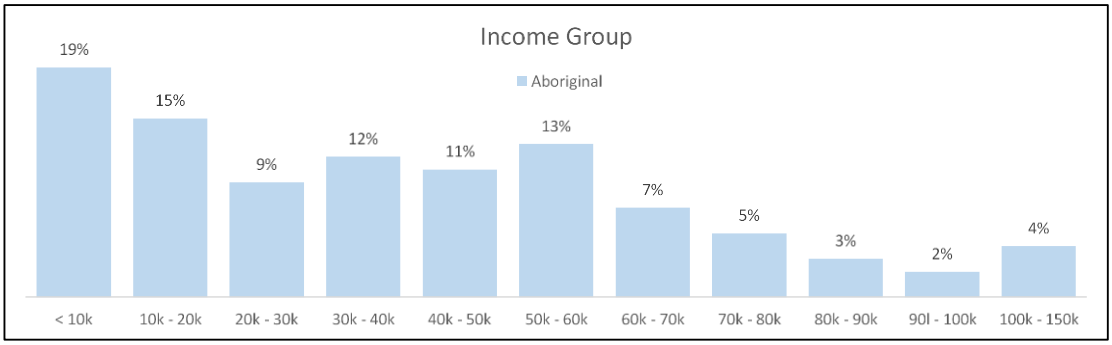
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs	15				81		5	51	8		117	239	127	64	706

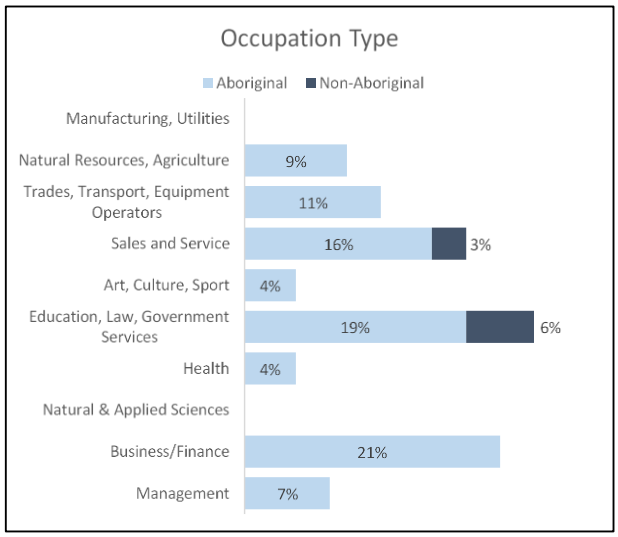
The Cree Nation of Waswanipi is the southern-most of the Cree communities. It is located at the junction of 3 rivers: Opicawa, Chibougamau and Waswanipi, the traditional trade and transportation routes for the Waswanipi Eenouch. Being the gateway to forestry, and mining activities further North, Waswanipi struggles in coping and limiting the impacts of these industries on their lands and livelihoods.

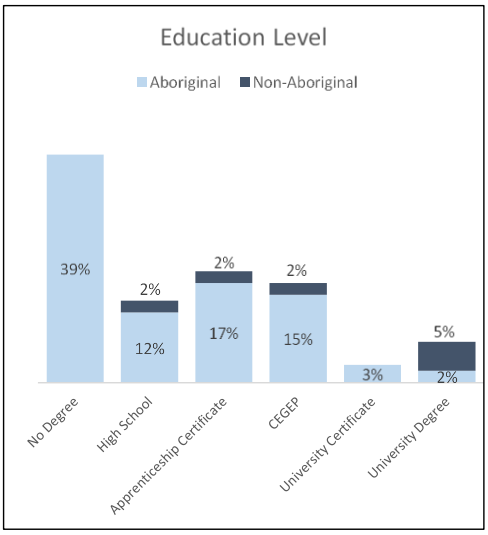
OUJÉ-BOUGOUMOU "The Place Where People Gather"

Key Stats (2016) | Population: 735 | Median Age: 25.1 | Median Income: $36,480 | Aboriginal Population: 91%







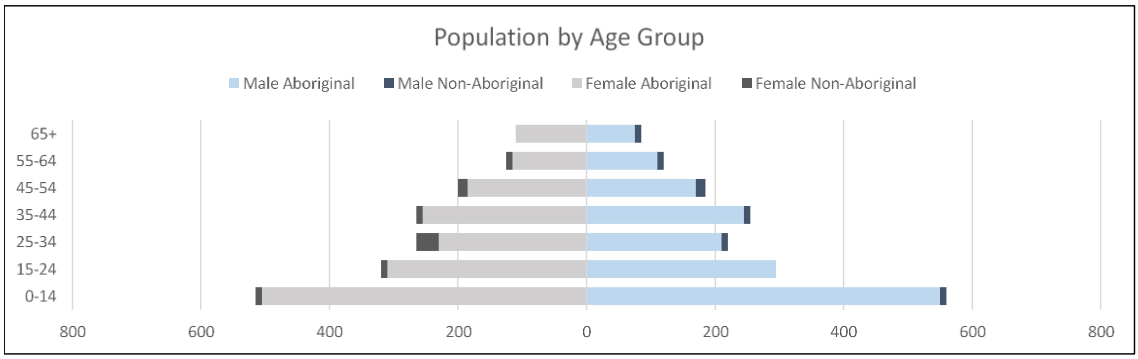


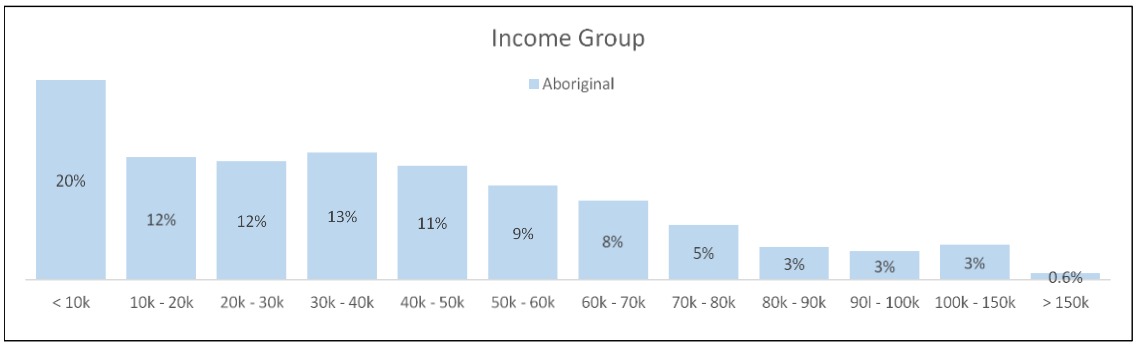
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs			62		128	3		42	38	52	85	75	122	50	654

