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ENVIRONMENTAL IMPACT STATEMENT SUBMITTED TO GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

PAUL F WILKINSON &
ASSOCIÉS · INC / ASSOCIATES · INC

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New Millennium Capital Corp.
1303, Greene Avenue
2nd Floor
Westmount (Québec)
H3Z 2A7

Tel.: (514) 935-3204
Fax: (514) 935-9650
Email: journeauxh@aol.com

Paul F. Wilkinson & Associates Inc.
5800, Monkland Avenue
2nd Floor
Montréal (Québec)
H4A 1G1

Tel.: (514) 448-9595
Fax: (514) 482-0036
Email: pfw@wilkinson.ca

PREPARED BY:

Paul F. Wilkinson, Ph. D.,
Environmental and Social Affairs Coordinator,
New Millennium Capital Corp.

Brigitte Masella, M.E.S.,
Associate Environmental and Social Affairs Coordinator,
New Millennium Capital Corp.

Nathalie Charland, M.Sc.,
Research Associate,
New Millennium Capital Corp.

APPROVED BY:

Robert A. Martin,
President and Chief Executive Officer,
New Millennium Capital Corp.

H. Dean Journeaux,
Chief Operating Officer,
New Millennium Capital Corp.

Jean-Charles Bourassa,
Vice-President Mines,
New Millennium Capital Corp.

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Ben Ahmed, Head Nurse, Matimekush Dispensary

Réjean Ambroise, Councillor, ITUM

David (Jean-Eudes) André, Local Coordinator, Ashuanipi Corporation, Matimekush-Lac John

Marie-Louise André, member, NIMLJ

Marie-René André, member, NIMLJ

Noël André, member, NIMLJ

Alexandre Aster, member, ITUM

André Auclair, Directeur général, Direction générale des affaires stratégiques et du territoire, MRNF, GoQ

Maeve Baird, Acting Director, Policy and Planning, Labrador and Aboriginal Affairs, GNL

Marvin Barnes, Regional Manager, Environmental Assessment and Major Projects, DFO (Newfoundland and Labrador)

Suzy Basile, Principal, Kanatamat School, Matimekush-Lac John

Chantal Basque, Acting Director, Kanatamat School, Matimekush-Lac John

Pierre Bastien, Executive Director, First Nations of Québec and Labrador Economic Development Commission

Marcella Beaudoin, Administrator, Ville de Schefferville

Denis Beaulieu, Responsable de la mise en valeur, Direction du territoire publique de la Côte-Nord, MRNF, GoQ

Denis Beaulieu, Manager, Wabush Lake Railway Company

François Beauregard, Interim Negotiator for East Claims, INAC

Richard Bell, former General Manager, Tshiuetin Rail Transportation Inc.

Elizabeth Bennett, Senior Regional Habitat Biologist, DFO (Newfoundland and Labrador)

Reg Bennett, Director, Occupational health and Safety Division, Government Services, GNL

Pierre Bernier, Agent de communication, Direction générale de la Gaspésie–Îles-de-la-Madeleine, MRNF, GoQ

Sylvie Bernier, Executive Assistant, Tshiuetin Rail Transportation Inc.

Pierre Bertrand, Senior Negotiator, Agreements, Negotiation and Implementation, INAC

Joëlle Bérubé, ingénieur, Centre d'expertise hydrique du Québec, MDDEP, GoQ

Tilman Bieger, Division Manager, Marine Environment and Habitat Management Division, DFO (Newfoundland and Labrador)

Denis Blackburn, ingénieur, Direction générale du développement de l'industrie minérale, MRNF, GoQ

Hector Blake, consultant

Gilles Blouin, consultant

Dave Bouchard, conseiller, Ville de Fermont

Simon Bouchard, Technicien en gestion du territoire publique, MRNF, GoQ

Jean Boucher, Senior Negotiator, INAC

Joël Boudreau, ingénieur, MDDEP, GoQ

Gervais Boudreault, Directeur, Société aéroportuaire de Schefferville

Sylvain Boulianne, analyste, MDDEP, GoQ

Pier-Luc Brisson, Sûreté du Québec, Schefferville

Rick Brown, consultant

Todd Burlingame, Manager, Environmental and Aboriginal Affairs, NLH

Angela Burridge, Environmental Scientist, Department of Environment and Conservation, GNL

Paul Carter, Executive Director, Natural Resources (Labrador West), GNL

Ruby Carter, Senior Advisor, Aboriginal Relations, NLH

Danie Chamberland, Directrice des services à la clientèle et des soins infirmiers, Centre de santé et de services sociaux de l'Hématite, Fermont

Jean-Marc Charbonneau, Directeur général, Direction générale du développement minéral, MRNF, GoQ

Dizzy Charland-Charbonneau, Associate Security Agent, PFWA

Jean Chartrand, Interim Director, Sectoral Strategies Directorate, INAC

John Clarke, Environmental Assessment Coordinator, NRC

Bas Cleary, Director, Environmental Assessment Division, Environment and Conservation, GNL

André Côté, Regional Director General, INAC, Québec

Pierre Côté, former Financial Advisor, Tshiuetin Rail Transportation Inc.

Manon D'Auteuil, ingénieur, Administration portuaire de Sept-Îles

Randy Decker, Senior Environmental Assessment Officer, Transport Canada

Annie Desrosiers, Agente de développement rural, Pacte rural, Centre local de développement de Fermont

Mme Desterres, member, ITUM

Paula Devereaux, Administrative Assistant, Outdoor Product, Department of Tourism, Culture and Recreation, Tourism Product Development Branch, GNL

Leo Dillon, consultant

Joseph Dominic, member, NIMLJ

Sébastien Dominic, member, NIMLJ

Christine Doucet, Senior Manager of Research, Wildlife Division, Environment and Conservation, GNL

Alonzo Drover, Owner, Drover's Labrador Outfitters Ltd.

Normand Ducharme, Directeur général, Centre de santé et de services sociaux de l'Hématite, Fermont

Brock Dumville, Industry Advisor, Sectoral Strategies Directorate, INAC

Jacques Dupont, Chef du service des projets en milieu terrestre, MDDEP, GoQ

François Dupuis, Directeur, Direction des affaires autochtones, MRNF, GoQ

Alison Earle, interim Executive Director, Women in Resource Development Committee, St. John's

Jimmish Einish, Elder, NNK

Jimmy James Einish, Deputy Chief, NNK

Philip Einish, Chief, NNK

Sampson Einish, Chair, Naskapi Education Committee

Tommy Einish, Elder, NNK

Jim Farrell, Mayor, Town of Wabush

Jean-Charles Filion, Sûreté du Québec, Schefferville

Arthur Fontaine, Clerk, ITUM

Marie-Marthe Fontaine, Councillor, ITUM

Phil Fontaine, National Chief, AFN

Pierre-Michel Fontaine, Chef de service industriel et nordique, Direction des évaluations environnementales, MDDEP, GoQ

Raoul Fontaine, member, NIMLJ

Ricky Fontaine, Economic Development Advisor, Assembly of First Nations of Québec and Labrador

Ronald Fontaine, Councillor, ITUM

Albert Fortier, homme d'affaires, Ville de Schefferville

Suzelle Fortier, femme d'affaires, Ville de Schefferville

Luc Fortin, Senior Environmental Officer, Canadian Transportation Agency

Clément Fortuna, homme d'affaires, Ville de Schefferville

Caroline Gabriel, Councillor, NIMLJ

Isabelle Gagné, Senior Inspector, Explosives Division, NRC

Pierre D. Gagnon, Gérant et PDG, Administration portuaire de Sept-Îles

Mireille Gingras, Environmental Assessment Analyst, Environmental Assessment and Major Projects Branch, Regional Oceans, Habitat and Species at Risk Branch, DFO (Québec)

Mario Gosselin, Sous-ministre associé, Secteur de la coordination et des services partagés, MRNF, GoQ

Carole Grant, Section Head, Habitat Evaluation, Marine Environment and Habitat Management, DFO (Newfoundland and Labrador)

Georges-Ernest Grégoire, Chief, ITUM

Kaku Grégoire, member, ITUM

Jacques Grondin, Senior Advisor, Canadian Environmental Assessment Agency

Joe Guanish, Elder, NNK

Dan Gulliver, Policy and Planning Development Specialist, Labour Market Development, Human Resources, Labour and Employment, GNL

Carol Harvey, citoyen, Ville de Schefferville

Richard Hepditch, Councillor, Town of Labrador City

Sandra Heppell, biologist, MRNF, GoQ

David Hughes, Assistant Deputy Minister, Policy and Planning (Acting), Labrador and Aboriginal Affairs, GNL

Melanie Itzkovitch, Policy Analyst, Minerals and Metals, Natural Resources Canada

André Jean, Directeur, Direction du développement et du milieu miniers, MRNF, GoQ

Robert Joly, Directeur, Direction des évaluations environnementales, MDDEP, GoQ

Greg Jones, Manager, Business Development, Energy Corporation of Newfoundland and Labrador

Marie-Marthe Joseph, member, NIMLJ

Lisa Ambroise Jourdain, member, NIMLJ

Raymond Jourdain, Councillor, ITUM

Jason Kelly, former Senior Regional Habitat Biologist, DFO (Newfoundland and Labrador)

Todd Kent, Tourism Development Officer, Labrador Region, Department of Tourism, Culture and Recreation, GNL

Manon Laliberté, Team Supervisor, Mining, Oil and Gas, Fish Habitat Management, DFO (Québec)

Normand Laprise, Directeur régional, Région administrative de la Côte-Nord (Région 09), MRNF, GoQ

Denis Larouche, entrepreneur, NordikEau, Ville de Schefferville

Junior Laurent, Youth Coordinator, NIMLJ

Céline Laverdière, Director, Policy and Intergovernmental Relations, INAC

Jean-Sylvain Lebel, Sous-ministre associé aux mines, MRNF, GoQ

Olivine Leblanc, infirmière, Dispensaire de Schefferville

Keith Leclaire, Director General, Naskapi CLSC

Graham Letto, Mayor, Town of Labrador City

Helen Littlejohn, administratrice, Sûreté du Québec, Schefferville

Roy Logan, Former Drilling Manager, New Millennium Capital Corp.

Renée Loiselle, Coordonnatrice, Environnement industriel, Direction des évaluations environnementales, MDDEP, GoQ

Claude Longpré, ancien Directeur de cabinet, Ministre responsable des Affaires autochtones, GoQ

Marcel Lortie, former Director General, Naskapi CLSC

Guy Lussier, Electrical Systems Technologist, Regional Director General's Office – Québec Region, Programs and Divestiture, Transport Canada, Montréal

Glen Luther, Biometrician, Environment and Conservation, Wildlife and Natural Heritage Division, GNL

Peter Madden, Chairman, Environmental Assessment Committee, Environmental Scientist, Environment and Conservation, Environmental Assessments Division, GNL

Kathleen Mahoney, Legal Advisor to National Chief, AFN

John Mameamskum, Director General, NNK

Matthew Mameamskum, Elder, NNK

Paul Mameanskum, Councillor, NNK

Pat Marrie, Environmental Scientist, Environment and Conservation, Environmental Assessment Division, GNL

Darlene McCurdy, Manager, Western Region, occupational health and Safety, GNL

Ian McKay, Environmental Assessment Coordinator, CEAAg, Halifax

Alexandre McKenzie, Councillor, NIMLJ

Alfred McKenzie, Researcher, Ashuanipi Corporation

Anita McKenzie, Councillor, NIMLJ

Elizabeth McKenzie, member, NIMLJ

Johnny McKenzie, member, ITUM

Jonathan McKenzie, Councillor, ITUM

Léonard McKenzie, Deputy Negotiator, NIMLJ

Marjolaine McKenzie, member, NIMLJ

Mike McKenzie, Councillor, ITUM

Patricia McKenzie, member, NIMLJ

Réal McKenzie, Chief, NIMLJ

Rodrigue McKenzie, member, NIMLJ

Uska Joseph McKenzie, member, NIMLJ

Clyde McLean, Manager, Investigations Section, Water Resource Management Division, GNL

Frank Meawasige, Special Advisor to National Chief, AFN

Claude Meilleur, Conseiller, Ville de Fermont

Livain Michaud, Senior Environmental Assessment Officer, Natural Resources Canada

Gilbert Michel, member, NIMLJ

Jules-Henry Michel, member, NIMLJ

Bruce Michel-Ambroise, member, ITUM

Dan Michielsen, Manager, Industrial Compliance, Environment and Conservation, Pollution Prevention Division, GNL

Kirsten Miller, Ecosystem Management Ecologist, Wildlife Division, Environment and Conservation, GNL

Lyne Morissette, Secretary General, ITUM

John Neville, biologist, GNL

Tanya Noseworthy, Director, Strategic Planning and Policy Coordination, Natural Resources, GNL

Raynald Ouellet, Responsable d'opérations, Administration portuaire de Sept-Îles

Isabelle Paré, Coordonnatrice technique et professionnelle, Centre de santé et de services sociaux de l'Hématite, Fermont

Joe Peastitue, member, NNK

Ronnie Peastitue, member, ITUM

Rod Peddle, citizen, Town of Labrador City

Lise Pelletier, Mairesse de Fermont et Préfète de la MRC de Caniapiscau

Ghislain Picard, Regional Chief, Assembly of First Nations of Québec and Labrador

Isaac Pien, Councillor, NNK

James Pien, Director, Tshiuetin Rail Transportation Inc.

Timothy Pien, Distribution Foreman, KESI

Julie Pilote, Technicienne en gestion du territoire, MRNF, GoQ

Jean-Guy Pinette, Councillor, ITUM

Rosario Pinette, Senior Negotiator, ITUM

Taniapisk Pinette, member, ITUM

Tauipish Pinette, member, ITUM

Dexter Pittman, Senior Environmental Engineer, Environment and Conservation, Pollution Prevention Division, GNL

Melissa Preston, Senior Operational Officer for Eastern Projects, MPMO-Natural Resources Canada

Charles Rawding, Owner, Labrador Hunting Safari Ltd.

Beth Rawding, Co-owner, Labrador hunting Safari Ltd.

Peter Reccord, Councillor, Town of Labrador City

Katrina Reid, Senior Regional Habitat Biologist, Habitat Evaluation, Marine Environment and Habitat Management Division, DFO (Newfoundland and Labrador)

Stéphane Rivard, Wildlife Technician, ministère des Ressources naturelles et de la Faune du Québec, Nord-du-Québec Region

Jean-Marc Robert, Director General, Transport Montagnais

Walter Rock, member, ITUM

Yves Rock, member, ITUM

Vanessa Rodrigues, former Senior Program Officer, CEAAg

Ken Rollings, Habitat Engineer, Habitat Planning and Operations, Marine Environment and Habitat Management Division, DFO (Newfoundland and Labrador)

Bernard Rossignol, Owner, Labrador 2 BG Adventure Inc.

Glenn Rowe, Navigable Waters Protection Officer, Navigable Waters Protection Program, Transport Canada

Réjean Roy, homme d’affaires, Ville de Schefferville

Ken Russell, Manager of Operations, Government Services, GNL

Gloria Sandy, member, NNK

Stella Saunders, Executive Assistant to the Chief, Natuashish Innu First Nation

Jean-Pierre Savard, Research Scientist, Canadian Wildlife Service

Carol Shaw, Spokesperson, Drover’s Labrador Outfitters Ltd.

Edward Shecanapish, Councillor, NNK

Alex Smith, Mineral Development Engineer (Environment), Natural Resources, Mineral Development, GNL

Marsha Smoke, Advisor to National Chief, AFN

Marcelle St-Onge, Councillor, ITUM

Mario St-Pierre, Directeur, Direction de l’aménagement de la faune de la Côte-Nord, MRNF, GoQ

David Swappie, Elder, NNK

Susan Swappie, Elder, NNK

Natacha Tanguay, Negotiator, Agreements, Negotiation and Implementation, INAC

Annette Tobin, Senior Policy Advisor, MPMO-Natural Resources Canada

Ronald Tooma, Councillor, NNK

Shinapest Tooma, Elder, NNK

Curtis Tootoosis, Principal, Jimmy Sandy Memorial School, Kawawachikamach

Glenn Troke, Environmental Assessment Officer, Environmental Protection Branch, Environment Canada

Donald Tshernish, member, ITUM

Minnie Uniam, Elder, NNK

James Uniam, member, NNK

Rebecca Uniam, Receptionist and Secretary, Naskapi CLSC

Marion Vaché, Analyst, Fish Habitat Protection, DFO (Québec)

Ernest Vachon, member, NIMLJ

Augustin Vollant, member, NIMLJ

Sylvain Vollant, Councillor, NIMLJ

Tommy Vollant, Councillor, ITUM

Walter Walling, Senior Negotiator, INAC

Richard Wardle, Assistant Deputy Minister, Mineral Resource Management, Mines, Natural Resources, GNL

Gale Warren, Senior Analyst, Labrador and Aboriginal Affairs, GNL

Julie Whiteway, Environmental Assessment Analyst, Environmental Assessment and Major Projects Division, DFO (Newfoundland and Labrador)

Bootwo Wilkinson-Chapman, Security Agent, PFWA

Harold Wills, Area Manager, Water Survey of Canada: Hydrometric Contacts, Environment Canada (Newfoundland and Labrador)

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LIST OF ACRONYMS AND UNITS

±	approximately
°C	degree Celsius
$	dollar
'	foot/second
"	inch/minute
>	larger than
%	percentage
<	smaller than
µ	micro
µg	microgramme
µg/L	microgramme per liter
µg/m^3	microgramme per cubic meter
µm	micron
µmho/cm	micro mho per centimeter
µS/cm	micro siemens per centimeter
AEMQ	Association de l'exploration minière du Québec (Québec Mining Exploration Association)
AFN	Assembly of First Nations
Al	aluminium
Al_2O_3	aluminium oxide
AMQ	Association minière du Québec (Québec Mining Association)
ANFO	ammonium nitrate and fuel oil
ARD	acid rock drainage
As	arsenic
asl	above sea level
ATV	all-terrain vehicle
B	billion
Ba	barium
BLSA	biophysical local study area
BOD	biological oxygen demand
B.P.	before present
BRSA	biophysical regional study area
C	carbon
Ca	calcium
$CaCO_3$	calcium carbonate
CAEAL	Canadian Association for Environmental Analytical Laboratories
CAM	Conseil Attikamek-Montagnais
CaO	calcium oxide
CARMA	CircumArctic Rangifer Monitoring and Assessment Network
CAS	Chemical Abstract Survey
CCME	Canadian Council of Ministers of the Environment
Cd	cadmium
CEAA	*Canadian Environmental Assessment Act*

CEAAg	Canadian Environmental Assessment Agency
Cégep	Collège d'enseignement général et professionnel
CEO	Chief Executive Officer
CEPA	*Canadian Environmental Protection Act*
CEQG	Canadian Environmental Quality Guidelines
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CLM	Consolidated Thompson Iron Mines Ltd
CLSC	Centre local de services communautaires
cm	centimeter
CNQA	*Cree-Naskapi (of Québec) Act*
Co	cobalt
CO_2	carbon dioxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Cr	chromium
CRACM	Centre for Reptiles and Amphibians Conservation and Management
CSSS	Centre de santé et de services sociaux
CTA	Canadian Transportation Agency
Cu	copper
CWQG	Environment Canada Water Quality Guidelines for the Protection of Aquatic Life
dB	decibel
dBA	A-weighted decibel
dBL	decibel linear
DFO	Department of Fisheries and Oceans Canada
DNA	deoxyribonucleic acid
DO	dissolved oxygen
DRI	direct reduced iron
DSO	direct-shipping ore
DSOP	Direct-Shipping Ore Project
dwt	deadweight tonnage
E	East
EAP	Employee Assistance Programme
ECNL	Energy Corporation of Newfoundland and Labrador
EIA	environmental impact assessment
EIS	environmental impact statement
ELAIOM	Elross Lake Area Iron Ore Mine
EPA	*Environmental Protection Act*
EPP	environmental protection plan
ERCP	Emergency Response / Contingency Plan
FDSN	Federation of Digital Seismographs Network
Fe	iron
FeO	iron oxide
FN	First Nation
FTE	full-time equivalent
GDP	gross domestic product

GHG	greenhouse gas
GHI	Groupe Hémisphères
GIS	geographic information system
GNL	Government of Newfoundland and Labrador
GoC	Government of Canada
GoQ	Government of Québec
GPS	global positioning system
GRCH	George River Caribou Herd
h	hour
ha	hectare
HADD	harmful alteration, disruption or destruction
HCO_3	bicarbonate
HDPE	high-density polyethylene
HEU	habitat equivalent unit
Hg	mercury
HQ	Hydro-Québec
HQD	Hydro-Québec Distribution
HSI	habitat suitability indices
HST	High Subarctic Tundra
IBA	impacts and benefits agreement
IBP	industrial benefits planning
ICMM	International Council on Mining and Metals
IN	Innu Nation
INAC	Indian and Northern Affairs Canada
IOCC	Iron Ore Company of Canada
IRR	internal rate of return
ISQG	Interim Freshwater Sediment Quality Guidelines
ITUM	Innu Takuaikan Uashat mak Mani-Utenam
JBNQA	*James Bay and Northern Québec Agreement*
JSMS	Jimmy Sandy Memorial School
JTU	Jackson turbidity unit
K	potassium
K_2O	potassium oxide
KESI	Kawawachikamach Energy Services Inc.
kg	kilogramme
kg/t	kilogramme per tonne
km	kilometer
km^2	square kilometer
km/h	kilometer per hour
kV	kilovolt
kw	kilowatt
L	liter
Leq	equivalent continuous noise level
LIM	Labrador Iron Mines Ltd
LIOP	LabMag Iron Ore Project

LOI	loss on ignition
LSEA	local socio-economic area
m	meter
M	million
m^2	square meter
m^3	cubic meter
m^3/d	cubic meter per day
m^3/h	cubic meter per hour
m^3/min	cubic meter per minute
m^3/s	cubic meter per second
m^3/y	cubic meter per year
MBCA	*Migratory Birds Convention Act*
MCC	motor control centre
MDDEP	ministère du Développement durable, de l'Environnement et des Parcs
mg	milligramme
Mg	magnesium
mg/kg	milligramme per kilogramme
mg/L	milligramme per litre
mg/Nm^3	milligramme per Normal cubic meter
MgO	magnesium oxide
MIBC	methyl isobutyl carbinol
min	minute
mm	millimeter
mm/d	millimetre per day
mm/h	millimetre per hour
Mm^3	million cubic meter
MMER	*Metal Mining Effluent Regulation*
Mn	manganese
MN	Nuttli magnitude
MODS	Mineral Occurrence Data System
MPMO	Major Projects Management Office
MRC	municipalité régionale de comté
MRNF	ministère des Ressources naturelles et de la Faune
MSF	Mid Subarctic Forest
Mt	million tonnes
MTQ	ministère des Transports du Québec
Mt/y	million tonnes per year
N	North
n/a	not applicable
Na	sodium
Na_2O	sodium oxide
NDC	Naskapi Development Corporation
NEQA	*Northeastern Québec Agreement*
Ni	nickel
NI	National Instrument

NIMLJ	Nation Innu Matimekush-Lac John
NLBP	Newfoundland and Labrador Benefits Plan
NLDEC	Newfoundland and Labrador Department of Environment and Conservation
NLH	Newfoundland and Labrador Hydro
NML	New Millennium Capital Corp.
NNK	Naskapi Nation of Kawawachikamach
no	number
NO_3^-	nitrate
NOC	National Occupational Classification
nos	numbers
NPRI	National Pollutant Release Inventory
NRC	Natural Resources Canada
NTDB	National Topographic Data Base, Canada
NTSC	National Topographic System of Canada
NTU	nephelometric turbidity unit
NWPA	*Navigable Waters Protection Act*
P	phosphorus
Pb	lead
PDAC	Prospectors and Developers Association of Canada
PEL	probable effect level
PFWA	Paul F. Wilkinson & Associates Inc.
PM	particulate matter
PM2.5	particulate matter less than or equal to 2.5 microns
PM10	particulate matter less than or equal to 10 microns
PNL	Province of Newfoundland and Labrador
py	person-year
QCM	Québec Cartier Mining Company (now ArcelorMittal Mines Canada)
QC/QA	quality control / quality assurance
QNS&LR	Québec North Shore and Labrador Railway
RBC	rotating biological contactor
RCMP	Royal Canadian Mounted Police
ROM	run-of-mine (ore)
ROW	right of way
RP	related project
RSEA	regional socio-economic area
S	siemen, South or sulfur (according to the context)
SARA	*Species at Risk Act*
sd	standard deviation
SF	sinter fines
SiO_2	silica
SIPA	Sept-Îles Port Authority
SO_4^{2-}	sulfate
SPF	super fines
SQ	Sûreté du Québec
STD	sexually-transmitted disease

t	tonne
Tata Steel	Tata Steel Global Minerals Holdings Pte Limited
TDS	total dissolved solids
TEK	traditional ecological knowledge
TEM	terrestrial ecosystem mapping
t/h	tonnes per hour
TiO_2	titanium dioxide
TPM	total particulate matter
TSH	Tshiuetin Rail Transportation Inc.
USEPA	Environmental Protection Agency of the United States of America
UTM	Universal Transverse Mercator
V	vanadium
Vale	Companhia Vale do Rio Doce
VBNCL	Voisey's Bay Nickel Company Limited
VEC	valued ecosystem component
W	West
WHO	World Health Organization
WM	Wabush Mines
WRDC	Women in Resource Development Committee
y	year
Zn	zinc

GLOSSARY

Ablation	The removal of glacier ice through melting, calving, evaporation and/or sublimation (Trenhaile 2004).
Adsorption	The surface retention of solid, liquid or gas molecules, atoms or ions by a solid or liquid, as opposed to absorption, in which the substances penetrate into the bulk of the solid or liquid (Parker 1989).
Alevin	A very young fish that has just hatched from the egg. The yolk-sac may still be attached to it. (Sammons 1994)
Amine	One of a class of organic compounds which can be considered to be derived from ammonia by replacement of one or more hydrogens by organic radicals (Parker 1989).
Angiosperm	Flowering plant.
Anisotropic	Showing different properties as to velocity of light transmission, conductivity of heat or electricity, compressibility, and so on, in different directions (Parker 1989).
Aquifer	Water-bearing formation (bed or stratum) of permeable rock, sand, or gravel capable of yielding significant quantities of water (TermiumPlus 2009, Internet site).
ArcGIS™	Digital geographic information system file containing all terrestrial ecosystem mapping polygon boundary and attribute data.
Baghouse	A large chamber for holding bags used to capture dust emitted at a point where material is transferred from one piece of equipment to another, such as a point at which ore is transferred from one conveyor to another.
Benthic	Refers to the bottom region of a waterbody (Sammons 1994).
Biophysical Local Study Area	The area where ELAIOM infrastructure and activities will be located and in which detailed terrestrial ecosystem mapping was completed.
Bioindicator	Biological indicator species are unique environmental indicators that offer a signal of the biological conditions in an environment (USEPA 2007, Internet site).
Biota	Pertaining to the living components (organisms) of the environment (Moran *et al*. 1986).
Chert	A hard, brittle sedimentary rock consisting of microcrystalline quartz (Parent 1990).
Chiroptera	Bats, a highly-specialized group of insectivorous mammals, which are the only mammals capable of flying like birds (Fitter 1967).

Cobble	A rock fragment, rounded or abraded, that is larger than a pebble and smaller than a boulder (Lapidus 1987).
Colluvial	Pertaining to the sediments (commonly poorly-sorted rubble) deposited by gravitational mass movements (Trenhaile 2004).
Comminution	The breaking, crushing or grinding of coal, ore or rock.
Conductivity	The transfer of heat from one object to another through direct physical contact (Moran *et al*. 1986).
Cryoturbation	The mixing of soil horizons due to freezing and thawing, commonly in association with underlying permafrost (Trenhaile 2004).
Decibel	A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-Pascals.
Decibel (A-weighted)	An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear.
Decibel (linear)	Measure of a linear peak air overpressure in terms of unweighted decibel.
Discount rate	The interest rate used to restate a future payment to present value (Berenblut and Rosen 1995).
Dissolved oxygen	The oxygen dissolved in water. The amount is usually expressed in parts per million (Moran *et al*. 1986).
Ecoregion	An area of the landscape with characteristic regional climate and landforms, as expressed in typical vegetation physiognomy and composition, soils and topography.
Ecotype	The most detailed ecological classification units within ecoregions, which are used to delineate and describe terrestrial landscapes or, alternatively, ecosystems in this report. Ecotypes occur in predictable landscape positions and feature characteristic landform, site and soil characteristics that can be identified through stereoscopic interpretation of aerial photographs and described in detail during site visits (MoELP-MoF 1998).
Electrofishing	Fishing that employs a direct electric current to attract and usually temporarily immobilize fish for easy capture (Merriam-Webster 2009, Internet site).
Ericaceous	Of or pertaining to a plant family that includes numerous plants, mostly from temperate climates, that normally grow in acidic soils.
Esker	A long, narrow, sinous or straight ridge formed of stratified glacial meltwater deposits, usually including large amounts of sand and gravel (Lapidus 1987).

Eutric	Of or pertaining to soils having a degree of saturation higher than 35%.
Eutophication	The process whereby an aging aquatic ecosystem, such as a lake, supports great concentrations of algae and other aquatic plants due to a marked increase in concentration of phosphorus, nitrogen and other plant nutrients (Lapidus 1987).
Fen	A sedge-dominated, groundwater-fed type of wetland that accumulates peat, but is less acidic than a bog.
Flocculant	An agent that causes particles to coalesce in a mass (Parker 1989).
Fluvial	Of or pertaining to a river or rivers.
Freshet	A comparatively high rate of flow of freshwater of short duration in a stream, resulting from heavy rainfall or rapid snow melt.
Fry	A young fish that has used up the yolk-sac that was attached when it emerged from the egg and started to actively find food on its own (Sammons 1994).
Gassing	The addition of chemical agents (the nature and quantity of which are trade secrets) to an emulsion to render it explosive. Because of hydrostatic pressure, the density at the base of the column of explosives in the blasting hole is higher than in the upper portion. That higher density gives more kilograms per meter at the bottom of the blast hole, where it is most needed (Perron 2009, *personal communication*).
Geosyncline	A part of the surface of the earth that sank deeply over a long period of time; a great trough hundreds of miles long and tens of miles wide that received thousands of feet of sedimentary and volcanic rock over millions of years (TermiumPlus 2009, Internet site).
Glacial debuttressing	Removal of support to a rock slope provided by a glacier, once the glacier has retreated or thinned (Trenhaile 2004).
Glaciofluvial	Pertaining to the sediments (commonly moderately- to well-sorted sand, gravel or cobbles) eroded, transported and deposited by glacial meltwater in ice-contact or proglacial environments.
Gneiss	A foliated, or banded, metamorphic rock with light-coloured layers, usually quartz and feldspar, alternating with dark-coloured layers of other minerals, usually hornblende and biotite (Parent 1990).
Greywacke	A dark grey, coarse-grained sandstone that contains abundant feldspar and rock fragments and commonly has a clay-rich matrix (Parent 1990).
Gross domestic product	The total value of all final goods and services produced in a particular economy in a given year.

Herpetofauna (Herptile)	All reptiles and amphibians (*e.g.*, salamanders, frogs, toads, caecilians, snakes, lizards, turtles, tuataras and crocodilians).
Hibernaculum	A site where hibernation occurs (Nagorsen and Brigham 1993).
Hydrometric station	A station on a river, lake, estuary or reservoir where water quantity and quality data are collected and recorded. Such data may include stage (water surface elevation), discharge, sediment concentration, water temperature, chemical and biological properties of water, ice formations and other characteristics (TermiumPlus 2009, Internet site).
Humus	A brown or black organic substance consisting of partially or wholly decayed vegetation or animal matter that provides nutrients for plants and increases the ability of soil to retain water.
Indicated Mineral Resource	The part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics, can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed. (CIM November 22, 2005)
Inferred Mineral Resource	The part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. (CIM November 22, 2005)
Isotropic	Having a tendency for equal growth in all directions or having identical properties in all directions (Parker 1989).
Kelt	The spent salmon after spawning. They return to the sea and may either die or return to spawn. (Fitter 1967)
Kettle	A hole or pit within glacial deposits, formed by the melt-out of a block of glacial ice (Trenhaile 2004).
Labour force catchment area	The geographic area in which the majority of the labour force is likely to be recruited.
Lacustrine	An adjective referring to lakes. For example, lake sediments may be referred to as lacustrine sediments (Smol 2008).

Landform	A distinct, three-dimensional feature on the earth's surface that has originated through a particular set of erosional and/or depositional processes and thus can be recognized wherever it occurs (Trenhaile 2004).
Lithology	The gross physical character of a rock or rock formation (Parent 1990).
Littoral	The shallower parts of a waterbody along the shore; often defined as the area where rooted aquatic macrophytes can grow (Smol 2008).
Lycopod	A genus of clubmosses, which are simple vascular plants.
Measured Mineral Resource	The part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity. (CIM November 22, 2005)
Mesic	Of or pertaining to well-drained soils that retain some water.
Mineral Reserve	Economically mineable part of a Measured or Indicated Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified. A Mineral Reserve includes diluting materials and allowances for losses that may occur when the material is mined. Mineral Reserves are subdivided in order of increasing confidence into Probable Mineral Reserves and Proven Mineral Reserves. A Probable Mineral Reserve has a lower level of confidence than a Proven Mineral Reserve. (CIM November 22, 2005)
Mineral Resource	Concentration or occurrence of diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge. Mineral Resources are subdivided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource. (CIM November 22, 2005)
Moraine	Landform deposited directly by glacial ice, typically consisting of grains ranging in size from clay to boulders (Trenhaile 2004).

Nuttli magnitude	Magnitude formula for earthquakes derived by Otto Nuttli in 1973.
Order	A taxonomic group between the Class and the Family (Parent 1990).
Particulate matter	Microscopic solid and liquid particles, of various origins, that remain suspended in the air for any length of time (NPRI April 2004, Internet site).
Peloid	Consisting of humus and minerals formed over many years by geological, biological, chemical and physical processes.
Periglacial	Pertaining to processes, features and climates modified by their close proximity to the margin of a glacier or an ice sheet, or by cold, non-glacial environments (Trenhaile 2004).
Permafrost	Perennially frozen soil and/or bedrock typically found in areas with arctic or subarctic climates (Trenhaile 2004).
pH	A term used to describe the hydrogen-ion activity of a system; a solution of pH 0 to 7 is acid, pH 7 is neutral, pH over 7 to 14 is alkaline (Parker 1989).
Photovoltaic cell	A cell capable of generating a voltage as a result of exposure to visible or other radiation (Parker 1989).
Phytoplankton	Tiny plants that live in water near the surface of lakes and oceans (Sammons 1994).
PNL-based Supplier	A Canadian (or landed immigrant) who meets the residency requirements defined by the *Election Act* (SNL 1992, CE-3.1), namely has resided in the PNL for the immediately preceding six-month period, or a former PNL Resident who has returned to the PNL but who has not yet met the above-cited residency requirement.
PNL Resident	A corporation incorporated under the laws of the PNL or a corporation incorporated elsewhere that maintains an office in the PNL.
Podzol	A group of zonal soils, the surface of which is organic matter overlying grey and dark mineral-rich soils (Lapidus 1987).
Polymer	A substance made of giant molecules formed by the union of simple molecules (monomers) (Parker 1989).
Prill	A pellet or solid globule of a substance formed by the congealing of a liquid during an industrial process.
Probable Mineral Reserve	Economically mineable part of an Indicated and, in some circumstances, a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified. (CIM November 22, 2005)

Proven Mineral Reserve	Economically mineable part of a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction is justified. (CIM November 22, 2005)
Proterozoic	A geological period before the first abundant complex life on Earth. Extended from 2,500 to 570 million years ago. Living forms included bacteria and fungi, primitive multicellular organisms.
Quartzite	A metamorphic rock consisting entirely of quartz, generally formed through metamorphism of sandstone (Parent 1990).
Quicklime	Calcium oxide that is prepared by roasting calcium carbonate limestone in a kiln until all the carbon dioxide is driven off (Parker 1989).
Recharge	The replenishment of water in an aquifer. Much of the natural recharge of groundwater occurs in spring and comes from the melting snowpack or from streams in mountainous regions. It can also occur during local heavy rainstorms. Groundwater often discharges into a river or lake, maintaining its flow in dry seasons (Environnement Canada 2008, Internet site).
Refractory	A material with a high melting point (Parker 1989).
Riparian	Pertaining to the banks of, or area immediately adjacent to, a watercourse.
River system	A system including all streams that rise within a given hydrographic basin, the waters of which eventually flow through a single channel into the ocean (TermiumPlus 2009, Internet site).
Roosting site	A daytime retreat or night-time resting place for bats and birds (Nagorsen and Brigham 1993).
Rubble	A loose mass of rough, angular rock fragments, coarser than sand (Parker 1989).
Schistose	Pertaining to the form of schist, a highly foliated (banded), medium-grained metamorphic rock that splits easily into flakes or slabs along planes of mica (Parent 1990).
Secchi disk	A white or black and white disk used to measure the transparency of water (Holdren *et al.* 2001).
Sediment	Bottom material in a lake or a stream that has been deposited after the formation of a lake basin or stream course. It originates from the remains of aquatic organisms, chemical precipitation of dissolved minerals and erosion of surrounding lands (Holdren *et al*. 2001).

Shale	A fine-grained sedimentary rock composed of compacted and hardened clay, silt and/or mud (Parent 1990).
Siltstone	A fine-grained sedimentary rock composed of compacted and hardened silt (Parent 1990).
Sublimation	Process of change from ice (solid state) to water vapour (gaseous state) (Strahler and Strahler 1996).
Surfactant	A substance, such as a detergent, that is active on the surface of another substance with which it comes into contact.
Syncline	A generally U-shaped fold or structure in stratified rock (Lapidus 1987).
Talik	An area of unfrozen ground within a region of permafrost, such as is commonly found beneath or immediately adjacent to large lakes or rivers (Trenhaile 2004).
Till	Material deposited directly by glacial ice with grains ranging in size from clay to boulders (Trenhaile 2004).
Total particulate matter	Any particulate with a diameter less than 100 microns (NPRI April 2004, Internet site).
Turbiditic	Pertaining to an upward sedimentary deposit formed by a turbidity current, a sudden underwater flow within a standing body of water, commonly initiated by a subaqueous mass movement (Trenhaile 2004).
Turbidity	A measure of suspended particulates in water (Smol 2008).
Tuyeres	A nozzle through which air is forced into a smelter, furnace or forge (Parker 1989).
Upper Cretaceous	The later period of the interval of geologic time that began 176 million years B.P. and lasted 71 million years. It is characterized by marine deposits, namely chalk, sandstone and siliceous rocks (Lapidus 1987).
Veneer	A thin (typically <2 m), commonly discontiguous surficial deposit overlying another material or bedrock (Trenhaile 2004).
Water balance	Inventory of water based on the principle that, during a certain time interval, the total water gain to a given catchment area or body of water must equal the total water loss plus the net change in storage in the catchment (TermiumPlus 2009, Internet site).
Waterbody	Pertaining to watercourses, lakes, reservoirs and ponds.
Water table	The upper water level of a body of groundwater (Tilleman 1994).

PROJECT TEAM EXPERTISE AND QUALIFICATIONS

New Millennium Capital Corp.

Robert Martin received a Bachelor of Arts (Geology) from Acadia University, Wolfville, Nova Scotia, in 1962 and a Certificate of Completion from MIT Sloan School for Senior Executives, Boston, Massachusetts in 1983. He has 40 years of experience in business and the mining industry.

Iron ore mining and development have been a major part of Mr Martin's working life. He identified the LabMag Iron Ore deposit in 1960, and for 28 years he worked for the IOCC, which originally owned the LabMag deposit.

From 1981 to 1983, Mr Martin was Managing Assistant to the Chairman of the IOCC. He held increasingly responsible executive positions with the IOCC from 1983 to 1986. Mr Martin was IOCC's Executive Vice President responsible for all Canadian operations from 1987 to 1989. From 1990 to 1991, Mr Martin was retained by the IOCC as a management consultant.

Mr Martin then moved on to work as a consultant and analyst for other mining companies including Tiomin Resources Inc., Davy Canada, Hillsborough Resources Ltd. and Melkior Resources Ltd.

In 2002, Mr Martin became a founding Director and Officer of LabMag Mining Corp. with one goal - to develop the LabMag Property into an operating mine and beneficiation complex.

When NML acquired an 80% interest in the LIOP, Mr Martin became President and Chief Executive Officer.

Dean Journeaux, Chief Operating Officer of NML, is a graduate Mining Engineer, B.Eng., McGill University, 1960. He is a member of the Order of Engineers of Québec and a CIM Fellow. He spent many years in northern Québec. He and his family lived in Gagnon, Port Cartier and Fermont, Québec. He was employed by QCM (owned by US Steel), where he held positions in engineering, operations and maintenance with increasing responsibility from mining through mine and railway mechanical maintenance, and port operations. He was part of the owner’s team that developed the design concepts for the Mont-Wright mine and processing plant and the new town of Fermont. This project incorporated the latest in environmental best practices, energy efficiency and sustainability concepts.

Later he transferred to Met-Chem Canada Inc. (US Steel’s iron ore consulting group) where he was responsible for the construction management of QCM’s Mont-Wright iron ore project. He became President of Met-Chem and was responsible for its development into a recognized international mining consulting firm, especially in iron ore mining and processing, in various locations, including India, Venezuela, Mexico and Africa.

In 1998, he left Met-Chem and formed Journeaux International, a consulting company that continues to serve clients in the mining and steel industries.

Mr Journeaux was a founding partner of LabMag Mining Corp. in May 2002.

In August 2003, he became a founding director of NML. In 2008, he was elected to the position of Chief Operating Officer of NML.

His responsibility in the preparation of the EIS included technical input to the design of the Project, including the development of various operating, environmental and sustainability policies. He was responsible for the overall supervision of the owner's team and consultants responsible for the EIA.

Jean-Charles Bourassa, Vice President, Mining, has 35 years of mining experience in all phases: project evaluation, feasibility studies, design, construction and operations. A large part of his career has been in the development and operation of iron ore mines, especially in Canada and India. In Liberia, he was the Assistant Project Manager for the National Iron Ore Company, a producer of washed natural ores similar to those of the ELAIOM. He has experience in various social and climatic environments from cold weather northern regions to tropical countries.

M. Bourassa began his career at QCM's new Mont-Wright Iron Ore Project. He was transferred to Met-Chem Canada Inc. to be part of its mine development team for the Kudremukh Iron Ore Company's Iron Ore Project in India, which included mining, concentration, a slurry pipeline and port facilities.

He is a 1972 graduate of École Polytechnique, Montréal, with a B.Sc. Mining Engineering (Honours), a member of the Order of Engineers of Québec and a CIM Fellow. He speaks French and English and has a working knowledge of Spanish.

M. Bourassa oversaw the preparation of the portions of the EIS dealing with the Project description. He participated in the public consultation/information programme. He also provided general guidance and direction to the specialists who prepared the other sections of the EIS.

Bish Chanda is Senior Vice-President - Marketing & Strategy for NML. As a partner with LabMag Mining Corp., he was involved in 2002 in the acquisition of the LabMag Property and has ever since been working on the project. He has over 35 years of experience in the mining industry, of which 25 years were spent with the IOCC where he occupied senior management positions. He is experienced in the management of major capital projects, the operation of processing plants, quality, strategic planning and marketing studies. In 1997, he joined the consulting business and worked internationally in sales and business development to market engineering services for mining projects.

Mr Chanda's current responsibilities include coordination of process development activities as well as marketing of iron ore products related to NML's projects. In the Project, his role included the review of processing complex design and capital and operating cost estimates, development of products that would meet customers' quality requirements, market analysis and revenue projections required for the financial analysis.

Anthony Wilson has over 40 years of experience in the mining and metallurgical industries, much of it related to projects outside Canada. A former consultant to the Mining & Metallurgy and Aluminium Divisions of SNC-Lavalin specializing in the preparation of proposals and the editing of project reports, he previously fulfilled the role of Director, Iron and Steel, at SNC-Lavalin, responsible for business development and the execution of all projects related to the ferrous metals industry. As a senior project manager, he has undertaken responsibility for projects in the ferrous, non-ferrous and alloy metals sectors, specializing in the preparation of conceptual and feasibility studies. He has carried out numerous projects involving the introduction and development of industrial plants in rural areas in a variety of countries. Prior to joining SNC-Lavalin in 1980, Mr Wilson was with

British Steel International where, for 10 years, he was involved in the management of overseas subsidiaries, business development, technical studies and project management.

Mr Wilson's technical contribution to the EIS for the ELAIOM came through his work on the Pre-Feasibility Study Report.

Steve Driscoll has 10 years of experience in GIS and data management. He is the Manager of the Geographic Information Systems at NML.

He collaborated with the EIS team to oversee the production of maps for the Project Registration and the EIS for the ELAIOM.

Laura Ciccotti has a B.A. in Human Environmental Geography. At NML, she is Associate GIS Director and Mineral Claims Administrator. She collaborated with the EIS team to oversee and produce maps.

Serge Guérin (MSc. Eng. Geol.) is a geologist with a Master's in Engineering. From 1974 to 1982, he held various positions within the Engineering, Budget and Operations Department of the IOCC in Schefferville. After the IOCC ceased operating in Schefferville, in 1982, M. Guérin spent two years working in a limestone quarry.

M. Guérin next occupied the positions of inspector and manager at the Commission de la santé et de la sécurité du travail, where he directed a 18-employee multidisciplinary team for 22 years.

M. Guérin has been a consultant with NML for several years. His expertise lies in his knowledge of mineral resources and the environment. With respect to the EIS, his work included conducting archival research in Montréal, Québec City and Sept-Îles, overseeing trenching in Schefferville in the summer 2008, and contributing to the production of the Project Registration, the Pre-Feasibility Study Report and the EIS.

His role in the preparation of the EIS was to advise NML in the areas of hydrogeology and the extraction and storage of tailings and overburden.

Moulaye Melainine is a graduate in Mining Engineering of École Polytechnique de Montréal and holds of a Master's in Mineral Industry Economics from McGill University, Montréal. He has been involved in the iron ore sector for over 25 years. From 1979 to 1985, he was the Head of the Mining Division and later Corporate Controller of Société nationale industrielle et minière, the Mauritanian state-owned iron ore producer. Mr Melainine then worked for 10 years on numerous international projects as a staff member of Met-Chem, the Montréal-based steel, iron ore, mining and minerals consulting company. More recently, he was Regional Vice-President of Tecsult International Inc., another well-known engineering consulting company based in Montréal.

At NML, Mr Melainine is the Vice President, Development.

Thiagarajan ("BK") Balakrishnan holds a M.Sc. in Geology from the University of Madras, India.

Mr Balakrishnan worked with the IOCC between 1973 and 2005, initially as a Supervising Engineer in Schefferville, later as Senior Geologist in Labrador City and finally as a Consulting Geologist.

Mr Balakrishnan has been the Chief Geologist of NML since January 2005. In that capacity, he has been responsible for planning and implementing all of the exploration and detailed investigation of the taconite and DSO deposits of NML.

The results of the geological work for which he was responsible have been incorporated in the EIS.

Mary-Jean Buchanan is a Senior Environmental Engineer with Met-Chem with over 20 years of experience in feasibility studies in mining and industrial projects and in the preparation of environmental assessments for international projects. She contributed to the preparation of Section 4.0 of the EIS.

Donna O'Quinn has seven years of experience in Health and Safety. She currently works for NML as Health, Safety and Environmental Manager. She is a member of the Canadian Society of Safety Engineers. She is currently completing her Construction Safety Officer designation in the province of Newfoundland and Labrador and has completed the Certification of Recognition Programme courses.

Mrs O'Quinn contributed data on employment, contracting and emergency preparedness to the EIS.

Paul F. Wilkinson & Associates Inc.

Paul F. Wilkinson holds a doctorate in Archaeology and Anthropology from Cambridge University.

He has worked as a consultant in Canada and internationally for over 30 years. He is the President of Paul F. Wilkinson & Associates Inc. which specializes in the environmental and social sciences, with particular reference to Aboriginal issues and environmental impact assessment.

PFWA has acted as the Coordinator of Environmental and Social Affairs for NML since 2005.

PFWA was responsible for creating and coordinating a team of consultants to collect and analyze baseline data for the LIOP between 2005 and 2007.

PFWA's role with respect to the ELAIOM has been to draft the Project Registration, to liaise with the responsible governments, to coordinate the team responsible for the biophysical effect assessment, to conduct the socio-economic effect assessment with the assistance of a small number of outside consultants and to oversee the preparation of the EIS.

PFWA was also involved in negotiating IBAs with the potentially-affected First Nations and other aspects of NML's public information programme.

Dr Wilkinson's role included planning, budgeting, oversight, negotiation and drafting.

Brigitte Masella has a Master's in Environmental Studies from York University.

She has over 15 years of consulting experience in Canada and internationally. She is employed by PFWA, which specializes in the environmental and social sciences, with particular reference to Aboriginal issues and environmental impact assessment.

Mme Masella has acted as the Associate Coordinator of Environmental and Social Affairs for NML since 2005.

Her role with respect to the ELAIOM has been to assist in drafting the Project Registration, liaising with the responsible governments, consulting the potentially-affected First Nations and non-Native communities, coordinating the team responsible for the biophysical effect assessment, conducting the socio-economic effect assessment and preparing the EIS.

Serge Mckenzie is an Innu from Matimekush-Lac John who has been living at Uashat mak Mani-Utenam since 1984. He left the Schefferville region in 1982 to complete secondary school at Sherbrooke and Jonquière, Québec. Later, he studied in the Humanities – Administration at the Cégep de Sept-Îles and took courses in law at the University of Ottawa and Université Laval.

With more than 25 years of work experience in the Native milieu, he has held strategic positions as General Secretary within ITUM (2004-2007) and as coordinator of the remedial and corrective measures related to the Sainte-Marguerite-3 hydroelectric project (1998-2003), while assisting in the environmental monitoring of said project. As a paraprofessional, he sits on the Board of Directors of Native businesses and a non-profit organization: Innu Construction and l'Immobilière Montagnaises, Destinations Sept-Îles Nakauinanu-Croisières Internationales and the Fondation Florent Vollant. In addition, he sat on various working committees in respect of the establishment of a junior hockey team at Sept-Îles, the extension of the Uashat reserve (Place de l'Anse) and the economic benefits of the Sainte-Marguerite-3 and Toulnoustouc projects.

As of November 2007, he has been a special advisor to NML, in collaboration with PFWA, acting as a liaison with the Innu in relation to the development of the ELAIOM, KéMag and LabMag projects. He collaborated in the study carried out by M. Daniel Clément on resource- and land-use by the members of the NIMLJ.

Nathalie Charland graduated from McGill University in 2004 with a B.Sc. in environmental and agricultural sciences with a major in wildlife biology, and in 2007 with a M.Sc. in environmental assessment.

She has five years of project management experience, including conservation projects and restoration of disturbed habitats. She produced the draft EIS for the Albanel-Témiscamie-Otish Park Project near Mistissini, Québec, and reviewed the EIS of a cement plant project in Tunisia.

Since 2008, she has been a research associate with PFWA. Her duties have included data-collection and analysis, drafting, project management and administration.

Mme Charland's work for the ELAIOM has involved: maintaining registers and chronologies of communications with potentially-affected communities; conducting data-collection and analysis; and assisting in drafting several sections of the EIS, especially those dealing with the description of the socio-economic environment and the effects of the ELAIOM on it.

Jacynthe Guimond graduated from McGill University in 2004 with a B.Sc. in environmental sciences with a major in renewable resource management. She has four years of consulting experience in various parts of Canada and internationally, including research on the effects of oil and gas exploration on the tundra ecosystem in Alaska. She also worked on a mangrove conservation project in Costa Rica.

Since 2005, she has been a research associate with PFWA. She has been responsible for research, fieldwork and project management for a variety of mandates in the environmental and social sciences, most of which involve natural resource management and Aboriginal peoples in northern Québec.

Mme Guimond has worked on several of NML's projects since 2005. Her work has involved: liaising between NML and Aboriginal communities; providing logistical support for fieldwork; conducting data-collection and analysis; preparing monthly progress reports; and assisting in drafting project descriptions.

Her contribution to the ELAIOM was in collecting baseline data and drafting some sections of the EIS.

Kaitlyn Urquhart has a Bachelor's in Biology from the University of Victoria. She has worked with indigenous communities on environmental issues in the Yukon, in Canada and in Ranong, Thailand.

She began working at PFWA in 2009 as a research associate. Her contribution to the EIS was in collecting background data and providing general administrative assistance.

Edith Dallaire holds a certificate as Administrative Assistant. She has worked for PFWA for 15 years. She currently holds the position of Director of Administrative Service.

Her role for the ELAIOM was to coordinate and oversee the management of environmental and social services.

Her role in the preparation of the EIS centred on preparing texts drafted by PFWA in the approved format.

Groupe Hémisphères

Hugo Robitaille (M.Sc. Env.) is a biologist with a Master's in Environmental Studies from Université du Québec à Montréal (UQÀM). He has been working as a consulting biologist for more than 14 years with municipalities, governments, industry and private-sector clients. He worked with Hydro-Québec in sustainable management activities concerning the rights-of-way of the electricity distribution network. He has also acted as an advisor, coordinating the establishment of watershed management councils for the Richelieu and Yamaska rivers. M. Robitaille has worked on many projects characterizing and mapping sensitive ecosystems in which there were a number of threatened species of flora and fauna in Québec, Labrador, British Columbia and Nepal. He recently carried out the terrestrial ecosystem mapping for the LIOP, which included more than 800 km of right-of-way for an electricity transmission line and pipeline as well as a mine site, a deep-water port and a pellet plant.

M. Robitaille has extensive experience in carrying out complex impact studies in the areas of renewable and non-renewable resources (wind and hydroelectric energy, mines).

With respect to the ELAIOM, M. Robitaille was project manager for the sections of the EIS related to biophysical components. He coordinated the various field surveys, ensuring that appropriate methodologies were applied and deadlines respected. M. Robitaille also collaborated with the members of the local First Nations so as to ensure their active involvement in the fieldwork. In collaboration with PFWA, he delineated the study areas and the VECs. He also coordinated the preparation and drafting of the sections of the EIS describing the biophysical environment and participated in the assessment of biophysical effects and the selection of mitigation and compensation measures. Finally, he coordinated the production of a follow-up programme on the biophysical components.

Daniel Néron (M.Sc. Phys. Geo.) is a physical geographer who has conducted many studies in the area of environmental protection, specializing in the conservation of aquatic and wetland ecosystems. He has conducted many studies on water regimes, dam management and mapping of wetlands and floodplains, and has consulted with legal experts on the delineation of high-water lines and the rehabilitation of degraded sites. He is also well-versed in problems related to fish habitat and is able to characterize spawning, rearing and feeding areas. He has expertise in geomatics and often participates in environmental mapping.

In the study of watersheds, he has developed master plans that, following the assessment of the carrying capacity based on phosphorous balance, allowed for the prioritization of actions regarding lake and waterway conservation.

With respect to the ELAIOM, M. Néron was GHI's scientific director. He was responsible for coordinating all activities related to geomatics. He participated in the limnologic and hydrologic field surveys. He also coordinated the preparation and drafting of the EIS sections on the description of the biophysical environment and participated in the assessment of biophysical effects, as well as the selection of mitigation and compensation measures applicable to fish habitat, water quality and hydrology.

Christian Corbeil, a member of the Ordre des Technologues professionnels du Québec, has more than 20 years of experience in environmental research and investigation as well as in the technical management and administration of projects pertaining to wastewater, soil and water characterization, ecological surveys and the rehabilitation of contaminated sites. From 1986 to 1995, he broadened his knowledge of soil and water while carrying out extensive field research supervision, geotechnical surveys, field sampling and surveys throughout Québec. Since 1995, Mr Corbeil has supervised several characterization studies of soils, groundwater and sediments. Between 1997 and 2004, he was responsible for the coordination and management of federal sampling programmes related to the environmental study (phases I, II and III) of more than 300 federal navigational aid, lighthouse and wharf sites. He also carried out the decontamination and final closure of a large mine in the Gaspé.

His management expertise includes the restoration of sites that have been contaminated by oil, mercury or heavy metals, particularly in remote areas and on islands. He has also interpreted toxicological and ecotoxicological risk-analysis data for such projects and has participated in the federal and provincial environmental assessment processes applicable to them.

With respect to the ELAIOM, M. Corbeil was GHI's technical director; as such, he supported M. Robitaille in all field planning and logistics and ensured adherence to the protocols of GHI and its partners for quality control and health and safety. He wrote the sections of the EIS related to soil and sediment quality.

Donald McLennan (Ph.D.) is a terrestrial ecologist with many years of professional experience consulting on ecology and management issues in Subarctic and Arctic ecosystems. Most recently he worked with GHI to complete the terrestrial ecosystem mapping for the LIOP mine site, pellet plant and pipeline and transmission line rights-of-way. Over the last two years, Dr McLennan has provided quality control, training, project planning and project administration services for the Lower Churchill River Hydroelectric Project for NLH.

Dr McLennan led the terrestrial ecosystem assessment for the Lac de Gras diamond mine development in Central Keewatin (Northwest Territories) and had significant input into the EIS component of that project. He has also worked across the Canadian Arctic and Subarctic on a wide variety of projects, including the assessment of hydroelectric developments and other resource development projects in the Mackenzie Delta, Yukon

Coastal Plain and Hudson Bay Lowlands, and in Northern Labrador in the Torngat Mountains.

With respect to the ELAIOM, Dr McLennan served as GHI's scientific advisor for all mapping and ecosystem characterization. He reviewed the preliminary versions of the ecological maps and, where required, corrected selected polygons and ecotypes. His expert advice was also solicited on all biological data collected during field surveys. He participated in the assessment of effects and the selection of mitigation and compensation measures.

Natalie D'Astous (M.Sc. Biol.) has some 17 years of experience as a professional biologist. She has published some 30 research or study reports, including a study on migratory caribou as part of the Northern Ecosystem Initiative funded by Environment Canada. Large mammals, birds of prey and waterfowl are her main areas of expertise. She has worked for various Native communities, including the Cree, the Innu and the Naskapis, Hydro-Québec, the Canadian Wildlife Service, MRNF and Environment Canada. From 1997 to 2005, she was the liaison officer between IN, Mamit Innuat and the NNK under a communications programme of the Institute for Environmental Monitoring and Research (Labrador).

With respect to the ELAIOM, Mme D'Astous coordinated, in collaboration with Mr Robitaille, the carrying out of wildlife surveys and the associated literature review. She was responsible for preparing the sections of the EIS describing wildlife and participated in the effect assessment and the selection of mitigation and compensation measures applicable to wildlife.

Marie-Ève Dion (M.Sc. Env.) is a biologist with a Master's in Environment. She has carried out several biology studies in the areas of vegetation management and conservation, as well as research into endangered and threatened species of flora. Since 2006, she has been working for GHI, where she honed her skills as a project manager responsible for various surveys of aquatic and terrestrial vegetation communities in Québec. She also carried out delineations of natural high-water marks, characterizations of wetlands and surveys of fauna and flora species at risk. She has worked in the Lower St Lawrence, the Eastern Townships, Montérégie, Charlevoix, Québec City, the Outaouais, the Laurentians and the Laval and Montréal regions, among others. She has supervised field teams conducting surveys for various development projects. She was also in charge of characterizing ecosystems for wind-power projects and participated in drafting the impact studies.

With respect to the ELAIOM, Mme Dion was responsible, in collaboration with M. Robitaille, for carrying out the ecosystem and flora surveys. She produced the reports on those surveys and participated in drafting the sections of the EIS on effects related to terrestrial ecosystems and flora.

Mathieu Charette (M.Sc. Biol.) is a biologist specializing in ecology. For the last 10 years, he has worked as a contract worker and consultant on various wildlife survey projects in North America for scientific studies and consulting mandates. He has extensive experience in surveys of avifauna, herpetofauna, small mammals, chiropters, fish and flora. He has an excellent knowledge of Canadian wildlife and has carried out surveys of species at risk for various development projects and impact studies. He has also contributed to several well-known scientific journals.

With respect to the ELAIOM, M. Charette was responsible for writing the sections describing the biophysical components related to avifauna, herpetofauna, chiropters, fish habitat and water quality.

David Savoie has been working as an intermediate technician in applied ecology for GHI since 2006. He has more than five years of experience in surveying breeding birds and species at risk in all regions of Québec. He has also carried several surveys of birds north of the 55th parallel.

With respect to the ELAIOM, M. Savoie carried out the bird surveys. He also assisted M. Néron with the water quality surveys.

Simon Chartrand, an intermediate technician in applied ecology, joined GHI in June 2006. His mandate is to carry out surveys. During his training, M. Chartrand acquired much experience in field surveys in all areas of ecological studies. He has participated in the description of terrestrial ecosystems within the framework of various impact studies and development projects involving GHI. He has carried out lake and river sampling programmes for various projects. He has also held the position of inspector for MDDEP, where he was responsible for collecting samples of wastewater, drinking water and bathing water.

With respect to the ELAIOM, M. Chartrand's main duty was to carry out surveys of watercourses and fish habitats along the proposed railway. He also took part in writing the technical report thereon.

Julie Tremblay (B.Sc.) is a biologist and also holds a certificate in GIS. She is currently completing a specialized graduate diploma in GIS, furthering her knowledge and acquiring greater skills in mapping and spatial analysis. She has worked as a research assistant on studies related to animal ecology in northern regions for the Chaire de recherche en sylviculture et faune and the Centre d'études nordiques, both affiliated with Université Laval.

Her training and employment have allowed her to deepen her knowledge in the areas of wildlife population ecology, wildlife management and conservation, ornithology and littoral and marine geomorphology. Her training as a biologist is an asset in carrying out terrestrial ecosystem mapping. She is highly proficient with MapInfo™, ArcGiS™, PurView™ and PCI-Geomatica™ software.

With respect to the ELAIOM, Mme Tremblay was in charge, within GHI, of geomatics and the production of terrain, terrestrial ecosystem and other maps generated by GHI.

Myrtille Husson (B. Adm.) has a B.A. in Business Administration from HEC Montréal and a graduate degree in Environment and Prevention. During training at the Réserve naturelle marine de Saint-Barthélemy (French West-Indies), she produced a publication to raise awareness of marine ecosystems. She also worked for the Old Port of Montréal Corporation, where her duties included raising employees' awareness of recycling and composting, developing an information bulletin and summarizing environmental regulations.

Since joining GHI in 2008, she has acquired experience in logistical and administrative support, both in the field and in the office. She has also honed her skills in project management by ensuring the administration and follow-up of various environmental projects.

With respect to the ELAIOM, Mme Husson assisted GHI's project director in the logistical organization of various field surveys and supported M. Corbeil in the application of the quality control and health and safety protocols throughout the process. She was responsible for coordinating communications with field teams, centralizing and formatting all data collected and assisting the team in the production of various reports.

Chantal Cameron (LL.B) is a lawyer who graduated from Université de Montréal in 2001. As the recipient of a Lavery, de Billy award in environmental law, she opted to work in that field and recently completed a Master's in environmental studies at Université de Sherbrooke. After practising civil liability law for three years, she acquired experience in project management working with communications companies.

In her employment with GHI, she has developed an environmental management system based on the ISO 14001 standard for a mining exploration company. In particular, she identified the regulations applicable to the company's activities and prepared a guide of environmental best practices. She also collaborated in the creation of a quality control and health and safety regime based on the ISO 9001 standard for GHI.

With respect to the ELAIOM, Mme Cameron was responsible for verifying that all the biophysical sections of the EIS were in conformity with applicable laws and regulations and supported the team in its selection of mitigation and compensation measures in accordance with current regulations.

Groupe Hémisphères's Partners

Envir-Eau

During the preparation of the ELAIOM, the team of Envir-Eau supported GHI and NML in selecting the best methods for managing groundwater and process water. The team analyzed historical geological data to define the hydrogeological properties of the various geological formations. Its expertise was also used in assessing effects and searching for mitigation measures that would be cost-effective for the client.

Gilles Fortin (M.Sc. Geol. Eng.) has a diploma in geological engineering from Université du Québec à Chicoutimi and a Master's in environmental studies from Université de Montréal. In addition to his employment at Envir-Eau, M. Fortin is the regional coordinator of the graduate studies programme in environmental management of Université de Sherbrooke, where he also teaches introductory courses on the environment and on pollution prevention and treatment. He has also worked in the areas of waste-disposal site engineering, mining, drinking-water resources, geophysics as it relates to mining exploration and the detection of contaminants. M. Fortin has carried out many projects relating to hydrogeology and water treatment. He also carries out studies for Envir-Eau on the production and management of leachate and develops corrective or mitigating measures to control its effects.

M. Fortin has dedicated much of his career to mining and mineral exploration. In that regard, he worked for Relevés géophysiques et Géomines ltée. He was a founding member of Agéos Sciences inc. He directed the exploration that led to the reopening, in 1987, of the Graphite Stratmin mine at St-Aimé-du-lac-des-Îles. M. Fortin has participated in various aerial and terrestrial geophysical exploration surveys in Canada, the US and Africa.

With respect to the ELAIOM, M. Fortin was responsible for the analysis of the geological and hydrogeological data, conducting the literature review and carrying out fieldwork related to hydrogeology. He also assisted GHI in the assessment of effects on the hydrology and the hydrogeology.

Abdel Mounem Benlahcen (Ph.D. Geol.) holds a Ph.D. in hydrogeology from Université du Québec à Chicoutimi. More specifically, Dr Benlahcen has studied in the areas of mining hydrogeology, hydrogeology of seepage in fractured formations and geochemistry associated with auriferous and metal deposits. Consequently, he has acquired extensive experience of chemical and hydraulic interaction phenomena in such mineral geological systems. He has conducted hydrogeological studies at several mining sites, including Niobec (the only underground niobium mine in the world), Joe Mann and Bouchard-Hébert (mining of massive sulfides for precious metals) and more specifically on fracture formation systems and their influence on underground seepage and the transportation of metals.

Working for Envir-Eau since 2005, Dr Benlahcen is involved in projects of various scales concerning the many facets of groundwater supply. His involvement includes exploratory fieldwork, supervision of well drilling and installation, pumping tests and interpretation, government certification of wells and the writing and interpretation of reports. Dr Benlahcen participated in the development of the geological and hydrogeological model associated with the dewatering of an abandoned mine well to control potential effects on the environment.

With respect to the ELAIOM, Dr Benlahcen assisted M. Fortin in preparing the literature review of geological and hydrogeological data. He also performed pumping tests and developed the relevant hydrogeological models.

TECSULT

During the preparation of the ELAIOM EIS, the TECSULT team was responsible for the studies on noise (ambient and project-generated) and air quality (dust) and their effects on local communities, wildlife and flora.

Lucie Boisjoly is a chemical engineer specializing in environment and industrial processes. She has more than 20 years of experience in the area of environmental engineering. For some eight years, she was a Project Engineer for Environment Canada’s Clean Air Division, where her responsibilities included the enforcement of federal regulations. Subsequently, she became health, safety and environment coordinator at Pétromont. As a project manager for Roche, Groupe-conseil, she participated in various environmental studies, including the impact study related to the PCB elimination project overseen by the ministère de l'Environnement et de la Faune and the impact study for the cogeneration project of the Centre Énergétique Montréal-Est.

At TECSULT, her work in the Industrial Environment Department involves environmental assessment studies, environmental impact studies and environmental authorization requests. It should be noted that she was responsible for the LIOP air and noise measurement programme.

With respect to the ELAIOM, Mme Boisjoly was in charge of carrying out the assessment of air quality and noise effects. She took part in writing the description of the receiving environment and in assessing effects on air quality, as well as selecting the associated mitigation and compensation measures.

Michel Forest (B. Eng.) has worked for TECSULT for more than 16 years. He holds a Bachelor's in mechanical engineering from École Polytechnique de Montréal. M. Forest has acted as project manager for numerous modelling studies on air quality and atmospheric dispersion.

He directed the air emission survey and atmospheric dispersion study of a Petro-Canada refinery and the study of fugitive emissions at the oil facility of Pipelines Montréal. He was responsible for assessing the need for the establishment of a local follow-up network on air quality at the Dorval and Mirabel airports. He has participated in several international projects on modelling atmospheric dispersion and the assessment of air quality. M. Forest has extensive experience in noise studies, including the Howells River and Emeril studies on the noise effects of the LIOP.

With respect to the ELAIOM, M. Forest was the coordinator of the noise effect assessment.

AECOM Canada

During the preparation of the ELAIOM EIS, the team of AECOM Canada (formerly Gartner Lee Ltd) was responsible for mapping landforms and permafrost. It also assisted GHI in the assessment of effects on ecosystems.

Robin McKillop (M.Sc., P. Geo.), is a geomorphologist specializing in Quaternary geology. He has applied his knowledge of the origins of landforms and the changes they undergo to predict the general geological, hydrogeological, geotechnical and ecological characteristics of the landscape.

Mr McKillop recently completed the geomorphological mapping of pipeline and energy transmission line corridors totaling 800 km for the LIOP, which was used for the terrestrial ecosystem mapping and engineering of the project. He also did the geomorphological mapping of a proposed 240-km road corridor in the centre of Nunavut, the biogeomorphological and slope stability mapping for the proposed site of a mine in a rugged region of north-western British Columbia, geomorphological resource mapping for the purpose of identifying sources of borrow material in northern Manitoba and geomorphological mapping and hydrological work to facilitate the selection of well sites in southern Ontario.

With respect to the ELAIOM, Mr McKillop was in charge of terrain mapping. He also described the geological environment of the region and participated in the assessment of effects on the physical environment (construction of roads and the electricity transmission line).

Donald F. McQuay (B.A., Agr. Geol.), principal environmental geologist, is a graduate of the University of Guelph. He has spent more than 25 years of his professional life with Gartner Lee Ltd (now AECOM Canada), where he has conducted landform assessments for the purposes of technical design, planning and characterization of ecological and agricultural conditions. He has worked on various studies on rail, pipeline and electricity transmission line corridors in Ontario and elsewhere in Canada.

Mr McQuay supervised the geomorphological mapping of a 800-km pipeline and energy transmission line corridor for the LIOP. He carried out geomorphological assessments of several hundred kilometers of corridors for the selection of the route and construction of pipelines in Ontario, as well as for the study of the twinned right-of-way for Trans-Canada

Pipelines and Canadian National through northern Ontario. He participated in mapping approximately one third of the Province of Ontario using existing data, the interpretation of aerial photos and field surveys, in order to define the physical and pedological geomorphological conditions.

With respect to the ELAIOM, Mr McQuay supervised Mr McKillop in carrying out the terrain mapping.

AMEC

During the preparation of the ELAIOM EIS, the team of AMEC Earth & Environmental, a division of AMEC Americas Limited, was in charge of experimental fisheries and the assessment of the quality and quantity of fish habitat.

Eugene Lee (M.Sc. Biol.) has a Master's in marine biology and 23 years of experience as a biologist, specializing in aquatic environments and project management. His primary areas of interest are the effects of industrial development on both marine and freshwater aquatic environments, fisheries research and the design and implementation of environmental monitoring programmes for governments and private agencies. He has experience in research and impact and monitoring studies involving aquaculture, marine and freshwater fisheries, oil developments, mining, landfills, toxic waste sites, military facilities, pulp and paper, highway construction, urban watershed monitoring, coastal construction, coastal zone management and hydroelectric developments. Mr Lee carried out the fish and contaminant surveys for the LIOP.

With respect to the ELAIOM, Mr Lee coordinated the experimental fisheries, the collection of benthic invertebrates and the collection and analysis of sediment data. He also assisted GHI in the assessment of effects.

James McCarthy is a biologist and Certified Fisheries Professional with the American Fisheries Society with over 15 years of experience. His research expertise is in the areas of environmental assessment and management of fish habitat.

He has been involved in a wide range of projects in Newfoundland, Nova Scotia, British Columbia and Alaska, working for private organizations and government agencies. Projects have generally entailed the design and implementation of environmental impact assessments, CEAA assessments, environmental effects monitoring programmes, compensation plans and baseline studies related to various human activities such as hydroelectric developments, mining/construction, forest harvesting and oil and gas activities.

With respect to the ELAIOM, Mr McCarthy supported Mr Lee in writing reports.

Dermot Kenny is a field technician with 10 years of experience in the areas of water, soil and fish sampling, including the assessment of ecological risk and environmental effects.

For the past year, Mr Kenny has been involved in numerous fisheries and water quality projects throughout Newfoundland and Labrador. His work has involved the use of a variety of skills, including: collection, consolidation and analysis of data; literature reviews; species identification, classification and description; bathymetric and electrofishing surveys; invertebrate, fish, water and sediment sampling; and collecting and assessing data on physical habitats within riparian, lacustrine and marine environments.

With respect to the ELAIOM, Mr Kenny assisted the AMEC team in the collection of field data and the writing of reports.

OTHER

Serge Ashini Goupil is an Innu from Matimekush-Lac John. Holder of a Bachelor of Science with a major in geography and a short programme in project management, M. Ashini Goupil has a varied and extensive knowledge of the Native Nations of Québec, and particularly of the Innu of Québec. Through Ashini Goupil Reg., he has participated in various social, community and environmental projects aimed at the development of the targeted communities. In the past 15 years, he has accumulated a varied experience on issues related to the environment, territorial negotiations, project development and management as well as public consultations involving Native groups. He is concerned with climate change and energy issues and is personally involved in the efficient use of energy.

M. Ashini Goupil is also the owner of a nature and Native cultural tourism company (Aventures Ashini), which offers discovery and healing activities in the traditional Innu territory in northern Québec. Over the past six years, he has welcomed various groups, including bush pilots, canoeists, leaders of Native organizations, civil servants, nature lovers and youths.

With respect to the ELAIOM, M. Ashini Goupil provided support to an expert of the GHI team during some of the surveys and was responsible for some of the logistics related to the technical and environmental assessments of the Project.

Michel Ashini Goupil is an Innu from Matimekush-Lac John. He is involved in a nature and native cultural tourism company (Aventures Ashini), which offers discovery and healing activities in the traditional Innu territory in northern Québec. Over the past six years, various groups have participated in those activities, including bush pilots, canoeists, leaders of Native organizations, civil servants, lawyers, nature lovers and youths.

With respect to the ELAIOM, M. Ashini Goupil, who is also a civil engineering technician, provided support to the GHI team during the survey of fish habitat along the railway line and the main access road.

Casimir McKenzie, **George Rock**, **Réginald Dominique** and **Martial Pinette** are Innu or Naskapis from the Matimekush-Lac John/Kawawachikamach area. With respect to the ELAIOM, they provided support to the GHI team during the various fieldwork undertaken in the Schefferville area.

Jacques Whitford Stantec Ltd

Mark Shrimpton, a Principal and the Socio-Economic Services Practice Director with Jacques Whitford Stantec Ltd, has over 25 years experience of assessing the socio-economic effects of large projects, and an internationally-renown expert in Industrial Benefits Planning. He originally undertook benefits-related research into human resources and industrial infrastructure requirements for such clients as Petro-Canada and Husky Energy (regarding offshore petroleum mega projects) and Newfoundland Hydro (regarding the Lower Churchill Hydroelectric Project). He subsequently authored, and he is assisting in the ongoing implementation of, Husky Energy's White Rose Oilfield Benefits and Diversity Plans, the only such plans prepared by external consultants. He has also assisted Chevron in its benefits planning for the Hebron oilfield project, and documented (for Exxon-Mobil and Petroleum Research Atlantic Canada) the industrial benefits from oil and gas projects and activity.

Mr Shrimpton has also assisted with IBP initiatives in Iceland (smelter and hydroelectric projects), Russia (mine and smelter projects), British Columbia (offshore petroleum development), New Brunswick and Prince Edward Island (for Atlantic Canada Opportunities Agency, regarding prospective offshore petroleum activity) and New Brunswick (for Irving Oil), as well as for Yukon Economic Development. Mr Shrimpton has also: presented on IBP at conferences and workshops in Canada, the United States, Iceland, Scotland, France and Malaysia; delivered a one-day course on the topic (for the Economic Developers Association of Canada, in Winnipeg, Sudbury and St. John's); and, organized and chaired a special session on IBP at the 2006 International Association for Impact Assessment in Norway.

Mr Shrimpton worked on the assessment of the socio-economic effects of the LIOP.

His role in the EIS of the ELAIOM was to prepare the Strategy for Full and Fair Opportunity and First Consideration (Appendix 3).

Arkéos inc.

Claude Rocheleau is an anthropologist (B.A. Université de Montréal, 1977) who holds a Master's Degree in Anthropology with a Prehistoric Archaeology orientation (Université de Montréal, 1982). He co-founded Arkéos inc., a firm of experts in anthropological research, which has been working in the heritage and archaeology fields since 1981.

Mr Rocheleau has accumulated more than 30 years of experience. The mandates that he has carried out have led him to deal with all facets of his chosen discipline: programming, opinions on appropriateness, surveys, excavations, animation, data analysis and interpretation. His experience allows him to assess the effects of construction projects on archaeological resources and to ensure follow-up on the mitigation measures that are adopted pursuant to the applicable legal and regulatory frameworks.

He has acquired solid experience in the northern environment. He has carried out several surveys and excavations, including for NML's ELAIOM and the KéMag Project in the vicinity of lac Harris. He also coordinated other northern reports: the relocation of the Mushuan Innu to Natuashish; the Toulnustouc River hydroelectric project (in collaboration with residents of Betsiamites); and many projects related to the James Bay development. In addition, he conducted numerous potential studies related to linear construction, such as transmission lines, roads and gas pipelines in all regions of Québec. These studies extended to both the prehistoric and historic periods.

With respect to the ELAIOM, Mr Rocheleau acted as archaeological project manager: he obtained the relevant permits from the Québec and the Newfoundland and Labrador governments; he supervised the fieldwork; he carried out the data analyses; and he wrote the final report. Mr Philippe Péléja, Archaeologist, assisted Mr Rocheleau during fieldwork.

Translation Team

Marie-Cécile Brasseur has been an associate of PFWA since its inception in 1975. She belonged for more than 25 years to the Ordre des traducteurs, terminologues et interprètes agréés du Québec. She directed the Linguistic Services of Makivik Corporation for 11 years, which enabled her to develop expertise in Aboriginal studies, northern research, environmental sciences and impact studies. She also performed services under contract for numerous clients and translated, among others, the report submitted by LGL Limited to the Department of National Defence on the *Initial Environmental Evaluation of the Arctic Subsurface Surveillance System*. From 1995 to 1999, she translated all reports issued by the Nunavut Implementation Commission regarding the creation and structure of the Government of Nunavut. Many of her translations were published, including Ronald Wright's *A Short History of Progress*.

She has coordinated French-to-English and English-to-French translation and revision of the various reports and documents used in the preparation of the Project Registration and the EIS for the ELAIOM.

Howard Scott has worked as a professional translator since 1981, working in a wide range of fields. He is a Certified Translator, a member of the Ordre des traducteurs, terminologues et interprètes agréés du Québec and has a B.A. and M.A. in translation from Concordia University.

He worked on the translation into English of several studies required for the Project Registration and the EIS for the ELAIOM.

Josée Vilandré received a bachelor of law from Université de Sherbrooke and a certificate in translation from Université de Montréal. She was a member of the Makivik Corporation legal department for almost 20 years before beginning a new career in translation in 2003.

She collaborates regularly with Mme Brasseur. Among other works, they completed in 2007 the translation of a Nile River Awareness Kit for Hatfield Consultants of Vancouver.

Since 2003, Mme Vilandré has produced numerous translations for the Legislative Assembly of Nunavut, various departments of the Government of Nunavut, Makivik Corporation, Health Canada, the First Nations Land Advisory Board and several other clients.

She participated in 2006 in the final revision of the French version of the Nunavik Inuit Land Claims Agreement.

Mme Vilandré worked on the translation into French of several reports required for the Project Registration and the EIS for the ELAIOM.

Chantal Bédard first studied Tourism and Management in Toronto, graduating from Humber College in 1987. She worked from 1992 to 1999 as a documentation and liaison agent for Tourisme Québec. She studied translation at McGill University, from which she graduated in 2005. While studying, she worked for two years as a technical translator for Suzanne Aubertin Translation Services. For the past eight years, she has been translating freelance for various clients, including Environnement Illimité Inc., International Civil Aviation Organization, the Royal College of Physicians and Surgeons, and Victoria Order of Nurses Canada.

She was responsible for the English-to-French or French-to-English translation of some of the reports and documents forming parts of the Project Registration and the EIS for the ELAIOM.

Louis-Martin Bédard has a B.A. in Physical Activity Science, a minor in Medieval Studies and a certificate in French writing. He has been working in the field of communications for 10 years and as a translator for six years. He took part in the translation of various documents related to the ELAIOM.

Laura Yaros, Certified Translator, holds a BA with Specialization in Translation from Concordia University, where she graduated with distinction in 1988. Over the years, she has won the Mary Coppin Prize and the Fishl (Philip) Cola Award. She works as a freelance translator in a wide range of fields, including law, labour relations, crafts and tourism.

Her work for NML included translating a section of Daniel Clément's report on land- and resource-use by the Innu of Northern Québec and their knowledge of the area of the ELAIOM.

Carolyn Perkes has worked since 1997 as a full-time translator in a variety of fields, including education, literacy, labour relations and the environment. She has translated comprehensive study reports, screening reports, project authorizations and related materials for Fisheries and Oceans Canada. In 1996, she completed a PhD in Québec and Canadian literature at Université Laval, specializing in the history of criticism of translated literature.

She contributed to the translation into English of a report required for the Project Notice and the EIS for the ELAIOM.

Other Partners

Bobbie Boland (MSW) is a social worker and mediator who has worked as a consultant for the past 15 years with varied client groups including community groups and all levels of government. Ms Boland's area of expertise is in the social sciences. Specifically Ms Boland was involved in providing gender-based analysis and advice on the ELAIOM. She also authored Women's Participation and Contributions: Issues relevant to the LabMag Iron Ore Development and the Environmental Assessment Review. Ms Boland also works in the area of social and economic monitoring, research, training, evaluation and facilitation of processes for large and small groups.

Michael Weiler is an anthropologist/geographer with M.A. degrees in Cultural Anthropology and Sociology (1982). He has studied in Bonn, Germany, and at McGill University, Montréal. He has also received training in cartography and GIS at the College of Geographic Sciences in Lawrencetown, Nova Scotia.

For more than 25 years, he has been working with and for FN communities and organizations, for example the Mi'kmaq of Nova Scotia and Prince Edwards Island, the

NNK in northern Québec, IN in Labrador, Mushkegowuk First Nation in northern Ontario, and James Bay Cree. He has also carried out research projects for Parks Canada and the ministère du Loisir, de la Chasse et de la Pêche.

For the past 10 years, he has been working for Treaty and Aboriginal Rights Research Centre in Shubenacadie, Nova Scotia, in the capacity of Land Use Researcher and GIS Manager.

Most of his work has focused on the topic of land use in the context of historical research, claims research or effect assessments. He has authored numerous studies, conference papers and articles in this field.

Mr Weiler was contracted by NML as an independent consultant to research current Naskapi land-use patterns in the context of the EIS for the ELAIOM.

Daniel Clément holds degrees (M.A., Ph.D.) in Anthropology from Université Laval and has worked with First Nations for 25 years. He has held the following positions: Curator for the Eastern Subarctic region within the Canadian Ethnology Service at the Canadian Museum of Civilization (1990-1997); Director of Research at the National Center for Scientific Research in Paris (1996); professor at several universities, including Paris X-Nanterres (1996). He has conducted numerous missions, each averaging two months in duration, to different FN communities in North America (Ekuanitshit, Pikogan, Chisasibi, Sandy Lake, Old Crow, Prince George, *etc*.), which allowed him to develop an expertise in First Nations' culture and, in particular, in their ecological knowledge. He has published numerous works and articles, including on the Innu of Québec (ethnobotany of the Montagnais of Mingan; Montagnais zoology). He has also participated as a consulting anthropologist in various environmental studies regarding proposed mining and hydroelectric developments within the traditional territory of the Innu.

In regard to the ELAIOM, M. Clément conducted a study of land-use by members of the NIMLJ and their knowledge of plants and wildlife through a literature review and a visit to Matimekush-Lac John.

Véronique Robichaud completed a Bachelor's (1992) and a Master's in economics (1994) at Université Laval. Her graduate studies along with her ongoing research activities at the Centre interuniversitaire sur le risque, les politiques économiques et l'emploi have contributed to the development of strong analytical capacities.

Over the years, she has been involved in the development of analytical tools, such as computable general equilibrium models, for the Centre Interuniversitaire sur le risque, les politiques économiques et l'emploi, Finance Canada, ministère des Finances du Québec and other research centres. Given her strong academic background and her communication skills, she has been involved in many training sessions and acts as a lecturer at the HEC Montréal.

Mme Robichaud participated in numerous research projects related to regional and international agreements, Aboriginal issues, international development and environment. Among other things, she has been responsible for the economic effect assessment of several projects such as: the construction and operation of a liquefied natural gas plant in Gros Cacouna; the expenditures of Université Laval in the Québec region; the changes in the traditional diet of the Inuit; the construction of marine infrastructure in Inuit villages; and the feasibility studies for hydroelectric projects in Nunavik.

Her role in the ELAIOM related to calculating the direct, indirect and induced economic effects.

Wade Locke is a Full Professor of Economics at Memorial University of Newfoundland. He specializes in the Newfoundland and Labrador economy, resource economics, public finance, public policy, innovation indicators, productivity, economic impact assessment and cost-benefit analysis. He has published extensively in a variety of areas.

In addition, Dr Locke has provided his professional services to all three levels of government, local, provincial and national, to foreign governments and to national, local, regional and international businesses. He has also served as a reference person to the local, national and international media.

He is a past president of the Atlantic Canada Economics Association, a current member of the Canadian Science and Innovation Indicators Consortium and a senior policy advisor to the Atlantic Provinces Economic Council. Dr Locke was awarded Memorial University's *President's Award for Exemplary Community Service 2008*.

Dr Locke's formal training consists of a Ph.D. (Econ) and M.A. (Econ) from McMaster University and a B.A. (Econ) and B.Sc. (Biology) from Memorial University. He also has a certificate in Applied Petroleum Economics from Van Meurs Associates through the Centre for Management Development (Memorial University). He was gold medal winner in economics at Memorial University and won a SSHRC Doctoral Fellowship and several university scholarships at McMaster University.

Dr Locke's recent research activities have been varied:

- has authored, either jointly or individually, more than 130 articles/papers and has presented more than 90 conference/seminar papers;
- has undertaken research on the economics of oil and gas activities in Newfoundland and Atlantic Canada;
- has worked extensively on economic impact and financial analysis related to oil and gas and mineral projects;
- his recent research focus has been on regional economic development issues and intergovernmental fiscal arrangements;
- has also investigated issues related to productivity, the knowledge-based economy, governance issues related to ocean boundaries and the role of higher education institutions in economic development in Atlantic Canada;
- finally, Dr Locke has been engaged in analyzing the economic impacts of the changes to equalization and the Atlantic Accords contained in the Budget 2007, in which context he appeared before the Senate Committee on National Finances as an expert witness.

Dr Locke's role in the ELAIOM was to model the economic effects, including income and employment, contribution to GDP and government taxation and revenue effect.

ES.0 EXECUTIVE SUMMARY

The present summary respects the structure set out in the Guidelines (GNL December 12, 2008).

ES.1 Identification of the Proponent

The proponent is New Millennium Capital Corp. (“NML”), a corporation incorporated in Alberta and quoted on the TSX Venture Exchange. It has offices in Calgary, Montréal, Labrador City and Schefferville.

ES.2 Project Overview

The objective of the ELAIOM is to mine over a three-year period approximately 11 Mt of ROM from four pits (Timmins 3N, Timmins 4, Timmins 7, Fleming 7N) located in the Province of Newfoundland and Labrador some 20 km north-west of Schefferville, Québec.

The area in question was impacted by mining activities and infrastructure between 1954 and 1982.

After crushing, washing, screening and (in winter) drying, the ROM will produce approximately 9 Mt of DSO product (“sinter fines” and “super fines”) over the three-year life of the ELAIOM, which will be shipped by rail to the Port of Sept-Îles, Québec.

The principal infrastructure, all of which will be located in Labrador, will be:

- a processing complex, including sizers, crushers, physical and magnetic separation equipment, boiler, dryer, conveyors, pumps and piping;
- a pipeline to take tailings and effluent from the processing complex by gravity to the abandoned Timmins 2 pit, which has been confirmed not to contain fish;
- a pumping station in the Timmins 2 pit and a pipeline to transfer water to the processing complex for use as process water;
- a pumping station and pipeline to deliver water from one of the dewatering wells at the Timmins 3N pit for use as potable water;
- covered SF and SPF stockpiles;
- a railcar-loading system;
- a camp to accommodate up to 300 workers;
- a wastewater and sewage treatment plant;
- offices, warehouse, workshops, garages, laboratory, mine dispatch, mine dry administration offices and other service buildings;
- part of an existing access road from Schefferville;
- site and haul roads;
- a landfill for solid waste disposal;
- part of an electricity transmission line from the Schefferville Substation, a substation and a 4.16-kV distribution network;
- an explosives factory and magazines;
- a 4.0 MW generator;

- part of a railway line from the processing complex to Mile Post 353, to be rebuilt on an existing rail bed.

The four pits and the infrastructure will disturb approximately 94 ha, some 46% of which has already been disturbed.

ES.3 Predicted Environmental Effects

ES.3.1 Biophysical

Fourteen biophysical environmental components were reviewed, and eleven VECs were selected on the basis of the Guidelines, a thorough programme of public information/consultation, a literature review and professional judgment.

Table ES.1 shows the residual effects predicted using the criteria defined in Section 7.0 (nature, direction, spatial extent, duration, frequency, magnitude, level of certainty, reversibility, ecological value, socio-economic value).

Table ES.1: Predicted Residual Effects on Biophysical VECs

VEC	Direction	Residual Effect
Noise (with and without blasting)	Negative	Low
Air quality	Negative	Moderate
Water quality	Negative	Low
Water budget		
Localized drying-up	Negative	Moderate
Modulating water regimen	Negative	Moderate
Surficial deposits	Negative	Low
Wetlands		
Loss	Negative	Moderate
Drying-up	Negative	Moderate
Caribou and habitat		
Noise disturbance - migratory caribou	Negative	Moderate
Noise disturbance - sedentary caribou	Negative	Moderate
Habitat destruction - migratory caribou	Negative	Moderate
Habitat destruction - sedentary caribou	Negative	Moderate
Harvested mammals	Negative	Low
Wolverine	Negative	Low
Birds at risk and migratory birds	Negative	None
Fish and fish habitat	Negative	None

The only cumulative biophysical effect that could be measured was that on air quality in Schefferville in combination with the effects of LIM's Schefferville Area Iron Ore Mine. None of the measured effects exceeded roughly 20% of the applicable regulatory standard.

All of the effects on biophysical VECs are negative, but none of them is predicted to be "significant".

ES.3.2 Socio-economic

Thirty-three socio-economic VECs were selected in the manner described in Section ES.3.1.

Table ES.2 shows the residual effects predicted using the criteria described in Section ES.3.1.

Table ES.2: Predicted Residual Effects on Socio-economic VECs

VEC	Direction	Residual Effect
Caribou Subsistence Hunting	Negative	Low
Local Employment	Positive	Moderate
Local Contracting	Positive	Low to Moderate
Newfoundland and Labrador Benefits	Positive	Very high
Treaty Rights	n/a	None
Comprehensive Land Claims Negotiations	n/a	None
Caribou Sport Hunting	n/a	None
Subsistence Fishing	n/a	None
Trapping	Negative	Low
Local Infrastructure and Services	n/a	None
Archaeological/Heritage/Palaeontological Sites	n/a	None
Sites of Culture and Spiritual Importance	n/a	None
Community Cohesion	n/a	None
Family and Interpersonal Relations	n/a	None
Maintenance of Community Populations	n/a	None
Road Safety	n/a	None
Commercial Fishing	n/a	None
Maintenance of Local Labour Forces	n/a	None
Maintenance of Social Stability	n/a	None
Rail Transportation of Ore	n/a	None
Inter-provincial Labour Mobility	n/a	None
Availability of Labour Force	n/a	None
Restoration/Rehabilitation	n/a	None
Training	n/a	None
Access to Territory for Traditional Activities	n/a	None
Racial Tension on Work Site	n/a	None
Sport Hunting of Caribou by NML Employees	n/a	None
Quality of Berries and Medicinal Plants	n/a	None
Goose Hunting	n/a	None
Small Game Hunting	n/a	None
Gender Relations	n/a	None
Health	n/a	None
Language in Workplace	n/a	None

None of the potential cumulative effects could be evaluated quantitatively. Table ES.3 summarizes the only conclusions that could be drawn regarding cumulative effects on socio-economic VECs.

Table ES.3: Cumulative Effects on Socio-economic VECs

VEC	Cumulative Effect
Rail Transportation of Ore	Positive effect on revenues of three concerned rail carriers.
Availability of Workers	No effect predicted.
Subsistence Hunting and Trapping	No prediction can be made.

Only five of the 33 socio-economic VECs will be affected. Three of the predicted impacts are positive and the effect on one of them, the Newfoundland and Labrador Benefits VEC, is significant.

ES.4 Mitigative Measures

A total of approximately 170 standard mitigation measures were identified, divided into the following categories: Tree-cutting and Management of Wood; Erosion and Sedimentation; Watercourse Crossings; Transmission Line Rights-of-way; Solid-waste Management; Management of Hazardous Materials; Drilling and Blasting; Construction Equipment; Mining Operation; Management of Ore, Stockpiles, Tailings, Mine Waste and Overburden; Water Management; Process Water and Effluent; Air Quality; Restoration.

The importance of effects was evaluated taking into account the application of those standard measures.

Wherever feasible, special mitigation measures were identified on a case-by-case basis in the hope of enhancing positive effects and reducing the importance of negative effects.

ES.5 Component Studies

Component studies were conducted in the following areas: fish and fish habitat; archaeological and heritage sites; gender equity; Schefferville Innu and Naskapi land- and resource-use and traditional ecological knowledge; hydrogeology; breeding birds; terrestrial ecosystem mapping; commuter mining; Aboriginal health.

They are all appended to the EIS.

A helicopter-based survey of caribou was also carried out in collaboration with LIM in May 2009.

ES.6 Proposed Monitoring and Response Plan

Table ES.4 summarizes the proposed monitoring programme.

Table ES.4: Monitoring Programme

Valued Ecosystem Component	Activity	Objective
Air Quality	Sampling for TPM and PM10 at workers' camp over 1-2 months during mining at Timmins 3N.	To test the prediction of a moderate negative effect on air quality at the workers' camp when operations are ongoing at the site nearest to it. Consideration will be given to continuing the monitoring depending on the results of the first monitoring.
Noise	*Without Blasting* Monitor noise at workers' camp during day and night. Monitor the noise emitted by the generator fitted with the energy-recovery system during the first days that it is in operation. *With Blasting* Maintain record of blasting data (vibration speed, ground vibration frequency, air pressure, dynamiting patterns).	*Without Blasting* To test the prediction of no important effects, with particular reference to the workers' camp. *With Blasting* To test the prediction of no important effects.
Water Quality	*Surface Water* Periodic (three times yearly) monitoring of water quality parameters (temperature, pH, conductivity, oxygen, turbidity and previously analyzed metals) using the techniques described in AMEC (January 2009) and other appropriate techniques. Sampling stations: Timmins 1, 2 and 6; tailings/effluent pipeline between processing complex and Timmins 2; Elross Creek; Goodream Creek. *Groundwater* Parameters described for surface water, plus nitrates and metals, will be sampled in at least four observation wells three times yearly and in the drinking water well six times yearly.	*Surface Water and Groundwater* To test the prediction of low importance of residual effect. If higher than predicted levels of contaminants are found, mitigation measures will be implemented.
Water Budget	*Localized Drying-up* Read piezometers monthly. Monitor flow-gauging stations in DSO3-13 and DSO3-14.	To test the predictions of moderate effects on localized drying-up and on modulation of water regimen.

Valued Ecosystem Component	Activity	Objective
	Modulating Water Regimen Monitor fluctuations in level of Timmins 1.	
Surficial Deposits	Field visits during removal of substrate and topsoil. Annual inspection of storage sites.	To ensure that area disturbed does not exceed the area predicted. To ensure storage conditions are respected.
Wetlands	*Loss of Wetlands* Field visits to check that area of wetland destroyed does not exceed the area predicted. Annual inspection to evaluate success of relocating wetland. *Drying-up of Wetlands* Install piezometers in two wetlands near Timmins 4 to monitor water content and drainage.	To test the predictions of moderate loss of wetlands and moderate localized drying-up.
Migratory and Sedentary Caribou	*Noise Disturbance* Migratory: Financial contribution to population monitoring by government/academia in exchange for results. Participation in CARMA. Sedentary: Helicopter-based survey in spring of every fourth year over a 50-km radius, including collection of samples, for genetic analysis and satellite collaring. *Ad hoc* collection of samples for genetic analysis from Native hunters and outfitters' clients. *Loss of Habitat* Migratory/Sedentary: Monitoring of losses of habitat of sedentary caribou. The results of other surveys will also be reviewed.	To ascertain if sedentary caribou are present in the vicinity of the ELAIOM, especially during the calving season. To test the predictions of moderate residual effects from noise disturbance and destruction of habitat on migratory and sedentary caribou. Note: The schedule of helicopter-based surveys assumes that Phase 2 (Assessment Group 2b) (Table 1.0) proceeds.
Harvested Mammals	Hunting and trapping success by the concerned FNs will be monitored at five-year intervals using the techniques described in Appendix D. Results of monitoring of losses of habitat of sedentary caribou will be	To test the prediction that the residual effect on harvested mammals will be low. To obtain indirect insights into the health of mammal populations. If declines in catches are identified, efforts will be made to determine

Valued Ecosystem Component	Activity	Objective
	employed. The results of government surveys and of scientific studies will also be reviewed.	if they are attributable, in part or in whole, to the ELAIOM. If they are, an effort will be made to identify mitigation or compensatory measures. Note: Monitoring will occur in Year 5 of Phase 1, which foresees two years for preparation/construction and three years for operations. Monitoring will continue at five-year intervals should Phase 2 (Table 1.0) proceed.
Wolverine	Baited posts will be set up within a 50-km radius of the ELAIOM every five years and will be monitored for one year (see Envirotel 3000 inc. Février 2008). The work of the recovery team for the Eastern Canada wolverine population will be monitored. Wolverines will be included in the interviews with the concerned FNs.	To test the view that wolverines are very rare in or absent from the vicinity of the ELAIOM. If wolverines are identified in the vicinity of the ELAIOM, appropriate measures will be discussed with the recovery team and the concerned governments and FNs. Note: See "Note" for Harvested Mammals above.
Birds	Surveys will be conducted every five years using the techniques described in Appendix F.	To test the prediction that there will be no negative effects on at-risk or migratory species. If effects are identified and can be attributed to the ELAIOM, mitigation or compensatory measures will be discussed with the concerned governments. Note: See "Note" for Harvested Mammals above.
Fish and Habitat	Visual inspection for post-blasting fish mortality in Pinette Creek.	To test the prediction of no effect on fish near Timmins 4.
Caribou Subsistence Hunting	This VEC will be addressed in the five-year surveys of harvested mammals described above.	To test the prediction that the Project will not cause an important decline in the number of caribou killed for subsistence purposes. If an important decline is observed and can reasonably be attributed, at least in part, to the ELAIOM, an effort will be made to

Valued Ecosystem Component	Activity	Objective
		identify compensatory measures, such as subsidizing the cost for hunters to travel to another area or organizing community hunts. Note: See “Note” for Harvested Mammals above.
Local Employment	Monthly, quarterly and annual reports on place of residence, ethnic affiliation and gender of all employees at the mine site will be prepared.	To identify whether the target of local hiring at each of the construction and operations phases has been reached. If not, an understanding of the reasons will be sought. If appropriate, measures to increase local hiring will be implemented.
Local Contracting	Will be addressed in the reports on local employment mentioned above.	No target for local contracting could be established. The question to be asked will be whether there are local contractors who have tried to obtain contracts, but who have failed. If there are, efforts to identify causes and solutions (*e.g.*, unbundling of contracts, assistance in preparing bids) will be implemented on a case-by-case basis.
Newfoundland and Labrador Benefits	The monthly, quarterly and annual reports described in the NLBP will identify the benefits (employment, contracting, taxes, royalties) flowing to Newfoundland and Labrador.	To ascertain whether the levels of employment and contracting predicted in Section 3.2.2 have been attained. If not, an attempt will be made, guided by Appendix 3, to identify the reasons and to implement corrective measures.
Trapping	Trapping will be addressed in the five-year surveys of harvested mammals.	To test the prediction that the ELAIOM will not cause an important decline in the number of animals trapped. If a significant decline is observed and can reasonably be attributed, at least in part, to the ELAIOM, an effort will be made to identify compensatory measures. Note: See “Note” for Harvested Mammals above.
Family and Interpersonal Relationships	NML' s human resources personnel will work individually	To evaluate to what extent commuting creates or aggravates

Valued Ecosystem Component	Activity	Objective
	with employees who commute to identify problems relating to family and interpersonal relationships. Subject to issues of confidentiality, examples of problems and solutions will be addressed in the annual report described above.	problems relating to family or interpersonal relationships. Mitigation or compensatory measures will be identified on a case-by-case basis, if required.
Community Cohesion	The effects of the ELAIOM on community cohesion will be monitored at five-year intervals. Note: See “Note” for Harvested Mammals above.	To test the prediction of no important effects.
Maintenance of Community Populations	The monitoring for local employment, local contracting and Newfoundland and Labrador benefits will collect data on the place of residence of employees. Those data will be analyzed every fifth year for changes of residence that might indicate an important effect on this VEC. Note: See “Note” for Harvested Mammals above.	To test the prediction of no important effects.
Gender Equity	The reports on local employment and Newfoundland and Labrador benefits will address also gender issues. Prepare and implement an employment equity/women’s employment plan before start of construction; monitor implementation of plan yearly.	To ascertain whether the commitments made in the employment equity plan (Appendix 19) have been respected. If not, methods of achieving them will be identified, and implemented.
Caribou Sport Hunting	Annual discussion with the four outfitters in Section 5.5.7.3 to discuss any perception of effects of ELAIOM on their business.	To test the prediction of no effect on their caribou-hunting activities.
Local Infrastructure and Services	Annual meetings with Schefferville Administrator, airport manager, health and social services personnel. Maintain regular contact with CSSS de l’Hématite, which administers the Schefferville Dispensary.	To test the prediction of no important effects.
Road Safety	NML’s security personnel will record all accidents and compile	To test the prediction of no effect on this VEC.

Valued Ecosystem Component	Activity	Objective
	an annual report.	
Maintenance of Social Stability	Maintain a register of "incidents" involving non-Native workers and local persons. Monitor appearances before itinerant court.	To test the prediction of no important effects.
Maintenance of Local Labour Forces	The number of former employees of the NNK and the NIMLJ hired by the ELAIOM will be recorded annually in the report on local employment.	To evaluate whether the ELAIOM has an important effect on this VEC.
Other	Annual meetings will be held with all levels of government, the concerned FNs, communities, concerned individuals and other organizations.	To identify issues not related to the VECs described above and, where appropriate, to identify and implement mitigating and compensatory measures.

The following response plans are described in outline and will be developed in full upon the authorization of the ELAIOM:

- Emergency Response/Contingency Plan;
- Environmental Protection Plan;
- Rehabilitation and Closure Plan;
- Employment Equity Plan.

ES.7 Fundamental Conclusions

The following fundamental conclusions can be drawn:

- only approximately 94 ha will be disturbed, some 46% of which has already been disturbed by prior mining activities;
- there will be no significant negative effects on biophysical VECs;
- there will be no effects on 28 socio-economic VECs;
- there will be low negative effects on two socio-economic VECs;
- there will be positive effects on three socio-economic VECs, and the effect on the Newfoundland and Labrador benefits VEC will be significant;
- there is little public concern about or interest in the ELAIOM in Labrador West;
- in the absence of the ELAIOM, it is likely that the regional transportation and energy infrastructure will be decommissioned, which will virtually eliminate any serious likelihood that the mineral potential of large areas of Labrador West and Labrador North will be able to be developed economically in the foreseeable future.

ES.8 Issues of Concern

The principal issues of concern are:

- to ensure that the predicted benefits for the people and government of Newfoundland and Labrador are attained or exceeded;

- to ensure that negative impacts on sedentary caribou are avoided.

ES.9 Table of Concordance

The Concordance Table follows:

Table ES.5: Concordance Table

Guidelines for the Environmental Impact Statement by the Government of Newfoundland and Labrador

REQUIREMENT	EIS
1. EXECUTIVE SUMMARY	
Proponent Identification	ES1
Project Overview (Predicted Environmental Effects, Mitigative Measures)	ES2, ES3, ES4
Residual Environmental Effects	ES3
Cumulative Environmental Effects	ES3
Outline of Component Studies	ES5
Proposed Monitoring Programmes	ES6
Proposed Response Programmes	ES6
Summary of Fundamental Conclusions	ES7
Issues of Concern	ES8
2. INTRODUCTION	1.0
2.1 Name of Undertaking	1.1
2.2 Identification of Proponent	1.2
Corporate Body (Name, Mailing Address)	1.2
Chief Executive Officer (Name, Official Title, Coordinates)	1.2
Principal Contact for Environmental Assessment (Name, Official Title, Coordinates)	1.3
2.3 Purpose of Environmental Impact Statement	1.4
3. THE PROPOSED UNDERTAKING	2.0
3.1 The Prospective Site and Study Area	2.1
Description of Boundary with Maps of Site	2.1.3, Figures 2.1 – 2.3
Principal Structures	2.1.1
Appurtenant Works	2.1.2
Habitat to be Disturbed (Types, Quantities)	2.2
3.2 Rationale/Need/Purpose of the Project	3.0
Perceived Benefits (Local, Provincial)	3.2, 4.9, 8.2.2, 8.2.3, 8.2.4, Appendix 3, Appendix 18
Existence of Established Need	3.1
3.3 Alternatives	3.3
3.3.1 Alternatives to the Project	3.3.1
Different Ways to Meet Project Need	3.3.1
Null Alternative	3.3.3
3.3.2 Alternative Methods of Carrying Out the Project	3.3.2
3.4 Relationship to Legislation, Permitting, Regulatory Agencies and Policies	3.4
Municipal (Activity Requiring Regulatory Approval, Name of Permit and/or Regulatory Approval, Legislation Requiring Compliance, Regulatory Agency)	3.4.2
Provincial (Activity Requiring Regulatory Approval, Name of Permit and/or Regulatory Approval, Legislation Requiring Compliance, Regulatory Agency)	3.4.2, 3.4.3
Federal (Activity Requiring Regulatory Approval, Name of Permit and/or Regulatory Approval, Legislation Requiring Compliance, Regulatory Agency)	3.4.2, 3.4.3

REQUIREMENT	EIS
3.5 General Project Description	4.0
Description of Physical Features (Written, Graphic)	2.1.1, 4.10, Figure 4.3
Lifespan (Construction, Operations, Other (Modification/ Decommissioning/Abandonment))	4.3, 4.13.1, Table 4.6, 7.3, 7.5.1.3
Assumptions for Project Design (Effects Avoidance Opportunities, Pollution Prevention, Adherence to Best Management Practice)	4.4 – 4.7
Applicable Codes of Practice, Guidelines and Policies	4.8, Appendices 4, 5, 8 and 21
Physical Features	4.10
Access Roads, Intersections and Service Roads	4.10.1, 4.10.4.9, 4.10.5.1, 4.10.5.3, 4.11.4, 4.12.3, 4.12.4
Lighting	4.10.4.14, 4.10.5.6
Stream Crossings (Culverts, Bridges, Fording Sites), Streams and Other Bodies to be Dewatered, Temporary Stream Diversions	4.11.1.3, 4.12.7.2
Temporary Construction Camps/Laydown Areas	4.10.2, 4.10.3, 4.11.5.2
Location of Mineral Licence and Ore Bodies in Relation to Provincial Boundaries (Québec and Labrador)	Table 1.0, 4.1, Figure 4.1
Detailed Volumes of Québec-based Resources to be Mined and Processed in Labrador	4.2.2, Table 4.6
Borrow Pits, Major Excavations and Waste Rock Disposal Locations Construction and Rehabilitation	4.10.4.23, 4.10.5.5, 4.11.1.2, 4.12.7.1, 4.13, Appendix 8
Temporary Sewage and Waste Disposal Facilities, Methods of Handling Waste and Refuse at Work and Camp Locations	4.10.4.18, 4.10.4.20, 4.10.5.8, 4.10.5.11, 4.10.11.3, 4.11.5.3, 4.11.5.4
Mine Infrastructure	4.10.4
Ore Crushing, Screening and Washing Facilities	4.10.4.1 – 4.10.4.3, 4.11.5
Fuel Tanks	4.10.4.15, 4.10.5.7
Utilities	4.10.4.11, 4.10.4.13, 4.10.4.16 – 4.10.4.18, 4.10.5.6, 4.10.5.10, 4.10.5.11, 4.11.2, 4.11.5
Water Supply and Distribution, Water Treatment	4.10.4.16 - 4.10.4.18, 4.10.5.10
Rock Fines and Wash Water Discharges	4.10.4.16, 4.10.4.19, 4.12.6.1
Electricity Supply Configuration (Owner/Operator Arrangements, Substations, On-site Electricity Transmission/Distribution, Alternative Generation Methods)	4.10.1.2, 4.10.4.13, 4.10.5.6, 4.11.2, 4.11.5.1
Railway Infrastructure (Railcar Loading Station, Ties, Rails and Ballast on Rail Bed, Ownership of New Railway Infrastructure, Regulatory Governing Body, Designation of Common Carrier Status)	4.10.1.3, 4.10.4.4, 4.11.3, 4.12.2.1 – 4.12.2.4, Appendix 18 A18.19
Shipping	2.1.2, 3.1
Explosives Magazine/Factory Component	4.10.4.24, 4.12.7.3, Appendix 8.2
Support Buildings (Administration and Engineering Offices, Warehouses, Maintenance Buildings, Laboratory, Other Buildings/ Facilities)	4.10.2, 4.10.4.5 – 4.10.4.8
Effluent Treatment Plant Components (Discharge Locations and Configuration, Anticipated Effluent Flume(s))	4.10.4.16 – 4.10.4.18, 4.10.5.11, 4.11.5.3, 4.12.6.1, 4.12.6.2

REQUIREMENT	EIS
Associated Planned Feasibility Studies (Proposed Mineral Resources, Completion Dates)	
Areas Underlying Proposed Waste Piles (Clearance/Condemnation Work, In-pit Disposal of Fines, On-land Disposal of Fines, Other Infrastructure)	4.10.5.5
3.6 Construction	Principally 4.11
Planned Construction Activities	4.11
Erosion and Sedimentation Control	4.10.4.10, 4.11.1.4, 4.11.1.5, Appendix 5
Work Camps (Location/Capacity/Facilities, Solid Waste Disposal, Disposal of Construction Waste, Opportunities for Waste-recycling) and Methods of Transportation to/from Camps	4.10.2, 4.10.4.18, 4.10.4.20, 4.10.5.8, 4.11.5.2 – 4.11.5.4
Construction Schedule (Right-of-Way Clearing, Slash Disposal, Construction Adjacent to Watercourses, Utility Placement, Processing and Storage Facilities)	4.11.1.6
Site Preparation (Grubbing/Clearing Right-of-Way, Cut and/or Fill Operations)	4.10.4.23, 4.11.1.1, 4.11.1.2
Water Body Alteration (In Water, Within Buffer Areas), Watercourse Crossing Structures (Locations of Crossings (Access and Service Roads, Transmission Lines, Pipelines), Proposed Infrastructure and Specifications, In-fill Area/Footprint, Design Criteria and Standards (Length/Width, Cross-section, Type/Amount of Required Fill Material)), Upgrades to Existing Watercourse Crossings	4.11.1.3
Blasting Activities in or near Water Bodies	4.11.1, 8.1.11
Electrical Systems (Location of Substations, Transmission, Method of Providing External Cable Transport Mechanisms)	4.10.1.2, 4.10.4.13, 4.10.5.6, 4.11.2, 4.11.5.1
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REQUIREMENT	EIS
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Fauna Species (Terrestrial and Aquatic (Including Avifauna), Woodland and Migratory Caribou (Including Commitment to Apply Woodland Caribou Mitigation Plan while Determining Identity of Caribou), Plans for Existing Habitat Preservation, Compensation for Habitat Loss)	8.1.7 – 8.1.10, 8.2.1, Appendices 5 and 20
Fish and Fish Habitat (Protection, Sediment and Erosion Control Plan, Compensation for Immitigable Losses)	8.1.11, Appendix 5
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7.2 Emergency Response/Contingency Plan	9.2, Appendix 21
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REQUIREMENT	EIS
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MINING AND EFFECTS ASSESSMENT SUBDIVISIONS OF PROJECT

For purposes of mining, the Project is divided into Phase 1 and Phase 2, each of which is described in Section 4.0. The two phases are referred to collectively as the Direct-Shipping Ore Project (“DSOP”).