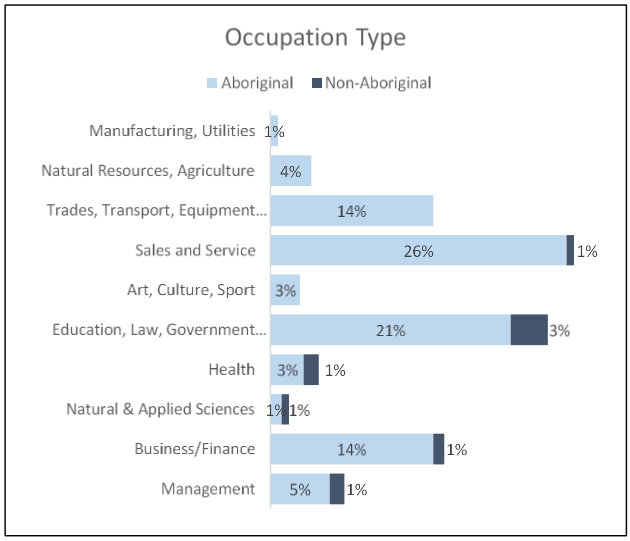
Ouje-Bougoumou is home to various attractions such as the "Aanischaaukamikw" Cree Culture Institute, Capassisit Lodge, Cultural Village and Cree Culture tours. The community is known for its stunning architecture, and has won multiple awards for it, including the United Nations “We the Peoples” Award, in recognition for the efforts in constructing the new village. In recent years, the community has focused on developing service-sector enterprises, sustainable forestry, and culture-based tourism. These three pillars look to grow the community and its economy towards self-sufficiency in the years to come.

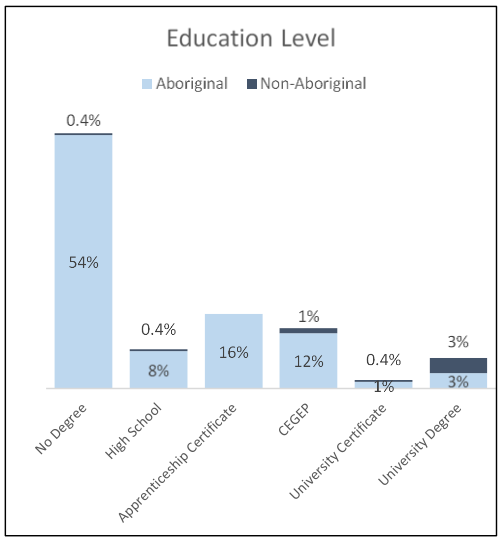
MISTISSINI "Big Rock"

Key Stats (2016) | Population: 3,515 | Med. Age: 26.4 | Med. Income: $35,392 | Aboriginal Population: 95%







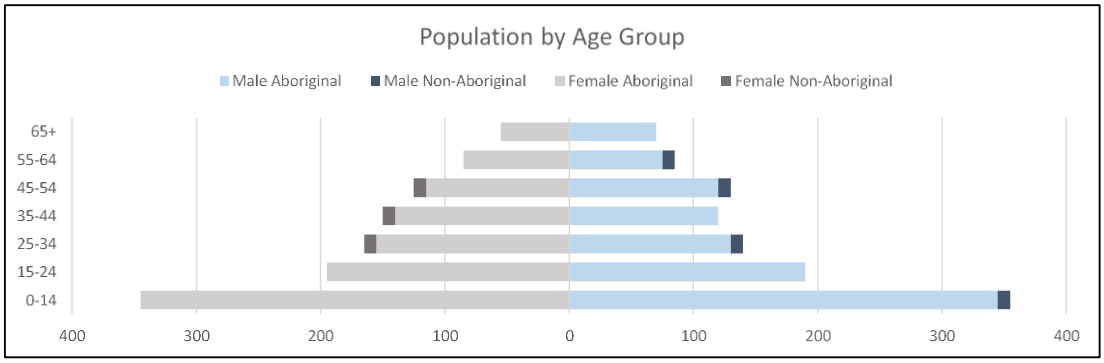


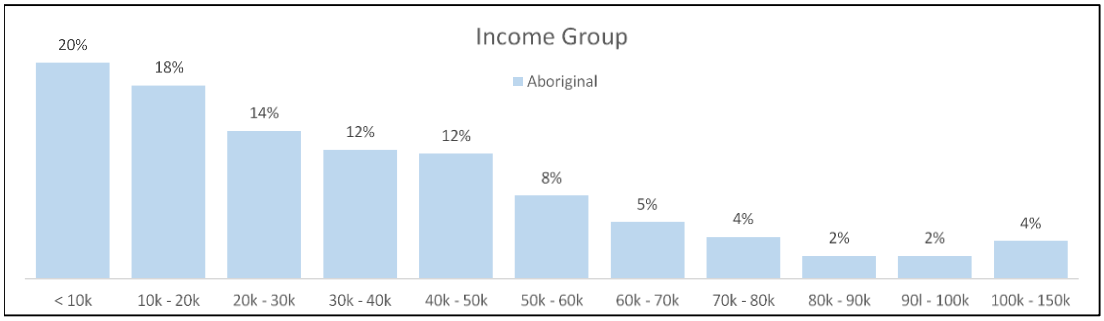
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs	15		753		525	15	27	319	27	67	156	188	232	71	2392

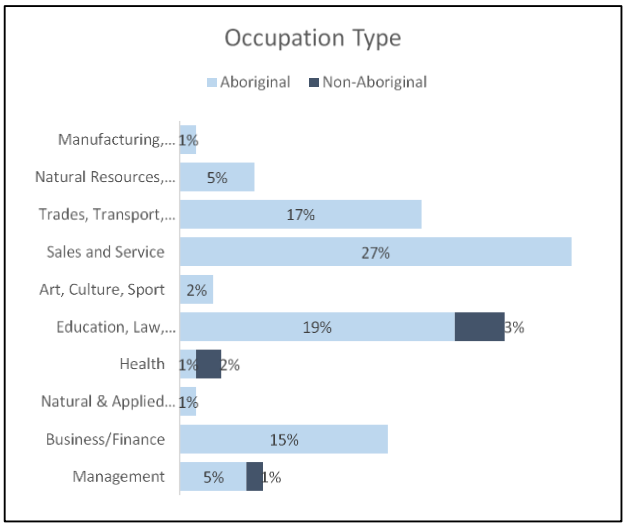
Mistissini is one of the larger Cree communities within the Eeyou Istchee territory, with a population of almost 4,000 people.

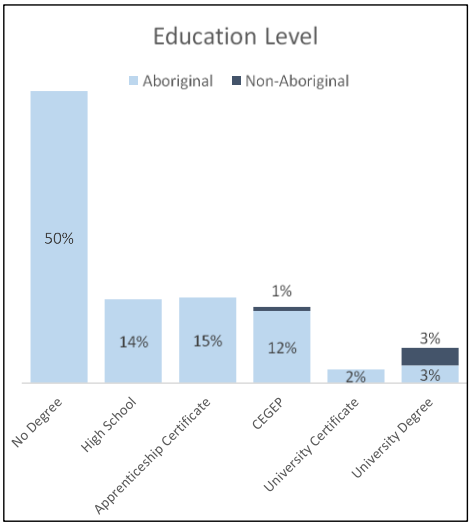
WASKAGANISH "Little House"

Key Stats (2016) | Population: 2,195 | Med. Age: 25.4 | Med. Income: $28,832 | Aboriginal Population: 97%







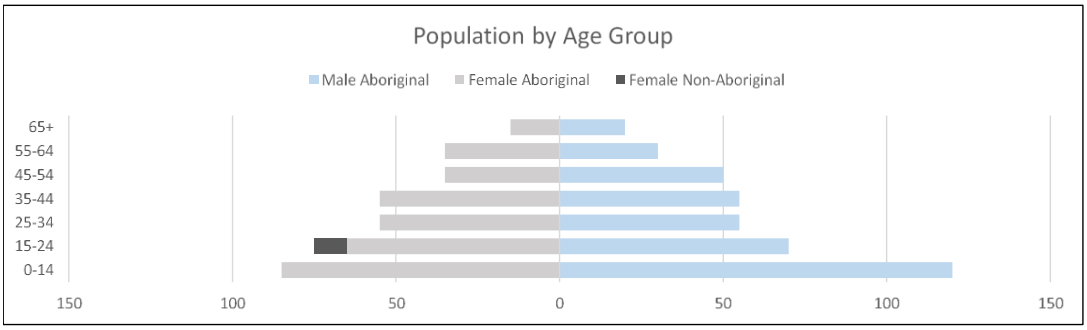


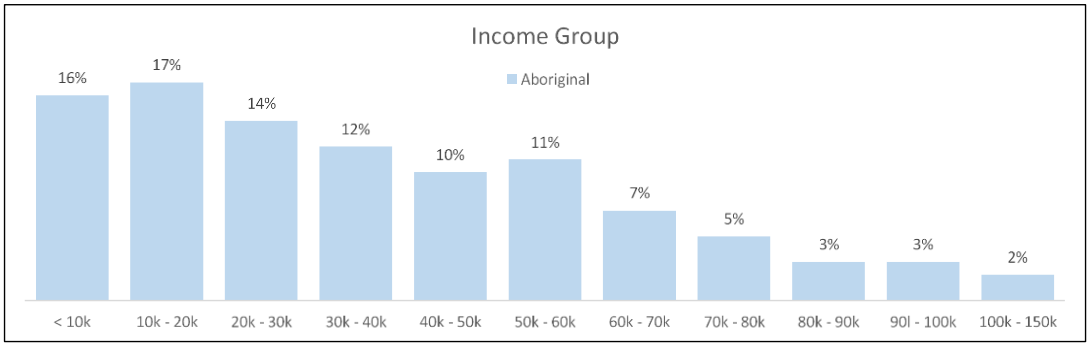
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs					252	15		112	29	47	37	150	463	95	1197

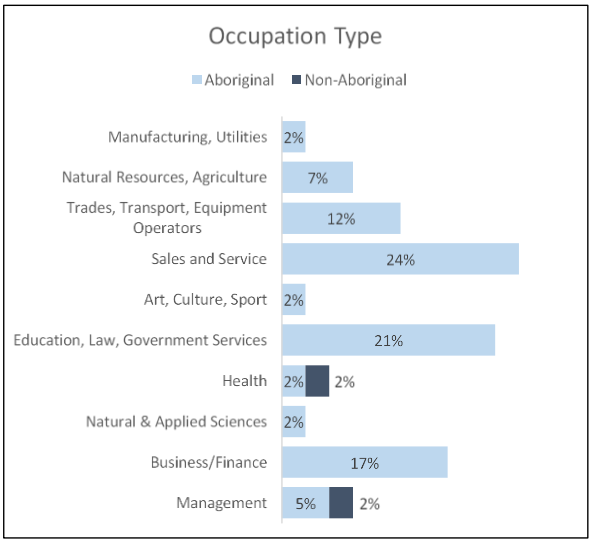
Waskagnish is located at the mouth of the Rupert River and James Bay. Originally an old Hudson' Bay Company trading post, it is a tourist destination all year round. Although relatively isolated from the rest of the Cree territory, it is also accessible by daily flights through airCreebec from Montreal. Trapping remains an important contributor to the local economy as well as a source of cultural and spiritual values. Many consider the community and its territory as one of North-America's premier destination for migratory birds.

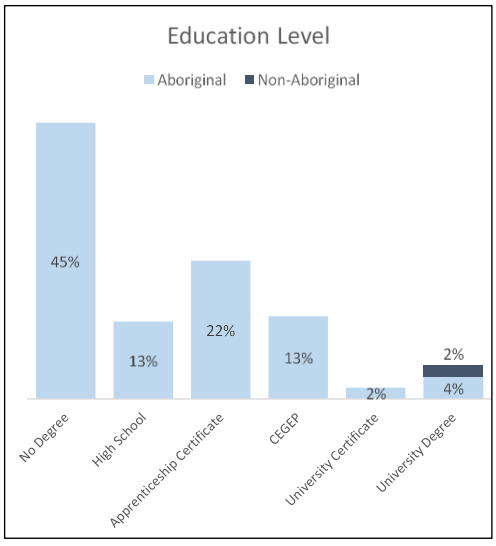
NEMASKA "Where There is Plentiful of Fish"

Key Stats (2016) | Population: 760 | Median Age: 27.4 | Median Income: $33,152 | Aboriginal Population: 97%