For purposes of EIA, the Project is divided into five “Assessment Groups”, which reflect principally the applicable environmental impact assessment regimes.

Table 1.0 illustrates the relationship between the mining phases and the Assessment Groups.

Table 1.0: Subdivision for Purposes of Environmental Impact Assessment

Mining Designation	Assessment Designation	Deposits	Province
Phase 1	Assessment Group 1a	Timmins 3N, 4, 7, Fleming 7N	Labrador
Phase 1	Assessment Group 1b	Ferriman 4	Québec
Phase 2	Assessment Group 2a	Goodwood, Sunny 1, Kivivic 3S, Leroy 1	Québec (N of 55^{o} N)
Phase 2	Assessment Group 2b	Kivivic 1, 2, 3N, 4, 5, Timmins 8	Labrador
Phase 2	Assessment Group 2c	Barney 1, 2, Sawmill 1, Fleming 6, Star Creek 2, Timmins 3S, Fleming 7 Ext	Québec (S of 55^{o} N)

References to the Phases and the Assessment Groups will be used interchangeably in the text that follows.

REFINEMENTS

The present EIS reflects the description of the ELAIOM as it existed when the text was completed in July, 2009. That description is likely to be refined as planning proceeds, but there is no expectation that any refinements will result in important changes to the nature or magnitude of the effects identified in Section 8.0. If such is the case, the GNL will be advised.

1.0 INTRODUCTION

1.1 Name of Undertaking

The name of the undertaking is "Elross Lake Area Iron Ore Mine".

1.2 Identification of Proponent

The Proponent is New Millennium Capital Corp.

Its mailing address is as follows: 1303, avenue Greene, Suite 200, Westmount, Québec, H3Z 2A7.

The Chief Executive Officer is Mr Robert A. Martin. His contact information is the following:

New Millennium Capital Corp.

1303, avenue Greene, 2nd Floor

Westmount, Québec, H3Z 2A7

Telephone: (514) 935-3204; Telecopier: (514) 935-9650

rmartin@nmlresources.com

1.3 Contact for Environmental Assessment

The contact person for the purposes of the environmental assessment is Dr Paul F. Wilkinson, Environmental and Social Affairs Coordinator. His coordinates are as follows:

New Millennium Capital Corp.

5800, avenue Monkland, 2nd Floor

Montréal, Québec, H4A 1G1

Telephone: (514) 482-6887; Telecopier: (514) 482-0036

pfw@wilkinson.ca

1.4 Purpose of Environmental Impact Statement

The purpose of the EIS is to satisfy the requirement of the Guidelines issued by the Minister of Environment and Conservation on December 12, 2008 (GNL December 12, 2008). The primary focus of this EIS is, therefore, Assessment Group 1a as described in Table 1.0.

The Guidelines note that "As more specific information is provided and as additional baseline information is gathered, other concerns and potential effects may be required to be considered by the Minister as recommended by the Environmental Assessment Committee."

In keeping with that philosophy and in order to reduce the likelihood of such additional requests and the associated delays, the EIS addresses such supplementary issues as the authors consider necessary on the basis of their knowledge and experience.

The Guidelines are clear that they and the resultant EIS pertain only to those aspects of the ELAIOM located within the Province of Newfoundland and Labrador.

We are aware of no other mining project in Canada that is located virtually on the boundary between two provinces.

It is self-evident that many types of effects, especially socio-economic effects, do not stop at provincial or other administrative boundaries and that their importance cannot be assessed and appropriate mitigation and monitoring proposed unless they are presented in their entirety.

In addition several of the First Nations with permanent communities in areas of Newfoundland and Labrador and Québec within the area of influence of the ELAIOM practise traditional activities on both sides of the border.

For their part, the non-Aboriginal populations of the two concerned provinces are highly mobile in response to evolving economic opportunities: when the iron ore mines in the Schefferville region were in operation, between 1954 and 1982, a very high percentage of the population of Schefferville consisted of recent arrivals from the Province of Newfoundland and Labrador.

In certain cases, therefore, this EIS presents baseline data from both Newfoundland and Labrador and Québec, and effects that occur in both jurisdictions are described and their importance assessed.

We recognize that the competent authorities in each concerned jurisdiction will take decisions relating exclusively to those jurisdictions. We believe, however, that the approach that we have adopted will allow them to take those decisions in a fully informed manner, thereby addressing one facet of the precautionary principle that is endorsed by the Guidelines.

Separate screening study reports for the reconstructed railway between Knob Lake Junction and the Timmins 1 vicinity and for the explosives factory and magazines to be located near Timmins 1 will be submitted to the GoC.

1.5 Structure of Environmental Impact Statement

The first substantive component of the EIS is an executive summary, including a concordance table that permits the reader to confirm that the EIS addresses all of the requirements of the Guidelines issued by the GNL (GNL December 12, 2008).

The executive summary is preceded by a list of the acronyms and units employed in the text and by a glossary that explains the technical and scientific terms used.

Brief biographical notes on each member of the team following the glossary allow readers to form their own judgment regarding their qualifications and experience, which may have implications for the confidence to be placed in the judgments, conclusions and opinions expressed in the EIS.

Sections 1.0 to 4.0 collectively introduce the proponent, explain the rationale for the ELAIOM, outline its economic viability and describe in detail the infrastructure that will be built and the nature of the mining and processing operations that will be carried out. Section 1.6 describes some of the benefits derived from using TEK.

Section 5.0 describes the physical, biological and socio-economic characteristics of the areas where the ELAIOM will be built and operated and in which its effects will be experienced, using local and regional study areas.

Section 6.0 describes the efforts that NML made to consult and inform the populations that might be affected by the ELAIOM, culminating in public presentations on the draft EIS in the communities that agreed to participate. It then offers a tentative evaluation of the level of public concern in Newfoundland and Labrador about the ELAIOM. It also identifies the

VECs identified through the sources described in Section 5.0 and the public consultation programme.

Sections 7.0 and 8.0 constitute a block that addresses the predicted effects of the ELAIOM:

- Section 7.0 describes the criteria and the process used to identify the effects and to measure their importance;
- Section 8.0 identifies and evaluates the positive and the negative effects and proposes mitigating measures. It also addresses the cumulative effects of the ELAIOM.

Section 9.0 explains the broad features of the proposed monitoring and follow-up programme and the emergency response/contingency plan, while Section 10.0 presents the outline of an environmental protection plan that will be prepared after the ELAIOM has been approved and before its starts operating.

Section 11.0 presents the conclusions that emerge from the preceding sections, with a particular focus on sustainable development.

A series of appendices in two volumes presents relevant data and information that could not be included in the body of the text and copies of the supporting studies commissioned as part of the preparation of the EIS.

1.6 Traditional Ecological Knowledge

Clarkson *et al.* (1992) presented a comprehensive explanation from an Aboriginal perspective of how a recognition of the value of Indigenous Knowledge can contribute to the achievement of sustainable development.

Given that the Project is located on lands used and occupied to varying degrees by four FNs and where there are many gaps in "scientific" knowledge, NML devoted particular attention to the collection and use of TEK. Its decision to do so also took into account the recognition in section 16.1 of the CEAA that "…Aboriginal traditional knowledge may be considered in conducting an environmental assessment."

The collection and use of TEK respected the interim principles set forth by CEAAg (March 23, 2005, Internet site):

- to work with the community;
- to seek prior informed consent;
- to access knowledge with the support of the community;
- to respect intellectual property rights;
- to collect knowledge in collaboration with the community;
- to bring TEK and western knowledge together.

NML's principal initiatives were:

- to review all the publicly available sources of TEK that it could find;
- to interview 10 members of the NIMLJ about their land- and resource-use in the vicinity of DSO2 and DSO3 and their knowledge of the plant and animal resources found there (Clément Mai 2009);
- to interview 20 Naskapis about their land- and resource-use in the vicinity of DSO2 and DSO3 (Weiler January 2009).

Attempts to collect such data from members of ITUM and IN were unsuccessful, since the permission of their respective government bodies could not be obtained, meaning that NML could not proceed without breaching one or more of the above-cited principles. If the consent of those two groups can be obtained, the data may be collected even after the tabling of this EIS if it is determined that it can contribute to the implementation of monitoring programmes. Alternatively, it might be collected as part of the EIA of a future phase of the DSOP.

The collection of TEK provided the following principal benefits:

- it identified 42 species present in the vicinity of the ELAIOM that have not been recorded in the literature and that NML had not identified during its surveys (Table 1.1);
- it provided detailed information on the distribution in time and space of wildlife in the area in question, which was available from no other source;
- it provided insights into the value placed on wildlife species by the members of the NNK and the NIMLJ interviewed;
- it contributed to efforts to determine whether caribou observed in spring belong to the sedentary (forest) or to the migratory ecotype (D’Astous and Trimper June 2009, *in preparation*).

Table 1.1: Species Identified by NIMLJ Members that were not Recorded in the Literature or Identified in NML's Surveys

Scientific Name	Common English Name	Common French Name	Innu Aimun Name
Small Mammals			
Mephitis mephitis	Striped skunk	mouffette rayée	shakak^{u}
Micromammals			
Rattus norvegicus	Brown rat	rat surmulot	misht-apikushish
Sorex spp.* (other than *palustris*)	Aquatic shrew	musaraigne aquatique	atampeku-apikushish
Fish			
Salvelinus alpinus	Arctic char	omble chevalier	shushashui
Osmerus morax	Rainbow smelt	éperlan arc-en-ciel	kauatuieshish
Waterfowl			
Anser caerulescens	Snow goose	oie des neiges	uapishk
Branta bernicla	Brant goose	bernache cravant	apishtiss
Bucephala islandica	Barrow's goldeneye	garrot d'Islande	mamatau-mishikushk^{u}
Melanitta perspicillata	Surf scoter	macreuse à front blanc	kuishkushipatam^{u}, papukutshat
Melanitta nigra	Common scoter	macreuse noire	kuaikan, shashteship
Gavia immer	Common loon	huart à collier	muak^{u}
Gavia stellata	Red-throated loon	huart à gorge rousse	ashu-muak^{u}
Gavia spp.	diver	plongeon	uitui-muakush
Phalacrocorax auritus	Double-crested cormorant	cormoran à aigrettes	kaktshiship
Anas rubripes	Black duck	canard noir	inniship
Anas acuta	Pintailed duck	canard pilet	uapinniship
Clangula hyemalis	Long-tailed duck	canard kakawi	auiu
Mergus merganser	Common merganser	grand harle	mishtshishik^{u}
Mergus serrator	Red-breasted merganser	harle huppé	ushik^{u}
Larus glaucoides	Iceland gull	goéland arctique	tshiashkueshish
Larus marinus	Great black-backed gull	goéland à manteau noir	mishi-tshiashk^{u}
Sterna hirundo	Common tern	sterne pierregarin	tshiashkueshish
Birds of Prey			
Haliaeetus leucocephalus	Bald eagle	aigle à tête blanche	kauapishtukuanit-missu
Aquila chrysaetos	Golden eagle	aigle royal	missu
Accipiter gentilis	goshawk	autour des palombes	nutshineueshu
Falco columbarius	Pigeon hawk (merlin)	faucon émerillon	pipitshish
Bubo virginianus	Great-horned owl	grand duc	uhu
Nyctea scandiaca	Snowy owl	harfang des neiges	uapakanui, uap-uhu
Surnia ulula	Northern hawk owl	chouette épervière	ekakauapatasht

Scientific Name	Common English Name	Common French Name	Innu Aimun Name
Aegolius funereus	Tengmalm's owl	Nyctale de Tengmalm (nyctale boréale)	papanashtshish
Tetraonidae			
Lagopus mutus	ptarmigan	lagopède alpin	kashkanatshish
Bonasa umbellus	Ruffed grouse	gélinotte huppée	pashpashtshu
Passerines			
Empidonax alnorum	Alder flycatcher	oiseaux des aulnes (gen.), moucherolle des aulnes	mushuau-pineshish
Plectrophenax nivalis	Snow bunting	bruant des neiges	pupun-pineshish
Charadiformes			
n/a*	snipe (gen.)	bécassine (gen.)	kamushkuashit
Piciformes			
n/a*	woodpecker (gen.)	pic (gen.)	pashpashteu
Other Bird			
n/a*	Tundra bird (gen.)	oiseaux de la toundra (gen.)	mushuau-pineshish
Insects/Arachnids			
n/a*	ant (gen.)	fourmi (gen.)	enuk^{u}
n/a*	Spider (gen.)	araignée (gen.)	kamitshetukatet, kaushuniamit
n/a*	bee/wasp (gen.)	abeille/guêpe (gen.)	Amu

* Due to the limitations of the study and the relative economic unimportance of these species to the Innu, more detailed information is not available.

Source: Clément (Mai 2009)

1.7 Sustainable Development and Precautionary Principle

Sustainable Development

By definition, mining projects generally exhaust the ore that they can exploit economically, which usually corresponds to a very high percentage of what is there. Future generations are, therefore, deprived of the benefits that that ore can yield.

Following the examples of the assessments of the Whites Point Quarry and Marine Terminal in Nova Scotia (Mullin 2008) and of the Kemess North Project and the Voisey's Bay Mine and Mill Complex (Fonseca and Gibson 2008), we shall address the issue of sustainable development in Section 11.0 by asking whether the Project will, on balance, make a positive overall contribution towards attaining ecological and community sustainability at both the local and regional levels. That approach is constant with the "… lasting economic legacy for the people of the Province…" set forth in CNLOPB (February 2006, Internet site), which appears to be the inspiration for the provisions of the Guidelines (GNL December 12, 2008) relating to full and fair opportunity and first consideration.

In general, NML subscribes to the 10 principles of sustainable development identified in ICMM (2009b, Internet site):

1) implement and maintain ethical business practices and sound systems of corporate governance;
2) integrate sustainable development considerations within the corporate decision-making process;
3) uphold fundamental human rights and respect cultures, customs and values in dealings with employees and others who are affected by our activities;
4) implement risk management strategies based on valid data and sound science;
5) seek continual improvement of our health and safety performance;
6) seek continual improvement of our environmental performance;
7) contribute to conservation of biodiversity and integrated approaches to land use planning;
8) facilitate and encourage responsible product design, use, reuse, recycling and disposal of our products;
9) contribute to the social, economic and institutional development of the communities in which we operate;
10) implement effective and transparent engagement, communication and independently verified reporting arrangements with our stakeholders.

<u>Precautionary Principle</u>

The original version of the precautionary principle set out in the 1992 Rio Declaration provides that "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (U.N. 1992). Gibson *et al*. (2005: 112) have described that definition as the "… narrow version…" Clearly, it is inapplicable to the ELAIOM, which does not pose threats of serious or irreversible damage.

Biggs *et al*. (2005: 273), among many other authors, have formulated a "softer" version of the precautionary principle, one that is applicable to the ELAIOM: "…if it is uncertain whether ecosystem damage will occur, then mitigation measures should be implemented."

For their part, Morrison-Saunders *et al.* (2006: 172) proposed that "For decision-making purposes the precautionary principle suggests that when there is uncertainty in available information concerning possible adverse effects, then the decision should come down in favour of the environment." They noted the link between the precautionary principle and environmental management strategies, especially the practice of adaptive management and the development of contingency plans.

NML will give effect to the "soft" version of the principle in the following ways:

- by designing the Project to avoid effects to the extent possible (see Section 4.5);
- by adopting the most sophisticated and least-polluting technologies available;
- by building flexibility into the design and implementation of the Project;
- by a comprehensive programme of monitoring and follow-up designed to compare actual effects against predicted ones and to identify effects that had not been predicted and by practising adaptive management;
- by preparing contingency plans;

- by paying for the necessary controls, the consequences of any accidents and the rehabilitation of any sites affected by its activities;
- by proposing mitigation measures for all apprehended effects that cannot be avoided.

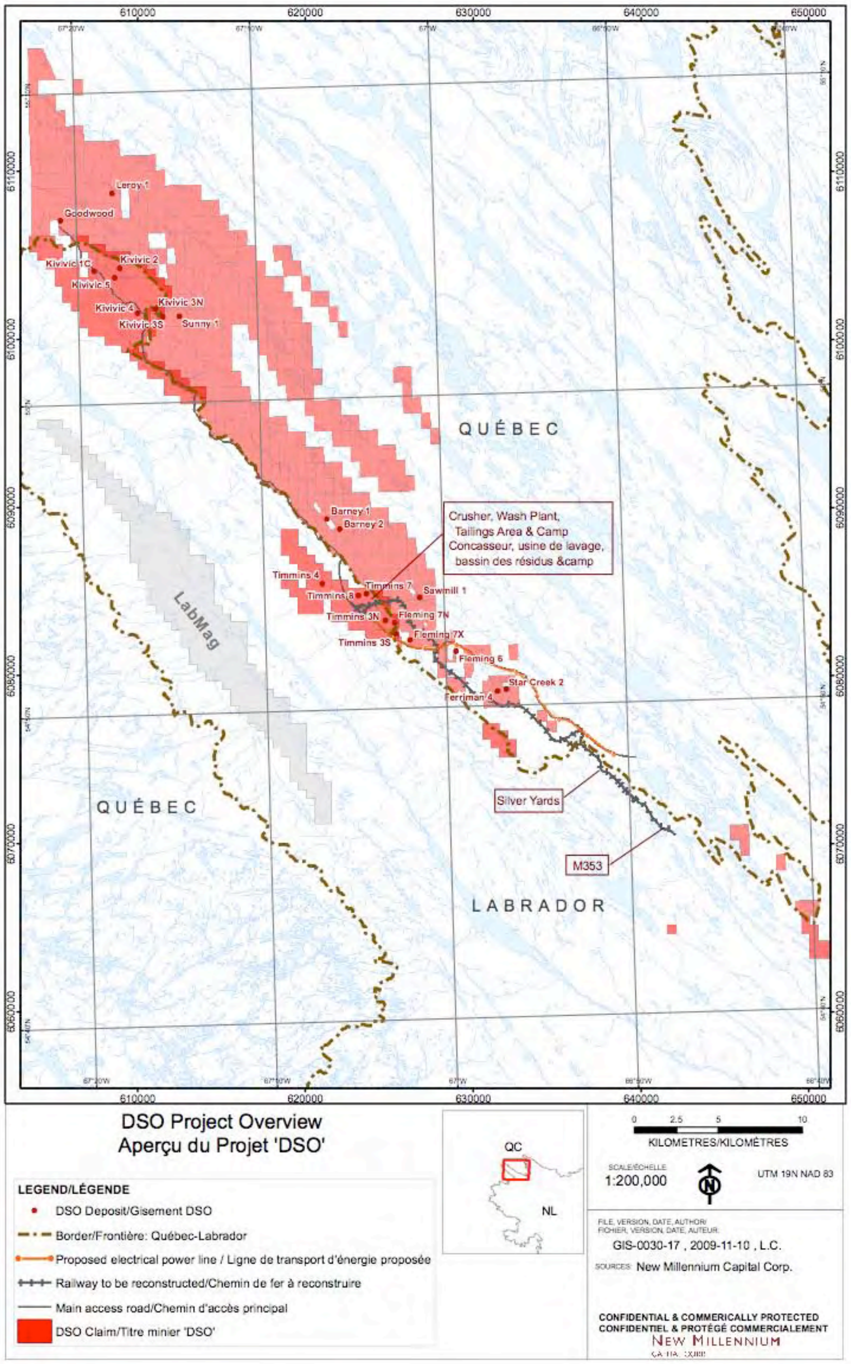
2.0 PROPOSED UNDERTAKING

2.1 Prospective Site and Study Area

2.1.1 Prospective Site and Principal Structures

For reference purposes, NML has divided the overall area in which the deposits are located into four areas, DSO1, DSO2, DSO3 and DSO4, the approximate limits of which are shown on Figure 2.1.

Figure 2.1: Direct-Shipping Ore Project Overview



The Project will be developed in two phases: Phase 1, in which one of the deposits in DSO2 (Ferriman 4) and four of those in DSO3 (Timmins 3N, 4, 7 and Fleming 7N) will be mined; and Phase 2, in which the deposits in DSO4 and other deposits in DSO2 and DSO3 will be mined. No activity is currently anticipated in DSO1 although some resources remain to be mined.

The present EIS pertains only to Phase 1. Authorization to proceed with Phase 2 will be requested at a later date.

The ELAIOM requires the establishment of the following principal facilities in the Province of Newfoundland and Labrador near the old Timmins 1 pit in DSO3:

- primary and secondary mineral sizers and a processing complex containing tertiary and quaternary cone crushers, physical separation equipment, jigs, magnetic separation equipment, grinding equipment, filtration units, cyclones, pan filters and boiler, dryer, conveyors, pumps and piping;
- a pipeline to enable tailings to be transported by gravity from the processing complex to one end of the old Timmins 2 pit for disposal, and a pump station and pipeline to withdraw water from the other end of that pit and transfer it to the processing complex for use as process water;
- a pipeline to deliver water from the dewatering wells of the Timmins 3N deposit to a process water tank near the processing complex and to a plant to treat the water prior to its distribution as potable water;
- covered stockpiles of SF and SPF products and a system to load products into rail cars;
- a fully equipped camp to accommodate some 150-300 (depending on number per room) persons, initially construction workers and, later, operations and maintenance personnel;
- a wastewater and sewage treatment plant;
- offices, warehouse, workshops, garages, laboratory, mine dispatch, mine dry administration offices and other service buildings;
- access, site and haul roads;
- a landfill for solid waste disposal;
- a system to distribute power at 4.16 kV from a new substation located adjacent to the processing complex at Timmins 1;
- an explosives factory and secure storage magazines;
- a diesel generator (4.0 MW).

The following principal facilities will be built at other locations, some in the Province of Newfoundland and Labrador and some in the Province of Québec:

- dewatering wells at each of the deposits that will be mined;
- a rebuild of the electricity transmission line, using the existing corridor for the part of the line closest to Timmins (approximately 20% of the corridor), while the rest of the line will generally follow the existing road. The line will run from the substation at

Schefferville to a substation located in the Province of Newfoundland and Labrador near the processing complex near the old Timmins 1 pit. The latter substation will step down electricity received from Schefferville at 69 kV or 34.5 kV (to be determined) to 4.16 kV;

- the reinstallation of the rail line from Mile Post 353 along the old railway bed to a rail car loading facility situated on a track loop to be reinstalled near the old Timmins 1 pit;
- a quarry/gravel pit near the site of the former Gagnon pit, in Québec (Section 4.10.4.23).

2.1.2 Appurtenant Works

Additional facilities required for the Project, to be built, owned and operated by third parties, are:

- a siding on the rail line at Pointe-Noire parallel to the existing track to a rotary dump rail car unloading facility situated on a track loop to be installed at a stockyard with a capacity of approximately 1.0 million tonnes of DSO. The agreements required for the use of facilities at the Port of Sept-Îles are under negotiation;
- the existing stockyard of WM, complete with one or more stackers, a combined stacker and bucket-wheel reclaimer and a system of conveyors to deliver either SPF or SF to a surge bin and then to a wharf and ship-loading facility capable of loading 4.0 Mtpy of DSO into ocean-going bulk ore carriers, initially of 75,000 dwt and later up to 150,000 dwt, using the WM ship-loaders.

2.1.3 Study Areas

The study areas within which baseline data were collected and the effects analyzed varied from one VEC to another. The LSEA and the RSEA are shown in Figures 2.2 and 2.3 respectively. The corresponding areas for the biophysical effects assessment are described in Table 5.1.

Figure 2.2: Local Socio-economic Area

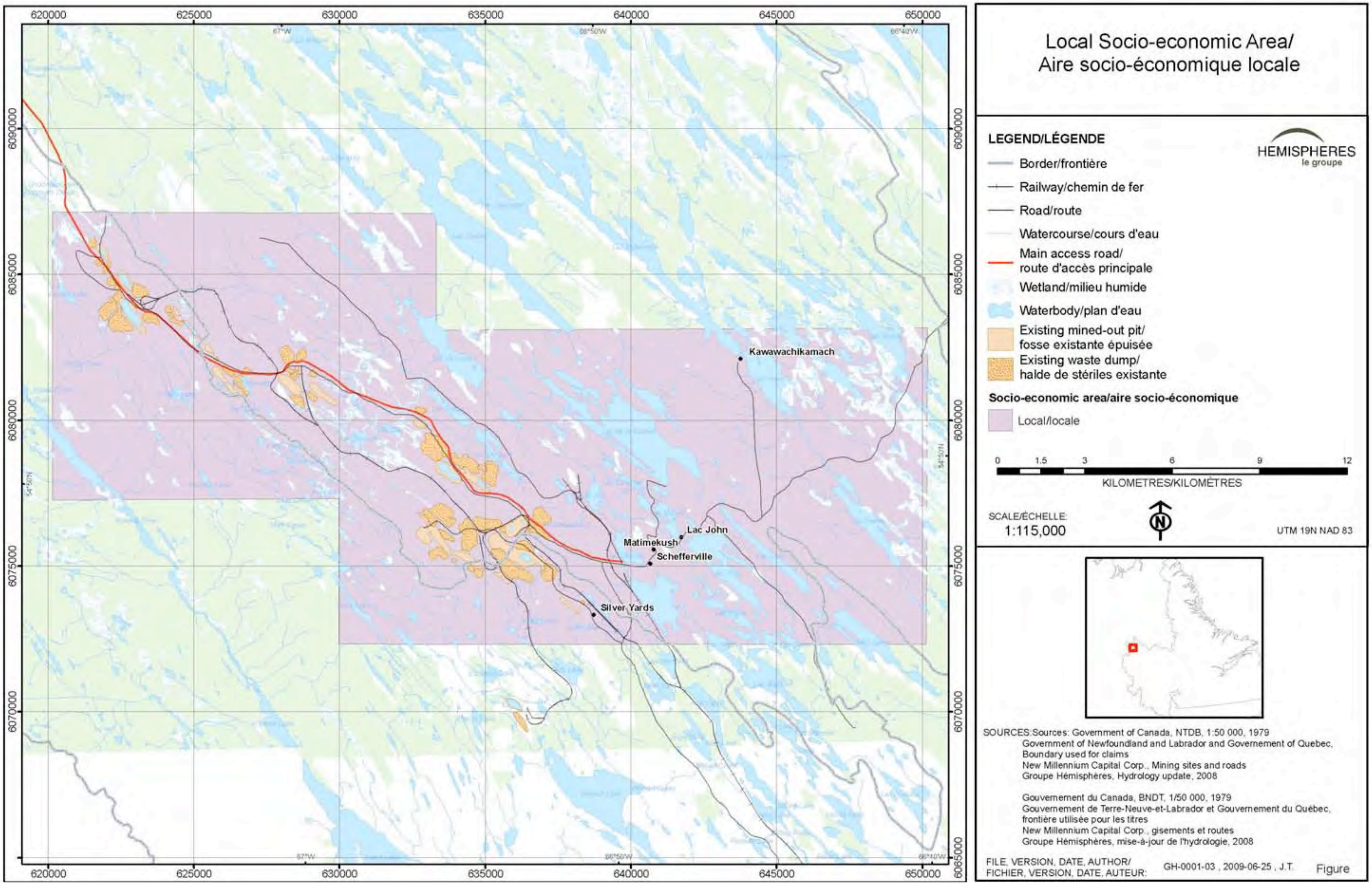
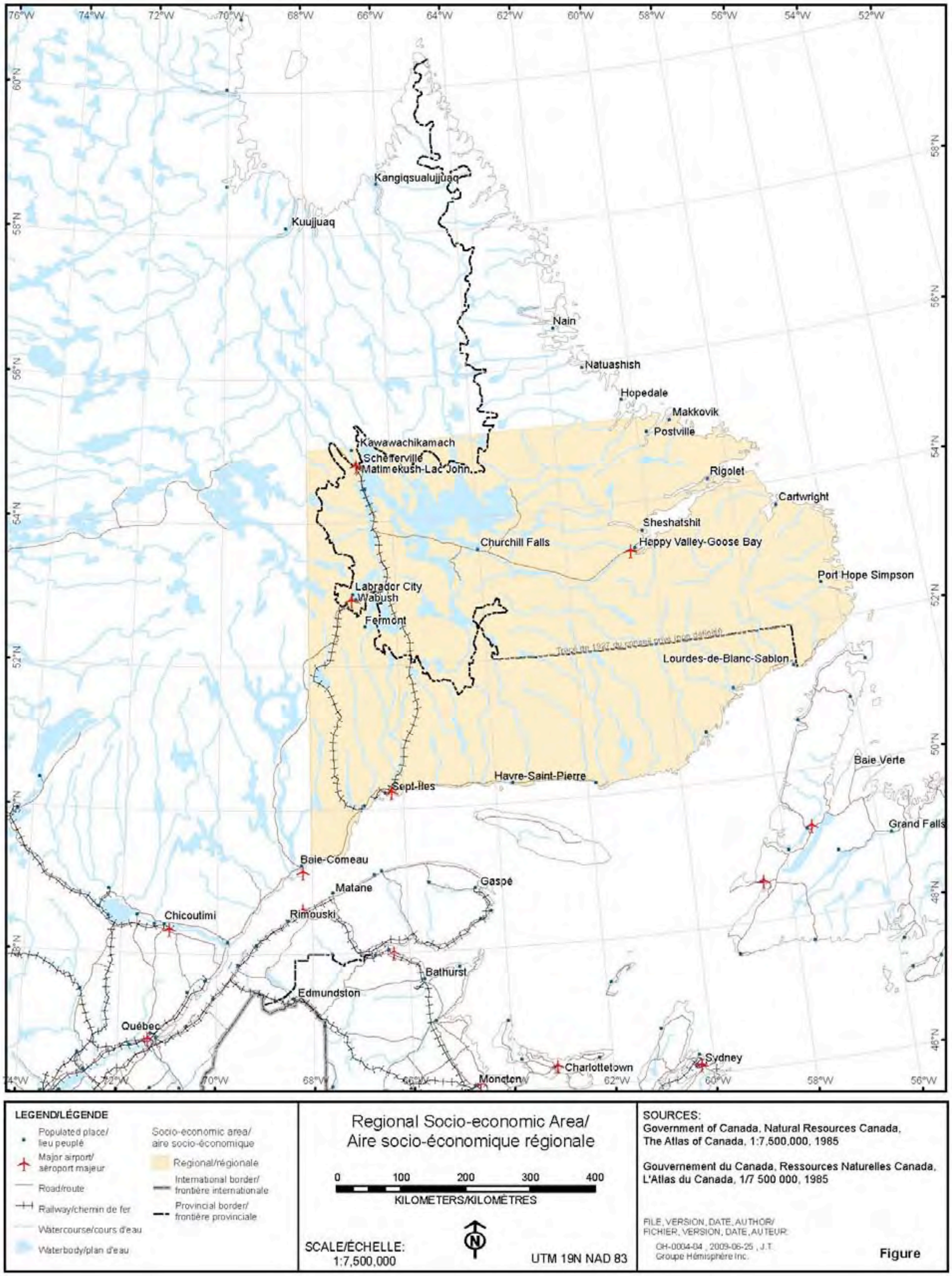


Figure 2.3: Regional Socio-economic Area



2.2 Types and Quantities of Habitat Disturbed

2.2.1 Terrestrial Habitat

Table 2.1 summarizes the types of terrestrial ecosystems that will be disturbed at each of DSO2 and DSO3.

The areas disturbed in each sector will be small and can be summarized as follows:

DSO2

- a total of approximately 46 ha of pristine habitat will be disturbed, virtually all of it in the MSF ecosystem;
- less than 1% of the habitat that will be disturbed has already been disturbed, which reflects the fact that there has been no prior mining;
- some 43% of the disturbed habitat will be restored.

DSO3

- a total of approximately 94 ha will be disturbed, some 46% of which has already been disturbed by prior mining activities;
- the pristine areas that will be disturbed are located entirely within the HST;
- some 31% of the disturbed habitat will be restored.

The pits and the various piles (waste rock and overburden) are important sources of habitat disturbance, as follows:

- DSO3 pits – 27.2 ha;
- DSO3 piles – 29.4 ha;
- DSO2 pit – 14.2 ha;
- DSO2 piles – 29.4 ha.

The workers' camp will disturb 1.75 ha of natural habitat. The processing complex will disturb 5.29 ha of natural habitat and 21.53 ha of disturbed habitat. The explosives factory and magazines will disturb 1.73 ha of disturbed habitat.

2.2.2 Aquatic Habitat

DSO 2

The area of aquatic habitat that will be disturbed at DSO2 has not yet been calculated.

DSO3

No aquatic habitat will be disturbed at DSO3, since Timmins 2, where tailings and effluents will be disposed of, is a flooded former mine pit rather than a natural waterbody, and sampling in 2008 revealed that it does not provide habitat for fish or aquatic mammals.

Table 2.1: Terrestrial Ecosystems Disturbed

Ecotype	Complete Name	Total for DSO3	Total for DSO2	Total (ha)	Total (%)
High Subarctic Tundra (HST)					
1	Alpine Shrub – Glandular Birch – Mesic	13.1	0	13.1	9.3%
2	Rock Outcrop – Crowberry – Xeric	5.4	0	5.4	3.9%
3	Low Alpine Shrub/Lichens – Subxeric	27.0	0.1	27.1	19.4%
4	Large-leaved Goldenrod Alpine Shrub – Seepage	0	0	0	0.0%
5	Uniform Riparian Shrub Fen	0	0	0	0.0%
6	Uniform Herb Fen	5.4	0	5.4	3.9%
7	Uniform Shrub Fen	0	0	0	0.0%
Mid Subarctic Forest (MSF)					0.0%
1	Black Spruce/White Spruce – Labrador Tea – Feathermoss	0	2.9	2.9	2.1%
2	Crowberry – Map Lichen – Rock Outcrop	0	0	0	0.0%
3	Glandular Birch – Crowberry –Thin Soil	0	0	0	0.0%
4	Black Spruce – Lichen – Rock	0	0	0	0.0%
5	Black Spruce – Lichen – Open Forest	0	29.5	29.5	21.1%
6	White Spruce/Black Spruce – Feathermoss – Seepage	0	0	0	0.0%
7	White Spruce – Willow – Sedges – Riparian	0	0.5	0.5	0.4%
8	Black Spruce/Tamarack – Glandular Birch – Sphagnum Bog	0	4.1	4.1	2.9%
9	Tamarack/Black Spruce – Sedges – Fluvial Fen	0	0	0	0.0%
10	Black Spruce Forested Fen	0	0	0	0.0%
11	Structured Herb Fen	0	0	0	0.0%
12	Uniform Herb Fen	0	8.8	8.8	6.3%
13	Non-Uniform Herb Fen	0	0	0	0.0%
14	Uniform Shrub Fen	0	0	0	0.0%
15	Uniform Riparian Shrub Fen	0	0	0	0.0%
Undisturbed area affected		50.9	45.9	96.8	69.1%
Disturbed area affected		43.2	0.02	43.2	30.9%
Total area affected (undisturbed + disturbed)		94.1	45.9	140.0	100.0%
Area to be rehabilitated		29.4	19.7	49.1	

3.0 RATIONALE/NEED/PURPOSE OF PROJECT AND NEWFOUNDLAND AND LABRADOR BENEFITS

3.1 Rationale

The deposits constituting the ELAIOM were explored, developed and, in some cases, partially mined between 1954 and 1982. After that date, the owners allowed the mining claims to lapse. Between 2004 and 2006, NML obtained the relevant claims from the GoQ and the GNL.

A dramatic increase in global demand for seaborne iron ore, mainly reflecting the industrial development of China, has created supply tightness in the iron ore market. Seaborne trade increased from 452 Mt in 2001 to over 800 Mt in 2007. The price of SF went up by 478% from 2002 to 2008. Analysts are projecting that the supply tightness will last until 2011-12.

The ELAIOM is a brownfield project that can be brought into production in a relatively short time, as some of the required infrastructure (*e.g.*, railway from Sept-Îles; electricity supply from the Menihek Power House; Schefferville Airport; Schefferville municipal infrastructure) is already in place. The capital cost requirement will therefore be lower than that of a greenfield project, and the environmental effects will be less. Because of the favourable market conditions and potentially attractive return on investment (see Section 3.2.1), NML has decided to seek authorization to proceed with the ELAIOM.

Currently, the iron ore seaborne market is dominated by three companies that collectively control over 70% of the market. Two of them, BHP and Rio Tinto, have their main operations in Australia, while the third, Vale, is located in Brazil. Canada has a competitive advantage over Australia and Brazil in supplying ore to Europe because of the lower shipping cost, and European steelmakers want to reduce their dependence on the three large suppliers.

In September 2008, NML secured a strategic partner with the global stature of Tata Steel, the world's eighth-largest steel company. Upon completion of the feasibility study, Tata Steel has an option to acquire an 80% interest in the legal entity that will be created to build and operate the DSOP in exchange for a contribution of $300 M towards the capital cost and a commitment to purchase, at prevailing world prices, 100% of the iron ore produced during the life of the mine (NML October 1, 2008).

The timing appears to be therefore opportune for NML to reactivate operations at the DSO deposits near Schefferville.

NML completed its prefeasibility study in February 2009 (NML *et al.* February 2009). The feasibility study is scheduled to be completed in the fourth quarter of 2009.

3.2 Economic Viability and Benefits

3.2.1 Economic Viability

The economic viability of a proposed project is a legitimate matter of interest in an environmental impact assessment. The regulators are entitled to be satisfied before approving a project, even a project without important negative environmental effects, that the project will yield the projected economic benefits and will not be abandoned prior to completion.

Assuming prices for SF and SPF that were 60% of the contract price in 2008, NML (March 4, 2009) (Appendix 1) forecast for a 10-year mine plan an IRR (unleveraged and before corporate taxes and mining taxes and based on a discount rate of 8%) of 39% and a payback of three years after the start of commercial production. Sensitivity analysis indicated that the economics of the Project are expected to remain strong even if iron ore prices fall below those assumed and even if capital and operating costs increase.

3.2.2 Benefits to Newfoundland and Labrador

3.2.2.1 Strategy to Ensure a Maximization of Benefits to the Province of Newfoundland and Labrador under principles of Full and Fair Opportunity and First Consideration

The Guidelines specify that "With a goal of maximizing benefits for the province, the proponent shall present a strategy to ensure Full and Fair Opportunity and First Consideration for employment, contracting and procurement, education and training."

Appendix 3 presents NML's Newfoundland and Labrador Benefits Strategy (Jacques Whitford Stantec Limited March 2009), to which NML already commits, which is still under development. Inspired by this preliminary Strategy, the balance of this section sets out the principal components of NML's proposed Newfoundland and Labrador Benefits Plan.

3.2.2.2 Newfoundland and Labrador Benefits Plan

The capital cost of the ELAIOM (within the PNL and the Province of Québec) is currently estimated at approximately $300 million, and the direct employment at approximately 300 person-years over approximately two years of construction. Of this investment (including equipment supply) approximately $225 million will be spent to build the facilities in the PNL.

The operating cost (including labour) for the ELAIOM including the newly reconstructed NML rail spur is currently estimated to be $55 million annually on average (within the PNL and the Province of Québec), of which $43 million or 78% of the total will be provided for employment and goods and services procured in PNL.

It is NML's intent to contract exclusively with PNL-based Suppliers for the construction and operation of all works and facilities associated with the ELAIOM situated in the PNL.

Preparation/Construction Phase

Virtually all work at the preparation/construction phase will be contracted out except for the mine development.

In application of the NLBP, of the $225 million to build the facilities in the PNL, NML will contract exclusively with PNL-based Suppliers for all works and facilities situated in the PNL and will award the total value, currently estimated at $165 million, for purchases of construction materials and supplies, and for construction contracts (including labour). This preparation/construction activity will generate an estimated minimum commitment of 255 person-years of employment or 85% for PNL Residents over two years. For the remaining $60 million for the purchase of mining and process equipment, it is NML's intent to contract exclusively with equipment suppliers with PNL-based distributors, to supply this equipment available only from manufacturers outside the PNL.

Operations Phase

The operating cost (including labour) for the ELAIOM including the newly reconstructed NML rail spur is currently estimated to be $55 million annually on average of which 78% or $43 million will be provided for employment and goods and services procured in PNL.

In application of the NLBP during the operations phase, in addition to the labour provided by PNL Residents, NML will contract exclusively with PNL-based Suppliers for all works and facilities situated in the PNL and accordingly NML will award the total estimated annual value of $20 million of the $55 million above for goods and services.

Table 3.1 sets out NML's current prediction of the principal on-site employment and of employment at NML's Labrador City office at the operations phase of the ELAIOM pursuant to the application of the NLBP.

NML intends to achieve or exceed the employment levels as described in Table 3.1 for PNL Residents. Positions as described are full time equivalents. In the event that the overall numbers of positions change, NML will respect the percentages shown in Table 3.1.

Table 3.1: Production and Employment by Location, Operations Phase, Phases 1 & 2

Year	1		2		3		4		5		6		7		8		9		10		11		12	
Production (%) NL	100.0%		79.2%		28.5%		11.5%		25.3%		26.7%		34.0%		33.1%		43.1%		42.1%		49.1%		40.1%	
Production (%) QC	0.0%		20.8%		71.5%		88.5%		74.7%		73.3%		66.0%		66.9%		56.9%		57.9%		50.9%		59.9%	
Total On-site Mining and Processing Labour	**138**		**158**		**180**		**185**		**186**		**187**		**188**		**189**		**190**		**191**		**188**		**189**	
	NL	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**
NL First Nations	7	5%	7	4%	8	4%	8	4%	10	5%	10	5%	12	6%	12	6%	12	6%	12	6%	12	6%	12	6%
QC First Nations	17	12%	27	17%	29	16%	29	16%	30	16%	30	16%	30	16%	30	16%	30	16%	31	16%	30	16%	30	16%
Processing Complex NL	39	28%	39	25%	38	21%	38	21%	36	19%	36	19%	34	18%	34	18%	34	18%	34	18%	34	18%	34	18%
Rest NL	74	54%	83	53%	101	56%	105	57%	105	56%	106	57%	107	57%	108	57%	109	57%	109	57%	109	58%	112	59%
Rest Other	1	1%	2	1%	4	2%	5	3%	5	3%	5	3%	5	3%	5	3%	5	3%	5	3%	3	2%	1	1%
Total NL	**120**	**87%**	**129**	**82%**	**147**	**82%**	**151**	**82%**	**151**	**81%**	**152**	**81%**	**153**	**81%**	**154**	**81%**	**155**	**82%**	**155**	**81%**	**155**	**82%**	**158**	**84%**
Total Other	**18**	**13%**	**29**	**18%**	**33**	**18%**	**34**	**18%**	**35**	**19%**	**35**	**19%**	**35**	**19%**	**35**	**19%**	**35**	**18%**	**36**	**19%**	**33**	**18%**	**31**	**16%**
Total On-site Support Labour	**45**		**45**		**45**		**45**		**45**		**45**		**45**		**45**		**45**		**45**		**45**		**45**	
	NL	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**
NL First Nations	4	9%	4	9%	4	9%	4	9%	4	9%	4	9%	4	9%	4	9%	4	9%	4	9%	4	9%	4	9%
QC First Nations	20	44%	20	44%	20	44%	21	47%	24	53%	24	53%	24	53%	24	53%	24	53%	24	53%	24	53%	27	60%
NL Residents	21	47%	21	47%	21	47%	20	44%	17	38%	17	38%	17	38%	17	38%	17	38%	17	38%	17	38%	14	31%
QC Residents	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Total NL	**25**	**56%**	**25**	**56%**	**25**	**56%**	**24**	**53%**	**21**	**47%**	**21**	**47%**	**21**	**47%**	**21**	**47%**	**21**	**47%**	**21**	**47%**	**21**	**47%**	**18**	**40%**
Total Other	**20**	**44%**	**20**	**44%**	**20**	**44%**	**21**	**47%**	**24**	**53%**	**24**	**53%**	**24**	**53%**	**24**	**53%**	**24**	**53%**	**24**	**53%**	**24**	**53%**	**27**	**60%**
Total Labrador City Office Staff	**10**		**10**		**10**		**10**		**10**		**10**		**10**		**10**		**10**		**10**		**10**		**10**	
	NL	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**	**NL**	**%**
NL First Nations	2	20%	2	20%	2	20%	2	20%	2	20%	2	20%	2	20%	2	20%	2	20%	2	20%	2	20%	2	20%
QC First Nations	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
NL Residents	8	80%	8	80%	8	80%	8	80%	8	80%	8	80%	8	80%	8	80%	8	80%	8	80%	8	80%	8	80%
QC Residents	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Total NL	**10**	**100%**	**10**	**100%**	**10**	**100%**	**10**	**100%**	**10**	**100%**	**10**	**100%**	**10**	**100%**	**10**	**100%**	**10**	**100%**	**10**	**100%**	**10**	**100%**	**10**	**100%**
Total Other	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**	**0**	**0%**
GRAND TOTAL NL	**155**	**80%**	**164**	**77%**	**182**	**77%**	**185**	**77%**	**182**	**76%**	**183**	**76%**	**184**	**76%**	**185**	**76%**	**186**	**76%**	**186**	**76%**	**186**	**77%**	**186**	**76%**
GRAND TOTAL OTHER	**38**	**20%**	**49**	**23%**	**53**	**23%**	**55**	**23%**	**59**	**24%**	**59**	**24%**	**59**	**24%**	**59**	**24%**	**59**	**24%**	**60**	**24%**	**57**	**23%**	**58**	**24%**
TOTAL Labour – Mine, Processing, Support and Labrador City	**193**	**100%**	**213**	**100%**	**235**	**100%**	**240**	**100%**	**241**	**100%**	**242**	**100%**	**243**	**100%**	**244**	**100%**	**245**	**100%**	**246**	**100%**	**243**	**100%**	**244**	**100%**
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The personnel required at the operations phase may be employed directly by NML or by NML's contractors. In accordance with the first of the underlying principles noted below, that will not affect NML's commitment to employ PNL Residents.

Underlying Principles

NML will apply the following principles in implementing the NLBP:

- principles will be binding on NML and NML's contractors and subcontractors;
- iron ore volumes mined within the PNL will be as indicated in Table 3.1;
- all commitments relating to the procurement of goods and services will apply to services provided from within the PNL and to goods manufactured in the PNL where those services and goods are competitive in terms of fair market price, quality and delivery;
- all commitments relating to employment assume the availability of PNL Residents possessing the qualifications, experience and competencies reasonably required for the positions available and willing to work for NML on fair terms and conditions substantially identical to those offered by other iron ore mining companies in the PNL;
- the recognition that works, facilities and infrastructure located in the PNL depend on access and other infrastructure located in Schefferville and that appropriate levels of employment and contracting must be offered to the citizens and corporations of the Schefferville area, taking into account the small size of the concerned population and the low number and limited capacities of the corporations based there;
- the recognition that the mining of deposits in the Province of Québec will require the use of the processing complex and other facilities in the PNL and that the levels of employment for PNL Residents at the processing complex, other facilities and operations in the PNL will be respected in accordance with the levels shown in Table 3.1;
- the recognition that significant indirect employment and business opportunities will accrue to the people of the Province of Québec through existing ownership of existing rail transportation infrastructure and shipping port facilities;
- the recognition that the PNL will be accepting mining tailings derived from ores extracted outside its boundaries, mined in the Province of Québec;
- the recognition that developing additional NML deposits beyond Phase 1, within the PNL, will require further PNL environmental registration;
- the NLBP will apply to all work and activity located in the PNL, including work and activity conducted in the PNL during and after the termination of the ELAIOM using direct-shipping ore mined in the Province of Québec;
- percentages of PNL Residents hired by NML or its contractors/subcontractors as per Table 3.1 will be respected, regardless of the volume of ore mined from the Province of Québec during or after the termination of the ELAIOM;
- PNL-based Suppliers contracted by NML to provide services for any work and activity located in the PNL during the ELAIOM will be retained for that and similar work and activity when all or most of the ore is mined in the Province of Québec or after the termination of the ELAIOM;

- if NML cannot recruit members of the concerned First Nations to fill the positions identified for them in Table 3.1, it will replace these positions with non-First Nation PNL Residents;
- NML will abide by any Impacts and Benefits Agreement entered into with the Innu Nation of Labrador;
- NML will ensure a process of full and fair opportunity and first consideration for PNL Residents and PNL-based Providers to maximize participation in and benefit from the ELAIOM for all work in the PNL;
- first priority in implementing the contracting provisions of the NLBP will be given to corporations located in Labrador, including Labrador Innu companies and joint ventures, while second priority will be given to those located in other parts of the PNL;
- first priority in implementing the employment provisions of the NLBP will be given to qualified residents of Labrador. Second priority will be given to qualified residents of other parts of the PNL;
- the commute system will be designed in response to the residential locations of the labour force, but will likely include the provision of air transportation to and from Wabush and Goose Bay and the Island of Newfoundland and the use of the railway;
- NML will hire PNL Residents as per Table 3.1, regardless of the source of the ore being processed, and will require its contractors and subcontractors to do the same;
- principles established within this NLBP will also be applicable to mining operations that extend beyond the current 12-year mining schedule in Table 3.1;
- NML commits to establish education and training programmes assuming the availability of interested candidates and participation of the required training and educational institutions, including using in-house training and external training organizations, to ensure participation of PNL Residents through all occupational classifications of the ELAIOM;
- where a PNL Resident is not qualified to fill a given position, NML will collaborate with the responsible governments to assist a PNL Resident to qualify for such position;
- NML will also collaborate with the responsible governments to provide interested PNL Residents with opportunities to achieve promotions;
- NML will implement training programmes and other human resources initiatives that will facilitate the hiring, retention and promotion of PNL Residents, including Innu of Labrador and women. These initiatives, which will also target youths through scholarships and work placement programmes, will be described in the Human Resources Plan and the Women's Employment Plan;
- NML commits to developing a Women's Employment Plan in accordance with guidelines to be issued by the responsible Minister;
- with respect to the reconstructed rail spur from Mile 353 (Knob Lake Junction) to Timmins 1 (the "spur line"), NML will proceed as follows:
    - o if, prior to the release of the ELAIOM by the GNL, NML has concluded an agreement-in-principle with a rail carrier to operate the spur line, it will provide an opportunity to a qualified PNL-based Supplier to match or exceed, within a

reasonable delay, the terms and conditions of that agreement-in-principle, in which case the contract will be awarded to the PNL-based Supplier;

  - if no qualified PNL-based Supplier exists, or if such a corporation does not bid or cannot match or exceed the terms and conditions of the agreement-in-principle in place within the specified delay, NML will require the rail carrier that is a party to the agreement-in-principle to employ PNL Residents for the positions associated with the operation and maintenance of the spur line;
  - in order to increase the employment of PNL Residents and to broaden their experience, NML will use PNL Residents employed at the processing complex to perform routine maintenance and minor repairs on the locomotives and cars;
  - NML will provide a PNL-based Supplier with a preferential right to establish at the processing complex or at Emeril a facility to repair the ore cars (*e.g.*, changing wheel sets and airbrake valves);

- NML will develop and implement initiatives addressing such groups as journey persons, apprentices and engineering/technology students;
- NML will expand its office in Labrador City to at least ten FTE positions staffed by PNL Residents. It will mandate that office, under the authority of the senior representative at the Timmins-area project office, to implement NML's policies and procedures regarding hiring, procurement and related matters for the PNL. That office will remain operational for as long as the processing complex near Timmins 1 is operational, even if no ore is being mined in the PNL;
- NML will open an office at the processing complex near Timmins 1. That office will be in charge of the day-to-day operation of the processing complex and of the mine sites. It will remain operational for as long as the processing complex is in operation, even if no ore is being mined in the PNL. The office will be headed by a senior executive, who will be a PNL Resident residing in Labrador City, with decision-making powers to implement NML's policies and procedures for hiring, training, personnel-management, procurement and contracting in coordination with the office in Labrador City;
- NML will publicize all labour requirements on its website and in newspapers in the PNL and will require its contractors and sub- contractors to do the same;
- NML will expand and will update monthly lists of potential PNL-based Suppliers contained in Appendices 12 and 13. It will post those lists on its website and at its offices in the PNL and elsewhere. It will provide at those offices personnel and computer and internet facilities that will allow unlisted potential PNL-based Suppliers to apply to be listed and listed potential PNL-based Suppliers to adjust their listings. It will make the same opportunities available by mail;
- NML will prepare and will update monthly lists of all its anticipated requirements for the provision of goods and services. Those lists will be posted on its website and will be forwarded to its listed potential PNL-based Suppliers by internet or by mail;
- NML will cooperate with governments and their agencies to:
  - identify gaps or shortcomings in PNL-based Suppliers and, in particular, those based in Labrador;

    - assist the governments and their agencies to identify and implement measures to reduce or to eliminate those gaps;
- on request, NML will meet with unsuccessful PNL-based Suppliers to explain why their bids were unsuccessful and to discuss training and other measures (e.g., “unbundling” large contracts into smaller, more manageable units) to increase their chances of success;
- NML will become a member of the concerned local and regional chambers of commerce and similar organizations;
- NML will participate in trade fairs and similar events in the PNL, especially in Labrador;
- NML will locate its processing complex and related facilities, its workers’ camp (large enough to accommodate all of the commute workforce) and its explosives factory and magazines in the PNL;
- NML will require potential bidders on the construction of those facilities to use competitive PNL-based Suppliers of construction, fabrication and assembly services where available;
- NML will inform potential bidders from outside the PNL of the construction, fabrication and assembly capacities of PNL-based Suppliers, especially those based in Labrador;
- NML will provide qualified PNL-based Suppliers of construction, fabrication and assembly services a full and fair opportunity and first consideration to bid on any such services that it requires;
- If NML receives several acceptable bids for the supply of construction, fabrication and installation services and if one or more of them comes from suppliers based outside the PNL and one or more from PNL-based Suppliers, NML will award the contract to a PNL-based Supplier;
- NML does not anticipate undertaking any research or development. If it does undertake any field-based research or development, however, its field activities will be based at the processing complex in the PNL, and it will commit to using PNL research institutions, laboratories or other analytical facilities in the PNL where such exist;
- NML will encourage its suppliers from outside the PNL to form alliances and joint ventures with PNL-based Suppliers in order to promote technology exchanges;
- NML will encourage its suppliers from outside the PNL to establish branch operations in the PNL to provide, if possible in collaboration with PNL-based Suppliers, support services for equipment supplied;
- if NML uses chartered aircraft to transport its workers at the start and the end of their work rotations, it will use a PNL-based Supplier to transport workers to and from locations in the PNL;
- during the preparation/construction and operations phases, NML will submit the following reports to the GNL:
    - a monthly report on direct employment of PNL Residents by job category/occupation, Aboriginal membership and gender, and procurement of goods and services;

  - a quarterly report on: employment results and total value of goods and commercial services acquired from PNL-based Suppliers during the quarter in question, identifying: the Census Consolidated Subdivision within which they are located; total value of purchases from PNL-based Suppliers by industry category during the quarter in question; cumulative total value of purchases from PNL-based Suppliers for the year to date;
  - an annual report summarizing cumulatively the information contained in the monthly and quarterly reports and presenting also indirect employment of PNL Residents by Census Consolidated Subdivision of residency, job category/occupation, Aboriginal membership and gender;
- upon request, NML will meet representatives of the GNL to discuss the foregoing reports;
- in order to facilitate reporting, NML will maintain at a minimum the following records:
  - list of employees showing: job category/occupation; date of hiring and termination; reason for termination; place and Census Consolidated Subdivision of residence; gender; Aboriginal membership;
  - quarterly procurement forecast;
  - quarterly procurement report;
  - register of pre-qualification notifications;
  - register of bidders' list notifications;
  - register of award notification forms;
  - register of briefing sessions with unsuccessful PNL-based Suppliers.

Contractual Confirmation

Prior to or upon the release of the ELAIOM from environmental impact assessment, NML will execute the NLBP in contractual form if requested with Her Majesty the Queen in Right of Newfoundland and Labrador.

NML acknowledges that its mining lease may provide that the NML NLBP will be a binding instrument and that the Minister of Natural Resources will have the power to issue a stop work order if it is not respected.

3.3 Alternatives

3.3.1 Alternatives to the Project

For environmental and economic reasons, NML intends to mine certain deposits identified by another mining company and, in some cases, prepared or partially mined by that company. Consequently, there are no alternatives at the macro scale.

3.3.2 Alternative Methods of Carrying Out the Project

3.3.2.1 Tailings Disposal Location

The tonnage of tailings to be disposed of during the first three years of production is estimated at 3 Mt or 2.15 Mm^3. Several alternatives were studied regarding tailings management. Early in the Project, it was decided to use existing mined-out pits to dispose of the tailings instead of developing a traditional tailings containment area complete with dams and polishing ponds.

Two tailings disposal locations in mined-out pits were evaluated: Timmins 1 and Timmins 2. Despite being closer to the processing complex than Timmins 2 (and therefore cheaper to operate), Timmins 1 was discarded on the basis that experimental fishing in 2008 (AMEC January 2009) revealed that it contains fish. The same programme indicated that Timmins 2 does not contain fish.

The Timmins 2 pit was therefore selected because:

- it is 100% covered by a claim owned by NML;
- the previous title holders declared many years ago that the deposit was completely mined-out;
- DFO has accepted that it is not a fish habitat (Bennett 2009, *personal communication*);
- it is relatively close to the processing complex, thereby minimizing capital and operating costs for handling the tailings and reducing the environmental effects of the pipeline used to transport them. A shorter pipeline also reduces the likelihood of an accident.

3.3.2.2 Source of Water Supply for Potable and Process Make-up Water

After being rejected as a site for disposing of tailings, Timmins 1 was chosen to be a source of potable and process make-up water. In response to concerns from DFO, the plan to take water from Timmins 1 was abandoned in favour of taking it from one or more of the wells that will be used to dewater Timmins 3N (Wilkinson 2009, *personal communication*).

3.3.2.3 Location of Workers' Camp

Two alternatives were evaluated regarding the workers' camp: a permanent camp at the mine site, and a camp at Schefferville.

NML decided that, for socio-economic reasons (cost of daily transportation, loss of productive time, influx of people, pressure on the municipal infrastructure), it would be preferable to install the camp at the mine site.

3.3.2.4 Sewage and Wastewater Treatment

The sewage and wastewater treatment concept was first evaluated based on a septic tank and tile field. This concept was later replaced by one based on biological rotating contactor technology, since a septic tank/tile field system to meet the requirements of approximately 190 persons would have required a large area and, possibly, costly rock excavation.

3.3.2.5 Solid Waste Disposal

The original plan for solid waste disposal was to use the sanitary landfill at Schefferville. It was found, however, that domestic wastes generated in Newfoundland and Labrador cannot be transported to Québec for disposal. It was therefore decided to construct a landfill in the vicinity of Timmins 1.

3.3.2.6 Year-round Operation

Originally, NML planned to mine and ship ore only eight months per year, since the undried ore would have frozen during shipment on account of its high moisture content. NML later decided to install a system to dry the ore, and it will now mine and ship ore year-round. NML will not, however, increase the volume of ore mined annually.

Year-round operation has some advantages from an environmental perspective since it reduces the peaks in certain effects (*e.g.*, atmospheric emissions) and spreads others (*e.g.*, employment) out over 12 months per year.

3.3.3 Null Hypothesis

The consequences of the null hypothesis, the situation in which the ELAIOM did not proceed, would be:

- the avoidance of the negative biophysical effects described in Section 8.1, none of which, however, is judged to be important;
- the loss of the positive socio-economic effects. As argued in Sections 5.6.2, 11.1 and A18.1 (Appendix 18), we believe that the loss of those benefits would deal a very serious blow to the long-term economic development of a large sector of Labrador West and Labrador North. It would also, we argue, lead eventually to the disappearance of the NNK and the NIMLJ as distinct and viable ethnic and socio-cultural groups.

3.4 Relationship to Legislation, Permitting, Regulatory Agencies and Policies

3.4.1 Environmental Assessment Processes

Figure 3.1 shows the environmental assessment regimes to which each of the Assessment Groups is subject.

The portion of the Project located in the Province of Newfoundland and Labrador is subject to environmental impact assessment under the *Environmental Protection Act* of the GNL and the CEAA.

The provincial EIA process to date can be summarized as follows:

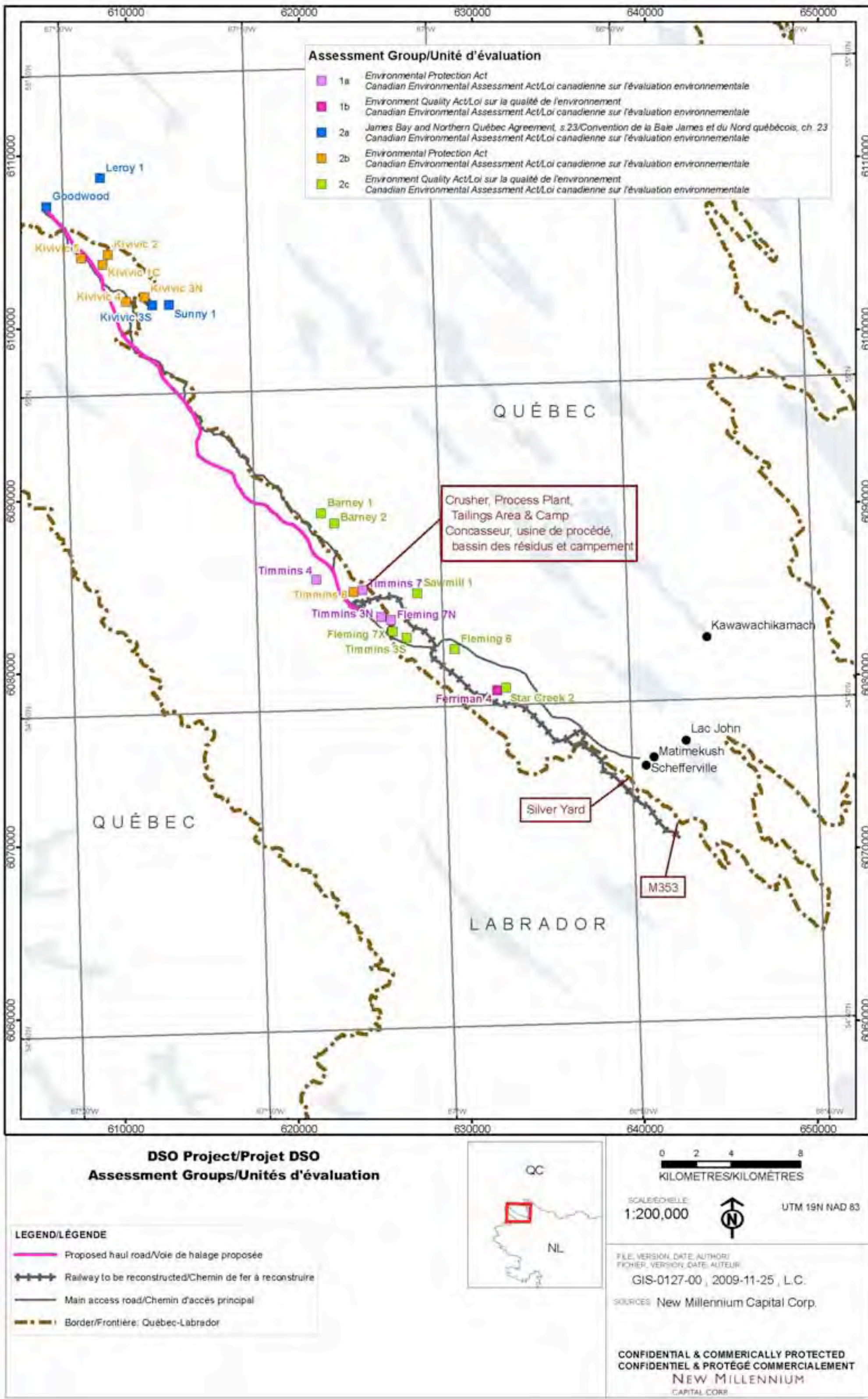
- the Project Registration was submitted on April 29, 2008, pursuant to the *Environmental Assessment Regulations*;

- the GNL registered the undertaking on May 5, 2008;
- following government and public review, the Minister of Environment and Conservation decided on August 7, 2008, to require an EIS;
- an Environmental Assessment Committee composed of provincial and federal representatives was appointed on August 25, 2008. It conducted a site visit on September 19, 2008;
- the Environmental Assessment Committee issued draft guidelines for the preparation of the EIS on October 29, 2008, for public review. NML submitted comments on December 3, 2008;
- the final guidelines were issued by the Minister of Environment and Conservation on December 12, 2008.

The highlights of the federal EIA process to date are the following:

- the Project Description was tabled with the CEAAg and the MPMO on April 30, 2008;
- NML provided supplemental information on an as-required basis between June 2008 and March 2009;
- the GoC announced on March 16, 2009, that it had initiated a screening of the Project on March 9, 2009. Under section 5 of the CEAA, an environmental assessment is required because NRC may issue a permit or license under paragraph 7(1)(a) of the *Explosives Act* and the CTA may issue a permit or license under subsection 98(2) of the *Canada Transportation Act* for the rebuilt section of railway between M353 and Timmins 1. In both cases, the level of assessment will be a screening in conformity with section 18 of the CEAA. By email of March 12, 2009, DFO (Newfoundland and Labrador) advised that it had determined that the Project will not entail any habitat alteration, disruption or destruction in Labrador. The ELAIOM will not, therefore, require a permit or licence under subsection 35(2) of the *Fisheries Act*.

Figure 3.1: Environmental Assessment Regimes Applicable to each Assessment Group



3.4.2 Authorizations Likely to be Required for Project Initiation

Table 3.2 lists the principal federal and provincial authorizations that are likely to be required prior to such Project implementation activities as land-preparation and construction. To the best of our knowledge, no municipal authorizations are required.

Table 3.1: Federal and Provincial Authorizations Likely to be Required for Project Initiation

Permit/Authorization	Trigger/Condition	Project Component/ Activity	Department/ Agency	Required Information	Comments
Government of Canada					
Approval under section 5 of *Canadian Environmental Assessment Act*	Requirement to obtain permits/authorizations from federal authorities.	Construction of explosives factory/magazines and railway reconstruction from M353 to Timmins 1 vicinity.	Federal Responsible Authorities (CTA, NRC)	Screening study reports.	
Permit under section 7 of *Explosives Act*	Requirement to obtain a permit to build an explosives factory/magazine.	Preparation/construction and operations phases.	NRC	Screening study report will provide required information. Typically, application involves forms to fill out.	
Certificate of fitness under section 90 of *Canada Transportation Act*	Precondition for the reconstruction or operation of a railway.	Reconstruction and operation of a railway from M353 to Timmins 1 vicinity during preparation/construction phase and operation of railway during operations phase.	CTA	Demonstration of adequacy of liability insurance coverage.	
Approval under section 98 of *Canada Transportation Act*	Requirement to obtain approval for the reconstruction of a railway.	Reconstruction of a railway from M353 to Timmins 1 vicinity.	CTA	Such matters as location of railway, requirements for railway operations and services and interests of affected localities.	
Licence under section 5 of *Radiocommunications Act*	Requirement to obtain a licence to install and operate a radio station.	Construction and operation of mine site.	Industry Canada	Technical specifications.	
Approval under section 7	Requirement to obtain	Construction and	Transport	Emergency	

Permit/Authorization	Trigger/Condition	Project Component/ Activity	Department/ Agency	Required Information	Comments
of *Transportation of Dangerous Goods Act*	approval for an emergency response assistance plan.	operation of mine site.	Canada	response assistance plan.	
Permit under section 31 of *Transportation of Dangerous Goods Act*	Requirement to obtain a permit demonstrating an equivalent level of safety.	Construction and operation of mine site.	Transport Canada	Technical specifications.	
Government of Newfoundland and Labrador					
Release under *Environmental Protection Act* and *Environmental Assessment Regulations*	Designated undertakings listed in *Environmental Assessment Regulations*.	Construction of mine and ancillary facilities.	NLDEC	EIS	
Lease under section 31 of *Mineral Act*	Requirement to obtain a mining lease.	Operation of mine site.	Department of Natural Resources	Land survey.	Can be applied for before or after EIA completed.
Certificate of approval for construction and operations under *Environmental Protection Act*	Requirement to obtain a certificate of approval for the construction and/or operations of an industrial facility.	Preparation/construction and operations phases.	NLDEC	Plans and specifications.	Certificate of approval specifies terms and conditions regulating the activities of an industrial facility that has air emissions and/or effluent discharges. Some of the authorizations listed hereunder may be covered by the certificate of approval for construction and operations.
Surface rights under sections 4(3) and 33 of *Mineral Act*	Requirement to obtain a demise of surface or other rights, including rights-of-way.	Construction and operation of mine site.	Department of Natural Resources		
Licence under section 6 of *Lands Act*	Requirement to obtain a licence to occupy Crown land.	Construction of part of railway and transmission line,	NLDEC	Land survey, if required.	

Permit/Authorization	Trigger/Condition	Project Component/ Activity	Department/ Agency	Required Information	Comments
		processing complex, workers' camp and other buildings.			
Approval under section 6 of *Mining Act*	Requirement to obtain Minister's approval of a development plan.	Development, operation, rehabilitation and closure of mine.	Department of Natural Resources	As required pursuant to section 4 of *Mining Regulations* and to Guidelines to the Mining Act.	
Approval under section 2 of *Rail Service Act*	Requirement to obtain approval of Lieutenant-Governor in Council.	Reconstruction/ operation of railway.	Department of Transportation and Works		
Licence under section 14 and/or permit under section 48 of *Water Resources Act*	Requirement to obtain a licence to use water for industrial purposes or to divert or impound water. Requirement to obtain a permit for an "undertaking" as defined in the Act (*e.g*., transport or utilize water; penning back or diversion of water).	Operation of wash plant, pit-dewatering, settling ponds, tailings deposition, water intake.	NLDEC	Plans and specifications.	
Permit under section 36 of *Water Resources Act*	Requirement to obtain a permit for sewage works.	Preparation/construction and operations phases.	NLDEC	Plans and specifications and an engineer's report.	
Permit under section 37 of *Water Resources Act*	Requirement to obtain a permit for waterworks.	Preparation/construction and operations phases.	NLDEC	Plans and specifications and an engineer's report.	
Permit under section 3 of *Dangerous Goods Transportation Act*	Requirement to obtain a permit for the transportation of dangerous goods in a vehicle.	Preparation/construction and operations phases.	NLDEC		

Permit/Authorization	Trigger/Condition	Project Component/ Activity	Department/ Agency	Required Information	Comments
Permission under section 153 of *Mine Safety of Workers Regulations*	Requirement to obtain written permission of inspector for explosives magazine.	Preparation/construction and operations phases.	Department of Natural Resources		
Approval under section 9 of *Air Pollution Control Regulations*	Requirement to obtain approval of a contingency plan detailing remedial action when best available control technology for an emission source is non-operational.	Operations phase.	NLDEC	Contingency plan.	
Permit under section 5 of *Quarry Materials Act*	Requirement to obtain a quarry permit.	Preparation/construction and, possibly, operations phases.	Department of Natural Resources	Plans and specifications.	Any quarry will be operated on a one-year permit. Quarry leases will not be requested. It is not anticipated that there will be a quarry in Newfoundland and Labrador.
Certificate under section 8 of *Heating Oil Storage Tank System Regulations*	Requirement to obtain a certificate of registration for heating oil storage systems up to 2,500 litres.	Construction and operation of camp, processing complex and other buildings.	NLDEC	Subject to an inspection.	
Certificate under section 18 of *Used Oil Control Regulations*	Requirement to obtain a certificate to construct, install or operate used oil storage systems or to collect, store and transport used oil.	Preparation/construction and operations phases.	NLDEC	Information pursuant to section 19 of *Used Oil Control Regulations*.	May not apply if certificate already obtained under *Storage and Handling of Gasoline and Associated Products Regulations*.
Registration under section 13 of *Storage and Handling of Gasoline and Associated Products*	Requirement to register a storage tank system for gasoline or associated products.	Preparation/construction and operations phases.	NLDEC	Plans and specifications.	

Permit/Authorization	Trigger/Condition	Project Component/ Activity	Department/ Agency	Required Information	Comments
Regulations					
Approval under section 16 of *Environmental Protection Act*	Requirement to obtain approval for a waste disposal site or waste management system.	Preparation/construction and operations phases.	NLDEC	Plans and specifications.	

3.4.3 Authorizations Likely to be Required after Project Initiation

Table 3.3 presents the main provincial authorizations potentially required during the course of construction or operations.

Table 3.2: Federal and Provincial Authorizations Likely to be Required after Project Initiation

Permit/Authorization	Trigger/Condition	Project Component/ Activity	Department/ Agency	Required Information	Comments
Government of Newfoundland and Labrador					
Acceptance under section 9 of *Mining Act*	Requirement to obtain Minister's acceptance of a rehabilitation and closure plan.	Mine.	Department of Natural Resources	As required pursuant to section 7 of *Mining Regulations* and to Guidelines to the Mining Act.	
Acceptance under section 10 of *Mining Act*	Requirement to submit financial assurance in form acceptable to the Minister.	Rehabilitation and closure of mine.	Department of Natural Resources	As required pursuant to section 10 of *Mining Act*.	
Permission under section 88 of *Wild Life Regulations*	Requirement to obtain written permission for shooting or trapping of nuisance widlife.	Construction and/or operations phases.	NLDEC		

Note: Under section 5 of the *Mining Regulations* pursuant to the *Mining Act*, an annual operational plan shall be submitted no later than one month before the commencement of the operating year of the lessee.

4.0 PROJECT DESCRIPTION

4.1 Location and Mineral Resources

4.1.1 Location

The deposits[1] held in whole or in part by NML are situated north-west and south-east of Schefferville. Some are on the Québec side, and some are on the Labrador side of the provincial border. They are in regions 23J/10, 23J/14, 23J/15 and 23O/03 of the NTSC (Table 4.1).

The locations of the deposits and claims and the extent of NML's ownership are shown in Figure 4.1. Details of the claims in Québec and the licences in Newfoundland and Labrador are set out in Table 4.2.

Table 4.1: Grouping by Area of the Deposits

Area DSO1		Area DSO2	Area DSO3	Area DSO4
(23J/10)	**(23J/15)**	**(23J/15)**	**(23J/14)**	**(23O/03)**
Houston 1	Knob Lake 1	Star Creek 2	Fleming 7N	Sunny 1
Houston 2S	Ruth 1 (Gill)	Ferriman 4	Fleming 6	Kivivic 1
Houston 2N	Ruth 10 (James)		Timmins 3N	Kivivic 2
Houston 3			Timmins 4	Kivivic 3S
Redmond 5			Timmins 7	Kivivic 3N
Malcolm 1			Timmins 8	Kivivic 4
			Barney 1	Kivivic 5
			Barney 2	Goodwood
			Sawmill 1	Leroy 1
			Timmins 3S	
			Fleming 7 Ext	

1 "Deposit" refers to mineralization that could be exploited commercially. It does not include "showings" or "outcrops", where mineralization has been recorded but where its commercial potential is unknown. That explains some apparent discrepancies between Tables 4.1 and 4.2, such as the omission of Malcolm 2, Sunny 2 and Elross 2 from the former.

Figure 4.1: Location of DSO Claims and Extent of Ownership

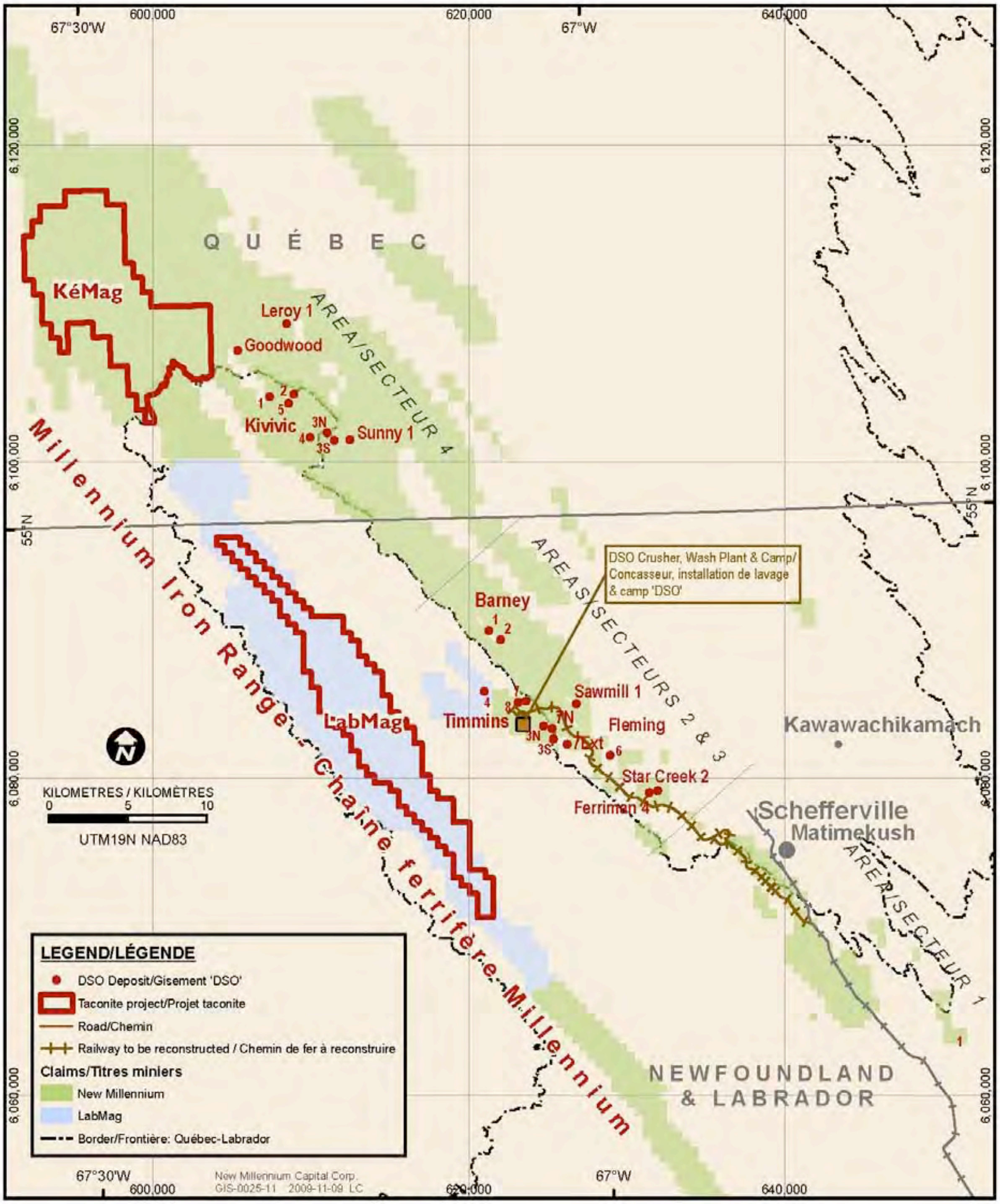


Table 4.2: DSO Claims and Licences

Area	Block	Claim Group	Claims	Area (ha)
1	Houston 2N	58038 - 58043	6	137
	Malcolm 1	58044 - 58046	3	147
		58047 - 58048	2	96
2	Ferriman 4 – Star Creek 2	2151895	1	39
		51671 – 51674	4	196
		98011	1	39
3	Barney 1, 2	50744 - 50753	10	406
	Fleming 7N	2148786 - 2148789	4	94
		2153808 - 2153809	2	15
		2161706	1	46
	Sawmill 1	2161015	1	49
4	Goodwood	2082463 - 2082534	30	1,379
		50755 - 50760	6	294
		99048 - 99052	5	245
	Sunny 1, 2, Kivivic 3S	2050700 – 2050702	3	147
		2082420 - 2082521	47	2,246
		2148790 - 2148793	4	30
		58049 - 58057	9	290
		2082420 - 2082521	11	530
TOTAL QUÉBEC			**150**	**6,425**
Area	**Block**	**Licence**	**Claims**	**Area (ha)**
1	Houston 1, 2S, 3	010595M	15	375
	Redmond 5	013405M	2	50
	Ruth 1 (Gill), 10 (James), Knob Lake 1	010479M	23	575
		010593M	8	200
3	Timmins 3N, 7, 8, Fleming 7N, Sawmill 1, Fleming 6	011279M	24	600
		011326M	1	25
	Timmins 4	010476M	10	250
		010944M	9	225
		010956M	1	25
		010957M	1	25
		010958M	1	25
		011280M	1	25
		011281M	1	25
		011282M	5	125
		011310M	4	100
		011977M	2	50
4	Kivivic 1, 2, 3N, 4, 5	010594M	37	925
		012834M	1	25
		014463M	6	150
		014464M	3	75
		014674M	1	25
		014675M	1	25
TOTAL NEWFOUNDLAND AND LABRADOR			**157**	**3,925**

4.1.2 Mineral Resources

The Ruth Formation and, predominantly, the Sokoman Formation of the Knob Lake Group are the principal sources of ore. The original composition and physical properties of the iron formation produced leached and enriched ores, which are classified as different grade types. The ores have been divided into three colour groups, as follows:

- Blue Ore: derived from the middle section of the Sokoman Formation; it is generally coarse-grained and friable and consists of hematite and martite, with minor chert;
- Red Ore: derived from the Ruth Formation; it is made up of earthy red hematite and retains the clay/slate characteristics of the original formation;
- Yellow Ore: derived from the lower section of the Sokoman Formation; it is made up of goethite and very fine-grained limonite that retains a high moisture content.

Ten deposits have so far been selected for development, five in Phase 1 (Ferriman 4 in Québec and Timmins 3N, 4, 7 and Fleming 7N in Newfoundland and Labrador) and five in Phase 2 (Goodwood, Kivivic 3N, 4, 5, Sunny 1). The four Phase 1 deposits in Newfoundland and Labrador, now known as Assessment Group 1a (Table 1.0), constitute the ELAIOM, or the Project.

They were selected in part because NML holds all, or virtually all, of the claims covering them and on the basis of the historical published resource estimates, even though those estimates were not compliant with NI 43-101.

Of the 10 deposits selected, the following eight had been drilled in 2008 to an extent that permitted the preparation of geological models of the mineral resources:

- Timmins 4 (Phase 1);
- Timmins 3N (Phase 1);
- Fleming 7N (Phase 1);
- Timmins 7 (Phase 1);
- Ferriman 4 (Phase 1);
- Goodwood (Phase 2);
- Kivivic 3N (Phase 2);
- Kivivic 5 (Phase 2).

The remaining two deposits, listed below, require further drilling:

- Sunny 1;
- Kivivic 4.

The following four deposits, on which no work has yet been done:

- Kivivic 3S;
- Barney 2;
- Timmins 8;
- Star Creek 2.

The cuttings samples from the drilling done to date, including the 2008 campaign, were sent to the laboratory of ALS Chemex at Sudbury, Ontario, for the determination of various parameters such as Total Fe, SiO_2, Mn, P, Al_2O_3, CaO and MgO content and LOI. Block models were created and mineral resources were evaluated in eight of the DSO deposits (Table 4.3).

Table 4.3: Resources by Deposit

Deposit	Tonnage	Fe (%)	Mn (%)	SiO_2 (%)*	Classification
Goodwood	22,404,000	59.79	0.13	6.03	Measured
	8,503,000	57.47	0.33	10.46	Indicated
	821,000	53.32	1.20	13.91	Inferred
Timmins 7*	0				Measured
	935,000	58.38	0.25	12.30	Indicated
	0				Inferred
Timmins 4*					Measured
	2,131,000	60.54	0.04	9.77	Indicated
					Inferred
Timmins 3N*	0				Measured
	2,147,000	59.67	0.03	11.96	Indicated
	485,000	59.70	0.04	11.90	Inferred
Fleming 7N*	0				Measured
	6,572,000	61.03	0.15	6.37	Indicated
	0				Inferred
Ferriman 4**					Measured
	9,361,000	55.37	1.86	8.12	Indicated
	2,081,000	53.78	1.69	6.38	Inferred
Kivivic 3N					Measured
	1,754,000	60.70	0.36	7.93	Indicated
	1,935,000	58.97	0.46	10.57	Inferred
Kivivic 5					Measured
	2,196,000	62.16	0.08	7.56	Indicated
	516,000	63.18	0.06	5.77	Inferred
TOTAL	22,404,000	59.79	0.13	6.03	Measured
	33,598,000	58.42	0.67	8.79	Indicated
	56,002,000	58.97	0.45	7.68	M+Ind
	5,839,000	56.76	0.93	9.23	Inferred

* Phase 1, Assessment Group 1a

** Phase 1, Assessment Group 1b

Appendix 2 shows the historical resources by deposit and province.

4.2 Volume of Ore

Based on the measured and indicated resources described in Table 4.3, the configuration of each open pit was developed to the end of its economic life using a pit-optimization software. The detailed pit design work was carried out using the optimum pit outlines, to which were applied detailed mine design parameters such as mining cost, pit haul road characteristics and geotechnical pit slope. Volumes of ore and tonnages were derived from the mine planning sequence. The results are presented in Section 4.2.1 for the Labrador pits and in Section 4.2.2 for the Québec pits.

4.2.1 Labrador Pits

The mineral reserves for the Labrador pits are listed in Table 4.4.

Table 4.4: Planned Production of ROM and Waste per Pit for Labrador

Deposit	Type of Material	Reserves ('000) tonnes
Timmins 3N*	Ore	1,662
	Waste	4,146
Timmins 4*	Ore	1,882
	Waste	1,635
Timmins 7*	Ore	1,038
	Waste	740
Fleming 7N*	Ore	6,253
	Waste	9,468
Kivivic 3N	Ore	1,670
	Waste	4,588
Kivivic 5	Ore	2,049
	Waste	2,023
Total:	**Ore**	**14,554**
	Waste	**22,600**

* Phase 1, Assessment Group 1a

4.2.2 Québec Pits

The mineral reserves for the Québec pits are listed in Table 4.5. It is to be noted that only Ferriman 4 is part of the Phase 1 development (Assessment Group 1b).

Table 4.5: Planned Production of ROM, Overburden and Waste per Pit for Québec

Deposit	Type of Material	Reserves ('000) tonnes
Ferriman 4*	Ore	9,821
	Overburden	1,500
	Waste	17,171
Goodwood	Ore	28,943
	Waste	16,959
TOTAL:	**Ore**	**38,764**
	Overburden	**1,500**
	Waste	**34,130**

* Phase 1, Assessment Group 1b

4.3 Mining Sequence and Duration

Because of the severe climatic conditions in winter, ore cannot be transported by train to Pointe-Noire unless it is dried, since undried ore will freeze in the rail cars and will be impossible to unload. Provision has been made in the Project to include a drying station to dry sized ore product before its transportation by rail. Therefore mining of ore and waste will take place for 12 months of the year.

Mining will start with Timmins 3N and Fleming 7N. The order in which the other deposits will be mined will be determined during the feasibility study. It is possible that, for technical or economic reasons, the tentative mining sequence shown in Table 4.6 will be modified. In particular, it is possible that the start of mining in Ferriman 4 might be deferred and that it might be mined over a longer period than the four years shown in Table 4.6. The scenario shown in Table 4.6 was nevertheless retained because, from an environmental perspective, it is to some degree a worst-case scenario.

The deposits will be mined using conventional open-pit mining methods based on truck/front-end loader hydraulic excavator operations. The rock will be drilled, blasted and loaded into trucks that will deliver the ROM ore to the primary mineral sizer located near Timmins 1. Initial mining development, or pre-production, will focus on the removal of waste rock in order to reach the ore.

The mines will be developed so as to produce approximately 5.5 Mt of ROM material per year for processing into 4 Mtpy of DSO (Table 4.6).

Blending of material from different pits will be carried out with a view to:

- ensuring that the processing complex can be fed with ore of reasonably constant hardness and quality to facilitate stable plant operation;
- maintaining a reasonably consistent Fe content in the ore feed to the processing complex.

Blending will be achieved by dispatching the ore trucks from the various active faces at a given time in a sequence that delivers the required blend of ores at the crusher.

During the pre-production period, which corresponds to the preparation/construction phase, sufficient waste rock will be mined to build the ROM pad and for other general construction work, such as building access roads. The ROM pad will be located near the primary sizer and will serve as a temporary stockpile of ROM on the rare occasions when the primary sizer is out of operation for maintenance.

Generally, the areas of the deposits with the least waste rock will be mined first, as this will minimize the stripping ratio. However, some areas with a larger volume of waste rock may be mined in the early years to meet blending requirements, with the consequence of increasing the stripping ratio. As a general rule, every effort will be made to maintain a constant stripping ratio.

Some clearing of organic material from the surface, evaluated at 1.5 Mt, will be required during mining of Ferriman 4. The material will be stored to the south-west of Ferriman 4 for future reclamation and rehabilitation purposes.

Table 4.6 sets out the planned ROM output during the first 10 years of operation from each pit based on current NI 43-101 reserves, the total quantities of overburden and waste to be removed each year and the total amount of product that will be shipped to Pointe-Noire.

Table 4.6: Annual Production (tonnes) of ROM and Overburden/Waste per Pit and of Product, Phases 1 and 2[1]

		Year 1 2011	Year 2 2012	Year 3 2013	Year 4 2014	Year 5 2015	Year 6 2016	Year 7 2017	Year 8 2018	Year 9 2019	Year 10 2020	Year 11 2021	Total
Total	**Product**	**1,001,360**	**3,999,817**	**3,998,920**	**3,998,247**	**4,001,288**	**3,998,414**	**4,002,382**	**4,001,650**	**3,999,206**	**3,592,426**	**0**	**36,593,710**
	Waste and Overburden	**3,393,881**	**8,652,936**	**15,166,333**	**7,310,285**	**4,128,937**	**2,993,663**	**2,518,594**	**4,823,166**	**3,134,764**	**6,107,613**	**0**	**58,230,172**
	Total Run of Mine	**1,429,044**	**5,948,472**	**6,217,503**	**5,832,180**	**5,993,980**	**5,761,762**	**5,585,507**	**5,796,327**	**5,512,144**	**5,240,869**	**0**	**53,317,788**
TIMMINS 3N	**Product**	0	0	987,971	0	0	0	0	0	0	0	0	987,971
	Waste	0	0	4,146,222	0	0	0	0	0	0	0	0	4,146,222
	Total Run of Mine	0	0	1,662,198	0	0	0	0	0	0	0	0	1,662,198
TIMMINS 4	**Product**	493,236	519,786	185,715	0	0	0	0	0	0	0	0	1,198,737
	Waste	655,726	506,440	473,017	0	0	0	0	0	0	0	0	1,635,183
	Total Run of Mine	738,431	832,606	310,561	0	0	0	0	0	0	0	0	1,881,598
TIMMINS 7	**Product**	0	534,480	86,262	0	0	0	0	0	0	0	0	620,743
	Waste	0	727,748	12,560	0	0	0	0	0	0	0	0	740,308
	Total Run of Mine	0	893,780	144,251	0	0	0	0	0	0	0	0	1,038,031
FLEMING 7N	**Product**	508,124	2,945,551	988,634	0	0	0	0	0	0	0	0	4,442,309
	Waste	2,738,155	5,918,748	810,695	0	0	0	0	0	0	0	0	9,467,598
	Total Run of Mine	690,613	4,222,086	1,340,559	0	0	0	0	0	0	0	0	6,253,258
FERRIMAN 4	**Product**	0	0	1,750,338	2,548,871	1,299,051	589,908	0	0	0	0	0	6,188,168
	Waste	0	0	9,723,839	4,927,747	2,319,974	198,956	0	0	0	0	0	17,170,516
	Overburden	0	1,500,000	0	0	0	0	0	0	0	0	0	1,500,000
	Total Run of Mine	0	0	2,759,934	3,818,580	2,219,577	1,022,505	0	0	0	0	0	9,820,596
GOODWOOD	**Product**	0	0	0	1,449,376	2,702,236	3,408,505	4,002,382	4,001,650	3,370,137	1,796,683	0	20,730,969
	Waste	0	0	0	2,382,538	1,808,963	2,794,707	2,518,594	4,823,166	1,976,232	654,504	0	16,958,704
	Total Run of Mine	0	0	0	2,013,600	3,774,403	4,739,257	5,585,507	5,796,327	4,634,700	2,399,434	0	28,943,228
KIVIVIC 3N	**Product**	0	0	0	0	0	0	0	0	0	998,377	0	998,377
	Waste	0	0	0	0	0	0	0	0	0	4,588,339	0	4,588,339
	Total Run of Mine	0	0	0	0	0	0	0	0	0	1,669,527	0	1,669,527
KIVIVIC 5	**Product**	0	0	0	0	0	0	0	0	629,069	797,366	0	1,426,436
	Waste	0	0	0	0	0	0	0	0	1,158,532	864,770	0	2,023,302
	Total Run of Mine	0	0	0	0	0	0	0	0	877,444	1,171,908	0	2,049,352

[1] As estimated in July, 2009.

The planned ore production per pit is based on material classified as "proven" and "probable reserves".

4.4 Design Assumptions

The ELAIOM was designed:

- to produce approximately 5.5 Mt/y of ROM and approximately 4 Mt/y (dry weight) of DSO product;
- to minimize its negative effects on the biophysical and social environments and to maximize its positive effects;
- to incorporate compensation for First Nations for its effects on them;
- to provide clients with the products that they require at a competitive cost;
- to withstand the effects of the rigorous northern climate;
- to provide a reasonable profit to NML's shareholders;
- to minimize the risk of accidents;
- to make its footprint as compact as possible;
- to use best-available technology so as to reduce effects and pollution;
- so that the technology used for Phase 1 (see Table 1.0) will meet the needs of Phase 2;
- to avoid limiting the access of local persons to the land and its resources;
- to ensure that all or most jobs and contracts at both the construction and the operations phases can be carried out by locally- and regionally-based firms and individuals;
- to optimize benefits for the citizens and government of Newfoundland and Labrador, with special reference to the citizens of Labrador West, keeping in mind that some ore will come from Québec and NML's obligations towards potentially affected First Nations flowing from recent decisions of the Supreme Court of Canada;
- so that all of the ore, including that mined in Québec and that to be mined during future phases of the Project, can be processed at the complex to be built near Timmins 1, meaning that that infrastructure will not have to be decommissioned at the end of Phase 1.

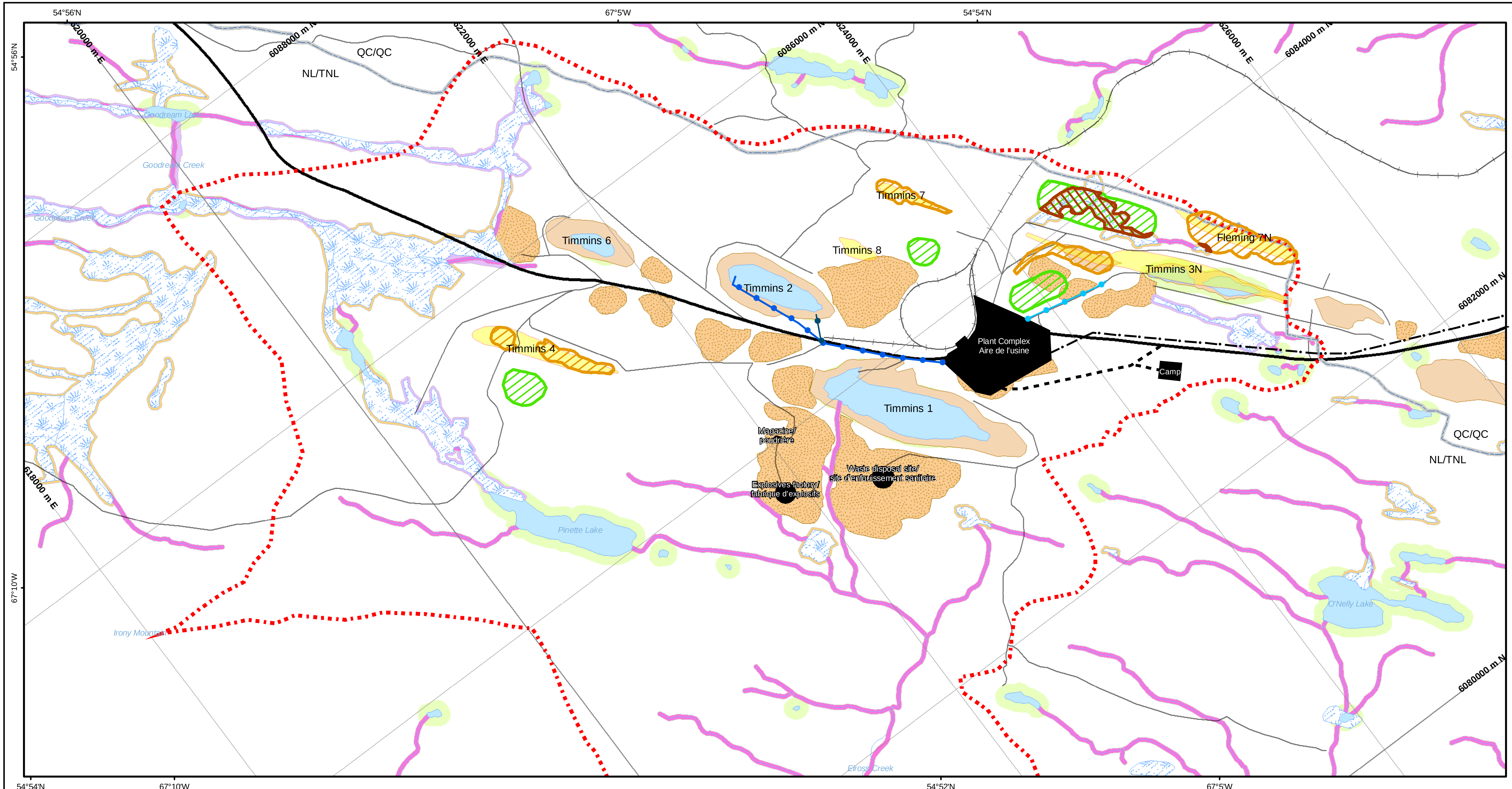
4.5 Effects Avoidance Opportunities

Figure 4.2 shows the ecological constraints that were identified to guide NML's planning.

The principal opportunity available to NML to avoid effects was to split the DSOP into two phases (see Table 1.0).

Phase 1 is located in an area already affected by mining that took place between 1954 and 1982. From an environmental perspective, it offers the following benefits:

- tailings and process water from the wash plant can be disposed of in the abandoned Timmins 2 mine, thereby avoiding the loss of terrestrial or aquatic habitat that is usually associated with the construction of a tailings disposal site;



LEGEND/LÉGENDE

- Proposed road/ route proposée
- Fresh water pipeline/ conduite d'eau de puits
- Process water pipeline/ conduite d'eau de procédé
- Tailings pipeline/ conduite de rejets miniers
- Proposed pit/ fosse proposée
- Proposed waste dump/ halde de stériles proposée
- Infrastructure footprint/ empreinte de l'infrastructure
- Constraint overlap area/ zone de chevauchement des contraintes
- Local study area/ aire d'étude locale
- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Powerline/ ligne de transport d'énergie
- Deposit/gisement
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Constraint areas/zones de contrainte

- Watercourse/ cours d'eau (15m)
- Riparian wetland/ milieu humide riverain (15m)
- Wetland/ milieu humide (15m)
- Waterbody/ plan d'eau (60m)

Ecological Constraints
Contraintes écologiques

DSO3 Sector
Secteur DSO3

0 1 2
KILOMETRES/KILOMÈTRES

SCALE/ÉCHELLE:
1:25,000

UTM 19N NAD 83

SOURCES: Government of Canada, NTDB, 1:50 000, 1979
Government of Newfoundland and Labrador and Governement of Quebec, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Groupe Hémisphères, Hydrology update, 2008

Gouvernement du Canada, BNDT, 1/50 000, 1979
Gouvernement de Terre-Neuve-et-Labrador et Gouvernement du Québec, frontière utilisée pour les titres
New Millennium Capital Corp., gisements et routes
Groupe Hémisphères, mise-à-jour de l'hydrologie, 2008

HEMISPHERES le groupe

FILE, VERSION, DATE, AUTHOR/
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Figure 4.2

- the principal access road from Schefferville to the site of the processing complex and camp already exists and is in good condition. Reusing it will not result in the loss of any terrestrial habitat or any new effects on fish or fish habitat;
- the rail bed between M353 and the Timmins 1 area still exists and is in good condition. Reactivating it will not cause any new effects on terrestrial or aquatic ecosystems;
- some 20% of the electricity transmission line will be built within the existing right-of-way, and existing poles will be used wherever possible. The balance will generally follow the existing access road. The foregoing will reduce negative environmental effects and will facilitate maintenance and repairs;
- using hydroelectricity from the Menihek Generating Station for a part of the energy requirements of the ELAIOM will avoid the pollution caused by diesel-fired generators;
- one of the deposits to be mined (Timmins 3N) has already been completely stripped and partially mined, two (Timmins 4 and 7) have been partially or completely stripped, and one (Fleming 7N) has been prepared for stripping by the cutting of trees and the construction of access roads. The foregoing means that mining can proceed without many of the biophysical effects that usually accompany clearing;
- surveys for archaeological and heritage sites were conducted several years in advance of the start of work, so that any excavation needed could be carried out well in advance of the start of the Project and so that, where feasible, infrastructure could be designed and located to avoid such sites. In the event, no sites were identified that would be affected by the Project;
- waste rock and other piles were located as close as possible to the pits, but outside areas of mineralization, to reduce the length of haul, and they were designed to minimize energy-consuming lifts;
- a plan to take a small quantity of water from the mined-out Timmins 1 pit was abandoned after the federal authorities expressed concern about the effects of its removal on fish in the Howells River drainage basin. The water in question will instead be taken from one or more of the dewatering wells that will in any case have to be drilled around the perimeter of the Timmins 3N mine;
- the workers' camp was located in the Timmins 1 area so as to: avoid the socio-economic effects associated with lodging a large, predominantly male, labour force in a small, predominantly Aboriginal, community; to eliminate the cost of daily transportation; to reduce the waste of productive time; and to eliminate the production of greenhouse gases associated with transporting employees by vehicle;
- the product stockpiles will be housed inside a dome so as to reduce the release of fugitive dust and to eliminate run-off from rain and snow, among other reasons;
- the heat generated by the boiler and the dryer will be used to heat other buildings, thereby reducing the consumption of local hydroelectricity and the need to import diesel fuel and similar products;
- the tailings disposal pipeline was designed to operate by gravity rather than under pressure, which reduces the potential for spills and reduces the magnitude in the event of a spill;

- a sanitary landfill will be built near the processing complex, thereby reducing the need to transport solid wastes;
- wherever possible, facilities, such as the explosives factory/magazines and the sanitary landfill, were located on waste rock piles created by the former mining operator so as to avoid disturbing productive habitats;
- mining and shipping ore will be spread over 12 months per year rather than the seven or eight months originally planned without any increase in the amount of ore produced annually. That will avoid the socio-economic effects of laying certain employees off seasonally. It will also distribute certain effects (*e.g.*, dust and noise) over a longer period each year, which will reduce their peak effects;
- an existing quarry will be used to produce aggregates rather than destroying habitat by opening a new one (see Section 4.12.7.5);
- it is anticipated that steel ties (sleepers) will be used on the rebuilt railway between M353 and Timmins 1, in part so as to eliminate the environmental effects of using treated-wood ties and in order to reduce the quantity of ballast that will have to be produced and transported;
- the explosives manufacturer will manufacture the explosives at the site of blasting rather than transporting pre-mixed explosives, thereby eliminating the danger of an explosion during transportation.

4.6 Pollution Prevention

NML commits to implement whenever possible pollution prevention techniques such as:

- minimizing the use of outdoor lighting, where doing so does not compromise safety and security. The latest available lighting technology will be used to avoid diffusion, and photovoltaic cells will be employed to regulate the degree of lighting applied. The foregoing will reduce light pollution and the potential for negative effects on migrating birds;
- using less-polluting working methods or equipment (*e.g.*, inflatable dome to cover product stockpiles, dust suppression equipment);
- exporting used oils and other hazardous products to an approved disposal facility;
- using less-polluting raw materials or products (*e.g.*, using diesel instead of Bunker C);
- minimizing the use of fossil fuels to generate electricity by using the excess capacity of the local hydroelectric generating station;
- integrating environmental considerations into inventory management, such as by minimizing the size of stockpiles and the quantities of fuel and explosives in storage at any given time;
- on-site reuse and recycling (*e.g.*, dust captured by dust-collection equipment will be returned to the process);
- equipping dust-producing equipment with baghouses;
- disposing of tailings in abandoned pits that do not contain fish;
- disposing of sewage, grey water, sump water from the pits and surface run-off in abandoned pits that do not contain fish;

- run-off at the processing complex will be directed to the tailings pond; there will be no discharge to surface water;
- no solid ammonium nitrate will be used in the explosives. All of the ammonium nitrate will be in solution form. That will eliminate the use of solid prill in the boreholes, thereby reducing the level of nitrates that might contaminate the groundwater;
- a polymer may be sprayed into the DSO product after it has been loaded into rail cars in order to eliminate losses during transportation to Pointe-Noire;
- using an emulsion explosive rather than ANFO, which reduces the danger of unsuccessful blasts, which can leave large amounts of polluting residue in the blast holes;
- if a surfactant is used to dewater the ore, the filtrate will be recycled;
- using steel ties on the rebuilt section of railway will eliminate the danger of pollution from treated-wood ties.

4.7 Adherence to Best Management Practices

NML is committed to engaging in responsible, sustainable business practices with regard to communities and the environment and to ensuring that its contractors and subcontractors do the same. As indicated in its Environmental Policy (Appendix 4), NML's primary concerns are environmental awareness, the conservation of plants and wildlife and human health. NML is committed to extending its Environmental Policy from its exploration activities to its mining activities as the Project progresses.

Appendix 4 reproduces the various policies that are in effect or under development.

NML is committed to doing everything within its power to ensure a fatality-free operation. As part of that commitment, it will implement the principles of the ICMM (2009a, Internet site) relating to the elimination of fatalities (reproduced in Appendix 4).

NML is a member of the PDAC, the AMQ and the AEMQ.

NML adheres to the PDAC's Environmental Excellence in Exploration (E3) principles (PDAC 2008).

As of March 19, 2009, NML was recognized as being in good standing by the Newfoundland and Labrador Construction Safety Association.

As noted in Section 1.7, NML also subscribes to the 10 principles of sustainable development of the ICMM (ICMM 2009b, Internet site).

NML's policy is that, for reasons of safety, humans will be evacuated within a radius of 1,000 m of blasting sites. The Project has been designed so that no buildings will be located within a radius of 500 m of a blasting site.

Considerable efforts have been made through the years to build strong links with the local and regional communities:

- NML conducted the programme of public information and consultation described in Section 6.0;
- NML involved Elders from the NIMLJ and the NNK in flights conducted in August and September of 2007 and 2008 to ascertain the presence of migratory-ecotype caribou

near its drill sites (Anonymous n.d.; O'Quinn 5 January, 2009) and gave a commitment to proceed as follows (Journeaux 2007, *personal communication*):

- o if more than 500 caribou were sighted within a radius of five kilometers of an active drill site, the NIMLJ and the NNK would be asked to name an observer to work with NML's staff to monitor the effects of the drilling on those caribou, with particular reference to the speed and direction of their movements;
- o if effects on the caribou were observed or suspected, especially effects that might influence the success of Innu and Naskapi hunters, the First-Nation observers and NML's staff would discuss solutions, which could include the temporary suspension of drilling.

NML paid the honoraria and the disbursements of the First-Nation participants.

In the event, the foregoing procedure never needed to be activated, since few caribou were seen within a radius of approximately 50 km around the drill sites in either of the years in question. There was no reason to attribute their absence to NML's presence or activities;

- from the outset NML has striven to maximize its use of consultants and providers of goods and services based in the Province of Newfoundland and Labrador, bearing in mind that the absence of direct transportation links between the urban centres there and the portions of the Province close to Schefferville may render such groups less competitive.

  Notwithstanding the foregoing, NML has done business with the following groups and individuals based in the Province of Newfoundland and Labrador: Professor Wade Locke; Strategic Concepts; Bobbie Boland; Jacques Whitford Environment Ltd.; Minaskuat Partnership Ltd; Fracflow Consultants Inc.; AMEC Earth and Environmental; Lotek Wireless; Northern Lights Lodge; LGL Limited; Black Spruce Heritage Services; Professor Adrian Tanner; Leslie Grattan and Associates; Peter Penashue Consulting; McInnis Cooper; Provincial Airlines; Universal Helicopters Newfoundland Ltd.; Innu Cartwright Drilling; 53 North Magazine; Aliant; AP Investments Ltd; Canadian Helicopters (Labrador); Cox & Palmer; David Dumaresque; Deborah Gale; Menihek Management; N.E. Parrott Surveys Ltd; Northern Alarm & Security Appliances Inc.; Office Works Inc.; Patterson Palmer Law; Robert Greenwood; Robert Regular; RSM Mining Services Inc.; Stewart McKelvey; Tammy Perry; The Copy Shop Ltd; White, Ottenheimer and Baker; Eastern Audio; Hodge Bros; Jordan Reid; Ken Rogers; Pat Burke; The Business Post; The Telegram; Wabush Hotel; Leo Dillon.

  The value of the goods and services purchased was in excess of $3 million;
- in response to complaints received in 2006, NML changed the flight paths of its helicopters operating in the Schefferville area, particularly in the Howells River valley;
- at the request of its owner, NML used a helicopter to relocate one of the hunting camps of an outfitter in Newfoundland and Labrador;
- NML invited representatives of the local First Nations to inspect its drill sites in 2007 and 2008;

- NML informed all of the concerned First Nations, including Innu Nation, in writing in advance of its activities in the field and provided them with a toll-free number to use for enquiries or complaints;
- NML's personnel in Schefferville regularly made themselves available to answer questions and to provide information;
- NML submitted copies of its environmental reports or summaries thereof to the concerned First Nations;
- NML has always accorded a priority, subject to standard commercial considerations, to hiring local persons and contracting with local companies. In 2008 alone, NML provided almost 11,000 person-hours of employment to Schefferville area residents (O'Quinn 7 January, 2009);
- in March 2008, NML announced the creation of a scholarship fund of $25,000 annually for secondary students in First-Nation schools who had shown the greatest improvement. The first scholarships were awarded in June 2009;
- representatives of NML have given career-related presentations and participated in career days at the two schools in the Schefferville area;
- in March 2008, NML subsidized the attendance by representatives of several Québec First Nations at the Forum autochtone conference in Québec City as part of its effort to ensure that they are familiar with the relevant laws and jurisprudence;
- starting in August 2007, NML employed a member of the NIMLJ and a former employee of ITUM to act as a liaison with the Innu communities;
- in October 2007, NML arranged for representatives of several First Nations to travel to Toronto to attend a speech by National Chief Phil Fontaine to the PDAC and to meet the National Chief to discuss mining projects;
- as a result of NML's initiative in October 2007, National Chief Fontaine visited the Schefferville-Kawawachikamach area in May 2008, where he met the Councils and the populations of the NIMLJ and the NNK;
- NML was one of the sponsors of the Wolverine Workshop organized by the NNK and the NIMLJ on March 26-27, 2009, which included presentations in the local schools;
- NML has subsidized sporting and cultural events for the local First Nations.