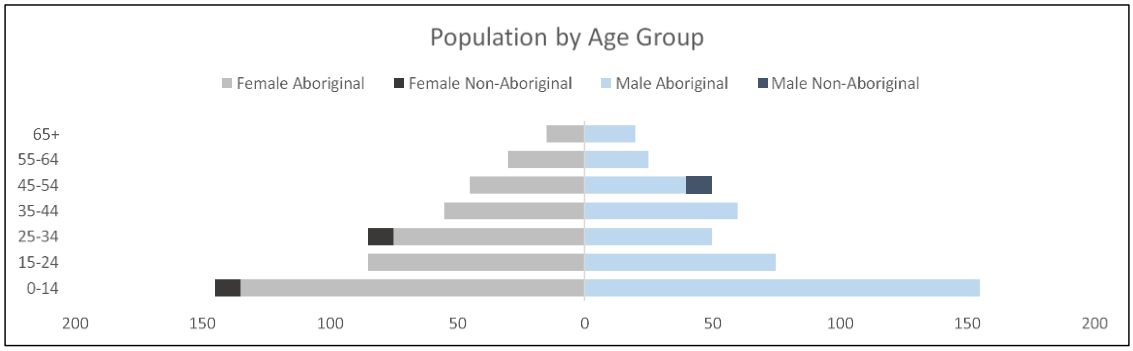


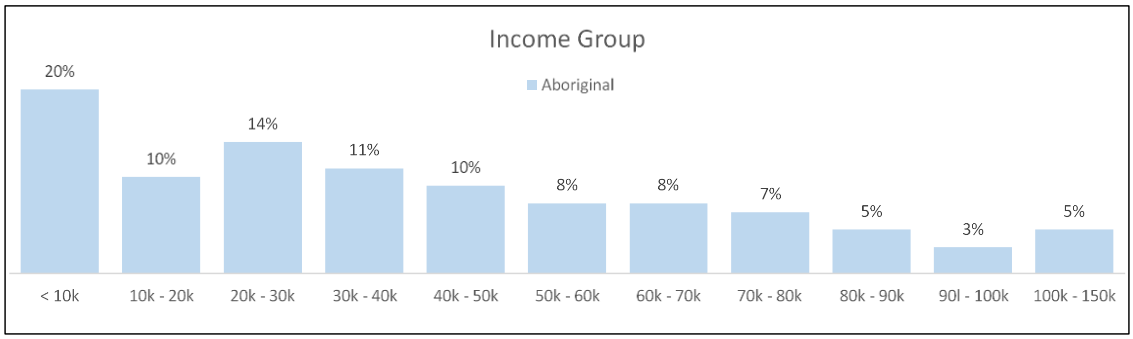
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs			5	3	109			20	25		74	35	24	50	342

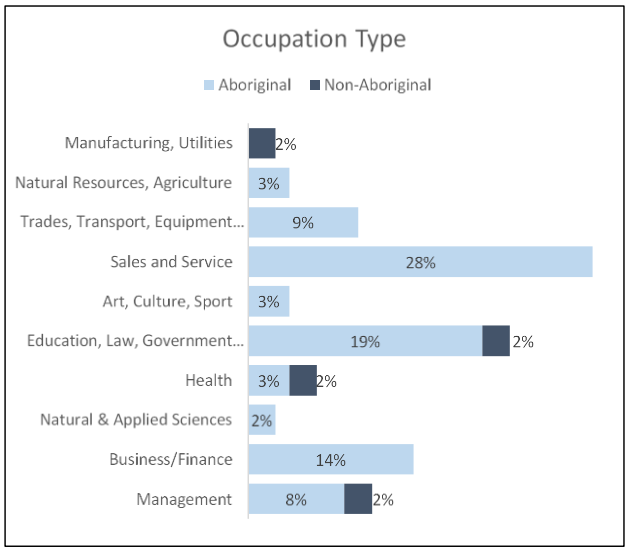
The community of Nemaska which means "Place to Fish" is nestled on the shore of beautiful Champion Lake. The community provides many different tourist activities including canoeing, camping, ice fishing, snowshoeing, dogsledding and snowmobiling. The community is also home to one of the richest lithium deposits in the world, both in volume and grade. This is a key strategic resource, as the demand for lithium salts increases for electric vehicles and energy storage worldwide.

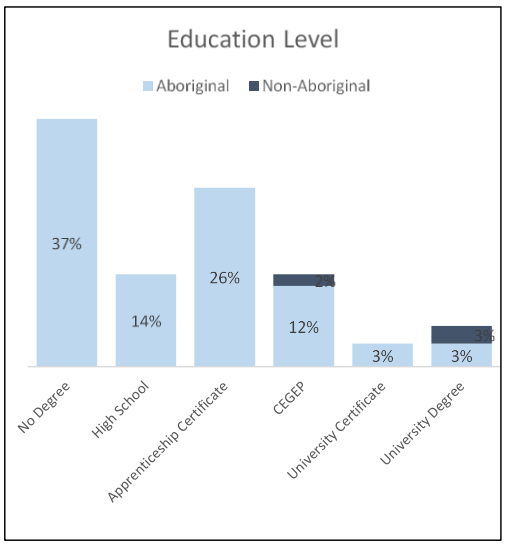
EASTMAIN "Lands East of James Bay"

Key Stats (2016) | Population: 865 | Median Age: 27.2 | Median Income: $33,600 | Aboriginal Population: 97%







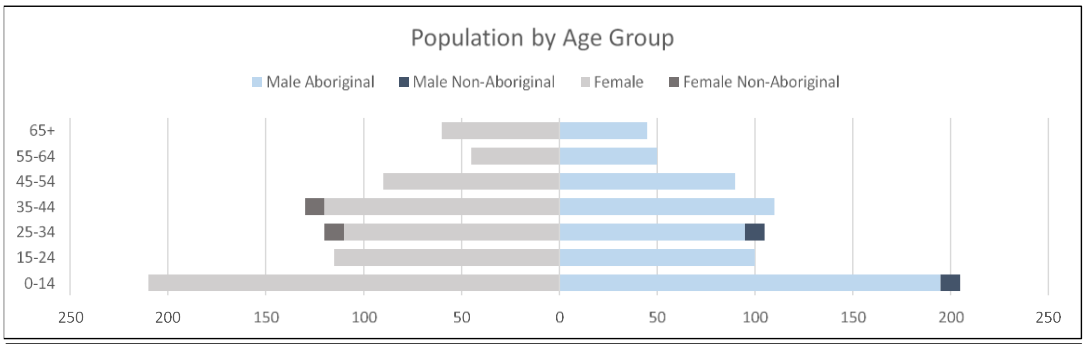


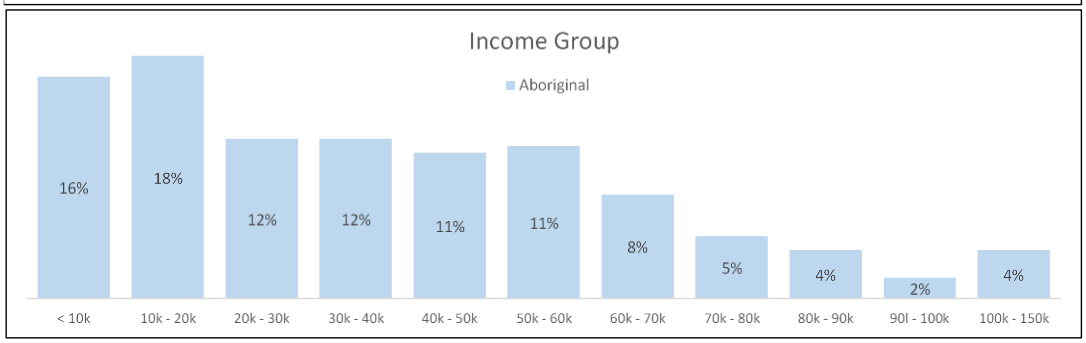
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs			3	35	174	12		34	37	5	158	75	47	92	671