4.8 Applicable Codes of Practice, Guidelines and Policies

In addition to what is identified in Sections 4.6 and 4.7, Appendix 5 presents the codes of practice, guidelines and policies relating to mitigating measures that NML will apply during the preparation/construction and operations phases of the ELAIOM. Appendix 8.2 presents a draft of NML’s blasting protocol.

NML is aware of the 2009 decision of the Federal Court of Canada in the case of *Great Lakes United and Mining Watch Canada and Minister of the Environment* in which the Court held that information on releases and transfers of pollutants to tailings and waste rock disposal areas must be made public through the *National Pollutant Release Inventory* in accordance with the CEPA. To the extent that NML may be required to conform to that judgment, it will certainly do so.

4.9 Contracting, Procurement, Education and Training

4.9.1 Contracting and Procurement

As noted in Section 4.7, since inception NML made a successful effort to obtain goods and services from corporations and individuals based in the Province of Newfoundland and Labrador, spending in excess of $3 million with some 40 entities and individuals.

NML also strives to award contracts to local firms and individuals, but its capacity to do so is limited by their rarity, small size and, in some cases, lack of relevant experience. Nevertheless, in 2008, NML awarded some $700,000 in contracts to five locally-based companies, four of which are Native-owned.

4.9.2 Education

Given that NML's activities to date have been exploratory, its financial and technical capacity to engage in educational activities has been limited to the scholarship programme and the activities in local schools described in Section 4.7.

If the ELAIOM proceeds, NML anticipates increasing the scope of its educational activities. Such initiatives will be guided by the NLBP and may form part of the IBAs that it intends to conclude.

4.9.3 Training

Proponents of projects at the exploratory stage must be careful not to create expectations of long-term employment that would be disappointed if their projects are not approved by the regulatory authorities, or if they do not proceed for commercial reasons. In addition, junior companies at the exploratory phase do not have the financial resources needed for ambitious training programmes.

With financial support from the Nunavik Mineral Exploration Fund and the logistical support of the NNK, NML delivered five days of training to 12 Naskapi students between October 3 and 9, 2007. The training addressed the following topics: safety rules; geology; use of technology (GPS, magnetometer, echo-sounder); core sampling (core types; retrieval techniques; transportation; logging and recording); planning and executing a drilling programme.

NML also ensured that all Aboriginal persons employed by it or its contractors received as much on-the-job training as circumstances permitted.

If the ELAIOM is approved and goes ahead, NML anticipates that training will be an important component of it and it will be guided by the NLBP in that respect.

NML will collaborate with local and regional educational and training institutions, including the College of the North Atlantic and the Université du Québec en Abitibi-Témiscamingue, and with the GNL, the GoQ and the GoC to finance, plan and deliver training.

Based on experience with other mining projects, training is likely to be an important component of the IBAs that NML intends to conclude.

Training will be provided to employees who wish to improve their skills in order to enhance their chances of promotion. It will also strive to reduce gender-related inequities.

4.10 Physical Features

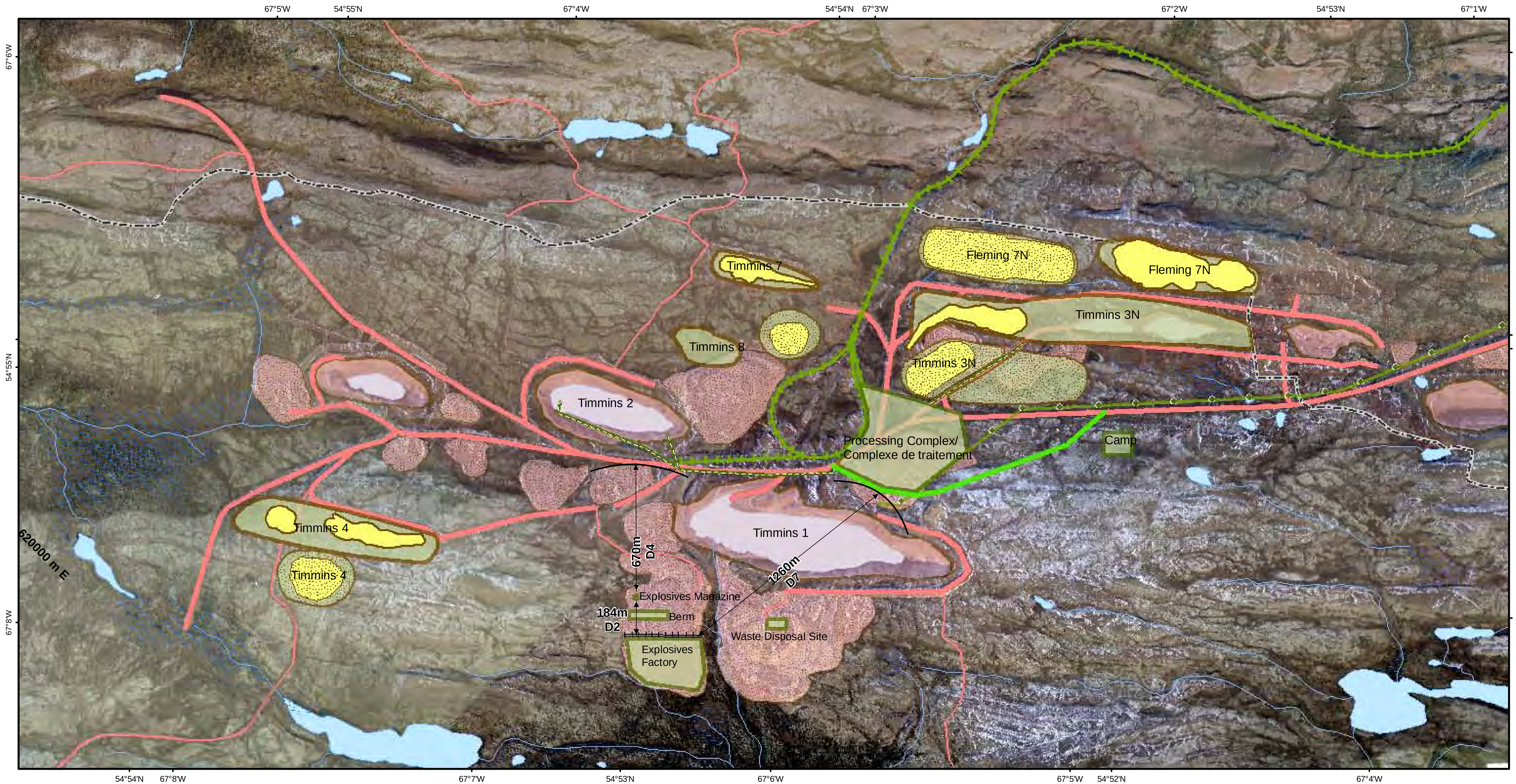
Figure 4.3 provides an overview of the planned infrastructure at DSO3.

4.10.1 Access and Support Infrastructure

4.10.1.1 Principal Access Road and Gate House

The Timmins 1 area is approximately 20 km north-west of Schefferville. It is accessible by a good gravel road, the former IOCC main access road, which meets the specifications of an unpaved all-weather highway that permits heavy traffic to circulate at provincially-regulated speeds.

Because of the location of the processing complex, a 1.6-km length of the access road will be relocated (Figure 4.3). The new road will by-pass the processing complex and will reconnect with the existing access road. A new branch road will connect the by-pass to the workers' camp. The plant gate will be located on the south side of the new by-pass (Figure 4.3), approximately two kilometers from the processing complex entrance. It will control access to the workers' camp 100 m away and to the access road to the wash plant and to DSO4. The gate house, a prefabricated building, will be manned 24 hours per day, seven days per week**.**



LEGEND/LÉGENDE

- Proposed waste dump/Halde de stériles proposée
- Proposed pit/Fosse proposée
- Diversion ditch/Fossé de déviation
- Proposed Pipeline/Pipeline proposé
- Proposed fence
- Relocated access road/Voie d'accès relocalisée
- Ultimate waste dump/Halde ultime de stérile
- Ultimate pit limit/Limite ultime de la fosse
- Infrastructure footprint/Empreinte de l'infrastructure
- Proposed electrical power line/Ligne de transport d'énergie proposée
- Railway to be reconstructed/Voie ferrée à reconstruire
- Watercourse/Cours d'eau
- Existing mine road/Route minière existante
- Existing road/Route existante
- Existing waste dump/Halde de stériles existante
- Existing mined-out pit/Fosse existante épuisée
- Wetland/Milieu humide
- 5-metre contour
- 25-metre contour
- Waterbody/Plan d'eau
- Border/Frontière: Québec-Labrador

Phase 1 Layout DSO3
Figure 4.3

0 0.125 0.25 0.5 0.75 1
KILOMETRES/KILOMÈTRES

SCALE / ÉCHELLE:
1:20,000

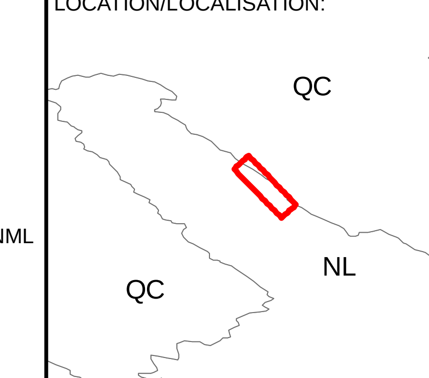
UTM 19N NAD 83

FILE, VERSION, DATE, AUTHOR/
FICHIER, VERSION, DATE, AUTEUR:
GIS-0060-12, 2009-11-16, L.C.

SOURCES:
Layouts, contours, existing structures - NML

Plans d'implantation, contours, structures existantes - NML

LOCATION/LOCALISATION:

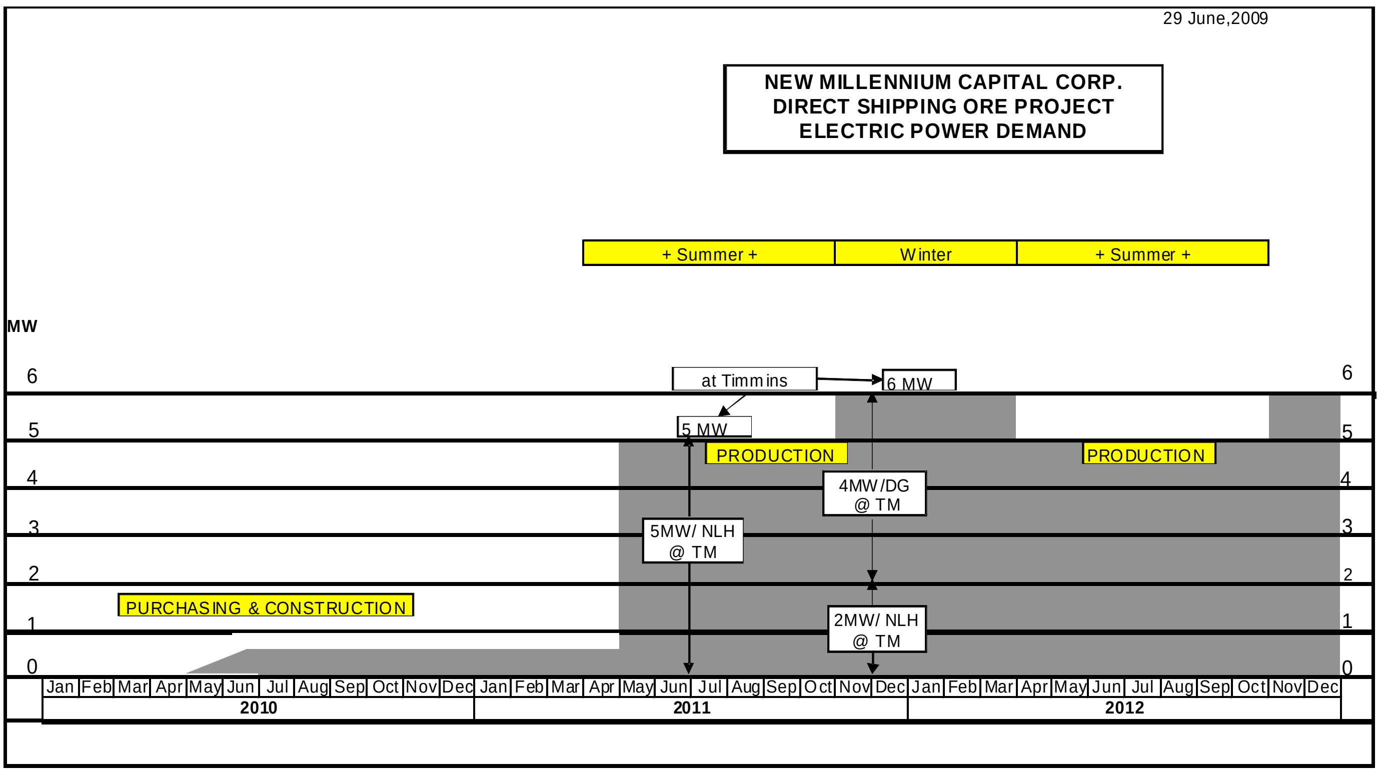


4.10.1.2 Electricity Transmission Line

The demand at the processing complex and the workers' camp is estimated at 5 MW in summer and 6 MW in winter (Figure 4.4). Power will be supplied via a 69-kV or a 34.5-kV (yet to be decided) transmission line from an existing substation at Schefferville, Québec.

NML will build the transmission line, supported on existing, replaced or new poles, from the HQ substation located some two kilometers west of Schefferville for some 20 km to a new substation located near Timmins 1. For ease of maintenance and in order to reduce environmental effects, the transmission line will follow the main access road. Some 17 km of the transmission line will be located in Québec. It is understood that the required 5 MW during summer will be able to be supplied from the Menihek Power House but that only 2 MW will be supplied from that source in winter. In order to ensure that the power taken by the Project does not create shortages in the Schefferville area during winter, a 4.0-MW diesel-fired generator adjacent to the wash plant will be used to meet the energy shortfall from time to time.

Figure 4.4: Projected Power Demand Profile



Notes: 1. The above is based on 12 months production. Starting May 2011.
2. Actual changes in production levels will probably be gradually ramped up and down; for simplicity, the ramping is not shown on the above figure.

Key: TM – Timmins 1

4.10.1.3 Railway Line from Mile Post 353 (Knob Lake Junction) to Timmins 1

The ore will be transported to Pointe-Noire, near Sept-Îles, Québec, from where it will be shipped by boat to its purchasers. The main railway line from Schefferville to Sept-Îles, built in the 1950s by the former operator of the mines at Schefferville, is still in operation. NML needs, however, to connect its planned mines at DSO3 to that main line.

When the former mines in the Timmins 1 area were in operation, they were connected to the main railway line at Knob Lake Junction (M353) by a 28-km single line railway.

After the mines in Schefferville were closed, in 1982, the rail, sleepers and other infrastructure were removed. The rail bed was not, however, removed, and it remains in good condition.

NML intends to rebuild the track between M353 and the Timmins 1 area essentially as it existed previously.

Only minor repairs to the rail bed will be required. No new culverts will be required, and very minor repairs to perhaps 10/27 culverts may be needed (Logan June 2008).

The new track will terminate near the processing complex with a loop for the rail car loading station and an appropriate number of sidings for such things as parking the tanker cars containing fuel.

4.10.2 Camp

There will be no requirement for a temporary workers' camp. The workers' camp will be installed at the beginning of the preparation/construction phase to accommodate construction personnel and, thereafter, operations personnel.

For the reasons explained in Section 4.5, it was decided to locate the workers' camp at the Timmins site.

The labour force at the operations phase will be approximately 190 persons. Some 50 employees recruited in the Schefferville/Kawawachikamach area will be bussed to and from work on a daily basis. The camp will therefore be sized to sleep approximately 140 persons and to feed approximately 190. The labour force at the preparation/construction phase may peak for short periods at approximately 300 persons, including the staff of contractors. At such times, workers will have to be housed two per room.

Catering and cleaning services at the camp will be contracted. The contractor will be responsible for ensuring that food-related activities respect the applicable legislation. The contractor's staff recruited from outside the Schefferville area will be accommodated in the workers' camp or in additional trailers.

The camp will be installed inside the entrance gate.

The camp will be composed of three single-room units or equivalent, each with approximately 50 rooms, a recreation complex and a kitchen complex. One unit or part thereof will be reserved for female employees. The camp will occupy 12,000 m² and will be heated by a diesel-fired hot-air unit.

A parking area for employees will have spaces for some 20 vehicles, each with a power outlet for use in winter. The parking lot will be constructed from mine waste covered by 150 mm of borrowed pit-run material or crushed material.

A local operator will be contracted to provide a bus service between Schefferville and the camp for employees recruited in the Schefferville/Kawawachikamach area.

4.10.3 Laydown Areas

Two open-air laydown areas will be provided for the preparation/construction and operations phases: one near the wash plant and the other near the maintenance garage. Their area will be approximately two hectares. Their surface will be the bare ground. They will be used for storing materials and equipment that can withstand exposure to rain or snow. More sensitive materials will be stored in a warehouse at the wash plant or in the garage.

4.10.4 Processing Complex

4.10.4.1 Ore-crushing, Screening and Washing Facility

The processing complex will comprise five main areas: the mineral sizing station; the fine crushing plant; the wash plant building, the dryer; and the product storage area.

The sizing station will be a structure enclosing the primary and secondary mineral sizers and the hopper and the apron feeder, both on steel skids. A retaining wall will be provided to permit the building of the truck-dumping ramp leading to both sides of the hopper at the top of the station. Access will be provided at the top level at the haulage road elevation and at the bottom via a service road. A weather-proof electrical control room will be provided at each of the three main areas. The sizing station, which will receive ore from mine trucks, will include mineral sizers to accept the larger ROM.

The fine crushing plant will be housed in a 50 m x 100 m building mounted on steel or spread concrete footings with grated elevated floors. Access will be provided from the service road. The building will be heated, including the hydraulic unit room and the electrical room. It will house the tertiary and quaternary cone crushers and will be equipped with an overhead or mobile crane and monorails to facilitate maintenance.

The wash plant building, which may be an inflatable dome, will measure approximately 100 m x 100 m x 30 m. It will house the physical separation equipment, the magnetic separation equipment, grinding equipment, filtration units, compressors and other auxiliary equipment. It will house both the high-voltage and the low-voltage electrical rooms. The generator referred to in Section 4.10.1.2 will at times be an important source of energy for the wash plant. A control room, lunch room and restroom area, as well as mechanical and electrical maintenance shops, will be provided. Process water, freshwater and potable water pumps, vacuum pumps and compressors will be located there.

Part of the ore will be processed in a fine jig upgrading step. The material that meets the grade criterion for sale will be dewatered and, if necessary, dried and directed to a covered stockpile prior to being loaded into rail cars for transportation to product-storage and ship-loading facilities at Pointe-Noire. The rejects will be returned to the process for further upgrading.

4.10.4.2 Products Stockpiles

Two products stockpiles will be used regularly: the SF stockpile; and the SPF stockpile. They will each hold approximately 25,000 tonnes. They will be 70 m in diameter and 32 m high. Both stockpiles, along with the reclaim system and the take-away conveyor, will be covered by an inflatable dome measuring approximately 100 m x 300 m x 35 m high. It is also possible that they will be located inside the railway loop near Timmins 1.

Fines produced at the apron feeder and the product from the secondary sizer will be collected on a conveyor and transferred through a stacker conveyor to the coarse ore stockpile. It will be located approximately 150 m south-west of the wash plant. In the reclaim tunnel, the apron feeders will be fitted with dust collectors installed at the discharge chute to control dust in the reclaim area.

A ROM pad located near the primary sizer will be used on the rare occasions when the primary sizer is out of operation for maintenance and for blending purposes.

4.10.4.3 Sized Ore Product Drying Station

Prior to rail transportation, the sized ore product (SF and SPF) will be dewatered and dried as necessary. During the summer months, the sized ore product will be filtered in the horizontal pan filters. During the transition seasons (fall and spring) steam will be injected to reduce the moisture of the product to about 5%. During the winter months an additional stage of drying will be added with the fluidized bed dryer to reduce moisture to 2% or less.

Horizontal Pan Filters and Steam

Dewatering the sized ore product will be based on horizontal pan filters in which steam will be injected into the filter cake at the filters to reduce the moisture content to about 5% in fall and spring. The diesel-fired steam boiler will generate most of the required steam. Part of the steam required during the winter months will be recovered from the fluidized bed dryer. It is estimated that the diesel fuel consumption required for a 30-day fuel period is 340,000 L. Diesel fuel will be brought to the site by rail in tank cars.

Fluidized Bed Dryer

The fluidized bed dryer consists of a vertical cylindrical steel vessel separated by a hot air distributor or fluoplate. Hot air is introduced into the lower portion (or windbox) of the vessel and enters the upper portion (or expansion chamber) via tuyeres in the fluoplate. The material to be dried is fed onto the fluoplate, where it is fluidized and dried by the hot gases. The dried material is discharged from the dryer via a variable speed rotary valve.

Primary dust-collection equipment consists of a bank of twin cyclones located adjacent to the dryer. The dried dust collected is discharged to be mixed back with the SPF product.

The secondary dust-collection equipment consists of reverse-pulse baghouses located adjacent to the cyclones. The dried dust collected is discharged to be mixed back with the SPF product. The exhaust gases are directed to the atmosphere via a free-standing exhaust stack. The stack will be 45 m high, or whatever other height is required to conform to the *Air Pollution Control Regulations* of the GNL. The flue gas particulate emissions are estimated at a maximum of 50 mg/Nm^3.

The overall dimensions of the dryer system are approximately 45 m x 20 m. It will be suitable for drying at a rate of 400 tph for a product moisture content of less than 0.5%, which, when mixed with some undried material, will result in a 2% moisture product.

Refractories removed from the dryer during maintenance will be sent for recycling or disposal.

The heat requirement of the dryer is provided by diesel-fired burners. The fuel requirement is estimated at approximately 1,000,000 L (to be confirmed) for a 30-day period. The diesel fuel will be brought to the site by rail in tank cars.

4.10.4.4 Rail Car Loading Station

Under the SF and SPF stockpiles, three belt feeders in a tunnel will reclaim the material for loading into rail cars. One product will be able to be loaded at a time. The reclaimed material will be conveyed to a surge bin, from where it will be loaded into rail cars using a PEBCO®-type system or, in the early stages of the Project, possibly by means of a front-end loader. The rail car loading station will be located approximately 200 m east of the processing complex.

The surge bin above the wagon load-out system has a capacity of about 540 tonnes, or five wagons. In a balanced operation this bin will operate 1/2 - 2/3 full. The PEBCO system comprises a hopper below the surge bin, which can be isolated by shut-off gates from the surge bin. There are shut-off gates at the outlet of the PEBCO bin. Below the PEBCO bin there is a pivoting chute with a closing gate at the outlet. This chute can be retracted to allow the locomotive to pass through the load-out system. There is an operator ideally within line of sight to the load-out system in an enclosed control room.

The system is designed to load at a rated capacity of 4,000 tph. It will take approximately six hours to load a 240-car train.

4.10.4.5 Mine Dispatch, Administration/Engineering Offices and Change House

Located near the primary mineral sizer, the mine dispatch will be a 30 m by 20 m, two-story building. The ground floor will have a hall, where mine crews and foremen will gather before and after their shifts to receive instructions from their supervisors, and before blasts and for safety meetings. Also on the ground floor will be: an office for a safety officer; a well-equipped first-aid station manned by a qualified attendant; training rooms; and separate showers and dryrooms for male and female employees. On the second floor, there will be offices for engineers and technicians and an area where mine haul trucks can be reached directly from a gateway and gangway for “hot seat” changes.

The office complex will be located at the mine dispatch and will consist of 17 Atco®-type or equivalent trailers assembled in modules. Each trailer will be 3.65 m by 18.3 m. The office complex will have four modules, one for each department: the mining group; the wash plant change house; the mill personnel; and the administration staff. The wash plant change house module will be equipped with separate baskets, showers and changing racks for men and women.

The complex will be approximately one meter above ground, supported on tripods. Each module will have skirting and interconnecting heated corridors.

4.10.4.6 Maintenance Garage

The mine equipment maintenance garage building will be included in the wash plant building. It will include a wash bay, four major equipment maintenance bays, a tire shop and service bay, a drill repair area and a small-vehicle service area.

The equipment will include a 25-tonne mobile crane and an air compressor. The building will be designed to accommodate Caterpillar® 785C-type mine trucks and Caterpillar® 993K-type front-end loaders. It is also planned to service Caterpillar® 834H-type wheeled dozers as well as the smaller equipment used on site.

The wash bay will be equipped with platforms, a pressure washing system and a water recycling system. An oil/water separator will be included in the water recycling system.

The fire truck and the ambulance will be parked nearby and will be brought inside the building whenever space becomes available.

4.10.4.7 Warehouse

The warehouse will be an integral part of the maintenance garage, separated from the maintenance bays by a concrete-block wall. Its floor area will be approximately 575 m^2. The floor will be at the same level as that of the maintenance garage so as to facilitate movements of fork lift trucks.

4.10.4.8 Laboratory Building

The laboratory building will have a floor area of approximately 200 m^2. It will be composed of three trailers, to which two wooden structures will be added: one will be for the electrical room, where all the electrical equipment will be installed; the other will have a concrete floor and will house the precision scales.

The laboratory building, located beside the wash plant building, will be installed on tripods approximately one meter high and it will also have skirting.

4.10.4.9 Site Roads

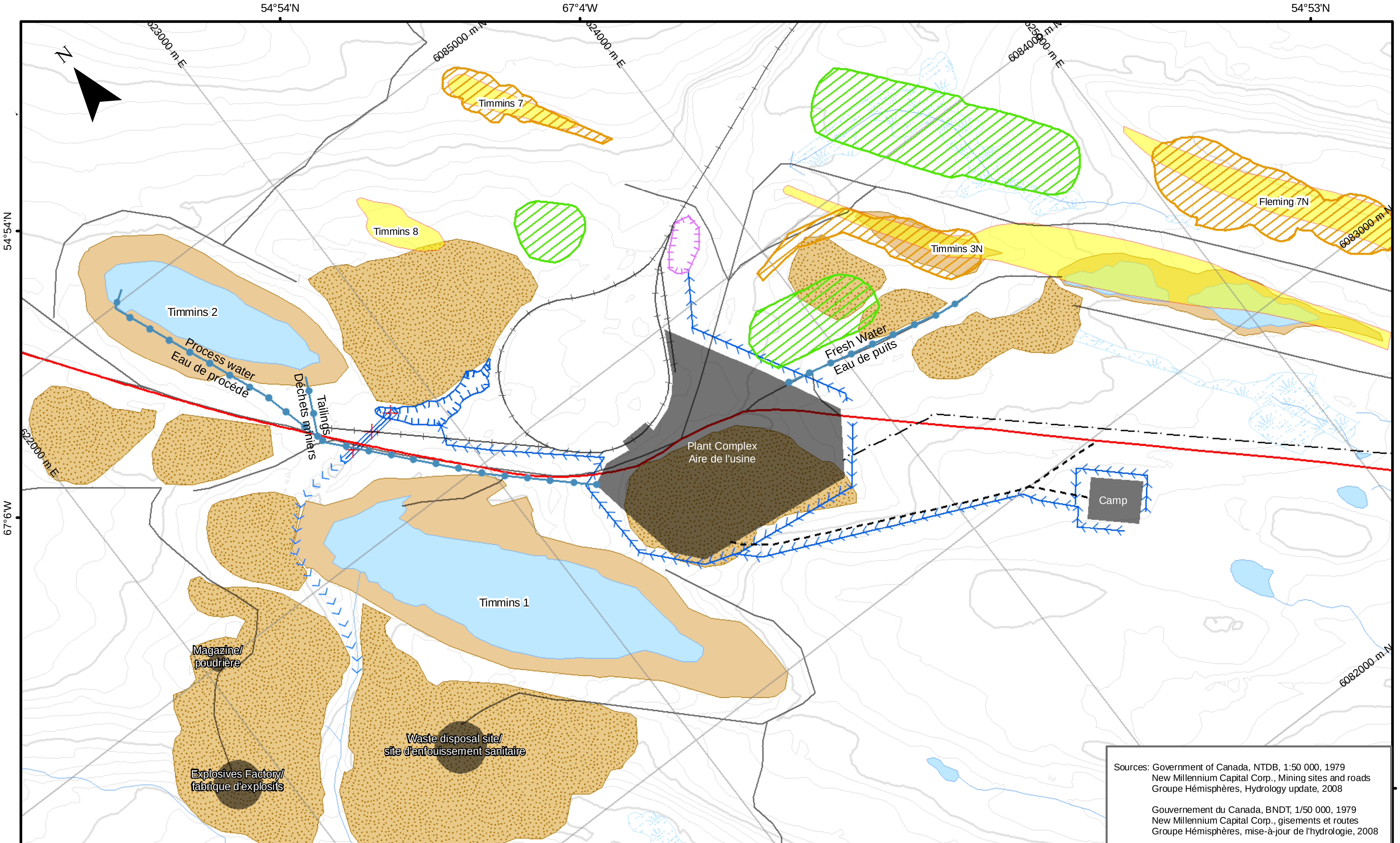
The site roads (Figure 4.3) are required to access the various parts of the property. They will include the following:

- a continuation of the mine haulage roads to the primary mineral sizer and the maintenance garage;
- a road connecting the explosives factory and magazines to the pit haul roads;
- a road from the wash plant area to the Timmins 2 pit;
- a road from the primary mineral sizer to the processing complex, which will also provide access to the sized-ore storage pile;
- a road from the new by-pass road to the camp and from the camp to the processing complex.

4.10.4.10 Stormwater Management

Whenever possible, buildings will be located on natural rises to reduce the risk of flooding.

Run-off within the processing complex area will be captured by perimeter ditches alongside the site roads. As indicated in Figure 4.5, run-off towards the south-west will be directed through the ditch along part of the access road and towards the existing sedimentation pond located at the bottom of the Timmins 2 waste rock pile, between Timmins 2 and the railway loop, in order to avoid discharging directly into Timmins 1. This pond will hold 25,000 m^3 of water for a retention time of approximately 24 hours, which is estimated to be large enough for the spring run-off. Two submersible pumps, one on stand-by, will be installed in the pond. Water will be pumped to the tailings thickener, to be used as process water. Any excess water will be pumped to Timmins 2 via the tailings pipeline. The pumps will be connected to the emergency power system in the event of power failures. The existing culvert under the road will be blocked in order to prevent discharge into Elross Creek. An emergency spill canal will be incorporated into the design to prevent wash-out.



Main access road/
route d'accès principale

Railway/voie ferrée

Road/route

Powerline/
ligne de transport d'énergie

Proposed road/
route proposée

Pipeline/
conduite

Proposed pit/
fosse proposée

Proposed waste dump/
halde de stériles proposée

Infrastructure footprint/
empreinte du bâtiment

Deposit/gisement

Watercourse/cours d'eau

Wetland/milieu humide

Waterbody/plan d'eau

Existing mined-out pit/
fosse existante épuisée

Existing waste dump/
halde de stériles existante

Existing infiltration pond/
bassin d'infiltration existant

Infiltration pond to be constructed/
bassin d'infiltration à construire

Perimeter ditch/
fossé de drainage

Existing large ditch/
grand fossé existant

Existing culvert (to be blocked)/
ponceau existant (à bloquer)

Stormwater Management
Gestion des eaux de pluie

DSO3 Sector
Secteur DSO3

0 100 200 300 400 500
METERS/MÈTRES

SCALE/ÉCHELLE:
1:15,000

UTM 19N NAD 83

FILE, VERSION, DATE, AUTHOR/
FICHIER, VERSION, DATE, AUTEUR:
GH-0020-03, 2009-07-07, J.T.

HEMISPHERES
le groupe

FIGURE 4.5

Run-off towards the north-east from the processing complex will be directed through a perimeter ditch towards the sedimentation pond located east of the railway loop. Observation of the area during dewatering activity in 2008 indicated that a high infiltration rate exists in the natural terrain and no overflow is expected.

Run-off from the camp area will be captured through perimeter ditches and will be directed towards the ditch along the access road by-pass. This ditch will direct water to the sedimentation pond located between Timmins 2 and the railway loop through the processing complex ditches system.

4.10.4.11 Heating, Ventilation and Air-conditioning

Exhaust fans will be installed in each module of the offices described in Section 4.10.4.5 to ensure proper air changes and temperature control in the summer.

The major buildings and facilities, including the wash plant, the processing complex electrical rooms and the mine equipment maintenance building (including the wash bay, the garage area, the change house and the warehouse), will be heated by oil-fired units.

The secondary crusher buildings and the reclaim tunnel will be partially heated by oil-fired space heaters, mainly to prevent the electrical and hydraulic unit rooms from freezing.

The secondary installations, being the laboratory and the gate house, will be heated by oil-fired heaters. The offices in the processing complex, including the control room and the maintenance building, will also be heated with oil-fired heaters. The camp will be heated by an oil-fired hot-air unit.

No air-conditioning units have been planned, as the average summer temperature is below 15°C.

4.10.4.12 Site Fencing

Fencing will be limited to the vicinity of the main gate, around substations and storage areas and at the explosives factory/magazines.

4.10.4.13 Electricity Distribution Infrastructure

At a substation to be located near Timmins 1, two transformers, one on stand-by, will step the incoming voltage of 69 kV or 34.5 kV down to 4.16 kV, a voltage that is suited to the power demand and layout of the site. Overhead lines will distribute power to various load centres; buried 5-kV cables or 5-kV cables on cable trays will be used in areas where an overhead line is inappropriate. Five-kV cables will also be needed for final connections to certain high-powered equipment.

4.10.4.14 Lighting

Lighting in outside areas and at the mine dispatch building will use the latest-available technology to avoid diffusion and will use photovoltaic cells to regulate the degree of lighting applied at any time. Lighting in the pits for maintenance purposes will be provided by five mobile light towers powered by diesel generators. No electrical distribution will be provided for the pits. There will be no lighting on haul roads.

4.10.4.15 Fuel

Diesel

Fuel will be transported by rail from Sept-Îles to a dedicated rail siding near the process facilities. Approximately 15 tank cars, each holding up to 100,000 litres of petroleum products, mainly No. 2 diesel oil, will be parked on a siding and will act as bulk storage from where day tanks around the site will be replenished as required. Approximately 10 rail tank cars will be required each week in winter, when the sized ore product drying station (Section 4.10.4.3) is in operation and when locally-produced hydroelectricity may not be available at all time, and three in summer. When empty, the tank cars will travel back south for refilling. The tank cars will have double walls as protection against accidental spills. The area immediately surrounding the fuel loading and unloading facilities will have a drainage system made from concrete or other material approved by the regulatory authorities. It will drain to an oil separator and to a storage tank sufficiently large to contain a spill.

Auxiliary mine equipment will be fuelled by a fuel truck.

Haul trucks and light vehicles will be refuelled at the rail siding directly from the rail tank cars.

4.10.4.16 Process Water Supply, Distribution and Disposal System

All intake structures, including details such as the size of fish screens, where applicable, will be designed during the preparation phase if the ELAIOM is approved.

Freshwater

The freshwater intake system will provide water to the freshwater and fire protection water tank located at the processing complex. The freshwater source will be the dewatering wells around the Timmins 3N pit, 1,000 m east of the processing complex. After mining comes to an end at that pit, at least one well will be left in operation to maintain the water supply. The pumping station at the edge of the Timmins 3N pit will be accessible via the haul road. The pump house will include two standard vertical turbine pumps, one on stand-by, placed in a galvanized pipe fed by the dewatering wells. The pump house foundation will be a concrete slab on pit-run material backfill.

Water will be pumped through a buried pipeline to the freshwater and fire protection water tank located at the processing complex. The tank will have a capacity of 1,250,000 L. The capacity exclusive to the fire protection system will be 1,135,000 L. The water will be filtered at the inlet of the tank to remove suspended solids and large contaminants, as it will also be used as gland seal water. The freshwater tank will feed the potable water treatment systems.

Process Water

Water recycled from the tailings pit (Timmins 2) will be received in a process water reservoir near the processing complex. It will be distributed throughout the processing complex by three pumps, two operating and one on stand-by. A total process water flow rate of approximately 3,600 m^3/h will be required to feed the various process areas. Booster pumps will be required in certain areas of the plant to increase water pressure.

A reclaim water system will be used to provide the required make-up water to the process water tank to maintain proper water flows in the processing complex. The reclaim water station will consist of two standard vertical turbine pumps, one operating and one on stand-by, suspended from floats anchored at the side of the Timmins 2 pit at the opposite end from where the tailings will be deposited.

4.10.4.17 Potable Water Supply

The potable water treatment system will be fed from the freshwater tank. A membrane filter unit (nanofiltration) will be used to provide potable water to the camp (maximum 300 persons) and the processing complex (50 persons). A similar system will also be installed at the maintenance garage for 50 persons. Thorough water quality analysis will be required to finalize design of the system and its requirements.

4.10.4.18 Sanitary Wastewater

Sewage and wastewater generated at each of the camp, the processing complex and the garage will be retained in holding tanks. The contents of those tanks will be transferred regularly by pump-equipped tanker trucks operated by a contractor to a central treatment unit utilizing RBC technology. The RBC process will be designed to meet effluent quality and natural environment discharge requirements as per GNL Regulation 65/03 (*Environmental Control Water and Sewage Regulations*, 2003), with 15 mg/L BOD_5 and 15 mg/L suspended solids. The RBC discharge will be returned to the processing complex to be combined with the tailings in the tailings pump box through a buried pipeline. Approximately 20 m^3 of sludge will be generated each year. It will be removed when necessary by a contractor to the solid waste disposal site.

4.10.4.19 Tailings Disposal System

The mined-out Timmins 2 pit will be used as the initial tailings containment basin.

The tailings containment system will operate in closed circuit with the processing complex. The design will meet all existing safety and environmental standards. There is not enough space in Timmins 2 to contain all the tailings of the two phases of the DSOP. Other mined-out pits (Timmins 3N, Timmins 7 or Fleming 7N) will, however, become available as mining proceeds, and one or more of them will be used for tailings disposal. The tailings disposal in Timmins 2 will be closely monitored, including testing the effluents for the parameters referred to in GNL Regulation 65/03, and will be performed in such a way that there will not be any discharge to the environment. The pit or pits that will be used once Timmins 2 is full will not be fish habitat, since they will have been excavated by NML in the immediately preceding years and will not have any inflow or outflow channels.

The tailings pipeline will be approximately 1,600 m long with an approximately 500-mm diameter. It will be installed on a close to constant slope between the processing complex and Timmins 2. After the tailings have collected in the tailings box, they will flow by gravity to Timmins 2, which is 30 m below the elevation of the processing complex. A pump will be available in case it is needed. If the plant shuts down, the pipeline will be flushed with water and will drain itself into the tailings pit.

A flow-detector will be installed at the outflow of the pipeline. If the flow of tailings stops in an unplanned way, that will indicate either that the pipeline is broken or that it is blocked. In either case, the duty staff will react quickly and appropriately. Given that the tailings will not be under pressure, the potential for a large spill is very low.

The pipeline will be inspected visually once per 12-hour shift, which should permit the identification of leaks before they become serious.

In the event of a leak, the material in question will be cleaned up and dumped in Timmins 2.

The process water reclaim pipeline will be approximately 2,000 m long and will have a diameter of approximately 500 mm. It will run alongside the tailings pipeline for most of its length. Made for most of its length from HDPE, the pipe will be designed to sustain various pressures. At the bottom of Timmins 2, there will be a steel section to handle higher pressure. The floating reclaim water station will be anchored at the side of the old Timmins 2 pit and it will consist of two standard vertical turbine pumps, one operating and one stand-by, each with a capacity of 500 m^3/h.

4.10.4.20 Solid Waste Disposal

Solid waste will be collected around the site in animal-resistant containers. A contractor will dispose of the contents of the containers in a new waste management site to be created near Timmins 1 (Figure 4.3) on one of the waste rock piles. It will meet or exceed the relevant regulatory standard of the GNL. The trenches will be clearly identified, and procedures will be implemented to cover the openings regularly in such a way that the site will not attract wildlife.

4.10.4.21 Disposal of Hazardous Materials and Used Tires

Hazardous materials and used tires will be collected and transported to the nearest approved disposal facility, which is located in Sept-Îles.

4.10.4.22 Communications

The following systems are planned:

- a telephone system, connected by land line to existing telecommunication facilities in Schefferville, will provide voice, fax and data transmission facilities;
- a new tower will be built, and mobile phone service will be secured from Lynx Mobility Inc., a company jointly owned by the NNK that services the Schefferville area;
- hand-held closed-circuit radios operating on three separate wavelengths will provide a local communications system for operations, security and maintenance staff;
- a local computer network, infrastructure and workstations will provide access to the internet. Naskapi Imuun Inc., which is wholly owned by the NNK, is the regional provider of high-speed internet service;
- satellite telephones will be available at key locations for emergency use.

4.10.4.23 Borrow Pits

It is expected that approximately 10,000 m^3 of material for the construction of road bases will come from existing waste rock piles near Timmins 1.

The rolling surfaces of roads will be constructed of crushed stone. It is planned to source that material from an existing borrow pit located near the Gagnon mine, in Québec.

Concrete-quality stone required during construction will come from the same borrow pit.

Sand for concrete will come from the Ferriman 4 area or from eskers west of the Menihek Dam.

4.10.4.24 Explosives

Explosives will be manufactured on site by a licensed subcontractor. The explosive used will be an emulsion or slurry type.

A preliminary estimate of the quantity of explosives to be used is approximately 1,800 tonnes per year.

The explosives factory will require an area of approximately 300 m by 300 m. The two explosives magazines will occupy an area of approximately 100 m by 100 m, and the detonator magazine will occupy an area of approximately 50 m by 50 m. There will be outside lighting within the compound. A berm will separate the factory and the magazines. They will be located as shown on Figure 4.3. The factory will include:

- one 6,000-square-foot pre-engineered steel plant building set on a concrete slab with sump areas. It will be divided by concrete-block walls into a boiler room, a motor control centre room, an office and washroom, a process area and a parking and service area for trucks. It will conform to the National Building Code of Canada and to any applicable local or provincial standards.

  The process area will contain two double-walled fuel phase tanks, each with a capacity of 5,000 L, which will contain a mixture of #2 diesel fuel, emulsifiers and mineral oil.

  The plant building will contain two stainless steel dissolver tanks for ammonium nitrate, each within a diameter of 10 ft and a height of 11 ft, and one stainless steel ammonium nitrate solution storage tank with a diameter of 12 ft and a height of 14 ft. Each dissolver tank will be equipped with an internal steam coil to heat the water to the desired temperature before the ammonium nitrate is introduced.

  The tanks will be located in a sump area that can contain 110% of their combined volume.

  The MCC room will contain the electrical distribution equipment, the switchboard, breakers and similar equipment.

  The boiler room will contain a low-pressure electric or oil-fired steam boiler and associated feedwater and condensate tanks and pumps.

  The truck bay will also contain a sump to collect washdown water. The washdown water will be collected periodically in a tanker truck and disposed of in Timmins 2;

- three Type-4 magazines. These will have steel-plated outer walls, and the interior (floor, walls, ceiling) will be lined with plywood. The space between the plywood and the outer walls (2”) will be filled with crushed stone. The magazines will be vented and will have high-security doors. Two will contain Class 1.1D explosives (boosters) and Class 1.5D (non cap-sensitive product for general blasting). The third magazine will be used to store detonators of Class 1.1B or 1.4. Access to the magazines will be controlled by means of a fence and a locked gate employing controlled, non-replicating keys;

- one 6,000-square-foot pre-engineered ammonium nitrate storage building on a concrete slab. It will not be insulated. It will be equipped with several doors with panic hardware, a large overhead door, ventilation, appropriate lighting and an auger and conveyor for loading ammonium nitrate into the dissolver tanks in the plant building. The conveyor belt will be covered so as to prevent spills of ammonium nitrate or releases to the atmosphere;

- several 20- or 40-foot standard enclosed shipping containers for storing sodium thiocyanate in bags, sodium nitrite in bags, acetic acid in drums, emulsifiers in drums and mineral oil in “cubes”;

- the entire area will be enclosed by a 6- or 8-foot galvanized chain link fence;

- the plant will be equipped with a fire-detection system if required by the regulator, but such a system is not obligatory at the present time. No permanent engineered fire-suppression systems are required in the plant or storage building, but dry chemical fire extinguishers will be placed strategically;
- preliminary calculations suggest that 800 amps at 575 V, three-phase, 60 HZ will be required. There is no plan for an emergency generator.

The access road and the site itself will be graded, ditched on both sides and covered with crushed stone wherever needed.

The principal mobile equipment will be: two process vehicles for manufacturing and delivering emulsion to the sites of blasting, each with a capacity of 20-25 tonnes, mounted on articulated chassis; a Caterpillar 960 or equivalent loader; a small fork lift; and two Ford 150 4x4 pickup trucks or equivalent.

Water will most likely be supplied from a well near Timmins 4.

The facility will be equipped with a septic system, which will be emptied periodically by an approved contractor.

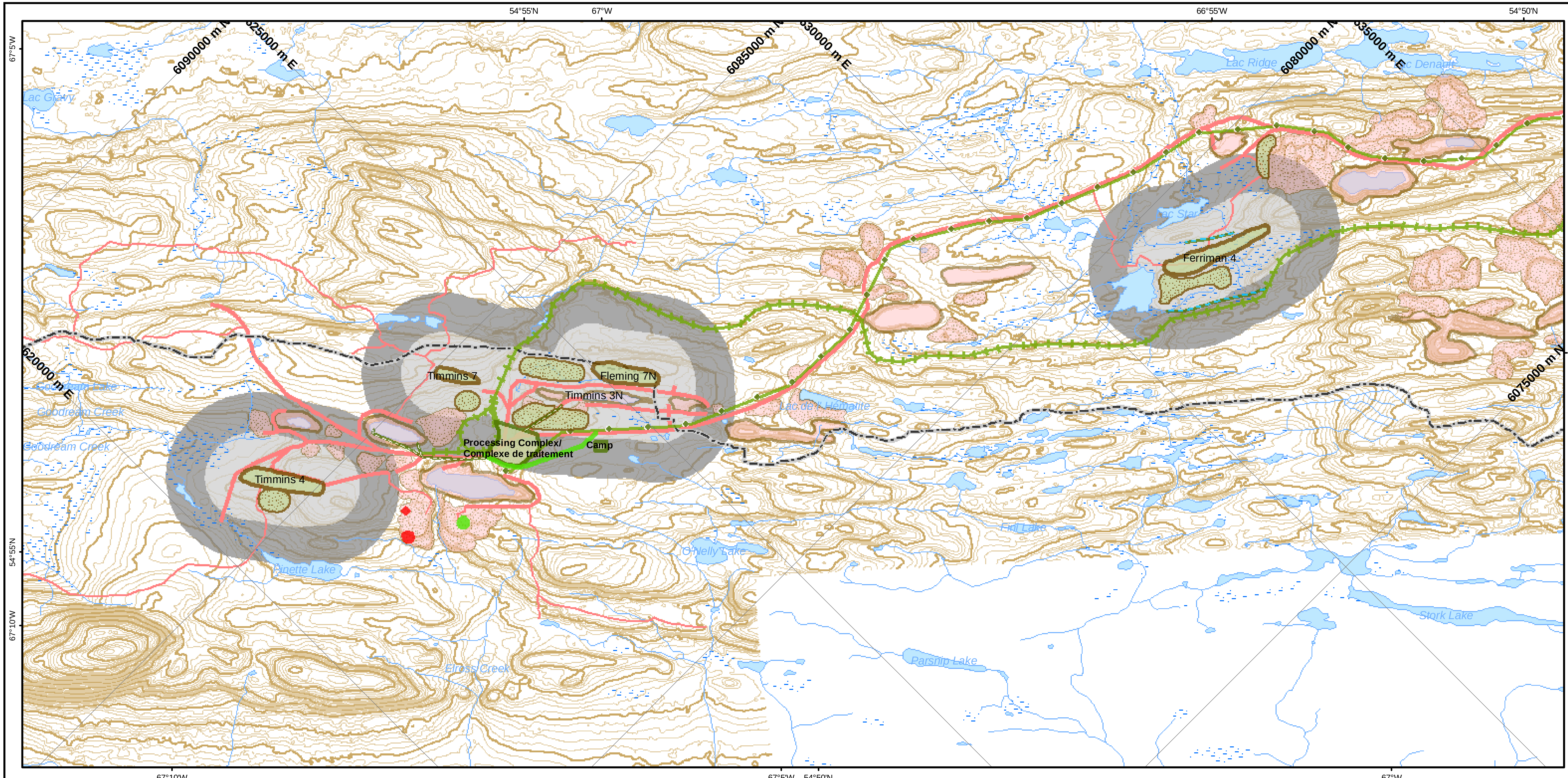
Solid wastes will be disposed of at the authorized site operated by NML.

Site security will be ensured by a fence, a lockable gate, adequate lighting and night surveillance.

Table 4.7 shows the approximate distances between the explosives factory and magazines and certain other infrastructure, all of which are in conformity with the applicable legislation. The explosive emulsion will be manufactured at the site of blasting rather than in the plant, and so the regulatory distances apply only to the magazines, in which explosives will be stored.

Table 4.7: Distances between Explosives Factory and Magazines and Infrastructure

Item	Explosives Factory Distance (m)	Magazines Distance (m)
Transmission line	2040	1900
Railway	1000	800
Dwelling (camp)	2730	1580
Workplace (processing complex)	1760	1610
Fuel bulk storage	1860	1620
Propane bulk storage	2540	2430



LEGEND/LÉGENDE

- Diversion ditch/Fossé de déviation
- Proposed Pipeline/Pipeline proposé
- Relocated access road/Voie d'accès relocalisée
- Ultimate waste dump/Halde ultime de stérile
- Ultimate pit limit/Limite ultime de la fosse
- Infrastructure Footprint/Empreinte de l'infrastructure
- Proposed electrical power line/Ligne de transport d'énergie proposée
- Railway to be reconstructed/Voie ferrée à reconstruire
- Boundary/Frontière: Québec-Labrador
- Existing mine road/Route minière existante
- Existing road/Route existante
- Railroad / Chemin de fer
- Existing waste dump/Halde de stériles existante
- Existing mined-out pit/Fosse existante épuisée
- Blast Perimeter-500 m
- Blast Perimeter-1000 m
- 5-metre contour/Contour 5 mètres
- 25-metre contour/Contour 25 mètres
- Explosives Magazine/Poudrière
- Explosives Factory/Fabrique d'explosifs
- Waste Disposal Site/Site d'enfouissement sanitaire

Safety Perimeter for Blasting
Figure 4.6

0 1 2 4
KILOMETRES/KILOMÈTRES

SCALE/ÉCHELLE:
1:50,000

UTM 19N NAD 83

FILE, VERSION, DATE, AUTHOR/
FICHIER, VERSION, DATE, AUTEUR:
GIS-0103-00 , 2009-07-03 , L.C.

SOURCES:
New Millennium Capital Corp.

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CONFIDENTIEL & PROTÉGÉ COMMERCIALEMENT

NEW MILLENNIUM
CAPITAL CORP.

QC
NL

4.10.5 Mine Sites

The following generic description applies to all of the mine sites.

4.10.5.1 Pit Design

The detailed design of pits took into account the haul road gradient, width and location, the geotechnical pit slope, dilution and mining recovery.

All in-pit roads will be 21 m wide to accommodate 135-tonne off-highway-class rear-dump trucks. This road width, which is three times the width of the trucks that will be used, is sufficient to support the two-way traffic system required to maintain an uninterrupted haulage cycle. Based on hauling experience from other mines operating under similar freezing conditions in winter, the maximum ramp gradient will be 8% for all mine roads. Temporary ramps will be used in the early years of mine operations to shorten haulage distances to the primary mineral sizer or to the waste rock pile. As the pit gets deeper over the years, a final ramp will be used to access the lower ore.

For each deposit, an overall slope angle of 50^{o} for the pit walls was used for the pit design based on experience gained from former iron ore mines in the Schefferville area. Further analysis of pit slope stability will be undertaken to determine whether this is the optimal configuration with respect to rock structures and properties.

4.10.5.2 Surface Water Management

To prevent incursion of surface run-off into the pits, ditches will be built to encircle them and to channel run-off away from the pits towards natural drainage features. Surface run-off will not enter the pit and will not become contaminated, so that redirecting it towards natural drainage will not create any risks for water quality.

4.10.5.3 Site Roads

Mine site roads, or haul roads, to be used by off-highway trucks will be 21 m wide.

4.10.5.4 Ore Storage Areas

No ore will be stockpiled near the pits. The ore will be transported to the processing complex immediately after excavation.

4.10.5.5 Waste Rock Piles and Overburden Piles

Piles will be created for three types of material:

- organic material to be used in site-rehabilitation;
- overburden, containing surface material, some of it for later use in mine reclamation;
- internal waste, containing in-pit materials that are non-economical (≤50%Fe and ≥18%SiO_2).

The tentative locations (Figure 4.3) will be confirmed through condemnation drilling so as to ensure that they do not impede access to economically recoverable ore at any time in the future.

The capacity of the waste rock and overburden piles required for each pit can be inferred from Table 4.6. Some of the waste material will be required to build haul roads and, initially, the access road. The waste rock piles will be progressively rehabilitated as they become inactive. The tops and berms will be prepared progressively for revegetation with indigenous species.

The design parameters for the waste rock piles are as follows:

- face angle of 45º;
- bench height of 18 m;
- berm width of 15 m;
- overall slope of 29°.

4.10.5.6 Electricity Supply

No electricity distribution will be made to the mine sites. There will be no lighting on the haul roads, and lighting of the loading areas will be ensured by the equipment headlights. Provision for five mobile tower lights is made for lighting in the pits during maintenance.

4.10.5.7 Fuel Storage and Refuelling Facilities

There will be no fuel storage or refuelling facility at the mine sites. Auxiliary equipment will be fuelled directly by the mobile fuel truck, while the haul trucks will refuel at the processing complex.

4.10.5.8 Solid Waste Disposal

No solid waste will be disposed of at the mine sites. All solid wastes will be collected in animal-resistant containers. Those containers will be collected by a contractor and disposed of at the planned sanitary landfill described in Section 4.10.4.20.

4.10.5.9 Disposal of Hazardous Materials

No hazardous materials will be generated at the mine sites. All equipment maintenance and repairs will be performed at the maintenance garage located at the processing complex.

4.10.5.10 Potable Water Supply

Bottled potable water will be supplied for use at the mine sites.

4.10.5.11 Sewage Treatment

There will be no need for sewage treatment at the mine sites, since there will be no buildings there. Portable toilets will be provided and will be emptied regularly by a contractor. The contents will be put into the central treatment plant described in Section 4.10.4.18.

4.11 Construction

The following section describes the general construction practices that will be employed and presents insights into some of the major anticipated activities.

4.11.1 General Construction Practices

Construction activities will involve:

- clearing vegetation and felling trees using hand-held equipment;
- grubbing of topsoil and overburden using heavy equipment;
- disposal and storage of soil;
- circulation of heavy machinery;
- drilling and blasting in the processing complex area to prepare foundations;

- transportation of workers;
- excavation for small-diameter water lines;
- concrete production and pouring;
- erection of buildings;
- water supply;
- sewage treatment;
- surface water management.

4.11.1.1 Site Preparation

Site preparation will be required for the processing complex, some of the mine site areas and the sites of pits. It will include clearing vegetation and removing topsoil. Trees of economic value (*e.g.*, for firewood) will be made available to the local First Nations. Topsoil will be removed by machinery and stockpiled in clearly designated areas.

4.11.1.2 Excavation and Fill

During the pre-production period, sufficient waste rock will be mined to build the ROM pad and for other general construction work such as building access roads. Excess waste rock from the pits that cannot be used for roads or general construction work will be disposed of in waste rock piles (Figure 4.3).

Local excavation and fill may be required, as shown in Table 4.8, and fill required has been estimated as follows:

Table 4.8: Volume of Excavated Material and Fill Required

Item	Excavated Material (m^3)	Fill (m^3)
Plant and surge pile foundations and site-levelling	8,500	2,000
Camp foundation	6,000	—
Total	**14,500**	**2,000**

Rock excavation not related to mining activities that is expected to require blasting will be subcontracted. The subcontractors will be responsible for the transportation, handling and safe disposal of spent or unused explosives. No blasting will be carried out in or near waterbodies.

4.11.1.3 Watercourse Crossing Structures

No new watercourse crossing structures will be required in DSO3. All the existing watercourse crossing structures for the railway, the access road and the haul roads have been inspected, and only minor repairs will be required.

4.11.1.4 Stormwater Management

The system of stormwater management described in Sections 4.10.4.10 and 4.10.5.2 will be built early in the preparation/construction phase in order to avoid problems with stormwater at that phase.

4.11.1.5 Erosion and Sedimentation Control

In order to limit erosion, activities related to grubbing/clearing and cut/fill, especially on slopes and along access roads and streams, will be limited to the strict minimum. A 20-m or greater buffer zone of undisturbed vegetation will be kept along streams or wetlands. No ditches will be built within this buffer zone. Excavated material will be stockpiled more than 20 m from any streams.

4.11.1.6 Construction Labour Force

The construction crews will work 10 hours per day, six days per week, on a schedule of 40 consecutive days on site followed by 10 days off.

Appendix 6 presents a breakdown of the 150 jobs that can confidently be assigned NOC codes at the present time. The remaining jobs will belong predominantly or entirely to the same categories.

4.11.2 Transmission Line

Starting from the substation on the northern side of Schefferville, the 69-kV or 34.5-kV (to be determined) electricity transmission line will continue for approximately 18 km in a north-westerly direction to Timmins 1. It will use the existing corridor for the part of the line closest to Timmins (approximately 20% of the corridor) while the rest of the line will generally follow the existing road in order to reduce environmental effects and to facilitate maintenance and repairs.

The overhead transmission line will require approximately 110 wooden poles or pole structures, of which approximately 80 will be single poles and approximately 30 will be two-pole H-frame structures. The height of the pole structures above ground will not be less than 20 m.

Site preparation will include levelling the ground when required. The pole structures will be installed at least 20 m away from the road. A 5-m minimum space on either side of the poles will be cleared of vegetation and will be maintained vegetation-free. The foregoing will be done using hand-held equipment. No chemical products will be used. Trees that might pose a risk of damaging the transmission line will be cut down.

Construction of the transmission line will follow the requirements of DFO (2007a; 2007b).

4.11.3 Railway Line from Mile Post 353 to Timmins 1

The railway track that used to run from Schefferville to Timmins 1 was removed some 25 years ago, but the bed remains in reasonable condition. Sleepers, rails and ballast will be installed early in the preparation/construction phase, so that equipment and materials can be transported by train, thereby limiting movements of vehicles along the main access road.

The reconstruction of the railway line will not require site development, since the line will be reinstalled on the existing bed. Construction will be made according to Canadian railway standards.

All existing stream crossings were inspected in 2008 and only minor repairs will be required (Logan June 2008). Repairs to existing stream crossings will respect the requirements of DFO (2007c).

4.11.4 Roads

As shown in Figure 4.3, existing roads will be reopened and used wherever possible. No new culverts are expected to be required for the existing roads in DSO3.

All roads except for the road from the access road to the workers' camp will be 21 m wide and will be constructed from mine waste covered by 150 mm of borrowed pit-run material, as they all are likely to be used by mining trucks. The road to the camp, which will not be used by mining trucks, will be 12 m wide.

Concerning the access road from Schefferville to Timmins 1, four semi-trailers and four light vehicles, each making several trips per day, will be required, in addition to which there will probably be approximately 20 movements per day by pick-up trucks and other light vehicles.

4.11.5 Processing Complex

The crusher will be pre-assembled in modules and shipped to the site for erection on a concrete pad.

The retaining wall of the dump hopper will be constructed using concrete or the “terre armée” method**.**

Dome-type buildings will be used to house the secondary crushing and screening plant, the wash plant and the product stockpiles adjacent to the rail car loading station. The assembling, construction and erection of the process equipment will be carried out inside the domes.

Generally, all process equipment and electrical control stations will arrive at the site in containers or modules, so as to minimize the size of the related labour force.

4.11.5.1 Electrical Power

Until the new transmission line is operational, electricity will be supplied by portable diesel-powered generators.

4.11.5.2 Camp

The workers’ camp described in Section 4.10.2 will be installed early in the preparation/construction phase. The small number of workers required to assemble it will live in Schefferville for the few weeks of assembly.

4.11.5.3 Sanitary Wastewater

The sanitary wastewater treatment system described in Section 4.10.4.18 will be installed near the workers’ camp early in the preparation/construction phase.

4.11.5.4 Solid Waste Disposal

The sanitary landfill described in Section 4.10.4.20 will be built at the start of the preparation/construction phase.

During the construction period, domestic solid waste generated on the various work sites will be collected in animal-resistant containers, the contents of which will be disposed of by a contractor in the above-cited sanitary landfill.

4.11.5.5 Disposal of Hazardous Materials and Used Tires

Hazardous materials and used tires generated during the preparation/construction phase will be transported to the nearest approved facility, which is located in Sept-Îles.

4.11.6 Mine Sites

No infrastructure will be constructed at the mine sites.

4.12 Operations and Maintenance

4.12.1 Labour Force

It was initially estimated that by Year 3 or 4, the DSOP would employ a total of approximately 190 persons on-site. In addition, it was assumed that contractors, such as the caterer and the supplier of explosives and blasting services, would have a modest number of employees on site. The numbers for the various categories of on-site personnel are given in Table 4.9, and their NOC codes are presented in Appendix 6**.**

There will be two 12-hour shifts per day, seven days per week, 365 days per year. Crews will rotate on a fly-in/fly-out basis. A schedule of two weeks in and two weeks out is anticipated, but this may be amended.

A local transportation operator will be contracted to provide a bus service between Schefferville and the camp for the workers recruited locally.

Table 4.9: Estimated Operations Personnel by Occupation[1]

Occupation	Number
Manager	1
Superintendent	5
Supervisor	7
Foreman	9
Executive secretary	5
Machinery operator	29
Labour	4
Dispatcher	2
Engineer	7
Geologist	4
Technician	33
Chemist	1
Plant worker	16
Plant labour	4
Electrician	10
Plant mechanic	10
Welder	4
Millwright	4
Mechanic	20
Clerk	6
Secretary	2
Security officer	1
Janitor	4

Occupation	Number
Carpenter	-
Steel erector	-
Plumber	-
Unskilled worker	-
Blasting	subcontracted
Camp operation	subcontracted
Ambulance	subcontracted
Total	**188**

[1] Figures not updated to correspond to Table 3.1. Table 3.1 prevails.

4.12.2 Transportation

4.12.2.1 Locomotives and Rolling Stock

NML will lease approximately 520 ore cars and three SD40 or equivalent locomotives, which will be operated by a third party.

4.12.2.2 Frequency of Trains and Dispatching Procedures

Consists of 240 cars will be formed at Timmins 1 and transported by a third party on NML's rebuilt railway to Knob Lake Junction. TSH will transport the trains from there to Emeril/Ross Bay Junction, where they will be transferred to QNS&LR for transportation to Arnaud Junction. Arnaud Railway will then take them to Pointe-Noire.

Empty cars will be returned along the reverse routing, with the exception that because of the gradient, consists along the final leg to Timmins 1 will be only 120 cars.

There will be approximately three ore trains of 240 cars per week, 12 months per year in each direction between Timmins 1 and Pointe-Noire.

4.12.2.3 Fuelling, Repair and Washing Facilities

Fuelling, repairs and washing of NML's rail equipment will be undertaken by the third-party operator.

4.12.2.4 Loading Facility

The rail car loading facility was described in Section 4.10.4.3.

The wagons will be loaded while the train is in motion. The speed of the locomotive will be controlled by its driver, who will receive instructions as to the speed of the train from the operator of the PEBCO system.

The 240-car consists will hold roughly 26,000 tonnes of ore. It will require approximately six hours to load such a train.

Consideration is being given to spraying a dust-abatement product on the SF and SPF in the wagons as the train leaves the loading facility, so as to protect against losses to wind during transportation to Pointe-Noire, which has both environmental and economic effects.

Wagon weights will be taken while empty via transducers in the flange of the approach rail section. These will give axle load readings, which can be translated into an empty wagon weight. The wagon will then be loaded through the PEBCO system with a calculated material weight to comply with acceptable axle loadings on the loaded wagon. The loaded wagon will be weighed again with transducers as it leaves the wagon loading system.

4.12.3 Access Road

The access road from Schefferville to Timmins 1 will be travelled by suppliers of goods and services to the mine and by Project vehicles, such as the buses transporting the local employees.

NML estimates that the Project will generate approximately 20 movements of vehicles along the main access road per day.

Most of the vehicles will be pick-up trucks. The largest vehicles travelling to and from Schefferville will be five-tonne flatbed trucks and the buses transporting the local workers.

The access road will be maintained by NML, using a grader and a haul truck for aggregate. No fugitive dust is expected to be emitted during the winter months. The amount of dust in summer will be reduced as much as possible by the use of a water truck.

The speed limit will probably be 70 km/h.

In Québec, roads maintained by municipalities and those maintained by the ministère des Transports du Québec are under the jurisdiction of the SQ (Filion 2009, *personal communication*). Roads maintained by mining companies are not under the jurisdiction of the SQ. Signage and safety along the Québec portion of the access road will therefore be the responsibility of NML. NML assumes that the same will be true for the portion of the access road located in the PNL.

4.12.4 Site Roads

The ore mined from the various pits will be hauled to the processing complex primary crusher located at a distance varying between 2 and 12 km (12 km is for the Ferriman 4 ore body). The crusher was located in as central a location as possible in order to minimize haulage costs and to keep the size of the truck fleet to a minimum. Normally, the fleet of four trucks will operate 17 hours per day and will deliver four to five loads of 135 tonnes of ore per hour to the crusher.

As for the waste rock, NML will operate two or three pits at once for ore-blending purposes. It is expected, therefore, that no more than two loads of waste rock per hour will be dumped on the same waste rock pile.

The roads will need to be maintained in top-notch condition to achieve the targeted production at the lowest possible repair and maintenance costs for the trucks. In view of this, a grader will be assigned to road grooming 24 hours/day. A water truck will spray the roads whenever necessary, in order to keep the dust down, thereby allowing the drivers good visibility to maintain an acceptable speed.

The haul roads will have proper drainage and a 2% crown plus a berm on the sides.

The haul roads (excluding the main access road) and the roads to the waste rock piles will not be open to the public during periods of active mining at the sites in question.

4.12.5 Maintenance Garage

The maintenance garage will be used to repair and maintain the fleet of heavy equipment and vehicles.

Lubricant dispenser systems will be used to collect, track and control the replacement of oil, grease and other lubricants.

Waste oils will be put into clearly-identified containers, which will be collected regularly by a licensed contractor and shipped to Sept-Îles for disposal.

4.12.6 Processing Complex

4.12.6.1 Effluent

The tailings, the only effluent that will be generated by the processing, will contain approximately 50% solids. An estimated 100 tph of solids and approximately 100 m^3/h of water will be generated, creating approximately 200 tph of tailings. The particles will range from 1 mm to less than 10 microns. The tailings will be sent by pipeline to Timmins 2, where the solids will settle to the bottom and the supernatant water will be reclaimed for reuse in the processing complex. No effluent will be released to the receiving environment.

Timmins 2 will be considered to be full when the tailings reach 5 m from the lip. At that time, the angle of the slope from the lip to the surface of the tailings will be reduced, so that caribou in particular do not risk killing or injuring themselves seriously by falling in and not being able to escape. By the time that Timmins 2 is full, space will have become available in other mined-out pits, including Timmins 3N, Timmins 7 or Fleming 7N, that do not contain fish.

The feasibility study report will include a water balance and tailings deposition programme and will predict the number of years that Timmins 2 will be used before switching to another mined-out area.

The sewage wastewater produced in each building in the processing complex will be held in tanks. These tanks will be emptied regularly by vacuum trucks. The sewage will be treated in the facility described in Section 4.10.4.18. The effluent will be sent to Timmins 2 via the tailings pipeline.

4.12.6.2 Acid Rock Drainage

Several waste rock and ore samples (Blue, Yellow and Red) from DSO2, DSO3 and DSO4 were analyzed for sulfur as a first indication of the potential for acid generation. Table 4.10 shows that the sulfur content is consistently below the value of 0.03% that is recognized as the threshold value for further characterization methods for acid rock drainage. It is therefore unlikely that the waste rock and ore from DSO2, DSO3 or DSO4 will generate ARD.

Iron ore was mined in the area for several decades and, as indicated in the Project Registration (NML April 29, 2008), water sampling programmes conducted in 2005 and 2006 in the area formerly mined indicated that the physical parameters measured (including dissolved oxygen, temperature, pH, conductivity and TDS) were consistent with good water quality in such environments.

Recently published results (LIM December 19, 2008) regarding potential acid rock drainage in the area seem to confirm the above-mentioned results. Static ARD testwork was performed on seven samples, all of which yielded a Neutralizing Potential / Acid Potential ratio ranging from 37 to 44. A ratio below 3 is considered to indicate a potential to generate ARD. Since all the samples were well above the threshold value of 3 they can be considered to be non-generating of ARD.

4.12.6.3 Atmospheric Emissions

Atmospheric emissions are described in Section 8.1.1.

Table 4.10: Sulfur Content of Selected Waste Rock and Ore Samples

Area	Deposit	Sample No.	Hole No.	From (m)	To (m)	Interval (m)	Sulphur (%)	Rock Unit	North (UTM)	East (UTM)	Elevation (m)
2	Ferriman 4	1567	08FE4005RC	13.5	16.5	3.0	<0.01	SWCIF/Ore	6079190	634223	574.5
2	Ferriman 4	3005	08FE4008RC	13.5	16.5	3.0	<0.01	RF/Ore	6078988	631529	572.0
2	Ferriman 4	1593	08FE4006RC	34.5	37.5	3.0	<0.01	RF/W	6079222	631249	573.4
3	Fleming 7N	2689	08FL7009RC	12.2	15.2	3.0	<0.01	MIF/Ore	6083026	625374	745.3
3	Fleming 7N	2967	08FL7015RC	24.4	27.4	3.0	<0.01	RF/Ore	6083387	625165	742.4
3	Fleming 7N	2975	08FL7015RC	48.8	51.8	3.0	<0.01	RF/W	6083387	625165	742.4
3	Timmins 3N	1465	08T13008RC	22.56	25.5	3.0	<0.01	MIF/Ore	6083798	624342	695.0
3	Timmins 4	5620	08T4008RC	16.5	19.5	3.0	<0.01	MIF/Ore	6085240	621268	703.7
3	Timmins 4	5628	08T4008RC	40.5	43.5	3.0	<0.01	LIF/W	6085240	621268	703.7
3	Timmins 7	1234	08T17011RC	13.5	16.5	3.0	<0.01	MIF/Ore	6084760	623689	708.8
3	Timmins 7	1241	08T17011RC	34.5	37.5	3.0	<0.01	MIF/W	6084760	623689	708.8
4	Goodwood	4581	08GD1008RC	36.6	39.6	3.0	<0.01	SWCIF/Ore	6107331	605199	765.2
4	Goodwood	4622	08GD1010RC	15.2	18.3	3.1	<0.01	MIF/Ore	6107176	605132	752.6
4	Goodwood	4966	08GD1017RC	54.9	57.9	3.0	<0.01	MIF/W	6107166	605343	761.5

4.12.6.4 Chemical Management

At the present stage of planning, NML cannot make categorical statements concerning the types and quantities of chemicals that it will use. The present section therefore presents a worst-case scenario. It does not include the chemicals that will be used to manufacture explosives, since explosives factories and magazines are under federal jurisdiction. The potential effects of those facilities will be addressed in a screening study report that will be submitted to the GoC.

The chemicals that may be used can be divided into four groups according to the purpose that they would serve, as follows:

- materials handling;
- ore-dewatering;
- dust-prevention during ore-transportation;
- flotation.

NML does not plan to use herbicides in the right-of-way of the electricity transmission line or pesticides to control insects.

Except where otherwise noted, chemicals will be stored in the approved containers in which they were transported by the manufacturers or the suppliers.

Materials Handling

After the ROM is crushed, a solution of calcium chloride may be sprayed on it at the discharge of the stacker conveyor when the secondary crusher is in operation to prevent freezing and to ensure that the material flows properly in the reclaim feeders, which move the crushed ore by conveyor to the secondary crushers. A typical dosage would be 250 L/h of solution at 30% concentration.

Calcium chloride could also be used in a spray to coat the inside of the ore cars in winter to facilitate the dumping of the ore on its arrival at Pointe-Noire. The spray would be at a 30% concentration. The dosage would be approximately 0.2 L/t, yielding a total annual consumption of 800,000 L for 4 Mt of DSO product.

Given that NML will dry the DSO product to 2% moisture, calcium chloride may not be used.

The calcium chloride 30% solution would be delivered to the processing complex by rail in tanker cars holding 100,000 L (roughly eight per year). The solution would probably be pumped directly from the tanker cars.

The CAS numbers for the calcium chloride product likely to be used are: 10043-52-4; 7447-40-7; 7647-14-5; 7732-18-5.

Ore-dewatering

Dewatering the ore may require the use of a flocculant and a surfactant.

The flocculant would be used in the thickeners to improve the settling rate of particles of iron. Thickeners are used to remove water by letting the particles in a solution settle, such that the excess water can be recovered at the surface. The process would take place in a large tank that would be equipped with a rake that would force the particles that settle towards a discharge in the centre of its base.

A surfactant could be used to reduce the surface tension of the water in the above tank, thereby improving the filtration process. One possible surfactant is Plurafac 120, which has good degradation properties. The maximum quantity that might be used would be 100 g/t. If NML uses a surfactant, it will recycle the filtrate so as to reduce the quantity consumed and the volume discharged into Timmins 2.

The CAS numbers of one potential surfactant are: 151789-07-0; 151789-06-09; 68526-86-3.

Dust-prevention during Ore-transportation

Various types of polymer can be sprayed onto the DSO product after it has been loaded into rail cars in order to prevent losses to wind during transportation to Pointe-Noire. The approximate quantity would be one litre per rail car, yielding a total of approximately 23,000 L if it is used only in summer and approximately 37,000 L if it is used year-round.

Flotation

Flotation has not been tested on NML's DSO products. It is possible that flotation will be needed for the SPF so as to improve its quality by removing silica and aluminium.

Assuming a similar process and reagent dosage to those used in flotation for other iron ores, use of the following reagents can be anticipated:

- caustic starch, used as a depressant to inhibit iron-bearing minerals from floating. Annual consumption would be approximately 125 t. The CAS number of caustic starch is 9004-53-9;
- quicklime, to increase the pH of the slurry to approximately 10.0, which increases the efficiency of the flotation process. Annual consumption would be approximately 250 t. The CAS numbers for a high calcium quicklime are: 1305-78-8; 14808-60-7;
- amine DA-16, which is the collector used to cause the silicon to float by adhering to it. The annual consumption would be approximately 125 t, since only 0.5 Mt/y of SPF will be produced;
- methyl isobutyl carbinol, which is an alcohol-based frother. If an amine is used, however, it is unlikely to be required, as the amine has sufficient frothing properties. The CAS number of MIBC is 108-11-2.

Given that any of the foregoing chemicals that will be used will be released only into Timmins 2 as part of the slurry or process water, they do not pose any risk to the environment. In any case, the amine is normally adsorbed on the solids and is not available for release, since it is not water-soluble. Quicklime and starch are not toxic, and MIBC decomposes rapidly.

Dust-suppression on Roads

A 30% solution of calcium chloride will be used in addition to spraying water to suppress dust on the roads between the middle of May and the end of August. It will be sprayed at the rate of 1,000 L/km. The total estimated annual consumption will therefore be of the order of 50,000 L. The CAS numbers are presented above.

Appendix 7 presents technical information on each of the chemical products that may be used, including the measures to be implemented in the event of an accidental release.

4.12.7 Mine Sites

4.12.7.1 Disposal of Waste Rock

As indicated in Figure 4.3, waste rock piles will be located near the pits in order to limit haulage distances.

The piles will have perimeter ditches to direct run-off to catchment basins, where suspended solids will settle. The waste rock benches will have a slope gradient away from the dumping face to prevent rainwater from running over the edge of the pile, so as to limit erosion of the dump face.

4.12.7.2 Dewatering

Dewatering is described and discussed in detail in Section 8.1.4 and in Appendix E. It will probably have to begin during the pre-production phase, because of the time that it takes to lower the water table to the required level.

A hydrogeological study was conducted in the fall of 2008 in DSO2 (Envir-Eau March 2009) (Appendix E). It included a literature review of DSO3. The pumping rate for Ferriman 4 was estimated at 46,000 m^3/d (32 m^3/min). It is likely that the pumping requirement will be lower in DSO3, possibly closer to 15 m^3/min. It will be met by several pumps.

The water pumped from the dewatering wells at DSO3 (except that to be used at the processing complex) will be pumped to Timmins 2, with the exception of that from Timmins 4, which will be disposed of in the abandoned Timmins 6 pit, which does not have an outflow or an inflow and cannot therefore be fish habitat. The foregoing strategy means that the water pumped to dewater the pits will always remain in its original drainage basin, so that the overall water balance in each drainage basin will not be affected.

Water that collects at the bottom of the pits in the sump will be pumped back to the surface and will be directed to Timmins 2 or, in the case of sump water from Timmins 4, to the abandoned Timmins 6 pit.

4.12.7.3 Blasting

The oxidizer solution, which consists mainly of ammonium nitrate dissolved in water, will be prepared more or less daily at the factory. Water consumption will average approximately 20,000 L/day. Only about 4,000 L/day will be disposed of in Timmins 2, since the balance will be in the emulsion introduced into the blast holes.

All of the raw materials will be transported from their place of manufacture or purchase to the rail head at Timmins by an appropriate combination of road and rail. They will then be trucked from the rail head at Timmins to the explosives factory/magazines.

The bulk emulsion will be manufactured on site. The product will have no solid ammonium nitrate. Rather, the ammonium nitrate will be in a solution. That will eliminate the use of solid prill on the bench or in the boreholes, thereby reducing the potential for contaminating the groundwater with nitrates.

The explosives will not be manufactured at the plant site and transported to the bench. Instead, the heated ammonium nitrate solution and other raw materials will be transported to the bench, where a specialized mixing/pumping system will combine them to manufacture the explosive mixture.

The mixture will not become explosive until gassing occurs in the borehole **[Email to NHR 26/10/09 requests explanation]**. That technology enables the use of variable densities of explosives, which makes it possible to optimize blasting results. More specifically, energy can be concentrated in the “toe”, which yields uniform fragmentation and smoother floors. Moreover, the product displaces water in boreholes.

Both ore and waste rock will need drilling and blasting. Blasts will be designed so as to minimize the use of explosives and to maximize the volume of blasted rock. Both ore and waste will be drilled using 9⅞” (250 mm) diameter boreholes with an average drilling pattern of 26' x 26' (8.0 m x 8.0 m), which may vary slightly according to the rock formation, the geological structure and the direction of blasting. Drilling will be done on a 38' (12 m) bench height and 6' (2.0 m) sub-drilling for minimum high spots between boreholes on the bench floor.

Blasting will occur twice weekly. Charges will be set sequentially so as to reduce dust emissions. Blasting will be executed under contract by the explosives supplier. The contractor will not only provide all the blasting materials, but will also load the boreholes.

Preliminary blasting simulations and fragmentation analysis indicate that an average powder factor of 0.18 kg/t for ore and waste will achieve a fragmentation that is suitable for the size of front-end loaders selected. If, however, experience warrants, the powder factor will be adjusted on the basis of rock formation and hardness.

The blasting management programme will include the following measures:

- pit water will be discharged to abandoned pits to ensure that it does not enter natural waterbodies, especially fish habitat;
- ensure that the manufacturer's spill containment and clean-up recommendations are followed;
- ensure that a proper blasting pattern is designed and used to minimize the use of explosives;
- only properly trained personnel will be allowed to handle explosives.

Two diesel-driven drills will be required to achieve the required production. They will be equipped with a dust-collecting system.

Appendix 8.2 reproduces the blasting protocol that will be followed.

4.12.7.4 Mineral Loading and Truck Transportation

Ore will be transported to the processing complex and waste rock to the waste rock piles by a fleet of 135-tonne trucks. The trucks will be loaded by wheeled diesel-powered front-end loaders (10 m^3). An estimated four 135-tonne trucks and two front-end loaders will be required.

Normally, the processing complex will be fed at a rate of four to five trucks per hour coming from two or three pits in order to meet the ore blend required by the plant design. It is not possible to predict at this time the daily production from each pit. When only one pit is in operation, one ore truck will enter it approximately every 15 minutes, and one truck hauling waste will enter approximately every 20 minutes. Those trucks will leave some few minutes later. When two pits are in operation, the frequency of truck movements will be halved so as to provide a constant supply of ore at the processing complex. There will be further proportionate declines for every additional pit that is in operation.

Fugitive dust generated during loading and hauling will be controlled by spraying water.

4.12.7.5 Auxiliary Equipment

To minimize spares, mobile equipment to service the processing complex and camp will be standardized with that for the mine whenever possible.

To maintain the haul roads, two graders will be required together with one of the haul trucks that will be loaded at the aggregate crushing and screening plant by a front-end loader. It is currently anticipated that the existing Gagnon quarry, in Québec (66.908504W; 54.827285N), will be used.

The access road from Schefferville to Timmins 1 will be maintained with one grader and one haul truck.

Two small front-end loaders with quick-coupling buckets, forks and jib booms will be used at the aggregate plant and around the workshops, warehouse, mineral sizer and processing complex.

One wheeled bulldozer and two tracked bulldozers will be required for bench preparation and waste rock pile maintenance.

For the maintenance and overhaul of front-end loaders and drills, a 90-tonne hydraulic-boom truck-mounted crane will be used. The same equipment will be used at the mineral sizer and processing complex for conveyor belt replacement and maintenance of the plant feed system.

To unload merchandise from rail cars, one 10-tonne fork lift and one 25-tonne hydraulic-boom truck-mounted crane will be used.

There will be one fuel truck, one water truck, one lube truck, one welding truck, one fully-equipped fire tender and one ambulance.

4.12.8 Schefferville Railway Station

Once the railway line from M353 to Timmins 1 is in operation, scheduled early in the preparation/construction phase, all bulk supplies, such as vehicles, heavy equipment, petroleum products and explosives, and most construction and other supplies will go directly to Timmins 1.

A preliminary estimate is that NML will transport two tonnes of freight per week on the two trains operated by TSH.

It is possible that some of NML’s employees, especially those recruited in Labrador West, will travel by train at the start and the end of their work rotations.

4.12.9 Schefferville Airport

The majority of NML’s non-local employees will commute by air at the start and the end of their work rotations.

Virtually without exception, NML’s visitors will travel by air.

Assuming a two-week rotation, there will be on average approximately 60 site workers and 10 other passengers per week during the operations phase and roughly 100 per week during the preparation/construction phase.

In emergency situations, NML will undoubtedly transport small quantities of freight by air.

NML anticipates using scheduled flights, which, it recognizes, will require a change in the current frequency and, probably, in the type of aircraft used.

4.13 Abandonment

A rehabilitation and closure plan will be prepared in conformity with the regulations of the GNL. It will be submitted before the start of operations, and scheduled updates will be submitted as required.

The plan (see Appendix 8) will address those of the following activities that are applicable, as stipulated in the "Guidelines to the Mining Act" (GNL 2009f, Internet site):

- a rehabilitation plan for all waste rock areas and ore stockpile areas;
- a description of the removal from the site of all surface pipelines and buried pipelines unless approval has been given by the minister for those pipelines to remain;
- the removal of all power transmission lines, poles, substations, transformers and associated electrical infrastructure, unless approval has been given by the minister for the electrical infrastructure to remain;
- the removal of all buildings, and other structures, including their foundations, unless approval has been given by the minister for those structures to remain;
- the rehabilitation of all open pits or quarries to the satisfaction of the minister, considering the following factors:
    - the dimensions of the pit;
    - the nature of the rock;
    - the stability of the rock;
    - the surrounding topography;
    - the surrounding land use;
    - proximity to residential or recreational areas;
    - the disposition of waste rock extracted from the open pit;
    - water elevations and groundwater characteristics;
- an assessment of surface excavations and stockpiles to determine their long-term stability;
- a description of all stockpile material, such as overburden, till and topsoil, for use during progressive rehabilitation or final rehabilitation and closure;
- a description of the reclaim method for all roadways, airstrips and other civil engineering works to the satisfaction of the minister;
- the removal of all machinery, equipment and storage tanks, unless approval has been given by the minister for those items to remain;
- the rehabilitation of all landfill sites and other waste management areas;
- a description of any other work necessary for final rehabilitation and closure.

Wherever practicable, rehabilitation will be carried out on a progressive basis.

The plans will also address monitoring and emergency measures in the event of accidents during or after site rehabilitation.

Planned rehabilitation and closure activities include the revegetation of the tops and berms of the waste rock piles and the revegetation of the topsoil/overburden disposal areas. Whenever possible, diverted streams will be rerouted to their original courses.

Preliminary indications are that the potential of tailings, waste rock and overburden to produce ARD is non-existent.

A literature review and, if appropriate, field tests will be conducted to determine which plant species are the most suitable for use in revegetation.

A financial assurance is also required as part of the rehabilitation and closure plan. A financial assurance proposal will be submitted to the GNL pursuant to the relevant regulatory requirements.

The rehabilitation and reclamation plan will be implemented only for infrastructure and sites that will not be used or occupied during Phase 2 of the DSOP. The balance of the plan will be implemented at the end of Phase 2.

4.13.1 Issues Requiring Consideration

Given the expectation that Phase 2 of the DSOP will follow Phase 1 and will use the major infrastructure constructed for Phase 1 (processing complex and related facilities, workers' camp, access road, reconstructed railway, rebuilt transmission line, tailings disposal system), the abandonment of Phase 1 raises no special issues other than the implementation of the rehabilitation and closure plan and the associated monitoring and site maintenance.

4.14 Production of CO_2

Table 4.11 shows that the ELAIOM will produce on average approximately 37,000 tonnes of CO_2 annually.

Table 4.11: Production of CO_2

	Average Annual Fuel (L)	Total Annual CO_2 Production (t)
Rail	382,255	1,061
Mining	3,914,352	10,865
Auxiliary Equipment	929,195	2,579
Small Vehicles	208,000	577
Drilling	301,596	837
Mega Dome Heating	188,624	524
Fluid Bed Dryer	6,251,379	17,351
Power Plant	985,500	2735
Total	**13,160,901**	**36,529**

5.0 RECEIVING ENVIRONMENT

5.1 Study Areas and Effect Assessment Areas

5.1.1 Biophysical

It is essential to define the limits of the BLSA and the BRSA prior to undertaking the study of the biophysical components of the receiving environment. This method allows for the definition of the study area for each component of the biophysical environment according to the spatial extent of the Project's anticipated effects. The definition of study areas also allows for research and survey work to be adjusted according to the sensitivity of the component. Table 5.1 describes the BLSA and the BRSA identified for each biophysical component. It also presents summary justifications for the selection of those areas. A detailed justification for each study area is presented in the corresponding section describing the receiving environment. The maps illustrating the limits of the various BLSAs and BRSAs are presented in the sections discussing the various components.

Table 5.1: Description of the Biophysical Local Study Area and the Biophysical Regional Study Area

Components	BLSA for DSO3 and Silver Yards	BRSA	Justification
Atmosphere (air quality and noise)	Area of 600 km^2 defined in section 8.1.1.3	North-eastern Québec-Labrador	Local: Modelling carried out for projects similar to ELAIOM confirmed that dust emissions, the most important effect on air quality, are most often limited to a 10-km radius. Regional: Gaseous contaminants can travel over long distances.
Water	Elross/Goodream streams (DSO3) and Bean Lake (Silver Yards) watersheds	Howells River watershed	Local: Direct effects will be confined to watersheds within which the Project is located. Regional: Before the downstream end of the Howells River watershed, dilution will be several times higher than 250.
Geology	DSO3 sector	Labrador Trough	Local: Direct effect on geology is limited to the sector to be mined. Regional: The Labrador Trough was selected as the BRSA because several other mining projects are proposed there and the geology is similar.
Physiography and geomorphology	DSO3/Silver Yards sectors and adjacent surficial deposits	North-eastern Québec-Labrador	Local: The only surficial deposits that will be affected are those of the DSO3 and Silver Yards sectors. Regional: North-eastern Québec-Labrador was selected as the BRSA because it has a similar geomorphology.
Quality of soils and deposits	Elross/Goodream streams (DSO3) and	Labrador Trough	Local: Any contamination of soils and sediments will be confined to the

Components	BLSA for DSO3 and Silver Yards	BRSA	Justification
	Bean Lake (Silver Yards) watersheds		watersheds within which the Project is located. Regional: The Labrador Trough was selected as the BRSA because several other mining projects are proposed there.
Terrestrial ecosystems	DSO3/Silver Yards sectors and adjacent ecosystems	High Subarctic Tundra and Mid Subarctic Forest ecozones	Local: The terrestrial ecosystems of DSO3, particularly wetlands, will be directly affected by the Project infrastructure. Regional: Biogeoclimatic limits of ecoregions.
Caribou of sedentary ecotype	50-km radius surrounding DSO3/Silver Yards sectors	Eastern Québec and Labrador territory occupied by caribou of sedentary ecotype	Local: Caribou of the sedentary ecotype being very sensitive to human activity, the 50-km radius selected corresponds to the potential disturbance zone (explanations in Section 5.4.3.1). Regional: Corresponds to the territory occupied by sedentary-ecotype caribou that could potentially be affected by the Project.
Caribou of migratory ecotype	20-km radius surrounding DSO3/Silver Yards sectors	Québec-Labrador Peninsula	Local: Caribou being a species sensitive to human activity, the selected radius of 20 km corresponds to the potential disturbance zone (explanations in Section 5.4.3.1). Regional: Corresponds to the range of migratory caribou.
Other large mammals	20-km radius surrounding DSO3/Silver Yards areas	100-km radius surrounding DSO3 sector	Local: Black bear can travel several km per day. Regional: A 100-km radius was deemed sufficient, since it corresponds to the limit of the Project's zone of influence on large mammals (explanations in Section 5.4.3.2).
Furbearers	DSO3/Silver Yards sectors	5-km radius surrounding DSO3/Silver Yards sectors	Local: Corresponds to sectors that will likely be directly affected by disturbances associated with Project activities. Regional: It is unlikely that the Project will affect furbearers living more than 5 km from the DSO3 and Silver Yards sectors.
Other small mammals	DSO3/Silver Yards sectors	5-km radius surrounding DSO3/Silver Yards sectors	Local: Corresponds to sectors that will likely be directly affected by disturbances associated with Project activities. Regional: It is unlikely that the Project

Components	BLSA for DSO3 and Silver Yards	BRSA	Justification
			will affect small mammals living more than 5 km from the DSO3 and Silver Yards sectors (explanations in Section 5.4.3.3).
Micromammals	DSO3/Silver Yards sectors	n/a	Local: The ranges of micromammals are limited to between 0.5 and 2.0 ha, corresponding to the DSO3 and Silver Yards sectors (explanations in Section 5.4.3.4). Regional: No need to define a BRSA; micromammals do not move outside the mining operations sectors.
Chiropters	DSO3/Silver Yards sectors	Howells River valley	Local: Corresponds to sectors that will likely be directly affected by disturbances associated with Project activities. Regional: Corresponds to the only habitat located close by.
Herpetofauna	DSO3 wetlands and Elross Creek watershed	5-km radius surrounding the DSO3/Silver Yards sectors	Local: Local effects will be confined to the watersheds within which the Project will take place. Regional: It is unlikely that the Project will affect herpetofauna living more than 5 km from DSO3/Silver Yards.
Insects	DSO3/Silver Yards sectors	Labrador	Local: The range of insects is local and highly specific. Regional: Region where similar insect habitats are found.
Avifauna	1-km radius surrounding DSO3/Silver Yards sectors	10-km radius surrounding the Project area	Local: Corresponds to sectors potentially directly affected by disturbances associated with Project activities. Regional: The species disturbed in the DSO3 sector will have to move to other areas. They could move within the DSO3 and Silver Yards sectors or over distances of up to 10 km, which corresponds to the range of the Golden eagle (the species with the largest home range living in Canada (MRNF 2007, Internet site)).
Fish	Elross/Goodream streams (DSO3) and Bean Lake (Silver Yards) watersheds	Howells River watershed	Local: Fish populations that may be directly affected by the Project are confined to the watersheds within which the Project takes place. Regional: Elross and Goodream streams flow into the Howells River.

5.1.2 Socio-economic

Figures 2.2 and 2.3 describe respectively the Local Socio-Economic Area and the Regional Socio-Economic Area.

The LSEA and the RSEA are the areas for which baseline data were collected to describe the socio-economic receiving environment and within which, for the sake of clarity and uniformity, effects were analyzed, even though their boundaries may not in every case coincide precisely with the limits of those effects. The RSEA also played the role of situating data from the LSEA and the findings applying to it in a broader context.

5.2 Prior Developments

During the 1970s, the IOCC operated several mines in DSO3.

The active mines were as follows (Figure 5.1):

- Retty Mine (Fleming 5), which included a crusher/screening plant, was located near the south end of DSO3. A spur line connected it to the main railway system;
- Fleming 3 Mine was located 2.5 km west of the Retty screening plant. The ore from this deposit was shipped to the Retty plant;
- Timmins 2 Mine: ore from this long deposit was shipped to the Timmins 1 screening plant;
- Timmins 1 Mine: this deposit, which included a screening plant, was mined out by the mid 1970s. At about that time, deposits such as Timmins 6 and Timmins 3 were brought into production. Timmins 4, Timmins 7 and Fleming 7S were stripped of overburden and readied for production. Access roads to Retty, Fleming 3, Timmins 3N, Fleming 7N and Timmins 4 were also built. Subsequent to the closure of the IOCC's operations, the two screening plants and the other mine facilities were dismantled and removed. The access roads to the mined-out pits were blocked. The transmission lines and the poles were removed. The railway line and the ties were removed, but the rail bed exists and is still in good condition.


Mines Operated by IOCC before 1982
Mines exploitées par IOCC avant 1982
FILE, VERSION, DATE, AUTHOR / FICHIER, VERSION, DATE, AUTEUR:
GIS-0088-00 , 2009-03-16 , S.D.
SOURCES:
New Millennium (aerial photography)
Figure 5.1
SCALE/ÉCHELLE:
1:30,000
KILOMETRES/KILOMÈTRES
UTM 19N NAD 83
LEGEND/LÉGENDE
Boundary/Frontière: Québec-Labrador
QC
NL
QUÉBEC
LABRADOR
Knox (Fleming 8)
Fleming 3
Timmins 3S
Timmins 3 north
Timmins 1
Timmins 2
Timmins 6
Pinette Lake

5.3 Physical Environment – Regional and Local Study Areas

Some descriptions of the methods used to collect the data presented in Sections 5.3 and 5.4 are presented in those sections. More detailed descriptions can be found in Appendix 9 and in Appendices A, E, F, G and H.

5.3.1 Background Studies

5.3.2 Atmosphere

The climate of central Ungava has been classified as humid micro-thermal under the Koppen-Gieger system (Pollard 2005). The growing season is very short, and precipitation moderate.

The analyses that follow are based on the 1971-2000 monthly climate normals from the Schefferville A meteorological station (no 7117825), the details of which are shown in Appendix 10, which also contains the relevant data for Churchill Falls. The analysis of extremes is, however, based on the complete operational period, which began in 1948.

5.3.2.1 Temperature

Long-term records indicate a mean annual air temperature of -5.3°C for the Schefferville town site at 522 m asl, but tundra ridge areas have been documented to have mean annual air temperatures as low as -7°C (Pollard 2005). The seasonal pattern of air temperature is typically continental and is characterized by dramatic extremes, with minima as low as -50.6°C and maxima above 34.3°C. On average, the first day of frost is September 11, and the last is June 13, which yields 92 frost-free days (Cournoyer *et al.* 2007).

Detailed analysis of data from a meteorological station operated for five years on the Timmins 4 site at an elevation of 782 m asl demonstrated a mean annual temperature there of -6.2°C (Nicholson and Lewis 1976).

5.3.2.2 Precipitation

Amount

Based on long-term data, the annual precipitation is 823 mm. Its monthly distribution is roughly skewed, with a peak in July. This zone, like others along the western boundary, is among the driest in Labrador. A little over one-half of precipitation falls as snow, the average thickness of which is 71 cm in March. There are 216 days with precipitation in one form or another.

Chemistry

Few atmospheric substances are monitored regularly or nationally, except for acid precipitation in eastern Canada. The evolution of the spatial distribution of SO_2^{-4} or NO^{-3} between 1990 and 2000 shows that this form of pollution is not an issue in the BRSA (Environnement Canada 2004).

5.3.2.3 Wind

Wind speed, with a mean value of 16.5 km/h, varies little from month to month. The most frequent direction of the wind is north-west. Maximum gusts have attained

153 km/h in December, while a sustained wind speed of 97 km/h was recorded for one hour in June (Environnement Canada 2004).

5.3.2.4 Ambient Noise Level

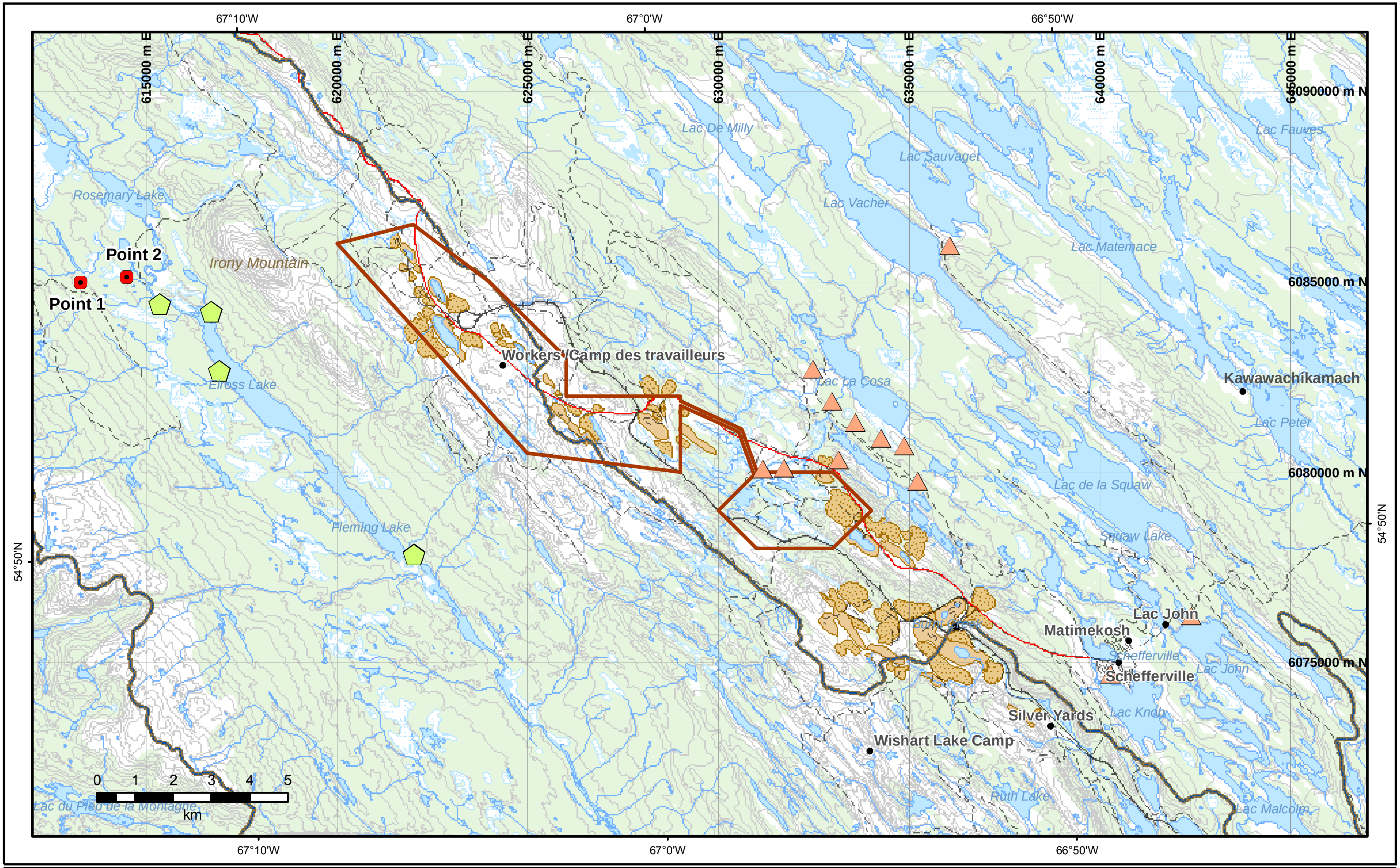
The ambient noise level measurements taken by Tecsult in October 2006 within the framework of the LIOP at the Howells River site were used to describe the ambient noise levels prior to implementation of the ELAIOM. The measurements taken at the Howells River site were collected at three stations, two of which can be considered as representative of the study area, since, like the ELAIOM, they are within the MSF and the HST zones. The location of these two stations is shown on Figure 5.2. Since the third station was located near a river, the noise level measurements obtained there are not considered to be representative of the background noise level of the ELAIOM, where there are no watercourses.

At the Howells River site, noise was measured using a Type-2 sound level meter (TES-1358), as prescribed in Publication 651 *Electroacoustics – Sound Level Meters* (1979) of the International Electrotechnical Commission. The TES-1358 sound level meter measures the acoustic pressure levels (in decibels) every second. It was calibrated on May 4, 2006. It was operated in slow mode with A frequency weighting for measurements in dBA. In addition, calibration checks were carried out before and after the measurements with a 4230 sound level acoustic calibrator according to recognized standards.

The noise measurements were taken outdoors. The microphone was placed at a height of 1.2 m above ground level, and at a good distance from obstacles and the vehicular traffic corridor.

Table 5.2 shows the results of the ambient noise level measurements obtained at the two representative measurement stations, during two periods (day time and night time). It also shows the noise levels that were equalled or exceeded 1%, 95% and 99% of the time, as well as the equivalent values over the measuring period of one hour. The L95 values represent the background noise.

The measured noise levels varied from 36.3 dBA (night time) to 39.7 dBA (day time). Those sound intensities reflect local activities, such as the passage of an airplane, a helicopter and a few trucks in the vicinity, as well as the presence of birds. Background noises (L95) measured between 33.0 and 36 dBA.



LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Noise measurement point/ point de mesure de bruit
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ Récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

Locations of Baseline Measurements of Ambient Noise

Localisation des points de mesure du bruit ambiant

SCALE/ÉCHELLE: 1:140 000

N

UTM 19N NAD 83

SOURCES:

NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-04-22

Figure 5.2

LOCATION/LOCALISATION

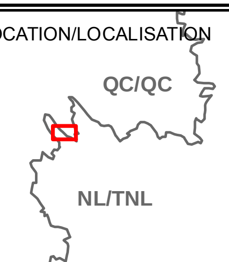


Table 5.2: Results of Ambient Noise Measurements

Location		Period	Ambient Noise (dBA)				Observations at Time of Noise Measurements
Description	UTM (X,Y)(1)		L99	L95	L1	Leq (period)	
Station 1	(614 403; 6 085 037)	**Day** (October 2, 2006 10:26 to 11:26)	32.9	33.0	52.5	39.3	Light wind Presence of birds Passage of an airplane Passage of two trucks
		Night (October 3, 2006 0:38 to 1:36)	35.3	35.5	37.3	36.3	Light wind Passage of a truck
Station 2	(613 220; 6 084 884)	**Day** (October 2, 2006 14:12 to 15:12)	33.3	33.5	52.9	39.7	Light wind Presence of birds Passage of a helicopter
		Night (October 3, 2006 4:17 to 4:59)	34.6	34.9	46.3	36.7	Light wind Presence of birds Passage of an airplane Passage of one truck

(1) UTM coordinates, Zone 19.

5.3.2.5 Ambient Dust Level

Since particulate matter may constitute a form of pollution that will be generated by activities carried out in DSO2 and DSO3, data on total particulate matter and fine particulates smaller than 2.5 µm in diameter (PM 2.5) are presented in this section. Data on the heavy metal concentrations (lead, arsenic, cadmium, beryllium, mercury, nickel, vanadium, chromium and zinc) found in the total particulate matter are also presented.

Baseline data on the ambient air quality were collected when ambient levels were assessed at the Howells River site prior to the implementation of the LIOP in 2006. The ambient air sampling site that was selected at that time is located at the following latitude and longitude coordinates: 54°53'N and 67°11'W (UTM coordinates 19N NAD83, 616 500mE, 6 083 400mN). The sampling site thus lies approximately 7 km west of DSO3 and 15 km north-west of DSO2.

Given the short distance between the sites, the similarity of their characteristics and the low level of human activity at the Howells River site when the measurements were taken in 2006, the measurements in question can be considered as representative of the entire ELAIOM study area.

The sampling and analysis methodologies used at the Howells River site in 2006 as well as the duration and frequency of sampling are shown in Table 5.3. The equipment was calibrated prior to sampling with a calibrator according to standard methodologies.

Table 5.3: Total Particulate Matter and Metal Sampling Methodology

Source	Sampling and Analysis Methodology	Duration and Frequency
Metals and total particulate matter	Environment Canada EPS 1-AP-73-2 method with a high-volume air sampler Model TISCH TE-5000 with quartz filters and dust gravimetric weighing. Atomic absorption for metals.	10 samples taken over 24-hour periods between August 29 and October 20, 2006
PM 2.5	TEOM 1400A Monitor (*Tapered Element Oscillation Microbalance*)	29 samples taken over 24-hour periods between September 1 and October 20, 2006

Table 5.4 shows the maximum and average daily concentrations calculated from the sampling parameters. The detailed results are presented in Consulair (Janvier 2008).

The results presented in Table 5.4 show that relatively low particulate concentrations are found in the natural environment. Indeed, average daily concentrations of 7 µg/m^3 and 36 µg/m^3 were measured in the ambient air for PM 2.5 and total particulates respectively. These values are 30% of the ambient air standards for PM 2.5 and total particulates in the Province of Newfoundland and Labrador. With respect to metals, insignificant concentrations were measured, except for nickel, for which one concentration equal to 16% of the standard was measured. That value is close to 100 times higher than the average concentration calculated for nickel. That result is inexplicable.

Table 5.4: Results of Sampling – Ambient Air(1)

Measured Parameter	Sample Size	Daily Maximum			Daily Average		
		Max. Conc. Measured (µg/m^3) (3)	Standard(2) (µg/m^3)	% of Standard	Av. Concen. (µg/m^3)(3)	Standard(2) (µg/m^3)	% of Standard
Total particulates	10	35.9	*120*	30%	7.9	*60*	13%
Arsenic	10	0.00083	*0.3*	0.3%	0.00023	-	-
Beryllium	10	0.000023	-	-	0.000017	-	-
Cadmium	10	0.00014	*2*	0.007%	0.000082	-	-
Chromium	10	0.0053	-	-	0.0027	-	-
Mercury	10	0.00016	*20*	0.0008%	0.000093	-	-
Nickel	10	0.32	*2*	16%	0.035	-	-
Lead	10	0.0034	*2*	0.2%	0.0017	-	-
Vanadium	10	0.0012	*2*	0.1%	0.00074	-	-
Zinc	10	0.057	*120*	0.05%	0.020	-	-
PM2.5	29	7	*25*	28%	4	-	-

(1) Source: Consulair (Janvier 2008)
(2) *Air Pollution Control Regulations*, Newfoundland and Labrador Regulation 39/04.
(3) When a given contaminant was not detected in the analysis, a concentration equal to half the value of the threshold of detection value was used.

5.3.2.6 Climate Change

The results from the second version of the Canadian Center for Climate Modelling and Analysis Coupled Global Climate Model, or CGCM2, show that the region of Schefferville should experience a 1 to 2°C rise in temperature between 1975-1995 and 2040-2060. For precipitation, the tendency indicates a yearly increase of 90 mm over the same period.

Climate changes are affecting the ice-free period in Nunavik. That observation applies to all the Inuit communities, but not to the residents of Kawawachikamach (Tremblay *et al*. 2006).

5.3.2.7 Data Gaps

The National Climate Data and Information Archive collected by Environment Canada at www.climate.weatheroffice.ec.gc.ca provides statistics to determine the validity of the calculation of means and extremes. Over the 30 years of records for Schefferville, one year is missing for temperature and precipitation measurements, and two years are missing for wind. The remaining data represent more than 95% of the available possible observations. It is believed that the validity of Environment Canada's statistics is sufficient.

5.3.3 Water Quality

The water quality section is divided into a first part on the physico-chemical properties of the waterbodies within the BLSA and a second part on contaminants already present within the BLSA, which is a previously mined area. In addition to the BLSA (DSO3 and Silver Yards sectors), data from DSO2 are analyzed for comparison, and a literature review was conducted to assess the water quality around the ELAIOM as well as in the Schefferville area.

5.3.3.1 Literature Review

Table 5.5 summarizes water quality in summer in 18 waterbodies close to Schefferville some 25 years after the start of mining in the area. Burnt Lake and Hematite Lake were both receiving water pumped from mines at the time of sampling. Indeed, Burnt Lake had been so severely disrupted by mining that it had virtually no natural catchment, and the stream above it was actively eroding mine wastes that were encroaching on its banks (Drake 1981a: 290). Bean Lake was at the time of the study fed by a stream that received water pumped from a mine and that drained the railway switch-yards (Drake 1981a: 291). Drake (1981a: 295) concluded that "Little change has followed the development of iron mines in the area, and the changes that have occurred are less than the local intra-regional variation".

Dubreuil (December 1979: 23-24) demonstrated that the physico-chemical characteristics of the water in Kata Creek, as reflected in conductivity and suspended solids, returned to normal within a few months of the cessation of pumping water from the Fleming 3 mine, but that the aquatic flora and fauna were recovering more slowly.

Menihek Lake's pH has been measured as 6.5. Duthie and Ostrofsky (1974) observed that this was among the higher pH values for lakes in western Labrador, due to the location of its drainage basin on the Labrador Trough. Lakes not associated with the Trough tend to have pH values of about 6.0.

The highest alkalinity values in the Lakes Plateau region, a region of numerous waterbodies connected by short streams and situated at a general elevation of 400-600 m, are also found in Trough lakes. Menihek Lake conforms to this observation, having an alkalinity value (as $CaCO_3$) of 14.3 mg/L (Scruton 1984). Shield lakes typically exhibit alkalinities in the range of 6-8 mg/L. Chloride concentrations in the Plateau lakes are low, owing to the relatively minor influence of the marine environment.

Based on the literature, turbidity in the Plateau lakes rarely exceeds 6 JTU (a measure that approximates NTU), unless influenced by high run-off, as in spring (Curtis February 2004). In relation to water softness, Scruton (1984) reports that the salinity of waterbodies on the Lakes Plateau has a mean value of 6.1 mg/L, placing these freshwater bodies among the softest in the world.

Conductivity in Menihek Lake has been measured by Duthie and Ostrofsky (1974) as being 31 μmho/cm.

Dissolved oxygen in the Plateau lakes ranges from 8 mg/L to 13 mg/L, and lakes are usually near oxygen saturation during the open-water period.

Table 5.5: Water Chemistry in Schefferville Area, Means and Standard Deviations (in parentheses), Summers 1975-1978

Site	Temperature (ºC)	pH	Ca (mg/L)	Mg (mg/L)	HCO_3 (mg/L)	SiO_2 (mg/L)
1. Setter Lake	13.5 (–)	7.1 (–)	12.9 (3.0)	10.4 (1.1)	81.0 (15.8)	2.3 (2.5)
2. Ares Lake	15.6 (1.9)	7.6 (0.5)	6.7 (1.2)	3.1 (1.0)	59.9 (7.5)	2.4 (1.1)
3. Knob Lake	13.7 (3.7)	6.9 (0.3)	6.6 (0.5)	4.1 (0.8)	24.4 (4.4)	2.1 (0.9)
4. Dolly Lake	11.6 (0.5)	6.9 (–)	8.6 (0.2	6.2 (0.1)	21.1 (–)	2.4 (0.9)
5. John Lake	12.6 (0.7)	7.1 (0.1)	10.2 (0.4)	6.9 (0.4)	51.9 (1.1)	1.1 (1.3)
6. MaryJo Lake	13.5 (0.4)	6.5 (–)	8.1 (2.2)	6.7 (1.6)	53.3 (–)	1.1 (0.5)
7. Lac Dian	10.3 (4.3)	6.6 (0.6	4.7 (1.4)	4.2 (1.1)	23.1 (4.7)	5.4 (3.7)
8. Burnt Lake[a]	11.6 (1.7)	7.7 (0.3)	14.7 (4.4)	9.4 (0.9)	90.9 (15.5)	5.5 (1.8)
9. Hematite Lake[a]	13.1 (2.0)	5.1 (0.1)	1.2 (–)	0.7 (–)	1.9 (1.7)	0.6 (0.1)
10. Hanas Lake	17.2 (3.1)	6.9 (0.5)	3.5 (0.6)	1.8 (1.3)	15.8 (3.1)	3.2 (1.3)
11. Elizabeth Lake	12.9 (–)	7.7 (–)	5.4 (0.6)	3.3 (0.4)	26.7 (–)	0.8 (0.8)
12. Hope Lake	13.0 (–)	5.7 (–)	9.8 (–)	6.9 (–)	59.9 (–)	(–) (–)
13. Lac LeJeune	10.4 (4.3	6.8 (0.8)	11.0 (3.0)	7.1 (1.5)	68.1 (12.0)	8.4 (4.1)

Site	Temperature (ºC)	pH	Ca (mg/L)	Mg (mg/L)	HCO_3 (mg/L)	SiO_2 (mg/L)
14. Bean Lake[a]	13.3 (1.2)	6.7 (0.6)	12.6 (1.3)	8.2 (0.5)	63.9 (13.0)	2.9 (1.0)
15. Gemini Lake	15.6 (2.9)	8.2 (0.7)	11.5 (2.4)	7.3 (2.3)	75.4 (16.3)	4.3 (1.4)
16. Lac Pinette	14.0 (3.6)	5.8 (0.4)	1.2 (0.6)	0.7 (0.4)	5.1 (2.6)	2.0 (1.7)
17. Howells River (Irony Mountain)	15.3 (2.8)	7.0 (0.5)	6.0 (1.6)	2.4 (0.4)	29.8 (8.7)	3.0 (1.1)
18. Howells River (Menihek Road)	11.1 (5.6)	6.7 (0.6)	4.6 (1.0)	2.1 (1.1)	25.6 (5.5)	4.2 (2.1)

a indicates a significant mining effect
Source: Drake (1981a)

For lakes in areas influenced by the geological constituents of the Labrador Trough, the predominant cation is Ca, and the usual order of concentration of major cations tends to be: Ca > Mg > Na > K. In Menihek Lake, the Ca:Mg ratio of 2.53 recorded by Duthie and Ostrofsky (1974) is typical of lakes lying on the dolomite, limestone and other sedimentary rocks of the Labrador Trough.

Among the metallic ions, only iron is present in significant amounts (0.05 mg/L) in Menihek Lake (Scruton 1984). Despite extensive mining activities in the Schefferville region between 1954 and 1982, iron concentrations in the Menihek system are much the same as for more remote lakes on the Plateau.

Water-sampling conducted for the LIOP in the Howells River basin in September 2003 (Curtis February 2004), September and November 2005, and March, late May and July 2006 (Gartner Lee Limited July 2006) yielded the following results:

September 2003

As shown in Table 5.6 lake-water concentrations of Ca, Mg, K and Na ions were similar in each of the waterbodies sampled and are consistent with what would be anticipated for lakes with drainage basins associated with the mineral-rich rocks of the Labrador Trough (Penn 1971). The slightly alkaline pH values recorded are consistent with this observation, in that the lakes are well-buffered, as indicated by higher Ca ion concentrations than would be found in waterbodies of the Canadian Shield.

Table 5.6: Lake Water Concentrations of Ca, Mg, K and Na Ions, Howells River System, September 2003

Lake Sampling Station	Calcium Ion Concentration (Ca mg/L)	Magnesium Ion Concentration (Mg mg/L)	Potassium Ion Concentration (K mg/L)	Sodium Ion Concentration (Na mg/L)
Chimo	14.8	4.50	0.12	0.44
Fleming	8.34	2.89	0.12	0.54
Ione	3.65	2.20	0.17	0.48
Rosemary	8.37	3.00	0.14	0.55
Contact	9.03	3.06	0.14	0.51

Source: Curtis (February 2004)

Temperature, conductivity and dissolved oxygen measurements demonstrated that the conditions found in the Howells River system are largely typical of what would be expected for waterbodies associated with the Labrador Trough. The conductivity measurements, however, showed somewhat greater variability, ranging from 38.1 µmho/cm in Ione Lake to 102.0 µmho/cm in Chimo Lake. An unusual finding for subarctic lakes was a de-oxygenated layer of bottom water in Fleming Lake, from a depth of 5 m to the bottom. The most likely cause, according to Curtis (February 2004), is a period of density stratification, during which time the oxygen demand of organics from an intense plankton bloom may have locally depleted oxygen from the bottom waters.

The physical parameters measured (including dissolved oxygen, temperature, pH, conductivity and TDS) were consistent with good water quality in such environments. The conductivity measurements ranged from 0.019 µmho/cm to 0.14 µmho/cm.

The Plateau lakes do not usually display any thermal stratification during the short summer season, given the low solar energy input and the intensity of wind-induced water circulation (Duthie and Ostrofsky 1974; Scruton 1984). Maximum lake water temperatures reach 16-18°C.

Ice thickness on lakes throughout the region reaches a maximum of about 1 m. Snow cover on the ice is also roughly 1 m thick, unless reduced by high winds. Thermal stratification in the lakes is typical under ice cover during late winter, when near-bottom waters are warmed to 3.5-5°C (Penn 1971). This general feature of subarctic lakes is caused largely by geothermal heat. In conditions of low snow cover, near-surface lake water may also warm rapidly in response to solar radiation. In spring, immediately after snowmelt from the ice cover, some lakes may have water temperatures of 4-5°C immediately below the ice (Penn 1971).

September and November 2005, and March, late May and July 2006

Surface water samples were collected from roughly 30 locations along the Howells valley. The overall water quality in the water features sampled (lakes, ponds, tributaries and Howells River) was excellent: the water was universally non-turbid (<1 NTU) and soft (hardness 20-60 mg/L; alkalinity 10-60 mg/L); most metals were below detection limits, except for some salts, Mn and Mg, which were present in very low concentrations.

The water was nutrient-poor; phosphorus (the limiting nutrient in the eutrophication of watercourses) was generally below 0.01 mg/L and always below 0.03 mg/L. The conductivity measurements ranged from 0.019 µmho/cm to 0.14 µmho/cm. One sample in the November 2005 sampling event contained elevated Pb concentrations, but, since Pb was almost undetected in the other sampling events, it does not appear to be a widespread or persistent result. No evidence of lake stratification was observed.

The physical parameters measured (including dissolved oxygen, temperature, pH, conductivity and TDS) were consistent with good water quality in such environments.

5.3.3.2 Ambient Surface Water Quality

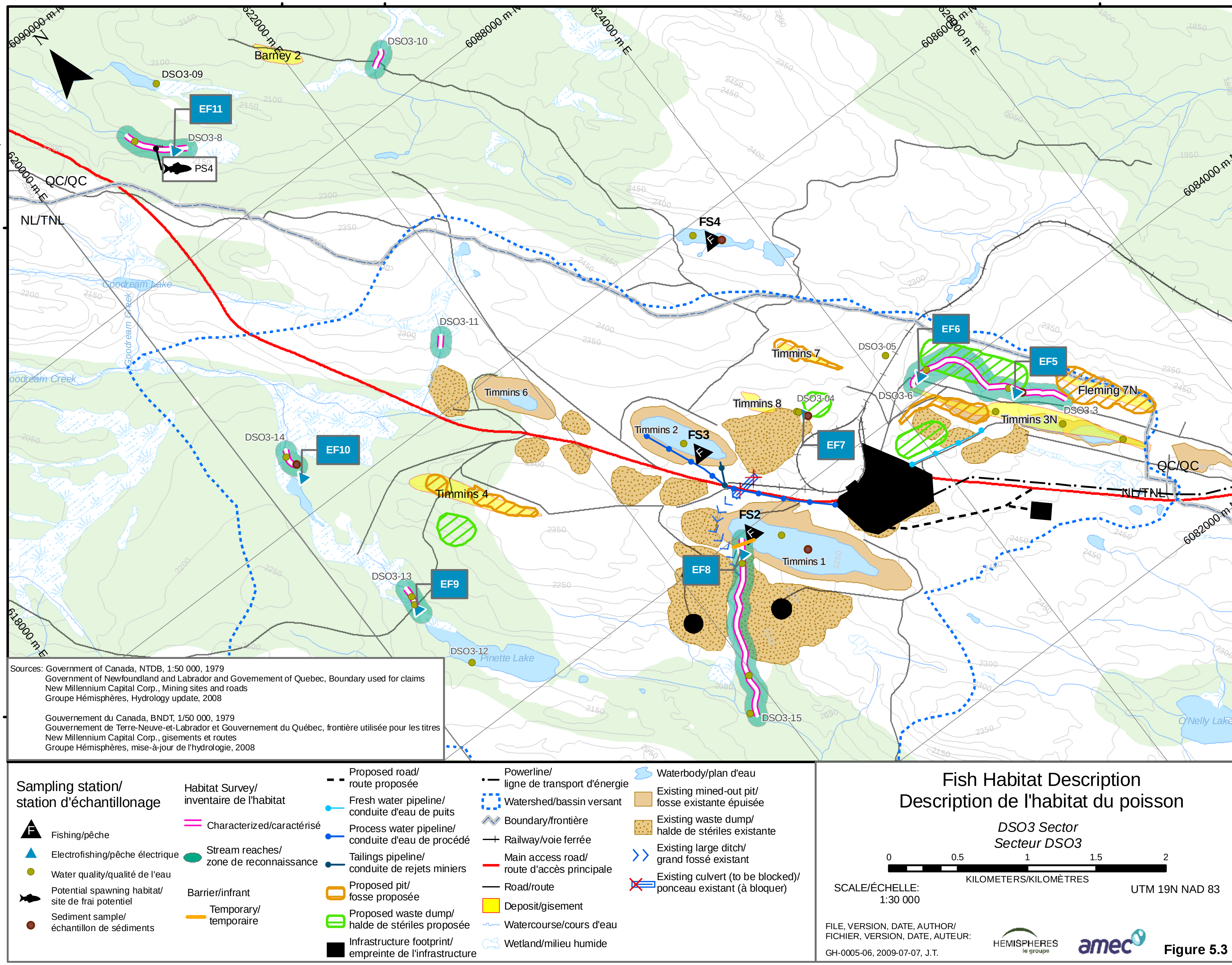
Results and Discussion for the *in situ* Parameters

A summary of the results for the physico-chemical parameters from the July and September surveys is presented in Table 5.7. Sample locations are presented in Figure 5.3.

Table 5.7: Summary of Water Quality Measurements at All Sampled Sites in July and September

Site	Temperature (°C)		Conductivity (µS/cm)		pH		Turbidity (NTU)	Dissolved Oxygen (mg/L)
	July	Sept.	July	Sept.	July	Sept.	July	July
DSO3-03	14.5	10.9	5	0	6.0	4.81	0.37	8.3
DSO3-05	14.1	10.6	7	0	5.7	5.21	210.0	10.4
DSO3-06	13.8	8.7	6	19	6.2	6.4	0.27	9.9
DSO3-07	15.5	12.5	5	0	6.1	5.73	0.66	10.2
DSO3-08	14.8	10.7	22	19	6.0	7.68	0.52	9.6
DSO3-10	13.4	-	5	-	4.9	-	0.16	8.4
DSO3-11	15.7	-	4	-	5.6	-	0.47	10.0
DSO3-13	16.7	8.8	6	-	4.7	-	0.62	6.9
DSO3-14	14.1	9.3	16	1	7.2	5.67	13.10	-
DSO3-15	13.8	9.7	2	11	5.8	7.78	0.23	-
Timmins 1	8.8	12.1	21	10	6.5	6.18	4.89	12.1
Timmins 2	7.8	11.7	25	13	6.6	6.33	11.10	12.5
DSO2-01	-	6.1	-	118	-	7.1	0.49	-
DSO2-02	-	8.8	-	54	-	6.36	-	-
DSO2-03	13.3	9.3	70	58	7.5	6.63	1.02	10.0
DSO2-04	14.7	8.9	70	59	7.5	6.81	1.02	10.0
Lac Star	14.3	-	72	-	7	-	0.34	11.5

Source: AMEC (January 2009)



54°56'N
67°5'W
54°54'N
54°56'N
54°52'N
67°10'W
N
6090000 m N
6088000 m N
6086000 m N
6084000 m N
6082000 m N
622000 m E
624000 m E
626000 m E
620000 m E
618000 m E
QC/QC
NL/TNL
Barney 2
DSO3-10
DSO3-09
EF11
DSO3-8
PS4
FS4
Goodream Lake
Goodream Creek
DSO3-11
Timmins 6
Timmins 7
DSO3-05
EF6
EF5
Fleming 7N
DSO3-6
DSO3-3
Timmins 8
DSO3-04
Timmins 3N
Timmins 2
FS3
EF7
DSO3-14
EF10
Timmins 4
FS2
Timmins 1
EF8
DSO3-13
EF9
DSO3-12
Pinette Lake
DSO3-15
O'Nelly Lake
Sources: Government of Canada, NTDB, 1:50 000, 1979
Government of Newfoundland and Labrador and Govemement of Quebec, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Groupe Hémisphères, Hydrology update, 2008
Gouvernement du Canada, BNDT, 1/50 000, 1979
Gouvernement de Terre-Neuve-et-Labrador et Gouvernement du Québec, frontière utilisée pour les titres
New Millennium Capital Corp., gisements et routes
Groupe Hémisphères, mise-à-jour de l'hydrologie, 2008
Sampling station/
station d'échantillonnage
Fishing/pêche
Electrofishing/pêche électrique
Water quality/qualité de l'eau
Potential spawning habitat/
site de frai potentiel
Sediment sample/
échantillon de sédiments
Habitat Survey/
inventaire de l'habitat
Characterized/caractérisé
Stream reaches/
zone de reconnaissance
Barrier/infrant
Temporary/
temporaire
Proposed road/
route proposée
Fresh water pipeline/
conduite d'eau de puits
Process water pipeline/
conduite d'eau de procédé
Tailings pipeline/
conduite de rejets miniers
Proposed pit/
fosse proposée
Proposed waste dump/
halde de stériles proposée
Infrastructure footprint/
empreinte de l'infrastructure
Powerline/
ligne de transport d'énergie
Watershed/bassin versant
Boundary/frontière
Railway/voie ferrée
Main access road/
route d'accès principale
Road/route
Deposit/gisement
Watercourse/cours d'eau
Wetland/milieu humide
Waterbody/plan d'eau
Existing mined-out pit/
fosse existante épuisée
Existing waste dump/
halde de stériles existante
Existing large ditch/
grand fossé existant
Existing culvert (to be blocked)/
ponceau existant (à bloquer)
Fish Habitat Description
Description de l'habitat du poisson
DSO3 Sector
Secteur DSO3
0 0.5 1 1.5 2
KILOMETERS/KILOMÈTRES
SCALE/ÉCHELLE:
1:30 000
UTM 19N NAD 83
FILE, VERSION, DATE, AUTHOR/
FICHIER, VERSION, DATE, AUTEUR:
GH-0005-06, 2009-07-07, J.T.

Figure 5.3

An analysis of the water samples collected in DSO3 yields the following conclusions: conductivity was exceptionally low (Table 5.7); the virtual absence of nutrients, salts or impurities in the water showed no correlation to the location of sampling sites downstream from former mining activities. Such low conductivity is generally not found in natural systems and is similar to pure or distilled water (Hade 2002). Water quality samples from DSO2 demonstrate a much higher conductivity, possibly due to higher run-off rates and because the samples were collected further downstream in rivers.

Dissolved oxygen was near saturation level in all samples collected in DSO2 and DSO3, including at the bottom of ponds or lakes. This is considered to be a function of the low biological productivity of the lakes, in combination with their lack of stratification. Some degree of oxygen depletion (72-77%) has been observed near lake bottoms immediately after ice-out (Duthie and Ostrofsky 1974). Such depletion, caused during the ice-cover period by the oxygen demand of organic sediments and organisms near the lake bottom, can be biologically important in small lakes or pools, where the total volume of water becomes significantly reduced in winter (Curtis February 2004).

Turbidity was high in Triangle Pond (DSO3-05), but such was not the case for other natural waterbodies upstream from former mines. Tailings piled along one side of DSO3-05 could cause heavy siltation during heavy rain events. This may have caused the high turbidity reading. Nutrients (phosphorus) were also high at this station. Water quality samples from DSO2 also revealed low turbidity.

The water quality sampling sites investigated in DSO3 showed a high variation in pH levels (Table 5.7) and most values were below the CCME criterion of 6.6 to 9.0 for freshwater, which is the healthy range for natural waterbodies (Hades 2002). It also corresponds to the tolerance zone of the majority of aquatic organisms. All the waterbodies within DSO3 were acidic at one or the other of the sampling periods. pH was close to neutrality in DSO2 samples and almost basic in July. The surface waters downstream from the former mine sites were less acidic than the water upstream from those sites.

Finally, the temperature for the waterbodies in DSO3 was typical of the region and the period sampled, as compared with the various studies performed for the LIOP.

The surface water in DSO3 was rather nutrient-poor as reflected in the low phosphorus concentrations generally encountered, which limits the growth of aquatic plants (macrophytes) and microalgae (phytoplankton).

Results and Discussion for the Laboratory Parameters

The characterization of water quality using the CCME criteria can be summarized as follows (see Figure 5.3):

- aluminium exceeded the CCME criterion at all sites;
- cadmium exceeded the CCME criterion at all sites;
- copper was slightly higher than the CCME criterion at four sites: DSO3-06, DSO3-07, DSO3-14 and DSO3-15;
- iron was above the CCME criterion at six sites: DSO3-05, DSO3-06, DSO3-08, DSO3-13, DSO3-14 and DSO2-02;
- lead exceeded the CCME criterion at site DSO3-15;

- mercury exceeded the CCME criterion at site DSO3-06;
- selenium was above the CCME criterion at site DSO3-15.

Tables 5.8 and 5.9 show the laboratory results for surface water samples at DSO3 and DSO2 respectively. The DSO2 data are presented because of its proximity to DSO3.

There seem to be no significant differences in metal contamination between sites upstream and downstream from the former mine sites. The metal with the highest concentrations seems to be iron. This may be natural, as peat bogs have been shown to accumulate high concentrations of iron (Syrovetnik *et al*. 2007).

All other parameters analyzed comply with the applicable requirements of the CCME. All the concentrations are much below the authorized levels of deleterious substances prescribed in the Environment Canada *Metal Mining Liquid Effluent Regulations*. The values of the measured variables are not limiting to aquatic life and are representative of concentrations measured in the region.

Table 5.8: Laboratory Results for Surface Water Samples from DSO3

Sample ID		**DS03-03**	**DS03-05**	**DS03-06**	**DS03-07**	**DS03-08**	**DS03-13**	**DS03-14**	**DS03-15**	**Timmins 1**	**Timmins 2**	**CCME Guidelines**
Lab Number		S2008-13078	S2008-13079	S2008-12951	S2008-13077	S2008-12952	S2008-12953	S2008-12954	S2008-13076	S2008-13074	S2008-13075	
Date Collected		**13-sept-08**	**13-sept-08**	**10-sept-08**	**13-sept-08**	**10-sept-08**	**10-sept-08**	**10-sept-08**	**12-sept-08**	**12-sept-08**	**12-sept-08**	
Parameters (µg/L)	MDL											
Aluminium	1	45	177	36	34	32	118	57	358	10	14	5 or 100[1]
Antimony	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-
Arsenic	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-
Barium	0.5	0.9	2.1	7.9	0.7	2.2	3.3	1.6	3.2	3.5	1.2	-
Beryllium	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Bismuth	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Boron	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	-
Cadmium	0.015	0.098	0.129	0.127	0.033	0.105	0.129	0.129	0.152	0.097	0.111	0.017
Calcium	500	<500	<500	1500	<500	1990	569	685	1100	1070	1300	-
Chromium	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-
Cobalt	1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	-
Copper	1	1	1	5	3	<1	1	4	9	2	<1	2 or 4[2]
Iron	1	86	419	1570	90	826	1080	1640	22	23	36	300
Lead	1	<1	1	<1	<1	<1	<1	<1	2	<1	<1	1 up to 7[3]
Magnesium	20	140	78	693	256	2290	291	195	810	769	900	-
Manganese	1	8	12	135	4	53	104	64	2	2	3	-
Mercury	0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.026
Molybdenum	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-
Nickel	1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	25 up to 150[4]
Phosphorus	2	8	14	5	4	5	<2	14	13	<2	<2	-
Potassium	20	362	116	67	62	331	56	20	277	259	151	-
Rubidium	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<1	-
Selenium	1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	1
Silicon	2	1750	241	3450	1180	1720	4280	405	1650	1330	2070	-
Silver	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Sodium	500	715	<500	1490	<500	373	820	<500	<500	<500	710	-
Strontium	1	2	<1	11	1	4	4	2	3	3	4	-
Sulphur	2	213	148	205	197	1290	136	59	486	448	362	-
Tellerium	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-
Thallium	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1
Tin	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	-
Titanium	2	<2	4	<2	<2	<2	<2	<2	<2	<2	<2	-
Uranium	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-
Vanadium	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-
Zinc	1	4	4	13	5	4	6	8	8	5	3	30

Source: AMEC (January 2009)

Legend

MDL: Method Detection Limit

CCME: Canadian Council of Ministers of the Environment

- : Value not established

Shaded area indicates that CCME Guidelines are exceeded

Guidelines specifications

[1] Aluminium: 5µg/L at a pH < 6.5
100µg/L at pH = 6.5

[2] Copper: 2µg/L at [$CaCO_3$] = 0-120mg/L
3µg/L at [$CaCO_3$] = 120-180mg/L

[4] Nickel: 25µg/L at [$CaCO_3$] = 0-60mg/L
65µg/L at [$CaCO_3$] = 60-120mg/L
110µg/L at [$CaCO_3$] = 120-180mg/L
150µg/L at [$CaCO_3$] >180mg/L

[3] Lead: 1µg/L at [$CaCO_3$] = 0-60mg/L
2µg/L at [$CaCO_3$] = 60-120mg/L
4µg/L at [$CaCO_3$] = 120-180mg/L
7µg/L at [$CaCO_3$] >180mg/L
4µg/L at [$CaCO_3$] >180mg/L

Table 5.9: Laboratory Results for Surface Water Samples from DSO2

Sample ID		**DS02-01**	**DS02-02**	**DS02-03**	**DS02-04**	**Star 1**	**CCME Guidelines**
Lab Number		S2008-12955	S2008-12956	S2008-12957	S2008-12958	S2008-12959	
Date Collected		11-sept-08	11-sept-08	11-sept-08	11-sept-08	11-sept-08	
Parameter (µg/L)	MDL						
Aluminium	1	10	17	8	5	8	5 or 100[1]
Antimony	1	<1	<1	<1	<1	<1	-
Arsenic	1	<1	<1	<1	<1	<1	-
Barium	0.5	1.2	3.7	0.9	1.0	0.8	-
Beryllium	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-
Bismuth	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-
Boron	20	<20	<20	<20	<20	<20	-
Cadmium	0.015	0.081	0.096	0.100	0.101	0.055	0.017
Calcium	500	17400	7620	7800	7910	8210	-
Chromium	1	<1	<1	<1	<1	<1	-
Cobalt	1	<1	<1	<1	<1	<1	-
Copper	1	<1	<1	1	<1	<1	2 or 4[2]
Iron	1	66	2160	64	203	103	300
Lead	1	<1	<1	<1	<1	<1	1 up to 7[3]
Magnesium	20	10400	4530	5400	5540	5580	-
Manganese	1	6	111	6	4	4	-
Mercury	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.026
Molybdenum	2	<2	<2	<2	<2	<2	-
Nickel	1	<1	<1	<1	<1	<1	25 up to150[4]
Phosphorus	2	7	7	8	7	9	-
Potassium	20	187	210	337	344	333	-
Rubidium	5	<5	<5	<5	<5	<5	-
Selenium	1	<1	<1	<1	<1	<1	1
Silicon	2	1890	2570	2620	2630	2590	-
Silver	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Sodium	500	<500	517	598	582	612	-
Strontium	1	8	7	7	6	6	-
Sulphur	2	496	228	835	868	767	-
Tellerium	5	<5	<5	<5	<5	<5	-
Thallium	1	<1	<1	<1	<1	<1	1
Tin	2	<2	<2	<2	<2	<2	-
Titanium	2	<2	<2	<2	<2	<2	-
Uranium	1	2	2	2	2	2	-
Vanadium	5	<5	<5	<5	<5	<5	-
Zinc	1	4	3	4	4	3	30

Source: AMEC (January 2009)

Legend

MDL: Method Detection Limit

CCME: Canadian Council of Ministers of the Environment

- : Value not established

Shaded area indicates that CCME Guidelines are exceeded

Guidelines specifications

[1] Aluminium: 5µg/L at a pH < 6.5
100µg/L at pH = 6.5

[2] Copper: 2µg/L at [CaCO3] = 0-120mg/L
3µg/L at [CaCO3] = 120-180mg/L

[3] Lead: 1µg/L at [CaCO3] = 0-60mg/L
2µg/L at [CaCO3] = 60-120mg/L
4µg/L at [CaCO3] = 120-180mg/L
7µg/L at [CaCO3] >180mg/L
4µg/L at [CaCO3] >180mg/L

[4] Nickel: 25µg/L at [CaCO3] = 0-60mg/L
65µg/L at [CaCO3] = 60-120mg/L
110µg/L at [CaCO3] = 120-180mg/L
150µg/L at [CaCO3] >180mg/L

5.3.3.3 Water Crossings Characteristics

No water crossings are planned by NML within the BLSA. If any water crossings prove to be required, their construction will respect all applicable provincial and federal standards. There are nine culverts along the railroad track in DSO3, but no water is present in any of them (PFWA December 2008).

5.3.3.4 Navigability

According to the NWPA, navigable waters include any body of water capable of being navigated by any type of floating vessel for the purpose of transportation, recreation or commerce (Transport Canada 2008, Internet site).

Using this definition, there are no navigable waters within DSO3. A large part of DSO3 is a patchwork of wetlands, which do not allow access by boat. Furthermore there is little to no connectivity between the different streams and lakes.

5.3.3.5 Hydrogeology

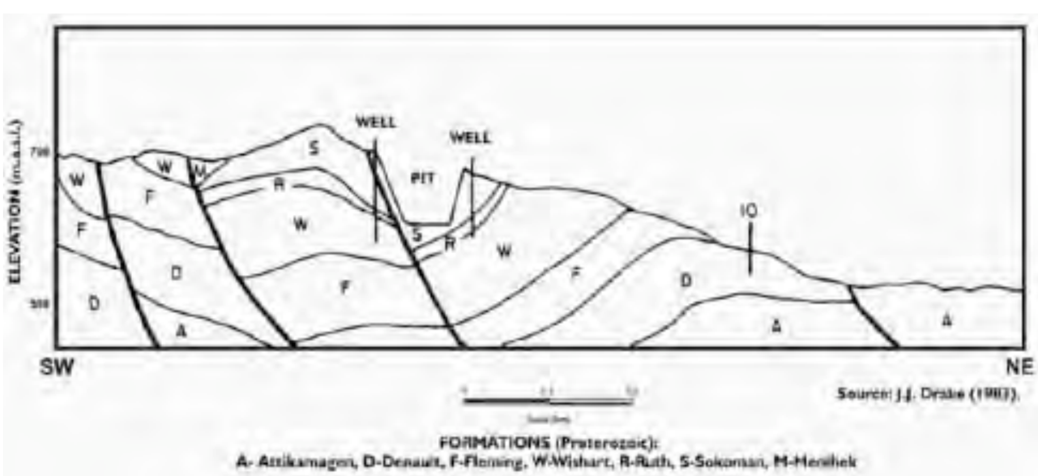
The section on hydrogeology addresses the following topics: the classification of groundwater (Class I, II or III); its physical and chemical quality; the identification of aquifers; the vulnerability of groundwater to pollution; and the direction of groundwater flow.

Groundwater Flow in Permafrost Areas

A literature review and field observations made it possible to establish a preliminary basic conceptualization of groundwater flow in DSO3.

The conceptual model of groundwater flow in an area of discontinuous permafrost shown in Figure 5.4 is taken from Drake (1983). Totally and permanently ice-free areas can occur in a permafrost zone. Those areas, called taliks, are found principally under lakes and under ridges at higher elevations. Groundwater flows on the surface of the permafrost along underground ice-free features, mostly small valleys filled with granular material. The groundwater flowing on top of the permafrost feeds the taliks, which recharge the water table under the permafrost.

Figure 5.4: Pattern of Groundwater Flow in Area of Discontinuous Permafrost



Flowing groundwater carries some heat. It also may infiltrate frozen soils that are sufficiently porous, causing the surface of the permafrost to thaw rapidly in active areas (Nicholson and Lewis 1976). Thus, the distribution and configuration of permafrost are parameters that change with time with a general tendency towards regressing.

State of Knowledge about Permafrost and Aquifers in DSO3

DSO3 is located in an area of discontinuous permafrost. In that region, characterized by several series of elongated ridges flanked by parallel valleys, the permafrost, which can attain a depth of 100 m, is found at the highest elevations on tundra sites poorly protected against the wind (IOCC 1974). Permafrost does not occur at lower elevations in the wooded valleys that are less exposed to wind (Nicholson February 1978a).

Table 5.10 shows the planned depth of mining at each deposit and the presence or absence of permafrost. The permafrost thickness values were taken from the literature and were not confirmed in the field. Unlike the other deposits, Timmins 3N has been partially mined.

Table 5.10: Permafrost in Deposits

Deposit	Proposed Final Mining Depth (m)	Permafrost	Thickness (m)
Ferriman 4	110	absent	n/a
Timmins 3	80	discontinuous	not known
Timmins 4	100	present	60 to 100
Timmins 7	50	present	3 to 20
Timmins 8	50	absent	n/a
Fleming 7N	110	discontinuous	60 to 100

Source: Envir-Eau (March 2009); Fortin (2009, *personal communication*)

The first studies of permafrost on the properties of the IOCC were carried out by McGill University and the National Research Council of Canada between 1955 and 1961 in the area of the Ferriman deposit. Areas of permafrost extended from the surface to a depth of 75 m. With the opening of the Timmins 1 deposit in 1967, and given the importance of permafrost in that region, research shifted to the Timmins sector. The Timmins 4 deposit in DSO3 was selected as an experimental site to determine the factors affecting permafrost and to develop appropriate techniques to delineate areas of permafrost. Concurrently, the Geotechnical Department of the IOCC developed, between 1970 and 1973, a structured programme to delineate permafrost during the mining of the deposits and to determine the physical properties of the frozen rock.

Between 1973 and 1975, Nicholson (February 1978a) conducted research on the distribution of permafrost at several sites in the Schefferville region, including Timmins 4 and Fleming 7. He concluded that the thickness of permafrost at that time ranged from 60 to 100 m, although ice-free areas were found in the valleys at the margins of those sites.

According to an internal report of the IOCC (Mihalovic March 14, 1980a), a layer of permafrost averaging 4 m in thickness was presumed to occur at Timmins 7. Permafrost was recorded to a depth of 20 m in the northernmost part of that sector, but it was as thin as 3 m in the southernmost part. In addition, indications suggested to Mihalovic that a second ice lens underlay the first one at the south end. A perched water table was observed. The main aquifer was believed to underlie the permafrost. It was thought that the depth of the roof of the permafrost could be estimated from the position of the water table observed nearby at Timmins 2.

In another report, Mihalovic (March 14, 1980b) indicated that Fleming 7 was frozen from 2 m below the surface to more than 43 m. A perched water table was also observed.

Mihalovic (April 8, 1980) noted that reports compiled over several years by the McGill Subarctic Research Station and the IOCC Technical Department concluded independently that the Timmins 4 deposit was frozen from the surface to a depth of more than 100 m. He also noted that it was difficult to establish the depth of the water table in a permafrost area. He was probably referring to the presence of perched water tables.

Groundwater Flow at DSO3

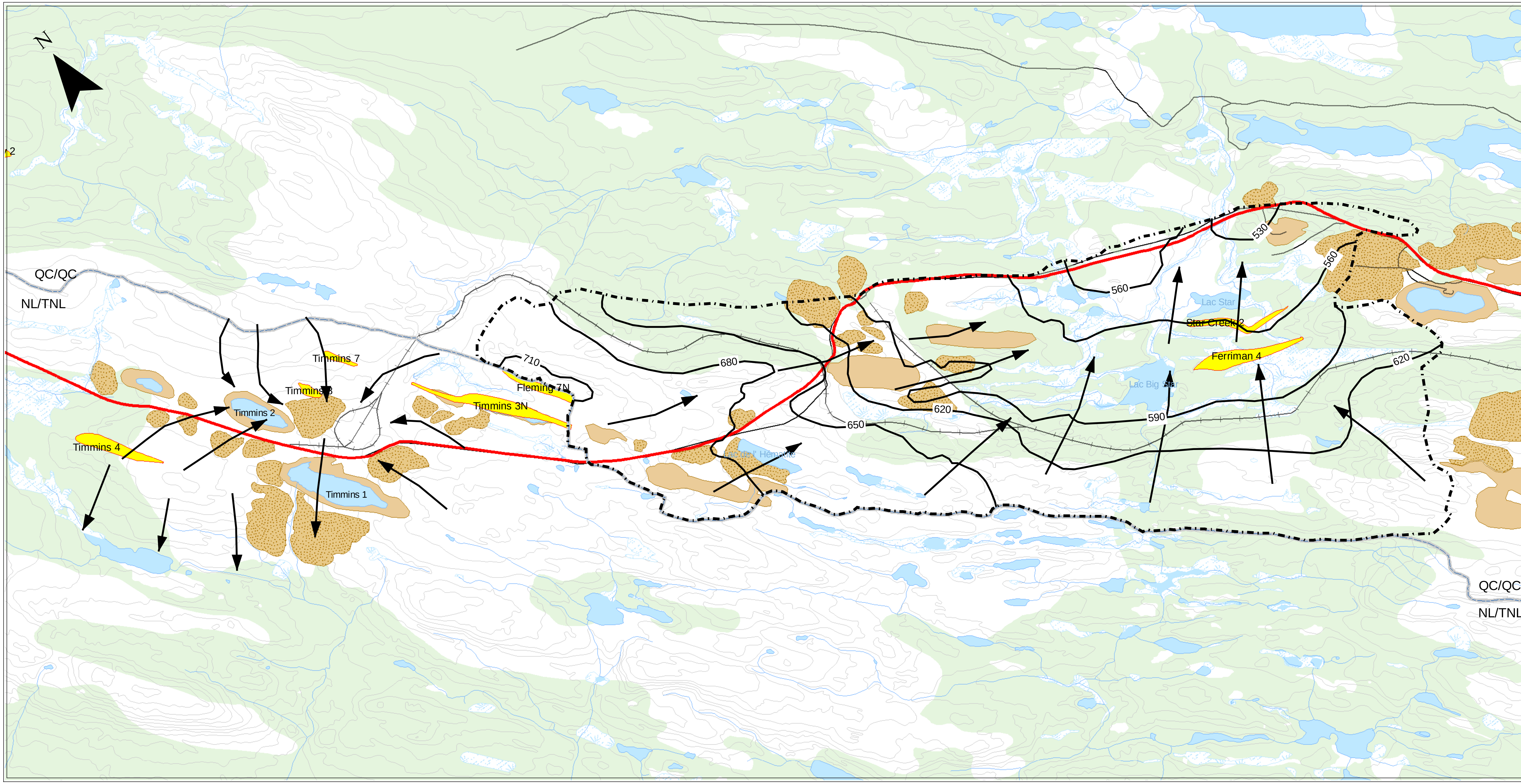
Most of the main aquifers in this sector are found in the bedrock. The presence of discontinuous permafrost promotes the formation of local perched water tables. The landform maps indicate that bedrock is exposed practically everywhere in these deposits (Groupe Hémisphères Mars 2009), which is in keeping with the fact that several deposits were stripped to the bedrock by the IOCC with a view to eventually mining them. The soil that is still present in the sector is said to be composed almost entirely of moraine. According to NML's geologists, the maximum thickness of the overburden is in the Fleming 7 sector, where thicknesses of up to 5 m were found. The overburden in the DSO3 sector is not thick enough to contain important aquifers.

The regional groundwater flow is illustrated in Figure 5.5. DSO3 is entirely located in Labrador, a short distance from the Québec border and, hence, from the limit of the surface water watershed. The recharging of the aquifers occurs mostly on the higher ridges, where the surface waters flow in different directions. All the DSO3 deposits are located close to the principal recharge area. Consequently, they have a limited recharge area. The regional groundwater flow in that sector roughly follows the surface flow. Part of the water that infiltrates into the recharge area flows towards Labrador, where DSO3 is located.

DSO3 was greatly disturbed by previous mining operations. Several abandoned pits and piles of waste rock are present. There is practically no vegetation in areas that were mined. According to Groupe Hémisphères (Novembre 2008a), which compared old maps with recent field observations, the drainage network was somewhat reduced by the former mining operations. All those changes at the biophysical level will have had an effect on the recharging of the aquifer in the disturbed areas.

Permafrost areas were identified at Fleming 7 and at Timmins 3, 4 and 7. Permafrost can significantly limit the infiltration of water into the soil and thus the recharging of the aquifer. In such situations, the surface water would tend to flow over the frozen soils or in the unfrozen superficial layer of the recharge area and to infiltrate in unfrozen areas at lower elevations and zones of taliks.

Figure 5.6 illustrates the possible flow of groundwater at Timmins in the presence of permafrost.



Limit of Fleming hydrogeological basin/ limite du bassin hydrogéologique Fleming
Piezometric isocontour (m)/ isocontour piézométrique (m)
Border/ frontière
Railway to be reconstructed/ voie ferrée à reconstruire
Main access road/ route d'accès principale
Road/route
Deposit/gisement
Watercourse/ cours d'eau
Wetland/ milieu humide
Waterbody/ plan d'eau
Existing mined-out pit/ fosse existante épuisée
Existing waste dump/ halde de stériles existante
Contour interval/ courbe de niveau
Source and direction of groundwater flow/ sens d'écoulement de l'eau souterraine

Regional Groundwater Flow

Hydrogeological Basin

Fleming and Timmins Area

0 1 2 3

KILOMETERS/KILOMÈTRES

Écoulement souterrain régional

Bassin hydrogéologique

Fleming et secteur Timmins

SCALE/ÉCHELLE: 1:40,000

UTM NAD 83 Zone

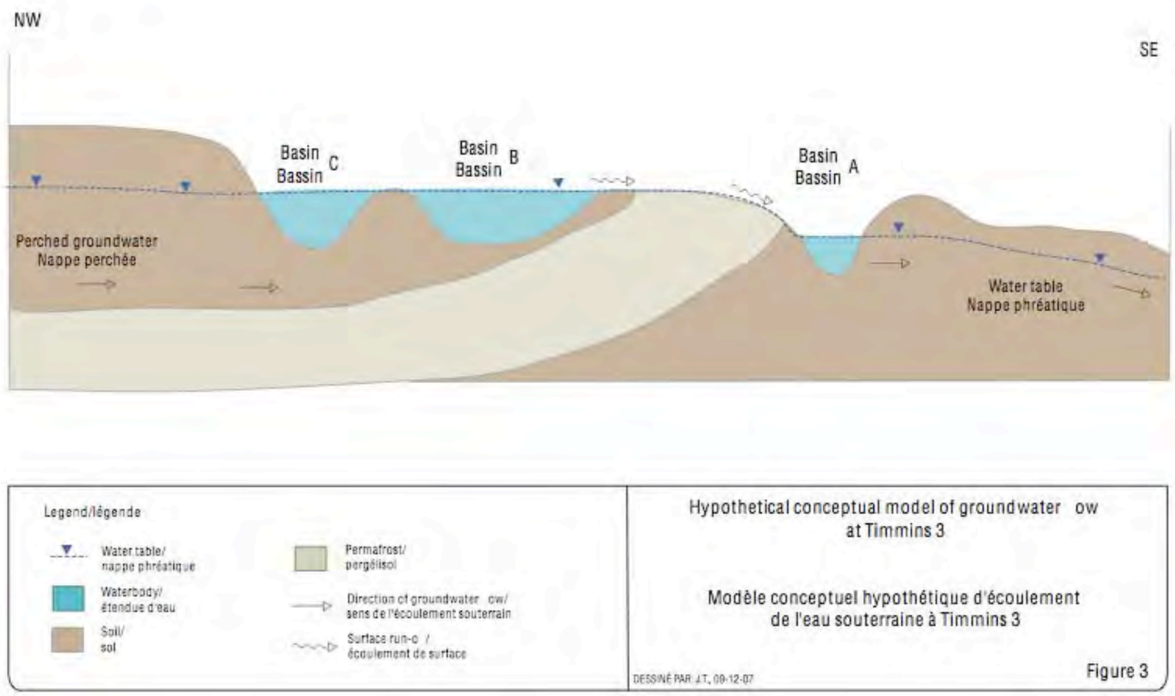
SOURCES: Government of Canada, NTDB, 1:50 000, 1979
Government of Newfoundland and Labrador and Governement of Quebec, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Groupe Hémisphères, Hydrology update, 2008
Hydrogeological Basin "Fleming", adapted from *L. Nichols*, 1966

Gouvernement du Canada, BNDT, 1/50 000, 1979
Gouvernement de Terre-Neuve-et-Labrador et Gouvernement du Québec, frontière utilisée pour les titres
New Millennium Capital Corp., gisements et routes
Groupe Hémisphères, mise-à-jour de l'hydrologie, 2008
Bassin hydrogéologique "Fleming", adapté de *L. Nichols*, 1966

FILE, VERSION, DATE, AUTHOR/ FICHIER, VERSION, DATE, AUTEUR: GH-0021-03 , 2009-06-25, J.T. Groupe Hémisphères Inc.

Figure 5.5

Figure 5.6: Hypothetical Conceptual Model of Groundwater Flow at Timmins 3



The pits excavated during former mining operations, namely Timmins 1, 2, 3 and 6, are today bodies of water. The level of the water in them probably indicates the level of the water table. Table 5.11 indicates the approximate level of the water level in the pits, as measured from the surface. If that assumption is correct, the main water table is well below the surface.

Table 5.11: Depth of Water in Pits

Deposit	Water Level (m below the surface)
Timmins 1	35
Timmins 2	50
Timmins 3	10
Timmins 6	55

The preceding view is borne out by the results of drilling conducted at Timmins 3 in November 2009 (Fortin 2009, *personal communication*). One drill hole encountered water at 60 m below the surface, and the other at 79 m. It appears that the regional water table lies beneath a layer of shale of the Ruth Formation, the thickness of which varies from 60 m to 80 m.

The IOCC mined ore in three sectors of the Timmins 3 deposit. Those sectors are respectively identified, from north-west to south-east, as sectors A, B and C. Sectors B and C are filled with water throughout the year, but Sector A contains water only at certain periods, mostly at snowmelt and following heavy rains. Given the absence of permafrost at Timmins 3, it can be inferred that the water level in the pits represents the level of the surface of the water table at that location.

Figure 5.5 shows that Timmins 1 pit is the destination of all the groundwater flowing through the Fleming 7 and Timmins 2, 3, 7 and 8 deposits. Being the point of origin of the watercourse called Elross Creek, Timmins 1 is the lowest point relative to the other deposits.

The topography supports the assumption that Timmins 4 and Timmins 6 form part of another hydrogeological network, namely that of Goodream Creek.

The water levels in Timmins 1 and 2 correspond to the surface of the water table. According to the landforms, the water transiting through Timmins 2 should flow towards Timmins 1. Elross Creek serves as the outfall for part of the groundwater of Timmins 1. According to AMEC (January 2009), the downstream portion of Elross Creek close to the Timmins 1 pit is permeable, which would allow the upflow of groundwater into the creek. The flooded part of Timmins 1 has an average depth of 30 m and a maximum depth of 75 m. The groundwater flows through rock formations towards the lower areas and then reappears in the valleys and depressions downstream.

Groundwater Chemistry

A sample of water was collected after 24 hours of pumping at Timmins 3 in November 2009 (Fortin 2009, *personal communication*). The results of measurements *in situ* and of chemical analyses are summarized in Table 5.12 and Table 5.13.

Table 5.12: Physical and Chemical Parameters Measured in the Field during Pumping Test at Timmins 3

Parameter	Unit	Value
Temperature	^{o}C	0.9
Conductivity	µS/cm	111
pH		6.5 - 8.5

Source: Fortin (2009, *personal communication*)

Table 5.13: Results of Laboratory Chemical Analyses for Basic Parameters of Water from Pumping Test at Timmins 3

Parameter	Unit	Value
Total cyanide	mg/L	< 0.01
Bicarbonate	mg/L $CaCO_3$	44
Chloride	mg/L	0.87
Sulfate	mg/L	0.9
Suspended solids	mg/L	6
Arsenic	mg/L	< 0.002
Copper	mg/L	0.005
Lead	mg/L	< 0.001
Nickel	mg/L	< 0.01
Sodium	mg/L	0.92
Zinc	mg/L	0.035
Iron	mg/L	< 0.1
Magnesium	mg/L	6.6
Potassium	mg/L	0.5
Calcium	mg/L	9.9

Source: Fortin (2009, *personal communication*)

Calculation of Aquifer Recharge

Methodology

As a general rule, an aquifer that is being pumped recharges in three ways:

- by infiltration through the beds of watercourses and lakes (Q1), which is negligible in the case of Timmins 1 and 2;
- by infiltration through recharge areas and the areas influenced by the pumping (Q2);
- by undergroundwater trapped in the cone of depression (Q3).

The Q2 and Q3 values were obtained respectively by applying the following formulae:

Q2 = recharge area x infiltration from precipitation

Q3 = KiA

Where: K = hydraulic conductivity of the aquifer (value obtained at Ferriman 4)

i = hydraulic gradient

A = vertical area of recharge

Results

Table 5.14 shows the results of the calculation of groundwater recharge of Timmins 1.

Table 5.14: **Recharge of Timmins 1**

Site	Direct Recharge through Infiltration			Contribution of Groundwater to Recharge				Q2+Q3 (m^3/day)
	Recharge area (km^2)	Infiltration (30%P) (mm/y)	**Q2 (m^3/day)**	K (m/day)	i	A (m^2)	**Q3 (m^3/day)**	
Timmins 1	12.4	250	**8,479**	1.09	0.05	1,100m x 30m	**1,799**	**10,278**

P: precipitation
Source: Envir-Eau (March 2009)

Data Gaps

Much historical and recent information about the BLSA can be found in the literature. Certain field data, such as the results of pumping tests and piezometric verifications conducted by the former mine operator, are not available. A survey programme will be undertaken in 2009 to remedy this lack of data and to permit detailed planning of the operation of the mines. Nevertheless, the available data are considered to be adequate for the purposes of this EIS.

5.3.3.6 Hydrography and Hydrology

The following sections address the general flow pattern in the BLSA, monitoring data on flows and the water balance in Timmins 1. These data constitute the basis for assessing the effects of dewatering the pits and for optimizing future operations.

Hydrography

The flow pattern of the watercourses in DSO3 shows a system of parallel rivers characterized by sharp, often 90º, changes of course in a hydrographic network oriented north-south, as described by Hamelin (1968) for the Labrador geosyncline. Natural lakes and ponds are scarce, because DSO3 is located on the summit of a ridge of hills on the drainage divide between the Labrador and the Ungava Bay basins. A small watercourse located between Timmins 3N and Fleming 7N (Figure 5.3) infiltrates into the soil before it reaches the site formerly stripped by the IOCC, which demonstrates the high permeability of the bedrock.

The four pits formerly mined by the IOCC constitute the largest waterbodies in the BLSA. The pits were excavated to a depth of 30 to 100 m. Timmins 1 and Timmins 2 have an average water depth of 30 m. The pits do not form part of the surface flow pattern, since they have neither tributaries nor emissaries. They are fed either by precipitation or by groundwater recharge. Timmins 1 does, however, have an outlet, namely Elross Creek. This special feature of having no tributaries seems common and natural in the region, and was described for a lake near Schefferville (Kalnins 1979).

Two ponds that are not linked to the surface drainage network were probably created by the construction of the railway about 50 years ago. Their average depth does not exceed one meter, and they dry up in the fall. There are more watercourses in the western part of DSO3, including lac Pinette and Goodream Creek.

Finally, a wide ditch for draining the spring thaw loops around Timmins 1 and discharges into the source of Elross Creek. It receives snowmelt from the drainage basin. Water from further upstream is evacuated through a tunnel beneath the main access road that connects with a large depression near the railway loop. For several days in spring, the flow in that ditch is torrential.

Knowledge about the surface flow pattern in the area was updated through field observations and interpretation of NML's 2008 1:10,000 aerial photographs. Comparisons with the NTDB data of 1979, which seem not to have been updated since the 1950s, show that approximately 5.5 km of watercourses dried up during the mining operations of the IOCC.

Hydrology

The present section focuses on Timmins 1 and Elross Creek, for the following reasons:

- Elross Creek is the principal natural waterbody in the BLSA;
- Timmins 1 is fish habitat and is the source of Elross Creek.

Results

Most of the mining in DSO3 will be carried out within the basin of Elross Creek, which flows directly into the Howells River. Timmins 4 is located within the basin of Goodream Creek, which also discharges into the Howells River through Sunset Creek via Triangle Lake. The watercourses of the BLSA total 21.50 km in length, in two drainage basins covering an area of 24.91 km^2, for a drainage density of 0.85 km/km^2 (Figure 5.3). This low density is usually explained by the permeability of the soil (Horton 1945), but mining operations carried out in the last 50 years, including the excavation of four large pits in the BLSA, must have contributed to the low density, since a comparison between old maps and recent field inspections and aerial photographs showed a decrease in the length of watercourses.

Table 5.15 shows the dimensions and instant flow rate of the watercourses in the BLSA. The longest watercourse is the DSO3-15 reach of the emissary from Timmins 1. According to field observations in 2008, approximately 21% of the DSO3 watercourses are intermittent, since the DSO3-03, DSO3-06 and DSO3-11 reaches, covering a length of no less than 4.35 km, had dried up between July, when the first survey was done, and September.

Table 5.15: DSO3 Stream Dimensions and Flow Rate Survey

Reach	Start Coordinate		Number of Transects	Stream Dimensions* (Wet)				Instant Flow Rate* (m^3/h)
	Northing (m)	Easting (m)		Width (m)	Left Depth (m)	Middle Depth (m)	Right Depth (m)	
DSO3-02	6083606	624514	2	1.50	0.21	0.05	0.03	130
DSO3-03	6083747	624664	4	2.30	0.22	0.25	0.23	22
DSO3-06	6084138	624393	6	1.18	0.14	0.18	0.13	13
DSO3-08	6088875	620814	3	1.38	0.11	0.10	0.11	104
DSO3-11	6084944	620381	2	3.37	0.15	0.19	0.17	48
DSO3-13	6084944	620381	3	0.43	0.23	0.39	0.32	121
DSO3-14	6086422	620277	3	0.84	0.24	0.25	0.17	86
DSO3-15	6082846	621745	11	2.84	0.14	0.15	0.11	236

*Mean value of transects surveyed between July 17 and 19, 2008.

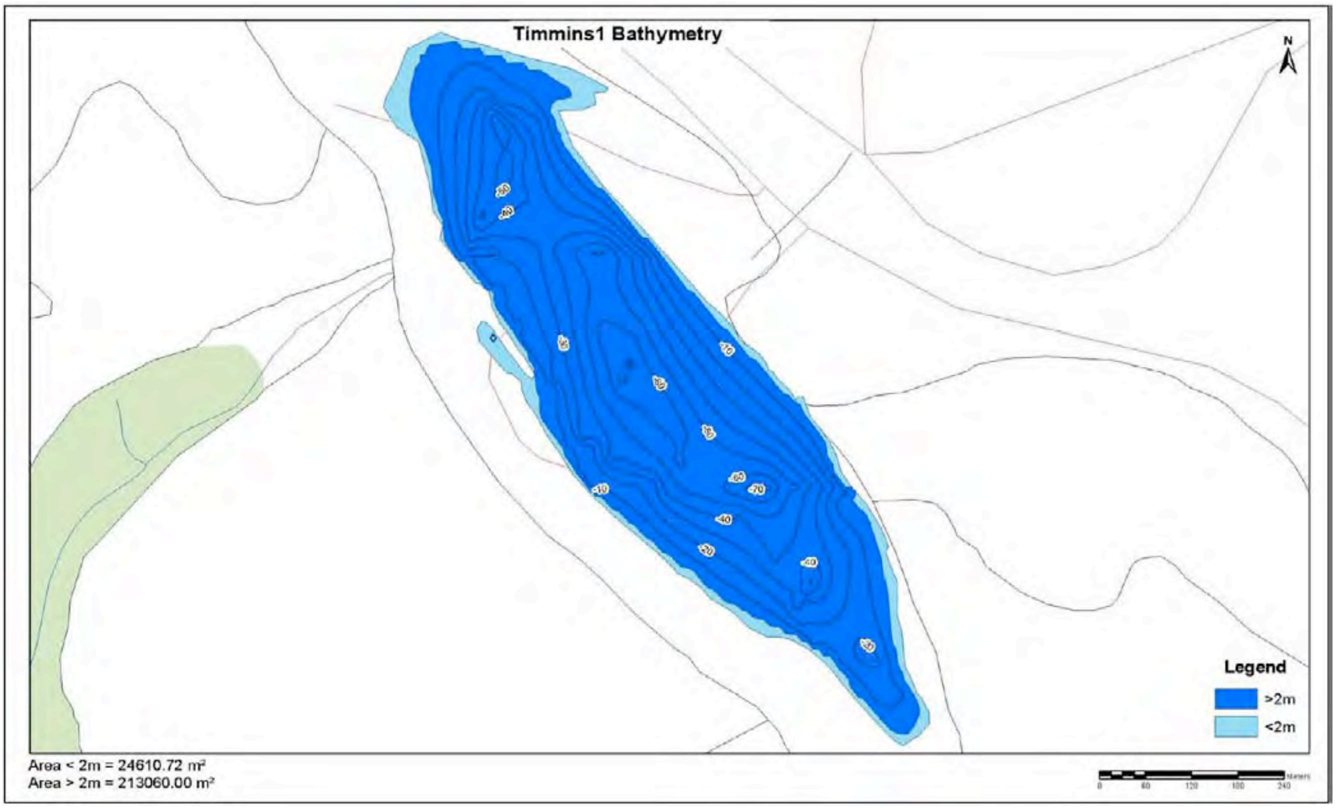
Source: AMEC (January 2009)

Water Budget for Timmins 1

The drainage basin in question is denuded or covered with shrubby tundra on its northern margin, since it corresponds in large part to a former mine site of the IOCC. Its area is 684.9 ha, excluding the waterbody in Timmins 1 (Figure 5.3). Two other pits occur in the drainage basin and lower the water table locally. Large dumps cover an important part of the site. The run-off slope is medium, not exceeding 15% near the drainage divide.

The source of the water in Timmins 1 is principally spring run-off, the water table and the precipitation that falls directly into the pit, the waterbody in which covers an area of 23.77 ha. Figure 5.7 shows that the pit contains a relatively important volume of water, estimated at approximately 7,500,000 m^3, with a maximum depth of approximately 70 m.

Figure 5.7: Bathymetric Profile of Timmins 1, September 2008



Source: AMEC (January 2009)

Table 5.16 shows the various steps in calculating the water budget. The first line relates to the evaluation of the specific flow. It indicates an average annual value of 1.88 mm/d. Expressed as a drainage coefficient, the values of the winter low flows are similar to those measured recently further downstream on the Howells River (Brace Centre for Water Resources Management August 2005). In 2005, the drainage coefficient for a basin of 246.7 km^2 was measured at 0.55 mm/d in mid March and at 0.48 mm/d at the end of April. The coefficients of average monthly drainage estimated from the hydrometric stations yield 0.34 and 0.35 mm/d for March and April respectively. Individually, the drainage coefficients vary from 0.22 to 0.51 mm/d for March and April. One can say therefore that the coefficients used are more conservative than those resulting from the field observations in 2005.

Table 5.16: Water Budget of Timmins 1

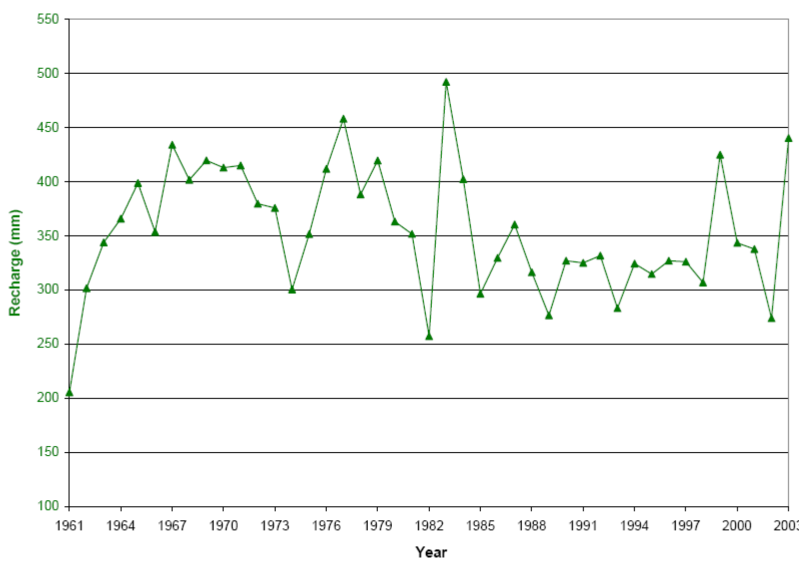
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Drainage coefficient (mm/d)	0.54	0.41	0.34	0.35	3.70	6.31	2.58	1.98	3.04	4.96	1.46	0.83
Inflow from watershed* (m^3/h)	155	117	96	100	1057	1801	737	565	867	1416	416	237
Precipitation on waterbody (m^3/h)					18	24	34	27	32	26		
Loss by evaporation (m^3/h)						33	34	27				
Outflow (m^3/h)	155	117	96	100	1075	1792	738	565	899	1442	416	237

* either from surface or ground
Source: Groupe Hémisphères (Novembre 2008b)

Expected Recharge Value

Based on the average monthly temperatures from the climate normals (Appendix 10), there are approximately six months during which recharge to the groundwater system will be available. From the Schefferville weather station, the mean monthly total precipitation data show that the summer months have the highest precipitation. Those data can be used to identify the range of precipitation with which to calculate low recharge and low baseflow conditions for this part of Labrador. Figure 5.8 shows the total annual recharge calculated by Fracflow Consultants (2005).

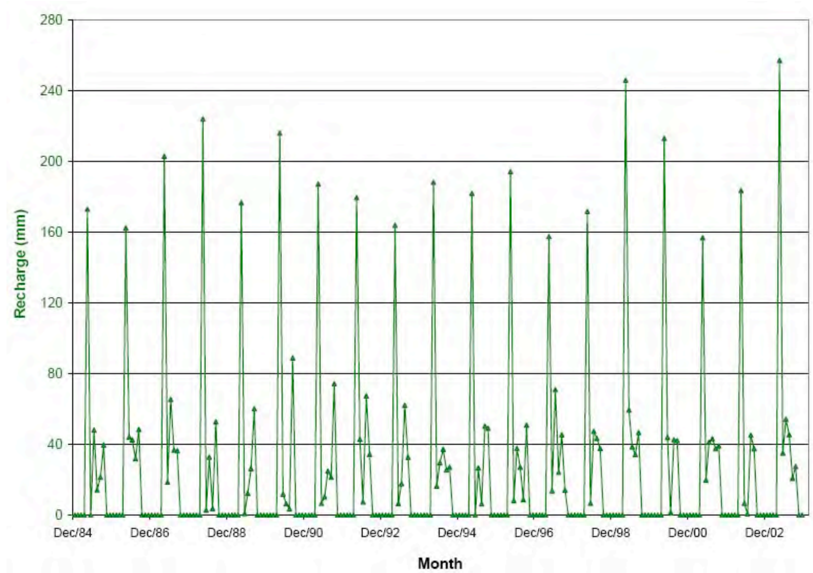
Figure 5.8: Total Annual Recharge, 1961 to 2003



Source: Fracflow Consultants (2005)

As Figure 5.9 shows, the estimates of mine pit groundwater inflows need to recognize that recharge takes place only over approximately six months each year.

Figure 5.9: Total Monthly Recharge, 1985 to 2003



Source: Fracflow Consultants (2005)

On the other side of the Howells River valley from DSO3, Fracflow Consultants (2005) used an annual recharge from 250 to 325 mm per year to simulate the inflow for the open pit planned for the LIOP.

Data Gaps

Very few hydrometric stations in small drainage basins (< 100 km^2) have been operating in Canada over long periods, by which we mean at least 15 years of flow data collected daily. There are no such stations within a 400-km radius of the ELAIOM. Smaller gauged watersheds do not exist in Québec (Bérubé 2009, *personal communication*) or in Labrador (Wills 2009, *personal communication*). Stations recently reopened for the Lower Churchill Project are missing many years of data.

5.3.4 Bedrock Geology

5.3.4.1 Results and Discussion

The entire BRSA is underlain by bedrock of the Canadian Shield. Two of the seven geological provinces into which the Canadian Shield is divided underlie the region surrounding Schefferville: Superior and Churchill.

Bedrock of the Superior Province, consisting of Archean rocks 2.5 to 4 billion years old, is exposed several kilometers west of the Howells River. Lithologies include cherty ironstone underlain by quartzite and the schistose to gneissic equivalents of the quartzite (Wardle *et al*. 1997).

Bedrock of the Churchill Province is exposed north-east of the Howells River, encompassing DSO2, DSO3, DSO4 and the Ville de Schefferville. The Churchill Province contains rocks 1.75 to 2.1 billion years old, including siltstone, shale and greywacke sequences with turbiditic origins and their schistose equivalents (Wardle *et al*. 1997). Most of the significant iron formations have been found in this Province.

The most prominent geological feature of the BRSA is the Labrador Trough. The Labrador Trough, associated with the Churchill Province, is a northwest-southeast-trending syncline that extends more than 800 km from western Labrador to the tip of the Ungava Peninsula. It separates the Archean rocks of the Superior Province to the west from the rocks comprising the North Atlantic Craton to the east. Its ridge-and-valley topography strongly influences local drainage patterns.

The rocks of the Labrador Trough are distributed in three belts, representing at least three cycles of tectonic activity and sedimentation (Wyroll 1971). Initial downwarping of the Archean basement rock allowed transgression of the historic sea, which facilitated deposition and chemical precipitation. Subsequent regressions of the sea, concurrent with volcanic activity, yielded a layering of the Wishart Formation (mainly quartzite) and, above, the Sokoman Formation (iron formations with chert). Finally, major uplift of land in the east led to further deposition and, ultimately, the Menihek Formation (calcareous and carbonaceous shales and slates). Weathered Menihek shales and slates are commonly exposed at surface in DSO2, DSO3 and DSO4.

During periods of metamorphism, the rocks were folded and faulted. Today, folds are locally well-exposed in ridge crests and river gorges east and west of the Howells River valley. Several streams cross-cut the northwest-southeast-trending folds, some following faults and others following gorges eroded by glacial meltwater. Differential erosion of the iron formations, which dip at about 10-12º to the north-northeast, is responsible for the distinctive terrace-like bedrock surface expression observed in parts of the BLSA.

On the high, windswept ridges within the BLSA, particularly those surrounding DSO4, weathered bedrock blankets intact rock. Post-glacial frost shattering, facilitated by the subarctic climate and locally fractured bedrock, has led to the accumulation of angular rock fragments against cliff bases and on ridge crests.

5.3.4.2 Data Gaps

There are no significant data gaps for bedrock geology within the ELAIOM.

5.3.5 Landforms, Glacial History, Surficial Deposits and Soils

This section presents a summary of Groupe Hémisphères (Mars 2009).

5.3.5.1 Regional Context

The main landscape elements of the Québec-Labrador Peninsula, including ridges, valleys and the pattern of the major drainage network, are the result of deformation and erosion of Pre-Cambrian (up to 3 billion years old) bedrock. Continental glaciations during the Quaternary Period (<2 million years) have modified areas of the landscape to varying degrees through the erosion of bedrock and the deposition of sediment and soil materials.

During the Quaternary Period, continental glaciations repeatedly covered most of Canada, including the Québec-Labrador Peninsula. The Laurentide Ice Sheet, which extended across mainland Canada from the foothills of the Rocky Mountains to Newfoundland, is believed to have had several centres, or ice divides, from which ice flowed outward. One of those ice divides, the Labrador Divide, appears to have been centred just several tens of kilometers north-west of Schefferville during the most recent, Late Wisconsin, glacial advance, which culminated locally about 8,000 years ago (Andrews *et al*. 1986). The variable orientations of glacially-streamlined landforms (*e.g.*, drumlins, roches moutonnées, striae) within the BLSA are consistent with this theory.

Till deposited beneath actively flowing glaciers and through passive let-down by melting ice covers most of the ground surface. Its continuity and thickness are, however, highly variable. Only a thin, discontinous veneer overlies bedrock west of the Howells River, whereas comparatively thick (up to several meters) ground moraine blankets the uplands to the east. The till is bouldery, with a silty sand matrix. Large erratics are scattered across the rolling plains.

Deglaciation appears to have occurred through gradual concentric retreat of the ice sheet from the margin toward the centre, with isolated areas of *in situ* downwasting of ice. Kettles and low-relief, hummocky moraine, as found near DSO4, are typical features of stagnant ice. Meltwater spillways and esker complexes radiate outward from the BLSA in regional-scale surficial geology mapping (Klassen *et al*. 1992). Boulder fields in some valley bottoms are probably the result of meltwater erosion of fine-grained sediments. According to radiocarbon dating of peat, the BLSA was not ice-free until 5,000 to 6,000 years ago (Nicholson 1971).

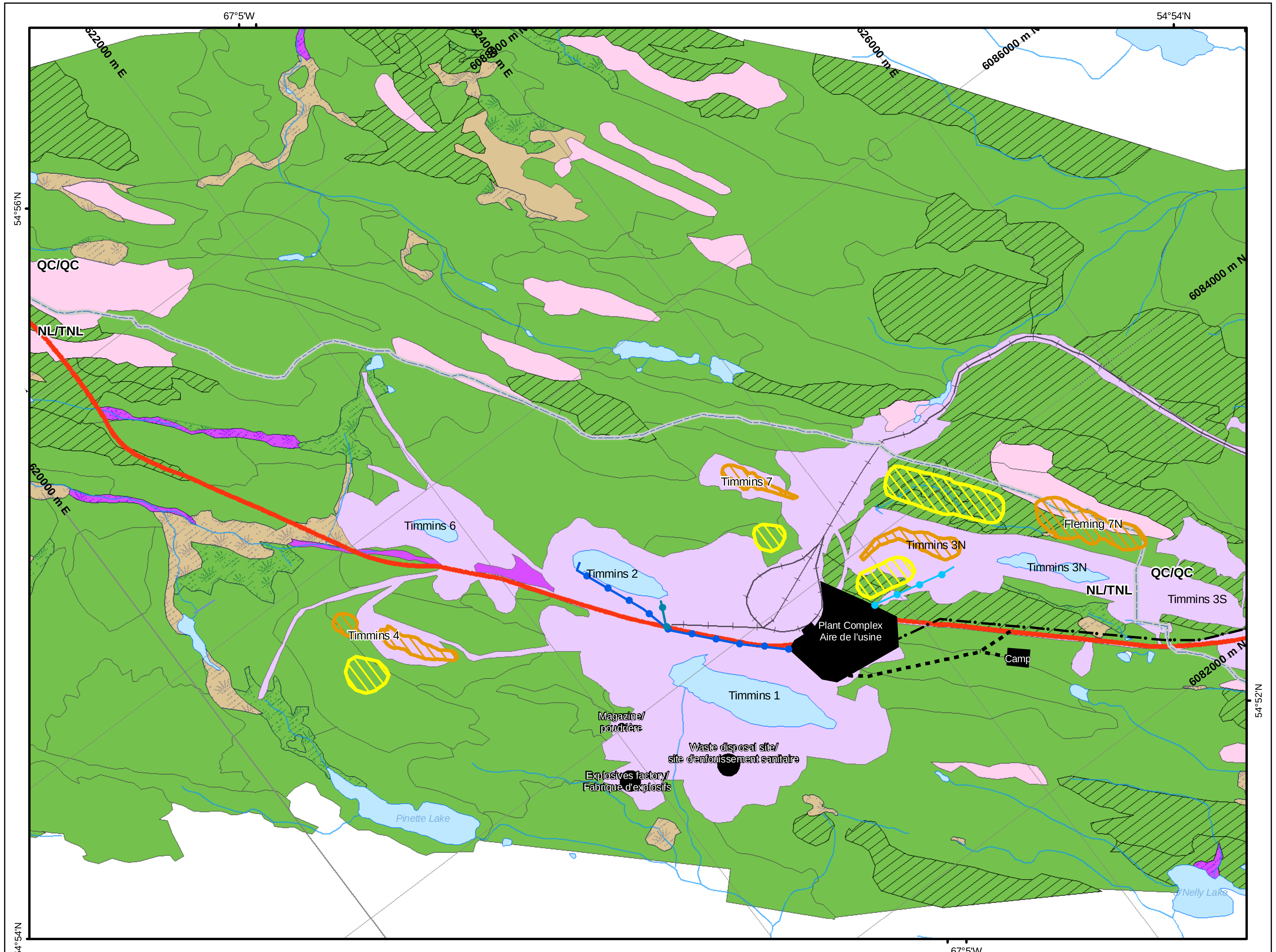
Early in the post-glacial period, particularly before vegetation had become established, a variety of processes modified the regional landscape. Periglacial activity was concentrated along windswept ridges and plateaux at high elevations, where snow depth during the long winter was minimal. As a result of glacial debuttressing and weathering, cliffs were particularly susceptible to frost shatter and mass movements. Colluvium accumulated along the bases of prominent hills and knobs. Streams eroded channels through glacial drift and formed small fans and deltas where they flowed into broad valley bottoms and lakes. Strong winds deflated till-covered ridges, leaving behind a gravelly surface lag and redistributing fine sediments into sheltered, low-lying areas. In valley bottoms and depressions within rolling to undulating plains, vegetation began to colonize. Wetlands formed in the most poorly-drained areas, such as along bedrock fractures and at the confluence of headwater streams and shallow subsurface drainage pathways, where high groundwater tables slowed the decomposition of organic material.

5.3.5.2 Soils

Due to the recent deglaciation, soils in the Schefferville region are relatively young. They generally developed on thin layers of drift which “although variable in composition often shows similarities with the underlying bedrock” (Nicholson and Moore 1977). In those areas where bedrock outcrops, soil development has not occurred at all (Nicholson and Thom 1973).

The soils can be classified as Alpine Dystric Brunisol, Regosolic Humic Gleysol and Lithic Regosol (Nicholson and Thom 1973). With the exception of soils underlain by dolomite, which are rich in calcium and magnesium, soils are acid and contain few nutrients (Waterway *et al*. 1984).

Groupe Hémisphères (Mars 2009) (Appendix H) conducted intensive fieldwork. More than 100 soil pits were dug. They confirmed the presence of Dystric Brunisol, Regosolic Humic Gleysol and Lithic Regosol. Several Humo-ferric Podzols were also found in acidic coniferous forest stands, and Humic Regosols were found along streams. Evidence of cryoturbation was observed within Dystric Brunisol in several locations at elevations higher than 650 m asl.



LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Proposed road/ route proposée
- Fresh water pipeline/ conduite d'eau de puits
- Process water pipeline/ conduite d'eau de procédé
- Tailings pipeline/ conduite de rejets miniers
- Powerline/ ligne de transport d'énergie
- Proposed pit/ fosse proposée
- Proposed waste dump/ halde de stériles proposée
- Infrastructure footprint/ empreinte de l'infrastructure
- Disturbed area/aire perturbée
- Watercourse/cours d'eau
- Waterbody/plan d'eau
- Wetland/milieu humide

Terrain Map
Dépôts de surface

DSO3 Sector
Secteur DSO3

HEMISPHERES le groupe

0 500 1,000 2,000 3,000
m

Scale/Échelle: 1:30000

UTM 19N NAD 83

FILE, VERSION, DATE, AUTHOR/ FICHIER, VERSION, DATE, AUTEUR: GH-0017-04, 2009-06-25, J.T.

Figure 5.10

LANDFORM

MORAINAL
- **ME** End moraine
- **MG** Ground moraine
- **MH** Hummocky moraine

GLACIOFLUVIAL
- **GD** Ice contact delta, esker delta, kame delta, delta moraine
- **GE** Esker, esker complex, crevasse filling
- **GK** Kame, kame field, kame terrace, kame moraine
- **GO** Outwash plain, valley train

ALLUVIAL
- **AP** Alluvial plain

COLLUVIAL
- **CS** Slope failure
- **CT** Talus pile

EOLIAN
- **ED** Sand dunes

ORGANIC
- **OT** Organic terrain

BEDROCK
- **RL** Bedrock plateau
- **RN** Bedrock knob
- **RP** Bedrock plain
- **RR** Bedrock ridge
- **/ R** Bedrock below a drift veneer

Drift veneer (<2 m) Overlying bedrock

MATERIAL
- **b** boulders, bouldery
- **c** clay, clayey
- **g** gravel, gravelly
- **p** peat, muck
- **r** rubble
- **s** sand, sandy
- **m** silt, silty
- **t** till

TOPOGRAPHY

LOCAL RELIEF
- **H** Mainly high local relief (>60 m)
- **M** Mainly moderate local relief (15 - 60 m)
- **L** Mainly low local relief (<15 m)

VARIETY
- **c** channelled
- **d** dissected, gullied
- **j** jagged, rugged, cliffed
- **k** kettled, pitted
- **n** knobby, hummocky
- **p** plain
- **r** ridged
- **s** sloping
- **t** terraced
- **u** undulating to rolling
- **w** washed, reworked

DRAINAGE

SURFACE CONDITION
- **x** Very rapidly drained
- **r** Rapidly drained
- **w** Well drained
- **m** Moderately well drained
- **i** Imperfectly drained
- **p** Poorly drained
- **v** Very poorly drained
- **h** Suspected high water table

FORMES DU RELIEF

MORAINIQUE
- **ME** Moraine frontale
- **MG** Moraine de fond
- **MH** Moraine bosselée

FLUVIOGLACIAIRE
- **GD** Delta juxtaglaciaire, delta d'esker, delta de kame, delta de moraine
- **GE** Esker, complexe d'eskers, remplissage de crevasses
- **GK** Kame, champ de kame, terrasse de kame, moraine de kame
- **GO** Épandage fluvioglaciaire, traînée fluvioglaciaire

ALLUVIAL
- **AP** Plaine alluviale

COLLUVIAL
- **CS** Rupture de versant
- **CT** Éboulis rocheux

ÉOLIEN
- **ED** Dune sableuse

ORGANIQUE
- **OT** Sol organique

ROCHE-MÈRE
- **RL** Plateau de roche-mère
- **RN** Colline de roche-mère
- **RP** Plaine de roche-mère
- **RR** Crête de roche-mère
- **/ R** Placage sur roche-mère

Placage (<2 m) Placage superposé à la roche-mère

MATERIAU
- **b** bloc
- **c** argile, argileux
- **g** gravier, graveleux
- **p** tourbe, terre tourbeuse
- **r** blocaille, blocailleux
- **s** sable, sableux
- **m** silt, silteux
- **t** till

TOPOGRAPHIE

FORME DE RELIEF LOCALE
- **H** Relief local généralement accidenté (> 60 m)
- **M** Relief local généralement modéré (15 - 60 m)
- **L** Relief local généralement plane (< 15 m)

VARIÉTÉ DE RELIEF
- **c** sillonné
- **d** disséqué , raviné
- **j** anguleux, anfractueux, escarpé
- **k** à marmite
- **n** martelé, bosselé
- **p** plat
- **r** crêté
- **s** incliné
- **t** étagé
- **u** ondulé à vallonné
- **w** lessivé , remanié

DRAINAGE

EN SURFACE
- **x** Très rapidement drainé
- **r** Rapidement drainé
- **w** Bien drainé
- **m** Modérément bien drainé
- **i** Imparfaitement drainé
- **p** Mal drainé
- **v** Très mal drainé
- **h** Nappe phréatique présumée élevée

Sources: Government of Canada, NTDB, 1:50 000, 1979
Government of Newfoundland and Labrador and Government of Quebec, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Groupe Hémisphères, Hydrology update, 2008
Ecoregion boundaries from Groupe Hémisphères, according to litterature

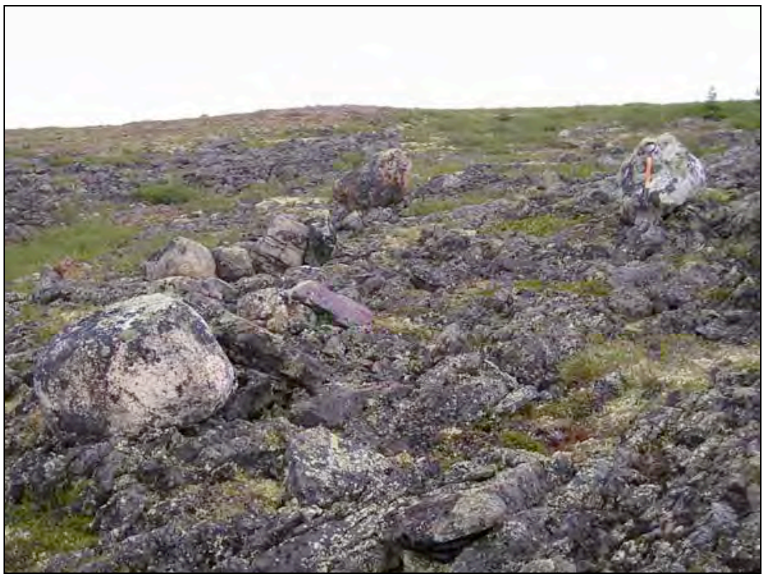
Gouvernement du Canada, BNDT, 1/50 000, 1979
Gouvernement de Terre-Neuve-et-Labrador et Gouvernement du Québec, frontière utilisée pour les titres
New Millennium Capital Corp., gisements et routes
Groupe Hémisphères, mise-à-jour de l'hydrologie, 2008
Limites des écorégions par Groupe Hémisphères, basées sur la littérature

5.3.5.3 BLSA Description

Figure 5.10 presents the various surficial deposits of the DSO3 area.

Bedrock is exposed in 1% of the BLSA. Outcrops with moderate relief (*i.e.*, 15-60 m) are common in high-elevation ridge crests that were subjected to the most intense glacial scour, but they are uncommon in low-relief upland areas and in valleys. Through weathering, mainly frost shatter, many bedrock surfaces have accumulated a thin cover of cobbles and boulders, which can be distinguished from till-derived boulders by their distinct angularity and occasional jigsaw-like arrangement (Figure 5.11).

Figure 5.11: Frost-shattered Bedrock and Rounded Till-derived Boulders



In general, exposed bedrock is well- to rapidly-drained, with thin Regosolic or Brunisolic soils restricted to fractures and sheltered depressions. Bedrock-dominated areas are covered by Ecotypes HST02 and HST03 (see Table 5.22).

Although punctuated by isolated bedrock outcrops, till has by far the greatest areal coverage of any landform within the BLSA, 77%. Discontinuous till veneers (<2 m) predominate on upper valley sides and the flanks of ridges, typically representing a transitional area between exposed bedrock and thicker, more continuous till blankets. Silty sand till veneers typically support well-drained soils and vegetation communities tolerant of periodic dry conditions. For example, within the BLSA, Ecotypes MSF05 and HST03 cover a large, continuous area of well-drained till. However, thick, moderately-drained till located on lower slopes supports ecotypes MSF01, MSF06, HST01 and HST04.

Till blankets ranging in thickness from about two to five meters occupy middle and lower valley sides, as well as valley bottoms not subjected to major erosion by glacial meltwater (Figure 5.12). Landforms composed of till most commonly exhibit a low-relief (*i.e.*, <15 m), rolling to undulating, surface expression, except where the underlying bedrock is rugged. Cobbley ablation till, deposited in association with downwasting ice and meltwater, exhibits a low-relief hummocky surface expression (Figure 5.13). Rail cuts and valleyside scarps reveal localized areas of till with depths of more than 10 m. On slopes, the till is generally well-drained, supporting Ecotype MSF01. In localized depressions and low-lying areas, however, the till may be moderately well-drained. The soil moisture in these areas is sufficient to promote the development of gleysol soils and to support Ecotypes MSF08 and, to a lesser extent, HST07.

Figure 5.12: Thick Till Blanket Supporting a Shrubby Vegetation

Figure 5.13: Cobbley Ablation Till

Evidence of glacial meltwater floods is widespread within the BLSA. Extensive valleyside deposits of till have been dissected, or channelled, by meltwater, in places exposing underlying bedrock. However, surprisingly few glaciofluvial deposits exist (<1% of areal coverage).

Several streams, which tend to follow the roughly northwest-southeast-oriented bedrock fractures and fold axes, exist within the BLSA (1% of areal coverage). Their beds are commonly armoured with cobble and boulder pavements derived from the underlying till substrate. However, most have discontinuous alluvial floodplains composed of sand and silt, with localized organics. Imperfectly-drained Cumulic Regosols in such floodplain areas support diverse vegetation communities, such as those associated with Ecotypes MSF07, MSF15 and HST05. Bedrock is exposed in some stream beds, forming cascade or step-pool channels with less diverse riparian vegetation (Figure 5.14). Riparian areas have a high biodiversity compared to the rest of the BLSA and are important habitats for wildlife.

Figure 5.14: Bedrock Step-Pool Stream

Wetlands are scattered throughout the BLSA, typically occupying eroded fractures within the underlying bedrock, isolated depressions within a rolling till blanket or low-lying areas at the confluence of surface or subsurface drainage paths. They have an areal coverage of 2%. Most wetlands are shallow, as indicated by boulders exposed in their centres, and exhibit poorly- to very poorly-drained mineral soils (Figure 5.15). Some, however, contain peaty organic material with thicknesses up to several meters (Figure 5.16). The groundwater table is at or near the surface throughout the wetlands, with areas of open water being common. Some wetlands have formed along the base of the valleysides in association with groundwater seepage areas. Ecotypes MSF10, MSF12, MSF14, HST06 and HST07 are associated with wetlands. All soils associated with fen wetlands are either Mesisol or Fibrisol (Organic Order) of various depths. As for the riparian areas, the wetlands shelter specific plant communities representing unique habitats for herptiles, birds and various mammals.

Figure 5.15: Wetland with Shallow Organic Deposits

Figure 5.16: Wetland with Thick Organic Deposits

A considerable portion of the BLSA (*i.e.*, 19%) has been anthropogenically disturbed by mining activity, which ended in 1982 (Figure 5.17). Alongside open pit mines, waste rock and tailings piles are up to 100 m high. Some have been stable long enough that vegetation, mainly willows and grasses, has begun to establish itself on the surface, particularly in pockets of fine sediment. Abandoned access roads, as well as the spoil from test pits and trenches, are also becoming vegetated.

Figure 5.17: Anthropogenically Disturbed Landscape

5.3.5.4 Permafrost

The first casual observations of frozen ground conditions in Labrador-Ungava, which covers northern Québec and Labrador and parts of the Côte-Nord and of Abitibi-Témiscamingue, were reported by Jenness (1949), who mapped what is now Schefferville as the "tentative southern limit of continuous permafrost". Thomas (1953) later described the same boundary as the "approximate southern limit of permafrost", noting that permafrost-free areas of limited extent occurred north of the boundary. Based on the same field data, Black (1951) concluded that there was no continuous permafrost in Labrador-Ungava and indicated the boundaries of discontinuous and sporadic zones. The southern limit of discontinuous permafrost was put at some 160 km north of Schefferville, while the sporadic zone extended to within 80 km of the Gulf of St Lawrence (Pryer no date).

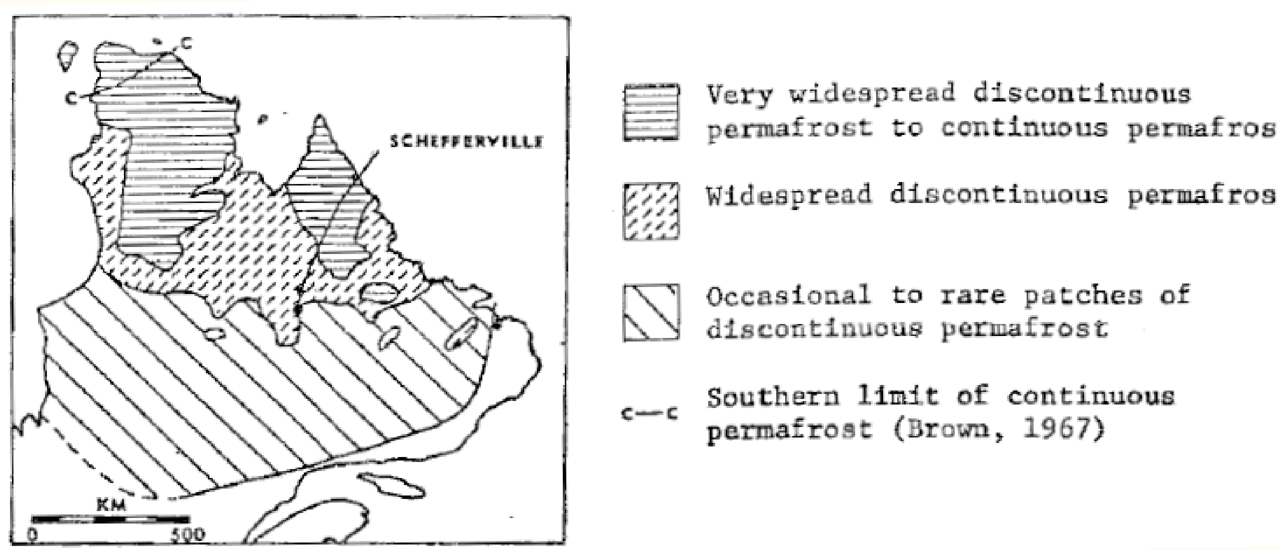
Mining near Schefferville after 1954, however, revealed evidence that permafrost was more widespread than had been estimated. Measurements by the IOCC showed that permafrost extended over 60 m in depth (Pryer no date). A permafrost distribution map based on field observations (Brown 1960) showed a narrow coastal area of continuous permafrost along the shores of Hudson Strait and Ungava Bay, while the southern limit of discontinuous permafrost was drawn close to the 55th parallel of latitude, slightly to the north of Schefferville. On the basis of both field observations and ground temperature investigations near Schefferville, Ives (May 1962) predicted the occurrence of contemporary permafrost based on vegetative cover and topography.

Although the ground temperature investigations were inconclusive, the results suggested that, under the subarctic conditions of Labrador-Ungava, relief, snow cover and vegetation influence the development and preservation of permafrost (Ives 1961). Ives (1961) found that the spread of vegetation after deglaciation played a critical role in the degeneration of widespread permafrost into scattered areas of frozen ground in an unstable equilibrium with the contemporary climate.

Nicholson (February 1978b) conducted research on permafrost distribution at various sites in the Schefferville area, including Timmins 4 and Fleming 7, at an elevation of 700 m asl, between 1973 and 1975. He concluded that extensive, deep permafrost underlies those areas that are higher in elevation, exposed and where tundra vegetation covers the ground. Permafrost at those sites ranges from 60 to 100 m in depth, though completely unfrozen areas occur in valleys on the margins of these sites. On less-exposed and lower-lying ground, which is covered by woodland, no permafrost is present (Nicholson and Lewis 1976). Beneath those waterbodies in the Schefferville area that are deep enough not to freeze solid during winter, due to their capacity to produce higher ground temperatures, permafrost is expected to be absent; nor is it expected to occur within 100 feet from permanently covered shoreline (Nicholson February 1978b).

Nicholson and Lewis (1976) also found that deep active layers to 10 m and more and talik zones, typically 15 to 30 m deep, are found in association with wet lines, in which there is substantial groundwater movement. Due to heat-transport by moving groundwater, possibly aided by the frozen ground being permeable along larger voids, the frost table retreats rapidly at times on deep active layer sites. Figure 5.18 shows the understanding of Nicholson and Lewis (1976) of the distribution of permafrost in Labrador-Ungava.

Figure 5.18: Distribution of Permafrost, Labrador-Ungava



Source: Nicholson and Lewis (1976)

Anecdotal reports from drillers at NML's summer 2008 camp near DSO4 corroborate the observation of Nicholson and Lewis (1976). Visible (ice-rich) permafrost was encountered until at least nine meters below the surface (Groupe Hémisphères Mars 2009).

During fieldwork, Groupe Hémisphères (Mars 2009) observed on high, windswept uplands and ridges the widespread presence of cryoturbation, which is the mixing of soil horizons due to freezing and thawing, commonly in association with underlying permafrost. The presence of cryoturbation may indicate permafrost at considerable depth, consistent with

Nicholson and Lewis (1976), or simply the disruption and churning of shallow soil as a result of freeze-thaw unrelated to permafrost.

Groupe Hémisphères (Mars 2009) concludes that “it is assumed that permafrost may be present in certain exposed sites, but not at depths that directly influence soil rooting conditions [...] Soils in these sites are best described as cryoturbated phases of a Burnisol or Regosol”.

5.3.5.5 Data Gaps

There are no significant data gaps in the knowledge of landforms, glacial history, surficial deposits and soils. A comprehensive mapping of surficial deposits and landforms was performed in 2008 by Groupe Hémisphères (Mars 2009) and is reproduced in Appendix H.

5.3.6 Soil Quality

5.3.6.1 Literature Review

The Bloom Lake EIS (Génivar Décembre 2006) showed the following average concentrations of metals in the soil: Al (5,000 mg/kg), Ba (60 mg/kg), Cr (25 mg/kg), Fe (6,000 mg/kg), Ni (8 mg/kg) and Mg (2,000 mg/kg).

Data from the Newfoundland and Labrador Department of Natural Resources (2009, Internet site) were also consulted. The Mineral Occurrence Data System gives some average metal concentrations for soils of the BRSA.

5.3.6.2 Results

Ten locations corresponding to the locations of the future mine facilities were sampled. All metals analyzed and parameters complied with the applicable requirements of the Soil Quality Guidelines (CCME 2008, Internet site) (Table 5.17). Where comparisons are possible, the measured values for various metal concentrations are lower than the concentrations measured in the region through the MODS. The average metal concentrations measured by the Newfoundland and Labrador Department of Natural Resources (2009, Internet site) in the same area for zinc and arsenic even exceed the recommendations prescribed in the CCME Soil Quality Guidelines (CCME 2008, Internet site).

5.3.6.3 Data Gaps

There are no significant data gaps in knowledge related to soil quality. Comprehensive regional soil quality data are available from the Newfoundland and Labrador Department of Natural Resources and 10 soil samples were collected and analyzed within the ELAIOM site limits.

Table 5.17: Soil Quality for DSO2 and DSO3

Sample ID	MDL	MINE SITE 1-0-0.05	MINE SITE 1-0-0.30	MINE SITE 1-0-0.30 Lab.Dup.	MINE SITE 2-0-0.05	PARC DS03 1-0-0.05	PARC DS03 2-0-0.05	GISE DS03 1-0-0.05	GISE DS03 2-0-0.05	GISE DS02 1-0-0.05	PARC DS02 1-0-0.05	CCME guidelines	MODS
Lab. Number		G08248	G08277	G08277	G08278	G08279	G08280	G08281	G08282	G08283	G08287	(mg/kg)	
Date Collected		2008-10-27	2008-10-27	2008-10-27	2008-10-27	2008-10-27	2008-10-27	2008-10-27	2008-10-27	2008-10-26	2008-10-27		
Location (UTM-Nad83)		19T 623606 6083840	19T 623606 6083840	19T 623606 6083840	19T 623502 6084564	19T 621181 6085802	19T 624390 6083260	19T 625530 6082857	19T 621166 6085456	19T 631912 6078931	19T 631218 6079099		
METALS													
Aluminium (Al)	20	9900	8600	9200	4900	12000	11000	11000	8200	5500	7500	-	-
Antimony (Sb)	2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
Arsenic (As)	6	ND	ND	ND	ND	6	10	11	6	ND	ND	12	15-39
Barium (Ba)	5	28	33	39	31	29	22	26	41	33	51	2000	-
Boron (B)	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
Cadmium (Cd)	0,5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	22	-
Chromium (Cr)	2	21	21	23	27	23	22	19	20	14	20	87	-
Cobalt (Co)	2	10	9	12	5	11	9	5	6	9	7	-	-
Copper (Cu)	2	16	25	28	9	20	26	15	10	10	8	91	38-76
Iron (Fe)	10-100	38000	34000	37000	23000	33000	37000	39000	43000	39000	59000	-	-
Lead (Pb)	5	11	11	12	8	14	20	18	12	6	13	600	22-33
Nickel (Ni)	1	13	17	19	10	18	19	11	9	7	6	50	28-54-
Magnesium (Mg)	10	2000	2600	2700	2000	2900	3000	2200	1700	1300	990	-	-
Manganese (Mn)	1	1200	1100	1300	670	990	890	680	970	1500	1600	-	-
Molybdenum (Mo)	2	ND	ND	ND	ND	ND	ND	3	ND	ND	ND	-	-
Selenium (Se)	1	ND	ND	N/A	ND	ND	ND	ND	ND	ND	ND	2.9	-
Tin (Sn)	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-
Zinc (Zn)	10	38	42	49	21	52	57	39	29	20	19	360	116-1945
MINERALS													
Sulfur (S)	0.01	0.03	0.02	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-
% Humidity	N/A	19	13	13	14	20	22	22	19	13	20	-	-

Legend

ND = Not detected

- = Non-applicable or non-available

MDL: Method Detection Limit

Lab-Dup = Laboratory-Initiated Duplicate

Shaded area exceeds CCME commercial/industrial land use

MODS: Average concentrations from Mineral Occurrence Data System

Sources: Compiled by GHI

5.3.7 Sediment Quality

5.3.7.1 Literature Review

The average metal concentrations found in lake sediments within DSO3 according to the MODS are similar to those in lake and stream sediments collected in the catchment area of the Pékan and Caniapiscau rivers (Génivar Décembre 2006) (Table 5.18).

Table 5.18: Average Concentrations of Bloom Lake Sediments Compared to MODS Data for DSO3

Average Concentrations (mg/kg)	Al	As	Cd	Co	Cr	Cu	Fe	Hg	Pb	Ni	Zn
Bloom Lake	4600-14000	-	-	2000-3300	-	24-30	11000-18000	-	-	-	113-180
MODS	-	13-61	14-48	-	49-73	58-12380		180-900	9-15	22-50	196-19000

Sources: Genivar (Décembre 2006); Newfoundland and Labrador Department of Natural Resources (2009, Internet site)

5.3.7.2 Results

Results were compared to the CCME Canadian Sediment Quality Guidelines for the Protection of Aquatic Life.

Two determining standard guidelines for sediment quality were identified on the basis of risk analysis studies done by the CCME:

- the ISQG: when the concentration is exceeded without exceeding the threshold concentration producing the PEL. Within this range, adverse biological effects on biota are sometimes observed (25-50% of cases);
- the PEL: in this range, adverse biological effects on biota are frequently observed (more than 50% of cases).

A summary of the results is found in Table 5.19. Arsenic exceeded the ISQG guideline at sites DSO2-03 and DSO3-05, but without exceeding the PEL guideline. Cadmium was slightly higher than the ISQG guideline at sites DSO2-03, DSO3-03, DSO3-05 and Timmins 1, again without exceeding the PEL guideline.

All other metals and physical parameters analyzed respect the applicable guidelines of the CCME and do not exceed the ISQG and PEL levels. The measured values for various sediment variables are lower than or similar to the concentrations measured in lakes close to the BLSA. Sediment quality in the BLSA is, therefore, comparable to that found in undisturbed environments in the same region (Newfoundland and Labrador Department of Natural Resources 2009, Internet site). It is important to mention that the average natural concentrations of arsenic, cadmium, copper and zinc in the region exceed the recommendations prescribed in the CCME Soil Quality Guidelines (CCME 2008, Internet site).

Table 5.19: Summary of Laboratory Results of Sediment Samples Collected in September 2008

Lab Number			S2008-13081	S2008-13082	S2008-13083	S2008-13084	S2008-13085	S2008-13086	S2008-13087	CCME Guideline	
Sample ID			DS03-14	Star 1	DS02-03	Timmins 1	DS03-05	DS03-07	DS03-03		
Date Collected			10-Sep-08	11-Sep-08	11-Sep-08	12-Sep-08	13-Sep-08	13-Sep-08	13-Sep-08		
Parameters	Unit	MDL								ISQG	PEL
Aluminum	(µg/g)	5	7290	3150	4420	1510	7430	6110	6230	-	-
Antimony	(µg/g)	0.5	0.7	0.6	1.4	1.3	1.7	1.2	0.5	-	-
Arsenic	(µg/g)	0.5	5.3	4.4	10.2	3.0	9.2	2.9	3.9	5.9	17.0
Barium	(µg/g)	0.5	24.8	6.2	24.2	70.4	14.6	13.9	10.6	-	-
Beryllium	(µg/g)	0.2	0.2	0.3	0.4	0.3	0.3	0.4	0.3	-	-
Bismuth	(µg/g)	0.2	<0.2	<0.2	0.7	0.7	1.0	<0.2	<0.2	-	-
Boron	(µg/g)	1	13	8	37	42	33	19	38	-	-
Cadmium	(µg/g)	0.5	<0.5	<0.5	0.9	0.8	0.8	0.5	0.7	0.6	3.5
Calcium	(µg/g)	25	291	1750	2680	119	116	266	174	-	-
Chromium	(µg/g)	1	11	9	12	4	17	13	9	37.3	90.0
Cobalt	(µg/g)	1	1	2	7	19	5	5	1	-	-
Copper	(µg/g)	1	9	4	5	12	11	10	10	35.7	197.0
Iron	(µg/g)	5	16600	7620	40600	45000	38400	23000	16400	-	-
Lead	(µg/g)	5	9	<5	12	13	13	12	6	35.0	91.3
Magnesium	(µg/g)	10	1100	1030	2250	486	2030	2550	1150	-	-
Manganese	(µg/g)	1	71	70	1420	2800	228	136	36	-	-
Mercury	(µg/g)	0.01	0.10	0.04	0.03	0.16	0.06	0.04	0.05	0.17	0.49
Molybdenum	(µg/g)	2	<2	<2	<2	<2	<2	<2	<2	-	-
Nickel	(µg/g)	5	6	<5	9	5	10	14	6	-	-
Phosphorus	(µg/g)	5	739	781	565	116	310	427	397	-	-
Potassium	(µg/g)	10	860	562	457	173	380	436	390	-	-
Rubidium	(µg/g)	2	9	6	6	3	6	5	6	-	-
Selenium	(µg/g)	0.1	0.3	0.8	0.3	<0.1	0.1	<0.1	0.1	-	-
Silicon	(µg/g)	5	7	8	19	26	11	55	8	-	-
Silver	(µg/g)	0.25	0.36	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	-	-
Sodium	(µg/g)	25	168	131	141	104	139	131	107	-	-
Strontium	(µg/g)	2	2	<2	3	<2	<2	<2	<2	-	-
Sulphur	(µg/g)	5	1690	4690	458	23	114	292	1370	-	-
Tellerium	(µg/g)	2	<2	<2	5	5	5	3	3	-	-
Thallium	(µg/g)	0.5	<0.5	<0.5	<0.5	2.3	<0.5	<0.5	<0.5	-	-
Tin	(µg/g)	2	<2	<2	<2	<2	<2	<2	<2	-	-
Titanium	(µg/g)	2	97	37	91	68	59	54	36	-	-
Uranium	(µg/g)	0.5	22.7	10.4	55.1	65.3	59.5	34.5	24.2	-	-
Vanadium	(µg/g)	5	16	<5	11	<5	13	10	8	-	-
Zinc	(µg/g)	2	23	36	45	17	29	48	17	123.0	315.0

Source: AMEC (January 2009)

Legend

MDL: Method Detection Limit
CCME: Canadian Council of Ministers of the Environment
- : Value not established

ISQG : Interim Freshwater Sediment Quality Guidelines
PEL : Probable Effects Level
Shaded area exceeds CCME Guidelines

5.3.7.3 Data Gaps

There are no significant data gaps in knowledge related to sediment quality. Comprehensive regional sediment quality data are available from the Bloom Lake mining project EIS (Genivar Décembre 2006) as well as from the Newfoundland and Labrador Department of Natural Resources. Seven sediment samples from within the ELAIOM site limits were also collected and analyzed.

5.3.8 Seismicity

The Schefferville station of the FDSN is located within the Eastern Background seismic zone, in which low-level but occasionally significant seismicity may occur. The region is seismically quiet in all directions from the station for more than 300 km (FDSN no date, Internet site). Blasts from the mines near Labrador City are recorded several times weekly. They normally range from 2<MN<3.

5.3.8.1 Data Gaps

Because this station has been in operation since 1995 without interruption, no data gap exists.

5.4 Biological Environment

5.4.1 Background Studies

Sections 5.4.2 and 5.4.3 present some descriptions of data-collection methodologies. More detailed descriptions are provided in Appendix 9 and in Appendices A, E, F, G and H.

5.4.2 Terrestrial Ecosystems

5.4.2.1 Ecosystem Mapping

Terrestrial ecosystem mapping makes it possible to classify and map the various terrestrial ecosystems present in a given territory. TEM includes forest ecosystems, the tundra, riparian ecosystems and wetlands. The approach used for the TEM included a description of the physical characteristics of the terrestrial ecosystems, such as landforms, drainage, surface geology and soil types. It also included certain biological characteristics of the terrestrial ecosystems, specifically the composition of the plant communities and the forest stands.

The TEM also made it possible to evaluate the quality of wildlife habitats and to assess the potential effects of the Project on highly-valued components such as rare plant species, sensitive ecosystems and ecological processes. In parallel with the description and mapping of the terrestrial ecosystems, a detailed survey of plants at risk was carried out throughout the area of the ELAIOM, including the BLSA. Field-sampling targeted ecosystems highly likely to contain plants at risk.

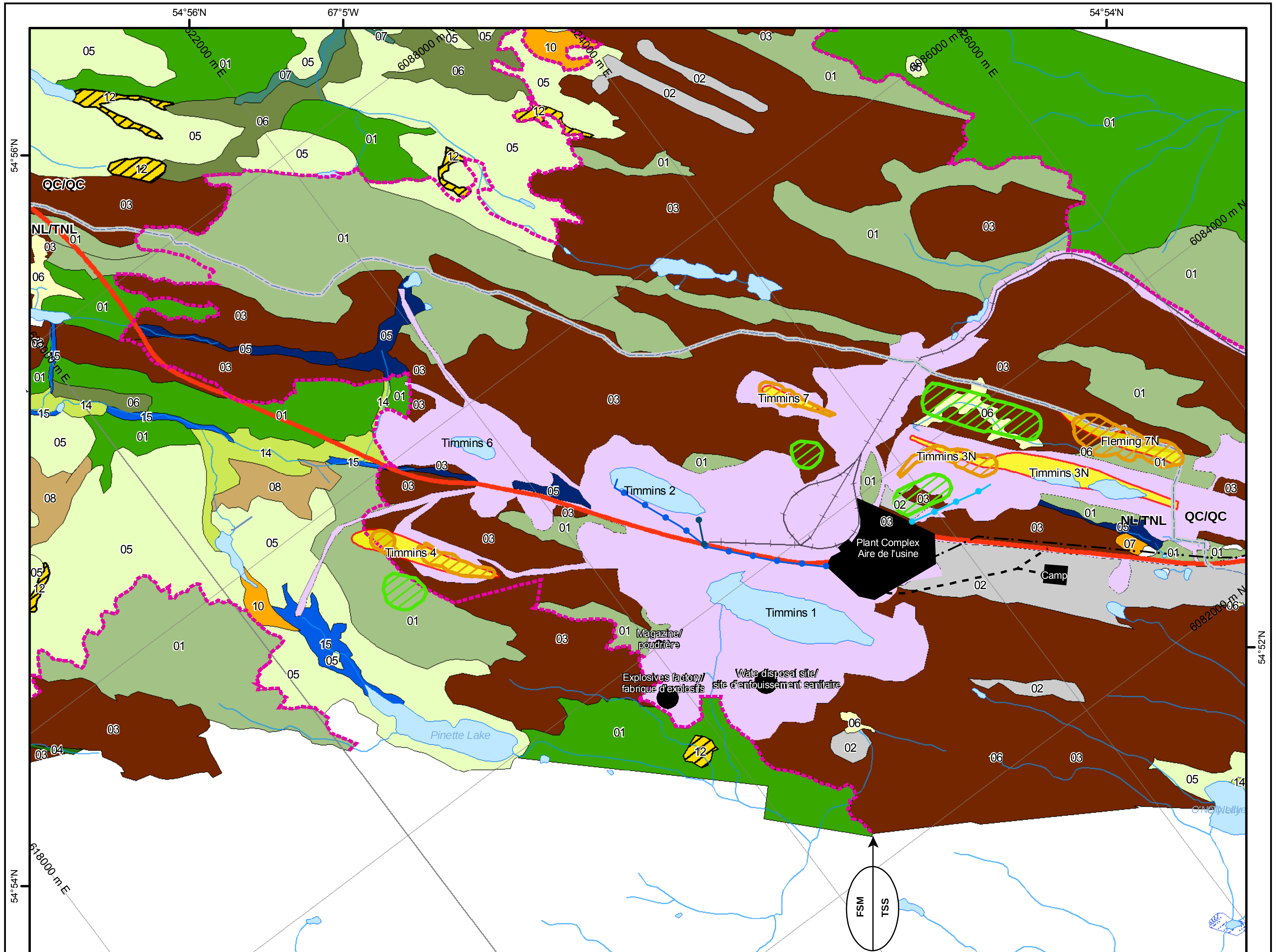
The TEM for the ELAIOM used the same methodology as that used in the 2006 TEM for the LIOP. Given the proximity of the two sites to one another and the similar floral composition of both areas, the same classification of ecotypes was used.

5.4.2.2 Local and Regional Distribution of Terrestrial Ecosystems

The Schefferville area lies in the broad transitional zone between the boreal forest and the tundra, with a vegetation cover ranging from closed spruce forest to tundra at higher altitudes (Nicholson and Thom 1973; Jones 1976). The distribution of cover types is diverse and is closely linked with drainage and microclimatic factors such as snow accumulation and exposure (Jones 1976).

DSO2 and DSO3 are located in the Taiga Shield Ecozone, which extends from coastal Labrador to central Northwest Territories (Gartner Lee Limited and Groupe Hemisphères December 2007).

Figure 5.19 presents the distribution of the various terrestrial ecosystems found in DSO3. They fall into two distinct ecoclimatic ecoregions: areas below about 680 m asl form part of the Mid Subarctic Forest Ecoregion, while areas above 680 m asl are classed as High Subarctic Tundra Ecoregion (Groupe Hémisphères Mars 2009).



Terrestrial Ecosystems (Ecotypes) for Mid Subarctic Forest Ecoregion

Ecotype	Complete Name
01	Black Spruce/White Spruce - Labrador Tea - Feathermoss
02	Crowberry-Map Lichen - Rock Outcrop
03	Glandular Birch-Crowberry - Thin Soil
04	Black Spruce - Lichen - Rock
05	Black Spruce - Lichen - Open Forest
06	White Spruce/Black Spruce - Feathermoss Seepage
07	White Spruce - Willow - Sedges - Riparian
08	Black Spruce/Tamarack - Glandular Birch - Sphagnum Swamp
09	Tamarack/Black Spruce - Fluvial Fen with Sedge
10	Black Spruce Forested Fen
11	Structured Herb Fen
12	Uniform Herb Fen
13	Non - Uniform Herb Fen
14	Uniform Shrub Fen
15	Uniform Fluvial Shrub Fen

Terrestrial Ecosystems(Ecotypes) for High Subarctic Tundra Ecoregion

Ecotype	Complete Name
01	Alpine Shrub - Glandular Birch - Mesic
02	Rock Outcrop - Crowberry - Xeric
03	Low Alpine Herb/Lichens - Subxeric
04	Large-leaved Goldenrod Alpine Shrub - Seepage
05	Uniform Riparian Shrub Fen
06	Uniform Herb Fen
07	Uniform Shrub Fen

Écosystèmes terrestres (écotypes) pour l'écorégion de la forêt subarctique moyenne (FSM)

Écotype	Nom complet
01	Épinette noire/épinette blanche – thé du Labrador - hypne dorée
02	Camarine hermaphrodite – rhizocarpe – affleurement rocheux
03	Bouleau glanduleux – camarine hermaphrodite – sol mince
04	Épinette noire – lichen – roche
05	Épinette noire – lichen – forêt ouverte
06	Épinette blanche/épinette noire - hypne dorée – écoulement latéral
07	Épinette blanche – saule – carex – milieu riverain
08	Épinette noire/mélèze laricin d'Amérique – bouleau glanduleux – marécage à sphaigne
09	Mélèze laricin d'Amérique/épinette noire – fen fluvial à carex
10	Fen forestier à épinette noire
11	Fen herbacé réticulé
12	Fen herbacé uniforme
13	Fen herbacé non uniforme
14	Fen arbustif uniforme
15	Fen riverain arbustif et uniforme

Écosystèmes terrestres (écotypes) dans l'écorégion de la toundra subarctique supérieure (TSS)

Écotype	Nom complet
01	Arbustaie alpine à bouleau glanduleux – mésique
02	Affleurement rocheux à camarine hermaphrodite – xérique
03	Arbustaie alpine basse à lichens – subxérique
04	Arbustaie alpine à verge d'or à grandes feuilles – écoulement latéral
05	Fen riverain arbustif et uniforme
06	Fen herbacé uniforme
07	Fen arbustif uniforme

LEGEND/LÉGENDE

- Ecoregion boundary/ frontière de l'écorégion
- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Powerline/ Ligne de transport d'énergie
- Proposed road/ route proposée
- Fresh water pipeline/ conduite d'eau de puits
- Process water pipeline/ conduite d'eau de procédé
- Tailings pipeline/ conduite de rejets miniers
- Proposed pit/ fosse proposée
- Proposed waste dump/ halde de stériles proposée
- Infrastructure footprint/ empreinte de l'infrastructure
- Disturbed area/aire perturbée
- Watercourse/cours d'eau
- Waterbody/plan d'eau
- Wetland/milieu humide

Terrestrial Ecosystems
Écosystèmes terrestres

DSO3 Sector
Secteur DSO3

HEMISPHERES le groupe

0 500 1,000 2,000 3,000 m

Scale/Échelle: 1:30000

UTM 19N NAD 83

FILE, VERSION, DATE, AUTHOR/ FICHIER, VERSION, DATE, AUTEUR: GH-0014-05, 2009-06-25, J.T.

Figure 5.19

Sources: Government of Canada, NTDB, 1:50 000, 1979
Government of Newfoundland and Labrador and Government of Quebec, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Groupe Hémisphères, Hydrology update, 2008
Ecoregion boundaries from Groupe Hémisphères, according to litterature

Gouvernement du Canada, BNDT, 1/50 000, 1979
Gouvernement de Terre-Neuve-et-Labrador et Gouvernement du Québec, frontière utilisée pour les titres
New Millennium Capital Corp., gisements et routes
Groupe Hémisphères, mise-à-jour de l'hydrologie, 2008
Limites des écorégions par Groupe Hémisphères, basées sur la littérature

5.4.2.3 Ecosystems of the Mid Subarctic Forest Ecoregion

The distribution of forested ecosystems in the BLSA and the BRSA is limited to the Mid Subarctic Forest Ecoregion. Within this ecoregion, the harsh climate inhibits continuous tree cover on sites most exposed to the wind. This ecoregion is transitional between the productive, closed boreal forest to the south and the treeless subarctic tundra to the north. Forests with a completely closed canopy are limited to moderately- or imperfectly-drained areas that are protected from the wind and receive a constant supply of nutrients from seepage. Large wooded areas formed by open Black spruce and spruce-lichen stands are common on dry sites of low productivity. Semi-open stands of Black spruce, mixed with White spruce and tamarack, are found on well-drained sites resting on deep moraine deposits. Forest fires are frequent and usually cover large areas dominated by spruce-lichen stands. Many of these forests are in the first stages of plant succession.