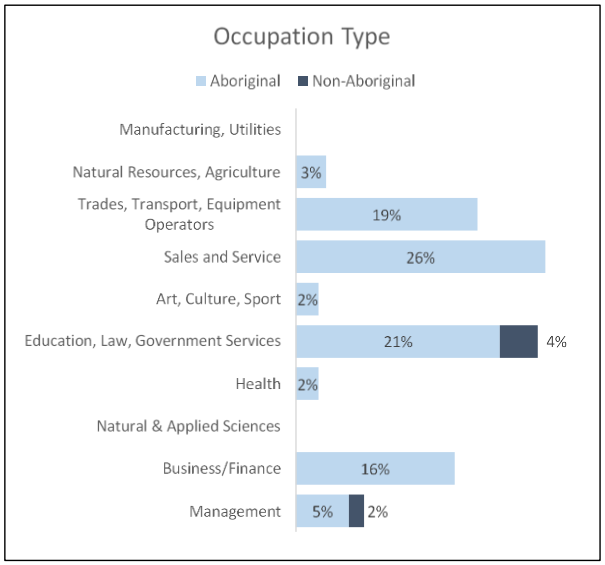
The main economic activities of the Eastmain are its services sectors. This includes a restaurant within a hotel, private businesses, and a construction company with a gas station and garage. Eastmain is also the headquarters for the Cree Regional Trappers Association, whose role is to support all local Cree Trappers by maintaining the practices of their traditional activities.

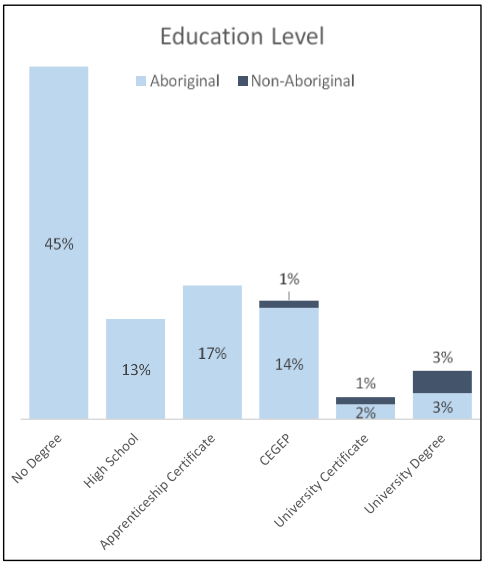
WEMINDJI "Red Ochre Mountain"

Key Stats (2016) | Population: 1,440 | Med. Age: 29.6 | Med. Income: $34,970 | Aboriginal Population: 96%







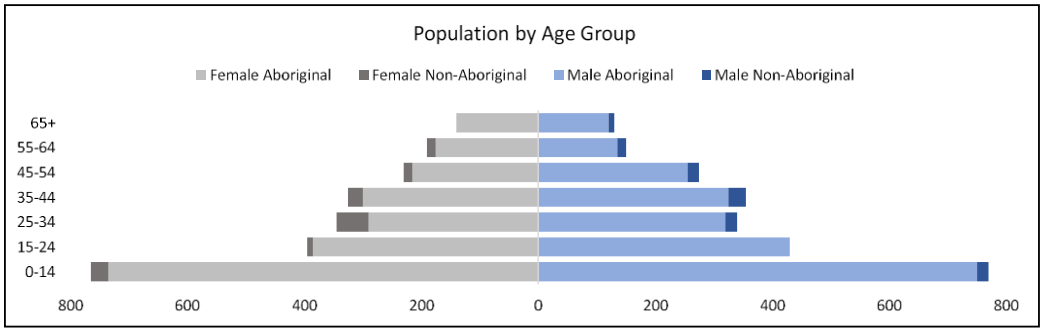


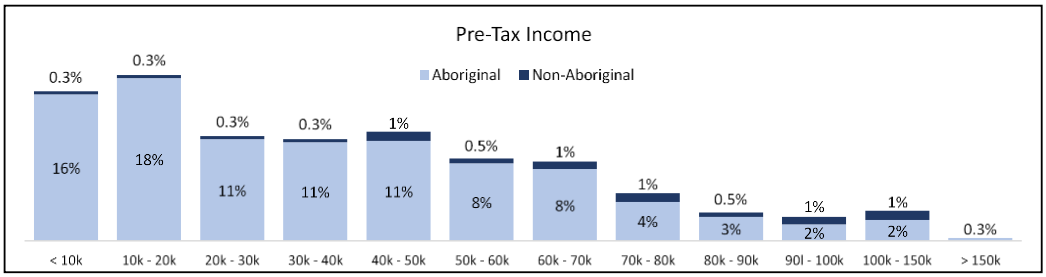
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs	150		830		245			200	34	162	88	75	237	99	2119

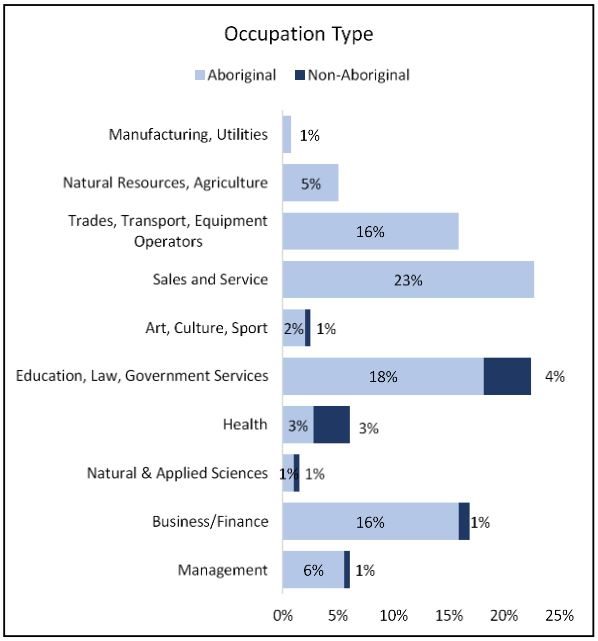
Wemindji has seen incredible growth as a community, now totalling more than 1,400 people. This town is an economic leader and community development giant in the region, known for being one of the fastest growing communities in Cree history. Wemindji is also home to the corporate headquarters of the Tawich Development Corporation, one of the leading construction companies in Eeyou Istchee.