Table 5.20 shows the ecotypes found in the MSF Ecoregion. Since they were not found in the BLSA, the ecotypes highlighted in grey were classified, described briefly and mapped for the MSF Ecoregion, but they were not described in detail in Groupe Hémisphères (Mars 2009).

Table 5.20: Mid Subarctic Forest Ecosystems

Ecotype	Code in Québec	Complete Name	Description
MSF01	RE12	Black Spruce/White Spruce – Labrador Tea – Feathermoss (Forested Ecosystem)	Black spruce stand with White spruce subdominant; thin to thick moraine or colluvial deposits; medium soil texture; well-drained.
MSF02	RO	Crowberry – Map Lichen – Rock Outcrops (Non-Forested Ecosystem)	Ericaceae community; rock outcrops; little or no surface geological deposits; variable soil texture; very rapid drainage.
MSF03	DS	Glandular Birch – Crowberry –Thin Soil (Non-Forested Ecosystem)	Low-shrub community; thin soils on summits or upper slopes; variable soil texture; rapid drainage.
MSF04	RE10	Black Spruce – Lichen – Rock (Forested Ecosystem)	Dominated by rock and rock outcrops; scattered Black spruce and Ericaceae species; very thin moraine deposits; variable soil texture; rapid drainage.
MSF05	RE11	Black Spruce – Lichen – Open Forest (Forested Ecosystem)	Black spruce lichen stand with some tamarack; thin to thick moraine or glaciofluvial surficial deposits; coarse soil texture; well- to rapidly-drained.
MSF06	RE25	White Spruce/Black Spruce – Feathermoss – Seepage (Forested Ecosystem)	White spruce stand, with Black spruce subdominant; moss-covered forest floor; medium to thick moraine or colluvial deposits; fine to medium soil texture; imperfect drainage with seepage.
MSF07	RE25f	White Spruce – Willow – Sedges – Riparian (Forested Riparian Ecosystem)	White spruce stand with moss-covered forest floor; thin to thick fluvial deposits; fine soil texture; riparian ecosystem; periodically flooded sites; imperfect to poor drainage.

Ecotype	Code in Québec	Complete Name	Description
MSF08	BS1	Black Spruce/Tamarack – Glandular Birch – Sphagnum Bog (Forested Wetland Ecosystem)	Forested bog with Black spruce and tamarack stand; organic deposits dominated by peatmoss; poor drainage.
MSF09	BS1f	Tamarack/Black Spruce – Sedges – Fluvial Fen (Forested Riparian Ecosystem)	Tamarack stand; forested fen; organic or fluvial deposits; poor drainage.
MSF10	Bbu	Black Spruce Forested Fen (Forested Wetland Ecosystem)	Uniform forested fen; organic deposits; ground cover dominated by sedge and grass; poorly-drained.
MSF11	Fns	Structured Herb Fen (Non-Forested Wetland Ecosystem)	Structured herb fen; organic deposits; ground cover dominated by sedge and grass; very poor drainage.
MSF12	Fnu	Uniform Herb Fen (Non-Forested Wetland Ecosystem)	Uniform herb fen; organic deposits; ground cover dominated by sedge and grass; poor to very poor drainage.
MSF13	Fnn	Non-Uniform Herb Fen (Non-Forested Wetland Ecosystem)	Open water randomly distributed in ponds; herb fen; organic deposits; ground cover dominated by sedge and grass, very poor drainage.
MSF14	Fau	Uniform Shrub Fen (Non-Forested Wetland Ecosystem)	Uniform shrub fen; dominated by various shrub species of the Ericaceae family; ground cover dominated by sedge and grass; poor drainage.
MSF15	Fauf	Uniform Riparian Shrub Fen (Non-Forested Riparian Ecosystem)	Non-forested riparian shrub fen; fluvial or organic deposits; ground cover dominated by sedge and grass; soil richer and plant community more diverse than Ecotype MSF14; imperfect to poor drainage.

Source: Groupe Hémisphères (Mars 2009)

The ecotypes forming the MSF Ecoregion vary according to vegetation physiognomy and the degree of moisture. Ecotypes MSF01 to MSF06 are forested ecosystems. Ecotypes MSF07 to MSF15 are wetland ecosystems, which are further subdivided into forested wetland ecosystems (Ecotypes MSF07 to MSF10) and non-forested wetland ecosystems (Ecotypes MSF11 to MSF15).

Forested ecotypes of the MSF Ecoregion are distributed within the BLSA according to topography, types of surficial deposits, local drainage and elevation. Forested ecosystems are found at elevations up to 650 m, where a transition occurs between MSF and HST ecotypes. They can also be found locally above 650 m, on slopes oriented towards the south or south-west. MSF ecosystems are concentrated in DSO2.

Table 5.21 shows the area occupied by MSF forested ecosystems within the Mapped Area defined in Groupe Hémisphères (Mars 2009) and the BLSA. They cover 23% of the BLSA. The MSF Ecoregion covers 33% of the Mapped Area.

Ecotype MSF05 is the most widespread in the MSF Ecoregion. It covers 15% of the Mapped Area. It is also the most important ecosystem in the BLSA, covering 11% of its area. It is found on thin tills and on glaciofluvial deposits (DSO2, lac Star and Star Creek). This ecotype is perfectly visible from the sky because of the very distinctive pale-coloured lichen ground cover. Ecotype MSF05 is characterized by: a low degree of closure of the canopy (15 to 25%); slow-growing Black spruce; shrubs dominated by Labrador tea (*Ledum groenlandicum*), Glandular birch (*Betula glandulosa*) and Bog blueberry (*Vaccinium uliginosum*); very sparse herbaceous ground cover; and very dense and continuous cover of Reindeer lichen (*Cladina rangiferina*). The typical soils are Humoferric Podzols with Mor-type humus.

Table 5.21: Extent (Per Cent) of MSF Ecosystems in the Mapped Area and the BLSA

Ecotype	Complete Name	Extent (%)	
		Mapped Area	**BLSA**
MSF01	Black Spruce/White Spruce – Labrador Tea – Feathermoss (Forested Ecosystem)	9	7
MSF05	Black Spruce – Lichen – Open Forest (Forested Ecosystem)	15	11
MSF06	White Spruce/Black Spruce – Feathermoss – Seepage (Forested Ecosystem)	2	1
MSF07	White Spruce – Willow – Sedges – Riparian (Forested Riparian Ecosystem)	1	0
MSF08	Black Spruce/Tamarack – Glandular Birch – Sphagnum Bog (Forested Wetland Ecosystem)	1	2
MSF10	Black Spruce Forested Fen (Forested Wetland Ecosystem)	1	0
MSF11	Structured Herb Fen (Non-Forested Wetland Ecosystem)	< 1	0
MSF12	Uniform Herb Fen (Non-Forested Wetland Ecosystem)	2	0
MSF14	Uniform Shrub Fen (Non-Forested Wetland Ecosystem)	< 1	1
MSF15	Uniform Riparian Shrub Fen (Non-Forested Riparian Ecosystem)	1	1
	Total:	**33**	**23**

Source: Groupe Hémisphères (Mars 2009)

5.4.2.4 Ecosystems of the High Subarctic Tundra Ecoregion

The climate of the High Subarctic Tundra Ecoregion is characterized by short, cool summers and long, windy winters. The growing season lasts only 80 to 100 days. Annual precipitation varies from 700 to 1,000 mm. The various ecotypes of the HST Ecoregion are all considered to be open, *i.e.*, devoid of arboreous vegetation. All the ecotypes of the HST Ecoregion support vegetation characteristic of the alpine tundra that was described by

Meades (1990). Her report mentions that more than 50% of the upland plateaus characteristic of the HST Ecoregion support vegetation dominated by shrubs, low shrubs and grasses. The HST Ecoregion contains discontinuous permafrost. Table 5.22 shows the seven ecotypes comprising the HST Ecoregion.

Table 5.22: Ecosystems of the High Subarctic Tundra

Ecotype	Complete Name	Description
HST01	Alpine Shrub – Glandular Birch – Mesic	Mesic ecosystem dominated by herbs and shrubs; thick till; silty texture; well- to moderately well-drained.
HST02	Rock Outcrop – Crowberry – Xeric	Dry ecosystem dominated by lichen-covered rock outcrops; thin or no soil; medium texture; very rapid drainage.
HST03	Low Alpine Shrub/Lichens – Subxeric	Subxeric ecosystem dominated by Ericaceae and lichen species; thin till on bedrock; medium to coarse texture; good to rapid drainage.
HST04	Large-leaved Goldenrod Alpine Shrub – Seepage	Ecosystem with soils enriched by seepage and dominated by tall shrubs and a dense and diverse ground cover; thick till deposits; medium or fine texture; moderate to imperfect drainage.
HST05	Uniform Riparian Shrub Fen	Riparian fen; fluvial or organic deposits; ground cover dominated by sedge and grass; imperfect to poor drainage.
HST06	Uniform Herb Fen	Uniform herb fen; organic deposits; ground cover dominated by sedge and grass; poor to very poor drainage.
HST07	Uniform Shrub Fen	Uniform shrub fen; dominated by diverse shrub species of the Ericaceae family; ground cover dominated by sedge and grass; poor drainage.

Source: Groupe Hémisphères (Mars 2009)

The ecotypes of the HST Ecoregion vary according to vegetation physiognomy and degree of moisture. Ecotypes HST01 to HST04 are non-forested ecosystems, whereas Ecotypes HST05 to HST07 are non-forested wetland ecosystems.

In the BLSA, the ecotypes of the HST Ecoregion are found, in the vast majority of cases, at elevations higher than 650 m. The ecosystems found at that elevation are similar to those of the arctic tundra of northern Québec and of Labrador. Wind is an important factor in the distribution and composition of these ecosystems.

Table 5.23 shows the surface area occupied by the HST ecosystems within the Mapped Area (60%) and the BLSA (57%).

Ecotype HST03 is the most widespread within the HST Ecoregion, covering 43% of the Mapped Area and 38% of the BLSA. It is found throughout the Mapped Area, but is mostly concentrated in the north. It supports a community of species suited to drought conditions and a harsh climate. The shrub layer is dominated by Glandular birch, Black crowberry (*Empetrum nigrum*) and Bog blueberry. The herbaceous layer is not very developed, and the bryophyte layer is dominated by lichens. Ecotype HST03 usually occurs on thin or very thin tills that are dominated by frequently cryoturbated melanic and eutric brunisols, with Mor-type humus.

Table 5.23: Extent (Per Cent) of HST Ecosystems in the Mapped Area and the BLSA

Ecotype	Complete Name	Extent (%)	
		Mapped Area	BLSA
HST01	Alpine Shrub – Glandular Birch – Mesic	13	15
HST02	Rock Outcrop – Crowberry – Xeric	1	3
HST03	Low Alpine Shrub/Lichens – Subxeric	43	38
HST04	Large-leaved Goldenrod Alpine Shrub – Seepage	1	0
HST05	Uniform Riparian Shrub Fen	1	1
HST06	Uniform Herb Fen	< 1	0
HST07	Uniform Shrub Fen	< 1	0
	Total:	**60**	**57**

Source: Groupe Hémisphères (Mars 2009)

5.4.2.5 Disturbed Environment

A substantial portion of the BLSA (19%) has been disturbed by previous mining activity, which ended in 1982, in some cases to such an extent that the original condition of the landscape is no longer recognizable. Mining-related alterations to the landscape include: large open pits; extensive piles of unprocessed, ore-rich rock, waste rock and tailings; numerous test pits and trenches; survey cut-lines; access roads and yards; and abandoned camps, infrastructure and equipment. In anthropogenically altered areas that have not been disturbed for several decades, pioneer species of vegetation have begun to colonize the surface. The rate of colonization has been slow, though, most likely due to the harsh climate, rocky soils and lack of organic matter. The following pioneer plant species were usually found on those sites: Rough alder (*Alnus rugosa*), Bearberry willow (*Salix uva-ursi*), Flatleaf willow (*Salix planifolia*), Dwarf birch and several grass species. Those species should be seen as good candidates for restoring disturbed sites.

Open pits up to several hundred meters across and more than a hundred meters deep represent the most important alteration to the landscape. They have steep bedrock walls and are commonly partly filled with groundwater and surface run-off. Evidence of recent rockfalls from the walls of the pits was observed. Within the deepest pits, snowdrifts persist well into the summer at the base of the north-facing walls. For the most part, very little vegetation has grown within the pits, except where groundwater seeps from the walls or around the perimeter of pit-bottom lakes.

5.4.2.6 Wetlands

The MSF Ecoregion supports complexes of wetlands, a common ecosystem characterized by minerotrophic stringed or uniform peatlands (fens), forested peatlands and treed swamps (Figure 5.20). The HST Ecoregion contains discontinuous permafrost and small areas of wetlands with thin organic soils, mostly located in depressions and around lakes.

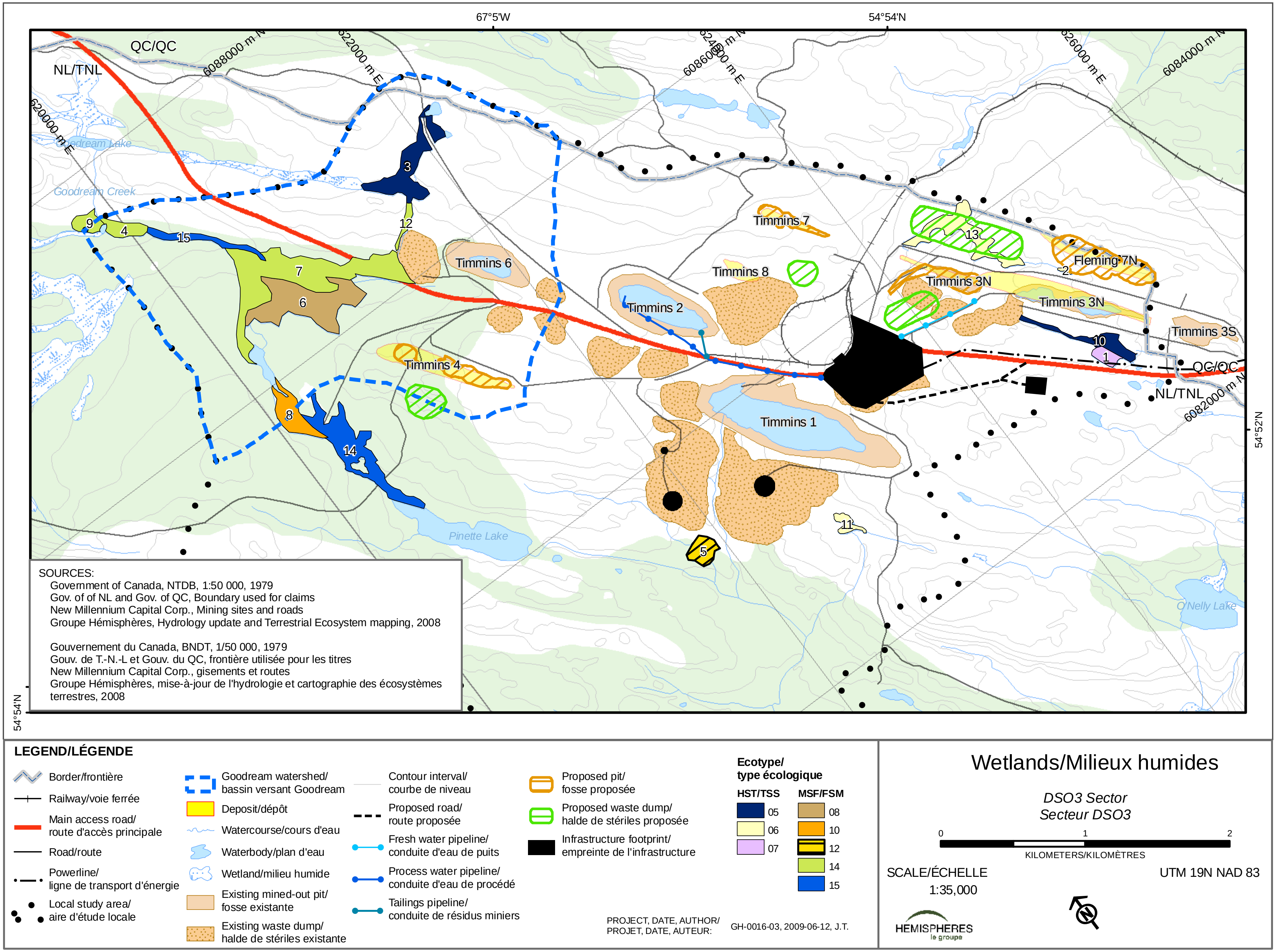

67°5'W
54°54'N
54°52'N
54°54'N
QC/QC
NL/TNL
6088000 m N
622000 m E
6086000 m N
624000 m E
626000 m E
6084000 m N
620000 m E
6082000 m N
Goodream Lake
Goodream Creek
Pinette Lake
O'Nelly Lake
Timmins 1
Timmins 2
Timmins 3N
Timmins 3S
Timmins 4
Timmins 6
Timmins 7
Timmins 8
Fleming 7N
SOURCES:
Government of Canada, NTDB, 1:50 000, 1979
Gov. of of NL and Gov. of QC, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Groupe Hémisphères, Hydrology update and Terrestrial Ecosystem mapping, 2008
Gouvernement du Canada, BNDT, 1/50 000, 1979
Gouv. de T.-N.-L et Gouv. du QC, frontière utilisée pour les titres
New Millennium Capital Corp., gisements et routes
Groupe Hémisphères, mise-à-jour de l'hydrologie et cartographie des écosystèmes terrestres, 2008
LEGEND/LÉGENDE
Border/frontière
Railway/voie ferrée
Main access road/ route d'accès principale
Road/route
Powerline/ ligne de transport d'énergie
Local study area/ aire d'étude locale
Goodream watershed/ bassin versant Goodream
Deposit/dépôt
Watercourse/cours d'eau
Waterbody/plan d'eau
Wetland/milieu humide
Existing mined-out pit/ fosse existante
Existing waste dump/ halde de stériles existante
Contour interval/ courbe de niveau
Proposed road/ route proposée
Fresh water pipeline/ conduite d'eau de puits
Process water pipeline/ conduite d'eau de procédé
Tailings pipeline/ conduite de résidus miniers
Proposed pit/ fosse proposée
Proposed waste dump/ halde de stériles proposée
Infrastructure footprint/ empreinte de l'infrastructure
Ecotype/ type écologique
HST/TSS
05
06
07
MSF/FSM
08
10
12
14
15
PROJECT, DATE, AUTHOR/ PROJET, DATE, AUTEUR:
GH-0016-03, 2009-06-12, J.T.
Wetlands/Milieux humides
DSO3 Sector
Secteur DSO3
0
1
2
KILOMETERS/KILOMÈTRES
SCALE/ÉCHELLE
1:35,000
UTM 19N NAD 83
HEMISPHERES
le groupe

Figure 5.20

Ten wetland ecotypes are found in the Mapped Area and are shown in Table 5.24. Wetlands occupy approximately 9% of the Mapped Area, and 5% of the BLSA. Fens are the most common wetland environment, occupying approximately 78% of the wetland surface area. The majority of the wetlands are located in the MSF Ecoregion.

Wetlands are generally found in depressions or bordering lakes and streams. Riparian wetlands, *i.e.*, riparian bogs (MSF07) and riparian fens (MSF15 and HST05), are limited to the fringes of watercourses. These wetlands are characterized by large seasonal fluctuations in the water level and by periodic flooding (GTMTH 1997).

In the MSF Ecoregion, several types of wetlands form complexes. Such is the case with Ecotypes MSF08, MSF10 and MSF12, which are generally located in depressions where drainage is poor. The horizontal fen (MSF10) forms a gradient between mesic ecosystems, such as MSF01 and MSF05, and non-forested wetlands such as Ecotypes MSF11, MSF12 and MSF14.

In the HST Ecoregion, with the exception of riparian fens, wetlands are associated with depressions that, in general, form isolated basins, or they are located close to the overflow point of a watercourse (GTNTH 1997). Consequently, they are fed periodically by the watercourse in question, mostly during high-water events. The shrub fen (HST07) is limited to the transition zone between the very wet, uniform herbaceous fen (HST06) and more mesic ecotypes.

Table 5.24: Types of Wetlands Found in the Mapped Area and the BLSA

Ecotype	Complete Name	CWCS* Classification	Extent (%)	
			Mapped Area	BLSA
MSF07	White Spruce – Willow – Sedges – Riparian	Riparian Bog	1	0
MSF08	Black Spruce/Tamarack – Glandular Birch – Sphagnum Bog	Depression Bog	1	2
MSF10	Black Spruce Forested Fen	Horizontal Fen	1	0
MSF11	Structured Herb Fen	Structured Fen	< 1	0
MSF12	Uniform Herb Fen	Basin Fen	2	0
MSF14	Uniform Shrub Fen	Horizontal Fen	1	1
MSF15	Uniform Riparian Shrub Fen	Riparian Fen	1	1
HST05	Uniform Riparian Shrub Fen	Riparian Fen	1	1
HST06	Uniform Herb Fen	Basin Fen	< 1	0
HST07	Uniform Shrub Fen	Basin Fen	< 1	0
		Total:	**9**	**5**

*CWCS: Canadian Wetland Classification System (GTNTH 1997).
Source: Groupe Hémisphères (Mars 2009)

Ecological Value

The ecological value of the wetlands was assessed on the basis of the criteria shown in Table 5.25. Each criterion was attributed a number of points, which were totalled to rank the value of each wetland. This assessment, adapted to regional conditions, was inspired by the method presented in Joly *et al.* (2008) and the criteria used by Bond *et al*. (1992).

Table 5.25: Criteria Used for the Assessment of Wetlands' Ecological Value

Criteria	Value of Component		
	Low (0 points)	**Moderate (5 points)**	**High (10 points)**
Area	Less than 5 ha	Between 5 and 10 ha	More than 10 ha
Connectivity	None	Intermittent	Permanent
Presence of species at risk	None	Potential	Confirmed
Representativeness	Common	Rare	Unique
Fragmentation	Important, fragments are distinct	Moderate, fragments are always connected	None
Disturbances	Major, processes are altered	Moderate, little effect on processes	None
Ecological value	**Low (0-20)**	**Moderate (21-40)**	**High (41 and more)**

Table 5.26 shows certain of the characteristics of the wetlands in DSO3.

Table 5.26: Description of Wetlands in DSO3

Wetland	Ecotype	Type	Surface Area (ha)
1	HST07	Uniform Shrub Fen	1.7
2	HST06	Uniform Herb Fen	0.2
3	HST05	Uniform Riparian Shrub Fen	10.0
4	MSF14	Uniform Shrub Fen	2.8
5	MSF12	Uniform Herb Fen	3.0
6	MSF08	Black Spruce/Tamarack – Glandular Birch – Sphagnum Bog	16.8
7	MSF14	Uniform Shrub Fen	26.8
8	MSF10	Black Spruce Forested Fen	5.4
9	MSF14	Uniform Shrub Fen	2.4
10	HST05	Uniform Riparian Shrub Fen	4.1
11	HST06	Uniform Herb Fen	1.5
12	MSF14	Uniform Shrub Fen	1.1
13	HST06	Uniform Herb Fen	8.6
14	MSF15	Uniform Riparian Shrub Fen	13.0
15	MSF15	Uniform Riparian Shrub Fen	3.4

Source: Groupe Hémisphères (Mars 2009)

In all, the BLSA includes 15 wetland environments occupying approximately 100 ha, or 5% of the BLSA. The fen is the most common type of wetland, and four types of fens were found. One depression bog is also present. The wetland environments generally cover a limited area; only four of them have an area greater than 10 ha.

Table 5.27 shows the ecological value of the wetlands in DSO3. The numbers of the wetlands correspond to those shown in Figure 5.20.

Table 5.27: Ecological Value of Wetlands in DSO3

Wetland	Criteria						Ecological Value
	Area	Connectivity	Presence of Species at Risk	Representativeness	Fragmentation	Disturbances	
1	0	0	0	10	10	10	Low
2	0	10	0	0	10	10	Moderate
3	5	10	0	5	0	0	Low
4	0	10	0	0	10	10	Moderate
5	0	10	0	10	10	10	Moderate
6	10	10	0	10	10	10	High
7	10	10	0	0	10	5	Moderate
8	5	10	0	10	10	10	Moderate
9	0	10	0	0	10	10	Moderate
10	0	10	0	10	10	10	Moderate
11	0	10	0	0	10	10	Moderate
12	0	10	0	0	0	0	Low
13	5	10	0	0	10	10	Moderate
14	10	10	0	5	10	10	High
15	0	10	0	5	10	10	Moderate

The wetlands in DSO3 have, in general, a moderate ecological value. Because of their large area, two of the wetlands were assigned a high ecological value. They are permanently connected to the hydrological network and show no signs of fragmentation or disturbance. Wetland 6 is the only depression bog in the BLSA.

In the northern part of the BLSA, wetlands 3, 4, 6, 7, 8, 12, 14 and 15 form a complex covering a total area of 79.3 ha. These wetlands are all interconnected. This complex alone represents 79% of all the wetland environments of the BLSA and should be considered as having a high ecological value given its area and connectivity, the fact that it contains a type of wetland unique in the sector and because of its low level of fragmentation and disturbance.

With respect to the Mapped Area, wetlands have a high ecological value: they support a diverse flora, many species of which are not found in other ecotypes; they are also interesting environments for wildlife as breeding and feeding habitats and, in the case of avifauna, resting areas during migration.

At the regional level, the wetlands in the BLSA do not, however, have the same importance, because wetlands are very common. Extensive wetland complexes are found in the vicinity, for example in the Howells River basin west of the BLSA and in the Caniapiscau River basin to the north-west. Those wetlands have a greater ecological value because they cover very large areas (several km^2) and include various types of wetlands within a single complex.

5.4.2.7 Other Sensitive Terrestrial Ecosystems

With the exception of wetlands, no other ecosystem found in the BLSA is considered as sensitive. The ecosystems present in the BLSA are common ones, both at the local and the regional levels, and they do not have the characteristics required to be assigned a high ecological value.

5.4.2.8 Flora Species at Risk

No flora species at risk was observed during the surveys of terrestrial ecosystems.

An analysis of species designated by the federal government (COSEWIC 2008, Internet site) and the provincial government (Environment and Conservation 2008, Internet site) revealed no species at risk in the BLSA. Furthermore, none of the federally or provincially designated species is likely to be found there.

5.4.2.9 Potential Wildlife Habitat

Wetlands are the wildlife habitats with the highest ecological value in the BLSA. They can be used as breeding areas by herpetofauna, as well as by various bird, mammal and fish species. They can also be used as feeding areas by certain mammal and bird species. A number of waterbodies are likely used as resting areas by migrating aquatic birds (Groupe Hémisphères October 2008).

The wetland complex located within the BLSA is the habitat that should be considered as having the highest value for wildlife, given its large area and the diversity of wetland ecotypes found there. The complex increases the diversity of habitats, since, in addition to the wetland habitats as such, the ecotones, or strips along their edges, increase the diversity of habitats, as they create a multiplicity of microhabitats, for example a drier hillock or a pond, likely to support a greater number of wildlife species.

Most of the ecosystems in the BLSA can be used as habitat by caribou, particularly the tundra habitats, which can be used as wintering grounds. Such habitats are, however, very common in the region. The mature forests in the south of the BLSA might offer suitable habitat for sedentary caribou, a species at risk. The other habitats in the BLSA, however, do not seem suited to this species (see the section on mammals below).

5.4.2.10 Data Gaps

Detailed mapping of terrestrial ecosystems was carried out within the BLSA and in a larger zone, *i.e.*, the Mapped Area. Ecological mapping was also carried out in an adjacent sector, the Howells River valley, within the framework of the LIOP. It is therefore possible to assert that all ecosystems present in the region have been recorded and described in detail.

5.4.2.11 Plant Use

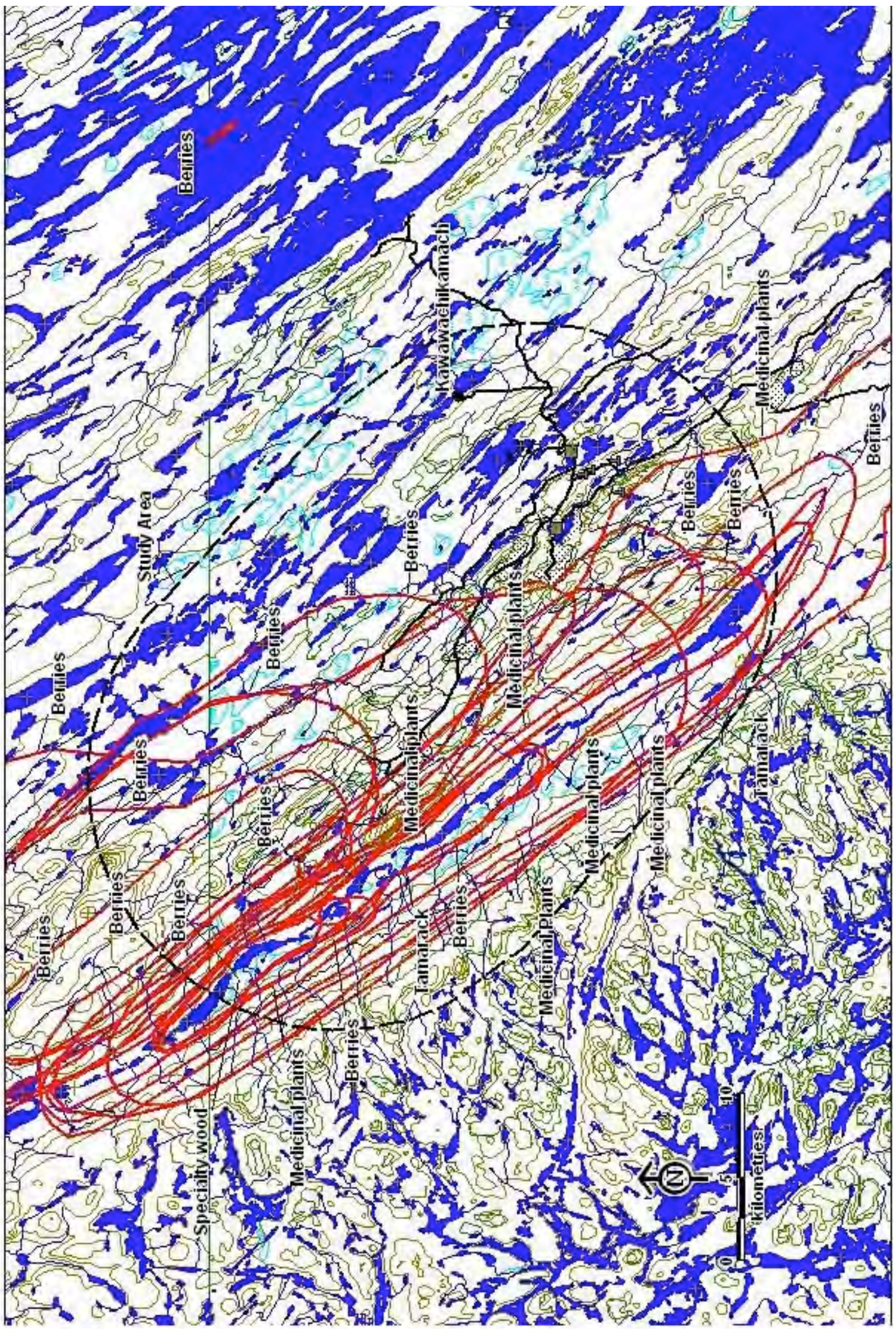
Appendix 11 presents a complete listing of Naskapi and Innu names of plants and animals and toponyms.

Naskapis

The Naskapis harvest a variety of plants in the LSEA (Figure 5.21), particularly in the Howells River valley. Protected along the entire length of the river by ridges on either side that run nearly at right angles to the prevailing winds, the valley has a relatively mild microclimate and thus supports a vegetation that is rich in variety and density and large in size. Berries (*e.g.*, blueberry, bilberry, cranberry, cloudberry, crowberry), medicinal plants (*e.g.*, tamarack, Labrador tea, birch, mosses) and specialty woods (*e.g.*, birch, tamarack) used for crafts are among the plants that are collected there (Weiler January 2009). While the medicinal plants are also found elsewhere, it is believed that they grow 'stronger' in the valley and that their medicinal properties are thus more effective. A similar perception exists with regard to specialty woods, which are used to manufacture such things as snowshoe frames, drum rims, sled runners, carvings and other tools or craft items, as they are considered to be of better quality in the valley (Weiler January 2009).

Along the ridge, the Naskapis gather mosty berries, the dominant varieties being blueberries, bilberries and crowberries. Those varieties are also harvested in the Swampy Bay River basin, particularly near La Tesserie, Hameau, Annabel, Miltière and de Milly lakes (Weiler January 2009).

Figure 5.21: Harvesting of Plant Resources Reported by Naskapis, 2006



Source: Weiler (January 2009)

Matimekush-Lac John Innu

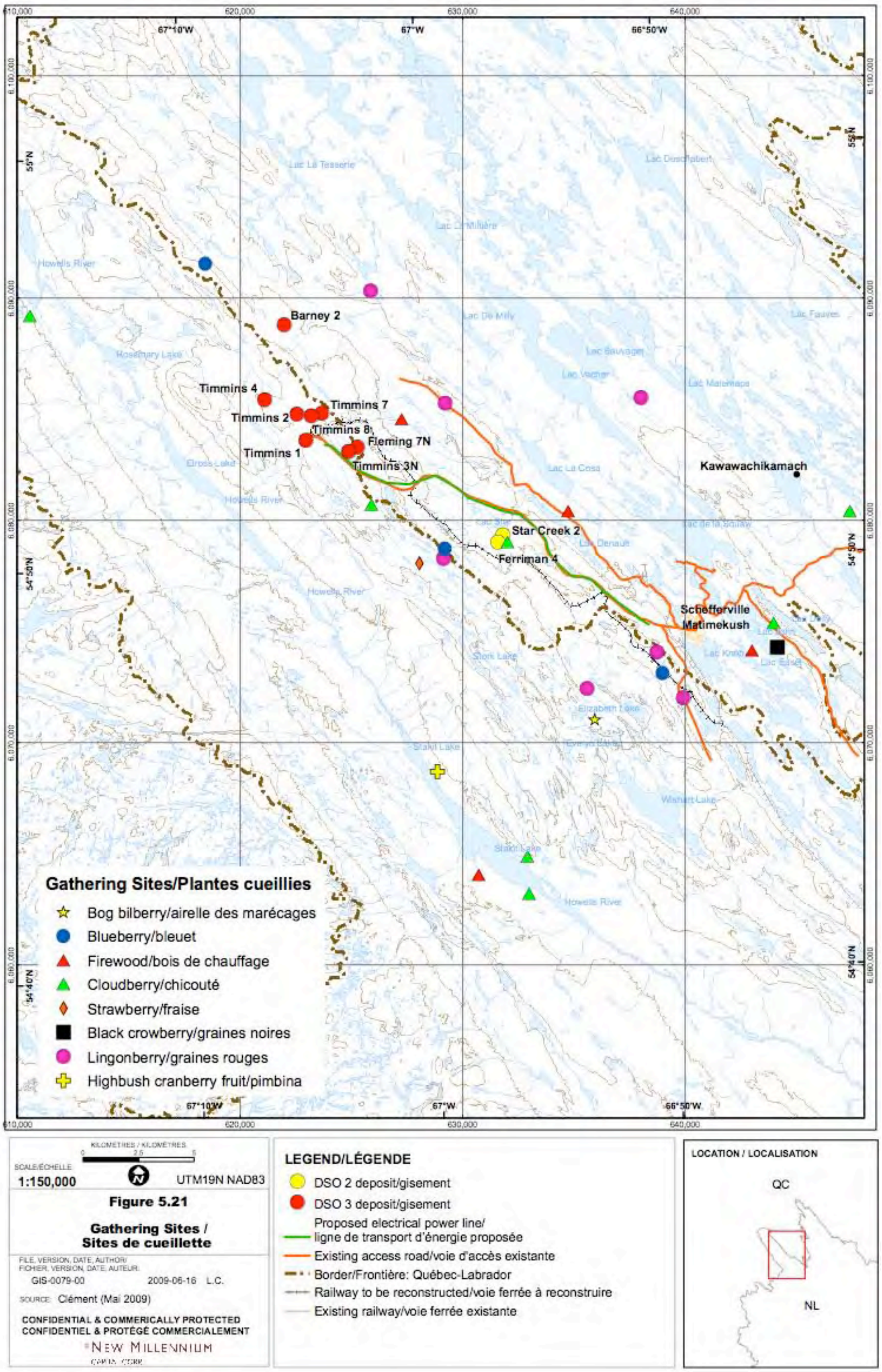
The Matimekush-Lac John Innu who were interviewed by Clément (Mai 2009) reported that they harvest berries in the LSEA and its surroundings, particularly cloudberries, lingonberries and blueberries. Table 5.28 lists all the kinds of berries harvested, while Figure 5.22 shows the sites where the Innu collect berries and wood. Several of the sites where lingonberries are collected are in or close to DSO3.

Table 5.28: Berries Harvested by Matimekush-Lac John Innu, 2008

Species/Informant #	1	2	3	4	5	6	7	8	9	10
anushkaniminanakashi - raspberry (*Rubus idaeus*)[1]				✓						
assiminanakashi - Black crowberries (*Empetrum nigrum*)				✓	✓	✓	✓			
inniminanakashi - blueberry (*Vaccinium* sp.)	✓	✓	✓	✓	✓	✓	✓	✓		
kakuminanakashi - currant (*Ribes* sp.)				meadows						
mashkuminanakashi - dogberry (*Sorbus decora*)				meadows						
massekuminanakashi - cranberries (*Vaccinium oxycoccos*)				meadows						
mushuminanakashi - mooseberry (*Viburnum edule*)							✓			
nissimininanakashi - bog bilberries (*Vaccinium uliginosum*)						✓	✓	✓	✓	
pineuminanakashi - Creeping snowberry (*Gaultheria hispidula*)							✓			
shikuteu - cloudberry (*Rubus chamaemorus*)	✓	✓	✓	✓	✓	✓	✓	✓	✓	
uishatshimininanakashi - Alpine cranberry (*Vaccinium vitis-idaea*)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
uteiminananakashi – strawberry (*Fragaria virginiana*)			✓	✓		✓				

[1] The plants were identified based on documentation. Since the same Innu name may refer in some cases to different taxa depending on the community, only the Innu names reported above are error-free.

Source: Clément (Mai 2009)



Source: Clément (Mai 2009)

In general, the berry-picking season extends from July to September, although lingonberries are also harvested in spring. Cloudberries are harvested in peatlands and on frozen islands in lakes, while blueberries and lingonberries are collected particularly along trails in mountainous areas (Clément Mai 2009).

Some plants were collected by the Innu in the general vicinity of the LSEA in 2008 for medicinal or technical purposes (Table 5.29). Two informants reported that Labrador tea is harvested for medicinal purposes in June and in August respectively. It is collected in significant quantities to ensure a sufficient supply for winter. One informant noted that it must be harvested "far enough where there is no dust" (Clément Mai 2009). The bark of young larch is also collected for future use: it is used to make an ointment that can be frozen for use when needed. Technical uses include covering the floors of tents with conifer branches, making axe handles or frames for drying animal skins and rendering nets invisible or inodorous to fish by using White spruce (Clément Mai 2009).

Table 5.29: Plants Used by Matimekush-Lac John Innu for Medicinal or Technical Purposes, 2008

Plant	Purpose	Use
ikuta - Labrador tea	medicinal	flu, fever, bronchitis, cancer
innasht - Balsam fir	medicinal	oleoresin (*pitshu-atshuk*[u]) for colds, flu
mashkushu - herbaceous plant in gen.	technical	for attracting geese
minapakun - Old Man's beard	technical	for starting fires
mushuminanakashi - mooseberry	medicinal	sore throats
shakau – alder	technical	mould for drying skins; poles for tents and sweating lodges
tshishtapakun - coniferous tree branches	technical	floor of tent; mattress
uapineu-mitshim - willow	medicinal	chest pain, flu, asthma
uapitsheuashkamuk[u] - Reindeer moss	technical	caulking for log cabins
uashkuetui - cone	medicinal	swollen wounds
uashkuetui - cone (White spruce)	technical	for making nets invisible to fish
uatshinakan – tamarack	medicinal	ointment for cuts; drink for flu and sore throats
uishatshiminanakashi - Alpine cranberries	medicinal	sore throats
ushkatamui - Water lily rhizome	medicinal	burns
ushkuai – birch	technical	snowshoes, axe handles
ushkuai – birch	medicinal	internal pains

Source: Clément (Mai 2009)

Firewood is undoubtedly the foremost purpose of wood-harvesting by the Innu. The preferred species for firewood are White spruce, Black spruce and larch. Recently some Innu have started to collect firewood in order to sell it to fellow Innu (Clément Mai 2009).

5.4.3 Fauna

There is no commercial use of wildlife in the LSEA.

Information on the harvesting of wildlife in the LSEA for recreational purposes is presented in Section 5.5.7.3.

Appendix 11 presents a complete listing of Innu and Naskapi names of animals and plants and toponyms.

5.4.3.1 Caribou

Given the cultural importance of caribou for the First Nations, this section is entirely devoted to the species, and addresses both the sedentary and migratory ecotypes.

Background Information

According to Banfield (1961), all the caribou in Québec and Labrador are sedentary caribou (*Rangifer tarandus caribou)*. In the absence of a clear consensus on the taxonomy of caribou in Canada, scientists devised an empirical classification based on the behaviour of the various groups of caribou (Edmonds 1988; Mallory and Hillis 1998). Four ecotypes, island, mountain, migratory and sedentary, are found in Canada. The last three ecotypes are found in Labrador (Schaefer *et al.* 2000; Bergerud *et al.* 2008). The migratory and the sedentary caribou inhabiting Labrador and north-eastern Québec are an integral component of the way of life for Aboriginal and non-Aboriginal people (Schmelzer and Otto 2001). Brown (June 2005) notes that the most commonly observed mammal in the Howells River valley is the migratory caribou. Sedentary caribou were thought to use wooded areas in the vicinity of the ELAIOM (Saint-Martin 1987).

Migratory Caribou

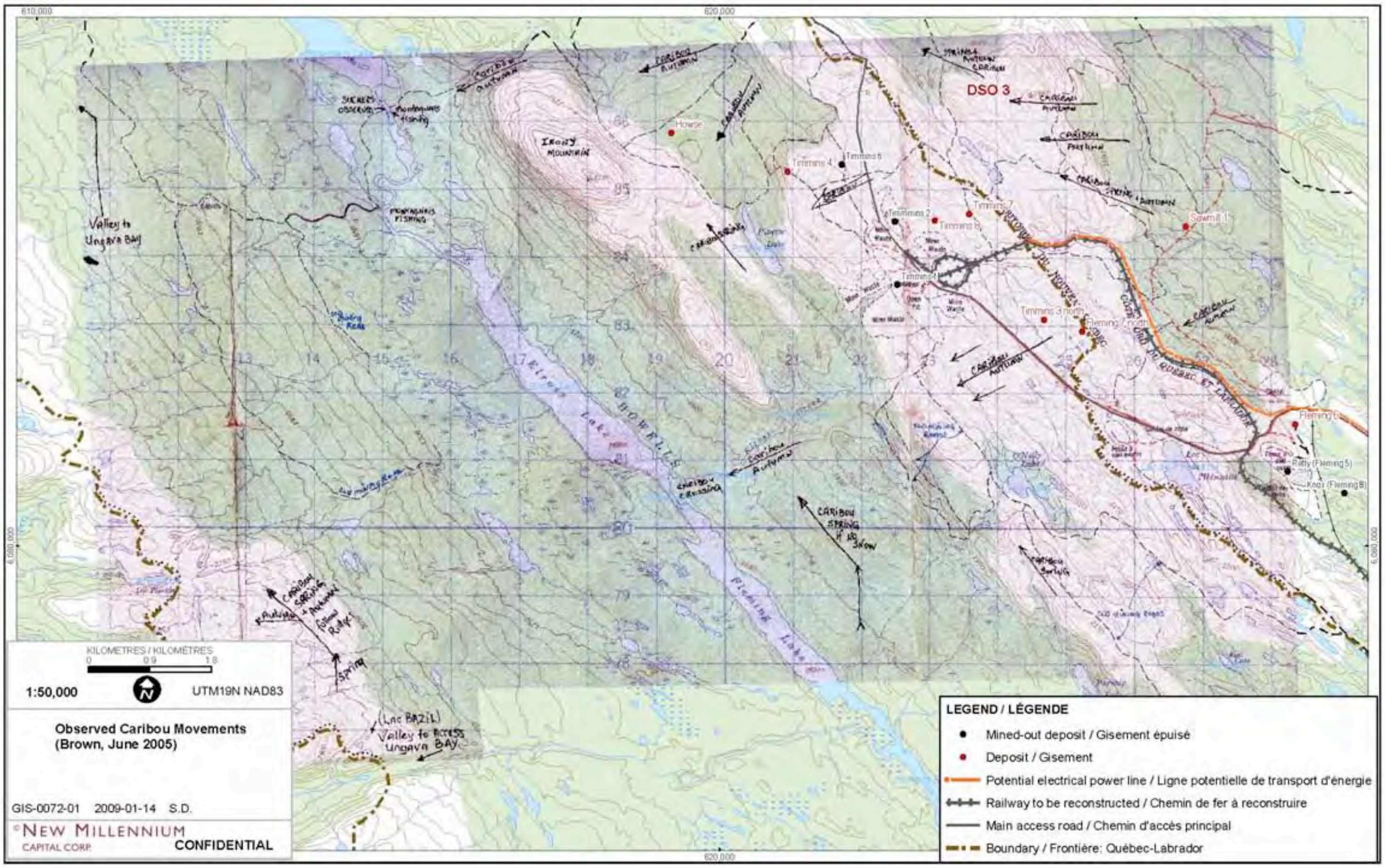
The migratory caribou found in the BLSA and the BRSA belong to the George River Herd. The most recent census of this population was carried out in 2001, at which time the size of the herd was estimated at 440,000 individuals (Couturier *et al.* 2004). The herd is believed to have since declined (Jean et Lamontagne Décembre 2004).

In general, the BLSA falls within the migratory corridor of the George River Herd, which links their calving and wintering grounds. Much less clearly defined than calving areas, the caribou wintering grounds are thought to have shifted towards eastern Labrador early in the 2000s (Schmelzer and Otto 2001). Although the range for this particular herd is known, the specific movements of individuals are unpredictable from year to year (Bergerud and Luttich 2003). Within their range, migratory caribou may be present in one location in a given year, but absent the next. This pattern is attributed to an avoidance strategy of overgrazed areas by the herd (Schmelzer and Otto 2001).

According to Brown's (June 2005) observations, the precise direction in which migratory caribou migrate in the Howells River catchment both in fall and in spring is influenced first by the topography and second by the former mine sites east of the catchment, the location of which coincides with the BLSA. The preferred migration routes of the caribou are high ridges and open Black spruce-lichen forest. The caribou have adapted to the formerly mined area by using old mining roads should they happen to lead in the same direction as that in which they are migrating. The direction of caribou movements in the area of the former mine sites as observed by Brown (June 2005) and as evidenced by recently used trails is presented on Figure 5.23 and Figure 5.24.

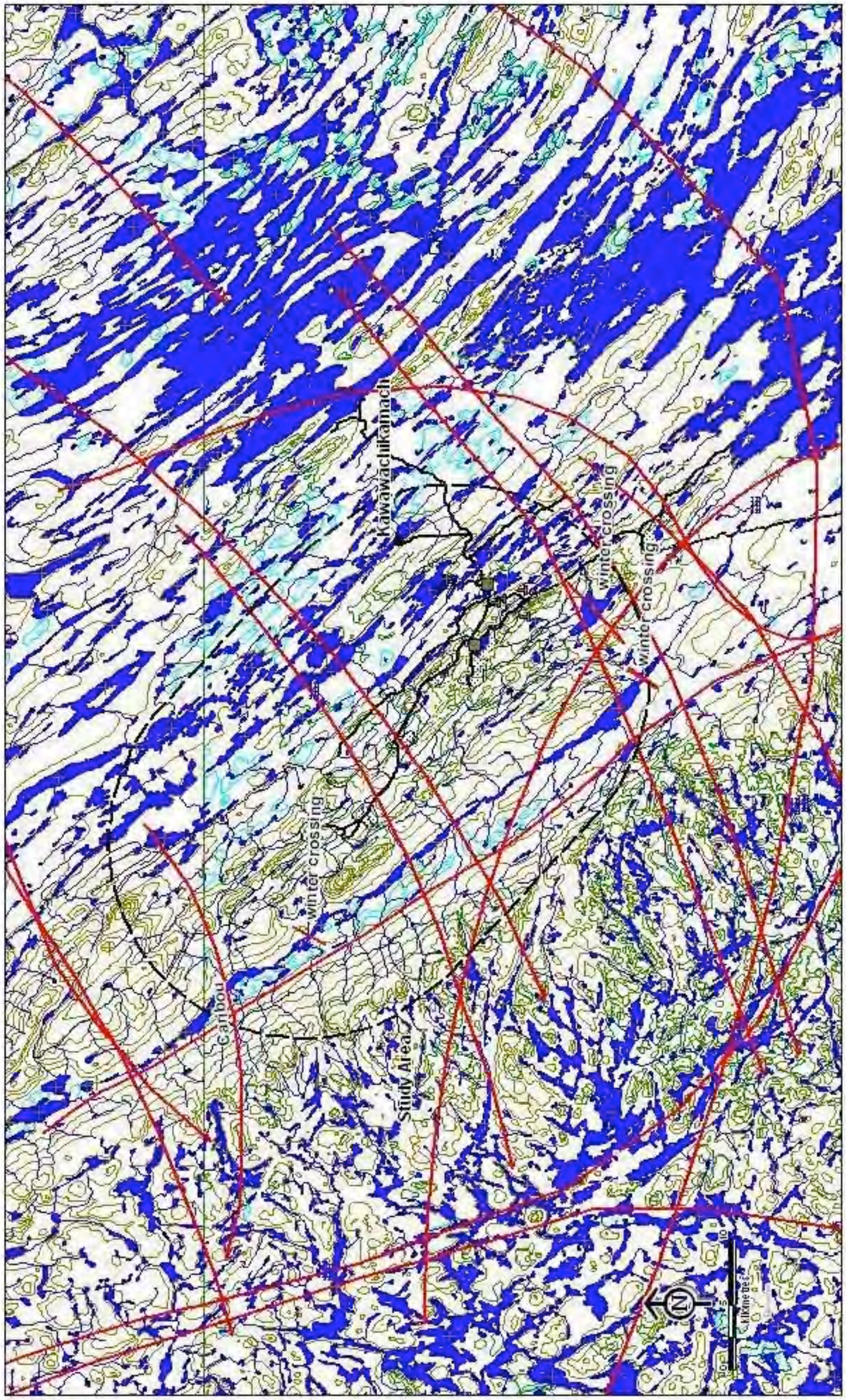
Since the BLSA supports Ecotype MSF05 (Black Spruce — Lichen — Open Forest) and Ecotype HST04 (Large-leaved Goldenrod — Alpine Shrub —Seepage) (see Section 5.4.2), food for caribou is readily available there, as it is elsewhere in the region.

Figure 5.23: Caribou Movements in and Around Old Mine Sites



Source: Brown (June 2005)

Figure 5.24: Pattern of Caribou Fall Movements Reported by Naskapis, 2006



Source: Weiler (January 2009)

Species at Risk

Sedentary Caribou

The sedentary caribou is considered an endangered species under federal and Newfoundland and Labrador legislation (Thomas and Gray 2002; GNL July 30, 2002). It is considered to be vulnerable under Québec legislation (*An Act respecting threatened or vulnerable species*, R.S.Q., chapter E-12.01).

The sedentary caribou prefers mature spruce forests. It uses various habitats depending on the season and, most likely, according to the environment in which the herds find themselves (Courtois 2003). In some regions, the females move to fens or islands for calving, in all likelihood to reduce the risks of predation. Some authors report that, in summer, they use sites offering better food or open areas exposed to the wind, which allows them to avoid insects. Sedentary caribou form larger groups in winter than at other seasons. They prefer mature conifer stands and also use open spaces rich in ground lichens until snow conditions make it impossible to dig feeding holes (Vandal 1985).

The population density of sedentary caribou is low (1 to 3 individuals/100 km^2) throughout its range. They occupy environments that are little suited to other cervidae, probably to isolate themselves from those cervidae and their predators (Courtois 2003). They avoid environments that have been disturbed naturally (*e.g.*, fire) or anthropogenically.

Brown (2008, *personal communication*) specified that he observed two types of caribou along the Howells River: solo animals that could be present at any time of year; and small groups of migrating animals that would travel down or across the valley principally in August-September during the pre-rut period. In the light of the foregoing, combined with his recollection that there were no recent migratory paths in the lower portion of the valley, he concluded that the solo animals were of the forest-ecosystem type, while the migrants belonged to the George River Herd. Brown (2008, *personal communication*) further noted that collared animals of the Red Wine Herd occasionally departed their forest-ecosystem lifestyle for one of a migratory nature with the George River Herd, and *vice-versa*.

The GNL is concerned that some of the caribou seen near the ELAIOM site might belong to the McPhadyen Herd of sedentary caribou, which has until recently been thought to be extinct (Doucet 2008, *personal communication*).

Figure 5.25 shows that the range of the McPhadyen Herd encompasses the BLSA area. There is, however, no direct evidence suggesting that the caribou associated with the McPhadyen River form a distinct population, and some have suggested that they belong to the Lac Joseph Herd, the range of which is located approximately 150 km south-east of the Schefferville area (Schmelzer *et al.* 2004). According to Environment Canada (2008:75), the "…McPhadyen River population was associated with the lac Joseph population but no longer exists".

A survey consisting of two days of flying time between January and April 1978 counted 281 caribou in the McPhadyen River area (Pilgrim 1979). Another late-winter aerial survey, in 1981, covering an area of ± 15,000 km^2 centered around the McPhadyen River counted 214 caribou in 10 groups composed of one to 50 animals (Phillips 1982). He concluded that a large number of caribou seemed to occupy the McPhadyen area in late winter. He noted that several important factors, including herd affinity with neighbouring caribou populations, such as the Lac Joseph Herd, herd range and spatial and temporal characteristics of migrations, remained unknown in 1982. Winter surveys carried out in the distribution area of the George River Herd, however, always render population estimates problematical, since both ecotypes are morphologically similar (Courtois 2003). The caribou observed by Phillips could have belonged to the migratory ecotype or the Lac Joseph migratory herd.

Of the four female caribou from the McPhadyen area that were radio-collared in 1984, three remained in the area when a large group of George River caribou that had moved there in February-March 1984 migrated north in April, which supports the resident status of the caribou in the McPhadyen area (Brown *et al*. 1986; RRCSL January 1994).

Another study of the McPhadyen and Lac Joseph herds was conducted between May 1984, and October 1986 (Saint-Martin 1987). Seven female caribou from the McPhadyen Herd were radio-collared in April 1984. The approximate range of the McPhadyen Herd was defined by a polygon surrounding the outermost locations of the radio-collared caribou (Figure 5.25). The data (based only on seven collared animals) suggested that the range extended north of Schefferville. However, the small sample size of collared caribou did not permit an adequate description of population dynamics (Saint-Martin 1987). The following inferences were made about the McPhadyen Herd: the animals were present at very low density; some animals travelled towards the area north of the McPhadyen River in winter, followed by a return movement in late winter and spring; travel rates increased as fall and spring approached; groups of up to 33 and 46 animals were observed in fall and late winter respectively; groups of up to four animals were widely dispersed during the calving period; individual females did not show marked fidelity toward specific calving grounds.

Bergerud *et al*. (2008) further commented on Saint-Martin's (1987) study by pointing out that the seven radio-collared animals did not use the same calving area in each of the three years of the study, which suggests that the group in question should not be designated as a herd and managed as a unit.

Nine caribou were sighted in the lac Harris area during three overflights between late August and mid September 2007 (NML 29 January, 2008). A further 33 caribou were sighted by NML's personnel in the same general area between July 2007 and mid October 2007. Their ecotype was not identified.

Three overflights in late summer 2008 revealed no sightings of caribou. The only caribou sighted by NML's personnel in the course of their duties during that period were five fresh carcasses in a pick-up belonging to a local resident on October 11, 2008 (O'Quinn 5 January, 2009).

Environment Canada (2008) conducted a scientific review with a view to identifying critical habitat for sedentary caribou in Canada. It determined that an area in Labrador immediately adjacent to the BLSA, if not within it, may include multiple local populations within a large area of relatively continuous habitat (see Unit 57 in Figure 5.26). Based on an assessment of habitat disturbance (fire and anthropogenic), Environment Canada (2008) determined that Unit 57 has a moderate probability of supporting a self-sustaining population (data on population size and trend were not available).

The range of sedentary caribou in Québec does not overlap with the BLSA (see Unit 57 in Figure 5.26). The GoQ (MRNF Mars 2008) also shows their distribution to be clearly outside the BLSA.

Figure 5.25: Range of McPhadyen Herd According to RRCSL (January 1994)

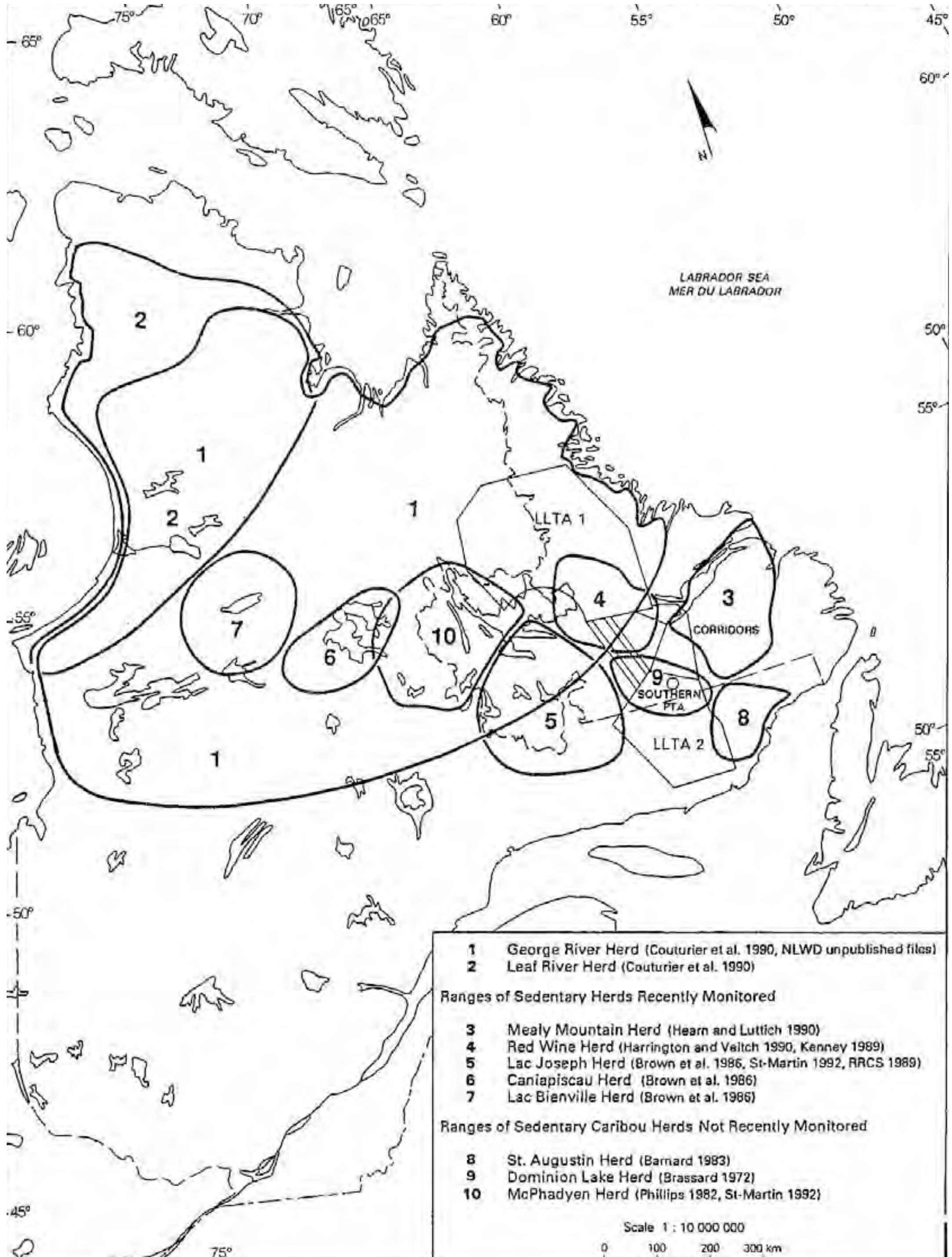
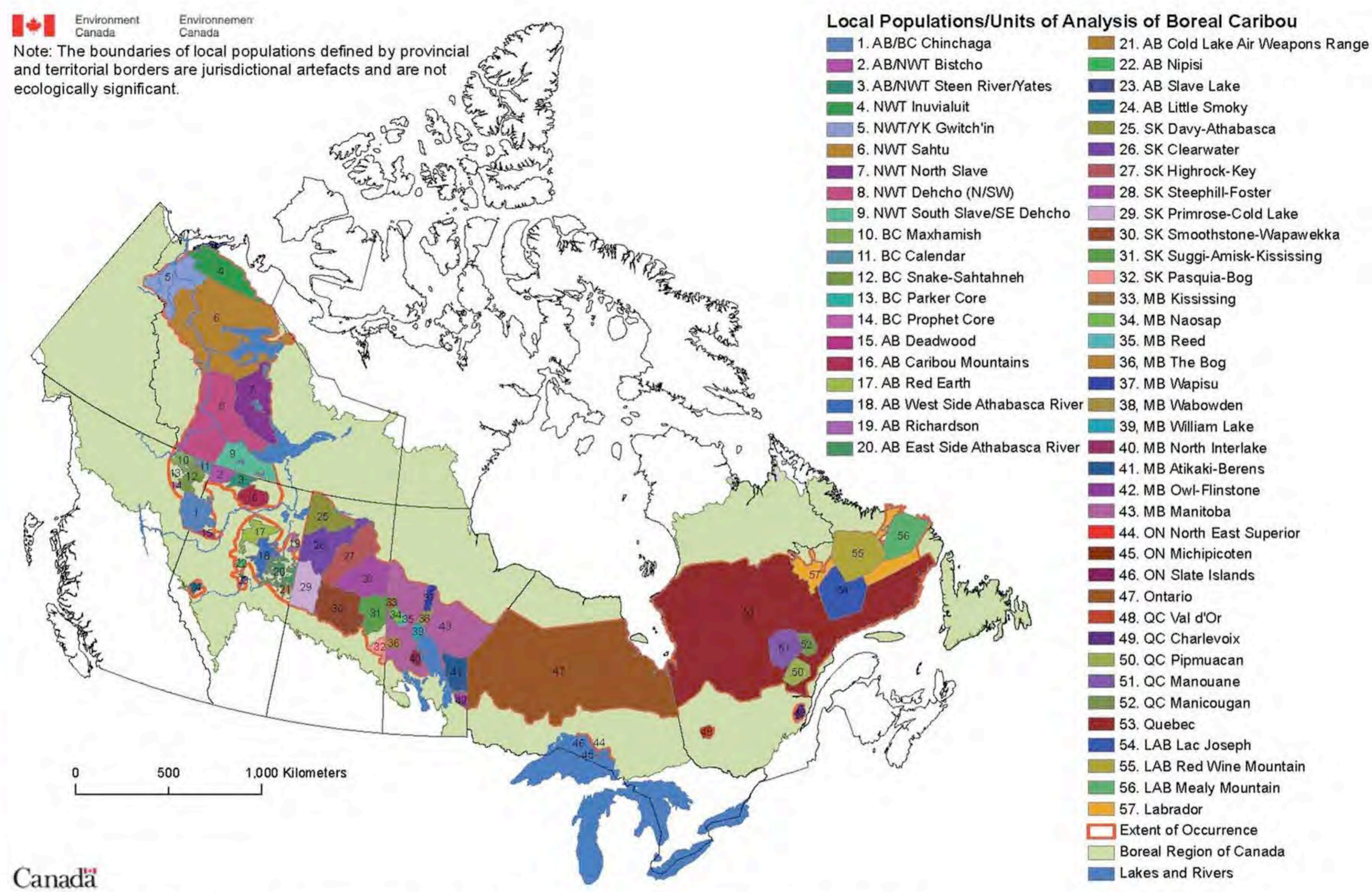


Figure 5.26: Local Populations of Boreal Caribou and Units of Analysis for Critical Habitat Identification



Source: Environment Canada (2008)

The BLSA does not have a high potential for sedentary caribou. Approximately 60% of its area is covered by subarctic tundra, and 19% (see Section 5.4.2.5) has been disturbed by former mining operations, including a road used by local human populations (Groupe Hémisphères Mars 2009). Sedentary caribou are highly sensitive to anthropogenic disturbance. They avoid roads and areas used by people (Dyer *et al.* 2001). The main limiting factor to its presence in the BLSA would be disturbances (including snowmobiles). Food availability would be of secondary importance, since it generally is abundant in the herd's range (Courtois 2003).

NML and LIM, in collaboration with wildlife biologists from the GNL, conducted a helicopter-based survey of caribou within a 50-km radius of DSO3 and of the claims of LIM between May 4-8, 2009 (D'Astous and Trimper June 2009, *in preparation*). There were three sightings of caribou and one sighting of tracks that were not associated with the preceding sightings. Two adult female caribou were measured, and tissue samples for genetic analysis were taken from them. The measurements did not permit a determination as to whether the caribou belonged to the sedentary or to the migratory ecotype. The results of the genetic analyses will not be available before early 2010. One of the female caribou was fitted with a satellite collar, but no signals were ever received from it.

According to Clément (Mai 2009), some of the Matimekush-Lac John Innu do not know the sedentary caribou. Others, however, recognize the existence of two caribou ecotypes. Some Innu see no morphological differences between the two ecotypes, except for the different habitats that they use. Others make a distinction based on morphological features, attributing to the sedentary caribou a stouter body and smaller antlers, as compared to the migratory caribou (Clément Mai 2009). The flesh of the sedentary caribou is said to be better than that of the migratory caribou, because the former ecotype is more sedentary. Those Innu who recognize the existence of the sedentary caribou (*minashkuat-atik* in innu aimun) say that it is extremely rare in, if not totally absent from, the Schefferville region (Clément Mai 2009). Most observations of sedentary caribou have been made outside the BLSA south of Wabush or in the Cabana Lake area (70 miles south of Matimekush). One Elder interviewed by Clément (Mai 2009) asserted, however, that females of the sedentary ecotype sometimes calve in the vicinity of lac Annabel (approximately 15 km north of the BLSA).

According to Weiler (November 2006), several, mostly older, Naskapi hunters harvest caribou on the plateau west of the Howells River throughout the winter. This region is reported to be a wintering area for small groups of caribou and an important hunting area in times when caribou are scarce elsewhere. Weiler (February 2000) reported that Naskapi informants had stated that caribou from the Caniapiscau, Opiscoteo and McPhadyen herds generally remained within 100 km around Caniapisacau and Delorme Lakes. The calving areas for these caribous would be south and south-west of Caniapiscau/Delorme lakes and north and north-east of Lake Clairambault.

The various sedentary caribou herds of Québec and Labrador have been the subject of genetic research. By the start of the 2000s, Courtois *et al.* (2002b) had already shown that the migratory and sedentary caribou were genetically different. At the North American Caribou Workshop held in November 2008 Dr Steeve Côté (Université Laval) gave a presentation on this topic. His team measured the genetic differentiation between three of the ecotypes and found that the mountain and migratory ecotypes are not genetically distinct. The genotypes of the forest ecotypes, however, showed significant differences, the

Mealy Mountain Herd being the most genetically distinct. The caribou of the Lac Joseph Herd are said to be closer genetically to the other sedentary herds. That suggests that the Lac Joseph Herd may contribute individuals to other herds, such as the Red Wine and Manicouagan herds and, if it still exists, the McPhadyen Herd. Thus, a connection could exist between the various herds and ecotypes, with individuals occasionally mingling with herds other than their own. If sedentary caribou are present in the BLSA, genetic analyses, coupled with telemetric follow-up, could help to identify their ecotypes with greater confidence.

Subsistence

Caribou

Traditionally, the Naskapis relied heavily on the GRCH for food, materials for clothing and shelter and tools. Today, caribou is still a major part of their diet. It also plays a central role in their religious ideology. Weiler (February 2000) writes that “some indigenous toponyms specifically refer to caribou presence or behaviour, or the interaction between Naskapi and caribou”.

A review by Weiler (February 2000) of existing studies on land-use that were conducted with Naskapis between 1989 and 1993 recorded information about caribou harvesting and resulted in a map showing the contemporary land use of the Naskapis. Table 5.30 and Figure 5.54 present that information. Most caribou are harvested between July and September (Weiler February 2000).

Table 5.30: Caribou Harvested by Naskapis, 1989-1993

Year	Caribou Harvested	Hunting Participation (%) of Respondents	Average Harvest of Respondents per Quarter
1989-90	309		
Jul-Sep		40	0.00
Oct-Dec		34	0.41
Jan-Mar		56	4.70
Apr-Jun		20	1.25
1990-91	445		
Jul-Sep		53	0.01
Oct-Dec		68	0.29
Jan-Mar		54	4.48
Apr-Jun		56	0.59
1991-92	745		
Jul-Sep		10	2.51
Oct-Dec		49	5.72
Jan-Mar		59	3.08
Apr-Jun		86	3.50
1992-93	258		
Jul-Sep		20	0.41
Oct-Dec		15	6.06
Jan-Mar		25	3.10
Apr-Jun		41	2.33

Source: Weiler (February 2000)

Caribou were not plentiful in the LSEA when the Naskapis lived on the Lac John and Matimekush reserves (*i.e.*, from 1956 to 1983). Moreover, the Naskapis were unable to undertake long-range caribou hunting trips during the first two decades of their settlement in the Schefferville area, since they were involved only marginally in the mining economy until then and thus had little money to purchase the necessary equipment (Weiler January 2009). Harvesting by the Naskapis was thus restricted geographically during that period and focused on such resources as fish, small game and waterfowl. Caribou were nonetheless harvested whenever possible (Weiler January 2009).

As the GRCH began to rebound during the 1970s and the Naskapis began to reap the financial benefits of the NEQA during the early 1980s, they increasingly recaptured some of their traditional hunting grounds by making use of snowmobiles and bush plane charters (Weiler January 2009).

Over the 1954-1982 period, the Naskapis hunted caribou largely in three areas:

- in portions of the range of hills between the Howells River valley and the Swampy Bay River basin that lies between Schefferville and the Howells River, including the northern part around Sunny Mountain and Greenbush and the western slope of the Howells River valley;
- in the area to the west of the Howells River, including the western portion of the valley and the adjacent wooded plateau;
- in the vicinity of Attikamagen Lake and the series of lakes north-west of it.

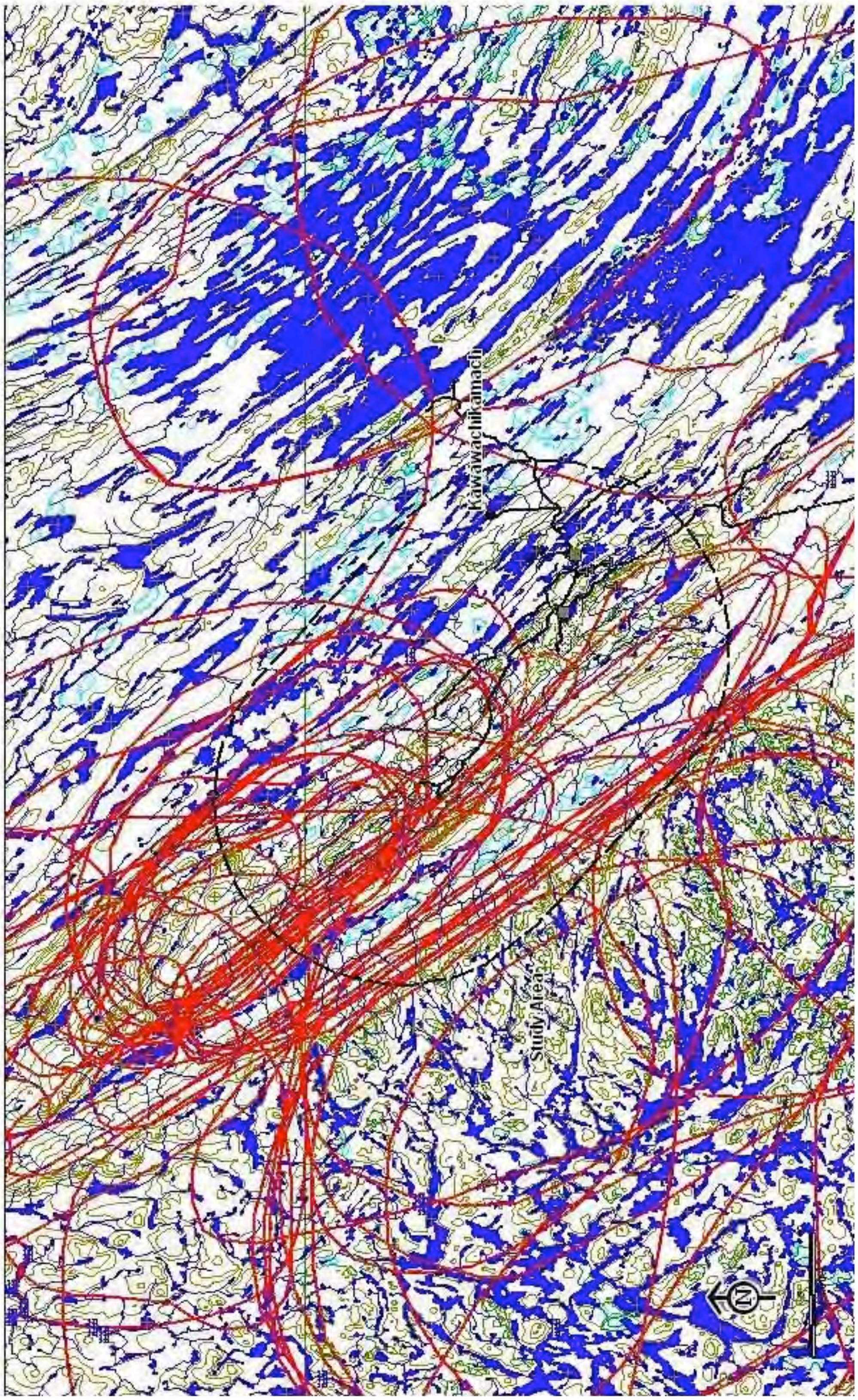
The highest density of caribou hunting activity was recorded in the Sunny Mountain/Greenbush area located in the north-western portion of the LSEA and beyond. While that area was reported to be used mainly during the fall migration, when caribou appear in some years in larger numbers, the other two areas were primarily utilized in winter, when caribou tend to live in dispersed, smaller groups and are less mobile (Weiler January 2009).

Weiler (January 2009) did not record any caribou hunting by the Naskapis in the vicinity of the IOCC's mining operations over the 1954-1982 period, for which the following explanations were given by the interviewees: the hunters were convinced that migrating caribou were avoiding that area; and access to the area by hunters was discouraged by the IOCC.

After the closure of the mines, in 1982, migrating caribou returned to the ridge east of the Howells River in fall, and a fairly extensive network of dirt roads established by the IOCC facilitated access to them (Weiler January 2009). During the decade following the closure of the IOCC's operations, the Naskapis hunted caribou throughout the LSEA.

A 2006 survey of Naskapi land- and resource-use in the Howells River valley (Weiler January 2009) shows extensive caribou hunting therein (Figure 5.27). The densest concentration of caribou hunting was recorded along the ridge between the Howells River valley and the Swampy Bay River basin between DSO2 and Goodwood; a secondary area of concentration is the Howells River basin between Kivivic and Stakit lakes (Weiler January 2009). Caribou can be found in both areas in some years during their fall migration. Most of the hunting activity during that period occurs along the ridge, as harvesting is most effective when caribou appear in large numbers along the fairly barren hilltops, where they can be spotted easily.

Figure 5.27: Caribou Hunting Reported by Naskapis, 2006



Source: Weiler (January 2009)

As the migration passes, some caribou tend to stay behind and overwinter in small, scattered groups in the Howells River valley and on the plateau to the west of it, both being wooded areas that provide them with food and shelter (Weiler January 2009). Hunting in these areas thus tends to occur after the main fall migration has passed and in winter.

The Innu of Matimekush-Lac John reported that, prior to 2006, they harvested caribou in the LSEA, but that, over the past few years, caribou have not traversed it. According to one informant, the mining exploration in the area might explain the absence of caribou (Clément Mai 2009). We note, however, that the caribou monitoring conducted by NML in the LSEA and the lac Harris area in July-September 2007 and 2008 revealed the following (O'Quinn 5 January, 2009): 17 caribou were observed in late July-August 2007, one of which was in the Timmins area; 16 caribou were spotted in the lac Harris area in October 2007; no caribou were seen during three overflights conducted in August-September 2008; a pick-up transporting five dead caribou (reportedly shot in the Greenbush/Kivivic areas) was seen in the Timmins area on October 11, 2008.

One of the Innu informants reported taking 20 caribou in 2008, while the second-largest caribou harvest reported for that year was five animals (Table 5.56). The Innu use the caribou for food, clothing, tool-making and rituals (*e.g.*, the skin is used in the fabrication of traditional drums) (Clément Mai 2009).

Brown (June 2005) notes that caribou are hunted by Naskapi and Innu hunters in the Howells River basin and outside the catchments wherever old mining roads provide access.

At a meeting held on July 9, 2007, the Council of the NIMLJ advised representatives of NML of the importance in some years of the caribou hunt between late July and late September in the vicinity of lac Harris, a short distance north of DSO2 and DSO3.

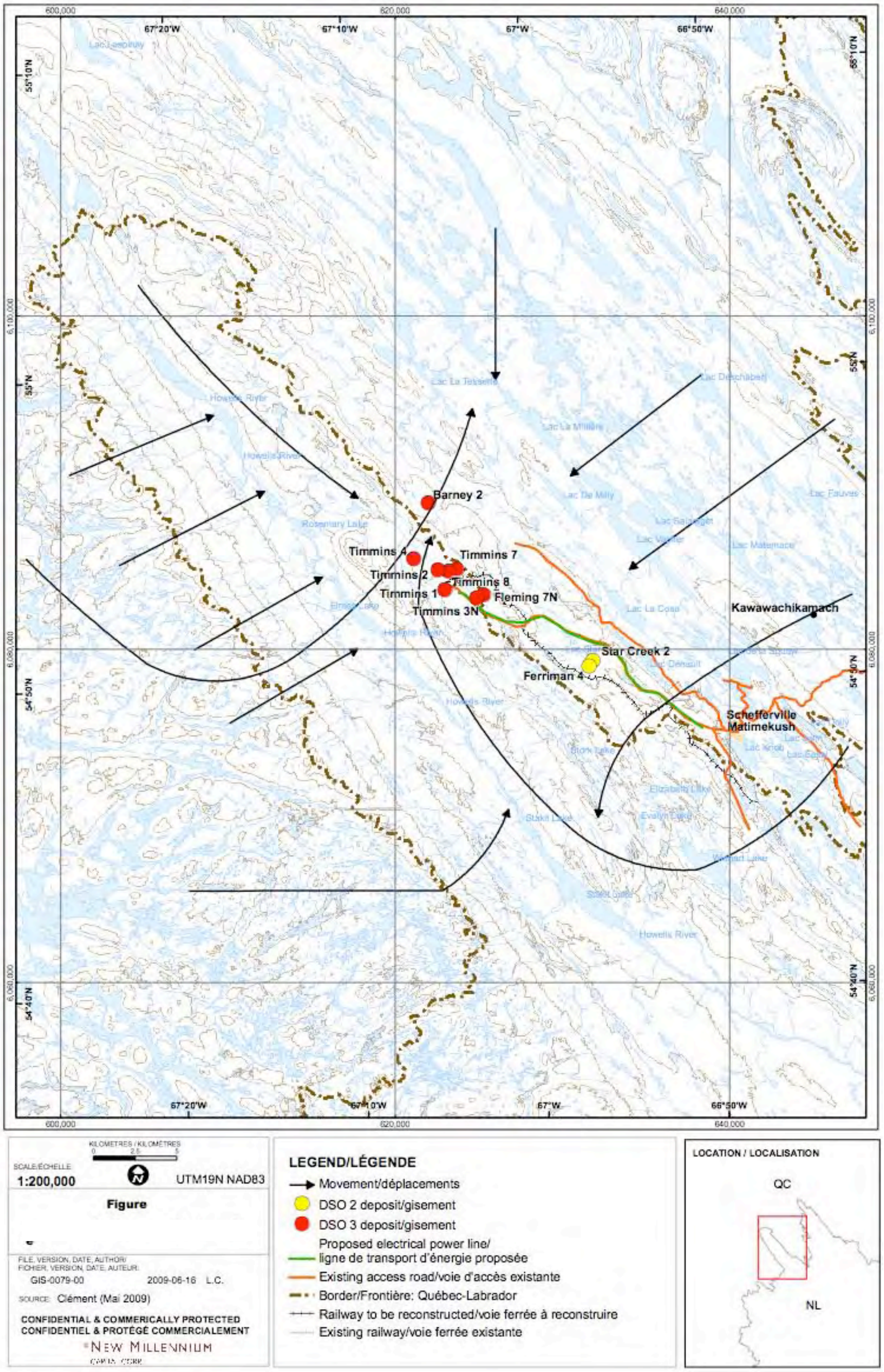
Traditional Knowledge

According to Clément (Mai 2009), migratory caribou (*mushuau-atik* in innu aimun) are found in the BLSA, but they are thought to have been avoiding the region of Schefferville in recent years for several reasons, such as drilling for mining exploration, fear of airplanes and global warming. In a general way, migratory caribou use mountains in the summer and woods and lakes in the winter (Clément Mai 2009). According to the Innu, their feeding habits also vary seasonally. In general, their main winter and summer food is reindeer lichen. They also eat broad-leaved and shrubby plants, mosses (sphagnum) and even, at times, rocks or sand (Clément Mai 2009).

The fall movement patterns of caribou identified by the Naskapi interviewees during the 2006 survey predominantly follow a north-east to south-west direction (Figure 5.24). Moreover, caribou are reported to cross the Howells River valley in winter at Rosemary and Stakit lakes (Weiler January 2009).

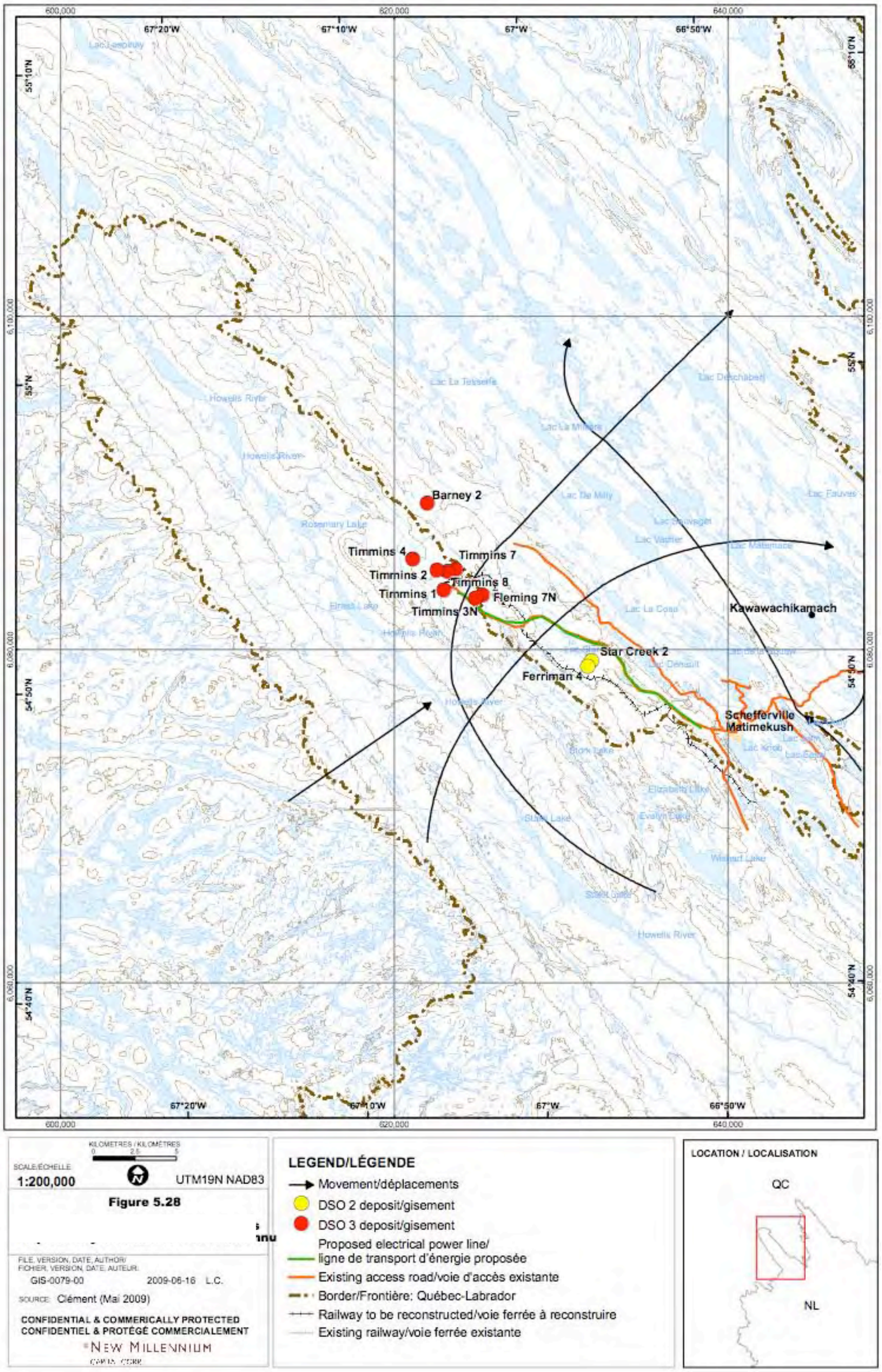
The Innu interviewees confirmed the fall movement patterns reported by the Naskapis. Some of the caribou arriving from the rivière George in the north-east turn south towards the Smallwood Reservoir, while others overwinter in the Fermont area and return to the Schefferville region in spring (Clément Mai 2009). Some of the interviewees identified caribou movements in the opposite direction, *i.e.*, from the south-west to the north-east, in which the caribou cross the Howells River and spend approximately one month in the Schefferville region. Other fall movements were reported (Figure 5.28). Spring movements can originate from the Fermont/Esker areas or from the rivière George (Figure 5.29).

Figure 5.28: Pattern of Caribou Fall Movements Reported by Matimekush-Lac John Innu



Source: Clément (Mai 2009)

Figure 5.29: Pattern of Caribou Spring Movements Reported by Matimekush-Lac John Innu



Source: Clément (Mai 2009)

Data Gaps

The level of knowledge of sedentary caribou in the BLSA is inadequate. It is hoped that the genetic analysis of the tissue samples collected in spring 2009 will provide useful insights.

The level of knowledge of the migratory caribou of the GRCH is considered to be high, but a population estimate has not been made since 2002. There may have been important changes in demography since then. Habitat use, food and movements have been well-documented, with more than 60 animals collared in the GRCH.

5.4.3.2 Other Large Mammals

The other species of big game observed by Brown (June 2005) along the Howells River between May and October over the 1983-2002 period included: Black bear (*Ursus americanus*) and moose (*Alces alces*).

Moose

As a general rule, moose are found in mixed coniferous and deciduous forests, particularly in stands of Balsam fir and White or Yellow birch. They use clearings, burnt areas and regenerating cut strips (Courtois 1993). In summer, they like to feed and find protection from heat and insects in wetlands and around waterbodies. In winter, moose gather in small groups in wooded areas where the snow cover is thinner (Prescott et Richard 1982). The size of the home range of moose is directly linked to the heterogeneity of the forest stands (Courtois *et al*. 2002a). Moose can move over tens of square kilometers to satisfy all their needs. Their range can vary from around 20 to hundreds of square kilometers.

In summer, its nutrient budget is positive, since deciduous trees and aquatic plants are abundant.

In early winter, moose occupy forest stands of varying densities that are rich in deciduous twigs. As the winter deepens, the sheltering canopy becomes increasingly important. Moose continue to feed in environments that are rich in browse, rarely venturing more than 100 m from the sheltering canopy (Courtois *et al.* 2002a). As snow accumulates on the ground to a depth exceeding 60 cm, moose use increasingly smaller areas and take refuge in thick stands of conifers where they can minimize energy expenditure while remaining close to browsing areas. These areas are known as “yards”. Apparently, much of the interregional variation in the density of moose is explained by the presence of a large proportion of ecotones in the habitat. The “food and ecotones” and “food and canopy” variables are those to be given priority in habitat modelling for moose (Courtois and Beaumont 2002). A large quantity of ecotones accompanied by a canopy can support a moose population of interesting density.

Although rare because the Schefferville area is outside their preferred habitat, moose are known to travel as far north as the Schefferville region in spring and summer (Brown June 2005). A DNA analysis of a sample of hair collected in the Howells River basin revealed the presence of moose there at some time between May and October 2006 (Brunet *et al.* 2008). According to Girard (November 2003), who conducted fieldwork in the area located north-west of Irony Mountain and the BLSA, Naskapis observed moose rarely. This species is relatively new to Labrador and was first reported in western Labrador in 1949 (Folinsbee 1974). The population has expanded since then.

The potential of the BLSA for moose habitat is low because of the high proportion of open areas (close to 60% of the BLSA is arctic tundra) (Groupe Hémisphères Mars 2009). Regeneration is rare, and 6% of the BLSA is covered by wetlands, including fens and shrub fens (MSF14) (Section 5.4.2). In addition, the BLSA contains no riparian bogs (MSF07), a preferred ecosystem of moose.

Moose tracks were observed south of Schefferville during the aerial survey of caribou conducted by NML and LIM in spring 2009 (Section 5.4.3.1) (D'Astous and Trimper June 2009, *in preparation*), but no wintering areas were found in the BLSA.

According to the Matimekush-Lac John Innu, moose (*mush*) are found only rarely in the BLSA (Clément Mai 2009). The construction of the railway in the 1950s is said to have facilitated the northward spread of moose. Paradoxically, however, the noise of trains make them flee (Clément Mai 2009). In general, moose are not much harvested by the Innu.

Black Bear

Black bears use a variety of habitats and are not, therefore, associated with a particular terrestrial ecosystem. The species can travel over long distances to feed. It is omnivorous, feeding on vegetation (twigs, buds and roots), berries, insects, carrion and young moose or caribou. It is often seen near dumps. Its home range covers an area ranging from a few square kilometers to over 1,000 km^2, depending on sex and the type of environment (Leblanc et Huot 2000). It can use open environments, but it tends to avoid recently burned areas. Its dormancy period in a den starts in October, when temperatures drop markedly, and ends in April or May (Leblanc et Huot 2000).

Subsistence

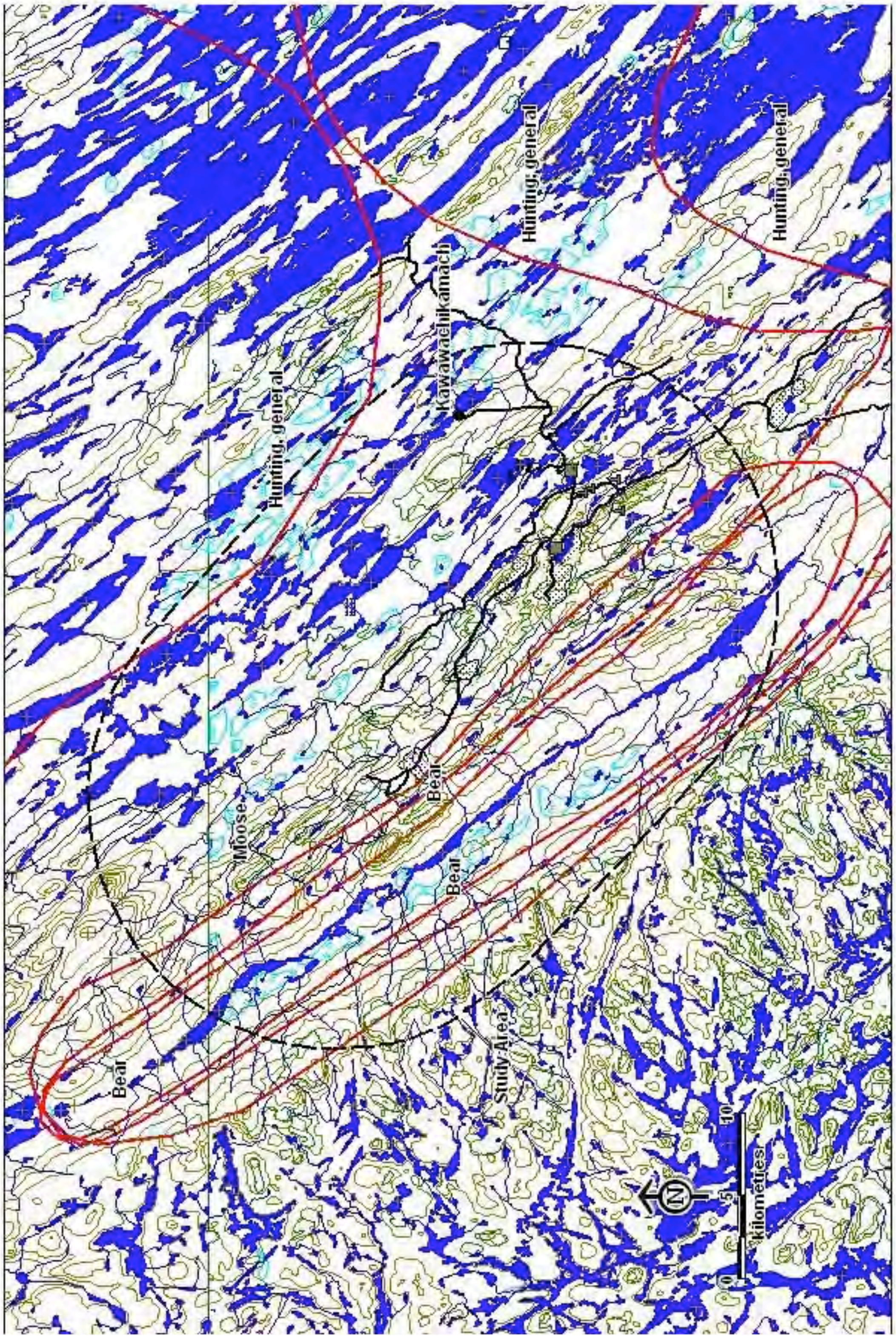
Black bear and moose are harvested by the Naskapis, principally along the Howells River valley for Black bear and east of the valley for moose (Figure 5.30). Between 1989 and 1993 only one moose was killed by Naskapi hunters (Tecsult Foresterie Inc. Septembre 2000) and this not necessarily in the BLSA.

Most of the Innu consulted by Clément (Mai 2009) had seen Black bears (*mashk*) in 2008 in the BLSA. The Schefferville landfill is believed to be the cause of the proliferation of Black bears. According to one Innu, there is a den in the Schefferville cemetery; another Innu made a similar observation in the mountains west of the Howells River (Clément Mai 2009). The Innu of Matimekush-Lac John said that, although Black bear abounds near the Schefferville landfill, it is not harvested because of its eating habits. They are also not keen on hunting moose (Clément Mai 2009).

Data Gaps

The density of large mammals in the BLSA is not known. On the other hand, their preferred habitats are well-documented in the scientific literature, and potential habitats are rare in the BLSA.

Figure 5.30: Hunting of Big Game other than Caribou Reported by Naskapis, 2006



Source: Weiler (January 2009)

5.4.3.3 Furbearers and Small Mammals

Background Information

The species of small mammals and furbearer observed by Brown (June 2005) along the Howells River between May and October over the 1983-2002 period included: Grey wolf (*Canis lupus*); beaver (*Castor canadensis*); otter (*Lutra canadensis*); mink (*Mustela vison*); ermine (*Mustela erminea*); Red fox (*Vulpes vulpes*); Red squirrel (*Tamiasciurus hudsonicus*); muskrat (*Ondatra zibethicus*); and Snowshoe hare (*Lepus americanus*). Since they occur in western Labrador, American marten (*Martes americana*), porcupine (*Erethizon dorsatum*), Northern flying squirrel (*Glaucomys sabrinus*), woodchuck (*Marmota monax*), Canada lynx (*Lynx canadensis*), Arctic hare (*Lepus arcticus*) and Arctic fox (*Vulpes lagopus*) will also be discussed. The small mammal species considered at risk or likely to be designated as such (in Québec) are the Least weasel (*Mustela nivalis*) and the wolverine (*Gulo gulo*).

Grey Wolf

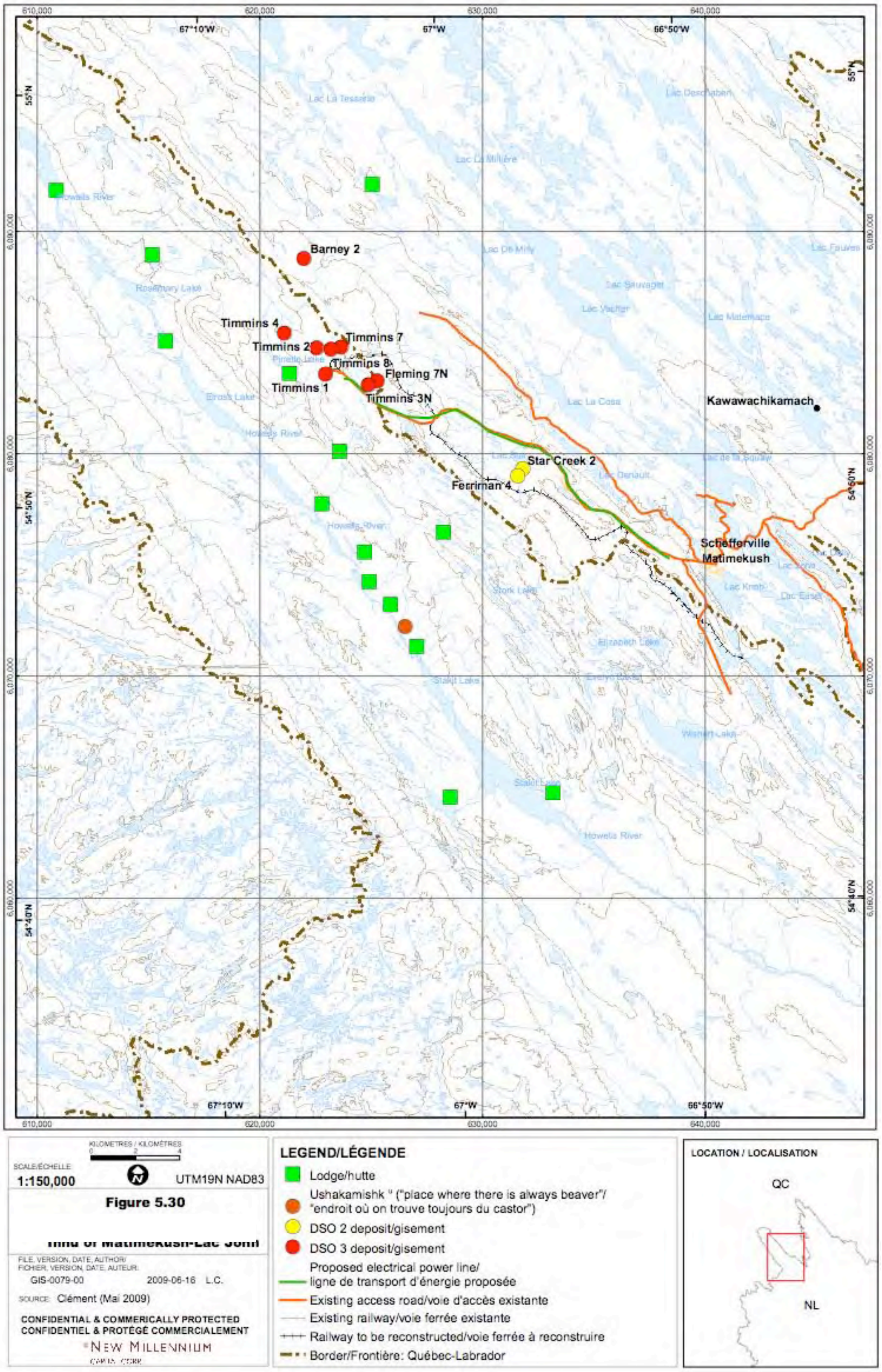
The Grey wolf is common in western Labrador. It can travel over very long distances following caribou. The availability of prey is, therefore, more important than the types of habitat present (Novak *et al*. 1987). The wolf is an opportunist. It preys on different species at different seasons. Beavers and other small mammals are more readily available in summer, whereas cervidae account for much of the wolf's diet in winter. Wolves are likely to be present in the BLSA when caribou migrate through it. Innu from Matimekush-Lac John have observed wolves (*maikan* in innu aimun) in the BLSA (Clément Mai 2009). Wolves are said to visit the landfill occasionally, but they are mostly associated with migratory caribou, which they follow most of the time.

Beaver

Beavers are found in watercourses, ponds, swamps and lakes in generally wooded areas. It is herbivorous. It eats the leaves, bark and twigs of most woody species that grow near water, as well as the stems and roots of various aquatic plants (Feldhamer *et al*. 2003). Its preferred foods are Trembling aspen, White birch, alder, eelgrass and pond lilies.

Beavers are present in moderate numbers, mainly near the mouths of the Howells River's tributaries and the wetlands around the western side of Kivivic Lake. However, the intensity of beaver trapping appears to be low (Weiler November 2006; Tecsult Foresterie Inc. Septembre 2000). The terrestrial ecosystems containing their habitat are mostly MSF07, MSF08, MSF12, MSF14 and MSF15, all associated with wetlands and riparian environments. The BLSA has a moderate potential for beaver because of the distribution of wetlands, principally represented by shrub and riparian fens (see Section 5.4.2). According to most of the Innu of Matimekush-Lac John who were interviewed, the beaver population (*aminshk* in innu aimun) in the region has been stable for the last 10 years (Clément Mai 2009). Figure 5.31 shows the observations of beavers in the BLSA by the Innu of Matimekush-Lac John. Most of the observations occurred in the last few years, but some date back further.

Figure 5.31: Beaver Lodges



Source: Clément (Mai 2009)

Otter

Otters are entirely dependent on aquatic habitats and fish. They feed mostly on fry and small fish, but they also eat invertebrates, frogs and aquatic insects. Otters can swim over 10 km in a single night (Feldhamer *et al*. 2003). The terrestrial ecosystems associated with their habitats are MSF07 and MSF15. The only waterbody offering potential habitat for otters in the BLSA is lac Pinette. The Innu of Matimekush-Lac John are very familiar with otters (*nitshik*) (Clément Mai 2009). Sightings of otters have been recorded in the BRSA, but it seems that none have been observed in the BLSA.

Mink

Mink are found in forests and on the shrub-covered banks of watercourses and lakes. Like otters, they feed on small fish, invertebrates and frogs, but they also eat birds and small mammals, such as the vole, muskrat and hare. The terrestrial ecosystems associated with their habitats are all within the MSF ecoregion. Only 6% of the BLSA is occupied by wetlands. Most of them are shrub and riparian fens (see Section 5.4.2), which do not constitute potential habitat for mink. The presence of the American mink (*atshikash* in innu aimun*)* was confirmed by all the Innu interviewed by Clément (Mai 2009). Some of them, however, suggested that the number of mink in the BLSA was low.

Ermine

Ermine (*shikush* or *kamishihtshit* in innu aimun) use a wide variety of habitats and feed essentially on hares, small mammals and birds. They are said to be plentiful in the Schefferville area, and are trapped by the Naskapis (Weiler November 2006). The Innu believe that the weasel population in the BLSA is stable (Clément Mai 2009).

Red Fox

Red fox (*matsheshu* in innu aimun) are relatively common in populated regions. Because it uses a wide variety of habitats, this species cannot be associated with a specific terrestrial ecosystem. They eat just about anything that they find, their diet being mainly composed of small mammals, insects, birds, fruit, seeds and carrion. According to the Innu of Matimekush-Lac John, foxes are found everywhere in the region of Schefferville. The Red fox population is thought to have increased in recent years (Clément Mai 2009). Foxes are said to be plentiful also by the Naskapis, who harvest them in considerable numbers (Weiler November 2006).

Red Squirrel

The Red squirrel inhabits coniferous and mixed forests as well as maple stands. In the boreal forest, they eat mainly conifer cones. Although at the northern limit of its range, the Red squirrel is probably present in the BLSA in low densities. Forested ecosystems (MSF), however, represent only 19% of the BLSA (see Section 5.4.2), which means a moderate to low potential for this species. According to Innu informants (Clément Mai 2009), Red squirrels (*anikutshash*) are found everywhere in the BLSA, even in the village.

Muskrat

The muskrat (*utshashk* in innu aimun) lives in bogs, ponds, rivers, streams and lakes. In summer, it feeds on the leaves and stems of various aquatic plants. In winter, it uses the submerged parts of these plants. Occasionally, muskrats will feed on mollusks, frogs or salamanders. Only 6% of the BLSA is occupied by wetlands (mostly fens). The terrestrial ecosystems associated with the muskrat's habitat are mostly ecotypes MSF07, MSF08, MSF12, MSF14 and MSF15, all wetland and riparian (see Section 5.4.2). The potential of the BLSA for muskrat is considered to be low to moderate. Muskrats are observed mostly in the sector of the Howells River according to the Innu of Matimekush-Lac John (Clément Mai 2009).

Snowshoe Hare

Snowshoe hare are found wherever young conifers grow: regeneration areas, copses, brush, along watercourses and in all places that offer protection and food. In summer, they feed on grass and broad-leaved plants. In winter, they browse on the buds, twigs and bark of a wide variety of trees and shrubs. Their home range covers from 6 to 12 ha and is criss-crossed by a network of well-marked paths that link resting and feeding areas (Feldhamer *et al*. 2003). The non-wetland forested and dry tundra ecosystems found in the BLSA offer a moderate potential for hare (see Section 5.4.2). All the Innu interviewed by Clément (Mai 2009) reported the presence of hare (*uapush*) in large numbers this year in the BLSA.

Marten

The American marten's preferred habitat is large coniferous forests. Their diet is mostly composed of small mammals, but they are not above eating carrion. Unlike the Newfoundland population, which is considered as threatened by COSEWIC, the marten population of western Labrador is probably healthy. Their habitat requirements may not be met due to the lack of large forests in the area. Still, the Naskapis trap marten in the region of the Howells River (Weiler November 2006). The Innu of Matimekush-Lac John reported, however, that marten (*uapishtan*) are rare in the BLSA (Clément Mai 2009).

Porcupine

Porcupines (*kak* in innu aimun) are a valued prey, particularly for the Innu. They generally live in mature forests, stands of conifers, rocky slopes and talus deposits. In winter, they feed on the inner bark of many trees, including tamarack and spruce. In summer, they feed on willow and alder buds and on the leaves and twigs of various shrubs and plants. The BLSA offers a low to moderate potential for porcupines, since the most common forest ecosystem (MSF05) is characterized by low density of canopy cover and a low proportion of tamarack stands (frequency of 29%) (see Section 5.4.2). According to the Innu of Matimekush-Lac John, porcupines are found everywhere along the roads in the region (Clément Mai 2009).

Northern Flying Squirrel

Northern flying squirrels live in coniferous and mixed forests. They often nest close to watercourses. They feed on pine, spruce and fir cones, mushrooms and arboreal lichens (Feldhamer *et al*. 2003). The BLSA is located at the northern limit of their range. Since forests are rare, the potential of the BLSA for this species is low. The Innu of Matimekush-Lac John reported observations of Northern flying squirrels (*upau-anikutshash*) in the BRSA (more specifically close to the Howells River) but not in the BLSA (Clément Mai 2009).

Woodchuck

The woodchuck can acclimatize to a multitude of habitats. As a general rule, they are found in pastures, on boulder-covered rugged terrain, in open forests and on well-drained rocky slopes. Woodchucks feed for the most part on herbaceous plants, but also on the twigs of shrubs and, occasionally, on insects. According to the Innu of Matimekush-Lac John, woodchucks (*uinishk*) are found in the BLSA (Clément Mai 2009).

Canada Lynx

Canada lynx (*pishu* in innu aimun) live in the boreal forest. The species is also found in swampy areas and in brush, where hare (its main prey) is abundant. Lynx are present and harvested in the Howells River valley (Weiler November 2006).

Tecsult Foresterie Inc. (Septembre 2000) contains data on the number of lynx harvested by the Naskapis (Table 5.31). These captures may not all have come from the BLSA; rather, they were probably harvested over the whole hunting territory of the Naskapis. In fact, the Innu of Matimekush-Lac John consider the Canada lynx to be scarce in the region, and several of those who were interviewed had never seen one (Clément Mai 2009). If present, Canada lynx would be associated with MSF ecotypes (see Section 5.4.2).

Other Species

Arctic fox and Arctic hare are also hunted by the Naskapis (Table 5.31). The BLSA is located at the southern limit of their ranges (Novak *et al*. 1987).

Table 5.31: Number of Individuals per Species of Small Mammal Harvested by Naskapi Hunters from 1989 until 1993

Common English Name	Common French Name	Scientific Name	Total Number of Individuals Harvested
American beaver	Castor d'Amérique	*Castor canadensis*	17
American marten	Martre d'Amérique	*Martes americana*	698
American mink	Vison d'Amérique	*Mustela vison*	172
Arctic fox	Renard arctique	*Alopex lagopus*	25
Arctic hare	Lièvre arctique	*Lepus arcticus*	25
Weasel	Hermine	*Mustela erminea*	31
Grey wolf	Loup gris	*Canis lupus*	21
Muskrat	Rat musqué	*Ondatra zibethicus*	139
North American porcupine	Porc-épic d'Amérique	*Erethizon dorsatum*	9
Northern river otter	Loutre d'Amérique	*Mustela americana*	62
Red fox	Renard roux	*Vulpes vulpes*	412
Snowshoe hare	Lièvre d'Amérique	*Lepus americanus*	337

Source: Tecsult Foresterie Inc. (Septembre 2000)

Arctic hare live in the tundra and on rocky slopes. Arctic fox use various habitats where they can find their prey (north of the tree line). Both species may be found in the BLSA, but Weiler (November 2006) did not record their presence in interviews with Naskapi hunters about the area from the Howells River valley to Menihek. According to the Innu of Matimekush-Lac John, Arctic fox (*uapatshesu*) are mostly observed on the tundra, but one individual was seen in the village of Matimekush-Lac John on January 12, 2009 (Clément Mai 2009).

Species at Risk

Wolverine

Wolverines, listed both federally and provincially as endangered, are typically found wherever there is prey availability and are not linked to specific habitats. No observations of wolverine have been made in the Project area recently (Clément Mai 2009). A study in the Howells River basin endeavoured to identify the presence of wolverines by means of baited posts. No wolverines were recorded (Brunet *et al.* 2008).

In 1978, an Innu gave to an INAC representative a wolverine reportedly harvested north of Schefferville (Moisan Octobre 1996). The site of the capture was not confirmed. Nonetheless, based on knowledge of the territory used by the Matimekush-Lac John Innu, it seems unlikely that the harvest would have occurred further than ± 150 km north of Schefferville.

Prior to 1978, the most recent sightings of wolverines (*kuekuatsheu* in innu aimun) in the Schefferville region were those made by the Innu of Matimekush-Lac John in the 1950s (Clément Mai 2009).

Subsistence

Naskapis

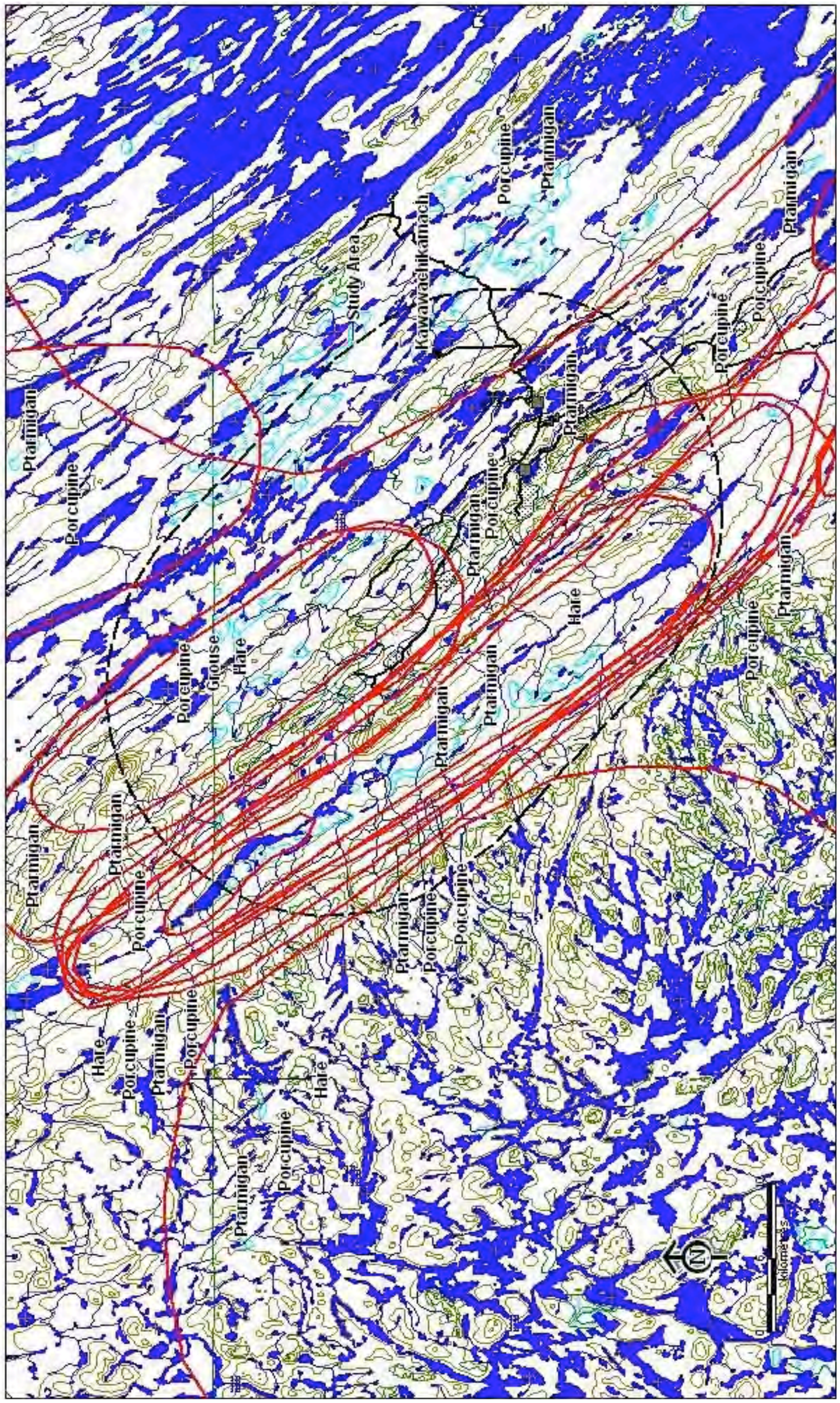
The Naskapis may harvest small game during excursions dedicated specifically to that purpose, although small game hunting is usually carried out as a secondary activity while fishing, trapping, berry-picking and travelling (Weiler January 2009). The most productive season for hunting small game is winter.

Small game harvesting by the Naskapis between 1954 and 1982 occurred principally to the north-west and the south and south-east of Attikamagen Lake. It was also recorded within the LSEA, including the northern part of Dolly Ridge to the west of lac Matemace, the area around Evelyn and Stork lakes immediately to the west of DSO1, the area west of lac La Cosa, at DSO2, and along the northern portion of the ridge between the Howells River valley and the Swampy Bay River basin starting to the west of lac Annabel (Weiler January 2009). Despite limited access to the IOCC mining sites during operations, ptarmigan was taken by the Naskapis at the Ruth (DSO1) and Ferriman/Star Creek (DSO2) sites (Weiler January 2009).

Weiler (January 2009) did not record any small game hunting by Naskapis in the LSEA in the decade following the closure of the IOCC's operations, although such hunting was reported to take place roughly 15 km south-east of Kawawachikamach.

Being densely wooded, the Howells River valley provides ideal habitat for ptarmigan, grouse, porcupine and Snowshoe hare, all of which are harvested therein by the Naskapis as reported in a 2006 study (Figure 5.32). The valley is especially rich in small game, and the large population of porcupine seems to be particularly appreciated. Porcupine is a highly nutritious food resource, and the largest small game species. Its population was fairly low across the entire Naskapi hunting territory for many decades. During the past 20 years, however, it has been gradually rebounding, particularly in the Howells River valley (Weiler January 2009).

Figure 5.32: Small Game Hunting Reported by Naskapis, 2006



Source: Weiler (January 2009)

Small game is also hunted on the ridge between the Howells River valley and the Swampy Bay River basin, primarily ptarmigan and, in some wooded areas, hare. Grouse and porcupine may also be found along the more heavily-vegetated eastern slopes (Weiler January 2009).

Ptarmigan, hare and porcupine were identified as three of the small game species harvested in the Swampy Bay River portion of the LSEA near lac La Tesserie and lac Hameau, while ptarmigan and porcupine were hunted in the vicinity of lac Guillet and lac Matemace (Weiler January 2009).

Historically, trapping did not play a major part in the Naskapi economy, which relied heavily on caribou until the general decrease in the caribou population across the Québec-Labrador Peninsula during the first half of the 20^{th} century. Trapping gained in importance with the settlement of the Naskapis in the Schefferville region and their increasing need for cash (Weiler January 2009).

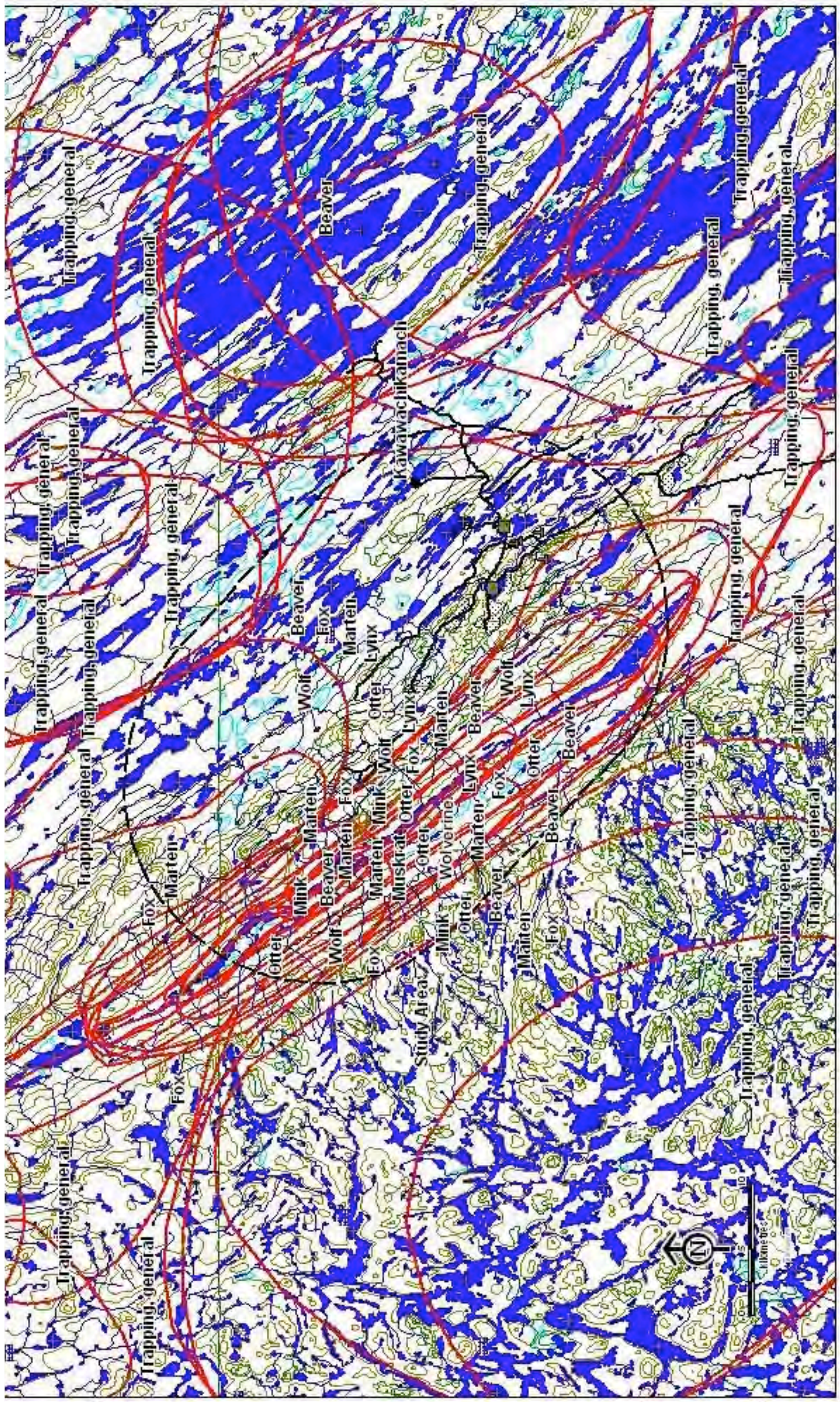
Several trapping areas were used in the LSEA over the course of the IOCC's mining operations, namely the upper and central portions of the Howells River basin, the surroundings of lac Baussac and the area to the north-east of lac Baussac and lac Matemace. Other areas were identified in the Swampy Bay River and Ferrum River basins, near Gillard, Roullois, Grouvel and Attikamagen lakes (Weiler January 2009).

During the decade following the closure of the IOCC's mines, the Naskapis trapped throughout the LSEA. The main areas were in the portion of the Swampy Bay River basin located in the LSEA and in the Howells River valley, including its eastern slope. Both areas are forested habitats interspersed with waterbodies, which attract most of the furbearing species of interest to trappers: such forest-dwellers as marten, weasel, ermine, wolverine, lynx and squirrel; and species that use riparian areas, such as beaver, muskrat, mink and otter (Weiler January 2009). Red and Arctic foxes and wolves may be encountered anywhere, including the fairly barren ridge.

Trapping in the LSEA is concentrated in the Howells River valley as reported in 2006 (Figure 5.33), where the combination of dense forests and numerous waterbodies provides prime habitat for most furbearing species. The Naskapis trap such species as marten, weasel, ermine, squirrel, lynx, otter, mink and muskrat (Weiler January 2009). During the 2006 survey, the Naskapi interviewees reported that the beaver population is moderate but rising. Beaver lodges are located near the mouths of many of the smaller tributaries of the Howells River and in the wetlands bordering the western shore of Kivivic Lake. Beavers are trapped by some trappers, but other trappers are waiting for a rise in the population before starting to do so. Wolves and Red foxes are plentiful in the valley, and both are harvested in good numbers. The wolf population tends to increase during the caribou migration (wolves are often shot rather than trapped). Wolverines, reported to be present in the valley, are sought after by the trappers. There have been sightings of wolverine tracks and the animal itself, but no reports of a kill. Furbearers harvested along the ridge are limited to a few species: Red and Arctic fox, wolf and, occasionally, weasel (Weiler January 2009).

Trapping in the eastern part of the LSEA -- the Swampy Bay River basin -- targets the same species as in the Howells River valley, with the exception of wolverine. The area surrounding Miltière, La Tesserie, Hameau, Annabel, Guillet and Baussac lakes is used for trapping (Weiler January 2009).

Figure 5.33: Trapping Reported by Naskapis, 2006



Source: Weiler (January 2009)

Matimekush-Lac John Innu

The Matimekush-Lac John Innu who participated in a study on land- and resource-use (Clément Mai 2009) indicated that their trapping of furbearers in the LSEA has generally declined as of late. Nonetheless, one Innu hunter achieved the following harvest in the LSEA and its surroundings in 2008 (Table 5.56): three beavers; two otters; 20 marten; 20 mink; 30 foxes; 100 hares; and about 10 muskrats. The Innu value the meat of beavers and muskrats highly (Clément Mai 2009). Most furbearers continue to be used for clothing and medicinal purposes, the latter being described in Table 5.32.

Table 5.32: Some Aspects of the Medicinal Use of Animals by the Innu of Matimekush-Lac John

Animal	Part	Use
amishk[u] (beaver)	*uishinau* - castoreum gland	cough, flu; infection; bladder disease; toothache
atik[u] (caribou)	*umishtatai-umik*[u] - rumen blood	for overall health
innineu (Spruce grouse)	*mushkami* - soup	flu
kak[u] (porcupine)	*kauiak*[u] - quills	heart diseases
kukamess (Lake trout)	*uishupui*	rhumatism, chest pains
mashk[u] (Black bear)	*uishupui* - gall bladder *uishinau* *pimi* - fat	? ? skin diseases, wounds, baldness
*nishk (*Canada goose)	*pimi* - fat	scars
nitshik[u] (River otter)	*ushui-pimi* - fat from the tail	earaches
*shiship (*waterfowl)	*mushkami* - soup	fortifying
uapush (Snowshoe hare)	*uapushuian* - fur	scars, burns
utshashk[u] (muskrat*)*	*pimi* - fat	skin diseases

Source: Clément (Mai 2009)

Two Innu informants each reported taking five porcupines in the general area of the LSEA in 2008 (Table 5.56).

Data Gaps

The population densities of small mammals and furbearers are not known, but data from harvesting studies and Traditional Ecological Knowledge compensate partially for that.

The habitat preferences of the various species are known, and the terrestrial ecosystem mapping of the BLSA and surroundings (see Section 5.4.2) permits informed conclusions about the potential for each of the habitats in question.

5.4.3.4 Micromammals

Background Information

The term micromammals refers to terrestrial mammals of a very small size. These animals play an important ecological role, being one of the first links in the food chain of carnivorous mammals and birds of prey. Micromammals include several taxonomic groups, such as rodents (mice and voles) and insectivores (shrews and moles) (Desrosiers *et al.* 2002). In general, they are active night and day and all year long. In winter, they rarely come out in the open, moving in tunnels that they dig under the snow to protect themselves from predators.

A review of observations by Brunet and Duhamel (Décembre 2005) and Brunet, Duhamel and Léger (Juin 2008; 2008) is presented in Table 5.33.

Local and Regional Distribution

During the 2005 micromammal survey, the Southern red-backed vole was the most abundant micromammal and was found in all the study areas. The Western heather vole was the next most abundant micromammal. One of the study sites of Brunet and Duhamel (Décembre 2005) included a part of the BLSA.

Brunet and Duhamel (Décembre 2005) indicated that they measured relatively low population densities, and they noted that inter-annual variations in the size of populations of micromammals are particularly great in northern latitudes. They speculated that such fluctuations might explain the absence of Ungava lemmings in 2005.

The Southern bog lemming was recorded in riverine and bog habitats between the 52nd and 53rd parallels of latitude south-west of Schefferville (Fortin *et al.* 2004). According to Girard (November 2003), small mammals, such as Ungava lemmings and Meadow voles, also occur in the Howells River valley.

The Innu of Matimekush-Lac John are familiar with the Star-nosed mole (which they call *nanashpatinishtsheshu*) and confirmed its presence in the BLSA (Clément Mai 2009).

Species at Risk

No species of micromammal is designated as being at risk in the Province of Newfoundland and Labrador.

Data Gaps

Envirotel 3000 inc. performed several micromammals inventories within the BRSA. All micromammals species at the latitude of the ELAIOM are common, and no significant data gaps exist.

Table 5.33: Species of Micromammals Potentially Present and Recorded in Schefferville Region and Habitat Description

Common English Name	Common French Name	Scientific Name	Habitat Description
Cinereus shrew	Musaraigne cendrée	*Sorex cinereus*	Mature deciduous or coniferous forests, bogs, fens and brush. Corresponding terrestrial ecosystems: MSF01, MSF06, MSF07, MSF08, MSF11, MSF12.
Pygmy shrew	Musaraigne pygmée	*Microsorex hoyi*	Various habitats close to watercourses (forests, groves, fens, *etc*.). Corresponding terrestrial ecosystems: MSF07, MSF11, MSF12, MSF13, MSF15.
Water shrew	Musaraigne palustre	*Sorex palustris*	Mature coniferous or mixed forests close to watercourses. Corresponding terrestrial ecosystems: MSF06, MSF07.
Star-nosed mole	Condylure à nez étoilé	*Condylura cristata*	Forests and fields, but prefers riparian and wetland environments. Corresponding terrestrial ecosystems: MSF07, MSF15.
Meadow jumping mouse	Souris sauteuse des champs	*Zapus hudsonius*	Wet meadows, brush, grassy banks of watercourses as well as alder and willow groves. Fringes of coniferous and deciduous forests (where vegetation is dense). Corresponding terrestrial ecosystems: MSF07, MSF11, MSF12, MSF15.
Woodland jumping mouse	Souris sauteuse des bois	*Napaeozapus insignis*	Deciduous and coniferous forests close to watercourses. Corresponding terrestrial ecosystems: MSF06, MSF07.
Meadow vole	Campagnol des champs	*Microtus pennsylvanicus*	Wet and brush areas close to ponds, lakes and watercourses. Corresponding terrestrial ecosystems: MSF11, MSF12, MSF15.
Northern bog lemming	Campagnol-lemming boréal	*Synaptomys borealis*	Sphagnum fens, wet coniferous forests, wet subalpine grasslands and tundra. Corresponding terrestrial ecosystems: MSF06, MSF08 MSF11, MSF12, HST01, HST03, HST04, HST05, HST06.
Rock vole	Campagnol des rochers	*Microtus chrotorrhinus*	Wet taluses, between moss-covered rocks, at the base of cliffs, on rocky outcrops in mixed or coniferous forests. Corresponding terrestrial ecosystems: HST02, HST03, HST05.
Southern red-backed vole	Campagnol à dos roux de Gapper	*Clethrionomys gapperi*	Mature forests (coniferous, mixed or deciduous) and brush close to a source of water. Corresponding terrestrial ecosystems: MSF06, MSF07, MSF08, MSF15.
Ungava collared lemming	Lemming d'Ungava	*Dicrostonyx hudsonius*	Dry and lichen-covered tundra areas. Corresponding terrestrial ecosystems: HST01, HST02, HST03.
Western heather vole	Phénacomys	*Phenacomys intermedius*	Various habitats close to water. Bushes near wooded areas, wet meadows with moss. Summits of mountains. Corresponding terrestrial ecosystems: MSF06, MSF07 MSF13, MSF15 HST01, HST02, HST03.

5.4.3.5 Chiroptera

Taxonomically, bats comprise the order Chiroptera, which means 'hand-winged'. The order is divided into two sub-orders: the MegaChiroptera and the MicroChiroptera (Nagorsen and Brigham 1993). In Canada, 20 species of bats are found (Williams *et al*. 2002). In Newfoundland there are three species of bats on the island of Newfoundland, but only one species, the Little brown bat (*Myotis lucifugus*), has been confirmed in Labrador (NLDEC 2009a, Internet site). It must be noted, however, that the distribution of many bats in Canada is still unknown (Wild Species Canada 2005, Internet site).

Common Species

No species were recorded in the surveys carried out in 2005 and 2006 (Brunet et Duhamel Décembre 2005; Brunet *et al.* Juin 2008). Cries were recorded but their low intensity did not make it possible to attribute them to a particular species. The following paragraphs briefly describe the two species most likely to be found in the region.

- Little Brown Bat

One species, belonging to the *Myotis* genus, was identified during a 2005 survey. NLDEC (2009a, Internet site) notes that the Little brown bat (*Myotis lucifugus*) is the only species known to live in Labrador. It is a medium-sized species. This species is the most widespread bat in Canada and exploits a variety of habitats (Williams *et al*. 2002), from arid grasslands to humid coastal forests. Summer roosts are, when possible, in buildings and other man-made structures or in tree cavities, rock crevices, caves and under the bark of trees. In summer females will congregate in nursery colonies that may contain hundreds to thousands of individuals (Broders and Forbes 2004). The Little brown bat emerges at dusk to feed on a variety of insect prey and will often feed over water (Furlonger *et al*. 1987). This species typically hibernates in caves and abandoned mines (Nagorsen and Brigham 1993).

- Silver-haired Bat

The Silver-haired bat (*Lasionycteris noctivagans*) is one of the three migratory bat species found in Québec and, possibly, in Labrador (Brunet et Duhamel Juillet 2005). Very little is known about this species of bat in Québec and Labrador, including its distribution. The Silver-haired bat occupies mainly wooded areas, where they hunt flying insects along lakes and ponds (Prescott and Richard 2004). During the day, they hide in trees or in cracks in the tree bark. According to Brunet and Duhamel's (Juillet 2005) literature review, the Silver-haired bat may be present in the Howells River catchment.

Local and Regional Habitat Distribution

Bat density was estimated as very low by Envirotel 3000 inc. (Février 2008). It must be noted that, even after several surveys in the area, no bat species were identified. While the species potentially present are enumerated, there is only a slight potential for those species to be found around DSO3. Surveys for identifying roosting and hibernacula conducted in 2005 and 2006 throughout the LIOP as well as in the ELAIOM found no evidence of bats (Brunet et Duhamel Décembre 2005; Envirotel 3000 inc. Février 2008).

Species at Risk

No species at risk are present or potentially present.

Traditional Knowledge

There is little traditional knowledge of Chiroptera, as they are not an important component of Native subsistence.

Data Gaps

Despite the paucity of data mentioned above, we do not believe that there are any major data gaps.

5.4.3.6 Herpetofauna

Amphibians and reptiles are regarded as a good bioindicator group for measuring environmental quality because they live in contact with both terrestrial and aquatic ecosystems and are sensitive to changes in environmental conditions. Both groups of animals face many threats posed by the loss of their habitat to urbanization and disturbances such as deforestation, pollution of their environment and global warming (Desroches and Rodrigue 2004). These numerous disturbances limit the distribution and abundance of local species. Road deaths, inadequate protection of habitats, introduction of exotic species, disease and illegal harvesting also affect populations of these groups.

Common Species

Table 5.34 demonstrates the species of herpetofauna present or likely to occur in the Schefferville region, including the BLSA, based on the literature review as well as the 2005 and 2006 surveys. The low abundance of the species present must be noted.

<u>American Toad</u>

The American toad (*Bufo americanus americanus*) can be found in a variety of terrestrial ecosystems in North-eastern Canada (Conant 1975). It is commonly found in forests, seasonal wetlands, swamps and the backwaters of rivers and bogs (Desroches and Rodrigue 2004; Conant 1975). It is resistant to dehydration and can live in drier environments than most amphibians. Its diet consists of spiders, grubs, worms and other insects and invertebrates. The "warts" of toads are actually glands, some of which produce extremely toxic substances.

<u>Blue-spotted Salamander</u>

The Blue-spotted salamander (*Ambystoma laterale*) is bluish-black in colouration and has blue and white flecks on the back and bluish-white spots on the sides of the body and tail (CRACM 2009). It lives in coniferous and deciduous forests, where it can be found beneath logs, rocks, leaf litter or in the burrows of small woodland animals (Conant 1975). Ponds that retain water into mid summer are vital for breeding, and the Blue-spotted salamander will migrate there to reproduce**.** It can survive cooler temperatures, and its distribution therefore spans much of the north-east portion of the US, as well as south-east Canada. They can be found in south-eastern Manitoba and east across southern Ontario, Québec and Newfoundland (Conant 1975). Blue-spotted salamanders eat a variety of small invertebrates: slugs, earthworms, snails, centipedes, earthworms and rove beetles (Desroches and Rodrigue 2004).

Table 5.34: Herpetofauna Potentially Present or Recorded in the Schefferville Region

Common English Name	Common French Name	Scientific Name	Literature Review	2005 Survey	2006 Survey
American toad	Crapaud d'Amérique	*Bufo americanus americanus*	X	X	X
Blue-spotted salamander	Salamandre à points bleus	*Ambystoma laterale*	X		
Mink frog	Grenouille du Nord	*Lithobates septentrionalis*	X		X
Northern green frog	Grenouille verte	*Lithobates clamitans melanota*			X
Northern spring peeper	Rainette crucifère	*Pseudacris crucifer crucifer*		X	
Northern two-lined salamander*	Salamandre à deux lignes	*Eurycea bislineata*	X		
Wood frog	Grenouille des bois	*Lithobates sylvatica*	X	X	X
Northern dusky salamander*	Salamandre sombre du Nord	*Desmognathus fuscus*	X		

*Potentially present only, not recorded.
Source: Brunet et Duhamel (Juillet 2005); Brunet et Duhamel (Décembre 2005); Brunet *et al.* (Janvier 2008)

Mink Frog

The Mink frog (*Lithobates septentrionalis*) is generally green to brown, often spotted or mottled. It is predominantly aquatic, living among the vegetation (especially among lily pads) in ponds, swamps and streams around wooded areas. It feeds on a wide variety of things, including spiders, snails, beetles and other invertebrates (Conant 1975). As tadpoles, they consume primarily algae and decaying plant matter. This species is common in Québec and Labrador (Desroches and Rodrigue 2004).

Northern Green Frog

The Northern green frog (*Lithobates clamitans melanota*) is green or bronze to olive-brown. Its most distinguishing feature is a pair of parallel ridges or folds extending about two thirds of the way down its back. It inhabits most aquatic environments: lakes, marshes, bogs, *etc*. (Desroches and Rodrigue 2004). It has a very diverse diet, ranging from small frogs to small snakes, worms and insects (Conant 1975).

Northern Spring Peeper

The Northern spring peeper (*Pseudacris crucifer crucifer*) has a dark cross on its back roughly in the shape of an "X" (thus the Latin name *crucifer*, for cross), though sometimes the marking may be indistinct. Spring peeper habitat includes wooded areas in or near flooded ponds and swamps. This species is very common in Québec and the Maritimes (Desroches and Rodrigue 2004). The colour variations of *P. crucifer* are mostly tan, brown, olive-green and grey (Desroches and Rodrigue 2004). It eats small arachnids, insects such as ants and water bugs (Conant 1975).

Wood Frog

The Wood frog (*Lithobates sylvatica*) is quite variable in colour, but is usually a mottled brown with a black mask-like patch from the eyes to the line of the jaw (Desroches and Rodrigue 2004). Wood frogs, as their name implies, are a woodland species, needing wooded swamps and ponds for their reproduction (CRACM 2009). This species is the most widely distributed amphibian in North America, even reaching beyond the Arctic Circle (Conant 1975). The Wood frog eats insects and other small invertebrates.

Northern Two-lined Salamander

The Northern two-lined salamander (*Eurycea bislineata*) gets its name from the two dark lines running longitudinally from behind the eyes to the tip of the tail. The general coloration is usually a shade of yellow, but may also be shades of brown or even green. This salamander prefers small, rocky, woodland streams, where it hides during the day beneath flat rocks and logs. This species is common in Québec, New Brunswick and the north-eastern United States, with small populations in Labrador (Desroches and Rodrigue 2004). It feeds on small invertebrates, mainly insects, worms and crustaceans (Conant 1975).

Northern Dusky Salamander

The Northern dusky salamander (*Desmognathus fuscus*) is highly variable in colour. Its dorsal surface is marked with a broad yellowish-gray, tan or brown stripe that runs from head to tail (CRACM 2009). The species is considered relatively common in southern Québec and is widely distributed in southern New Brunswick (Desroches and Rodrigue 2004). The Northern dusky salamander is found primarily in areas with limestone. It lives at the edges of rocky streams and prefers wooded or partially wooded habitats. It spends much of its time under flat rocks, logs and other debris, especially near water (CRACM 2009). It feeds primarily on small insects, arachnids and centipedes (Conant 1975).

Local and Regional Distribution

There is a total of eight species of herpetofauna potentially present within the BRSA. Five species were found during the Brunet and Duhamel surveys (Brunet et Duhamel Juillet 2005; Brunet et Duhamel Décembre 2005; Brunet *et al.* Janvier 2008). These are the American toad, the Mink frog, the Northern green frog, the Northern spring peeper and the Wood frog. The three species that, based on the literature, may be present (the Northern dusky salamander, the Northern two-lined salamander and the Blue-spotted salamander) were searched for but not found.

The Wood frog and the Northern spring peeper were recorded in all four areas sampled (Figure 5.34). The Northern spring peeper outnumbered the Wood frog in all four. The American toad was found only in Area 3. Brown (June 2005) also recorded the American toad in the Howells River valley, and he was advised that it belonged to the *copei* subspecies. Table 5.34 lists the species whose confirmed geographic distribution is limited to the south of DSO2, but that may nevertheless occur at DSO3.

No salamanders or snakes were recorded during the 2005 and 2006 surveys.

The Northern spring peeper was found at several locations between Radisson and the Caniapiscau Reservoir close to the 53rd parallel of latitude west of the study area (Fortin no date(a)).

Fortin (no date(a)) did not record eggs of the Spotted salamander (*Ambystoma maculatum*) at any of the 20 stations sampled between Radisson and the Caniapiscau Reservoir, but he did record the northernmost occurrence of that species close to Mistissini, slightly north of the 50^{th} parallel of latitude. Fortin (no date(b)) also recorded the Northern two-lined salamander close to the 54^{th} parallel of latitude some distance west of Schefferville, and he cited other records south and south-east of Schefferville.

Brunet and Duhamel (Juillet 2005) noted that few inventories of herpetofauna have been conducted in northern regions and that knowledge of the northern limits of the distribution of herpetofauna is consequently limited.

Species at Risk

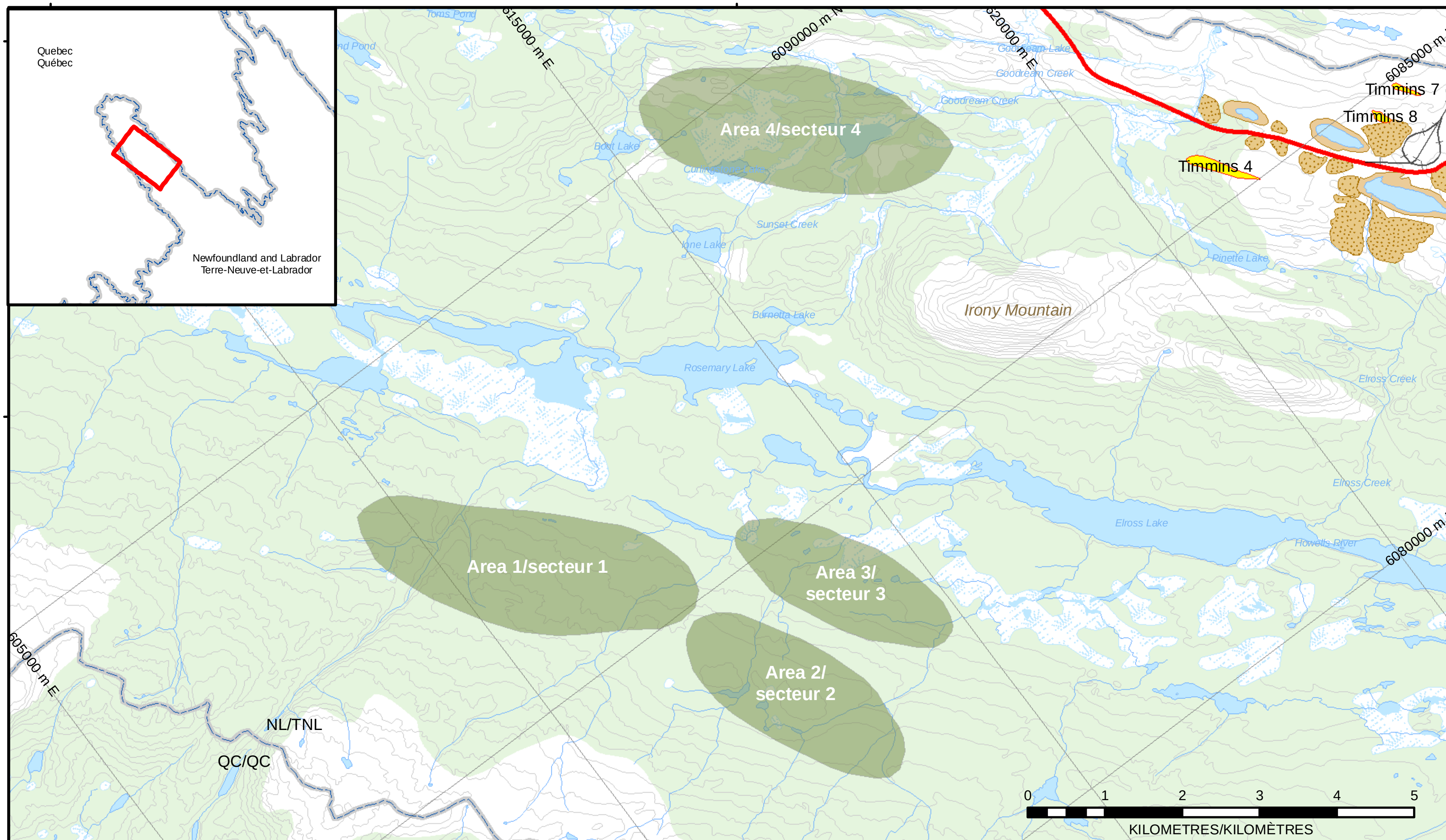
No amphibians or reptiles found in the literature review are protected under the legislation of Canada or Newfoundland and Labrador. No other species at risk are expected to be found in the BRSA.

Traditional Knowledge

There is little traditional knowledge of amphibians and reptiles among the Schefferville Innu, since they are not an important part of their subsistence and are considered to be pests (Clément Mai 2009). The American toad and the Mink frog are the only species of amphibians and reptiles apparently known to the Innu. No salamanders or snakes are known to them (Clément Mai 2009).

Data Gaps

The current knowledge of the herpetofauna potentially found in DSO3 comes from studies conducted for the LIOP, not from studies directly at the proposed mining sites. Nevertheless the two projects are near each other, and we believe that the data collected for the LIOP are generally applicable to DSO3. Consequently, we do not believe that there are any major data gaps.



LEGEND/LÉGENDE

- Sampling areas/ secteurs d'échantillonage
- Border/frontière
- Railway/chemin de fer
- Main access road/ route d'accès principale
- Deposit/gisement
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante
- Contour Interval/ courbe de niveau

FILE, VERSION, DATE, AUTHOR/ FICHIER, VERSION, DATE, AUTEUR: GH-0007-01, 2009-04-09, J.T. Groupe Hémisphères Inc.

Sampling Areas:

Herpetofauna, micromammals and bats

Secteurs d'échantillonage:

Herpétofaune, micromammifères et chiroptères

SCALE/ÉCHELLE: 1:75,000

UTM 19N NAD 83

SOURCES: Government of Canada, NTDB, 1:50 000, 1979
Government of NL and Governement of QC, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Envirotel, Wildlife survey, 2005
Groupe Hémisphères, Hydrology update, 2008

Gouvernement du Canada, BNDT, 1/50 000, 1979
Gouvernement de T.-N.-L. et Gouvernement du QC, frontière utilisée pour les titres
New Millennium Capital Corp., gisements et routes
Envirotel, inventaire faunique, 2005
Groupe Hémisphères, mise-à-jour de l'hydrologie, 2008

Figure 5.34

5.4.3.7 Insects

Typical Species

In a survey of insects in the Schefferville region from August 10-11, 1974, Minot (no date) identified insects belonging to the following Orders: Coleoptera, Hemiptera, Hymenoptera, Lepidoptera, Plecoptera, Psocoptera, Trichoptera and Odonata.

In a literature review, Brunet and Duhamel (Juillet 2005) identified 67 species of insects of the Orders Lepidoptera and Odonata that may be present in the region of the LIOP encompassing Sept-Îles, Schefferville and Churchill Falls. The field surveys that followed in 2006 recorded four species of insects in the Schefferville area of the Province of Québec (Brunet *et al*. Juin 2008).

Munroe (1951, Internet site) reported on a six-week survey of butterflies in the Schefferville region in summer 1948. Anthony (March 1969) reported on a 10-day survey of butterflies in the same region in July 1967.

None of the specimens identified by Anthony (March 1969) came from the Howells River valley, but at least one was from the adjacent Irony Mountain. He noted that "Most of the species we took were extremely limited in their altitudinal and environmental preferences…".

In a conversation on February 14, 2008, Mr Brian Skinner, MRNF, confirmed that knowledge about insects potentially present in northern Québec, including the BLSA, is incomplete. At this time the MRNF cannot provide a list of insects for northern Québec in general or for the Schefferville region in particular.

Species at Risk

One species of insect likely to be designated as at risk by the GoQ is potentially present (Table 5.35).

Table 5.35: Insect Species Likely to be Designated

Common Name	Scientific Name	SARA Status	COSEWIC Status	Status in Québec	Status in Labrador
n/a	*Trechus crassiscapus*	---	---	Likely to be designated	---

Source: Skinner (2007, *personal communication*)

Traditional Knowledge

The Innu consider insects to belong to the pest species, except for certain diptera used as fishing bait. Clément (Mai 2009) reported that all genera and species of diptera, butterflies, ants, flies, bees and spiders are observed everywhere.

Data Gaps

There are differences in species identification between literature reviews and traditional knowledge. The surveys recently carried out for the LIOP were not intended to compile a complete profile of the insect fauna. While data gaps undoubtedly exist, they are not considered to compromise the integrity of the present study.

5.4.3.8 Avifauna

There are approximately 10,000 species of birds worldwide, of which 653 have been found in Canada (Wild Species 2005, Internet site). As is the case for all other species groups found in northern Québec and Labrador, the avifauna diversity is lower than in more southerly regions. Birds are not as sensitive to relatively small modifications to their habitat as are fish and herpetofauna. As long as adequate habitats are available, they are generally able to relocate without large effects on populations. The patchwork of multiple mining projects causing spatial segregation is more apt to affect local avian populations (Ewers and Didham 2006).

Common Species

The surveys conducted by Groupe Hémisphères (October 2008) (Appendix F) identified 43 avian species. Of those species, 14 are possible, probable or confirmed breeders. For a complete record of species observed as well as species breeding see Groupe Hémisphères (October 2008) (Appendix F). The surveys took place in the DSO2, DSO3 and DSO4 sectors and in the Howells River valley (Figure 5.35).

Rafts of White-winged scoters (*Melanitta fusca*) were observed on a few of the water-filled abandoned pits. According to Savard (2009) this type of observation in July should be males migrating to their moulting site. It is known that this species moves to some areas of the estuary of the St. Lawrence as well as Hudson Bay at this time of year. Savard (2009) suggests three possibilities: 1) they are birds that have already started to moult or 2) it is a gathering of males that nest in the region and are preparing to migrate and 3) these are birds that came near their moulting site. He also notes that it is rare for this species to moult in freshwater, therefore the second and third possibilities may be more probable than the first.

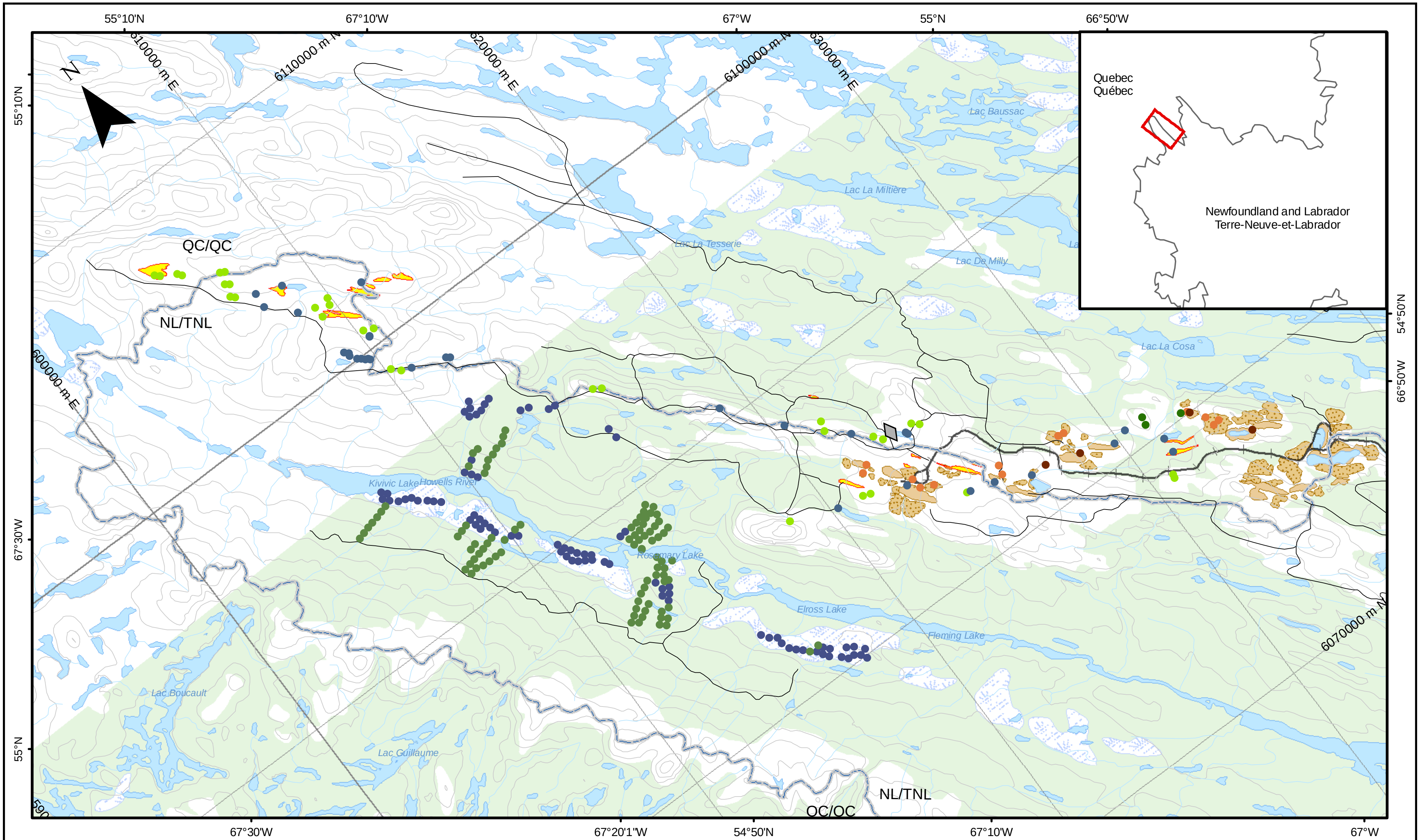
In the open areas, White-crowned sparrows (*Zonotrichia leucophrys*) were the most abundant. A Semipalmated plover (*Charadrius semipalmatu*) with chicks was observed, confirming nesting.

In coniferous forests, Fox sparrows (*Passerella iliaca*) and Dark-eyed juncos (*Junco hyemalis*) were the most abundant. An osprey (*Pandion haliaetus*) was also observed.

In the tundra habitat, 111 breeding pairs of White-crowned sparrows and 40 breeding pairs of American tree sparrows (*Spizella arborea*) were observed, being the most abundant species. In addition, 18 breeding pairs of Common redpoll (*Carduelis flammea*), 11 pairs of American pipits (*Anthus rubescens*) and 10 breeding pairs of Horned larks (*Eremophila alpestris*) were the other most abundant species.

Girard (November 2003) reported sighting Canada geese (*Branta canadensis*) on the banks of Ione Lake.

Seven of the 43 species detected by Groupe Hémisphères (October 2008) are species of interest according to David's (1996) list (Table 5.36). The number of species observed at the ELAIOM site is consistent with the number found for the LIOP (Global Environnement/Golder Associates November 2005) and the Schefferville Iron Ore Mine Project (LIM December 19, 2008).



Listening Point/Point d'écoute

Habitat/Milieu

- Barren/ dénudé
- Cliff/ falaise
- Transitional forest/ forêt de transition
- Wetland/ milieu humide
- Tundra/ toundra

- Rusty blackbird/ quiscale rouilleux
- Border/frontière
- Railway/voie ferrée
- Road/route
- Deposit/gisement
- Watercourse/cours d'eau
- Waterbody/plan d'eau
- Wetland/milieu humide
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

FILE, VERSION, DATE, AUTHOR/
FICHIER, VERSION, DATE, AUTEUR:
GH-0008-04 , 2009-06-12 , J.T.

Bird Survey Points
Points d'inventaire d'oiseaux

0 1 2 3 4 5

KILOMETRES/KILOMÈTRES

SCALE/ÉCHELLE:
1:200,000

UTM 19N NAD 83

SOURCES: Government of Canada, NTDB, 1:250 000, 1979
Government of Newfoundland and Labrador and Government of Quebec, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Golder Associates (2005) and Groupe Hémisphères (2008), Bird Surveys

Gouvernement du Canada, BNDT, 1/250 000, 1979
Gouvernement de Terre-Neuve-et-Labrador et Gouvernement du Québec, frontière utilisée pour les titres
New Millennium Capital Corp., gisements et routes
Golder Associates (2005) et Groupe Hémisphères (2008), Inventaires d'oiseaux

Figure 5.35

Table 5.36: Species of Interest Observed in the Study Area According to the Status Classification in David (1996)

Latin Name	English Name	French Name	Status
Perisoreus canadensis	Gray jay	Mésangeai du Canada	Breeding resident; uncommon
Pinicola enucleator	Pine grosbeak	Durbec des sapins	Breeding resident; uncommon
Loxia leucoptera	White-winged crossbill	Bec-croisé bifascié	Breeding resident; uncommon
Anthus rubescens	American pipit	Pipit d'Amérique	Breeding resident; uncommon; rare wintering habitat
Passerella iliaca	Fox sparrow	Bruant fauve	Migratory breeding; uncommon; rare wintering habitat
Catharus minimus	Gray-cheeked thrush	Grive à joues grises	Migratory breeding; uncommon

Source: Groupe Hémisphères (October 2008)

Table 5.37 summarizes observations of birds in the Howells River valley between 1983 and 2006.

Brown (June 2005) reported sighting many ospreys within the Howells River catchment.

Furthermore, Minaskuat Limited Partnership (January 2008) reported sighting a Northern goshawk (*Accipiter gentilis*) in the Howells River valley in March 2006.

Local Habitat Distribution

The Schefferville area is the northern extremity of the range of many avian species, but it is also an important migratory ground for species moving to islands within the Arctic Circle (Gauthier et Aubry 1995). The numbers of breeding waterfowl and shorebirds observed during the two-week survey conducted by Global Environnement/Golder Associates (November 2005) in mid June to early July 2005 were low, but that is probably attributable to the fact that waterfowl and shorebird nesting surveys in that area are best conducted in May (CQ-WBPS 2001) and that the major waterfowl flyways do not pass over or through the Schefferville and Howells River regions (Thomasson-Grant 1988).

The wetland complex in DSO3 is the habitat that must be considered as having the greatest value for avifauna, given its size and the diversity of types of wetland that is found there. The greater diversity of micro-habitats likely harbours more species of birds compared to non-wetland ecotypes.

Table 5.37: Species of Birds Observed in Howells River Basin 1983-2006

Species			Spring-Fall 1983-2002[1]	Summer 2003[2]	Spring 2005[3]		Summer 2006[4]
Common English Name	Common French Name	Scientific Name			Wetland	Transitional Forest	
Alder flycatcher	Moucherolle des aulnes	*Empidonax alnorum*				X	
American bittern	Butor d'Amérique	*Botaurus lentiginosus*	X				
American black duck	Canard noir	*Anas rubripes*	X		X		
American redstart	Paruline flamboyante	*Setophaga ruticilla*			X	X	
American robin	Merle d'Amérique	*Turdus migratorius*	X	X	X	X	
American tree sparrow	Bruant hudsonien	*Spizella arborea*			X	X	
Bald eagle	Pygargue à tête blanche	*Haliaeetus leucocephalus*	X				
Belted kingfisher	Martin-pêcheur d'Amérique	*Ceryle aleyon*	X				
Black-and-white warbler	Paruline noir et blanc	*Mniotilta varia*			X	X	
Blackpoll warbler	Paruline rayée	*Dendroica striata*	X				
Black scoter	Macreuse noire	*Melanitta nigra*					X
Boreal chickadee	Mésange à tête brune	*Parus hudsonicus*	X		X	X	
Canada goose	Bernache du Canada	*Branta canadensis*	X	X	X	X	
Cape may warbler	Paruline tigrée	*Dendroica tigrina*			X	X	
Chipping sparrow	Bruant familier	*Spizella passerina*			X	X	
Common goldeneye	Garrot à oeil d'or	*Bucephala clangula*					X
Common loon	Plongeon huard	*Gavia immer*	X	X	X	X	
Common merganser	Grand harle	*Mergus merganser*	X			X	X
Common raven	Grand corbeau	*Corvus corax*	X	X		X	

Species			Spring-Fall 1983-2002[1]	Summer 2003[2]	Spring 2005[3]		Summer 2006[4]
Common English Name	Common French Name	Scientific Name			Wetland	Transitional Forest	
Common redpoll	Sizerin flame	*Carduelis flammea*	X		X	X	
Common snipe	Bécassine des marais	*Gallinago gallinago*	X				
Common tern	Sterne pierregarin	*Sterna hirundo*			X		
Duck	Canard	none		X			
Fox sparrow	Bruant fauve	*Passerella iliaca*			X	X	
Golden eagle	Aigle royal	*Aquila chrysaetos*	X				
Golden-crowned kinglet	Roitelet à couronne dorée	*Regulus satrapa*				X	
Greater yellowlegs	Grand Chevalier	*Tringa melanoleuca*	X		X	X	X
Green-winged teal	Sarcelle d'hiver	*Anas crecca*	X				X
Grey jay	Mésangeai du Canada	*Perisoreus canadensis*	X	X	X	X	
Grey-cheeked thrush	Grive à joues grises	*Catharus minimus*			X	X	
Hermit thrush	Grive solitaire	*Catharus guttatus*			X		
Herring gull	Goéland argenté	*Larus argentatus*		X	X		X
Hoary redpoll	Sizerin blanchâtre	*Carduelis hornemanni*	X				
Lapland longspur	Bruant lapon	*Calcarius lapponicus*	X				
Lincoln's sparrow	Bruant de Lincoln	*Melospiza lincolnii*			X	X	
Magnolia warbler	Paruline à tête cendrée	*Dendroica magnolia*				X	
Merganser	Harle	*Mergus* sp., *Lophodytes* sp.					X
Myrtle warbler	Paruline à croupion jaune	*Dendroica coronata*			X	X	

Species			Spring-Fall 1983-2002[1]	Summer 2003[2]	Spring 2005[3]		Summer 2006[4]
Common English Name	Common French Name	Scientific Name			Wetland	Transitional Forest	
Northern hawk owl	Chouette épervière	*Surnia ulula*		X			
Northern pintail	Canard pilet	*Anas acuta*	X				
Northern three-toed woodpecker	Pic tridactyle	*Picoides tridactylus*			X	X	
Northern waterthrush	Paruline des ruisseaux	*Seiurus noveboracensis*	X		X	X	
Osprey	Balbuzard pêcheur	*Pandion haliaetus*	X	X	X		
Ovenbird	Paruline couronnée	*Seiurus aurocapillus*			X	X	
Palm warbler	Paruline à couronne rousse	*Dendroica palmarum*			X	X	
Philadelphia vireo	Viréo de Philadelphie	*Vireo philadelphicus*				X	
Pine grosbeak	Durbec des sapins	*Pinicola enucleator*		X		X	
Red-breasted merganser	Harle huppé	*Mergus serrator*		X			X
Red-breasted nuthatch	Sitelle à poitrine rousse	*Sitta canadensis*				X	
Ring-billed gull	Goéland à bec cerclé	*Larus delawarensis*				X	
Ring-necked duck	Fuligule à collier	*Aythya collaris*					X
Rough-legged hawk	Buse pattue	*Buteo lagopus*	X	X			
Ruby-crowned kinglet	Roitelet à couronne rubis	*Regulus calendula*	X		X	X	
Rusty blackbird	Quiscale rouilleux	*Euphagus carolinus*		X	X	X	X
Savannah sparrow	Bruant des prés	*Passerculus sandwichensis*			X		
Scaup	Fuligule	*Aythya* sp.					X

Species			Spring-Fall 1983-2002[1]	Summer 2003[2]	Spring 2005[3]		Summer 2006[4]
Common English Name	Common French Name	Scientific Name			Wetland	Transitional Forest	
Scoter	Macreuse	*Scoter* spp.					X
Semipalmated plover	Pluvier semipalmé	*Charadrius semipalmatus*	X				
Slate-colored junco	Junco ardoisé	*Junco hyemalis*			X	X	
Spotted sandpiper	Chevalier grivelé	*Actitis macularia*	X		X		
Spruce grouse	Tétras du Canada	*Falcipennis canadensis*		X		X	
Surf scoter	Macreuse à front blanc	*Melanitta perspicillata*					X
Swainson's thrush	Grive à dos olive	*Catharus ustulatus*				X	
Tennessee warbler	Paruline obscure	*Vermivora peregrina*	X				
Tree swallow	Hirondelle bicolore	*Tachycineta bicolor*			X	X	
White-crowned sparrow	Bruant à couronne blanche	*Zonotrichia leucophrys*	X	X	X	X	
White-throated sparrow	Bruant à gorge blanche	*Zonotrichia albicollis*			X	X	
White-winged crossbill	Bec-croisé bifascié	*Loxia leucoptera*			X		
Wilson's warbler	Paruline à calotte noire	*Wilsonia pusilla*	X				
Wilsons snipe	Bécassine de Wilson	*Gallinago delicata*			X	X	
Woodpecker	Pic	none		X			
Yellow warbler	Paruline jaune	*Dendroica petechia*	X		X	X	
Yellow-bellied flycatcher	Moucherolle à ventre jaune	*Empidonax flaviventris*			X	X	

Species at Risk

There are four species at risk that are likely to use the study area (Table 5.38), including those that could theoretically reproduce therein on the basis of their breeding range and the existence of potential breeding habitat (NLDEC 2008b, Internet site; COSEWIC 2008, Internet site). The Rusty blackbird (*Euphagus carolinus)* is the only such species (Table 5.38) that has been observed in the BRSA. It was observed near Inukshuk Lake (DSO4).

Table 5.38: Species at Risk Potentially Present in Study Area

English Name	Latin Name	Status	
		Newfoundland/ Labrador	COSEWIC
Harlequin duck	*Histrionicus histrionicus*	Vulnerable	Special concern
Peregrine falcon ssp. *anatum*	*Falco peregrinus anatum*	Threatened	Special concern
Short-eared owl	*Asio flammeus*	Vulnerable	Special concern
Rusty blackbird	*Euphagus carolinus*	--	Special concern

Source: Groupe Hémisphères (October 2008)

The following paragraphs summarize data on the species of birds at risk potentially present in the BRSA or the BLSA.

Harlequin Duck

The Harlequin duck nests along watercourses characterized by rapids (Morneau *et al*. 2008). Its distribution in north-eastern Québec is poorly known. It probably does not nest in the BLSA, since no suitable rivers are present.

Peregrine Falcon, *anatum* Subspecies

The Peregrine falcon nests predominantly on cliffs or on structures of human origin, such as bridges, tall buildings and quarries (Bird 1997). Two subspecies occur in Québec: *tundrius* and *anatum*. The former lives, in summer, in the northernmost area of Québec and Labrador, but the southern limit of its breeding area is poorly known; conversely, the *anatum* subspecies, the numbers of which are on the rise, inhabits the south of Québec, at least as far north as the Saguenay River, but the northern limit of its breeding area is poorly known. The Peregrine falcon does not nest in the BLSA, since there are no cliffs that offer the necessary characteristics.

Short-eared Owl

During the breeding season, the Short-eared owl inhabits a variety of extensive open areas, such as dunes, peatlands, swamps, wet prairies, pastures or arctic tundra (Holt and Leasure 1993). The abundance of the species is a function of that of voles and fluctuates greatly. The Short-eared owl can even be absent in certain years if the vole population is at a low. The Short-eared owl may nest regionally, especially in the tundra located in the northernmost part of the BRSA. The BLSA does not offer suitable habitat for nesting. The Short-eared owl was not known to the Innu (Clément Mai 2009), so it is probably not common around Schefferville.

Rusty Blackbird

During the breeding season, the Rusty blackbird lives close to water; it uses peatlands, marshes, swamps adjacent to forests, humid woodlands and thickets of large shrubs where pools persist. It is also found in the partially inundated surroundings of lakes and beaver ponds (Nadeau 1995).

Rusty blackbirds were sighted in a swamp bordering Ione Lake (Girard November 2003). A Rusty blackbird was also observed on July 18, 2008, near Inukshuk Lake (DSO4) during a fisheries survey (Groupe Hémisphères October 2008).

Traditional Knowledge

Despite the fact that many species have been observed in the BLSA by members of the local FNs, only species at risk or species having socio-economic importance with a high probability of being found in the BLSA and BRSA have been retained in this section. A complete list of bird species observed by the Matimekush-Lac John Innu is found in Clément (Mai 2009). While there is detailed information about the presence of raptors and songbirds in Clément (Mai 2009), they are not hunted or used by the local populations.

The most important group of birds for the livelihood of the Innu are the Missipat or 'water game' (Clément Mai 2009). The wetlands around Kivivic Lake, as well as Boundary and Harris lakes, represent a refuge for waterfowl by serving as staging and nesting areas during spring/early summer (Clément Mai 2009).

Two species of loons are clearly distinguished by the Innu. *Mualt*, or the Common loon (*Gavia immer*), and *ashu-mualt*, the Red-throated loon (*Gavia stellata*). The Common loon is very common along the Howells River, and the Red-throated loon is common around Rosemary Lake, but it is not observed directly in the BLSA.

Kakatshiship, or Double-crested cormorant (*Phalacrocorax auritus*), was familiar only to one informant and does not appear to be very common.

Auiu, the Long-tailed duck (*Clangula hyemalis*), is common in the spring, and many observations of this species have been reported. It has been reported in the eastern and western portions of the Howells River valley, between Fleming and Stakit lakes.

Various dabbling duck species -- *inniship* (Black duck; *Anas rubripes*), *uapinniship* (Pintail duck; *Anas acuta*) and *amishkunniship* (Green-winged teal; *Anas carolinensis*) -- are assigned to the same category by the Innu. They appear to be quite common and widespread, with observations between John and Squaw lakes, north of Elross Lake and along the Howells River and at lac Star.

Umamult is the generic name for the scoters, which include all three species. *Umamult* is the White-winged scoter (*Melanitta fusca*), *papukutshat* is the Surf scoter (*Melanitta perspicillata*) and *kuaikan* is the Black scoter (*Melanitta nigra*). The Black scoter is the most abundant, but it is sometimes seen only in the spring, which suggests that it uses the area only during migration.

UshiR', which refers to the mergansers, includes *ushiR*, or Red-breasted merganser (*Mergus serrator*), and *mishtshishilé*', or Common merganser (*Mergus merganser*). These species are apparently seen in the Howells River.

Tshiashlé' is the generic name of gulls. Their eggs are commonly eaten by the Innu and Naskapis. Herring gulls (*Larus argentatus*) and Iceland gulls (*Larus glaucoides*) are thought to be present in the BLSA and are commonly observed at the Scherfferville landfill.

Tshiashkueshish, or terns, were observed by one informant. It is most likely a Common tern (*Sterna hirundo*), although possibly an Arctic tern (*Sterna paradisaea*). This species is also observed along the Howells River. The eggs of terns are eaten.

Nutshipaushtikueshish, or the Harlequin duck, is associated with fast water according to the Elders. Informants confirmed that it is sometimes seen in the rapids around lac John, but very rarely in the BLSA and BRSA. This species is listed both federally and provincially and is discussed earlier in this section.

Another group with considerable importance for the Innu is the Tetraonidae family, known in innu aimun as *gpineuat*, which are sought after for their meat. Three species are commonly found within the BRSA: *innineu*, or Spruce grouse (*Falcipennis canadensis*); *uapineu*, or Willow ptarmigan (*Lagopus lagopus*); and *kashkanatshish*, or Rock ptarmigan (*Lagopus mutus*). Finally, *pashpashtshu*, or Ruffed grouse (*Bonasa umbellus*), is less common but is also observed in the BRSA. Spruce grouse is the most common species, being found in summer and winter. It is reported around the Howells River. Willow ptarmigan is common in the winter, also around the Howells River. The Rock ptarmigan is observed in the spring and fall and is found in mountainous regions near old IOCC sites. Finally, Ruffed grouse has been observed by only one of the Innu interviewed. It is generally more common further south, *i.e.*, near Sept-Îles and along the St. Lawrence River.

Subsistence

Naskapis

Waterfowl is an important resource in spring, since it provides relatively large amounts of high-quality food when other resources are less available (fishing is difficult in spring due to unsafe ice conditions; caribou are less mobile and have generally retreated from the area; and hunters' movements are restricted by difficult snow and ice conditions, making small-game hunting less attractive). Moreover, waterfowl hunting is carried out in a relatively stationary manner and can yield high returns for relatively little investment of time, effort and transportation (Weiler January 2009). Suitable locations are ashkui, sites of early open water in otherwise ice-covered waterbodies during the spring waterfowl migration.

Waterfowl are harvested during the fall migration to a lesser degree, when they tend to stop to rest on suitable waterbodies or to feed on hilltops and ridges offering berries or other food. Locally, breeding populations are also occasionally hunted (Weiler January 2009).

None of the waterfowl hunting areas reported by the Naskapis for the 1954-1982 period was located in the LSEA. The key areas identified in the wider Schefferville region were at Attikamagen Lake, part of the upper Swampy Bay/Ferrum river basins near Annabel, Gillard and Roullois lakes, and the lac Harris area (Weiler January 2009).

The only area where the Naskapis reported harvesting waterfowl in the LSEA over the 1983-1993 period is a system of interconnected waterbodies in the Swampy Bay River basin consisting of Vacher, Gunshot, La Miltière and De Milley lakes. Such hunting occurred primarily during the spring migration.

The Howells River valley, the Swampy Bay River basin and the ridge between them are used by the Naskapis for waterfowl hunting (Figure 5.36). Attikamagen Lake is probably the most heavily used site and produces important yields in spring.

Geese and ducks are harvested in the Howells River valley during the spring migration.

The many ashkui that occur along the Howells River and the associated string of lakes are attractive sites to migrating waterfowl, inducing them to land, rest and feed. Consequently, they constitute the most productive waterfowl hunting spots (Weiler January 2009). During a 2006 survey, the Naskapis most frequently identified Stakit Lake in the southern part of the valley and Kivivic and Rosemary lakes in the northern part as waterfowl hunting areas. In summer, the valley retains a significant breeding population of geese and ducks nesting mostly in the wetlands along the western shore of the Howells River, particularly on the western side of Kivivic Lake. Some Naskapis hunt these resident populations during the moulting period in June or later in summer (Weiler January 2009). The hilltops along the ridge offer staging areas for flocks of geese during the fall migration. Geese rest and feed on the northern half of the ridge, attracted by the berries. Goose hunters thus come to that area in fall (Weiler January 2009).

Waterfowl are also harvested in the Swampy Bay River basin, principally in spring, in Annabel, Hameau, Mollie and La Tesserie lakes (Weiler January 2009).

Pursuant to Section 15 of the NEQA, the members of the NNK have the following annual guaranteed levels of harvesting for migratory birds: 2,246 Canada geese; two Snow geese; 303 ducks; and 10 loons.

Matimekush-Lac John Innu

The Matimekush-Lac John Innu harvest Canada geese in the LSEA and beyond (Figure 5.37) for food and clothing.

They hunt Canada geese and waterfowl in spring and in fall. They also collect their eggs (Clément Mai 2009).

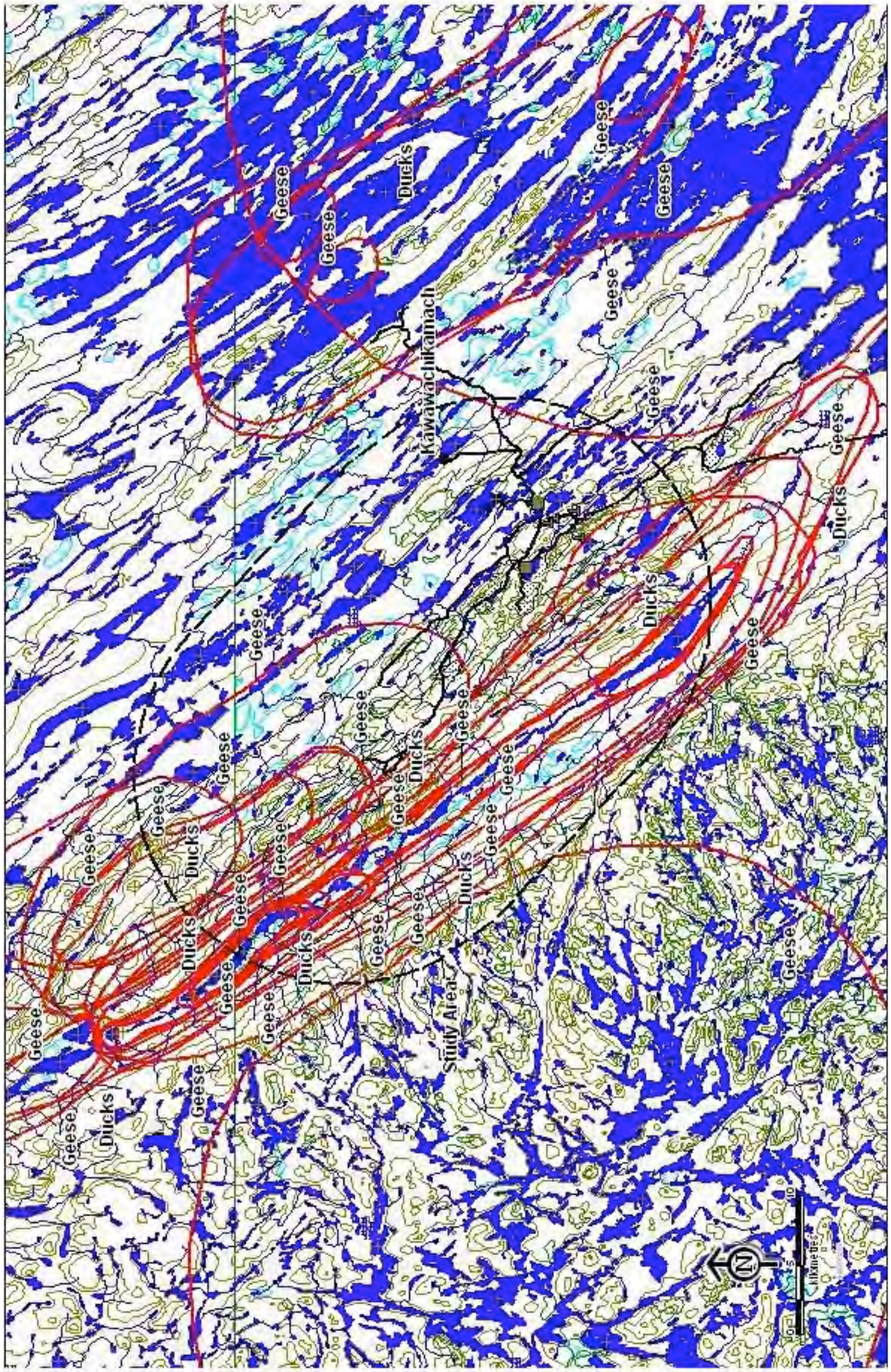
Three of the Innu informants each took between 20 and 25 Canada geese in the general sector of the LSEA in 2008, while two each harvested 10 ducks and one took 30 ducks (Table 5.56).

The numbers of Spruce grouse taken by the Innu informants in 2008 ranged from 20-30 to 50, while those for Willow ptarmigan were between 2-3 and 200 (Table 5.56).

Data Gaps

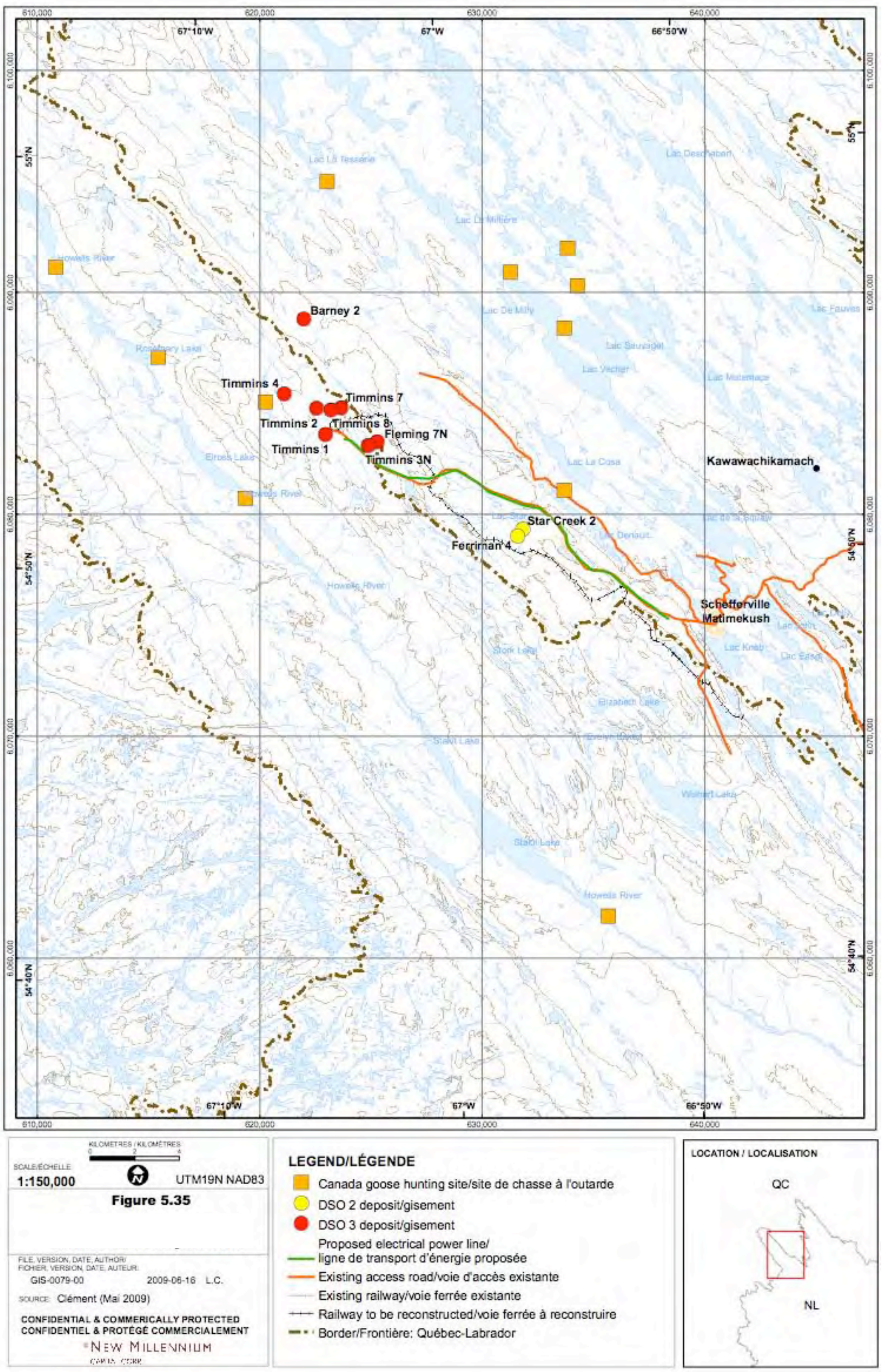
Avifauna distribution and populations around the site are well studied. There are no important data gaps.

Figure 5.36: Waterfowl Hunting Reported by Naskapis, 2006



Source: Weiler (January 2009)

Figure 5.37: Canada Goose Hunting Sites Reported by Matimekush-Lac John Innu



Source: Clément (Mai 2009)

5.4.3.9 Fish

Nearly 1,400 species of fishes are found in Canadian waters, comprising approximately 60% of all Canada's vertebrate species. Eleven percent of Canada's species of fish occur in freshwater habitats.

Common Species

Table 5.39 lists the 11 species of fish that have been recorded in the Schefferville region and in the Howells River basin. According to AMEC (January 2009), however, only Brook trout (*Salvelinus fontinalis*), burbot (*Lota lota*) and Lake chub (*Couesius plumbeus*) have been found in the BRSA. Only Brook trout and Lake chub have been recorded within the BLSA.

Table 5.39: Fish Species Present in Schefferville Region and in the Howells River Basin

Common English Name	Common French Name	Scientific Name
Brook trout	Omble de fontaine	*Salvelinus fontinalis*
Burbot	Lotte	*Lota lota*
Lake chub	Méné de lac	*Couesius plumbeus*
Lake trout	Touladi	*Salvelinus namaycush*
Lake whitefish	Grand corégone	*Coregonus clupeaformis*
Landlocked Atlantic salmon (Ouananiche)	Saumon atlantique (Ouananiche)	*Salmo salar*
Longnose sucker	Meunier rouge	*Catostomus catostomus*
Northern pike	Grand brochet	*Esox lucius*
Round whitefish	Ménomini rond	*Prosopium cylindraceum*
Slimy sculpin	Chabot visqueux	*Cottus cognatus*
White sucker	Meunier noir	*Catostomus commersoni*

Source: Scruton (1984); Brown (June 2005); Weiler (November 2006); Gartner Lee Limited (July 2006); AMEC (January 2009)

Brook Trout

The Brook trout has a long, streamlined body with a large mouth that extends past the eye. Colour variations include olive, blue-gray or black above with a silvery white belly and markings along the back. It is found throughout the north-eastern United States and the eastern provinces and the Maritimes. It is very common in northern Québec and Labrador (Scott and Crossman 1974). It occupies cool, well-oxygenated creeks and small to medium rivers, and lakes. It feeds on a wide range of organisms including worms, leeches, crustaceans, insects (chironomids, caddisflies, blackflies, mayflies, stoneflies and dragonflies), mollusks, fishes, amphibians and small mammals (Scott and Crossman 1974).

Lake Chub

The Lake chub has a silvery appearance, darker on its back, lighter sides, with a white or cream belly. It is found in all Canadian provinces but not on the Island of Newfoundland. It is present in Labrador (NLDEC 2009c, Internet site). The main food of the Lake chub is insect larvae, but it will also eat plankton and algae. The Lake chub spawns in spring, usually April – May. They migrate in schools to streams, where they scatter their eggs over a rocky or gravel substrate. Breeding males develop nuptial tubercles on their heads and reddish patches at the base of their pectoral and pelvic fins. Lake chub are likely prey for larger fish, such as trout and Smallmouth bass, and for fishing-eating birds (Scott and Crossman 1974).

Other Species Potentially Present

Apart from Brook trout, very possibly burbot and Lake chub, we do not expect any other fish species to be present within DSO3. In this section, fish species found near Schefferville and in the Howells River basin are described, as there is a remote possibility that they would swim upstream into the BRSA (mostly at DSO2), but they could not enter the BLSA.

White and Longnose suckers (*Catostomus catostomus*) usually dominate the fish biomass in the larger lakes of the region, where more than 50% of the biomass may be composed of suckers and Lake trout (*Salvelinus namaycush*) (Scruton 1984). Brook trout is the dominant species in the smaller lakes. Individuals of that species have been observed in all aquatic habitat types encountered by Lee (July 2006) during visual surveys in the Howells River valley in September 2005. According to his visual estimates, Brook trout ranged in age from young of the year (0+) to five-year-old (5+) individuals. Young of the year and 1+ were usually encountered in upwelling areas, on stream margins and in small side channels. Older Brook trout (5+) were generally present in pools, deeper sections and on pond margins (Lee July 2006).

A DFO gill-net survey of western Labrador lakes in 1982 indicated that Lake trout accounted for 37% of the biomass of the salmonid catch (Scruton 1984).

Brown (June 2005) did not observe any juvenile ouananiche (*Salmo salar*) in any of the tributaries of the Howells River that he visited; nor did he observe any obstacles restricting passage anywhere along the river. However, a one-day angling survey conducted within a 3.5-km section of the Howells River immediately above Stakit Lake in September 2005 resulted in the capture of 16 juvenile ouananiche (Lee July 2006).

Ouananiche have been observed migrating up the Howells River to spawn every year from 1983 to 2002 in great numbers during August and September (Brown June 2005). Brown (June 2005) searched for the actual spawning beds throughout the lower part of the Howells River without success, not having observed any spawning behaviour or witnessed any alevins or kelts. He speculated that spawning may take place between Fleming and Stakit lakes.

Brown (June 2005) believes that 1,000 to 1,500 ouananiche may spawn in the Howells River each year, and that the Howells River represents critical habitat for it.

It appears that the population of ouananiche in the Howells River has what it needs in order to sustain its long-term health (Brown June 2005). Essentially, its survival depends on food, cover, reproduction and water quality, all of which are currently provided directly or indirectly through its use of appropriate habitat types (spawning sites, rearing areas, growth and feeding areas and passable migration routes).

According to Curtis (February 2004), the fact that Lake trout were found in Ione Lake was unanticipated, given that this species is not generally found in such small waterbodies. He believes that the fact that the fish of Ione Lake and its tributaries appear to be isolated from those of the lower Howells River system by a 3-m waterfall on the stream connecting Ione Lake to Rosemary Lake may mean that the fish in Ione Lake are genetically distinct from those in other parts of the Howells River watershed. The degree of genetic distinctness would depend upon the time during which the fish have been isolated and the selective forces acting on them over that period. Observations of the general appearance of the fish did not reveal any overt evidence of their being morphologically different from fish in other parts of the Howells basin.

Local Habitat Distribution

Table 5.40 describes the parts of DSO3 where fish and fish habitat are present. As only Brook trout were caught within DSO3 by AMEC except for one stream (Lake chub DSO3-13), fish here means solely Brook trout. Figure 5.3 shows all of the sampling sites investigated. Within each site multiple sampling points were taken. The number of points varied with the length and complexity of the site. Two habitat classification systems were used: the Beak (1980); and a new classification system soon to be implemented by DFO (McCarthy *et al*. 2007). The Beak habitat classification system uses a total of four habitat types based on salmonid life-cycle stages and habitat suitabilities.

Table 5.40: DSO3 Habitat Type and Fish Presence Summary

Site	Predominant Habitat Type		Fish Presence	Number of Transects
	New Classification	Beak		
DSO3-02	Run / Riffle	-	No fish	2
DSO3-03	Steady	IV (shelter and feeding)	No fish	4
DSO3-06	Steady	IV (shelter and feeding)	No fish	6
DSO3-08	Run/Riffle	IV (shelter and feeding)	Brook trout	3
DSO3-09	No stream habitat present	-	-	4
DSO3-10	Dry	Dry	No fish; Channel was dry	2
DSO3-11	Dry	Dry	No fish; Channel was dry	1
DSO3-12 (Lac Pinette)	Lake	-	Brook trout	-
DSO3-13	Run/Riffle/Steady/Pool	IV (shelter and feeding)	Lake chub, Brook trout	3
DSO3-14	Steady	IV (shelter and feeding)	No fish	3
DSO3-15	Riffle	II (rearing, limited spawning)	Brook trout	11
Timmins 1	Former mine	-	Brook trout	1
Timmins 2	Former mine	Not applicable	No fish	1

Generally, the water quality measurements made at each transect showed suitable physico-chemical conditions for fish habitat. However, fish habitat at stations DSO3-10 and DSO3-13 is jeopardized by the inexplicably high acidity (pH < 5.0). Station DSO3-05 (Triangle Pond) showed high turbidity, which does not favour the presence of fish.

Streams

- DSO3-02

Approximately 200 m of stream was surveyed and was classified as predominantly run/riffle habitat. This stream flows between three existing mine pits (Timmins 3A, 3B and 3C), terminating at pit 3C. The average stream wet width was 1.5 m. Mean water depth was 0.1 m with an average velocity of 0.01 m/s. Substrate consisted mostly of medium substrate with fines intermixed. It was not considered fish habitat and was not surveyed in September 2008.

- DSO3-03

Approximately 320 m of stream was surveyed and was classified as comprising a majority of steadies with a portion of run/riffle habitat. The average stream wet width of the steadies was 2.3 m with a mean depth of 0.27 m and an average velocity of 0.01 m/s. Substrate in the steadies consisted primarily of organics. The average stream wet width of the run/riffle habitat was 0.58 m with a mean water depth of 0.12 m and an average velocity of 0.25 m/s. Substrate in this habitat type consisted primarily of organics with medium and fine substrates intermixed.

During the July 2008 survey this site was considered potential fish habitat, but at the time of sampling, in September 2008, the channel was dry in places, with very little cover. Electrofishing was conducted but did not yield any fish. This stream is not considered fish habitat.

- DSO3-04

This site consisted of a small body of water located just west of Timmins 1 near the former railway track. The perimeter of the waterbody was surveyed and no inflows/outflows were located. Geologists working for NML stated that this waterbody is a result of rain run-off and the spring freshet. The stream was not considered to be fish habitat and was not surveyed in September 2008.

- DSO3-05

This site also consisted of a small waterbody located just to the east of DSO3-04. This waterbody was also surveyed around its entire perimeter, but no evidence of an inflow/outflow was identified. The geologists of NML again stated that this waterbody is a result of rain run-off and the spring freshet. It was not considered fish habitat and was not surveyed in September 2008.

- DSO3-06

Approximately 500 m of stream was surveyed and classified as steady habitat. The average stream wet width was 1.18 m. Mean water depth was 0.15 m with an average velocity of 0.02 m/s. Substrate consisted primarily of organics with medium and fines intermixed.

During the July 2008 survey this site was considered potential fish habitat, but at the time of sampling, in September 2008, the channel was dry in places, with very little cover.

Electrofishing was conducted, but did not yield any fish. This stream is an extension of the stream labelled DSO3-03 and is not considered fish habitat.

- DSO3-07

This site consisted of a lake (Inukshuk Lake). No surveys were conducted, but water quality samples were collected and analyzed. This site may be considered as a control or reference site for water quality should development proceed. This waterbody was not considered fish habitat, and it was not surveyed in September 2008.

- DSO3-08

Approximately 60 m of stream was surveyed and classified as run/riffle habitat. The average stream wet width was 1.38 m. The mean water depth was 0.11 m with an average velocity of 0.19 m/s. Substrate consisted predominantly of medium and fines with coarse substrate intermixed. An access road is proposed to cross this stream.

Stream DSO3-08 yielded a catch of two Brook trout 120 mm and 240 mm in length respectively. The sampling site had ample overhang cover from vegetation along the banks. This stream is confirmed as fish habitat due to the observed presence of fish there.

- DSO3-09

This site has an existing road crossing between a bog and a lake; however, no inflow or outflow were identified connecting those two bodies of water. Consequently, no stream surveys were conducted. This stream was not considered fish habitat and was not surveyed in September 2008.

- DSO3-10

Approximately 60 m of stream was surveyed and classified as predominately run/riffle habitat. The average stream wet width was 3.37 m. The mean water depth was 0.11 m with an average velocity of 0.15 m/s. Substrate consisted mostly of medium substrate intermixed with coarse and fines. During the July 2008 survey this site was considered potential fish habitat, but at the time of sampling, in September 2008, it was dry. It is therefore not considered to be fish habitat.

- DSO3-11

Approximately 60 m of stream was surveyed and classified as predominately run/riffle habitat. The average stream wet width was 1.1 m. The mean water depth was 0.20 m with an average velocity of 0.06 m/s. Substrate consisted predominately of medium substrate intermixed with coarse, fines and organics. During the July 2008 survey this site was considered potential fish habitat, but at the time of sampling it was dry. It is therefore not considered to be fish habitat.

- DSO3-12

This site consisted of a lake (lac Pinette). No stream surveys were conducted, but water quality samples were collected and measurements taken. The Native guide Réginald Dominique fished in this stream in the presence of Daniel Néron, and one Brook trout was caught.

- DSO3-13

Approximately 150 m of stream was surveyed and classified as a combination of run/riffle, steadies and pool habitats. The average stream wet width of the run/riffle habitat was

0.43 m with a mean water depth of 0.15 m and an average velocity of 0.52 m/s. Substrate consisted predominantly of medium substrate intermixed with coarse, fines and organics. The average stream wet width of the steadies habitat was 2.2 m with a mean water depth of 0.26 m and an average velocity of 0.0 m/s. The average stream wet width of the pool habitat was 2.2 m with a mean water depth of 0.45 m and an average velocity of 0.04 m/s. Substrate in the steadies and pool habitat consisted mostly of medium substrate intermixed with coarse, fines and organics.

Stream DSO3-13 yielded three Lake chub ranging from 40 mm to 80 mm in length and one Brook trout 60 mm in length. A suitable sampling site was found near the mouth of lac Pinette, as the upstream portion of this stream was dry in parts. This stream is confirmed as fish habitat due to the presence of fish there.

- DSO3-14

Approximately 60 m of stream was surveyed and was classified as steady habitat. The average stream wet width was 0.84 m. The mean water depth was 0.22 m with an average velocity of 0.13 m/s. Substrate consisted predominately of organics intermixed with fine and medium substrate.

During the July 2008 survey this site was considered potential fish habitat, but it did not yield any fish during sampling. This stream is not considered fish habitat.

- DSO3-15

Stream DSO3-15 yielded 20 Brook trout ranging from 45 mm to 150 mm in length. It is therefore confirmed as fish habitat. The outflow of Timmins 1 was surveyed between the pit and its confluence with the outflow of lac Pinette (1.5 km). It was predominantly riffle habitat with an average stream wet width of 2.84 m. The mean water depth was 0.11 m with an average velocity of 0.21 m/s. Substrate consisted mostly of medium substrate intermixed with fine and coarse substrate. At the outflow from the pit, there were two steadies (6 m x 20 m and 15 m x 100 m). One small pool was also identified while surveying the stream. Its dimensions were 3.79 m x 3 m with an average depth of 0.32 m and an average velocity of 0.06 m/s. The substrate was classified as medium with coarse and fine substrates intermixed.

The total amount of fish habitat identified within the stream was 64.19 units. Under the Beak Habitat Classification System the stream was identified as having a total of 47.99 of Type II (rearing), and 16.2 units of Type IV (pool) habitat.

<u>Ponds</u>

- Timmins 1

Timmins 1 is located in DSO3. It is a former pit now filled with water from the spring freshet, sub-surface flow, run-off and precipitation in unknown proportions. Timmins 1 contains Brook trout. It has an area of 23.78 ha, with the deepest point measuring 75 m. The substrate is composed of rubble, gravel, sand and silt. Total Habitat Equivalent Units have been calculated for Brook trout at 2.2 ha.

- Timmins 2

Timmins 2 is a former pit now filled with water, a result of rain, run-off and the spring freshet in unknown proportions. It is located in DSO3. No inflow or outflow was observed. Gillnets and minnow traps were set but did not yield any fish; therefore no other surveys were conducted or samples collected. Timmins 2 is not considered to be fish habitat.

Species at Risk

No species of fish at risk are found within the BLSA.

Subsistence

Naskapis

The Naskapis fish year-round. Fishing was particularly important to the Naskapis during the first decades following their resettlement to the Schefferville area, when caribou were scarce or inaccessible. The main areas fished during that period were the upper Swampy Bay River basin (Squaw, La Cosa, Vacher, De Milly, Miltière, La Tesserie, Hameau, Annabel, Peter, Matemace, Gunshot, Baussac and Guillet lakes) and the Attikamagen Lake system. Fishing also took place to a lesser degree in Elross, Fleming and Kivivic lakes in the Howells River valley. It is likely that relatively less fishing was done there at that time despite its proximity to the Naskapi settlement because of its limited accessibility due to the mining operations (Weiler January 2009).

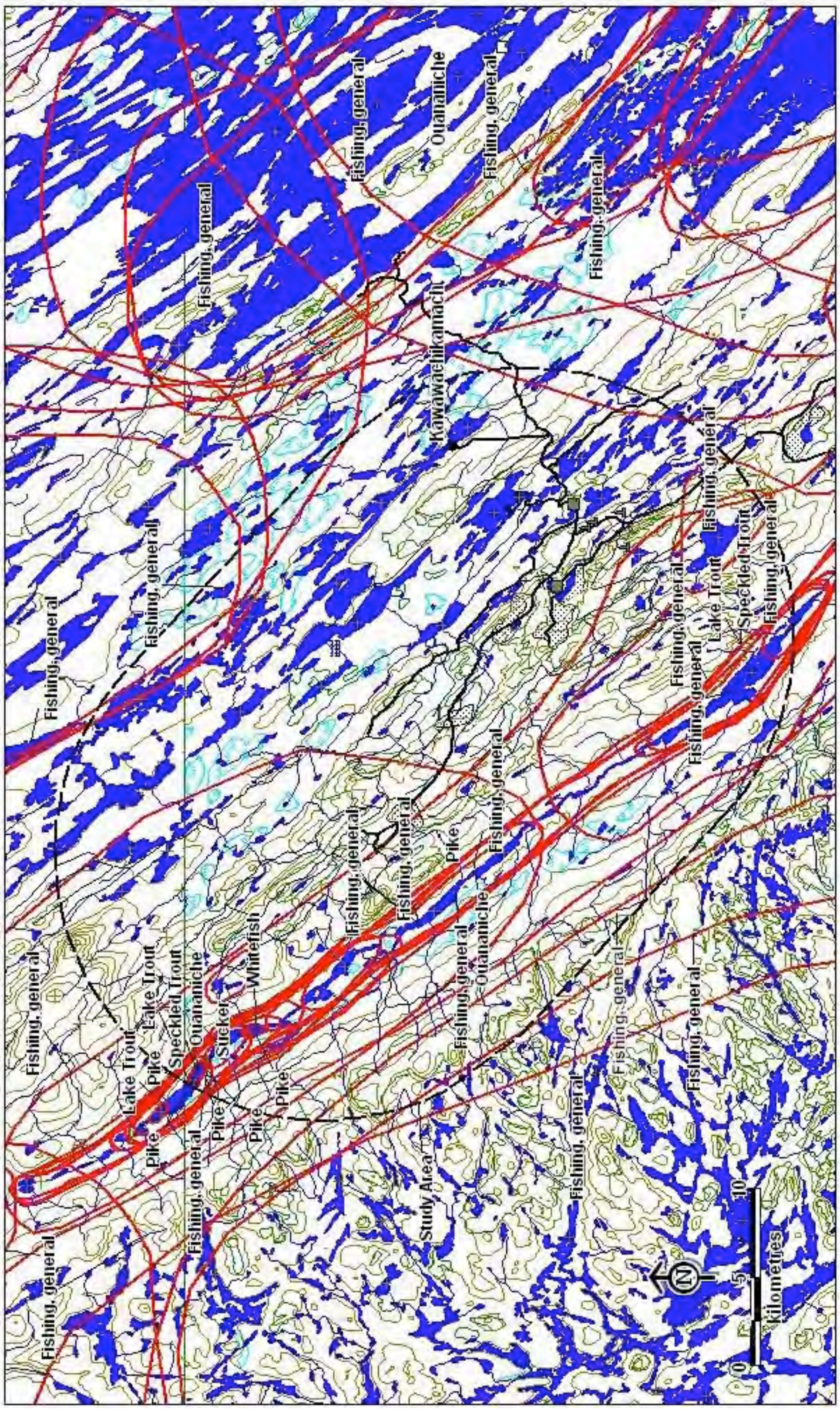
The densest concentration of fishing activity during the decade following the closure of the IOCC mines occurred in the Attikamagen Lake region and the upper Ferrum basin (near Tait, Hayot, Roullois and Pluton lakes), which is located immediately to the north of Attikamagen Lake (Weiler January 2009). Fishing also took place in the extensive system of the upper Swampy Bay River basin, as well as the Howells River and the lakes adjacent to it (Stakit, Elross, Fleming, Rosemary and Kivivic).

Some of the lakes along the edge of the ridge between the Howells River valley and the Swampy Bay River basin that are located close to the former mine sites (*e.g.*, Ruth, Elizabeth and Evelyn) were avoided by some of the Naskapis given fears of contamination from mine tailings (Weiler January 2009).

The 2006 study into Naskapi land- and resource-use revealed that the Howells River and the lakes along its course were used extensively and year-round (Figure 5.38). Brook trout and sucker were caught along the entire length of the Howells River and its connected lakes, while Lake trout, pike, whitefish (both Lake and Round whitefish) and ouananiche were harvested in all the lakes bordering the river (Stakit, Fleming, Elross, Rosemary and Kivivic lakes) (Weiler January 2009). Most of the smaller lakes on the valley's eastern slope were also used, though to a lesser extent, with Brook trout and sucker being the species most harvested.

Many interviewees indicated that they still avoid those lakes situated close to and downstream of the former mining pits for fear of contaminated run-off or seepage entering them.

Figure 5.38: Fishing Reported by Naskapis, 2006



Source: Weiler (January 2009)

Fishing is also carried out in the lakes located on the plateau to the west of the Howells River valley, usually in combination with trapping or caribou hunting in winter (Weiler January 2009).

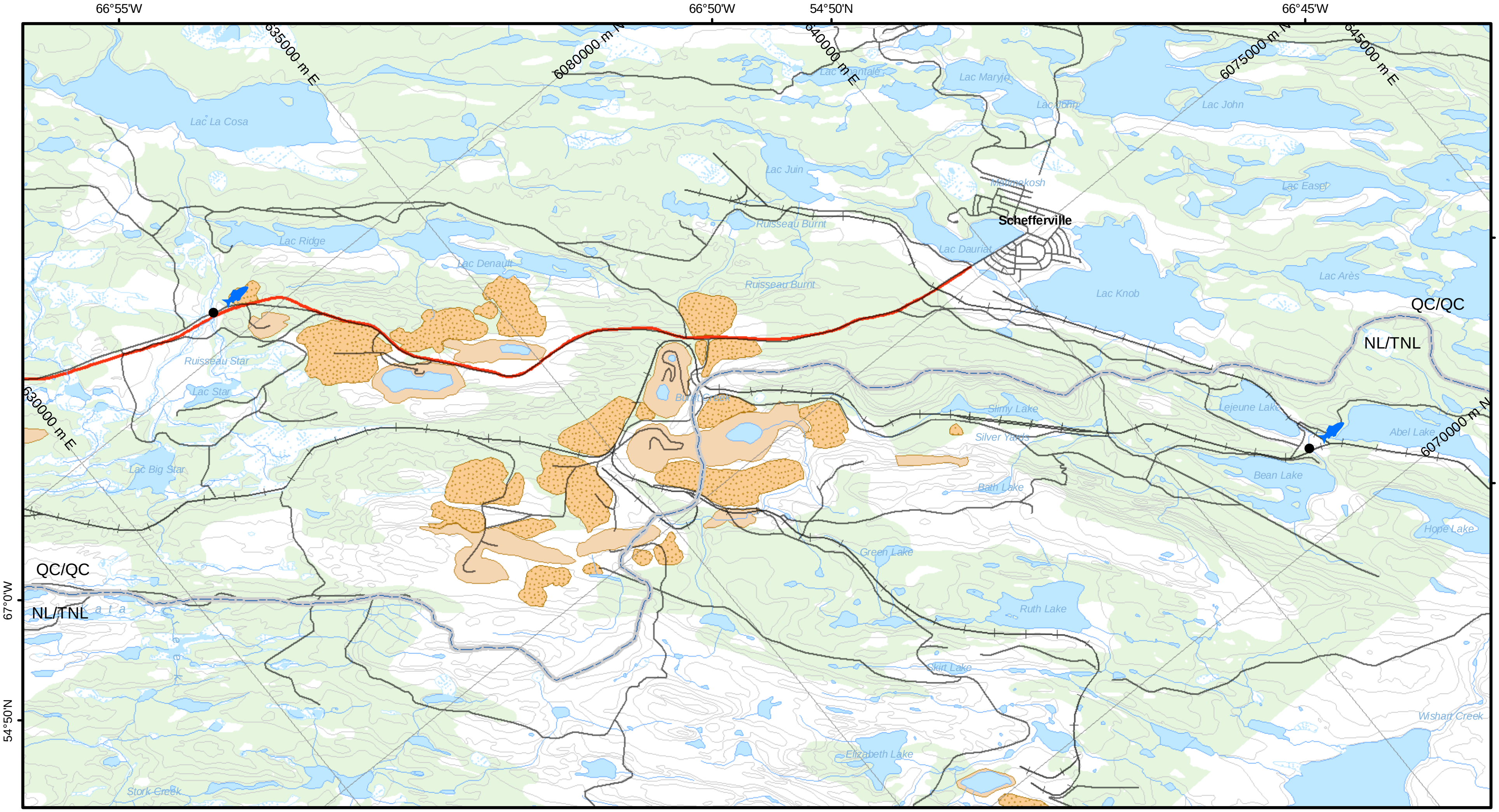
The only lakes in the Swampy Bay River basin that were positively identified in 2006 as being fished were La Tesserie, Hameau, Mollie, Baussac, Guillet, Barry and Hanas lakes (Weiler January 2009).

Matimekush-Lac John Innu

The Matimekush-Lac John Innu reported that they capture fish with nets, rod and line and by hand. Nets are used for whitefish and suckers, which are used mainly as bait, while Brook trout, pike and ouananiche are taken by rod and line. Ice-fishing targets principally Brook trout. A prime fishing spot for Brook trout is lac Star, where over 40 groups of Innu go annually to harvest an average of 200 fish per group (Clément Mai 2009). Three Innu informants reported taking respectively 1,000, 150 and 100 trout in the LSEA and its surroundings in 2008 (Table 5.56). The other species taken in relatively large numbers in 2008 were Lake whitefish, Lake charr, Longnose sucker and White sucker. Those species are not, however, found in DSO2 or DSO3.

Ashini-Goupil (2008, *personal communication*) notes that, in addition to lac Star, the Matimekush-Lac John Innu fish in the area of Lejeune, Bean and Atiol lakes (Figure 5.39).

Brown (June 2005) notes that Innu fish with rod and line in the Howells River basin. The angling activities of the Innu, who camp alongside the river near Irony Mountain, appear to concentrate on the migrating ouananiche, but Brook trout are also known to be captured. It may be that the Innu also fish for migrating Lake trout in October, as stated once by a group of young Innu who were angling unsuccessfully near Irony Mountain at that time in 1994. Angling is used to catch Landlocked salmon, and gill nets are used to catch whitefish (Brown 2006, *personal communication*).



Legend/légende

- Fishing site/site de pêche
- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

HEMISPHERES le groupe

Innu Subsistence Fishing Sites near DSO2

0 4,000
m

Sites de pêche de subsistance innus près de DSO2

Scale/échelle: 1:70,000

UTM 19N Nad 83

FILE, VERSION, DATE, AUTHOR
FICHIER, VERSION, DATE, AUTEUR: GH-0025-04, 2009-06-25, J.T.

Sources/sources:
Government of Canada, NTDB, 1:50 000, 1979
Gov. of of NL and Gov. of QC, Boundary used for claims
New Millennium Capital Corp., Mining sites and roads
Groupe Hémisphères, Hydrology update, 2008
Ashini-Goupil 2008, *personal communication*

Gouvernement du Canada, BNDT, 1/50 000, 1979
Gouv. de T.-N.-L et Gouv. du QC, frontière utilisée pour les titres
New Millennium Capital Corp., gisements et routes
Groupe Hémisphères, mise-à-jour de l'hydrologie, 2008
Ashini-Goupil 2008, *communication personnelle*

Figure 5.39

Traditional Knowledge

DSO3-03 does not contain much fish habitat and is not commonly used. The only waterbody in this area that is used for recreation and fishing by the local populations is lac Pinette (DSO3-12). Nevertheless, local persons have a thorough knowledge of the species of fish present in the BLSA.

This section describes all the species observed by the Innu and the Naskapis and discusses the probability of finding these species in the BLSA and the BRSA. The Naskapis are documented as using Elross Lake, Kivivic Lake and Fleming Lake in the Howells River basin, but not the small lakes within the BLSA and the BRSA (Weiler January 2009).

The Innu recognize several forms of *matamek*, or Brook trout. According to the Innu, Brook trout is abundant everywhere in rivers, streams and lakes. They are known to be found in lac John, the Howells River, Elross Lake, Island Pond, Boot Lake and lac Squaw. The Innu have also reported the presence of a spawning ground at lac Star (DSO2). According to several informants, the population of Brook trout has increased in a number of the waterbodies commonly fished (Clément Mai 2009).

Other species also recorded in the Howells River are *uanan*, or Ouananiche*,* and *kukamess,* or landlocked Atlantic salmon. This species is found in the Howells River, but it spawns in large rivers (Scott and Crossman 1974), and it is unlikely to occur within the BLSA and the BRSA.

Northern pike, or *tshinusheu* (*Esox lucius*), is observed in the Howells River, but not in the lakes and streams of the BLSA and the BRSA. It prefers large rivers and lakes (Scott and Crossman 1974).

Arctic char, or *shushashui* (*Salvelinus alpinus*), is described by the Innu, but this species is reported further north. That is consistent with the biology of the species, which requires regions of very cold water. It is not expected within the BLSA and the BRSA.

Lake trout, or *kukamess,* is a species that frequents large and deep cold water lakes (Scott and Crossman 1974). It is not expected within the BLSA and the BRSA. According to the Innu informants, it is found in the Howells River, but it is not expected to occur in the streams and small lakes of the BLSA and the BRSA.

Whitefish, or a*ttikamek'* (*Coregonus clupeaformis*), generally prefers the deep and cold water commonly found in large lakes and rivers (Scott and Crossman 1974). This species is reported in most large lakes in the area, but it is not found in small streams such as the ones present in the BLSA and the BRSA (Clément Mai 2009).

Atshakashamekush is probably Lake chub (Clément Mai 2009). This species is already identified as present within the BRSA (AMEC January 2009). Populations are considered stable by the Innu.

Kauatuieshish, or Rainbow smelt (*Osmerus mordax*), were identified by only one informant in lac Matemace and is not expected within the BLSA and the BRSA.

Minai, or burbot (*Lota lota*), is already recorded in the BRSA (AMEC January 2009). Populations are considered stable by the Innu (Clément Mai 2009).

Makatsheu, or Black sucker (*Catostomus catostomus*), and *mikuashai*, or White sucker (*Catostomus commersoni*), may be found within the BLSA and the BRSA, as they are confirmed in the Elross Creek catchment area and are found in small streams and lakes (Clément Mai 2009). Usually this species is the first to be caught in nets during surveys, so it is believed they are not present in the BLSA and the BRSA, as none were caught (AMEC January 2009).

Data Gaps

There are no serious data gaps needing further studies.

5.5 Socio-economic Environment - Regional and Local Socio-economic Areas

5.5.1 Socio-political and Institutional Framework

The Project straddles the Québec-Labrador border (Figure 2.1).

Labrador is one of the nine regions that compose the Province of Newfoundland and Labrador. It is further subdivided into regions, one of them being the Labrador West region in which the Project is located. There are no communities in the LSEA that are in the Province of Newfoundland and Labrador. The nearest Labrador-based communities are the municipalities of Labrador City and Wabush, both of which are located more than 200 km south of the Project area.

In Québec, the Project is situated at the northern limit of the Région administrative de la Côte-Nord (Region 09) and, therein, at the northern edge of the MRC de Caniapiscau. There are three communities in the LSEA, all of which are located in the Province of Québec: the Ville de Schefferville; the Naskapi community of Kawawachikamach; and the Innu reserves of Matimekush and Lac John, which for present purposes are treated as a single community.

Both the Ville de Schefferville and the NNK are represented on the Conférence régionale des Élus de la Côte-Nord, which is the principal representative of the Région administrative de la Côte-Nord for regional development. The NIMLJ is not represented on the Conférence régionale des Élus de la Côte-Nord, since the nine Innu nations in the Région administrative de la Côte-Nord do not agree on the form that their representation should take, if indeed they should be represented at all. The nearest Québec-based community outside the LSEA is the Ville de Fermont, which is adjacent to Labrador City and Wabush.

Figure 5.40 shows the location of the Project within the general socio-political and institutional context.

Figure 5.40: Socio-political and Institutional Context

5.5.2 Communities in LSEA

5.5.2.1 Native

Two Native communities live in the the LSEA: the NNK and the NIMLJ. Both are situated in the Province of Québec.

Naskapi Nation of Kawawachikamach

The Naskapis and their ancestors have occupied the interior of the Québec-Labrador Peninsula since time immemorial. The Naskapis traditionally led a nomadic existence, following the caribou herds from Hudson Bay in the west to the Labrador Coast in the east, and from the southern coast of Ungava Bay in the north to the vicinity of Labrador City in the south. Starting in the early 19^{th} century, they congregated temporarily and seasonally at the various posts of the Hudson's Bay Company and at favoured hunting locations, such as Indian House Lake on the George River.

The Hudson's Bay Company and other interests subjected the Naskapis to several relocations between the mid 1800s and the mid 1900s, according to its commercial needs and interests. The major relocations can be summarized as follows (NNK 2009, Internet site):

- to Fort Chimo (situated across rivière Koksoak from modern Kuujjuaq) in 1831;
- to Fort Nascopie (located near Petitsikapau Lake), in Labrador, in 1842;
- to Fort McKenzie (located in the vicinity of chute du Schiste on rivière Caniapiscau) in 1915;
- to Fort Chimo in 1948;
- to Schefferville in 1956.

Between 1956 and 1983, the Naskapis co-existed with the NIMLJ: at Lac John until 1972; and thereafter on the Matimekush Reserve (Weiler January 2009). Figure 2.2 shows Schefferville, Kawawachikamach and the Matimekush and Lac John reserves.

In 1983, the Naskapis moved to Kawawachikamach, located at 54° 49' 44" N and 66° 48' 41" W in Québec some 15 km north-east of Schefferville and some 15 km east of DSO3. Kawawachikamach and DSO3 are connected by an all-weather road, which also permits direct access to DSO3.

Kawawachikamach was built between 1980 and 1983 following the signing, in 1978, of the NEQA, Canada's second modern treaty, between the GoQ, the GoC and the Naskapis de Schefferville Indian Band, among others.

The Category IA-N land on which the community is located covers 41.44 km^2 (NEQA 1978). It is similar to a reserve, in that it is provincial land that has been transferred to the administrative control of the GoC for the exclusive use of the Naskapis.

In 1984, the CNQA, Canada's first Aboriginal self-government legislation, was signed, transferring to the newly-created Naskapi Band of Québec many of the powers of local government formerly exercised by INAC, thereby granting to the Naskapi Band substantially more autonomy than that enjoyed by Indian bands under the *Indian Act*.

The NEQA had been negotiated to an important degree under the assumption that Schefferville would continue to be a thriving mining centre for the foreseeable future. The closing of the mines only five years following its execution led to the signing of an

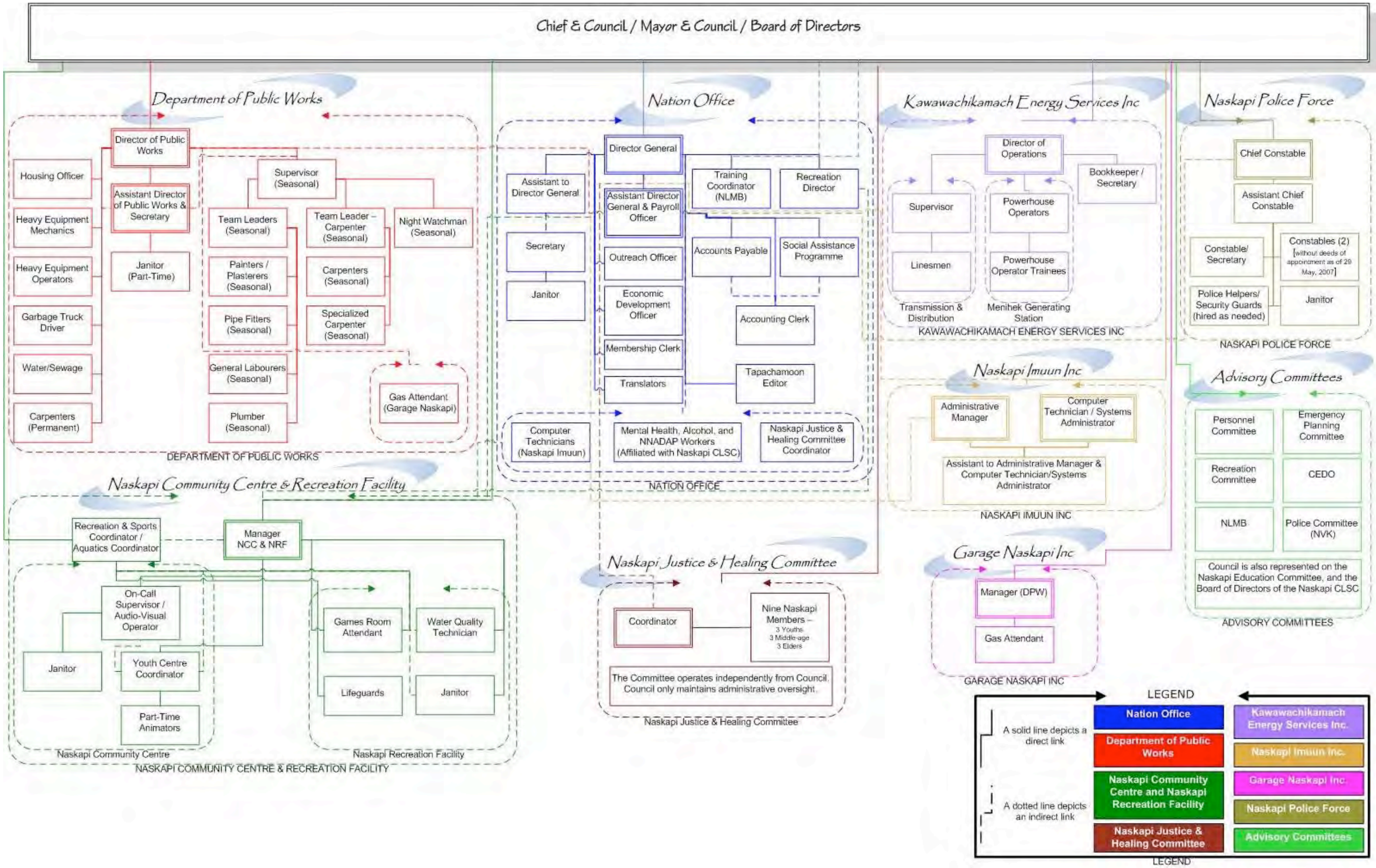
Agreement Respecting the Implementation of the Northeastern Québec in 1990. Among other things, said Agreement established the model for funding capital and operations and maintenance expenditures over five-year periods and created a working group to address Naskapi employment (NNK 2009, Internet site).

The Naskapi Band of Québec, created under the CNQA of 1984, replaced the Naskapis de Schefferville Indian Band, which had been created under the *Indian Act* by order-in-council in 1971. In April 1996, Council authorized changing the name to Naskapi Nation of Kawawachikamach. That change came into effect on May 1, 1999 (NNK no date (a)).

The NNK Council consists of one chief and five councillors elected in accordance with a by-law adopted pursuant to the CNQA (NNK no date (a)). The Nation acts through its Chief and Council, who are elected for a term of three years.

Figure 5.41 reproduces the organizational chart of the NNK.

Figure 5.41: Organizational Chart of NNK



Source: NNK (no date (a))

Nation Innu Matimekush-Lac John

Two Innu reserves on the outskirts of Schefferville are located in the LSEA.