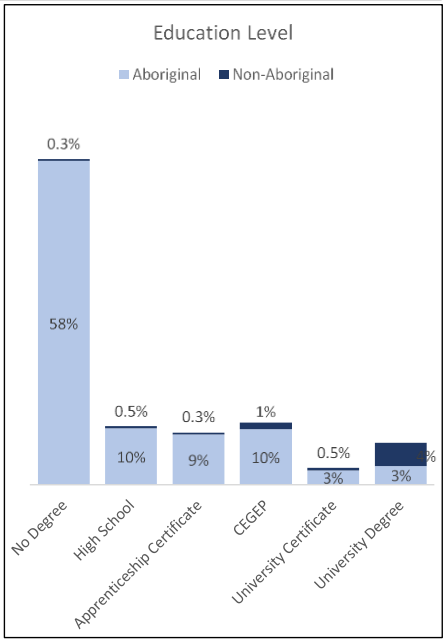
CHISASIBI "Great River"

Key Stats (2016) | Population: 4,840 | Med. Age: 25.8 | Med. Income: $34,000 | Aboriginal Population: 95%







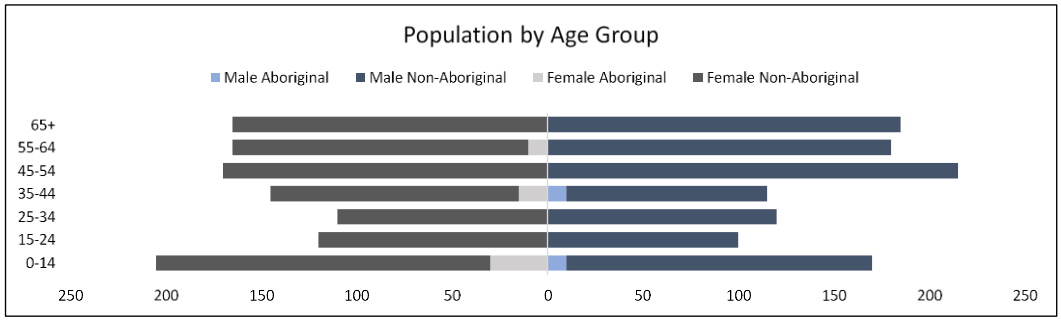


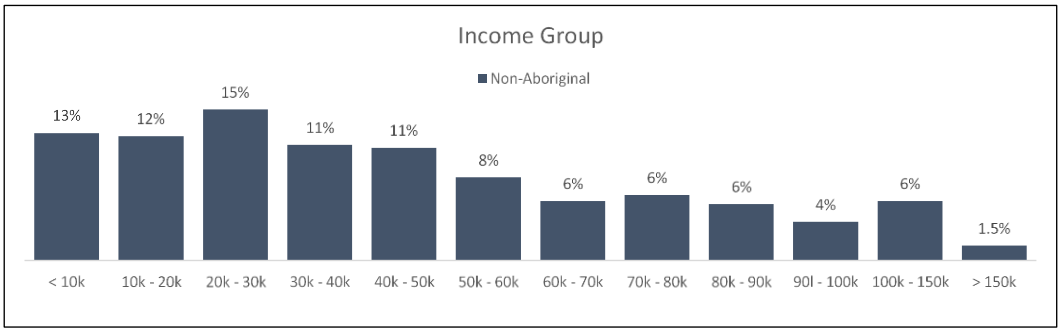
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs					1586	3		173	15	12	78	390	364	104	2726

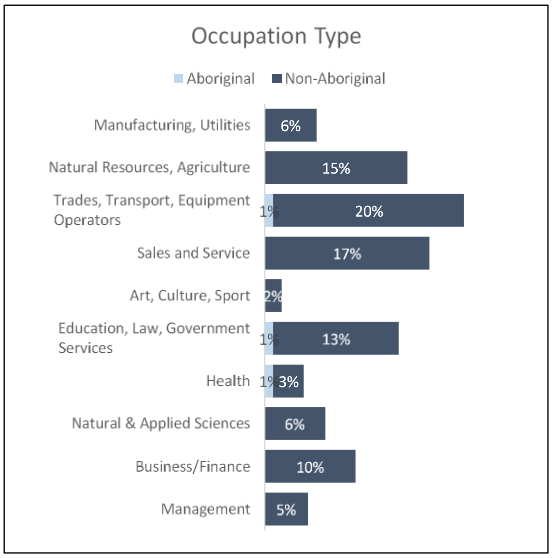
The largest of the 9 Cree community in the Eeyou Istchee territory, Chisasibi is also the northernmost community accessible by road. With daily flights from the local airport, Chisasibi is easily accessible to both aboriginal and non-aboriginals alike. Being a central travel hub, Chisasibi already has the required infrastructure in place to attract tourists year-round. Due to this fact, Chisasibi is expected to keep growing over the short and long-term.

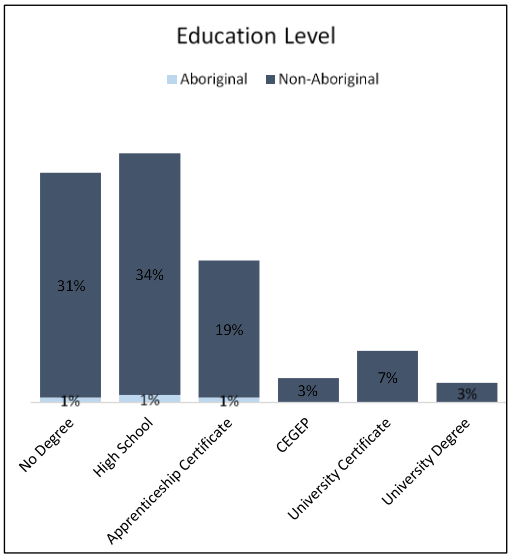
LEBEL-SUR-QUÉVILLON

Key Stats (2016) | Population: 2,160 | Median Age: 44.7 | Median Income: $38,468 | Aboriginal Population: 3%







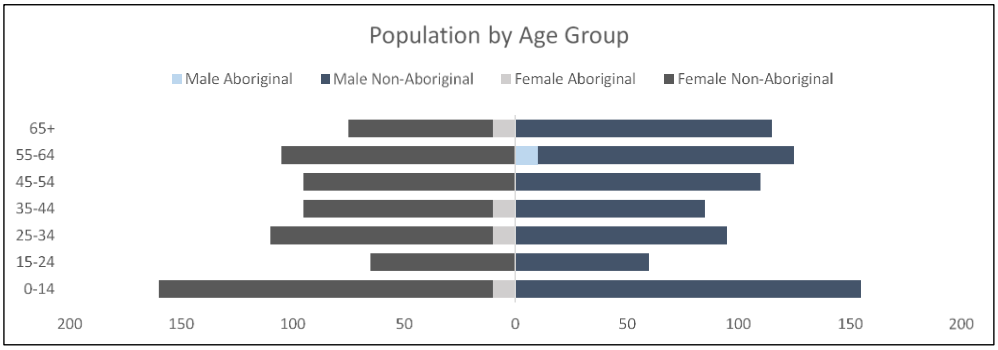


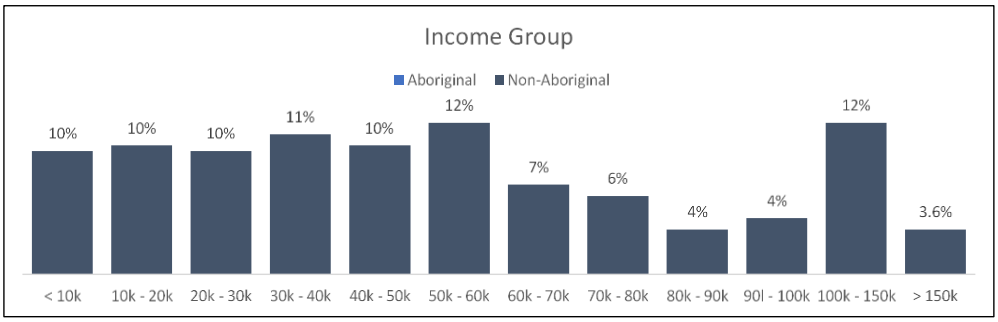
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs															0