The Matimekush Reserve is adjacent to the shore of Pearce Lake, at 54° 48' 30" N and 66° 49' 25" W. It is located 20 km south-east of DSO3. DSO3 is accessible by road from Matimekush and Lac John via the road that the Innu call *takutaut-meshkanau*, meaning “the road to the summit of the mountain” (Clément Mai 2009).

According to Frenette (Laforest 1983), the Innu of Schefferville designate themselves by the name “Naplekinnuat”, that is, the “Innu of Knob Lake”, lac Knob being one of the two lakes adjacent to the centre of Schefferville. The expression “Schefferville Innuat” is also used. The Elders still identify themselves as “Mishta Shipu Innuat”, or '”Innu of the Great River”, *i.e.*, the Moisie River. The Mishta Shipu Inuuat are a sub-group of the Uashau-innuat of Sept-Îles.

Frenette (Laforest 1983) explains further that “In fact, the present population of Schefferville is made up of the descendants of the families whose hunting territories have always been in the region. As such, they are NUTSHIMI UNNUT, or “people of the bush”. The territory that they still use corresponds to that of the former Michikamau and Petitsikapau bands, and parts of the territory of the Kaniapiskau Band. As we have seen, the Michikamau and Petitsikapau bands joined the Moisie Band to form a single group, the MISTA SHIPU UNNUT. Almost all the Schefferville Montagnais are connected by kinship. They still have frequent contact with those who live in Sept-Îles and Mani-Utenam.” (unofficial translation).

The Schefferville Innu are assigned to the sub-category “Kameshtupuspet”, that is, those who go deep inland, in contrast to the sub-category Uinipeku-Innuat, or 'Innu of the coast'. They were the northernmost Innu of the former Moisie Band (Clément Mai 2009), and their descendants are among the members of the Matimekush-Lac John community.

Long before the construction of the former mines, the Innu occupied the territory around Schefferville, especially in spring, fall and winter, when families trapped in that area. In summer, the Innu families stayed in the Sept-Îles area.

In 1955, the Innu, some of whom had worked on building the railway from Sept-Îles, settled near Lac John. In 1957, more than 500 Innu were living in Schefferville, but their status was not yet recognized by INAC (Clément Mai 2009). The GoC, anticipating the end of the infrastructural work for developing the mining operations, pressured them to return to their original reserves. Some did so, but over 300 of them stayed. The majority of those who remained had their hunting territories nearby (Clément Mai 2009).

The Lac John and the Matimekush reserves were established in 1960 and 1968 respectively, following the transfer of the land on which they are located by the GoQ to the GoC. Initially, the Naskapis shared the Lac John Reserve and thereafter the Matimekush Reserve with the Innu. In 1983, the NNK surrendered its interest in the latter reserve upon its relocation to Kawawachikamach. Following the closing of the Schefferville mines, in 1982, and the departure of most of the non-Native residents, in May 1998 the Governor in Council expanded the area of the Matimekush Reserve from 14.8 ha (NEQA Section 20) to 70.9 ha.

The Lac John Reserve covers 23.3 ha (INAC 2009a, Internet site).

The NIMLJ has been a Band under the *Indian Act* since 1973; prior to that, the Innu in the Schefferville region were considered by the GoC to form part of the Innu of Sept-Îles Band

(CNIMLJ 30 octobre 2008). The NIMLJ is governed by a Council consisting of a chief and four councillors, who are elected pursuant to the *Indian Act* for two-year terms (INAC 2009a, Internet site).

5.5.2.2 Non-Native

The only non-Native municipality in the LSEA is the Ville de Schefferville, Québec.

The municipal territory covers 9,644 ha (MRC de Caniapiscau no date). It is located at 54° 48' N and 66° 48' W, approximately 20 km south-east of DSO3.

Schefferville, a municipality incorporated in 1955 with the beginning of the IOCC's activities, maintains its legal status despite the closing of the iron ore mines there in 1982. It is governed by the *Loi sur les cités et villes* (L.R.Q., chapitre C-19). In addition, since November 1990, its administration has operated under the auspices of the GoQ according to the *Loi concernant la Ville de Schefferville (1990, chapitre 43)*. That law provides for the provision of municipal services, the delimitation of the town's territory, the administration of its affairs and the holding of municipal elections (MRC de Caniapiscau no date). Moreover, said law provides for the administration of the municipality by an Administrator appointed by the ministère des Affaires municipales, des Régions et de l'Occupation du territoire, who has the powers and obligations of a mayor and municipal council, until a municipal council is elected by an election declared by the GoQ (Beaudoin 2009b, *personal communication*).

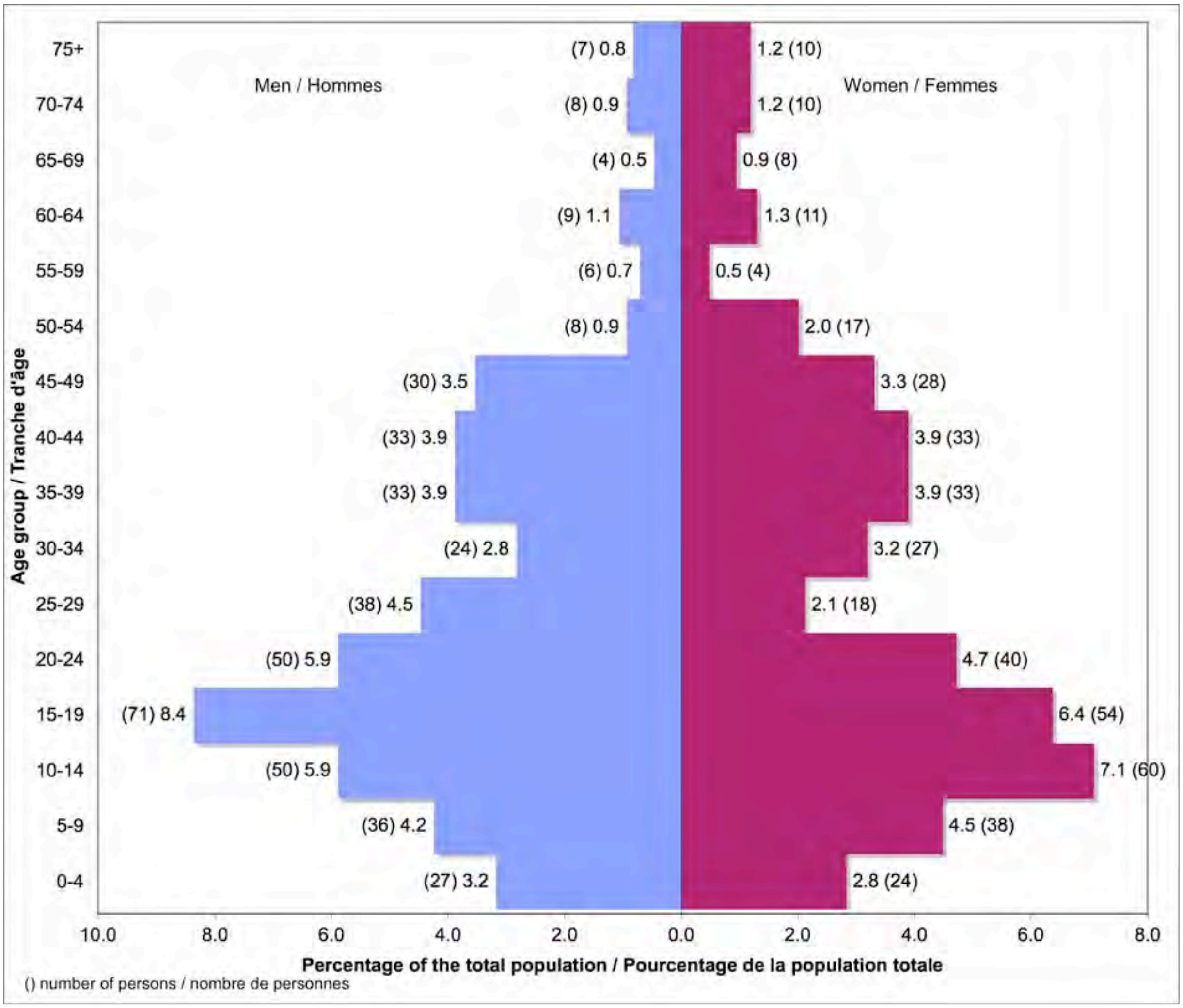
5.5.3 Populations in LSEA

5.5.3.1 Naskapi Nation of Kawawachikamach

The members of the NNK numbered 965 on March 31, 2007 and 1,024 on March 31, 2008. Of those, 809 lived on Category IA-N land on March 31, 2007, and 849 on March 31, 2008. The average annual rate of increase of the population between 1986 and 2007 was 5.27% (NNK no date (a)), during which time the population has roughly doubled (NDC August 1989).

The population is young: 59.6% are under 30 years of age. Figure 5.42 presents the distribution of age and sex groups based on the total population living in Kawawachikamach on March 31, 2008. The relative lack of Elders reflects the high mortality that occurred among Naskapi infants and children in the early 1950s.

Figure 5.42: NNK Population Living in Kawawachikamach, March 31, 2008



Source: Compiled by PFWA based on NNK (no date (a))

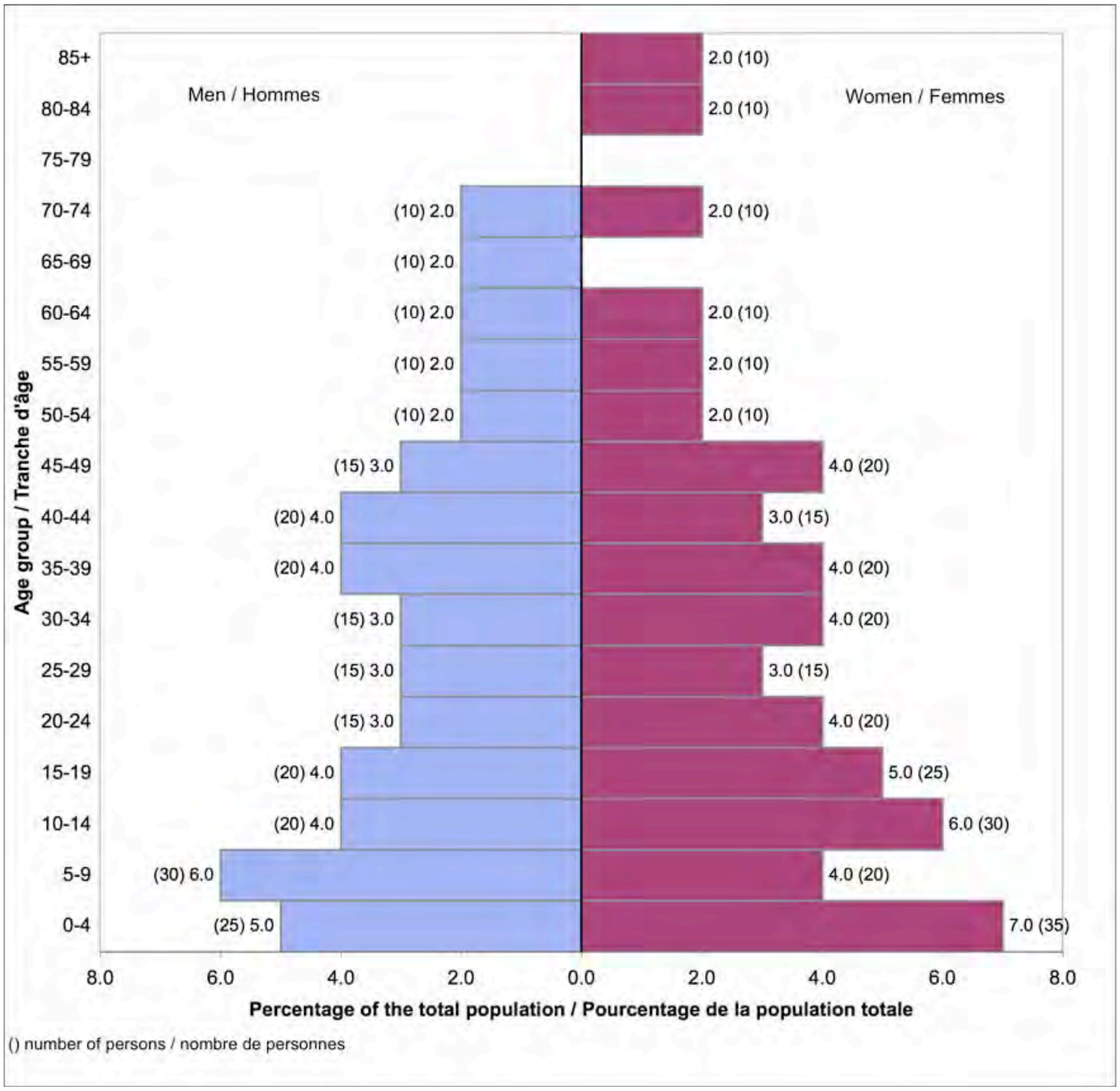
5.5.3.2 Nation Innu Matimekush-Lac John

The NIMLJ had 838 members in January 2009, 718 of whom lived on the two local reserves (INAC 2009a, Internet site).

Based on the 2006 Census, 41% of the population are under 20 years of age (Statistics Canada 2009a, Internet site). Figure 5.43 presents the distribution of age and sex groups based on the total population in 2006.

Historical data for the NIMLJ are not available, but data in Clément (Mai 2009) (Appendix D) suggest that its population has roughly tripled since 1957.

Figure 5.43: NIMLJ Population Living in Matimekush and Lac John, 2006



Source: Compiled by PFWA based on Statistics Canada (2009a, Internet site)

5.5.3.3 Ville de Schefferville

The population of Schefferville was 202 persons in 2006. Between 2001 and 2006 it decreased by 15.8% (Statistics Canada 2009a, Internet site). Obviously, the population was much higher during the former mining operations: 1,995 persons in 1971; 3,429 in 1976; and 3,271 in 1981 (Gaucher 2009, *personal communication*).

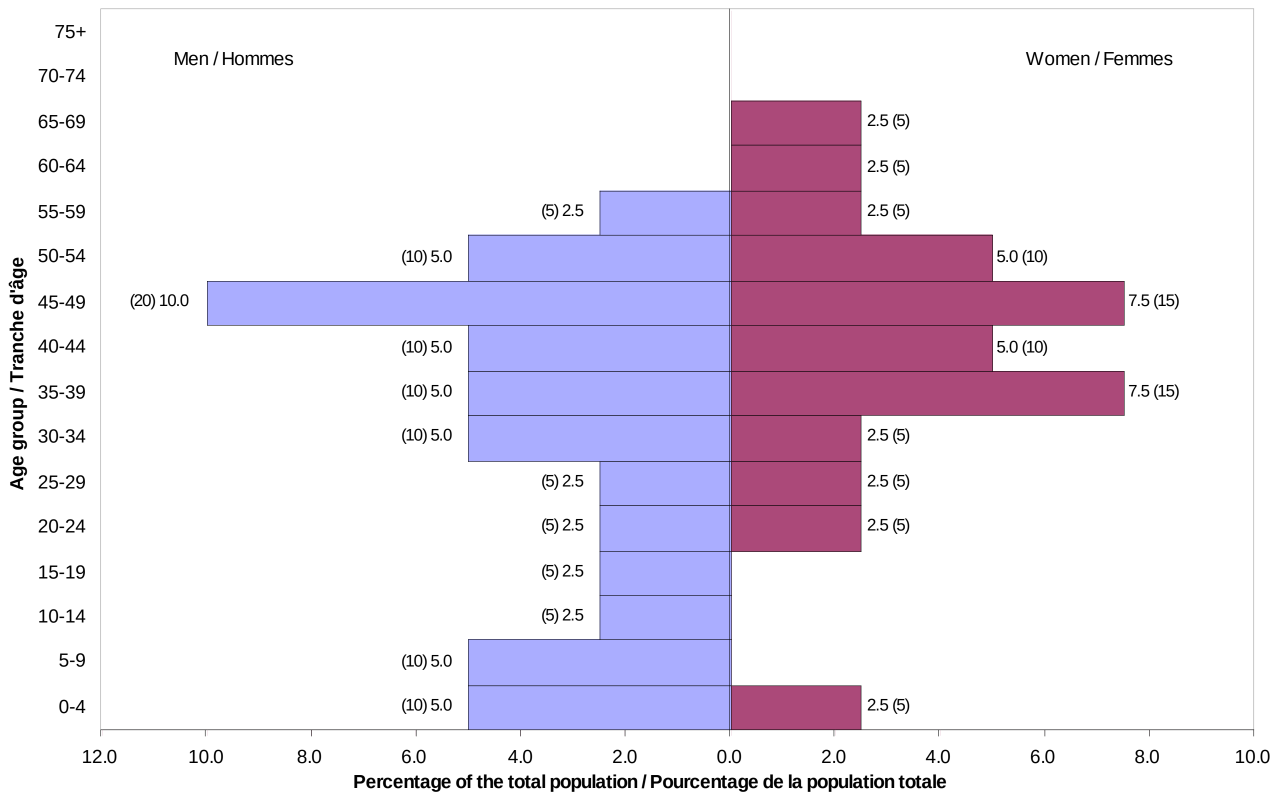
Figure 5.44 presents the distribution of age and sex groups in Schefferville based on the total population in 2006. It is clear that it is atypical in several ways: the absence of young women between the ages of five and 19 years; the absence of men older than 59 years; and the high proportion of middle-aged persons. The apparent absence of certain demographic groups must, however, be treated with caution, as it could result from such factors as the rounding of figures by Statistics Canada on account of the small population.

According to Beaudoin (2009b, *personal communication*), a handful of men older than 59 years lives in Schefferville.

The structure of the population can be explained in part by the fact that the non-Native population exists primarily to serve the two Native populations and, to a lesser degree, to satisfy the needs of the outfitting and mining exploration industries. Many of the persons who work there choose not to have their families with them, especially now that there is no longer a separate school for non-Natives. Nevertheless, the reason why there are some males aged 5 to 19 years but no females in that age group escapes easy explanation, if it is indeed true.

There is a significant population increase in summer, when approximately 100 persons move to Schefferville to work in outfitting (Beaudoin 2008, *personal communication*).

Figure 5.44: Population Living in Schefferville, 2006



( ) number of persons / nombre de personnes

Source: Compiled by PFWA based on Statistics Canada

5.5.4 Education and Labour Force in LSEA

5.5.4.1 Naskapi Nation of Kawawachikamach

Education and Language

The systematic education of the Naskapis under the Québec educational system began only in the mid-1970s. A survey of Naskapis between 18 and 65 years of age in 1978 revealed that the majority of them had not proceeded beyond the middle grades of high school. By 1986, the number of Naskapis who had continued to higher grades of their secondary education had almost doubled (NDC August 1989). In the 2007-2008 school year, 256 students (145 in elementary and 111 in secondary) were enrolled in the JSMS, which provides education from Pre-kindergarten to Secondary V (Tootoosis 2008, *personal communication*).

Naskapis wishing to pursue post-secondary education are required to attend institutions outside Kawawachikamach and Schefferville. In the 2005-2006 school year, 17 Naskapis were pursuing their education at post-secondary institutions. Naskapi students frequently abandon their post-secondary studies as a result of the culture shock that they experience living and studying away from their family and community and because they often lack financial management skills (Tootoosis 2008, *personal communication*).

Table 5.41 presents the levels of schooling among the Naskapis aged 15 years and over as of 2001.

Table 5.41: Levels of Schooling Among Naskapis, 15 Years and Over, 2006

Education Attainments	2006					
	Total	%	Male	%	Female	%
Population 15 years and over	360	100	185	100	180	100
Persons with less than a high school graduation certificate	230	63.9	120	64.9	110	61.1
Persons with a high school graduation certificate	65	18.0	25	13.5	45	25.0
Persons with an apprenticeship or trades certificate	30	8.3	25	13.5	10	5.6
Persons with a college or university diploma below bachelor's degree	30	8.3	15	8.1	15	8.3
Persons with a university degree at bachelor's level or higher	0	0.0	0	0.0	0	0.0

Note: Totals that do not correspond to the sum of the relevant cells reflect the rounding of numbers applied by Statistics Canada.
Source: Statistics Canada (2009a, Internet site)

Most Naskapis speak their mother tongue (Naskapi) although, as the Naskapi syllabus was implemented only eight or nine years ago at the JSMS, the middle-aged generation generally cannot read or write Naskapi. Naskapi is the language of instruction from Pre-kindergarten to Grade 2. From Grade 3, English becomes the main language of instruction, although students continue to learn Naskapi and begin learning French.

All but the older Naskapis speak English. Many of them also understand and speak innu aimun (Montagnais). A few Naskapis have a good knowledge of French (Tootoosis 2008, *personal communication*).

Training

Members of the NNK have participated in numerous training programmes and have mastered skills in various fields since 1978, when an intensive seven-year professional training programme was undertaken pursuant to Section 18 of the NEQA (NDC August 1989). Between 1978 and 1985, the most popular training and adult education programmes were carpentry, driving, operation of heavy equipment, chainsaw maintenance and repair, radio operator, finishing carpentry, foundations, small business management, outfitting and firefighting. A total of 375 Naskapis enrolled in the programmes, leading to employment within the NNK or elsewhere (NDC August 1989). No adult education programmes were available to Naskapis between 1985 and 1990, either through the NDC or the JSMS (Chapman July 1991).

Since 1992, training initiatives have been organized in the framework of the Naskapi Local Management Board, whose mandate is to prioritize the employment and training needs of Naskapis living in Kawawachikamach and to develop corresponding employment and training programmes. Municipal and office employees benefit from regular upgrading of their skills (PFWA August 2000).

Table 5.42 lists the training initiatives implemented over the 1978-1985 and 2001-2008 periods.

In 2004, four Naskapis received training to become prospectors or geological technicians. Each participant gained knowledge in the following:

- rock and soil sampling;
- mineral identification;
- operation of Beep-Mat device used to detect metal;
- orientation in the field, using a compass and maps;
- conducting survey lines.

Table 5.42: Naskapi Training Programmes Undertaken between 1978 and 1985 and 2001 and 2008

Type of Training	Year	Number of Trainees	Duration
Accounting	2004-05	1	22 weeks
	2006-07	1	50 weeks
	2007-08	1	50 weeks
	2007-08	1	45 weeks
Adult Education	2003-04	1 (11 abandoned)	6 months
	2006-07	33 (16 abandoned)	School year
	2007-08	-	School year
Arena Maintenance Worker	2003-04	1	12 weeks
	2006-07	3	6 months
	2007-08	3	17 weeks
Atmacinta Inc. Work Placement	2003-04	1	26 weeks
Auto Mechanics	2007-08	1	14 months
Bakery On-the-Job	2003-04	1	3 weeks
Bookkeeping	1978-85	4	32 weeks

Type of Training	Year	Number of Trainees	Duration
Bus Driver	1978-85	1	3 weeks
Carpenter	1978-85	90[1]	variable[1]
	2003-04	8 (two dismissed)	16 weeks
Chainsaw Maintenance and Repair	1978-85	8	1 week
Community Health Representative	1978-85	2[2]	variable[2]
Computer Support	2005-06	1 (abandoned)	-
	2006-07	1	1 month
Computer Technician	2002-03	1	On-the-Job
	2003-04	1	19 weeks
	2005-06	1	-
	2006-07	1/2	11/6 months
	2007-08	1	12 months
Computer Technician, Assistant	2004-05	1	12 months
	2005-06	1	12 months
Computer Technician/Network Administration	2003-04	1	6 months
Cooking	2006-07	1	50 weeks
	2007-08	1	50 weeks
Cultural and Translation Training Programme of NDC Head Office Staff	2001-02	-	-
Cultural Sector	2003-04	NDC Translation Staff	12 months
Distance Learning	2003-04	1 (abandoned)	26 weeks
Drilling	2004-05	2	9 weeks
Driving	1978-85	15	2 weeks
Drop-in Centre	2001-02	4	n/a
	2002-03	1	26 weeks
Drop-in Centre, Assistant Coordinator	2003-04	2 (two resigned)	18 weeks
Drop-in Centre, Coordinator	2002-03	1	26 weeks
	2003-04	1 (abandoned)	26 weeks
Drug-Addictions Certificate	2002-03	1	3 six-week modules
Early Childhood Education	2001-02	2	-
eCommerce Business Consultant and Systems Support Specialist	2001-02	1	-

Type of Training	Year	Number of Trainees	Duration
Economic Development and Outreach Officer	2001-02	1	-
	2002-03	1	12 months
	2003-04	1	12 months
	2004-05	1	12 months
	2005-06	1	12 months
	2006-07	1	12 months
	2007-08	3	12 months
Economic Development Capacity Building	2004-05	Nation staff	12 months
	2005-06	Nation staff	12 months
	2006-07	Nation staff	12 months
	2007-08	Nation staff	12 months
Electrician	1978-85	2	15 weeks
	2002-03	-	-
	2004-05	1	43 weeks
Employability Measures (Training in Construction)	2002-03	8	26 weeks
Excavator Operator	2001-02	1	-
	2003-04	1	3 weeks
Firefighter	1978-85	17	2 weeks
	2002-03	-	-
	2003-04	4	3 weeks
Firefighter, Heavy-Duty First Responder	2001-02	4	-
Foundations	1978-85	15	3 weeks
Forestry Heavy Machinery Operator	2007-08	1	4 months
Furnace Maintenance	1978-85	2	6 weeks
Grader Operator	2006-07	2	5 weeks
Hairdresser	1978-85	1	41 weeks
	2001-02	1	-
	2005-06	1	34 weeks (on-the-job)
	2006-07	1	1 month
Handicraft Skills	2006-07	18	27 weeks
Heavy Equipment Operator	1978-85	7	16 weeks
	2002-03	1	18 weeks
	2004-05	13	3 weeks
Heavy Equipment Operator, Upgrade	2005-06	4	3 weeks
High School Upgrading	2007-08	1	3 months

Type of Training	Year	Number of Trainees	Duration
High-Speed Internet Access	2001-02	-	-
Ice Rink Attendant	2003-04	1 (abandoned)	15 weeks
Information Clerk (upgrading)	1978-85	1	1 week
Interior/Exterior Finishing	1978-85	15	4 weeks
Internet Connection	2004-05	1	-
Janitor and Maintenance Technician	2001-02	1	-
Janitor, Assistant	2003-04	1	26 weeks
JSMS Special Needs (Teachers' aide)	2002-03	2	36 weeks
Life Skills	1978-85	20-50	46 weeks
Lifeguard	2006-07	2	8 weeks
Loader Operator	2001-02	1	-
Management	2003-04	2	12 months
Massage Therapy	2007-08	1	74 weeks
Mother Tongue Translation	2002-03	8	1 week
Multi-purpose Centre	2002-03	35	Construction season
Municipal Maintenance	1978-85	1	32 weeks
NCC Youth Work Experience Programme	2006-07	3	11 months
NDC Board of Directors	2003-04	NDC Board of Directors	20 days
	2004-05	NDC Board of Directors	20 days
NDC Summer Career	2006-07	6	6 weeks
	2007-08	6	6 weeks
NNK Summer Career	2007-08	20	6 weeks
Naskapi Relief Services Inc. Coordinator	2007-08	1	5 months
Office Assistant/Filing Clerk	2001-02	1	-
	2002-03	1	44 weeks
Outfitting	1978-85	8	32 weeks
Painters	2002-03	3	3 weeks
Pastry Making	2007-08	1	50 weeks
Plasterers	2002-03	3	3 weeks
Plumbing	1978-85	2	15 weeks
	2007-08	1	7 weeks
Police Officer	2005-06	1	12 weeks
Power House Operator	2001-02	4	-

Type of Training	Year	Number of Trainees	Duration
	2002-03	2	On-the-Job
	2003-04	2	52 weeks
	2004-05	2	12 weeks
Prefabricated Housing Components, Installation	2006-07	61	2 months
Prefabricated Housing Components	2007-08	Department of Pubic Works	18 weeks
Protective Firewall	2007-08	6	2 months
Radio Operator	1978-85	8	3 weeks
Railway	2007-08	2	5 days
Recreation Animator	2001-02	1	-
	2002-03	1	12 weeks
	2003-04	1	19 weeks
	2005-06	1 (one dismissed)	18 weeks
	2007-08	2	6 months
Recreation Technician	1978-85	1	34 weeks
Restoration of Blue/Retty Lake Abandoned Mine Site	2006-07	5	3 weeks
Roofing	2004-05	10 (one dismissed)	17 weeks
Sachidun Childcare Centre Staff Training	2002-03	All staff	On-the-Job
Sachidun Childcare Centre Staff	2003-04	All Staff	6 months
Sachidun Childcare Centre Youth Work Experience Programme	2006-07	2	11 months
School Bus Monitor	2003-04	1	6 months
Secretariat	2003-04	to defray costs of Secretary	12 months
	2004-05	to defray costs of Secretary	12 months
	2005-06	to defray costs of Secretary	12 months
	2007-08	to defray costs of Secretariat	12 months
Secretarial Skills	1978-85	1	45 weeks
Security Guard	2005-06	7	-
	2006-07	9	-
Semi-Trailer Driver	2002-03	1	3 weeks
Sewage Lifting Station	2007-08	10	5 weeks
Sewing	2002-03	15	10 days

Type of Training	Year	Number of Trainees	Duration
Small Business Management	1978-85	15	1 week
Small Engine Mechanics	1978-85	1	5 weeks
Snow Removal	2004-05	2 (one dismissed)	7 weeks
Social Worker	2007-08	3	variable
Socio-Economic Development Agent	1978-85	1	34 weeks
Special Needs Assistant	2001-02	2	-
	2006-07	2	School year
	2007-08	1	School year
Summer Students NDC	2003-04	4	6 weeks
	2005-06	5	6 weeks
Summer Students NNK	2003-04	6	6 weeks
	2005-06	9	6 weeks
Summer Students Programme NNK and NDC (public works, summer camp)	2004-05	12	6 weeks
Teacher Assistant	2003-04	3	40 weeks
	2004-05	2	43 weeks
	2005-06	2	43 weeks
Training and Economic Development Officer	2006-07	2	12 months
Teacher Training	2001-02	1	-
Teacher Upgrading	1978-85	3/4	2/1 weeks
Team Leaders	2005-06	8	-
Trade Show Marketing and Promotion	2001-02	1	-
Traditional Crafts	2004-05	10	26 weeks
	2005-06	10	13 weeks
Training Coordinator	2001-02	1	-
	2003-04	1	12 months
Translation	2003-04	8	1 week
	2006-07	3	1 week
Upgrading	2003-04	2 (two abandoned)[3]	variable[3]
	2004-05	1 (two abandoned)[4]	variable[4]
Ventilation Maintenance	2002-03	2	6 weeks
Water and Sewer Systems	1978-85	2	30 weeks
Wildlife Conservation Agent	1978-85	3	38 weeks
Wood Cutter	2001-02	2	-

Type of Training	Year	Number of Trainees	Duration
Word Processing	1978-85	1	20 weeks
Youth Center Coordinator	2004-05	2	52 weeks

- Data not available.

[1] Cumulative total of four courses: 12-week course of 45 students; 24-week course of 15 students; 9-week course of 15 students; 2-week course of 15 students.

[2] Cumulative total of two courses: 34-week course for one student; 52-week course for one student.

[3] Cumulative total of four courses: 43-week course for one student; 12-week course for one student; 32-week course for one student (abandoned); 22-week course for one student (abandoned).

[4] Cumulative total of three courses : 29-week course for one student (abandoned); 43-week course for one student (abandoned), 19-week course for one student.

Source: Compiled by PFWA from NDC (August 1989) and NNK Annual Reports

Labour Force

The Naskapi labour force (following Statistics Canada, the labour force includes the population 15 years and over) numbered 134 persons in 1975, 249 persons in 1986 (NDC August 1989) and 614 persons as of March 31, 2008 (NNK no date (a)).

Women accounted for 48% of the 2008 labour force, while 83% of the labour force was between 15 and 49 years of age (NNK no date (a)).

Work Experience

The employment history of the Naskapis in the wage-labour economy effectively began with their arrival in Schefferville, in 1956. At that time, few Naskapis found long-term employment at the mines. They were mainly employed as seasonal workers in such tasks as general labouring, janitorial work, street-building and house-construction. By the time the mines closed in 1982, 17 Naskapis held permanent jobs (Chapman 13 August 1991).

A number of Naskapi men worked as fishing and hunting guides during the late 1960s and the 1970s. Subsequent employment opportunities came with the construction of the Complexe La Grande, during which the Naskapi Construction Corporation employed on average 18 Naskapis for three months each summer between 1979 and 1984 on slashing and tree-planting contracts (NDC August 1989).

The planning and building of Kawawachikamach during the early 1980s was organized in such a way that it would maximize training and employment for the Naskapis, including particular attention to the hiring of women. The Naskapi Relocation Corporation employed 54 Naskapis in 1982, 37 in 1983 and 40 in 1984; it was dissolved following the completion of the construction of Kawawachikamach (Chapman 13 August 1991). The move to Kawawachikamach also meant that the NNK could, for the first time, hire its own employees for public works related to the maintenance of the village infrastructure (NDC August 1989). By 1987, the NNK had become the principal employer of the Naskapis (Chapman 13 August 1991).

Today, many members of the NNK have work experience as office, municipal, recreational facility and community centre employees. The NNK employs them to fill managerial, secretarial, administrative and clerical positions.

A number of Naskapis are also employed in health-care positions, child-care services and teaching positions:

- all of the 12 employees (of whom seven are permanent and five are substitutes) of the Sachidun ChildCare Centre are Naskapi (NNK no date (a));
- 18/34 employees of the JSMS are Naskapi (NNK no date (a));
- Naskapis occupy 7/17 positions at the Naskapi CLSC (the executive secretary, a bookkeeper, a nurse, a social worker, a community worker and two receptionists) (Uniam 2009, *personal communication*).

There are also four trained Naskapi police officers and six helpers (NNK no date (a)). There are experienced computer technicians, mechanics, carpenters, heavy equipment operators, powerhouse operators, water and sewage treatment operators and janitors among the members of the Nation (PFWA August 2000). There is also an engineer and an electrician.

Women are active in the Naskapi labour force: they occupy 13 of the 18 permanent positions in the Nation Office; 10 of the 12 employees of the Sachidun ChildCare Centre are women; in the Department of Public Works, three women work as general labourers; women constitute the majority of the gas bar attendants; and women fill both the position of Assistant Director of the Department of Public Works and that of painter (NNK no date (a)).

Table 5.43 presents the major employers and number of Naskapi employees in 2006.

Table 5.43: Major Employers and Number of Naskapi Employees, 2006

Name of Employer	No of Naskapi Employees
NNK[2]	179
CLSC Naskapi	7
NDC[3]	76
JSMS	22
TSH	7
TOTAL	**291**

Source: Compiled by PFWA

In summer 2008, NML employed 10 Naskapis on the ELAIOM for a total of 3,753.50 person-hours.

[2] Includes the following subsidiaries and related entities: head office; Garage Naskapi Inc.; Naskapi Imuun Inc.; Naskapi Police Force; KESI; Sachidun Childcare Centre; Naskapi Landholding Corporation.

[3] Includes the following subsidiaries and related entities: head office; Manikin Centre; Naskapi Northern Wind Radio Station; cultural projects; Naskapi Management Services Inc. (including Naskapi Adoschaouna Services Inc. and the Tuktu Hunting and Fishing Club).

5.5.4.2 Nation Innu Matimekush-Lac John

Education and Language

The members of the NIMLJ speak innu aimun and French (CNIMLJ 30 octobre 2008).

In spring 1991, 100 Innu were registered in elementary school, while 50 were attending secondary school and 10 were in college. Among the population aged 20 years and more, 10% (30 persons) had completed high school, while <3% and <1% had completed college and university respectively (Autochtonomie Enr. 18 juin 1992). The annual high school drop-out rate in 1990-1991 was 29%.

As of March 11, 2008, 29 youths and young adults were enrolled in secondary school, one person was in professional training to become a heavy machinery operator, 11 persons were participating in programmes at the college level and six persons were at university (Aster 2008, *personal communication*). One of the college students was studying iron-ore treatment.

Table 5.44 shows the education levels of the members of the NIMLJ in 2006. Aster (2008, *personal communication*) notes that many Innu who complete their education leave the Schefferville area in search of better employment opportunities.

Table 5.44: Levels of Schooling Among Members of NIMLJ, 15 Years and Over, 2006

Education Attainments	2006					
	Total	%	Male	%	Female	%
Population 15 years and over	365	100	165	100	195	100
Persons with less than a high school graduation certificate	265	72.6	120	72.7	145	74.4
Persons with a high school graduation certificate	20	5.5	0	0.0	15	7.7
Persons with an apprenticeship or trades certificate	30	8.2	20	12.1	10	5.1
Persons with a college or university diploma below bachelor's degree	25	6.8	10	6.1	15	7.7
Persons with a university degree at bachelor's level or higher	25	6.8	10	6.1	15	7.7

Note: Totals that do not correspond to the sum of the relevant cells reflect the rounding of numbers applied by Statistics Canada.

Source: Statistics Canada (2009a, Internet site)

Training

Professional training programmes for adults are not currently available to the members of the NIMLJ (Aster 2008, *personal communication*), and no historical information is available.

Labour Force

The labour force of the NIMLJ had 360 members in 2006, of whom 54% were women and 70% were aged between 15 and 49 years (Statistics Canada 2009a, Internet site).

Work Experience

Most of the jobs held by the Innu are generated by the Band Council, which manages all the local economic and government activities. That has been the case for numerous years; for example, the Band Council generated 63% of the Innu-held jobs in 1990-1991 (Autochtonomie Enr. 18 juin 1992).

Between 1996 and 2006, most of the experienced labour force of Matimekush and Lac John was employed in the health and education sectors, the service sector and the manufacturing and construction industries (Statistics Canada 2009a, Internet site). The school employs 28 persons, of whom three teachers and the janitor are Innu. Native-owned businesses such as TSH, KESI, Société de gestion Innu, Restaurant Chez Rita and Artisanat Innu, and non-Native businesses, such as Gestion Porlier Inc. and Northern Store, also generate some jobs for Innu (Robert 2008, *personal communication*).

The work experience of the members of the NIMLJ includes labouring, carpentry, electrical work, operation of heavy machinery, construction and renovation (St-Pierre 2006, *personal communication*; Robert 2008, *personal communication*). Some Innu also work as guides during the outfitting season, and some have experience in mining exploration (Robert 2008, *personal communication*).

There are public works programmes intended to create employment for the unemployed members of the community and for students. Examples of such initiatives are repairing mining roads and cleaning streets (St-Pierre 2006, *personal communication*).

In summer 2008, NML employed eight Innu on the ELAIOM for a total of 3,271.75 person-hours.

5.5.4.3 Ville de Schefferville

Education and Language

Table 5.45 summarizes the levels of schooling of the residents of Schefferville aged 15 years and over as of 2006. The relatively high level of education may reflect the fact that most of its residents are there because of their ability to provide technical and other services that the Naskapi and Innu populations are not yet able to provide for themselves.

In 2006, 45% of the population had French as a mother tongue, while 18% had English and 35% had neither French or English; 42.5% were bilingual in English and French (Statistics Canada 2009a, Internet site).

Table 5.45: Levels of Schooling Among Residents of Schefferville, 15 Years and Over, 2006

Education Attainments	2006					
	Total	%	Male	%	Female	%
Population 15 years and over	160	100	85	100	75	100
Persons with less than a high school graduation certificate	50	31.2	25	29.4	25	33.3
Persons with a high school graduation certificate	30	18.8	15	17.6	15	20.0
Persons with an apprenticeship or trades certificate	35	21.9	25	29.4	10	13.3
Persons with a college or university diploma below bachelor's degree	25	15.6	10	11.8	10	13.3
Persons with a university degree at bachelor's level or higher	20	12.5	10	11.8	10	13.3

Note: Totals that do not correspond to the sum of the relevant cells reflect the rounding of numbers applied by Statistics Canada.
Source: Statistics Canada (2009a, Internet site)

Training

No training programmes have been or are available to the non-Native population of Schefferville (Beaudoin 2008, *personal communication*).

Labour Force

In 2006 the labour force consisted of 160 individuals, of whom 47% were women and 75% were between 15 and 49 years of age (Statistics Canada 2009a, Internet site).

Work Experience

Of the 100 or so public-sector positions occupied by residents of Schefferville, about 60 are provided by the NIMLJ Council and the organizations functioning under its jurisdiction (school, dispensary, garage, *etc*.) (MRC de Caniapiscau no date). By providing 10 or so positions, Transport Canada constitutes another important employer. Other public and private organizations, such as the Ville de Schefferville and TSH, also provide some employment. About 15 positions in Kawawachikamach, primarily in the health and education sectors, are held by residents of Schefferville (MRC de Caniapiscau no date).

The commercial sector accounts for approximately 60 jobs, the main employers being the Northern Store and the Hôtel Royal (MRC de Caniapiscau no date). Société de gestion Porlier and Société Fortier inc. provide some temporary and permanent positions (Beaudoin 2008, *personal communication*).

5.5.5 Economy in LSEA

5.5.5.1 Naskapi Nation of Kawawachikamach

Employment and Unemployment Rates

In 2006, the unemployment rate (refers to the number of unemployed persons expressed as a percentage of the labour force in the week (Sunday to Saturday) prior to Census Day – May 16, 2006) was 20.6% while the employment rate (refers to the number of persons employed in the week (Sunday to Saturday) prior to Census Day (May 16, 2006), expressed as a percentage of the total population 15 years of age and over) was 37.0% (Statistics Canada 2009a, Internet site). According to CLSC Naskapi (January 2005), the percentage of Naskapis not actively employed (*i.e.*, not engaged in wage-earning employment) accounted for 60% of the labour force.

Income

In 2005, the median income of Naskapis with income was $14,816, compared to $24,430 for the Province of Québec (Statistics Canada 2009a, Internet site). According to data from the CLSC Naskapi, the gross annual income for more than one third of all Naskapi families was under $30,000 (CLSC Naskapi January 2005). These figures compare to an average per capita income of $2,973 and an average per household income of $10,693 in 1983 (OPDQ 1986). The figures from OPDQ (1986) are consistent with those derived from two partial surveys conducted in 1981 and 1983, which yielded an average of $2,853 and $9,629 per capita and household incomes respectively in 1983 (NDC August 1989). By 1986 the average annual per capita income had reached $5,091 (NDC August 1989).

Businesses

Table 5.46 lists the businesses that are wholly- or co-owned by the NNK or some of its members or NDC.

Table 5.46: Businesses Wholly- or Co-owned by Naskapis

Name of Business	Service Provided
Naskapi Catering Inc.	Catering Housekeeping
KESI	Operating and maintaining the Menihek Generating Station and the related transmission and distribution network
Tshiuetin Rail Transportation Inc.	Providing passenger and wayfreight rail transportation between Emeril and Schefferville
Naskapi Imuun Inc.	Providing computer, high-speed internet and cellular telephone services in Kawawachikamach/Schefferville/ Matimekush region
Kawawachikamach Taxi	Providing local passenger transportation service
Kuiskun Ltd.	Selling sporting goods
Manikin Center	General store
Naskapi Arts & Crafts Shop	Selling Naskapi arts and crafts
Naskapi Gas Bar & Garage Inc.	Sale of fuel
Naskapi Management Services Inc.	Project and construction management services
Naskapi Adoschaouna Services	Project and construction management services
Société aéroportuaire de Schefferville	Operation and maintenance of Schefferville Airport
Lynx Mobility Inc.	Providing cellular services to remote and rural Canada

Source: Compiled by PFWA

5.5.5.2 Nation Innu Matimekush-Lac John

Employment and Unemployment Rates

In 2006, the unemployment rate was 33.3% while the employment rate was 41.7% (Statistics Canada 2009a, Internet site).

Income

In 2005, the median income of the members of the NIMLJ with income was $14,304, compared to $24,430 for the Province of Québec (Statistics Canada 2009a, Internet site). In 1990, the per capita income was $4,651 (Autochtonomie Enr. 18 juin 1992).

In December 1990, 87% of the Matimekush-Lac John Innu were receiving either employment insurance (120 beneficiaries), social assistance (330 beneficiaries) or an old-age pension (24 beneficiaries) (Autochtonomie Enr. 18 juin 1992). Today, over 80% of the population derives income from social assistance or employment insurance (CNIMLJ 30 octobre 2008).

Businesses

Table 5.47 lists the businesses that are wholly- or co-owned by the NIMLJ or some of its members.

Table 5.47: Businesses Wholly- or Co-owned by NIMLJ or its Members

Name of Business	Service Provided
Transport ferroviaire Tshiuetin inc.	Providing passenger and wayfreight rail transportation between Emeril and Schefferville
Société de gestion Innu	Renting heavy machinery Construction and renovation Public works
Artisanat Innu	Selling Innu crafts
Dépanneur MLJ	Grocery store
Restaurant Chez Rita	Restaurant
Transport Montagnais	Passenger transportation and trucking
Société aéroportuaire de Schefferville	Operation and maintenance of Schefferville Airport

Source: Robert (2008, *personal communication*)

5.5.5.3 Ville de Schefferville

Employment and Unemployment Rates

In 2006, the employment rate among the residents of Schefferville was 65.6%, and the unemployment rate was 12.5% (Statistics Canada 2009a, Internet site), which reflects the fact that most non-Native residents are there only because they were offered employment.

Income

Statistics Canada does not publish income figures for Schefferville.

Businesses

Table 5.48 lists the businesses that are owned wholly or in part by residents of Schefferville.

Table 5.48: Businesses Wholly- or Co-owned by Residents of Schefferville

Name of Business	Services Provided
Gestion Porlier ltée.	Ambulance service Undertaker Taxi service Car rental Restaurant Garage Convenience Store Hotel
Fortier inc.	Outfitting service Hotel Restaurant Car rental Convenience store
Northern Store	General store
Duberco inc.	Plumbing, heating and air-conditioning Petroleum products distribution
Pourvoirie Labrador 2 B G Adventure Inc.	Outfitting services
Location Pelletier	Car rental
Théo Mazerolle	Excavation and heavy equipment rental

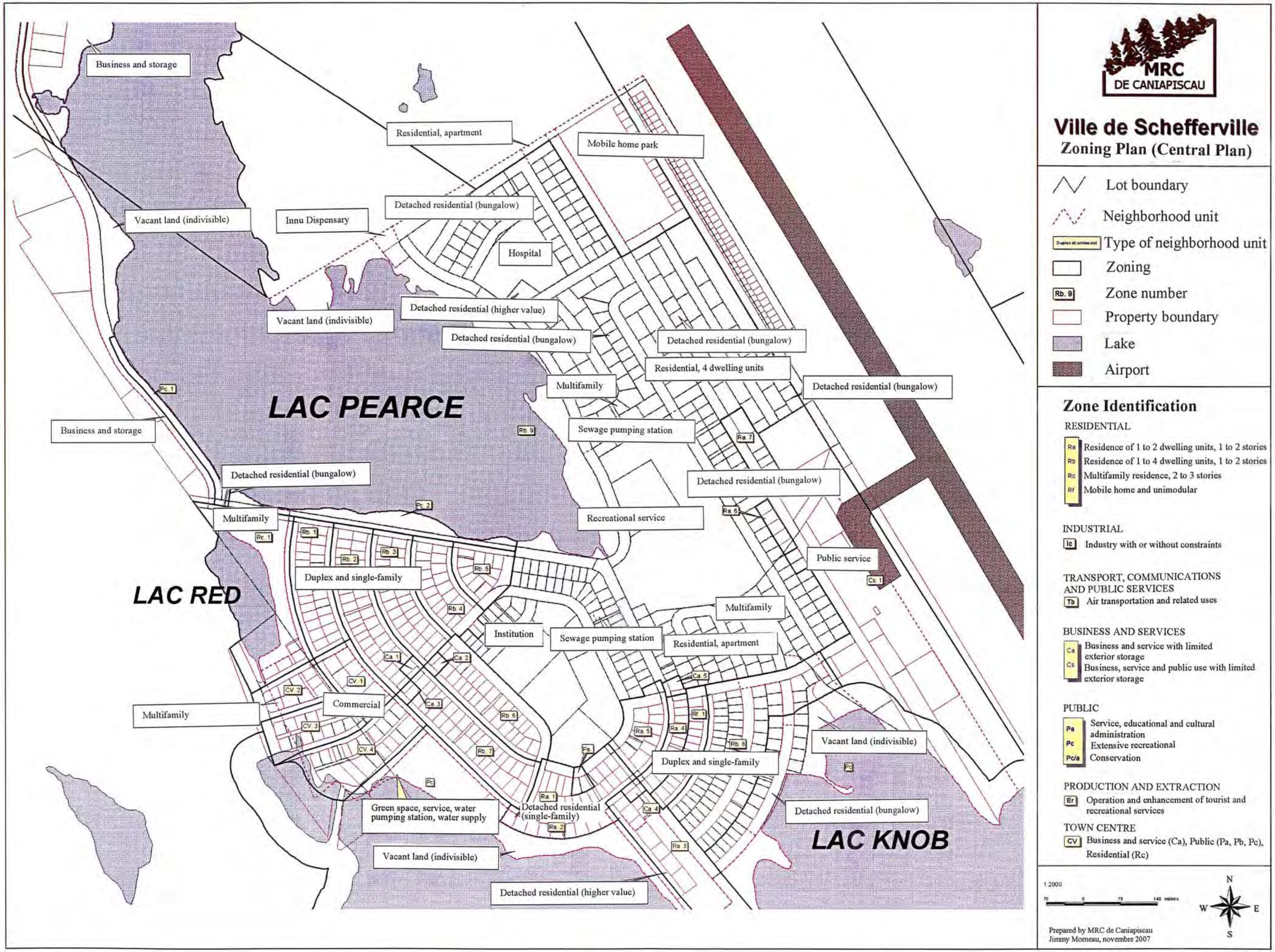
Source: Robert (2008, *personal communication*)

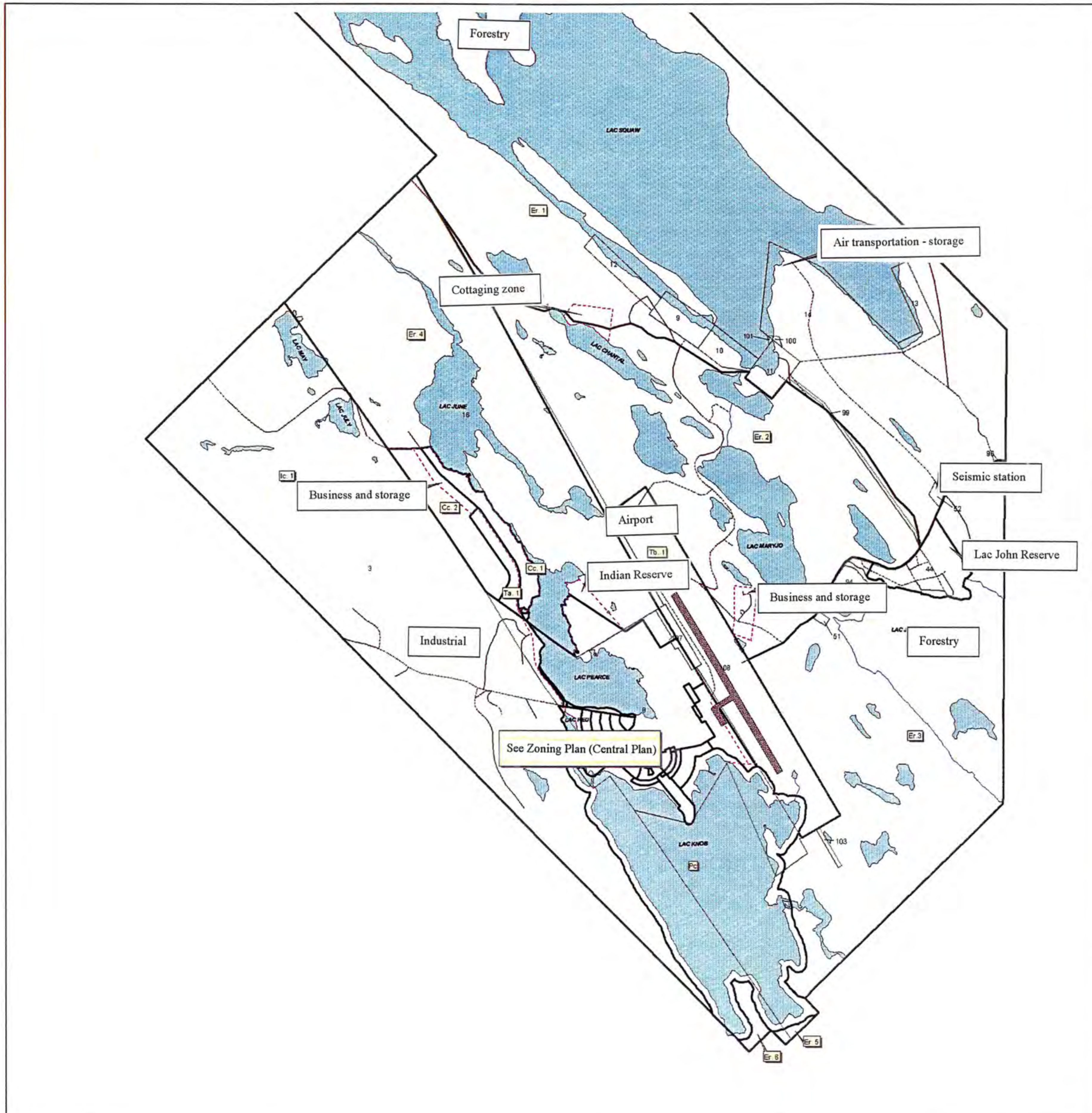
5.5.6 Land Classification in LSEA

5.5.6.1 Ville de Schefferville

Figure 5.45 shows the zoning in Schefferville and the natural and human limits to its expansion, while Figure 5.46 shows the zoning in its surroundings.

Schefferville has very little room for expansion. It is surrounded by the Matimekush Reserve, lac Pearce, Transport Canada's land at the airport and an abandoned area formerly used by the previous mining company, the soil of which is probably contaminated and which contains broken water and sewage pipes. The only area available for expansion is east of the town centre and west of the Transport Canada property (Beaudoin 2008, *personal communication*).


MRC DE CANIAPISCAU
Ville de Schefferville
Zoning Plan (Central Plan)
Lot boundary
Neighborhood unit
Type of neighborhood unit
Zoning
Zone number
Property boundary
Lake
Airport
Zone Identification
RESIDENTIAL
Ra Residence of 1 to 2 dwelling units, 1 to 2 stories
Rb Residence of 1 to 4 dwelling units, 1 to 2 stories
Rc Multifamily residence, 2 to 3 stories
Rf Mobile home and unimodular
INDUSTRIAL
Ic Industry with or without constraints
TRANSPORT, COMMUNICATIONS AND PUBLIC SERVICES
Tb Air transportation and related uses
BUSINESS AND SERVICES
Ca Business and service with limited exterior storage
Cs Business, service and public use with limited exterior storage
PUBLIC
Pa Service, educational and cultural administration
Pc Extensive recreational
Pc/a Conservation
PRODUCTION AND EXTRACTION
Er Operation and enhancement of tourist and recreational services
TOWN CENTRE
CV Business and service (Ca), Public (Pa, Pb, Pc), Residential (Rc)
1:2000
N
W
E
S
Prepared by MRC de Caniapiscau
Jimmy Morneau, novembre 2007
LAC PEARCE
LAC RED
LAC KNOB
Business and storage
Residential, apartment
Mobile home park
Detached residential (bungalow)
Vacant land (indivisible)
Innu Dispensary
Hospital
Detached residential (higher value)
Detached residential (bungalow)
Detached residential (bungalow)
Residential, 4 dwelling units
Detached residential (bungalow)
Multifamily
Sewage pumping station
Business and storage
Detached residential (bungalow)
Detached residential (bungalow)
Multifamily
Recreational service
Public service
Duplex and single-family
Multifamily
Institution
Sewage pumping station
Residential, apartment
Multifamily
Commercial
Vacant land (indivisible)
Duplex and single-family
Green space, service, water pumping station, water supply
Detached residential (single-family)
Detached residential (bungalow)
Vacant land (indivisible)
Detached residential (higher value)
Pc 1
Pc 2
Rb 9
Ra 7
Ra 6
Rc 1
Rb 1
Rb 2
Rb 3
Rb 5
Rb 4
Cs 1
Ca 1
Ca 2
Ca 3
Ca 5
CV 1
CV 2
CV 3
CV 4
Rb 6
Rb 7
Rb 8
Rf 1
Ra 4
Ra 5
Ra 1
Ra 2
Ra 3
Ca 4



MRC DE CANIAPISCAU

Ville de Schefferville

Zoning Plan (Global Plan)

- Zoning
- Zone number
- Block
- Block number
- Neighborhood unit
- Type of neighborhood unit
- Road
- Watercourse
- Lake
- Airport

Zone Identification

RESIDENTIAL

Rc — Multifamily residence, 2 to 3 stories

INDUSTRIAL

Ic — Industry with or without constraints

TRANSPORT, COMMUNICATIONS AND PUBLIC SERVICES

Ta — Ground transportation

Tb — Air transportation and related uses

BUSINESS AND SERVICES

Cc — Business and service with important exterior storage

PUBLIC

Pc — Extensive recreational

Pc/a — Conservation

PRODUCTION AND EXTRACTION

Er — Operation and enhancement of tourist and recreational services

1:10 000

Prepared by MRC de Caniapiscau
Jimmy Morneau, novembre 2007

N S W E

5.5.7 Land- and Resource-use in LSEA

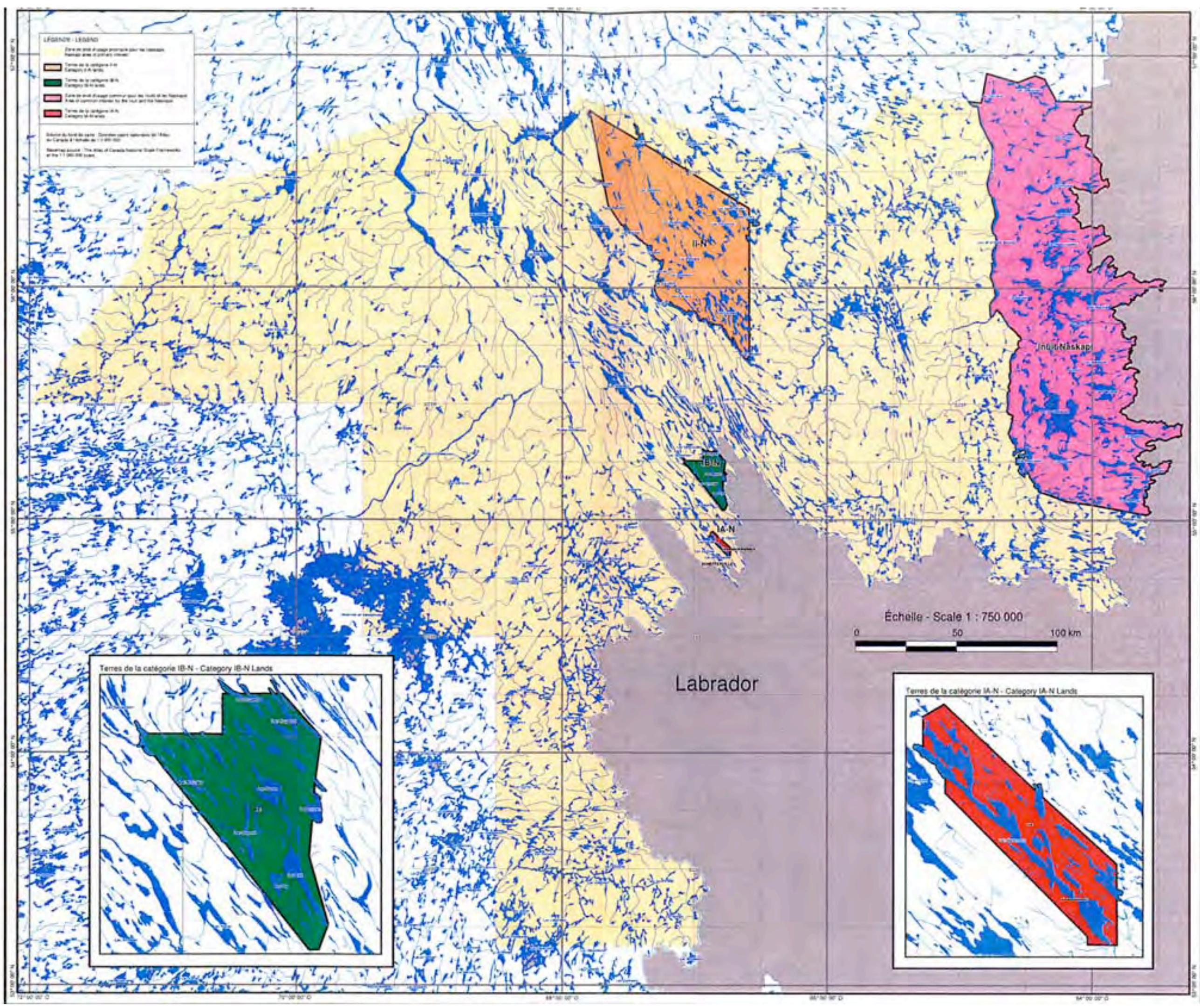
5.5.7.1 Naskapi Nation of Kawawachikamach

The Naskapis and their ancestors have hunted, fished and trapped in the Québec-Labrador Peninsula for at least 3,500 years, as supported by archaeological evidence (McCaffrey 1988).

The NEQA granted the Naskapis varying degrees of harvesting rights on some of their traditional territory in Québec, the locations of which are presented on Figure 5.47. Given that Kawawachikamach is within a few kilometers of the Québec-Labrador border (which the Naskapis do not in any case recognize), the Naskapis report that they continue to hunt, fish and trap extensively in Labrador, as they have done for thousands of years.

In addition to the sectors shown in Figure 5.47, the Naskapis have the right to harvest caribou and to take other fish and game as an ancillary activity to caribou-hunting and under certain conditions in areas immediately to the north and to the south-west.

Figure 5.47: Naskapi Sector



Source: Ross (2007, *personal communication*)

There are two categories of harvesting: individual and family activities; and activities conducted under the Hunter Support Programme established by Section 19 of the NEQA. According to PFWA et ÉEM inc. (Octobre 1995), the former are responsible for the bulk of the wildlife harvest, particularly small game, as well as the plant and berry harvest. The Hunter Support Programme harvesting activity often involves larger teams of hunters who travel to more distant hunting areas and stay out for longer periods. Particularly in recent years, the Hunter Support Programme has sponsored a large-scale goose hunt in spring. Fishing is primarily done in summer and winter, trapping in the winter and goose hunting in spring (PFWA et ÉEM inc. Octobre 1995). There is not, and never has been, any Naskapi commercial fishery.

In his study in 1988 of Naskapi land-use patterns and their socio-economic significance, Weiler (July 1988) notes that Naskapi land-use activities take place mainly within a corridor of land, which is "…approximately 100 to 150 km in width along the eastern side of the Howells, Goodwood and Caniapiscau rivers, and extending from the Schefferville region in the south up to the area around Nachikapau Lake and the former site of Fort McKenzie". However, the most concentrated land use occurs within a radius of between 30 and 50 km around Kawawachikamach.

In 2006, Naskapis were interviewed specifically about their land- and resource-use in the Howells River valley. The results (Weiler November 2006; Weiler January 2009) show that the Howells River valley and the hills on both sides are extensively used by Naskapis for hunting and for gathering plants, including medicinal plants. Because of the proximity, year-round accessibility and richness in wildlife and plant resources of that area, its importance for young harvesters and for those with part-time or full employment is reportedly increasing.

Table 5.49 presents the animal species harvested by the Naskapis between 1989 and 1993. The importance of caribou, Canada goose, fish and ptarmigan is striking. Table 5.50 lists the plant species that are harvested by the Naskapis.

Table 5.49: Number of Individuals per Species Harvested by Naskapi Hunters from 1989 until 1993

Common English Name	Common French Name	Scientific Name	Total Number of Individuals Harvested
American beaver	Castor d'Amérique	*Castor canadensis*	17
American marten	Martre d'Amérique	*Martes americana*	698
American mink	Vison d'Amérique	*Mustela vison*	172
Arctic char	Omble chevalier	*Salvelinus alpinus*	29
Arctic fox	Renard arctique	*Alopex lagopus*	25
Arctic hare	Lièvre arctique	*Lepus arcticus*	25
Atlantic salmon (ouananiche)	Saumon atlantique (ouananiche)	*Salmo salar*	25
Black bear	Ours noir	*Ursus americanus*	12
Brook trout	Omble de fontaine	*Salvelinus fontinalis*	5788
Burbot	Lotte	*Lota lota*	324

Common English Name	Common French Name	Scientific Name	Total Number of Individuals Harvested
Canada goose	Bernache du Canada	*Branta canadensis*	3569
Caribou	Caribou	*Rangifer tarandus*	1757
Cisco	Cisco de lac	*Coregonus artedii*	32
Duck spp.	Canard spp.	n/a	388
Ermine	Hermine	*Mustela erminea*	31
Grey wolf	Loup gris	*Canis lupus*	21
Lake trout	Touladi	*Salvelinus namaycush*	7078
Lake whitefish	Grand corégone	*Coregonus clupeaformis*	6587
Least weasel	Belette pygmée	*Mustela nivalis*	193
Longnose sucker	Meunier rouge	*Catostomus catostomus*	2613
Loon	Huard	*Gavia* spp.	12
Moose	Orignal	*Alces alces*	1
Muskrat	Rat musqué	*Ondatra zibethicus*	139
North American porcupine	Porc-épic d'Amérique	*Erethizon dorsatum*	9
Northern river otter	Loutre d'Amérique	*Mustela americana*	62
Northern pike	Grand brochet	*Esox lucius*	690
Red fox	Renard roux	*Vulpes vulpes*	412
Rock ptarmigan	Lagopède des rochers	*Lagopus mutus*	1763
Round whitefish	Ménomini rond	*Prosopium cylindraceum*	71
Snow goose	Oie des neiges	*Chen caerulescens*	8
Snowshoe hare	Lièvre d'Amérique	*Lepus americanus*	337
Spruce grouse	Tétras du Canada	*Dendragapus canadensis*	1704
White sucker	Meunier noir	*Catostomus commersoni*	1477
Willow ptarmigan	Lagopède des saules	*Lagopus lagopus*	9965

Source: Tecsult Foresterie Inc. (Septembre 2000)

Table 5.50: Plants Harvested by the Naskapis and their Uses

Common English Name	Common French Name	Scientific Name	Uses
Bearberry	Arctostaphyle raisin-d'ours	*Arctostaphylos uva-ursi*	n/a
Bilberry (Whortleberry)	Myrtille commune	*Vaccinium myrtillus*	n/a
Birch	Bouleau	*Betula* spp.	Snowshoes, tea, syrup
Bird eyes	Raisin d'ours rouge	*Arctostaphylos rubra*	Tea

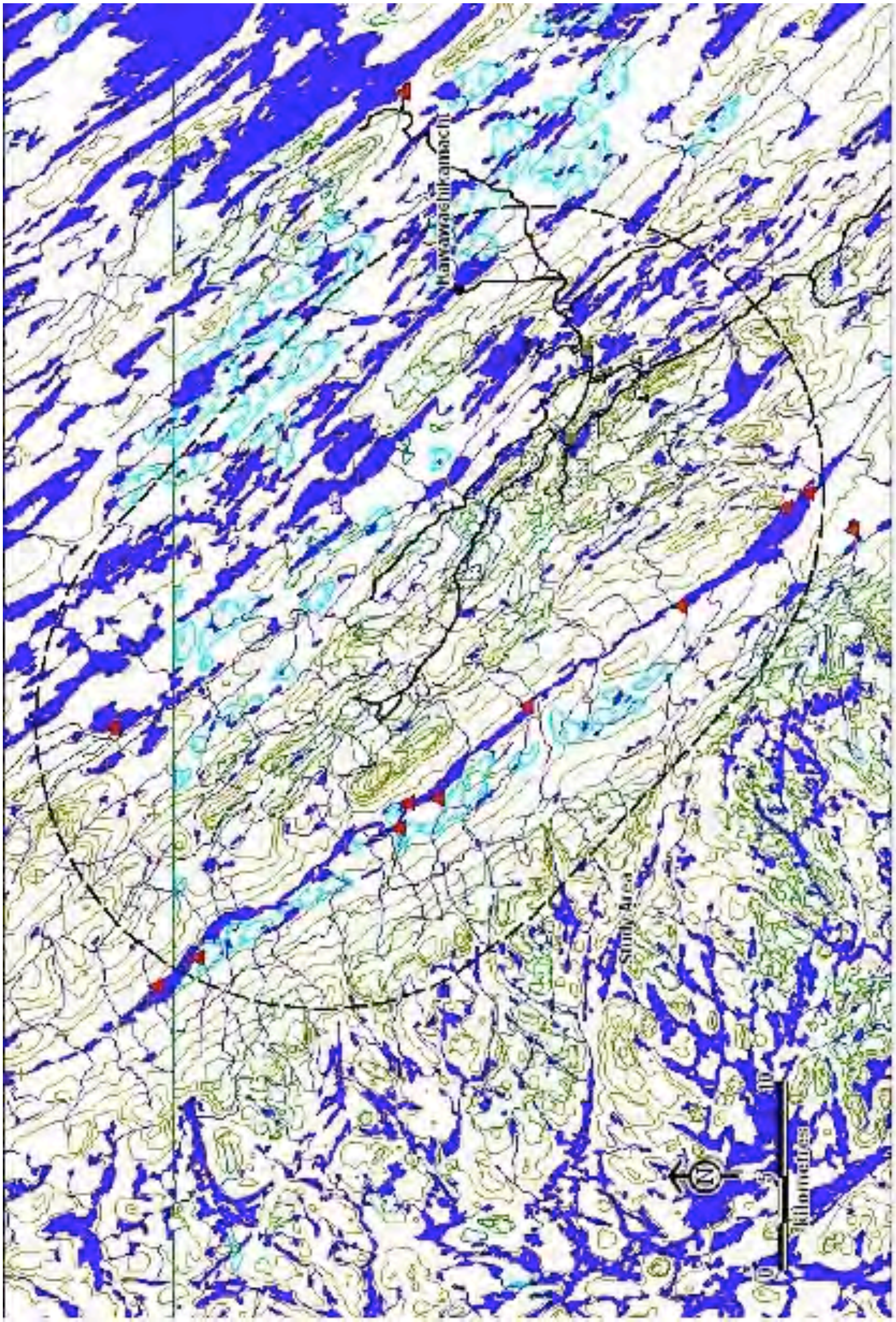
Common English Name	Common French Name	Scientific Name	Uses
Black spruce	Épinette noire	*Picea mariana*	Bandages, ointment
Blackberry	Mûrier	*Rubus* spp.	Jam, juice
Blueberry	Airelle à feuilles étroites	*Vaccinium angustifolium*	Jam, mixed with fish, poultice
Common juniper	Genévrier commun	*Juniperus communis*	Tea
Cones of evergreens	Cônes de conifères	n/a	Colouring agent, tea
Cow parsnip	Berce très grande	*Heracleum maximum*	Paste, poultice, tea
Diamondleaf willow	Saule à feuilles planes	*Salix planifolia*	Poultice, pills, bandages, juice (sap.)
Dry hard wood	Bois de feuillus sec	n/a	Baby powder, smoking hides
Fern	Ptéridium	*Pteridium* spp.	n/a
Large cranberry	Airelle à gros fruits	*Vaccinium macrocarpon*	n/a
Large Labrador tea	Grand thé du Labrador	*Ledum groenlandicum*	Tea, syrup, poultice
Moss	Mousses	*Sphagnum* spp.	Diapers, towels, dishcloth
Small Labrador tea	Petit thé du Labrador	*Ledum groenlandicum*	Tea, syrup, ointment
Stiff clubmoss	Lycopode innovant	*Lycopodium annotinum*	As part of a recipe for pancakes, tea
Tamarack	Mélèze laricin	*Larix laricina*	Snowshoes, tea, poultice
White spruce	Épinette blanche	*Picea glauca*	Mattress, tea, poultice, ointment

Source: Ross (2006, *personal communication*); Weiler (November 2006)

During interviews with Naskapis concerning their land- and resource-use during the former mining operations (Weiler January 2009), only two camp sites were identified within the LSEA: one at lac Vacher, and the other between Peter and Matemace lakes. No camp sites were reported in the LSEA during the decade following the closure of the mines, although some were identified immediately to the east, in the vicinity of Attikamagen Lake (Weiler January 2009). Many camp sites were reported in the 2006 survey (Figure 5.48): those within the Howells River valley are located at Kivivic, Elross and Fleming lakes and at the inflow and central portion of Stakit Lake; one camp was identified in the Swampy Bay River basin, on the western shore of lac Hameau (Weiler January 2009).

Long-distance travel routes principally followed waterways. The Naskapis sought to balance the use of routes of ‘least resistance’ (or effort) with those maximizing safety and the availability of food resources. For a highly mobile society such as the Naskapis relying on seasonally- and locally-fluctuating resources, such travel routes were critical to their economic and, up until recently, their very physical survival (Weiler January 2009). Because the routes were determined by the geology and drainage patterns of the traditional Naskapi territory, they remained stable throughout time; only their use by the Naskapis varied in response to changes in resource-harvesting patterns.

Figure 5.48: Camp Sites Identified by Naskapis, 2006



Source: Weiler (January 2009)

The Naskapi interviewees identified two major travel routes in the LSEA that were used over the 1954-1982 period: both cross the entire traditional territory of the Naskapis from its northernmost limit at Ungava Bay to the central lake plateau around Attikamagen, Petitsikapau and Michikamau (now the Smallwood Reservoir) lakes in the south (Weiler January 2009). The first route followed the Howells River, connecting Ungava Bay to the Ashuanipi region via the lower Koksoak, Caniapiscau and Goodwood rivers in the north and Menihek and Ashuanipi lakes in the south. The second route followed the Swampy Bay River and joined the Ungava region via the lower Koksoak and lower Caniapiscau rivers to the Attikamagen-Petitsikapau lake plateau and, ultimately, Michikamau Lake.

Figure 5.49 shows the travel route along the Howells River in detail. There are several winter crossings alongside it that Naskapi hunters, generally on snowmobile, use. Two of the river crossings were identified during the 2006 survey, one at the north end of Rosemary Lake and the other at Stakit Lake.

Figure 5.50 shows the snowmobile trails reported by Naskapis as part of a 2004-2008 study into the effects of climate change on access to the territory and resources. It shows that one winter trail traverses the footprint of DSO2 and DSO3. Similarly, one summer route identified by Naskapis as part of the preceding study crosses the Project footprint (Figure 5.51).

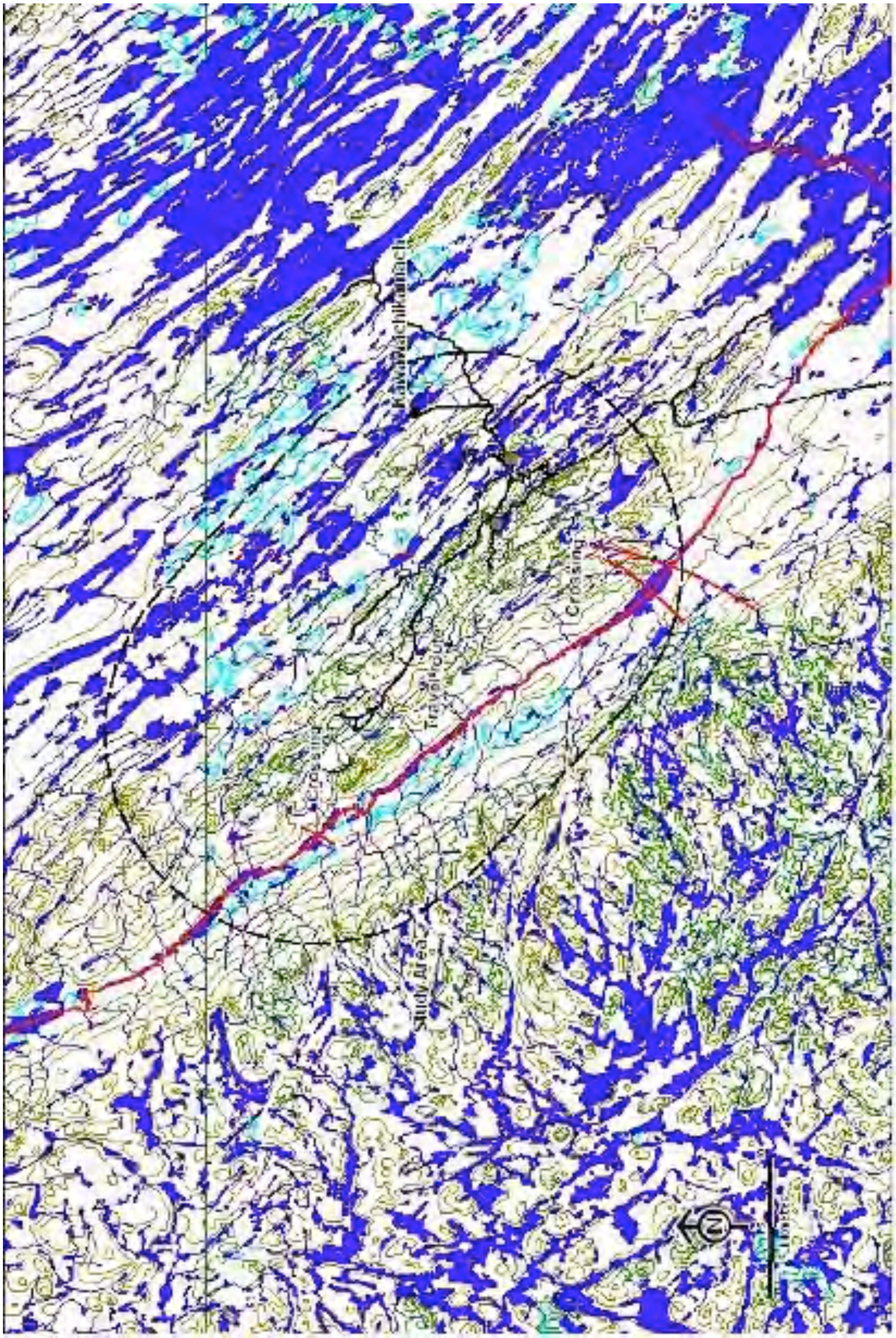
Ashkui attract a diversity of wildlife in spring and thus serve as prime harvesting areas as well as sources of freshwater at that season (Weiler January 2009). During the 2006 survey, the Naskapi interviewees identified ashkui sites on Kivivic Lake, at the southern limits of Elross and Fleming lakes, in the river section connecting Fleming and Stakit lakes and on Stakit Lake (Figure 5.52).

Figure 5.53 and Table 5.51 present the toponyms identified in the LSEA by the Naskapis in Weiler (January 2009). Appendix 11 presents a complete listing of Innu and Naskapi toponyms and names of plants and animals.

Sections 5.4.3 presents more detailed information on land- and resource-use by the Naskapis.

It is clear that DSO2 and DSO3 form only a tiny part of the area of intensive use of the Naskapis and an even smaller part of their total land use range (Figure 5.54).

Figure 5.49: Travel Routes Identified by Naskapis, 2006



Source: Weiler (January 2009)

Figure 5.50: Regional Winter Trails Identified by Naskapis

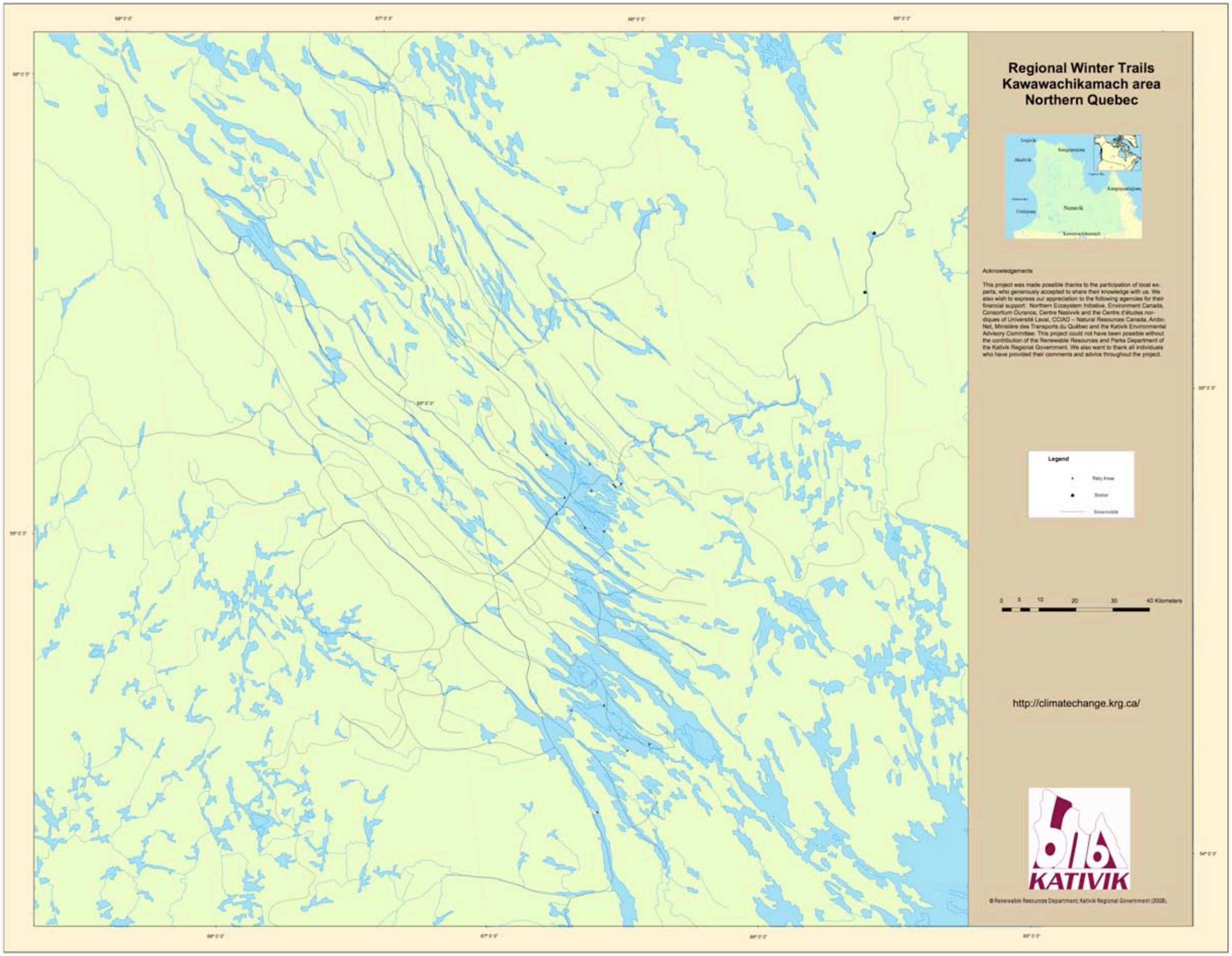


Figure 5.51: Regional Summer Routes Identified by Naskapis

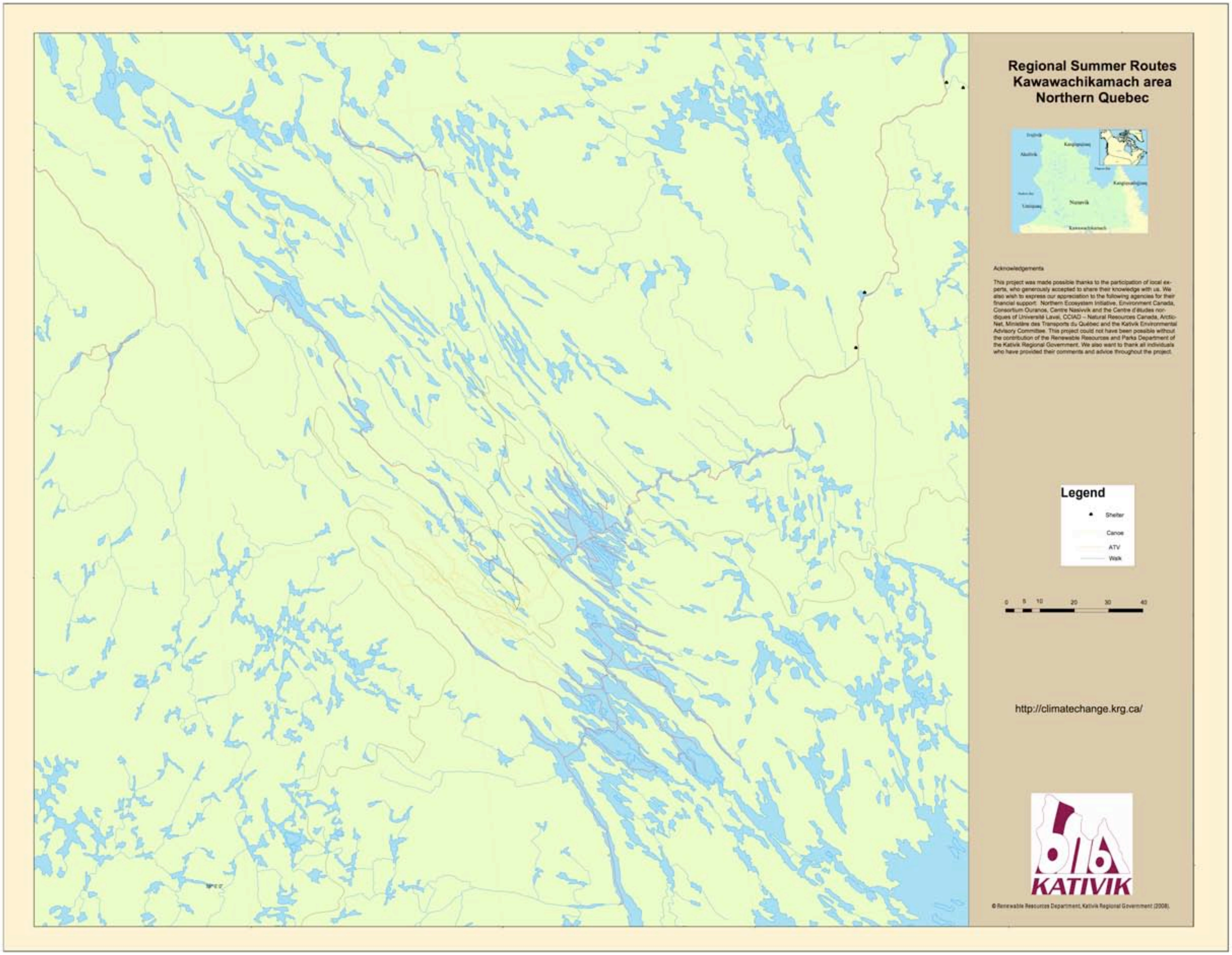
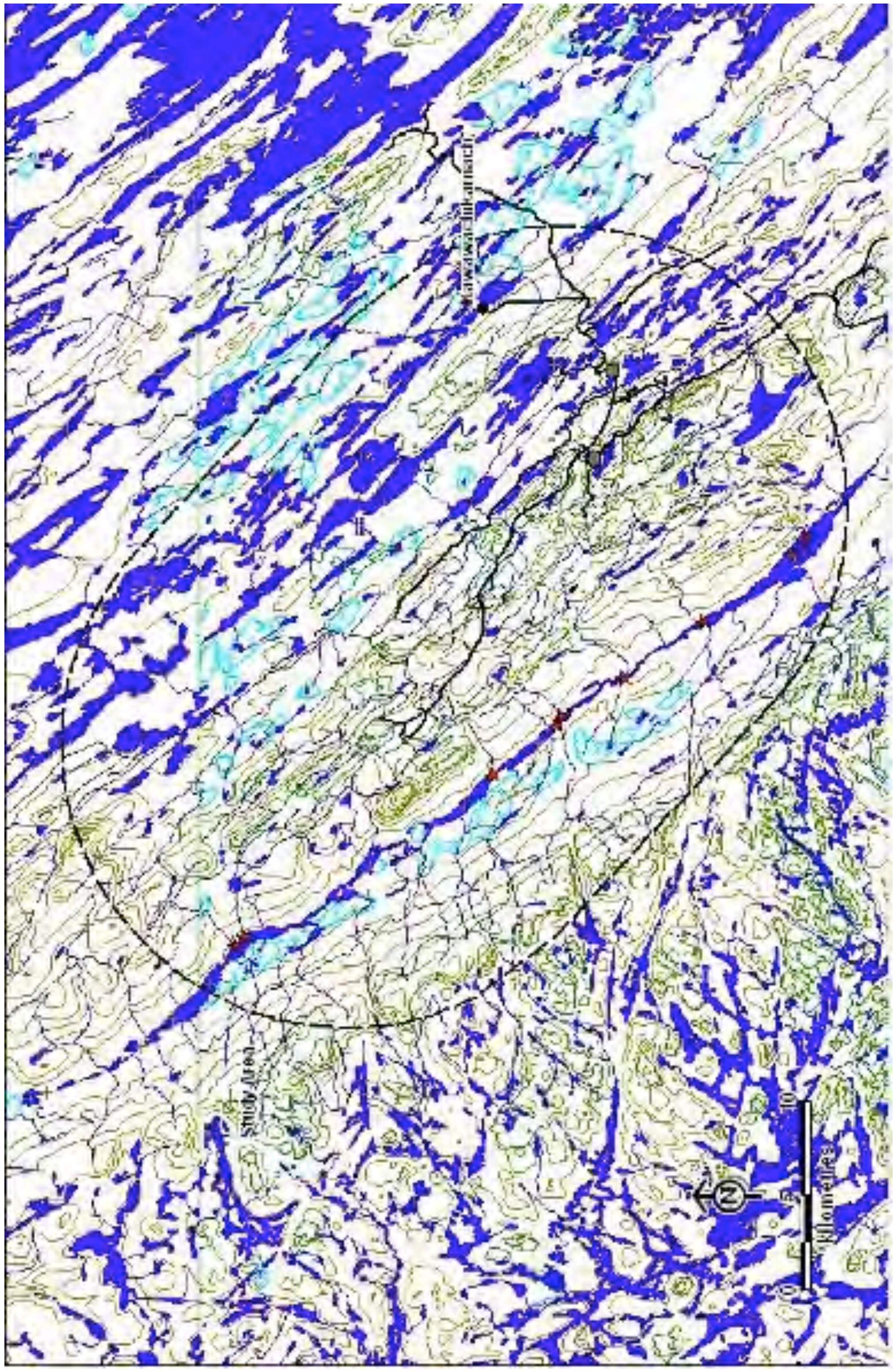


Figure 5.52: Ashkui Identified by Naskapis, 2006



Source: Weiler (January 2009)

Figure 5.53: Toponyms Collected from Members of NIMLJ and NNK

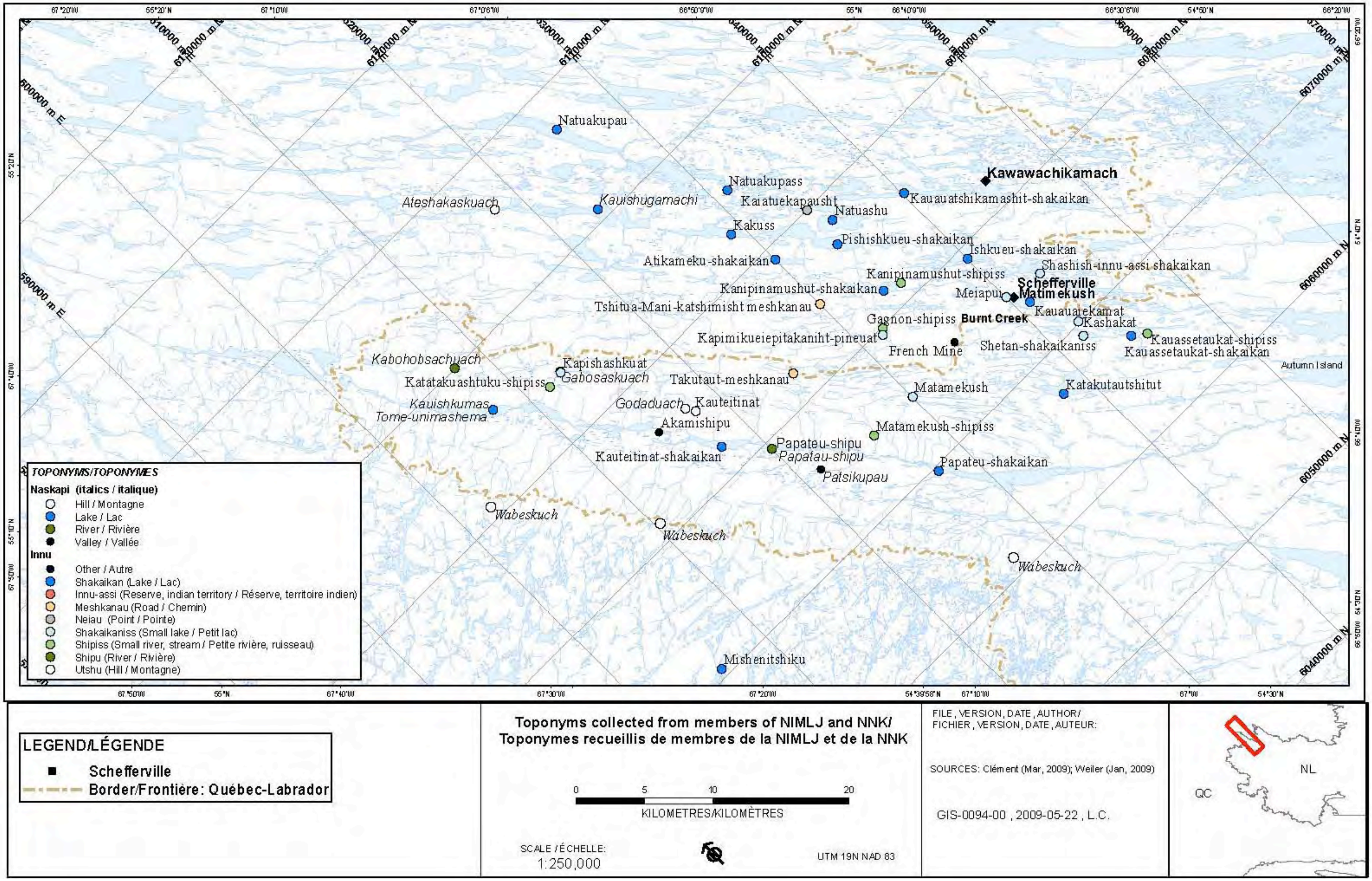
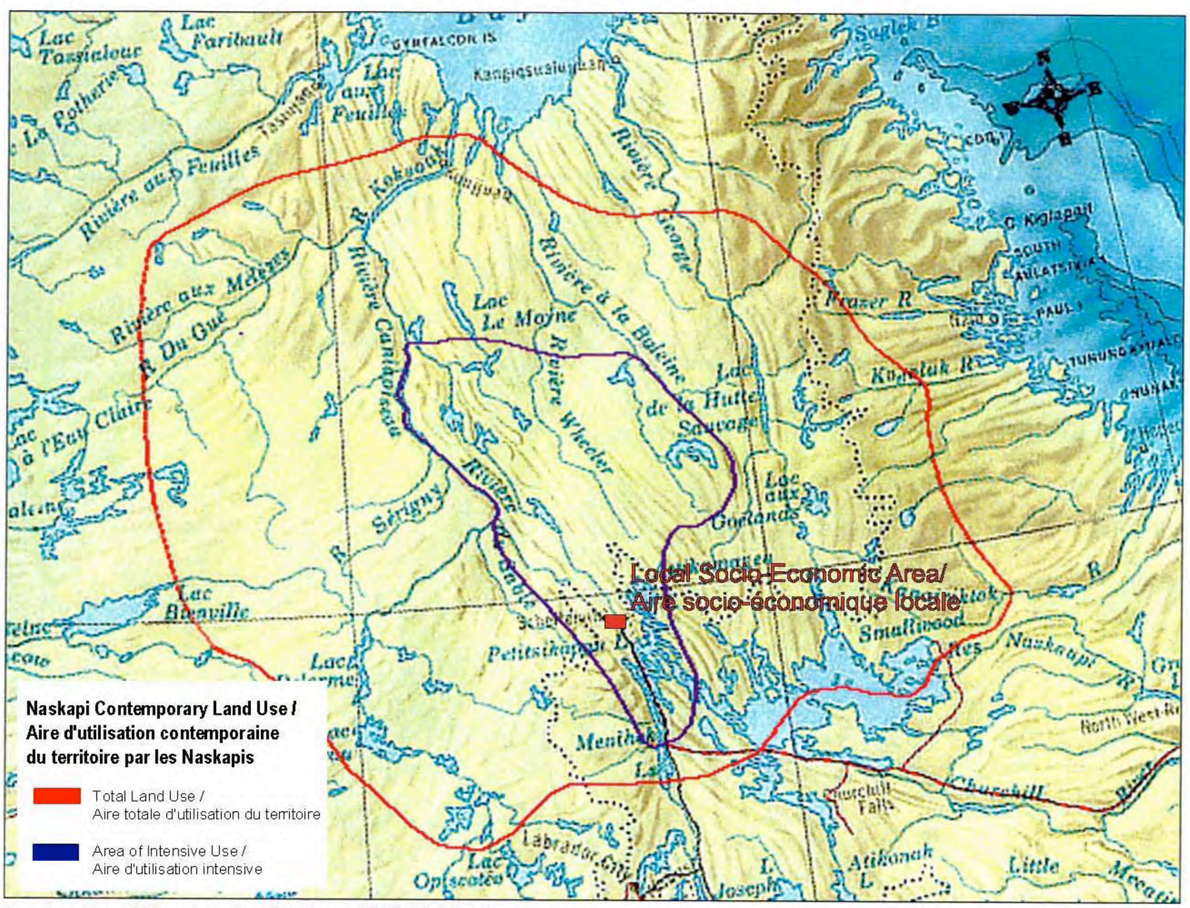


Table 5.51: Naskapi Place Names

Naskapi Place Name	Official Place Name	Translation	Feature	Location
Ateshakaskuach		Beginning of tundra	Hill	67°15'09"; 55°08'71"
Gabosaskuach			Lake	67°23'40"; 54°98'24"
Godaduach			Hill	67°16'56"; 54°90'58"
Kabohobsachuach		Small, dried-up stream	River	67°31'46"; 55°03'44"
Kauishkumas	Kivivic Lake	Twin lakes	River	67°31'83"; 54°99'72"
Kauishugamachi	lac Annabel		Lake	67°06'91"; 55°03'79"
Papatau-shipu	Howells River	River of round stones	River	
Patsikupau	Howells River valley	Wooded area	Valley	
Tome-unimashema	Kivivic Lake	Tommy's lake	Lake	67°31'83"; 54°99'72"
Wabeskuch		Range of hills along western side of Howells River valley	Ridge	

Source: Weiler (January 2009; 2009, *personal communication*)

Figure 5.54: Range of Contemporary Land Use by Naskapis



Overlay: New Millennium Capital Corp. 2009-03-17 S.D.

Source: Weiler (February 2000)

5.5.7.2 Nation Innu Matimekush-Lac John

During the first half of the 20th century, the occupation of the territory by the Mishta-shipu-Innuat was characterized by a nomadic lifestyle and a pattern of resource-use in accordance with a millennial model. From the 1950s onwards, the influence of industrial society and government intervention disturbed this model and gave rise to new modes of harvesting centered around the Matimekush-Lac John community (Clément Mai 2009).

Clément (Mai 2009) summarized land- and resource-use by the Innu of Matimekush-Lac John during the period of mining operations in Schefferville as follows:

- in fall, the caribou hunt, which had begun in late summer, predominated. Gradually, other activities such as net fishing, beaver and small game hunting and some waterfowl harvesting also took place. Certain groups left Schefferville by plane in early October to stay for prolonged periods in the bush, where traditional dwellings were still in use;
- after freeze-up, activity focused mainly on trapping furbearers. The principal species trapped was marten, either near the town or in remote areas. People travelled to their territory by train or snowmobile. The hunting groups in remote aras returned to the reserve in mid December;
- in January-February, very little activity took place, since animals hibernated or moved about infrequently during this time. Nonetheless people focused on the caribou hunt, especially between late February and May. In March, the caribou hunt often took place on a collective basis, in the south-west during the 1970s and north of Schefferville during the 1980s. In late winter, trapping-related activity increased. Occasionally, hunters travelled to remote areas for two months at a time. Hunters appeared to trap less frequently than in fall. "The trapping of marten, mink, fox, lynx and weasel ended around April 15 or 30, while beaver, otter and muskrat could be caught until mid June" (Laforest 1983) [unofficial translation]. As the weather warmed up, other activities were added, such as small game hunting or ice fishing. Around mid April, the groups located in remote areas returned to Schefferville;
- in spring, several campsites were established for periods varying between a few days to one or two weeks for the purposes of hunting waterfowl. Hunters preferred Canada goose in early May, and then other species whose hunting season lasted longer. Break-up followed, and net fishing increased;
- summer, lasting from mid June to September, was devoted mainly to fishing. It was also the time for trips to Sept-Îles or Sainte-Anne-de-Beaupré for the annual pilgrimage in July.

The current situation basically reflects a pattern similar to that which prevailed in the 1980s following the cessation of mining operations. Notable changes include an increase in short hunting trips within the LSEA and in truck or skidoo outings in the vicinity of Schefferville as well as a relative drop in trapping in preference to fishing (Clément Mai 2009).

As far as we can ascertain, the Innu of the NIMLJ are not, and never have been, involved in any local commercial fishery.

Annual cycles described by the Innu of Matimekush-Lac John are presented in Table 5.52. They can be summarized as follows (Clément Mai 2009):

- caribou hunting is predominant in fall. Fishing and small game and waterfowl hunting are also practised;
- trapping occurs from fall to early spring;
- caribou hunting starts again in March-April;
- Canada goose hunting is predominant in May;
- summer is mainly devoted to fishing, hunting of small game and gathering.

The main travel routes of the Innu of Matimekush-Lac John follow the two existing gravel roads that traverse the LSEA (Clément Mai 2009): one extends from Schefferville to lac Annabel and lac Leroy; the other, which connects Schefferville to lac Le Fer, is west of the first route and in part parallel to it. The second route corresponds to what NML calls the "main access road" (Figure 2.1). Two other travel routes are worthy of mention (Clément Mai 2009): a dirt road from Schefferville towards Wishart Lake to the south-west, from where the Howells River is accessible; and a partly dirt road from Schefferville roughly towards the north-east, reaching lac Sauvaget and lac Vacher. The road to Wishart Lake would be crossed by the reconstructed portion of the railway. The main sites used – generally in 2008 – by the Matimekush-Lac John Innu informants and the routes taken are presented in Table 5.53.

The contemporary hunting territory of one of the Innu informants extends from the eastern limit of the Howells River to the ELAIOM site (Figure 5.55).

Generally, the average travelling time is relatively short (30-60 minutes) regardless of the season (Clément Mai 2009). The duration of the stays in the bush varies seasonally: up to two to three days in winter; up to two weeks in spring; up to one week in summer; and up to two to three days in fall (one exception being a 15-day stay). Fuller information is provided in Table 5.54.

In the bush, the Matimekush-Lac John Innu overnight generally in canvas tents, camps built of wood or houses (Table 5.55). Camps made of wood – or chalets – are the most often used. The chalets identified by the Innu informants extend from south of Stakit Lake to lac Vacher (Figure 5.56).

The 2008 harvesting figures provided by six Innu informants (Table 5.56) cover an area that is slightly larger than the LSEA.

Some of the Innu informants said that ashkui are good sites for hunting otter, Canada geese and waterfowl and for taking drinking water. One informant indicated that ashkui constitute good fishing spots, while another said the opposite. Three informants judged ashkui to be dangerous places (Clément Mai 2009). Figure 5.57 shows the ashkui sites reported by the informants, some of which occur at DSO2.

Table 5.52: Contemporary Annual Harvesting Cycles of Matimekush-Lac John Innu

Inf. #	Winter	Spring	Summer	Fall
1	caribou hunting small game hunting fishing trapping (<1998)	Canada goose hunting	fishing	caribou hunting beaver hunting small game hunting
2	caribou hunting small game hunting fishing trapping (<1998)	Canada goose hunting fishing	small game hunting gathering	small game hunting trapping
3	furbearing animal hunting trapping small game hunting fishing cottaging	Canada goose hunting furbearing animal hunting fishing small game hunting	hunting fishing cutting firewood	trapping small game hunting fishing
4	?	Canada goose hunting	Fishing	?
5	fishing small game hunting	Canada goose hunting fishing	Canada goose and waterfowl hunting small game hunting	caribou hunting (<2006) small game hunting fishing
6	caribou hunting small game hunting fishing	Canada goose hunting fishing trapping small game hunting	fishing	caribou hunting small game hunting fishing trapping
7	small game hunting fishing	Canada goose hunting fishing	fishing berry gathering	waterfowl hunting fishing
8	———	Canada goose and waterfowl hunting fishing small game hunting	fishing small game hunting caribou hunting	small game hunting trapping (<1999)
9	small game hunting trapping	———	———	———
10	small game hunting cottaging	Canada goose hunting fishing	small game hunting fishing	caribou hunting small game hunting

Source: Clément (Mai 2009)

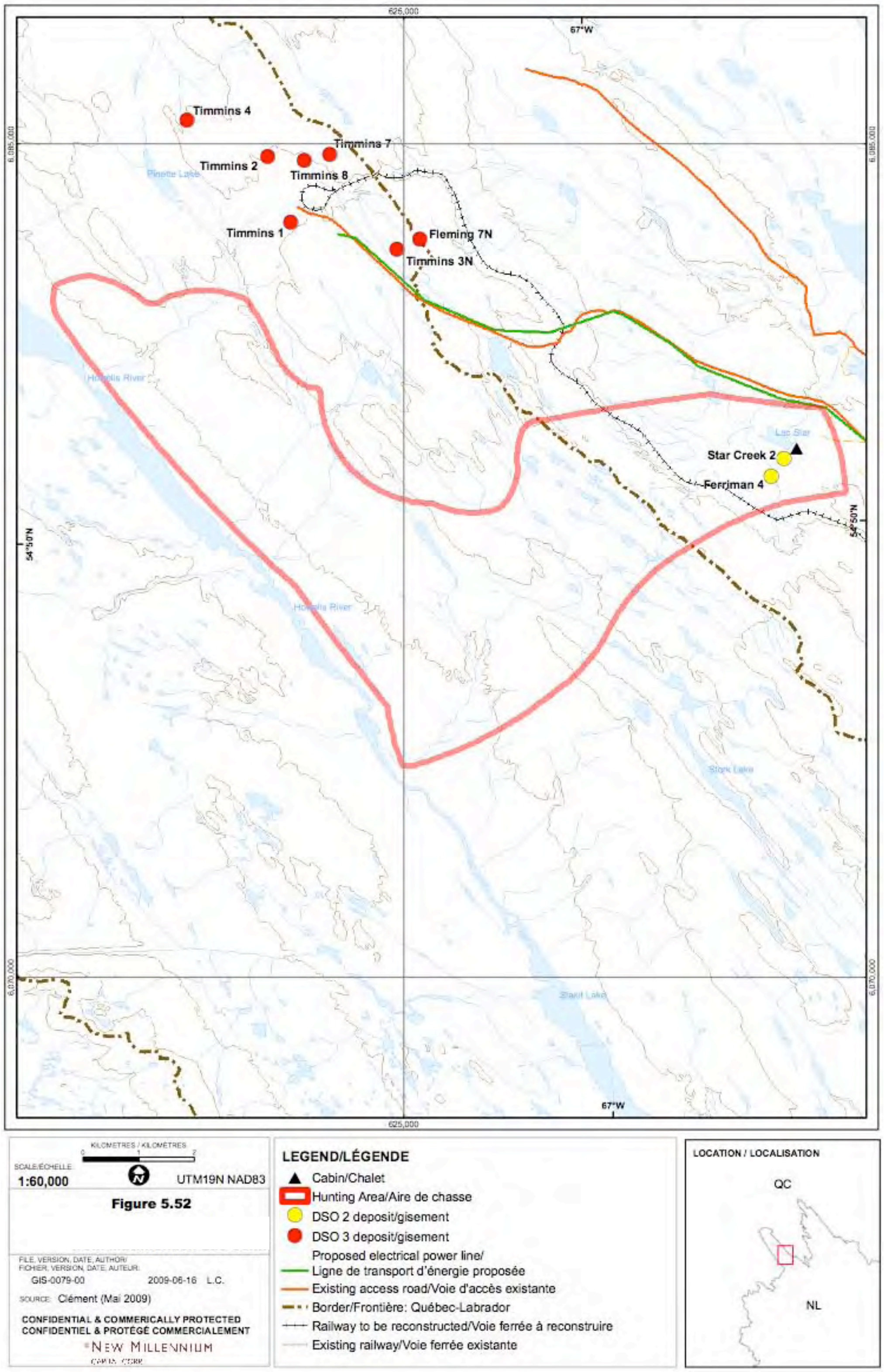
Table 5.53: Main Sites and Travel Routes Used by Matimekush-Lac John Innu, 2008

Inf. #	Principal Sites Used	Routes	Mode of Transport - Winter	Mode of Transport - Spring	Mode of Transport - Summer	Mode of Transport - Autumn
1	a. Takutaut-meshkanau b. Kakuss –La Miltière Lake	a. Takutaut-meshkanau b. Dirt road and trail running through lakes Squaw, Vacher, *etc*. areas	snowmobile	car/truck	car/truck water craft	car/truck snowmobile
2	a. Takutaut-meshkanau b. Papateu-shipu – Howells River c. Natuashu – lac Sauvaget	a. Takutaut-meshkanau b. Takutaut-meshkanau c. Dirt road and trail	snowmobile[1]	snowmobile[1]	car/truck[1]	car/truck[1]
3	Lac Star	Takutaut-meshkanau and trails	snowmobile	car/truck snowmobile ATV	car/truck ATV	car/truck AVT snowmobile
4	a. Takutaut-meshkanau b. lac Star	Takutaut-meshkanau	snowmobile[2]	snowmobile[2]	car/truck[3]	———
5	a. Takutaut-meshkanau b. Tshitua-Mani-katshimisht meshkanau c. Pishishkueu-shakaikan – lac Vacher	a. Takutaut-meshkanau b. Tshitua-Mani-katshimisht meshkanau c. Dirt road and snowmobile trail	snowmobile	car/truck snowmobile helicopter[4]	car/truck	car/truck
6	Papateu-shakaikan - Stakit Lake	Dirt road and trail running through Katakutautshitut – Wishart Lake	snowmobile	snowmobile car	car/truck	car/truck snowmobile
7	a. Papateu-shakaikan - Stakit Lake b. Shetan-shakaikan - Hope Lake		snowmobile	snowmobile	car/truck	car/truck
8	a. Takutaut-meshkanau Papateu-shakaikan - b. Stakit Lake c. Matamekush	a. Takutaut-meshkanau b. Dirt road c. Dirt road	———	snowmobile[5]	car/truck water craft	———
9	Papateu-shakaikan - Stakit Lake	Snowmobile trail	———	snowmobile[6]	———	———
10	a. Kanipinamushut-shakaikan - La Cosa Lake b. Pishishkueu-shakaikan – lac Vacher	a. Tshitua-Mani-katshimisht meshkanau b. Land route and trail passing through Ishkueu-shakaikan – Squaw Lake	snowmobile	car/truck snowmobile watercraft	car/truck	car/truck snowmobile

1. 1997
2. Winter and spring 2005
3. Summer 2006
4. 2006
5. May 1982
6. March 1998

Source: Clément (Mai 2009)

Figure 5.55: Contemporary Hunting Territory of an Innu from Matimekush-Lac John



Source: Clément (Mai 2009)

Table 5.54: Duration of Travels of Matimekush-Lac John Innu, 2008

Inf. #	Winter Trips	Winter Duration	Winter Travel[1]	Spring Trips	Spring Duration	Spring Travel[1]	Summer Trips	Summer Duration	Summer Travel[1]	Autumn Trips	Autumn Duration	Autumn Travel[1]
1	20	2-3 days	2-4 hrs	1	7-10 days	45 min	weekends	2 days	?	weekends	2 days	1 hr
2	5-6	2 days	45 min	1	2 weeks	½-5 hrs	1	1 day	1 day	often	round trip	?
3	weekends evenings	2-3 days round trip	30 min 30 min	weekends long weekends	2-3 days 2 weeks	30 min 30 min	often	1 evening	20 min	weekends long weekends	2-3 days 15 days	20-30 min
4	?	?	?	1	2 weeks	?	weekends	2-3 days	15-20 min	?	?	?
5	6	round trip	20 min	weekends evening long weekends	round trip round trip 7-10 days	50 min	weekends	round trip	3-4 hrs	weekends	round trip	30 min
6	weekends	2-3 days	1.5 hrs	weekends long weekends	2-3 days 2 weeks	1 hr	weekends	2-3 days	1 hour	weekends	2-3 days	1 hour
7	often	2-3 days	1.5 hrs	1	1 week	1 hr	often	1-7 days	15 min	1	3 days	1.5 hours
8	——	——	——	1	1 week	1 hr	often 1 long weekend 2 1	—— 1 week round trip round trip	1.5 hours 1.5 hours 1 hour 1 hour	every day	round trip	n/a
9	3-4	round trip	?	——	——	——	——	——	——	——	——	——
10	10-12	round trip	?	1 long weekends	round trip 1 week	2 hrs 1hr	3 5	round trip 1 day	n/a 30 min	2 2-3	round trip round trip	? ?