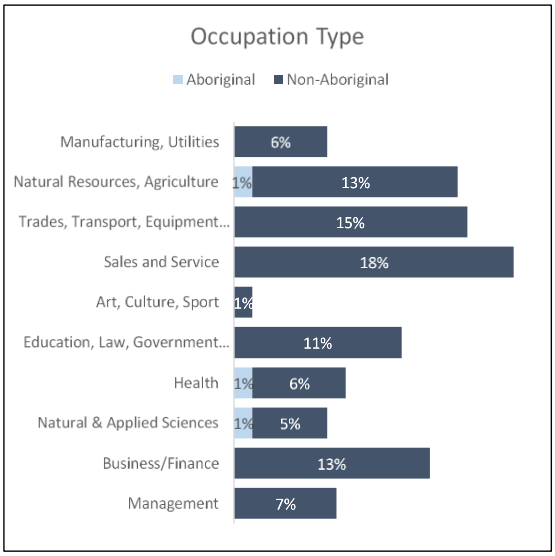
Since the closure of the pulp mill plant in 2000, a significant emigration from the community had been noticed. In November 2019, the pulp mill reopened, employing approximately 300 people at an average salary of $90,000 per year which has since stabilized the population. The mill sources softwood chips from sawmills in Quebec to product approximately 300,000 tons of pulp annually. The city is also well known for its hunting, fishing, and hiking trails and is a perfect setting for anyone who loves the great outdoors.

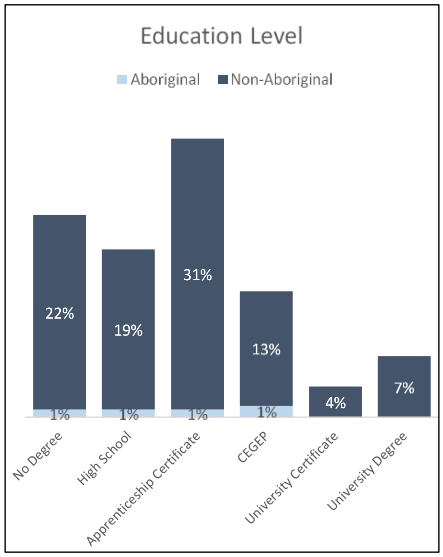
MATAGAMI "Where the Waters Meet"

Key Stats (2016) | Population: 1,445 | Median Age: 38.3 | Median Income: $34,000 | Aboriginal Population: 3%







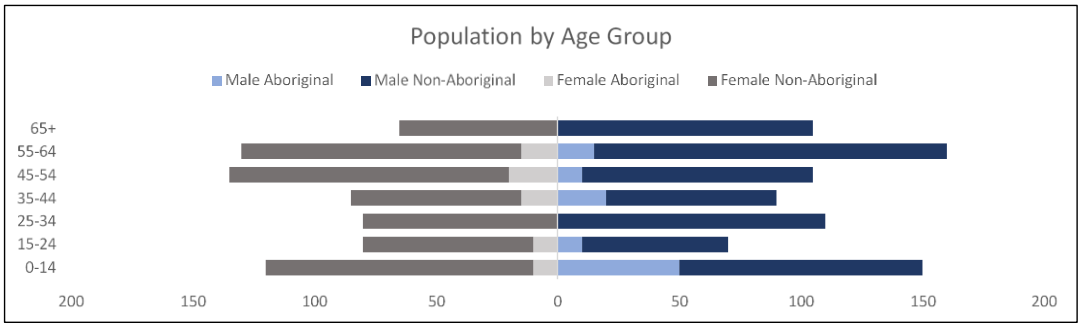


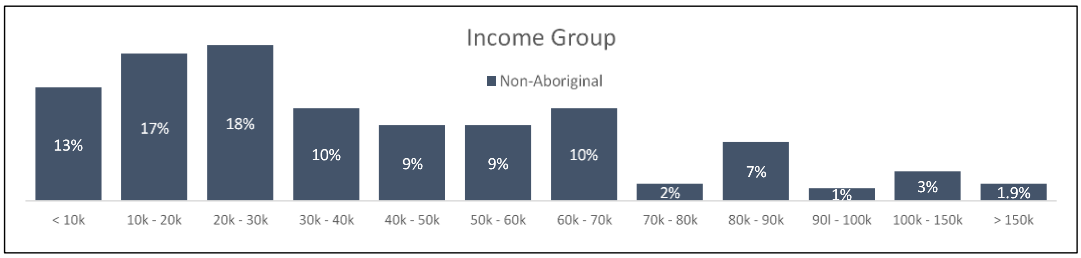
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs								3							3

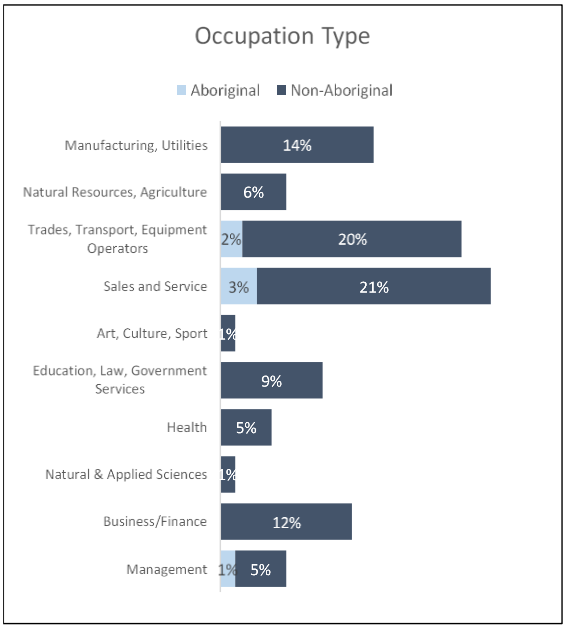
Matagami was first founded in 1963 with the development of mining in the area. The town is still largely focused in this industry, with the 2 largest employers being mining companies. In May 2021, the Government of Quebec granted $5M to upgrade the road leading to the Sunday Lake geological fault from Matagami. This project is the first under the "Memorandum of Understanding", an economic plan between the Cree, and Quebec Government, which aims to create a development hub in Matagami for mining.

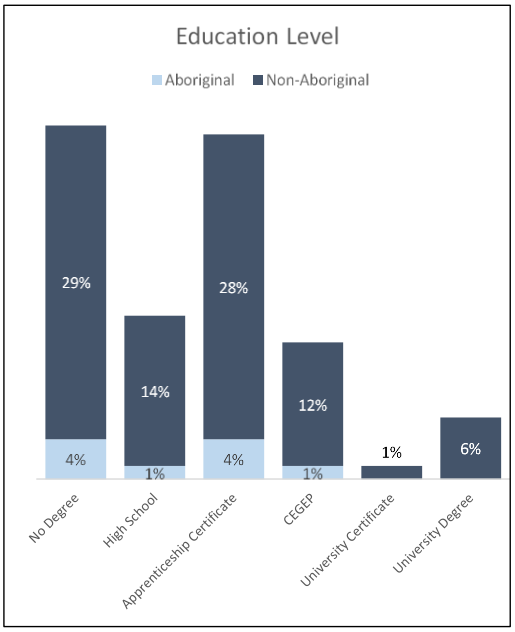
CHAPAIS

Key Stats (2016) | Population: 1,480 | Med. Age: 42.7 | Med. Income: $32,827 | Aboriginal Population: 11%







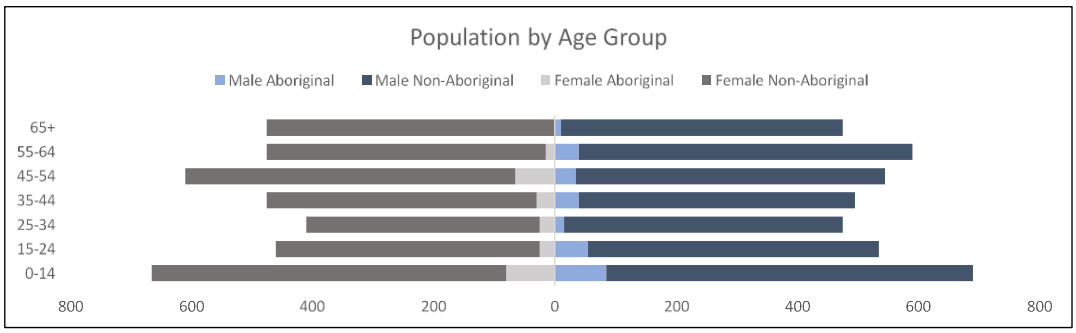


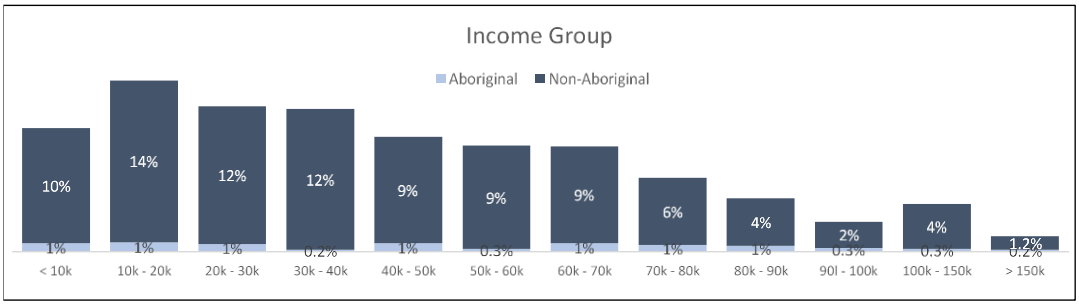
NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs								3							3

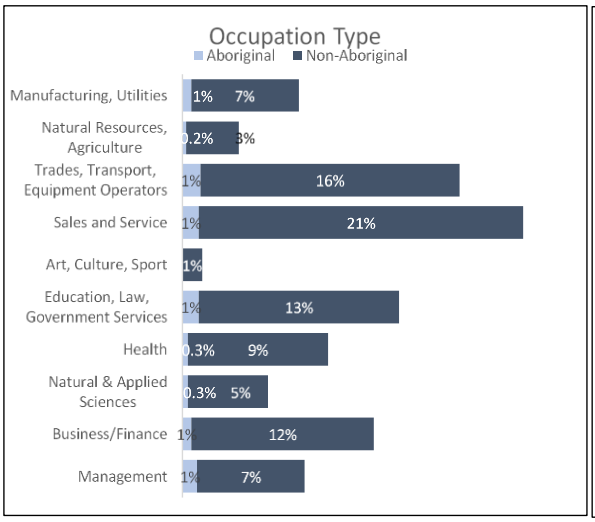
Chapais is located in the heart of the James Bay tourist region. From the yearly fishing tournament in mid-summer, to the ski-doo club which runs throughout the winter, Chapais is a tourist destination throughout the year. Additionally, since the closure of the local mine in 1991 the city has become home to the area's largest forest biomass facility, which produces electricity using waste products from the sawmills in the region. This has helped stabilize the population and grow the local economy.

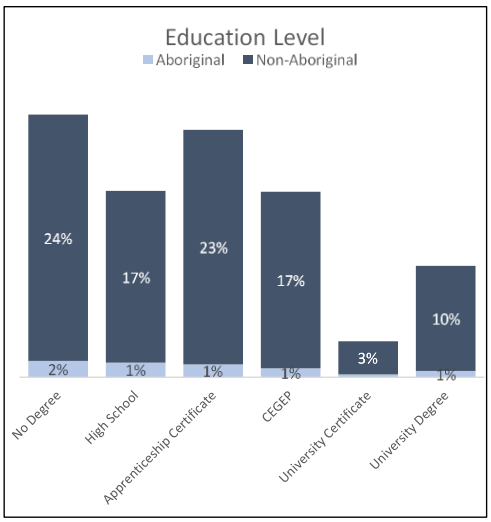
CHIBOUGAMAU "Meeting Place"

Key Stats (2016) | Population: 7,385 | Median Age: 39.1 | Median Income: $38,832 | Aboriginal Population: 7%









NAICS Classification	A	B	C	D	E	F	G	H	I	J	K	L	M	N	TOTAL
No. of Jobs			35												35

Chibougamau is the largest town in the Nord-du-Québec admirative region and therefore provides essential services to several other small communities including Mistissini, Oujé-Bougoumou, and Chapais. The population is predominantly white and French speaking, with approximately 25% being bilingual. Since 1991, the population has been steadily declining from 8,855 to 7,504 in 2016, however in August of 2021 the Quebec Government invested $87M to build 300 new homes in the region.

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