[1] Duration of trip from residence to harvesting location.
Key: ? missing data; - no activity during period in question; n/a not applicable.

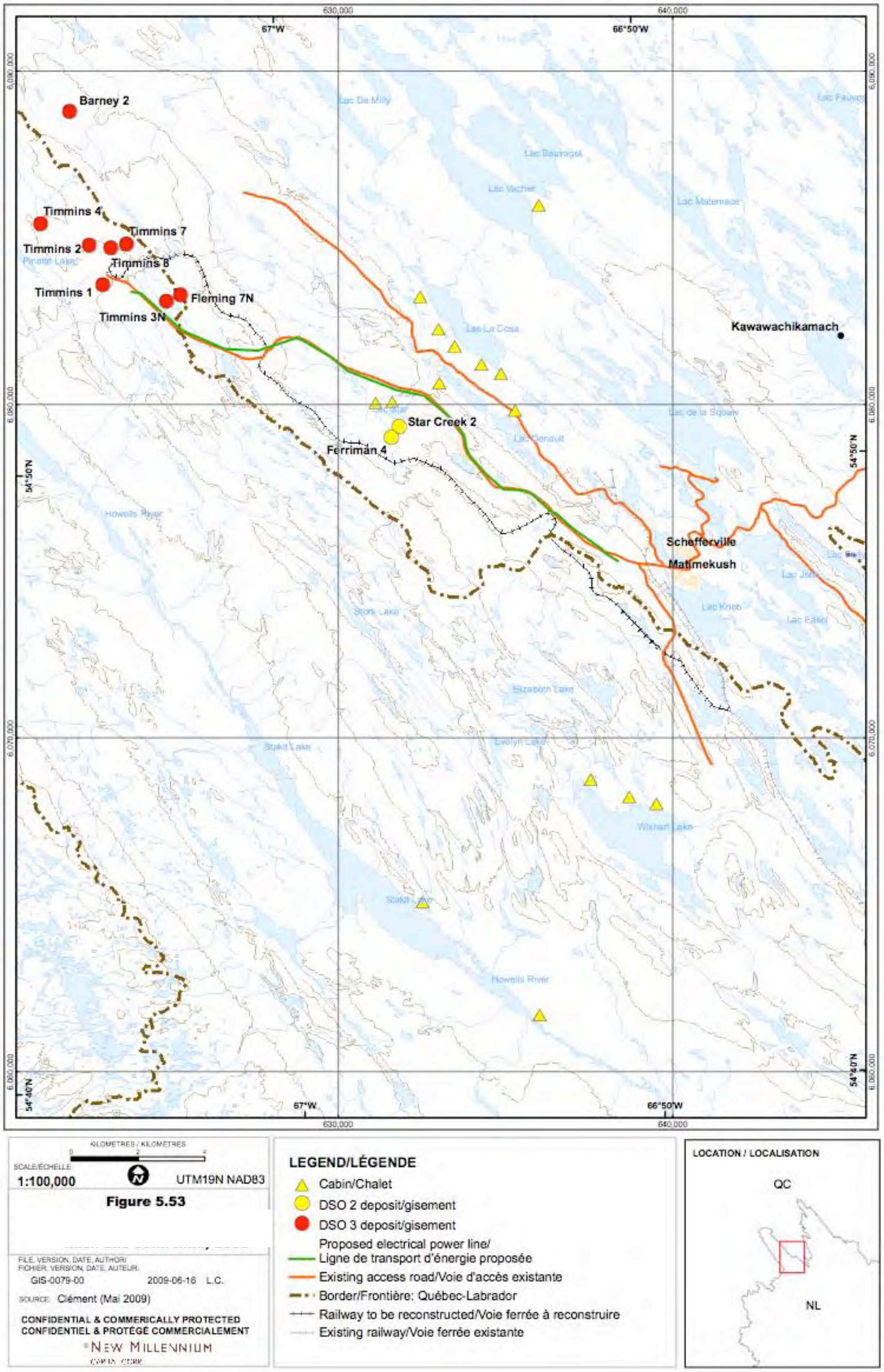
Source: Clément (Mai 2009)

Table 5.55: Types of Camps of Matimekush-Lac John Innu, 2008

Inf. #	Winter	Spring	Summer	Autumn
1	*patshuianitshuap* (fabric tent)	day shelter	a. outdoors b. *patshuianitshuap* (children) (fabric tent)	n/a
2	*patshuianitshuap* (fabric tent)	*kakusseshitshuap* (white tent)	n/a	n/a
3	*mitshuap* (house)	*mitshuap* (house) + *patshuianitshuap* (fabric tent)	*mitshuap* (house)	*mitshuap* (house)
4	?	?	*mishtikushitshuap* (wood cabin)	?
5	n/a	*patshuianitshuap* (fabric tent)	n/a	n/a
6	*mishtikushitshuap* (wood cabin)	*mishtikushitshuap* (wood cabin) and *patshuianitshuap* (fabric tent)	*mishtikushitshuap* (wood cabin)	*mishtikushitshuap* (wood cabin)
7	*mishtikushitshuap* (wood cabin)	*mishtikushitshuap* (wood cabin)	*tetaut patshuian, tetaut mishtik*^{u} (half fabric, half wood)	*mishtikushitshuap* (wood cabin)
8	———	?	*patshuianitshuap* (fabric tent)	n/a
9	n/a	———	———	———
10	n/a	*patshuianitshuap* (fabric tent)	a. n/a b. *kakusseshitshuap* (white cabin)	n/a

<u>Source</u>: Clément (Mai 2009)

Figure 5.56: Sites of Chalets of Matimekush-Lac John Innu, 2008



Source: Clément (Mai 2009)

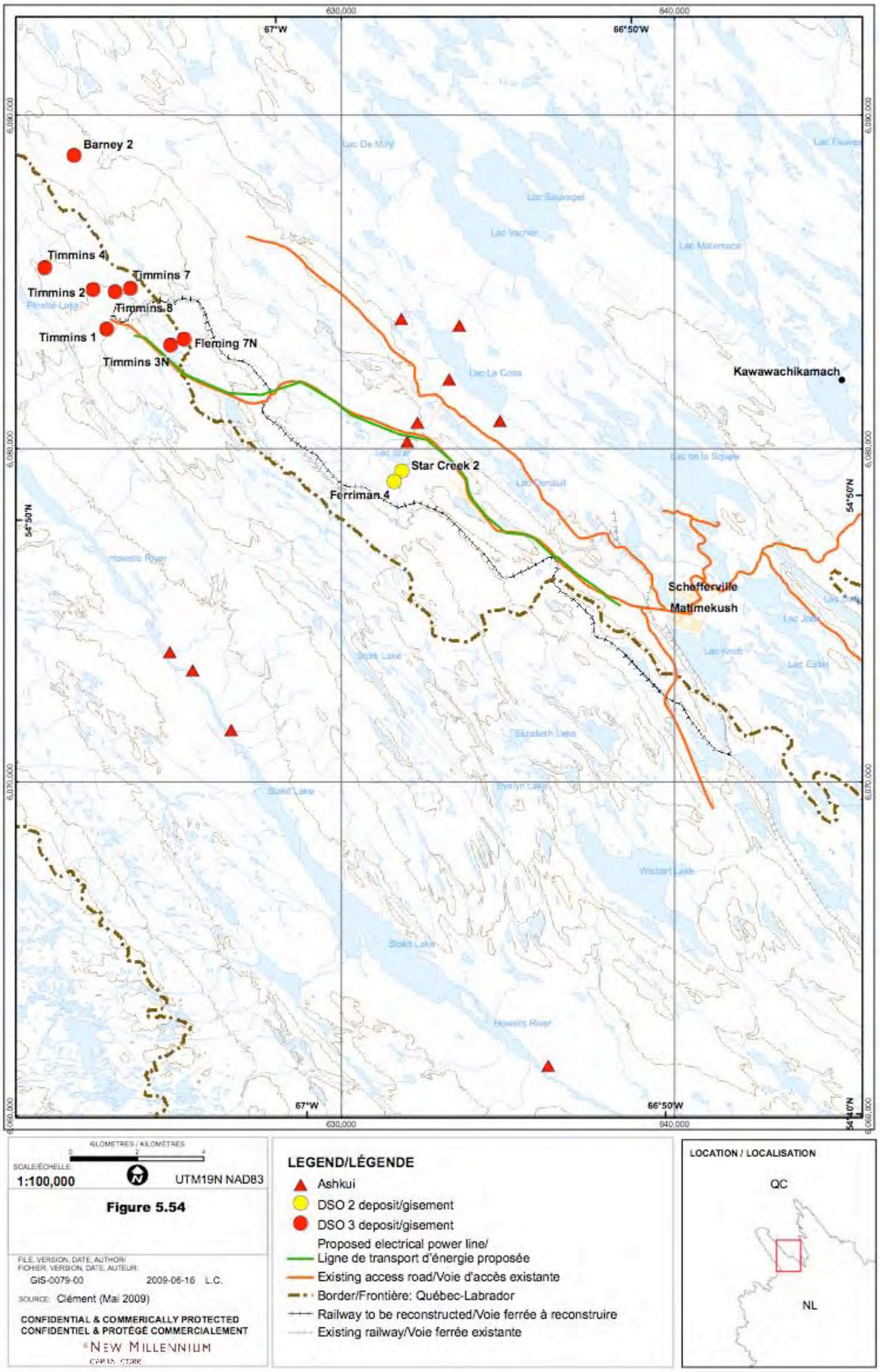
Table 5.56: Harvesting Statistics of Six Matimekush-Lac John Innu, 2008

Categories	Species	1	3	5	6	8	10
Aueshishat	*Amishk*[u] (beaver)		3		2		
	atik[u] (caribou)	5	20	4	0[b]	3	
	atshakash (mink)		20				
	kak[u] (porcupine)	5-6	1		5		
	Maikan (wolf)		0[a]				
	Matsheshu (Red fox)		30		2		
	nitshik[u] (otter)		2				
	uapush (hare)		100	15	20-30	4-5	
	uapishtan (marten)		20				
	Utshashk[u] (muskrat)		6-10				
Nameshat	*Matamek*[u] (Brook trout)	300	1000	50-75	150	25	20
	Papakatamek[u]					10	3
	Uanan (Atlantic salmon)				10	7	
	Kukamess (Lake trout)				50	50	
	Tshinusheu (pike)	1-2			25	10	
	Attikamek[u] (L. whitefish)				100	20	
	Makatsheu (W. sucker)				10	30	
	Mikuashai (L. sucker)				20	40	
	Minai (burbot)					10	
	Atshakashamekuss						
	Minnow						
Missipat	*Nishk* (Can. goose)	22	20	5	25	10	2
	Muak[u] (Common loon)		3				
	Inniship (Am. black duck)		10	3			
	Auiu (Long-tailed duck)						10
	Kuaikan (Black scoter)						2
	Other ducks		30				
Pineuat	*Innineu* (Spruce grouse)	20-30		40	40	50	20
	Uapineu (W. ptarmigan)	2-3		120	200	60	20

a. 2 on average in past years; b. 7 in 2007

Source: Clément (Mai 2009)

Figure 5.57: Ashkui Indentified by Matimekush-Lac John Innu, 2009



Source: Clément (Mai 2009)

Figure 5.58 shows the registered traplines of members of the NIMLJ and ITUM in 1971, some of which are in Labrador. The extent to which those traplines are used by the registered owners is unknown, largely because the Council of ITUM refused NML's invitations to conduct or to participate in a study of the land- and resource-use of its members in the LSEA. In 1990-1991, 17 Innu from Matimekush-Lac John derived income from trapping (Autochtonomie Enr. 18 juin 1992).

Table 5.57 and Figure 5.53 present the toponyms used by the members of the NIMLJ to designate areas in the LSEA. Appendix 11 presents a complete listing of Innu and Naskapi toponyms and names of plants and animals.

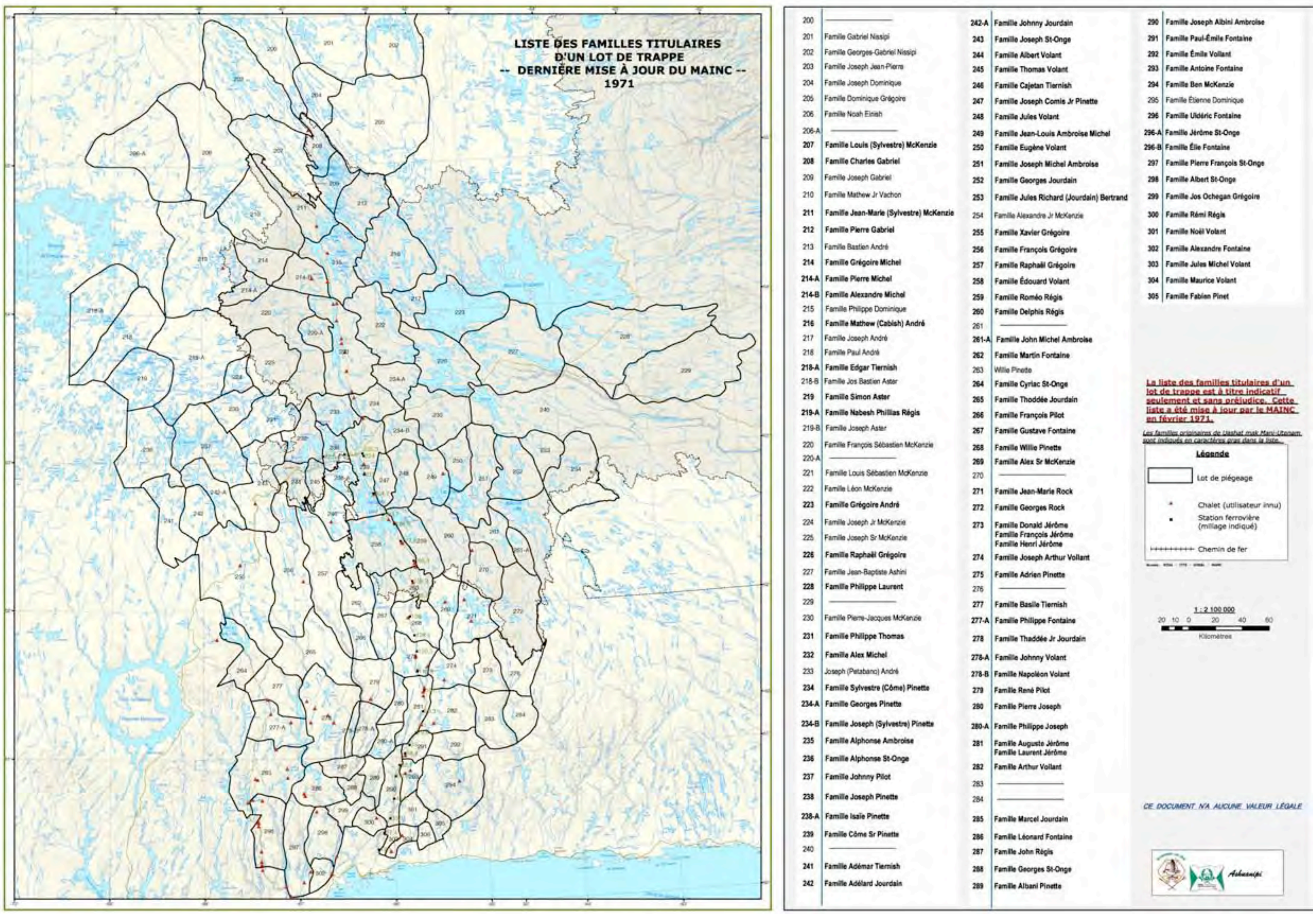
Taking into account Clément (Mai 2009) (Appendix D), it seems safe to make the following assumptions about the land- and resource-use of the members of the NIMLJ: that the entire area covered by its comprehensive land claim (Figure 5.59), which includes DSO2 and DSO3, is used; that harvesting is especially important in areas close to Matimekush-Lac John; and that the types and quantities of resources harvested are similar to those harvested by the Naskapis.

Laforest (1983) and Weiler (July 1988) noted that the land-use activities of the NIMLJ are concentrated in the area south of Schefferville. According to Laforest (1983), the use by the members of the NIMLJ of the region south of Schefferville is due to the availability of train service between Schefferville and Sept-Îles, which facilitates travel since the train will stop at points selected by Natives travelling to and from the bush to drop them off and to collect them with their game.

Brown (June 2005) noted that the ± 100-mile-long road system in the Schefferville area, which was formerly used for mining exploration, now offers a large area, mostly located outside the Howells River catchment, in which to hunt while travelling by all-terrain vehicle and pick-up truck. Due to the excellent walking conditions within the upper part of the Howells River catchment, local Innu hunters of caribou, Naskapi hunters and the clients of Labrador outfitters are sometimes observed there on foot.

As was the case for the Naskapis, DSO2 and DSO3 seem, however, to occupy only a tiny part of the contemporary harvesting territory of the members of the NIMLJ.

Figure 5.58: Traplines as of 1971



Source: Ashuanipi Corporation (no date)

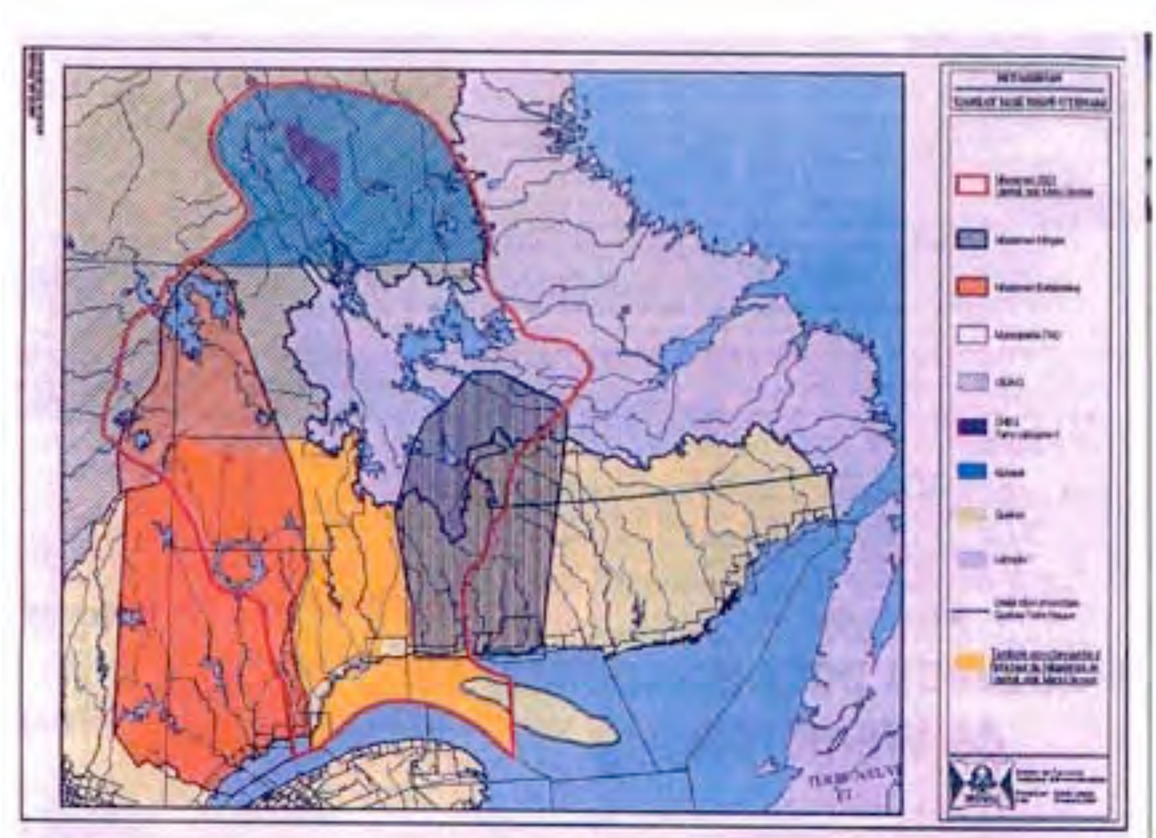
Table 5.57: Selected Toponyms of Matimekush-Lac John Innu

Innu Name	Etymology	Synonym	Entity	Official Name	UTM
Akamishipu	the other side of the river			--------	615000/6086000
Atikameku-shakaikan	whitefish lake		shakaikan	lac de Milly	630000/6088900
French mine	French Mine			Burnt Creek	635000/6075350
Gagnon-shipiss	Gagnon's creek		shipiss	ruisseau du lac Star	632000/6079800
Ishkueu-shakaikan	woman’s lake	Anikutshash; Uepashtamakan-katueushit-shakaikan	shakaikan	lac de la Squaw	640000/6079000
Kaiatuekapausht	where the small trees are in a line		neiau	pointe au lac Sauvaget	634200/6089820
Kakuss	small porcupine		shakaikan	lac la Miltière	629000/6092500
Kanipinamushut-shakaikan	lake where the water does not freeze in winter	Key Lake	shakaikan	lac La Cosa	634000/6081700
Kanipinamushut-shipiss	creek of the lake where the water does not freeze in winter		shipiss	ruisseau du lac La Cosa	635300/6081200
Kapimikueiepitakaniht-pineuat	where we twist the necks of ptarmigan	Tommy Inishushakameshum; Lac Gagnon	shakaikaniss	lac Star	631650/6079450
Kapishashkuat	where the trees are small		shakaikaniss	Greenbush Lake	613000/6094200
Kashakat	where there are alders		shakaikaniss	Abel Lake	642500/6070000
Katakutautshitut	where the summit is steep		shakaikan	Wishart Lake	638000/6067000
Katatakuashtuku-shipiss	the creek with trees of the same height		shipiss	Greenbush Brook	611700/6094000
Kauassetaukat-shakaikan	the lake where there is a hill with a rounded overhang		shakaikan	Gilling Lake	644500/6066500
Kauassetaukat-shipiss	the small river of the lake with a hill with a rounded overhang		shipiss	Gilling River	645445/6065800
Kauauaiekamat	round lake	Naplek	shakaikan	Knob Lake	641000/6073500
Kauauatshikamashit innu-	the reserve of the lake with		innu-assi	Village Naskapi	642800/6082450

Innu Name	Etymology	Synonym	Entity	Official Name	UTM
assi	several bends				
Kauauatshikamashit-shakaikan	the lake with several bends		shakaikan	lac Matemace	640100/6085700
Kauteitinat	the heart-shaped mountain		utshu	--------------	618000/6085200
Kauteitinat-shakaikan	the lake of the heart-shaped mountain		shakaikan	Elross Lake	617500/6082000
Matamekush	the small trout		shakaikaniss	--------------	630000/6074700
Matamekush-shipiss	small river of the small trout lake		shipiss	--------------	626000/6074690
Meiapui	the shitty water		shakaikaniss	lac Dauriat	640000/6075000
Mishenitshik^{u}	big otter		Shakaikan	Bazil Lake	606000/6070500
Natuakupass	the small basin with calm water surrounded by alders		shakaikan	lac Guillet	631100/6095000
Natuakupau	the basin with calm water surrounded by alders		shakaikan	lac Gillard	625400/6107000
Natuashu	divided in two		shakaikan	lac Sauvaget	635000/6088000
Papateu-shakaikan	the lake of the river with flat rocks		shakaikan	Stakit Lake	627500/6069500
Papateu-shipu	the river with flat rocks	Shapatish-shipu	shipu	Howells River	620000/6079300
Pishishkueu-shakaikan	lake of the small woman		shakaikan	lac Vacher	634000/6086500
Shashish-innu-assi shakaikan	lake of the old reserve		shakaikaniss	lac John	643000/6074500
Shetan-shakaikaniss	little Saint-Anne lake		shakaikaniss	Hope Lake	642000/6069000
Takutaut-meshkanau	the trail on top of the mountain	Ka-uteitinat-meshkanau; Greenbush-meshkanau; Redmond-meshkanau; Kausheiautshimut-meshkanau	meshkanau	-------------	625000/6082100
Tshitua-Mani-katshimisht meshkanau	the trail of the Holy Mary		meshkanau	-------------	630000/6084300

* shakaikan 'lake'; shakaikaniss 'small lake'; shipu 'river'; shipiss 'small river, creek'; neiau 'pointe'; utshu 'hill'; innu-assi 'reserve, indian territory'; meshkanau 'road'
Source: Clément (Mai 2009)

Figure 5.59: Area Claimed by ITUM and NIMLJ



Source: Innuvelle (February 2005)

5.5.7.3 Non-Native

Ville de Schefferville

The land- and resource-use in Schefferville reflects the town's industrial history and the fluctuation of its population as a result of the opening and closing of the mines. After the closure of the mines, in 1982, most resident families associated with the mining operations left and were in large part replaced by contractual workers residing in the town on a temporary or seasonal basis. Nonetheless a small number of its original residents continue to live there permanently. Data collected by the municipality show that roughly one third of the population living there is Native (Beaudoin 2009b, *personal communcation*). Out of 197 private dwellings, only 93 were occupied in 2006 (Statistics Canada 2009a, Internet site).

In accordance with a plan to reduce the area of the urban perimeter and to rationalize the costs of municipal services, a number of houses, trailers and public buildings, including a recreation centre, hospital and churches, were demolished as of 1990. The initial urban perimeter was modified following the transfer of some 50 ha of the municipal territory for the expansion of the Matimekush Reserve. The following facilities still form part of the Ville de Schefferville (Beaudoin 2009b, *personal communication*): the airport; the train station; the police station; a hotel; a guest house; a general store; two corner stores; a hardware store; two restaurants; a gas station; and a dispensary serviced by a full-time doctor, nurses and an ambulance.

Some facilities located within the limits of the municipality serve both the Ville de Schefferville and the Matimekush Reserve: a potable water treatment plant; a wastewater treatment plant; and a fire station. Moreover, the landfill that services Schefferville, Matimekush-Lac John and Kawawachikamach is located on the territory of the Ville de Schefferville (Beaudoin 2009b, *personal communication*).

Sport Hunting and Fishing

<u>Labrador</u>

Hunting in Labrador is open to residents and non-residents of the Province of Newfoundland and Labrador. In order to hunt game with a firearm, hunters must possess a valid hunting license and may hunt only those species for which an open season has been declared. Non-residents hunting big game must be accompanied by a guide provided by a licensed outfitter. Non-residents do not require the services of an outfitter or guide to hunt small game, coyotes or migratory game birds (GNL 2009e, Internet site).

Brown (June 2005) noted that caribou are hunted by Labrador outfitters in the Howells River valley and outside the valley wherever old mining roads provide access.

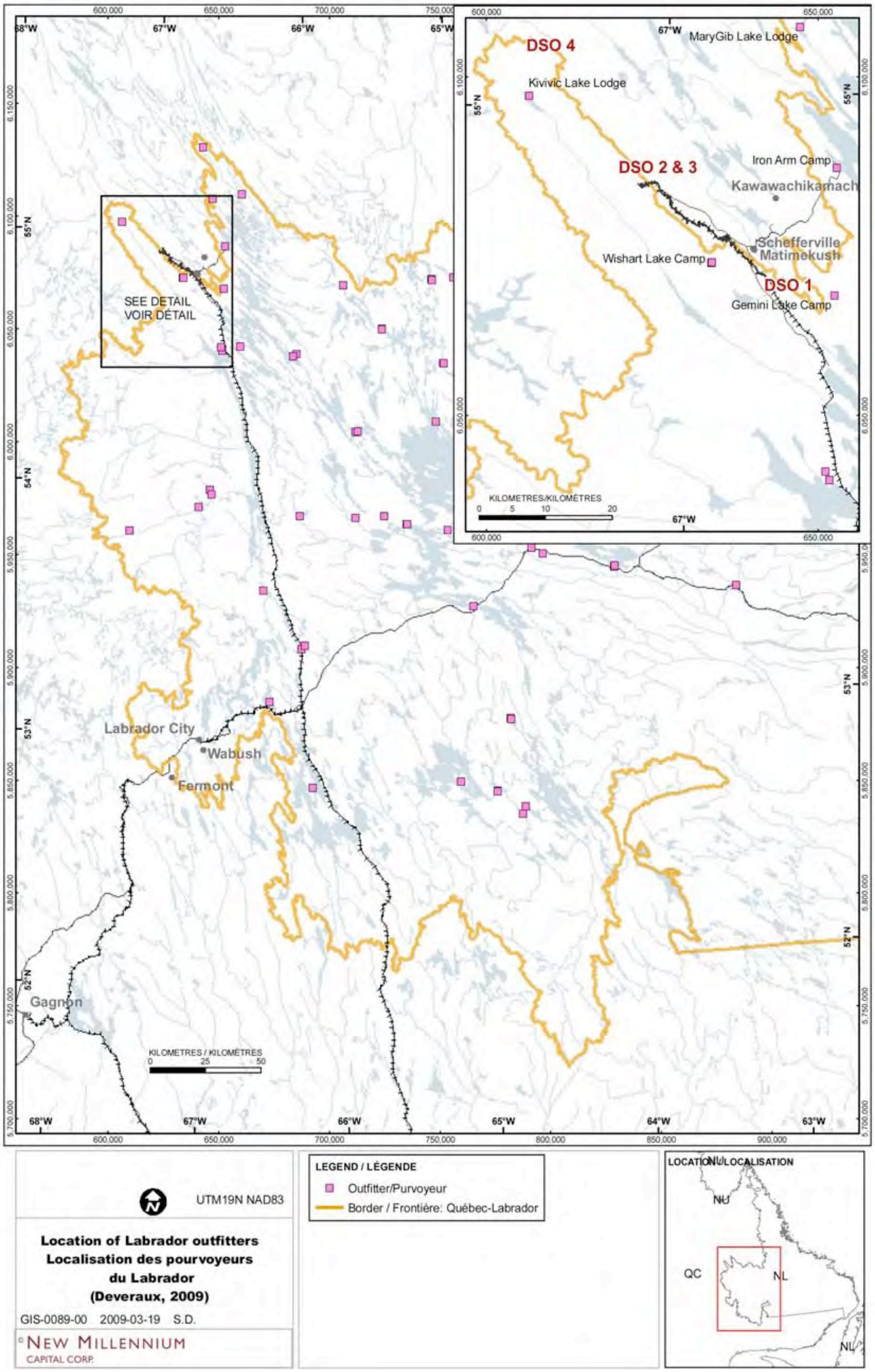
Sport fishing occurs in Labrador along the Howells River within a ± 2.5-km distance of the two road access points (Irony Mountain and the Menihek road). Brown (June 2005) noted that angling in the Howells River valley had increased during the preceding decade due to the opening of several outfitting camps in Labrador near Schefferville. Angling is advertised as a bonus to the caribou-hunting adventure offered by the outfitting companies (Brown 2006, *personal communication*).

There are four outfitting camps in Labrador close to DSO2 and DSO3 (Figure 5.60): Kivivic Lake Lodge (Labrador 2 BG Adventure Inc.); Gemini Lake Camp and Iron Arm Camp (Labrador Hunting Safari Ltd.); and Wishart Lake Camp (Drover's Labrador Outfitters Ltd.) (Devereaux 2009, *personal communication*).

The Wishart Lake Camp is situated some 15 km south of DSO3. Its main activity is caribou hunting. It can accommodate 20 hunters at a time, and an average of 100 hunters stay at the camp annually (Drover 2009, *personal communication*). Each hunter can kill two caribou, yielding a theoretical total of 200 kills per year. We note, however, that the camp has not been used much over the past two years due to changes in the migratory patterns of the caribou and their rarity in the area (Drover 2009, *personal communication*)

The Gemini Lake Camp is located about 30 km south-east of DSO3, while the Iron Arm Camp is some 27 km east of DSO3. In addition to those camps, Labrador Hunting Safari Ltd. may own five satellite camps in the Schefferville area, but efforts to obtain confirmation were unsuccessful. Labrador Hunting Safari Ltd. attracts roughly 150 hunters per year in the Schefferville area, yielding an annual average of 300 caribou kills (Rawding 2009, *personal communication*). It also brings in approximately 165 fishermen on a yearly basis (Rawding 2009, *personal communication*).

Figure 5.60: Labrador Outfitters



The Kivivic Lake Lodge, located some 25 km north-west of DSO3, can accommodate 10 persons. Fifty hunters used the lodge annually from 2000 to 2007, and 100 caribou kills were registered during each of those years (Rossignol 2009, *personal communication*). The lodge has not been open since 2007 given changes in the caribou migration routes. Snowmobile trips have been offered in winter at the Kivivic Lake Lodge for the past 10 years, attracting 36 to 42 persons each year (Rossignol 2009, *personal communication*).

Québec

Figure 5.61 shows the hunting and fishing zones in Northern Québec.

The ELAIOM is located in Zone 23 North (Figure 5.61). It is an area where the establishment of outfitting camps is prohibited.

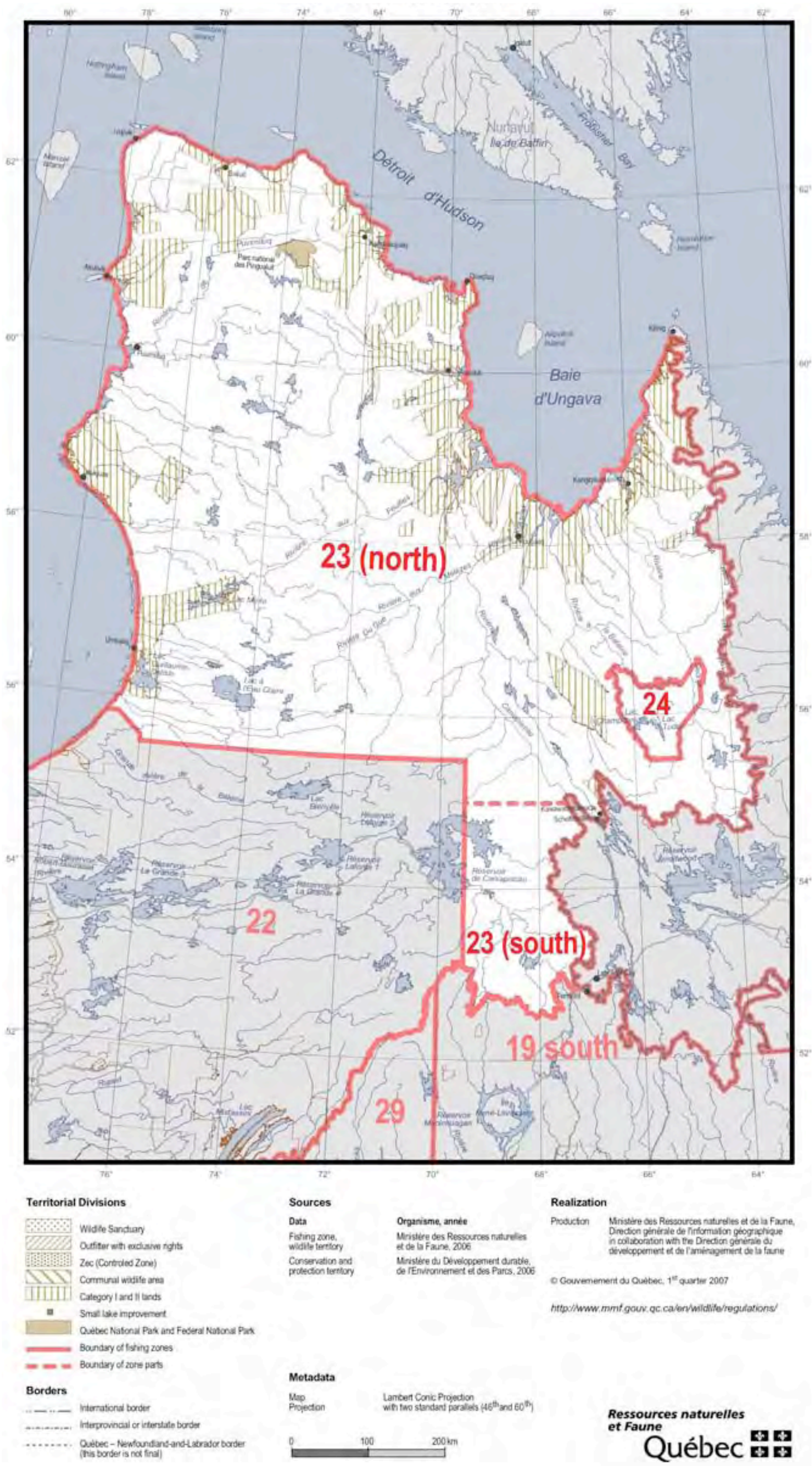
Sport hunters other than Québec residents hunting in Zone 24 (situated > 100 km north-east of Schefferville) are required to use the services of an outfitter. The prohibition on outfitting camps in the vicinity of the ELAIOM means that there is no sport hunting of caribou there. The only exception to the foregoing is the right of non-Native residents of Schefferville to hunt caribou for sport without using the services of an outfitter pursuant to article 17 of the *Règlement sur les activités de chasse*. The small non-Native population of Schefferville suggests that the kill of caribou for sport in the LSEA is very small, but no statistics are maintained.

Sport fishing by Québec residents is permitted throughout Zone 23 for the following species: Northern pike, Brook trout, Landlocked Atlantic salmon, Lake trout and splake. In Zone 23 North, anadromous Atlantic salmon and Arctic charr can also be fished. The season for all of the above species extends from 1 June to 7 September of each year. Anglers resident in Québec are required to use the services of an outfitter for fishing Lake trout only from 8 to 30 September of each year. Anglers other than Québec residents fishing north of the 52^{nd} parallel are required to use the services of an outfitter at all times. Since there are no outfitting camps in the vicinity of the ELAIOM in Québec, there is no sport fishing by non-residents of Québec in the LSEA. Because of the high cost of travelling to Schefferville and the cost and difficulty of travelling in the bush, most anglers use outfitting camps. Except for salmon fishing, most fishing is conducted as an ancillary activity to caribou hunting. The absence of outfitting camps in Québec in the LSEA and its surroundings renders it highly unlikely that sport fishing is practised there.

Winter fishing by residents of Québec is permitted for Northern pike, Arctic charr, Brook trout and Lake trout at specific lakes throughout Zone 23, two of which are located within a 40-km radius of DSO2 and DSO3 -- Annabel and Vacher lakes (Figure 5.62). The winter season extends from 1 December to 30 April of each year. Given the distance between the ELAIOM and Annabel and Vacher lakes, it is virtually inconceivable that the ELAIOM could affect the fish or fishing activities in them. Winter fishing in this area does not attract persons from outside Schefferville.

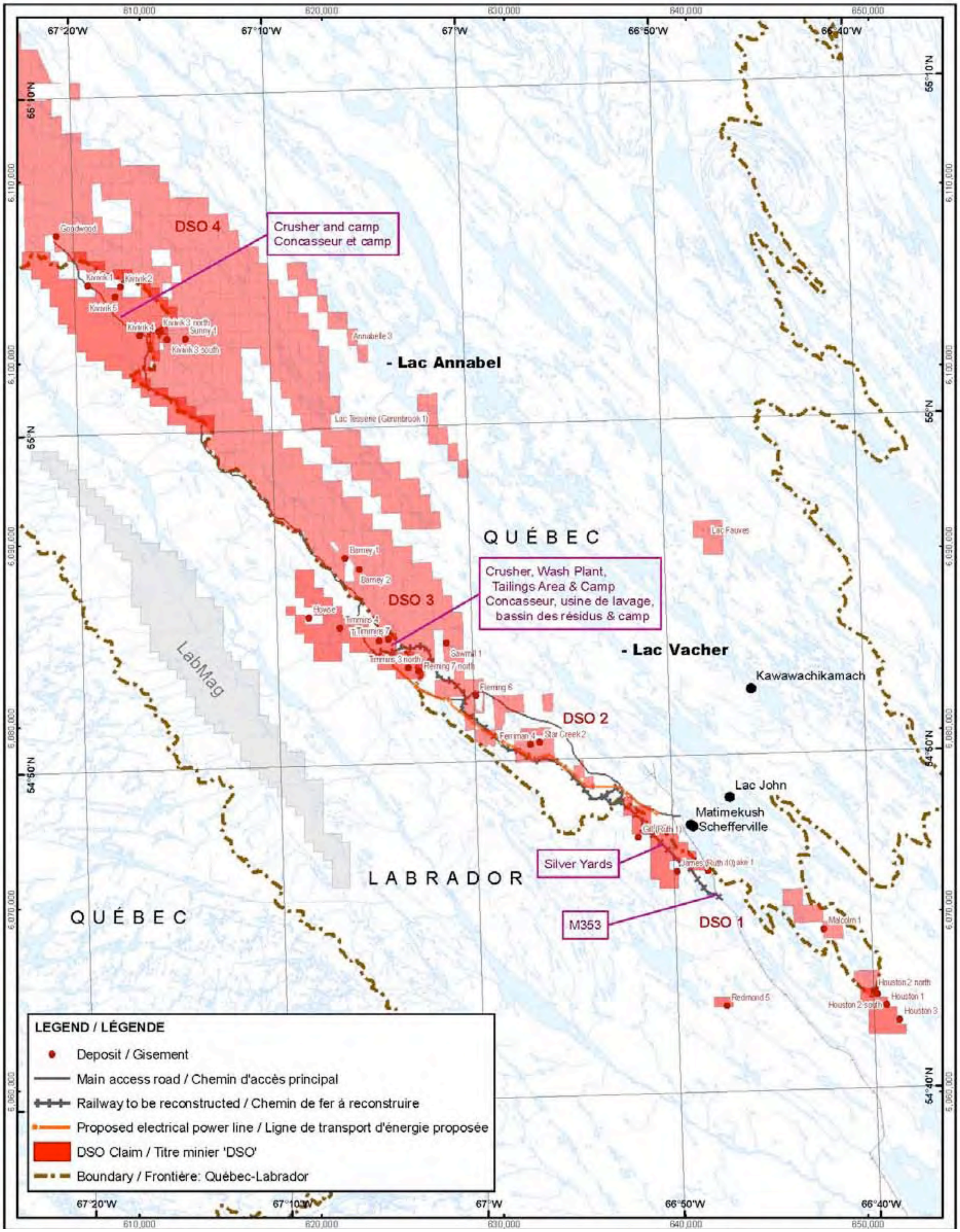
Mandatory recording of fish caught in Zone 23 applies only to anadromous Atlantic salmon. Anadromous Atlantic salmon are not found in the vicinity of the ELAIOM. Consequently, there are no records of sport fishing in Québec in the vicinity of the ELAIOM. Given that the only fish recorded in the Québec portion of the LSEA were Brook trout and burbot (AMEC January 2009), it is unlikely that that area constitutes an important destination for non-Native anglers. In the Labrador portion of the LSEA, only Brook trout and Lake chub were recorded (AMEC January 2009), so it too is unlikely to be an important area for sport fishing.

Figure 5.61: Hunting and Fishing Zones in Northern Québec



Source: MRNF (no date, Internet site)

Figure 5.62: Lakes in Schefferville Area Where Winter Fishing is Permitted



Commercial Fishing

Labrador

As far as we can ascertain, there is not, and never has been any commercial fishery in or near the Labrador portion of the LSEA.

Québec

As far as we can ascertain, there is not, and never has been, any commercial fishery in or near the Québec portion of the LSEA.

5.5.8 Infrastructure and Services in LSEA

5.5.8.1 Naskapi Nation of Kawawachikamach

Public Services

Kawawachikamach has its own school, CLSC (health centre), fire station, water-treatment plant, piped water and sewage, sewage-treatment system, fire hydrants, street lights, recreational complex and swimming pool. The NNK and NDC both maintain offices there. Since 1982, some 154 housing units, predominantly single-family houses, have been built.

Education Services

The JSMS, built in 1985, offers Kindergarten through Secondary V. It houses a science laboratory, a library, computers, a gymnasium and a home economics room.

The Sachidun Childcare Centre has been operating since February 1999. It can accommodate up to 26 children.

Health and Social Services

Health services are provided by the Naskapi CLSC. The CLSC was created in 2001, replacing the Naskapi Dispensary, which had been administered by the CSSS de l'Hématite in Fermont. The CLSC is managed by a predominantly Naskapi Board of Directors that establishes the services that the CLSC will provide and decides on activities and resources (NNK 2009, Internet site).

Under *An Act to amend the Act respecting health services and social services concerning the Naskapi Nation of Kawawachikamach*, only Naskapis may use the services of the Naskapi CLSC. The NNK Council and the Agence de la santé et des services sociaux de la Côte-Nord may, however, enter into an agreement to offer services to non-Naskapis, such as NML's labour force.

The CLSC receives monthly visits from a dentist, who also provides services to the populations of Schefferville and Matimekush-Lac John (MRC de Caniapiscau no date). It supervises a team of three doctors who service the CLSC on a rotational basis and who also serve the two dispensaries in Schefferville (Chamberland 2009, *personal communication*). The services offered by the CLSC encompass emergency and prevention.

The CLSC building covers 585 m^2. It has rooms for medical and psycho-social consultations, radiology, specialized services (dentistry, ophthalmology, otorhinolaryngology, nutrition, psychology and ergotherapy), a sampling and diagnosis laboratory, administration and a counter for prescribed medication (NNK no date (a)). It has only observation beds, so patients needing long-term care are transferred to external health facilities, usually in Sept-Îles (Lortie 2006, *personal communication*).

In the 2007-2008 fiscal year, over 1,000 pyscho-social interventions and over 300 interventions under the Aboriginal Diabetes Initiative were made (NNK no date (a)). Some of the other programmes managed by the Naskapi CLSC are the Foetal Alcohol Spectrum Disorders Programme, the Prenatal Nutrition Programme and, for those who have lost either partial or total autonomy, the Home and Community Care Programme.

Drug- and alcohol-abuse constitute a widespread health concern. In 1987, it was estimated that only 25 Naskapi families (149 persons) had no serious problems related to substance-abuse, while 19 families (132 persons) had serious problems and a further 10 families (66 persons) had very serious problems (Chapman 13 August 1991). A study suggested that alcohol-abuse may constitute in large part a mechanism for “people to make status claims or defend an identity threatened by the lack of access of those persons to desired economic goods” (Chapman 13 August 1991). In other words, alcohol-abuse may be one way in which some Naskapis try to resolve some of the pressures that accompany their transition from a relatively egalitarian society that does not value possessions highly to a competitive society that encourages the accumulation of wealth.

If the preceding were true, one might expect the acculturated youths to have less of a problem with alcohol-abuse than the older generations, but such does not appear to be the case. It could be hypothesized that alcohol-abuse becomes a persistent behavioural pattern that is passed on from generation to generation (Chapman 13 August 1991), or that it has multiple (and dynamic) causes.

At a training session on March 14-15, 2009, for the CLSC Board of Directors, the Director-General was instructed to address as a matter of priority the two major health issues that were identified: diabetes; and addictions (Leclaire 2009, *personal communication*).

<u>Police Services</u>

Police services are provided by the Naskapi police force, which is financed under a tripartite agreement between the Naskapi Village of Kawawachikamach, a corporation created by a law of the GoQ in 1979 to act as the municipal government for the Category IB-N lands, the GoC and the GoQ (INAC 2009a, Internet site). The police force consists of four full-time constables and supernumeraries (NNK no date (a)). The police station covers 255 m^2. The vehicles in use in 2007-08 were one snowmobile, two all-terrain vehicles, one sport-utility vehicle, two pick-up trucks and a boat (NNK no date (a)).

<u>Fire-fighting Services</u>

The Kawawachikamach Volunteer Fire Department is responsible for fire-suppression and rescue, fire prevention and public fire safety education within the community. In 2007-2008, there were 12 volunteers (NNK no date (a)), three of whom had completed a four-week fire-fighter training programme in November 2003 (NNK no date (b)). The Nation owns an International Autopump Econo fire truck. Its equipment includes an 800-imperial-gallon water tank with a 1,050-gpm pump and a hydraulic ladder support (NNK no date (b)).

<u>Water Supply and Sewage</u>

The water and sewage infrastructure in Kawawachikamach can be summarized as follows (NNK no date (a)):

- water pumping station, built in 1982 and renovated and extended in 2006;
- sewage pumping station and service building for lagoons, built in 1982 and upgraded in 2001-2002;

- sewage lifting station, completed in 2007-2008.

<u>Telecommunications</u>

A radio station services the community. Since 1993, it has occupied the former crafts centre adjacent to the Nation's offices.

Naskapi Imuun Inc., a wholly-owned Naskapi firm, provides high-speed internet service and cellular telephone service in the Kawawachikamach/Schefferville area. The typical coverage is a 20-km radius around Dolly Ridge (Pande 2009, *personal communication*), which excludes DSO3.

<u>Recreational</u>

The recreational infrastructure in Kawawachikamach includes an open-air ice rink, a swimming pool, a work-out room, a gymnasium and a baseball field.

5.5.8.2 Nation Innu Matimekush-Lac John

Public Services

<u>Education Services</u>

"École de Kanatamat Tshitipetitamunu" provides education services to the members of the NIMLJ from Kindergarten to Secondary V (MRC de Caniapiscau no date). Non-Aboriginal students from Schefferville also attend the school, and they are integrated into its regular classes. The language of instruction is French.

<u>Health and Social Services</u>

Health services are provided to the members of the NIMLJ only by a GoC-funded dispensary on the Matimekush Reserve.

In 2006, the dispensary received services from a doctor (shared with the Schefferville Dispensary and the Naskapi CLSC) and employed five nurses and social workers trained in drug- and alcohol-related problems (MRC de Caniapiscau no date; St-Pierre 2006, *personal communication*). The dispensary also provides specialist services through visiting personnel. It is equipped with two observation beds (MRC de Caniapiscau no date).

The most frequent health problems are related to unhealthy life styles: bad nutrition, diabetes and smoking (St-Pierre 2006, *personal communication*). A monthly average of 525 patients were seen by the doctor or the nurses from April 1 to December 31, 2008, and an estimated additional 50 persons per month visited the dispensary for such other services as addictions, nutrition and psychology (Ahmed 2009, *personal communication*).

The prevalence of such social problems as substance-abuse and violence in the community, including among youths, has been raised as one of the contributing factors to the significant school drop-out rate (Autochtonomie Enr. 18 juin 1992).

<u>Police Services</u>

Police services were provided by a police department recognized under a tripartite agreement between the NIMLJ Council, the GoC and the GoQ (INAC March 2003), but they are currently provided by the Sûreté du Québec, since the Innu police force has for some time been non-operational as a result of financial problems.

A survey (CAM 1987) revealed the presence of numerous social problems, including alcoholism, violence, vandalism and fires.

Other

Fire protection and water and sewage services are provided by the Ville de Schefferville (INAC March 2003).

5.5.8.3 Ville de Schefferville

Public Services

Education Services

The former school of the Ville de Schefferville was transferred in 1998 with the land for the extension of the Matimekush Reserve. School-aged children living in Schefferville attend the "École de Kanatamat Tshitipetitamunu" on the Matimekush Reserve from Kindergarten to Secondary V. Pursuant to an agreement between the Commission scolaire du Fer de Sept-Îles and the NIMLJ Council, the former pays for the education services to the non-Native or Native children living in Schefferville, which results in an annual subsidy of approximately $10,000 per child (Beaudoin 2009b, *personal communication*). The ministère de l'Éducation reimburses the Commission scolaire du Fer.

School-aged children who are eligible for education services in English may, upon agreement with the JSMS, attend the school in Kawawachikamach.

As in most remote communities of the North Shore, education beyond secondary level must be pursued elsewhere.

Health and Social Services

The Schefferville Dispensary, a service point of the CSSS de l'Hématite, provides health care services to the population of Schefferville. Most of the clientele of the Schefferville Dispensary is non-Native. It is accessible to any Canadian citizen who holds a health card issued by a provincial government. The cost of services provided to non-residents of Québec is billed to the province of residence of the person in question.

The medical team is made up of one nurse and one doctor at any given time. The latter is shared with the Matimekush Dispensary and the Naskapi CLSC, and attends the out-clinic at the Schefferville Dispensary every Wednesday. Since the on-call doctor lives in Schefferville, the Schefferville Dispensary responds also to emergency situations (Chamberland 2009, *personal communication*). Three nurses work on a rotational basis, each one working a four-week shift followed by eight weeks off (Chamberland 2009, *personal communication*; Leblanc 2009, *personal communication*). Nursing services are available at the Schefferville Dispensary during working hours (Mondays, Tuesdays and Fridays from 9h00 to 12h00 and 13h00 to 17h00, Wednesdays from 10h00 to 12h00 and 13h00 to 18h00 and Thurdays from 08h00 to 12h00 and 13h00 to 16h00); outside those hours, the nurse is on-call 24 hours per day and may call on the doctor if required.

The Schefferville Dispensary offers the following services:

- emergency and stabilization care, and medical evacuation;
- thrombolysis;
- usual health care (medicine and nursing);
- some community health programmes may be offered in collaboration with the CSSS de l'Hématite (telephone line support);
- application of the Region-09 patient transfer policy, <u>for residents</u>;

- dressings;
- one observation bed (short-term: 0 to 6 hrs);
- administration of medications outside the dispensary (antibiotic therapy, oncology,…);
- pharmacy service through the François Alarie Pharmacy of Fermont (mandatory payment by credit or debit card);
- wart clinic (cryotherapy);
- obstetric follow-up (as of 35 weeks);
- vaccinations of all kinds;
- blood and other sample collection (analyzed in Sept-Îles);
- some emergency blood sample analysis are done *in situ* (cardiac markers, strep-test,…);
- access to the Info-Social and Info-Santé line (811).

The Schefferville Dispensary intervened 1,104 times on a total of 247 patients in the 2006-2007 fiscal year (CSSS de l'Hématite 2008).

Ambulance service is available in the Schefferville area at all times from Gestion Porlier Ltée, which executed 167 and 143 medical transportations in the 2007-2008 and 2006-2007 fiscal years respectively (ASSSCN 2008). An Air Inuit aircraft is available for emergency evacuations. Daily flights to Sept-Îles permit elective transfers to medical specialists (Chamberland 2009, *personal communication*).

<u>Police Services</u>

As in other remote areas in Québec, police services are provided by the Sûreté du Québec through an outpost station. The four positions allocated to the Ville de Schefferville are usually filled by two full-time police officers, who are on duty 24 hours per day. Regular services are provided from 08:00 to 16:00 five days a week, with the exception of special events. Nonetheless the police officers are on call 24 hours per day and seven days per week, and can be reached through a dispatch service in Baie-Comeau (Beaudoin 2009b, *personal communication*). Upon request, they provide support to the Naskapi police force. Since 2008, in virtue of a special agreement, the police officers servicing the Ville de Schefferville service the community of Matimekush-Lac John for specified periods, since the functioning of the Amerindian Police unit there was suspended as a result of financial difficulties. Additional staff from the Sûreté du Québec is thus brought in, and daily patrols are extended to 02:00. Otherwise, patrols conducted outside regular hours and on weekends must be requested and paid for in full by the Ville de Schefferville (Beaudoin 2009b, *personal communication*).

<u>Fire-fighting Services</u>

Municipal fire protection services were maintained after the closing of the mines. Under an inter-community agreement with the NIMLJ, the Ville de Schefferville manages the fire protection services, and the cost is shared between both communities. The services are constrained by the difficulty of recruiting volunteer fire-fighters and their high turnover rate, as well as by the costly updating of equipment to government standards (Beaudoin 2009b, *personal communication*).

Transportation and Access

The network of all-weather roads built in the 1950s continues to service the urban perimeter of the Ville de Schefferville and the Matimekush Reserve. It was extended when the Matimekush Reserve was expanded in 1998, in particular by the construction of a road that provides access between Schefferville and Kawawachikamach without crossing the Matimekush Reserve.

The road network for which the Ville de Schefferville assumes responsibility for maintenance, upgrading, signage and lighting totals 8 km (Beaudoin 2009b, *personal communication*). It provides access to such facilities as the airport and the railway station. It connects to the provincial road that leads to Kawawachikamach, the maintenance of which is the responsibility of the NNK under the terms of a contract with the MTQ.

Part of the network of mining roads built by the IOCC for its mining activities, and left without maintenance since 1982, is situated within the limits of the municipality. The former mining roads, located on Crown land, follow the Québec-Labrador border and give access to resources that are principally located in Labrador. Some of them lead to recreational areas at Squaw, Chantal and MaryJo lakes in Québec.

The Ville de Schefferville does not have any responsibility for the former mining roads. Recent GoQ regulations provide, however, for agreements between the GoQ and the municipality resulting in the assumption of responsibility for road maintenance/upgrading by the former, unless there is an agreement with a private firm, such as a mining company, to share the associated costs (Beaudoin 2009b, *personal communication*).

Neither the municipal nor the mining-road network is connected to the provincial highway network in Québec or in Newfoundland and Labrador.

The Ville de Schefferville is planning to upgrade the signage of its roads (Beaudoin 2009a, *personal communication*).

The Schefferville Airport is owned by Transport Canada and is classified as a Remote Airport under the National Airports Policy. Since 1999, it is managed by the Schefferville Airport Corporation, which belongs equally to the NNK and the NIMLJ, prior to which it was operated by the NNK since the early 1990s. The area of the Schefferville Airport is 125 ha. Its facilities include a terminal building of 200 m^2 built in 1971, one paved runway (5000' x 150') and a combined firehall and maintenance garage of 1,130 m^2 (Transport Canada 2009, Internet site).

The airport serves around 1,500 people regionally (Transport Canada 2009, Internet site).

Air Inuit operates daily flights between Schefferville and Sept-Îles and three flights per week between Schefferville and Montréal via Québec.

Nolinord operates two to three charter flights per week between Montréal and Schefferville during the sport hunting season for caribou, in August and September. Every year, approximately 2,200 passengers, mainly the clients of outfitters, use this service (Boudreault 2006, *personal communication*).

TSH, which belongs equally to the NNK, the NIMLJ and ITUM, provides passenger and freight rail transportation services in collaboration with QNS&LR between Schefferville and Sept-Îles. There are two passenger trains and one freight train per week. The trains are operated by QNS&LR employees between Ross Bay Junction and Sept-Îles and by TSH employees between Ross Bay Junction and Schefferville. The IOCC built the railroad between Schefferville and Sept-Îles to transport its ore; the first ore-loaded wagons departed from Schefferville in summer 1954 (CNIMLJ 30 octobre 2008).

The major infrastructure associated with the train service in Schefferville is a maintenance shelter, built in 2006-2007, and a station. The station employs two full-time workers (ITUM, NNK and NIMLJ 28 November, 2003).

Waste Disposal

The landfill in Schefferville opened in 1997. Pursuant to an agreement between the NNK, the NIMLJ and the Ville de Schefferville, it services the three communities. Although its original life expectancy was 21 years, the absence of a waste management plan for discarded household appliances and other scrap metals is contributing to shortening its lifespan (MRC de Caniapiscau no date), which has now been reduced to 15 years (Beaudoin 2009b, *personal communication*).

Under the *Règlement sur l'incinération et l'enfouissement des matières résiduelles* (c. Q-2, r.6.02), wastes generated outside Québec cannot be disposed of in a landfill in Québec.

There is an approved site for disposing of abandoned vehicles. The prevailing legislation would not, however, permit mining companies to use it (Beaudoin 2009b, *personal communication*).

Since summer 2007, there has been a programme for recycling regular tires, but the mining companies would have to make arrangements for recycling their larger tires (Beaudoin 2009a, *personal communication*).

Water Supply and Sewage

Drinking water is taken from lac Knob, which is within the urban perimeter. The water flows by gravity to the chlorination and pumping station, which distributes it to the municipality and the Matimekush Reserve. A project to upgrade the quality of the drinking water is currently under study; water consumption and leaks are monitored closely (Beaudoin 2009b, *personal communication*).

Many sections of the water mains are equipped with heating cables, as are the pipes feeding the fire hydrants. The heating cables were replaced in 2003 because of damage resulting from variations in the voltage of the electricity supplied by the Menihek Generating Station (Beaudoin 2009b, *personal communication*).

A physico-chemical wastewater treatment system was installed in the existing plant in 1999. Ownership was transferred to the municipality in 2000 (MRC de Caniapiscau no date).

The sewer and water systems date from 1955. Following a sewage backflow at the Matimekush Reserve, the NIMLJ severed the pipe connecting the area in question to the treatment plant in spring 1997, causing sewage from that area to flow directly into lac Pearce, which is located within the limits of the municipality (MRC de Caniapiscau no date).

Other

The only recreational infrastructure that remains in Schefferville since the closing of the mines in 1982 is the municipal arena (MRC de Caniapiscau no date).

5.5.9 Industry in LSEA

There is no industrial land use in the Schefferville area at the present time.

The only past industrial land-use of the Schefferville area was mining, from 1954 until 1982. Exploration of the iron ore deposits in Western Labrador started in 1936 by Labrador Mining and Exploration, which was acquired in 1942 by Hollinger Consolidated Gold Mines Ltd. The latter identified, with its Québec counterpart – Hollinger North Shore Exploration, iron ore deposits in the Schefferville area (Wardle October 2004). The IOCC started mining the deposits in 1954.

One of the deposits in DSO3, Timmins 3, was partially mined, and two others, Timmins 4 and 7, were partially stripped before the closure in 1982 (NML February 5, 2008).

Given that Timmins 3, 4 and 7 are old mine sites, the area surrounding them, especially to the south-west, may contain mine waste. Some portions of the old rail bed may be contaminated by hydrocarbons.

In DSO2, Ferriman 4 and Star Creek 2 were investigated by means of drilling and trenching, but neither of them was mined.

The only potential source of contamination in the Star Creek drainage basin is the waste rock pile from the mined out Retty pit located in Québec. For the reasons explained above, it is not expected that there will be an important degree of contamination.

5.5.10 Aboriginal and Treaty Rights in LSEA

5.5.10.1 Naskapi Nation of Kawawachikamach

Pursuant to the NEQA and the JBNQA, the Naskapi beneficiaries have and exercise the following constitutionally protected treaty rights, among others:

- the exclusive right to hunt, fish and trap at all seasons and without restrictions as to number, age and sex except for reasons of conservation all species of wildlife in the Naskapi Sector (Figure 5.47);
- within the Naskapi area of primary interest, the exclusive right to hunt for commercial purposes and to keep in captivity and to practise husbandry of the following species of wildlife: caribou; Willow ptarmigan; Rock ptarmigan; Arctic hare; Snowshoe hare; Spruce grouse; musk ox;
- a right of first refusal for seven out of 10 applications for outfitting operations on Category III lands in the Naskapi area of primary interest;
- guaranteed levels of harvesting for each species of animal that they harvest.

Figure 5.47 shows that the treaty rights of the Naskapis extend to the Québec portions of the LSEA.

The Naskapis assert rights to large portions of Labrador, including DSO3.

5.5.10.2 Nation Innu Matimekush-Lac John

The NIMLJ has not signed a treaty. Unlike those of the NNK, its members do not therefore have or exercise any treaty rights. The NIMLJ is, however, in the process of negotiating a treaty with the governments of Canada and Québec.

The CAM was founded in 1975 to represent the interests of the Innu and the Atikamekw in the negotiation of their comprehensive land claims (Ashuanipi 2006; INAC 2009b, Internet site). The CAM's comprehensive land claim was accepted for negotiation by Canada in 1979 and by Québec in 1980. After the CAM's dissolution, in 1994, the two Native groups (Innu and Atikamekw) negotiated their claims separately. The Innu created three distinct negotiation groups, one of which – Ashuanipi Corporation – was created in 2005 to represent the NIMLJ and ITUM. In January 2007, Ashuanipi submitted a proposed framework agreement, which is being reviewed by the parties (INAC 2009b, Internet site).

Figure 5.59 shows the territory claimed by ITUM and the NIMLJ, which includes all of the Québec portions of the LSEA and the RSEA.

Although the land claims of the Québec Innu in and to parts of Labrador have been accepted by the GoC, negotiations have not yet started (Beauregard 2008, *personal communication*), because the GNL refused in the early 1980s to negotiate with the CAM on the basis that it gives priority settling the land claims of the Aboriginal residents of Newfoundland and Labrador (Dupuis 1993; NIMLJ 2003).

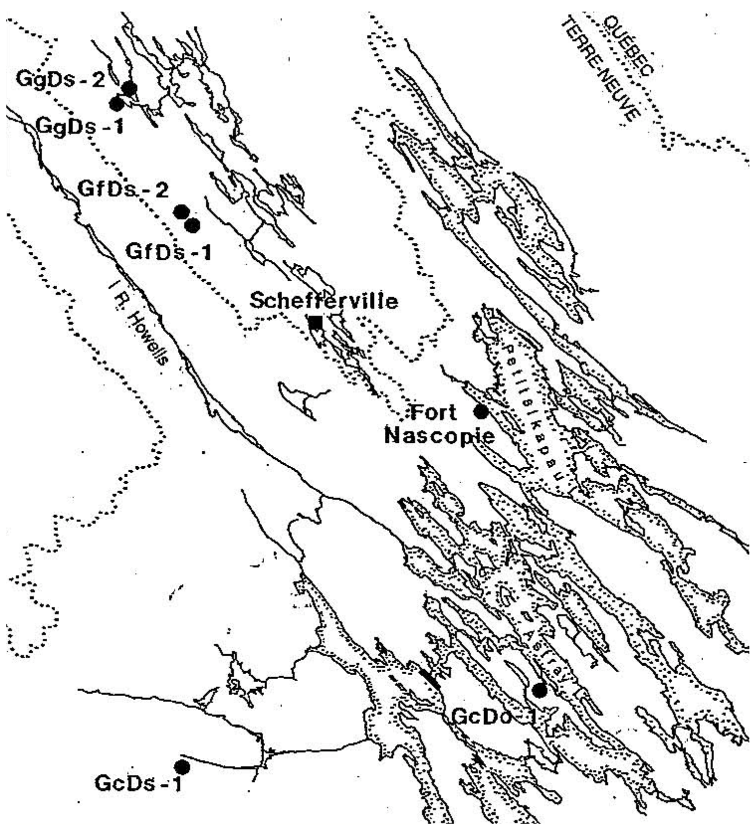
The GNL does not have a policy on land claims stating that it deals preferentially or exclusively with FNs residing in Newfoundland and Labrador, but the foregoing is in fact its current practice (Carter 2008, *personal communication*).

5.5.11 Archaeological and Heritage Sites in LSEA

In June 2008, Arkéos Inc. conducted an archaeological assessment of 14 deposits in DSO2, DSO3 and DSO4 prior to the implementation of the 2008 exploration programme (Arkéos inc. November 2008). No archaeological sites or artefacts were observed.

During fieldwork in the Schefferville region by David Denton and Moira McCaffrey in 1984, which was continued by McCaffrey from 1985 to 1987, four archaeological sites were recorded in Québec, east of the Howells River basin (McCaffrey March 2004) (Figure 5.63).

Figure 5.63: Archaeological Sites in Schefferville Area



Source: McCaffrey (March 2004)

Three of these sites (GfDs-1, GfDs-2 and GgDs-1) represent lithic exploitation and workshop sites that are at or near chert outcrops within the Fleming geological formation. A curated toolkit recovered from Site GfDs-1 yielded a C^{14} date of 3500-2500 B.P. and suggested links with the Intermediate Indian period of the Labrador coast (McCaffrey March 2004). The fourth site, GgDs-2, is a "prehistoric campsite on Hameau Lake which provided evidence of lithic reduction further removed from an actual quarry zone" (McCaffrey March 2004).

McCaffrey (March 2004) suggested that "it is highly unlikely that the study region [which corresponded roughly to the Howells River valley between the northern end of Stakit Lake and Kivivic Lake] was ever a popular locale for summer camping, or for reunions by large groups of people. [...] However, the region could have provided sheltered locations for late fall and winter camping by single families or small groups".

Archaeological surveys conducted by Arkéos Inc. (July 4, 2007; July 27, 2007) in the lac Harris area revealed the presence of two sites of interest. A lithic tool, charcoal and a stone structure suggesting a hearth were identified at one site, and two fragments of lithic tools were identified at a second site. The presence of several hunting camps dating to 1970-1980 in an area of 0.03 km^2 surrounding the second site suggests an ancient and continuous occupation of the site (Arkéos Inc. July 27, 2007).

MRC de Caniapiscau (no date) identifies two historical sites in Québec in the area east of the Howells River basin: a wooden cabin at Burnt Creek that was built in 1947 as part of the initial exploration effort of the former mining company; the guest house of the former mining company in Schefferville, where Premier Maurice Duplessis died.

5.5.12 Palaeontological Sites in LSEA

An early Proterozoic micro-fossil from the Sokoman Iron Formation was discovered in a pit located 5.5 km west of Schefferville (Knoll and Simonson 30 January 1981). It was a black chert consisting mainly of peloids.

An important fossil-bearing bed was found in the Redmond Mine in Labrador, roughly 16 km south-east of Schefferville. Thirty-six different species of flora, including angiosperms, conifers, ferns, a lycopod and an algae, were identified, belonging to the inferior level of the Upper Cretaceous period (Blais décembre 1959). More than 100 specimens were collected in only two cubic yards (1.5 m^3).

5.5.13 Sites of Cultural and Spiritual Importance in LSEA

5.5.13.1 Protected Areas

There are no protected areas in or near DSO2 (MDDEP 2009, Internet site) or DSO3 (GNL 2009a, Internet site; GNL 2009b, Internet site).

MDDEP recently set aside land roughly 80 km north of the ELAIOM to create a national park in the so-called Corrugated Hills (Boisjoly 2008, *personal communication*). In its 2009 budget, the GoQ announced investments in its national park network. None of the five projected parks is located in the LSEA or the RSEA.

On March 29, 2009, the GoQ also announced an additional 14 protected areas, mostly located in northern Québec. None of them is situated in the LSEA or the RSEA.

There are no protected or potential public water supply areas in the Labrador portion of the LSEA (GNL 2009c, Internet site).

5.5.13.2 Sites of Spiritual Importance

Informants from the NIMLJ identified two sites of religious importance (Clément Mai 2009): *Shetan-shakaikaniss* (Hope Lake), a pilgrimage site at which a statue of Saint Anne has been erected; and *Tshitua-Mani-Katshimisht meshkanau*, the “road of the Holy Virgin”, which runs from Schefferville to lac Annabel and lac Leroy. A statue of the Virgin Mary was erected along the road, at Hameau Lake.

Neither of those sites is located in the LSEA.

5.5.14 Data Gaps

The only important gaps in knowledge of the LSEA relate to land- and resource-use by the members of Innu Nation and those of ITUM. In both cases, the groups concerned refused repeated invitations from NML to conduct or to participate in studies. The information on the land- and resource-use of the members of the NNK and the NIMLJ gives a good indication of the types of land- and resource-use that are feasible there. The LSEA is so small that it cannot form a vital area for land- and resource-use for the members of the Innu Nation and those of ITUM.

5.5.15 Communities in RSEA

5.5.15.1 Native

There are seven Native communities in the RSEA, excluding the LSEA.

Two of them, Uashat mak Mani-Utenam, in Québec, and Sheshatshit, in Newfoundland and Labrador, are considered to be potentially affected by the Project, and NML is thus conducting IBA negotiations with them through their respective political entities: ITUM and IN.

We are of the view that the Aboriginal or treaty rights and/or interests of the remaining five communities are not likely to be affected by the ELAIOM. For that reason, the following sections provide more information on Uashat mak Mani-Utenam and Sheshatshit than on the others.

Uashat mak Mani-Utenam

After 1895, when the Moisie trading post closed, all the Innu groups went to trade in Sept-Îles, although the former Moisie trading post would remain a summer camp area for many families (Clément Mai 2009).

The Sept-Îles Reserve was established in 1909. In 1926, it was populated by about 60 families; 200 Aboriginals still used the Moisie site. In 1950, the Moisie Band numbered more than 800 individuals (Clément Mai 2009).

In the first half of the 20th century, most of the Innu of Sept-Îles were pursuing their ancestral activities in the centre-south of the Québec-Labrador Peninsula. The first subsidies emerged at the same time (*e.g.*, purchase vouchers), and various types of temporary or seasonal jobs were offered to Amerindians. Starting in the 1950s, new transfer payment programmes appeared (*e.g.*, social assistance, old-age pensions, family allowances), influencing traditional activities. The Mani-Utenam Reserve was created in 1949, and the inhabitants of the Moisie were forced to move there, as were the families living in Sept-Îles.

Many of the latter refused to move and finally won their case, so that today there is a community on the two reserves, Uashat and Mani-Utenam.

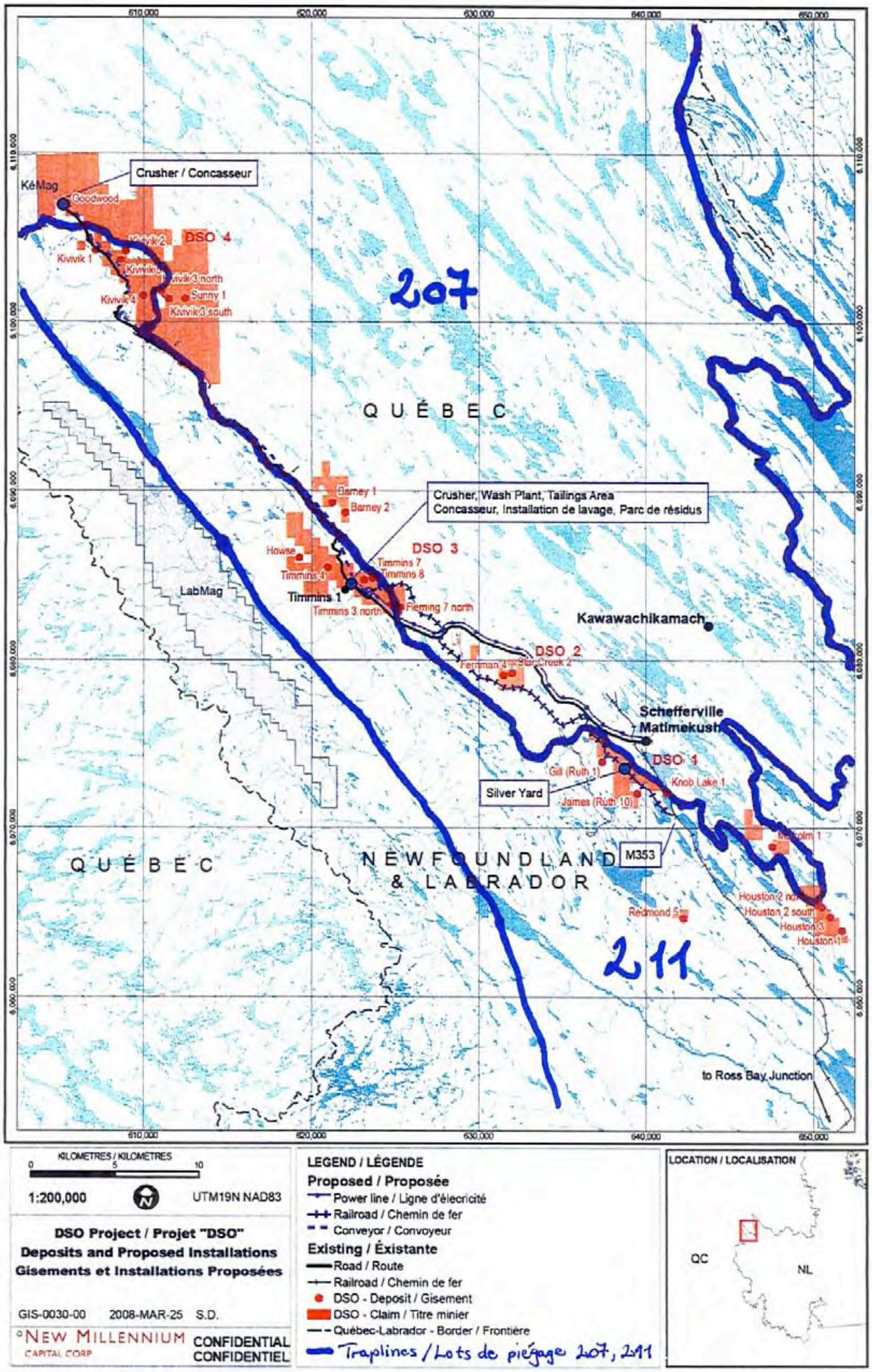
To protect beaver trapping, the GoQ and the GoC created at the beginning of the 1940s a system of beaver reserves where trapping was exclusive to Aboriginals. The Saguenay Beaver Reserve, which covers the LSEA and part of the RSEA, was created in 1954.

Figure 5.58 shows the registered traplines as of 1971. The majority of them belong to Innu from Matimekush-Lac John and Uashat mak Mani-Utenam. Figure 5.64 shows the two registered traplines that cover the Schefferville area, including DSO2 and DSO3, and that belonged to members of ITUM in 1971.

The Second World War caused fur prices to collapse on the world market. The inland posts and outposts of the fur-trading companies were closed one after the other. For many Amerindians, it became essential to find new sources of income. As a result, many Sept-Îles Innu worked on the construction of the railway and the mining development in Schefferville. The prospect of finding jobs also attracted Aboriginals from other reserves (Pessamit, Nutashkuan, Sheshashit). All these workers and their families settled near lac Knob, but living conditions were difficult there, not to mention that once they had left their reserves, they were no longer eligible for government assistance. Fearing that the presence of the Innu would cause the pollution of lac Knob, the mining company offered them in 1956 a new site near lac John. They moved there.

ITUM, a Band under the *Indian Act*, is governed by a chief and nine councillors. The reserves of Uashat and Mani-Utenam cover 117 ha and 527 ha respectively (INAC 2009a, Internet site).

Figure 5.64: Traplines 207 and 211



Sheshatshit

The members of IN live at Natuashish and Sheshatshit (Figure 5.65), both of which are several hundred kilometers from the site of the ELAIOM. IN, so-named in 1990, was formerly known as the Naskapi-Montagnais-Innu Association, which had been created in 1976.

Until the 1950s, the GNL had little direct contact with the Labrador Innu, delegating the day-to-day administration of Labrador to religious organizations and trading companies (Newfoundland and Labrador Heritage 2009, Internet site). North West River originated as a trading post in 1743 and became an important service centre for the region. The Innu used North West River only as a campsite in summer until the late 1950s, after which they began to settle there more permanently. Sheshatshit, located on the south bank of the North West River, formed part of the community of North West River until 1979, at which time the Innu decided to form a separate community that would be distinct from the Euro-Canadian, settler population (MacLaren Plansearch January 1994).

The Sheshatshit Band Council consists of one chief and six councillors. Its chief sits on the Board of Directors of IN. Sheshatshit was formally recognized as a reserve in 2006 (Newfoundland and Labrador Heritage 2009, Internet site). The reserve covers 804 ha (INAC 2009a, Internet site).

Figure 5.65: Location of Natuashish and Sheshatshit

Source: Innu-Aimun (2005)

Other

In addition to Uashat and Mani-Utenam, there are four other Innu communities in the Québec portion of the RSEA, excluding the LSEA:

- Ekuanitshit (Mingan);
- Natashquan (including Pointe-Parent);
- Unamen Shipi (La Romaine);
- Pakua Shipi (Saint-Augustin).

The Inuit community of Kuujjuaq is, strictly speaking, outside the RSEA, but we decided to present a little information about it, since it may be affected by the ELAIOM if it becomes a source of workers. That situation might be facilitated by the fact that Air Inuit offers three scheduled flights weekly between Kuujjuaq and Schefferville.

There are four Inuit communities in the Labrador portion of the RSEA:

- Hopedale;
- Postville;
- Makkovik;
- Rigolet.

Natuashish is the only Labrador Innu community in the RSEA other than Sheshatshit.

5.5.15.2 Non-Native

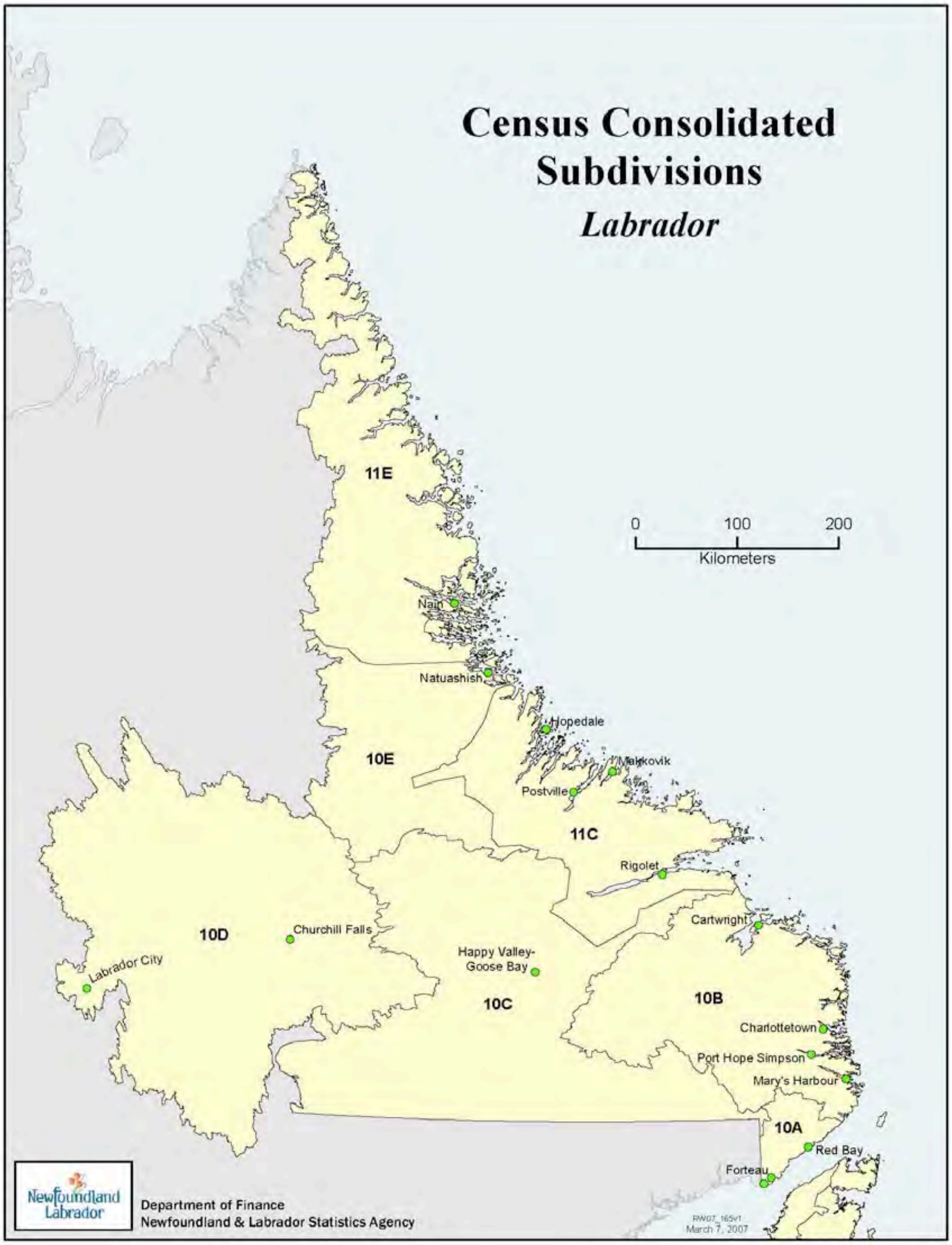
Communities in Labrador

The following census classifications are described in Figure 5.66.

Organized by census subdivision, the non-Native communities in Labrador can be presented as follows:

- Census Division 10 (15 communities, each being a census subdivision)
    - Forteau, L'Anse-au-Clair, L'Anse-au-Loup, Pinware, Red Bay, West St. Modeste, Cartwright, Charlottetown, Mary's Harbour, Port Hope Simpson, St. Lewis, Happy-Valley-Goose Bay, North West River, Labrador City, Wabush
- Subdivision 10A (15 unorganized localities)
    - Anse Éclair, Barge Bay, Buckles Point, Capstan Island, Davis House, East St. Modeste, English Point, Job's Room, L'Anse Amour, L'Anse-au-Diable, Loup-au-Loup, Pinware River, Point Amour, Rocketts Cove, White House

Figure 5.66: Census Consolidated Subdivisions - Labrador



Source: GNL (2009d, Internet site)

- Subdivision 10B (76 unorganized localities)
  - o Batteau, Battle Harbour, Belfry, Belle-Isle, Bill's Brook, Black Bear Bay, Black Tickle, Bobbin Joyce, Camp Bay, Cape St. Charles, Caribou Castle, Caribou Run, Carrolls Cove, Chateau, Chimney Tickle, Comfort Bight, Dead Islands, Domino,

Dove Brook, Dumpling Harbour, Eagle River, East Coast, Fishing Ships Harbour, Flatwater, Frenchman's Island, Georges Cove, Gouffre Harbour, Gready Harbour, Hare Harbour, Hawke Harbour, Henley Harbour, Independent Harbour, Indian Harbour, Indian Tickle, Island Harbour, Keyer's Cove, Kings Cove, Lodge Bay, Loran, Matthews Cove, Muddy Bay, Normans Bay, North Cove, North River, Open Bay, Pack's Harbour, Paradise Point, Paradise River, Partridge Bay, Pensions Arm, Petty Harbour, Pinsent Arm, Pitt Harbour, Plant's Bite, Pompey's Head, Red Point, Rexons Cove, Sadler's Arm, Salmon Bight, Sandy Hook, Seal Bight, Seal Island Harbour, Separation Point, Snack Cove, Snug Harbour, Spear Harbour, Spotted Islands, Square Islands Harbour, St. Mary's River, St. Michael's Bay, Table Bay, Triangle, Venison Islands, Venison Tickle, White Point, Williams Harbour

- Subdivision 10C (14 unorganized localities)
  - Bluff Head, Goose Harbour, Goose Bay, Goudies Cove, Holton Harbour, Melville A.F.S., Mud Lake, Mulligan, North West Islands, Pottle's Bay, Rocky Cove, Sheshatshit, Ticoralak Head, Turner Bay
- Subdivision 10D, also called Churchill Falls (34 unorganized localities)
  - Amusk, Ashuanipi, Astray, Carol Lake, Cavanagh, Churchill Falls, Drylake, Embar, Emeril, Esker, Faden, Fatfish, Gilling, Harland's Landing, Knob Lake Junction, Knoll Lake, Little Wabush Lake, Livingston, Menihek, Monan, Opocopa, Oreway, Padeau, Pitaga, Redore, Ross Bay Junction, Sawbill, Seahorse, Shabo, Silver York, Talzie, Twin Falls, Wabush Lake, West Labrador
- Subdivision 11C (18 unorganized localities)
  - Adlatovusek, Aillik, Emily Harbour, Holton, Hopedale, Iglosoataliksoak, Indian Harbour, Ittilliarsuk, Kaipokok, Koanclikulluk, Lucyville, Middle House, Paradise, Pinginak, Smokey, Sunnyside, Turner's Bight, West Bay
- Subdivision 11E (23 unorganized localities)
  - Cape Harrison, Cutthroat, Ford, Hebron, Iggiak, Iglosuatiliratsuk, Kamarsuk, L'anse-au-Medee, Moores Harbour, Neitak, North Labrador, Nutak, Ojak, Okak, Ramah, Rattler's Bight, Saglek Bay, Sanga Bay, Shango Settlement, Ungardlek, Voisey's Bay, Webb Bay, Zoar.

There appear to be no communities in the portion of Census Subdivision 10E that overlaps with the RSEA (Statistics Canada 2009b, Internet site). We include, nonetheless, data on Natuashish since it is part of IN.

Although Subdivision 11E is located outside the RSEA, we provide data on it for the sake of completeness and because Nain may be a source of workers and contractors.

Given the large distances between the Project area and the non-Native communities in the RSEA -- excluding, of course, Schefferville -- we consider that the potential effects of the Project on them are principally the creation of employment and contracting opportunities. For that reason, we have elected to present only the data relevant to those matters.

Communities in Québec

There are 20 non-Native communities in the Québec portion of the RSEA, excluding the LSEA. They are subdivided among five MRCs, as follows:

- Caniapiscau
  - Fermont
- Manicouagan
  - Franquelin, Godbout, Baie-Trinité (including Pointe-des-Monts and les Islets Caribou); Port Cartier (including Pointe-aux-Anglais and Rivière-Pentecôte)
- Sept-Rivières
  - Gallix, Greater Sept-Îles (including Clarke City and Moisie), Rivière-au-Tonerre (including Sheldrake), Rivière-Saint-Jean (including Magpie), Longue-Pointe-de-Mingan
- Minganie
  - Havre-Saint-Pierre, Baie-Johan-Beetz, Natashquan, Côte-Nord-du-Golfe-du-St-Laurent (including Kegaska, Chevery, Harrington Harbour, Aylmer Sound, Tête-à-la-Baleine), Gros-Mécatina (including Mutton Bay, La Tabatière)
- Basse-Côte-Nord
  - Saint-Augustin, Bonne-Espérance (including Vieux-Fort, Rivière-St-Paul, Middle Bay), Blanc-Sablon (including Brador et Lourdes-de-Blanc-Sablon).

For the reasons explained in Section 5.5.15.2, the data presented for the non-Native communities in the Québec portion of the RSEA, apart from Schefferville, focus on matters related to employment and contracting.

5.5.16 Populations in RSEA

5.5.16.1 Uashat mak Mani-Utenam

According to the 2006 Census, the Uashat and Mani-Utenam reserves were inhabited by 1,190 and 1,120 persons respectively.

Women accounted for roughly 51% of the population on each of the reserves (Statistics Canada 2009a, Internet site).

5.5.16.2 Labrador Innu

In 2006, 1,103 persons were recorded as living in Sheshatshit on reserve or Crown land, of whom 563 (51%) were women (INAC 2009a, Internet site).

There were 710 residents at Natuashish in 2006, of whom 52% were women (Statistics Canada 2009a, Internet site).

5.5.16.3 Communities in Labrador

There were 23,950 persons recorded in Census Division 10 (see Figure 5.66) in 2006 (Table 5.58). Men accounted for 51% of the population.

Thirty-seven per cent of the population of Census Division 10 resided in Labrador West (*i.e.*, Labrador City and Wabush). Men represented 52% of the Labrador West population.

Population data for other areas of the Labrador portion of the RSEA are summarized in Table 5.58.

The unemployment rates are uniformly high.

Table 5.58: Labrador Communities – Population, Labour Force, Income and Employment

Area / Community	Total Population (persons)			Labour Force Size* (persons)			Income – Median Before Tax ($)			Employment Rate (%)			Unemployment Rate (%)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Newfoundland and Labrador (province)	245,735	259,735	505,470	203,920	218,465	422,385	25,929	15,823	19,573	50.4	45.7	47.9	20.7	16.3	18.6
Census Division 10 (Labrador)	12,145	11,805	23,950	9,600	9,410	19,010	38,054	16,626	24,927	61.7	53.9	57.8	18.3	16.5	17.5
Census Division 11 (Nunatsiavut)	1,235	1,180	2,415	915	890	1,805	21,632	16,525	18,763	32.8	44.9	38.8	43.8	18.4	31.5
Total Labrador[1]	13,380	12,985	26,365	10,515	10,300	20,815	-	-	-	59.0	53.1	56.0	20.7	16.7	18.8
Census Division 10															
Forteau	230	220	450	190	165	355	22,893	13,005	17,175	50.0	48.5	50.7	20.0	30.4	25.5
L'Anse-au-Clair	110	120	225	100	80	180	-	-	-	45.0	43.8	44.4	40.0	20.0	33.3
L'Anse-au-Loup	305	285	595	240	255	495	29,945	17,828	21,500	39.6	58.8	49.5	37.5	17.1	26.9
Pinware	60	50	110	45	35	85	-	-	-	0.0	0.0	0.0	100.0	100.0	75.0
Red Bay	120	110	225	90	130	220	-	-	-	0.0	26.9	20.5	90.9	33.3	60.9
West St. Modeste	70	70	140	50	60	110	-	-	-	40.0	16.7	31.8	40.0	50.0	36.4
Cartwright	285	265	550	235	225	460	17,984	14,363	15,840	19.1	33.3	26.1	65.4	37.5	50.0
Charlottetown	195	170	370	150	130	280	22,752	17,216	18,496	20.0	30.8	25.0	66.7	52.6	63.9
Mary's Harbour	220	195	415	170	160	335	21,312	16,491	18,176	23.5	34.4	28.4	66.7	50.0	58.7
Port Hope Simpson	275	250	530	230	200	430	18,496	14,496	15,712	21.7	35.0	27.9	65.5	42.3	55.6
St. Lewis	130	120	255	105	95	200	21,312	12,320	15,744	23.8	36.8	30.0	57.1	50.0	53.8
Happy Valley - Goose Bay[2]	3,740	3,853	7,575	2,930	3,020	5,945	35,777	20,694	27,079	66.6	64.9	65.7	15.6	9.9	12.7
North West River	240	250	495	205	210	415	27,477	30,112	29,333	46.3	59.5	53.0	33.3	10.7	20.0
Labrador City	3,740	3.505	7,240	3,040	2,890	5,935	58,196	15,205	30,884	76.6	55.7	66.4	6.0	12.7	8.9
Wabush	895	845	1,740	750	710	1,460	70,784	14,027	36,091	81.3	48.6	65.4	3.9	14.8	8.1
Subdivision 10A	40	30	70	50	30	75	-	-	-	40.0	0.0	33.3	0.0	0.0	0.0
Subdivision 10B	245	230	475	205	185	385	16,704	13,280	14,608	17.1	27.0	22.1	75.0	57.1	63.0

Area / Community	Total Population (persons)			Labour Force Size* (persons)			Income – Median Before Tax ($)			Employment Rate (%)			Unemployment Rate (%)		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Subdivision 10C	560	555	1,115	340	345	685	19,104	13,984	16,176	36.8	36.2	36.5	32.4	21.9	28.6
Subdivision 10D (Churchill Falls)	350	325	680	280	240	525	73,991	16,351	51,732	78.6	56.2	68.6	6.4	0.0	5.3
Subdivision 10E	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-
Sheshatshit[3]	540	563	1,103	-	-	-	-	-	-	-	-	-	-	-	-
Natuashish	340	370	710	200	230	430	14,176	19,136	17,600	40.0	52.2	47.7	34.6	20.0	26.8
Census Division 11															
Hopedale[4]	280	255	530	195	185	380	15,648	16,864	16,448	23.1	45.9	35.5	52.4	10.5	32.5
Makkovik	185	175	365	140	145	285	22,336	18,048	20,096	32.1	41.4	36.8	52.9	29.4	37.1
Postville	110	110	220	85	85	170	-	-	-	23.5	52.9	38.2	60.0	0.0	30.0
Rigolet	140	130	265	120	100	215	19,840	14,496	16,608	29.2	40.0	34.9	41.7	20.0	31.8
Nain[5]	520	510	1,035	380	370	750	21,856	16,928	19,392	39.5	44.6	41.3	34.8	22.0	27.9
Subdivision 11C	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-
Subdivision 11E	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-

* Refers to population 15 years and over.
\- Data not available.
1 Obtained by adding or averaging entries from Census Division 10 and Census Division 11.
2 Includes localities of Goose Bay Military Reserve, Goose Bay Canadian Forces Base, Happy Valley, Spruce Park.
3 Data from: INAC (2009a, Internet site). Includes only those living on reserve.
4 Includes locality of Salvation.
5 Includes locality of Kauk Bight.

Explanatory Note

In addition to random rounding, area and data suppression has been adopted to further protect the confidentiality of individual respondents' personal information. Area and data suppression results in the deletion of all information for geographic areas with populations below a specified size. For example, areas with a population of less than 40 persons are suppressed. If the community searched has a population of less than 40 persons, only the total population counts will be available.

In areas with populations below 250 persons, or where the number of private households is less than 40, income data are suppressed. If a community searched has less than 250 persons, or if the number of private households is less than 40, the income data will not be available. All suppressed cells and associated averages, medians and standard errors of average income have been replaced with zeros. In all cases, suppressed data are included in the appropriate higher-level aggregate subtotals and totals.

Persons living on Indian reserves and Indian settlements who were enumerated with the 2006 Census Form 2D questionnaire were not asked the questions on citizenship and immigration. Consequently, data are suppressed for Indian reserves and Indian settlements at the census subdivision level. These data are, however, included in the totals for larger geographic areas such as provinces and territories.

5.5.16.4 Communities in Québec

Population data by MRC are presented in Table 5.59. MRC de Caniapiscau, which is in the immediate vicinity of the ELAIOM, counted 2,635 persons in 2006 excluding those living in the LSEA. The populations of the other MRCs nearest the Project site are as follows: 38,300 in MRC de Sept-Rivières; 5,460 in MRC de Minganie; and 35,815 in MRC de Manicouagan.

Table 5.59 provides a breakdown of population data for each community in the Québec portion of the RSEA.

The unemployment rates are uniformly high.

Table 5.59: Québec North Shore Communities (and Kuujjuaq) in RSEA (excluding LSEA) – Population, Labour Force, Income and Employment

MRC	Town	Total Population (persons)			Labour Force Size* (persons)			Income – Median before Tax ($)			Employment Rate (%)			Unemployment Rate (%)		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
	Kuujjuaq	1,070	1,065	2,135	705	710	1,420	38,485	34,816	36,032	72.3	71.8	71.5	12.0	10.6	11.3
Cania-pis-cau	Fermont	1,445	1,185	2,635	1,205	950	2,155	75,531	15,870	58,871	94.2	54.7	76.8	0.9	10.4	4.1
Manicouagan	Baie-Comeau	15,140	14,670	29,810	12,570	12,120	24,695	49,349	19,148	28,722	66.2	56.0	61.2	8.1	7.2	7.7
	Franquelin	175	170	345	170	150	315	34,785	15,219	19,781	50.0	50.0	50.8	0.0	12.5	5.7
	Godbout	200	160	365	170	155	325	22,490	18,003	19,568	35.3	32.3	32.3	27.8	18.2	24.1
	Baie-Trinité	280	250	525	250	200	455	32,838	13,519	19,152	56.05	50.0	52.7	20.6	24.0	19.7
Total Manicouagan		**18,310**	**17,500**	**35,815**	**15,070**	**14,285**	**29,365**	**-**	**-**	**-**	**68.1**	**56.5**	**62.4**	**8.0**	**8.0**	**8.0**
Sept-Rivières	Port-Cartier	3,565	3,195	6,755	2,770	2,640	5,410	43,244	17,642	28,753	64.1	49.1	56.7	7.3	9.4	8.2
	Gallix	405	350	760	375	310	690	37,934	17,048	28,580	53.3	43.5	48.6	13.0	10.0	11.8
	Greater Sept-Îles	13,905	13,930	27,825	11,015	11,165	22,180	34,480	19,069	26,877	62.6	56.7	59.7	9.3	7.2	8.3
	Uashat	580	615	1190	375	435	810	12,896	15,136	13,997	34.7	32.2	33.3	39.5	38.6	38.6
	Mani-Utenam	550	570	1120	370	395	760	14,560	15,264	15,040	32.4	38.0	36.2	41.5	23.1	32.5
	Rivière-au-Tonerre	210	180	390	200	175	380	30,775	18,474	27,159	60.0	51.4	55.3	7.7	9.5	8.5
	Rivière-Saint-Jean	140	120	260	120	100	215	23,373	15,741	18,375	33.3	60.0	48.8	43.8	29.4	37.5
Total Sept-Rivières		**19,355**	**18,960**	**38,300**	**15,225**	**15,220**	**30,445**	**-**	**-**	**-**	**60.7**	**53.8**	**57.3**	**10.8**	**9.1**	**10.0**
Minganie	Longue-Pointe-de-Mingan	205	225	430	180	195	375	29,220	21,065	24,405	47.2	48.7	49.3	19.0	13.6	14.0
	Ekuanitshit (Mingan)	185	225	405	125	155	275	10,880	17,920	14,048	40.0	38.7	40.0	47.4	40.0	41.0
	Havre-Saint-Pierre	1575	1575	3150	1,290	1,255	2,550	33,531	22,319	28,712	62.0	59.0	60.6	9.6	11.3	10.4
	Baie-Johan-Beetz	45	50	95	35	45	75	x	x	x	42.9	44.4	40.0	40.0	0.0	25.0
	Aguanish	150	155	305	145	140	280	20,471	18,137	20,444	44.8	12.3	30.4	31.6	60.0	41.4
	Natashquan, canton	125	140	265	105	125	235	29,824	20,384	25,312	66.7	56.0	59.6	17.6	12.5	15.2
	Natashquan, reserve	410	405	810	255	260	515	9,216	13,488	10,997	21.6	36.5	28.2	42.9	16.7	31.8
Total Minganie		**2,695**	**2,775**	**5,460**	**2,135**	**2,175**	**4,305**	**-**	**-**	**-**	**52.2**	**50.2**	**51.3**	**19.0**	**17.2**	**17.8**

MRC	Town	Total Population (persons)			Labour Force Size* (persons)			Income – Median before tax ($)			Employment Rate (%)			Unemployment Rate (%)		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Basse-Côte-Nord (equivalent territory)	Côte-Nord-du-Golfe-du-St-Laurent	505	525	1,030	450	425	875	24,900	18,222	20,804	52.2	50.6	51.4	28.4	22.8	26.0
	Unamen Shipi (La Romaine)	460	460	925	320	330	650	6,480	10,976	9,248	25.0	27.3	26.9	51.5	36.7	46.0
	Gros-Mécatina	285	280	565	230	255	485	28,290	15,055	16,718	13.0	25.5	19.6	77.8	48.1	64.2
	Saint-Augustin	310	385	600	220	240	465	27,786	20,838	26,547	38.6	56.2	47.3	45.2	21.2	31.2
	Pakuashipi	135	155	290	85	95	180	13,280	13,200	13,216	47.1	52.6	50.0	18.2	27.3	22.7
	Bonne-Espérance	430	405	830	355	330	685	23,212	18,103	20,456	25.4	34.8	29.9	62.5	46.3	54.4
	Blanc-Sablon	630	630	1265	485	480	960	24,572	22,783	23,358	46.4	53.1	50.0	26.7	13.6	20.0
Total Basse-Côte-Nord		**2,755**	**2,840**	**5,505**	**2,145**	**2,155**	**4,300**	**-**	**-**	**-**	**36.3**	**43.5**	**39.9**	**43.7**	**29.5**	**36.9**

* Refers to population 15 years and over.

X = area and data suppression.

5.5.17 Education and Labour Force in RSEA

5.5.17.1 Uashat mak Mani-Utenam

Education and Language

Mandatory school attendance by the members of ITUM began with the construction of a residential school in Mani-Utenam in 1951 (Clément Mai 2009).

Some 20% of the population aged 15 years and over at Uashat had either a high-school diploma or an apprenticeship/trade certificate in 2006, while another 12% had a college degree or higher (Statistics Canada 2009a, Internet site).

At Mani-Utenam, 21% of the population 15 years and over had a high-school diploma or an apprenticeship/trade certificate in 2006, and another 15% had at least a college degree (Statistics Canada 2009a, Internet site).

Innu aimun is the mother tongue of over 85% of the population of Uashat and Mani-Utenam. Approximately 95% speak French, while only a small percentage speaks English (Statistics Canada 2009a, Internet site).

Training

Of the total population of Uashat and Mani-Utenam with a post-secondary certificate (365 persons), 25% (90/365) had a diploma in architecture, engineering or related technologies, 16% (60/365) had one in the business/administration field and 14% (50/365) had one in personal, protective or transportation services (Statistics Canada 2009a, Internet site).

Labour Force

In 2006 Uashat and Mani-Utenam had a combined labour force of 1,570 persons (Statistics Canada 2009a, Internet site).

Work Experience

Of the total experienced labour force of both reserves, 7% (45/690) had worked in construction as of 2006 (Statistics Canada 2009a, Internet site).

5.5.17.2 Labrador Innu

Education and Language

The 2006 Census does not contain data on education and language for Sheshatshit. The data for Census Subdivision 10C are useful, however, since the population of Sheshatshit accounts for approximately 95% of the population of Subdivision 10C: some 23% of the population aged 15 years and over in Subdivision 10C had either a high-school diploma or an apprenticeship/trade certificate in 2006, while another 9% had a college or university degree (Statistics Canada 2009a, Internet site).

The first permanent school in Sheshatshit was built in 1952, and a regular 10-month education programme was established in 1960. By 1967, the majority of Innu of school age seemed to comply with the programme, since only two families left for the bush that year (MacLaren Plansearch January 1994). In the early 1990s, however, the Band Council increasingly promoted an outpost programme and, in spring 1993, over 100 Sheshatshit families were in the bush, leaving only between six and 10 children in school (MacLaren Plansearch January 1994).

The present school in Sheshatshit – the Peenamin McKenzie School – was built in 1969 and teaches children from Kindergarten to Grade 12. As of 1994, a significant part of the curriculum was taught in innu aimun (MacLaren Plansearch January 1994).

Roughly 13% of the population aged 15 years and over at Natuashish had either a high-school diploma or an apprenticeship/trade certificate in 2006, while another 17% had a college degree or higher (Statistics Canada 2009a, Internet site).

Innu aimun is the mother tongue of more than 85% of the population of Natuashish, and almost 80% speak English (Statistics Canada 2009a, Internet site).

Training

There were no training data for Sheshatshit in the 2006 Census. The data for Census Subdivision 10C are relevant, as Sheshatshit represents 95% of the population thereof: of the 135 persons with a post-secondary certificate in 2006, 41% had a diploma in architecture, engineering or related technologies, 15% had one in business/administration and another 15% had one in personal, protective or transportation services (Statistics Canada 2009a, Internet site).

Of the 100 persons at Natuashish with a post-secondary certificate in 2006, 25 had a diploma in architecture, engineering or related technologies, 10 had one in the business/administration field and 15 had one in personal, protective or transportation services (Statistics Canada 2009a, Internet site).

Labour Force

The 2006 Census does not provide data on the Sheshatshit labour force. Based on the size of the labour force in Census Subdivision 10C, we presume that the Sheshatshit labour force consisted of roughly 650 persons (Statistics Canada 2009a, Internet site).

The labour force of Natuashish consisted of 430 persons in 2006 (Statistics Canada 2009a, Internet site).

Work Experience

There were no 2006 Census data on work experience in Sheshatshit. In Subdivision 10C, 5% of the experienced labour force had worked in construction as of 2006 (Statistics Canada 2009a, Internet site).

Many Sheshatshit Innu have worked as labourers and carpenters on housing projects in Sheshatshit (MacLaren Plansearch January 1994). In 2006, roughly 270 Aboriginals worked at the Voisey's Bay mine and concentrator (NRC 2008, Internet site). We do not know, however, how many were Innu, since Labrador Inuit were also employed there.

Of the experienced labour force at Natuashish, 6% (15/260) had worked in construction as of 2006 (Statistics Canada 2009a, Internet site).

5.5.17.3 Communities in Labrador

The following summarizes some of the data on education, language, training and work experience that are presented in Table 5.60. Other data, such as those pertaining to Subdivision 11E (which lies outside the RSEA) are provided in Table 5.60 but are not described in the text.

Education and Language

Approximately 36% of the population of Census Division 10 aged 15 years and over had a high-school diploma or an apprenticeship/trade certificate in 2006, and another 33% had at least a college degree (Statistics Canada 2009a, Internet site).

Concerning Labrador West, 44% of the population 15 years of age and over had either a high-school diploma or an apprenticeship/trade certificate in 2006, and another 36% had at least a college degree.

The vast majority of the population of Census Division 10 is anglophone.

Training

Of the 9,055 persons with a post-secondary certificate in Census Division 10 in 2006, 36% had a diploma in architecture, engineering or related technologies, 20% had one in business/administration and 11% had one in personal, protective or transportation services (Statistics Canada 2009a, Internet site).

Approximately 44% of those with a post-secondary certificate in Census Division 10 resided in Labrador West. Of those 3,970 individuals, 47% had a diploma in architecture, engineering or related technologies, 18% had one in business/administration and 7% had one in personal, protective or transportation services.

Labour Force

The labour force of Census Division 10 numbered 19,010 persons in 2006, of whom 7,395 (39%) resided in Labrador West (Statistics Canada 2009a, Internet site).

Work Experience

Approximately 6% of the experienced labour force in Census Division 10 (730/13,150) had worked in construction as of 2006, while roughly 25% had worked in resource-based industries (Statistics Canada 2009a, Internet site).

We note that a very significant proportion of the experienced labour forces of Labrador West had worked in the resource-based industries (40% for Labrador City and 49% for Wabush), most of whom were probably employed by the mining industry.

Table 5.60: Labrador Communities – Education, Training and Work Experience

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
Newfoundland	1.	68,605	72,965	141,57	No postsecondary certificate, diploma or degree	111,12	123,77	234,900	Agriculture and other	19,885	4,610	24,500
and Labrador	2.	42,520	50,810	5	Education	5	5	19,090	resource-based			
(province)	3.	32,105	19,275	93,330	Visual and performing arts, and communications	6,460	12,640	2,840	industries			
	4.	32,525	41,575	51,380	technologies	1,440	1,395		Construction	15,565	1,425	16,985
	5.	5,940	8,370	74,100	Humanities			6,450	Manufacturing	14,620	7,865	22,485
	6.	22,220	25,470	14,310	Social and behavioural sciences and law	2,830	3,625	10,505	Wholesale trade	4,850	1,775	6,630
				47,690	Business, management and public administration	3,500	7,000	43,510	Retail trade	12,205	18,380	30,580
					Physical and life sciences and technologies	9,870	33,640	4,285	Finance and real estate	3,205	4,690	7,895
					Mathematics, computer and information sciences	2,335	1,950	7,980	Health care and social	5,180	25,180	30,360
					Architecture, engineering, and related technologies	3,875	4,110	46,405	services			
					Agriculture, natural resources and conservation	44,190	2,210	3,360	Educational services	6,555	10,450	17,005
					Health, parks, recreation and fitness	2,415	940	25,635	Business services	22,050	13,345	35,390
					Personal, protective and transportation services	4,560	21,075	17,405	Other services	22,185	27,850	50,040
					Other	11,330	6,080	10				
						0	10					
Census	1.	2,995	3,060	6,055	No postsecondary certificate, diploma or degree	4,660	5,300	9,965	Agriculture and other	2,730	510	3,245
Division 10	2.	1,665	2,245	3,905	Education	175	530	705	resource-based			
(Labrador)	3.	2,070	760	2,830	Visual and performing arts, and communications	35	35	65	industries			
	4.	1,990	1,955	3,950	technologies				Construction	645	80	730
	5.	235	360	595	Humanities	100	165	265	Manufacturing	365	275	640
	6.	640	1,035	1,675	Social and behavioural sciences and law	130	255	385	Wholesale trade	240	105	350
					Business, management and public administration	260	1,535	1,795	Retail trade	545	925	1,475
					Physical and life sciences and technologies	90	90	175	Finance and real estate	135	235	370
					Mathematics, computer and information sciences	165	225	390	Health care and social	195	1,050	1,250
					Architecture, engineering, and related technologies	3,100	175	3,280	services			
					Agriculture, natural resources and conservation	125	55	180	Educational services	255	540	790
					Health, parks, recreation and fitness	110	745	860	Business services	855	595	1,450
					Personal, protective and transportation services	660	295	955	Other services	1,200	1,650	2,850
					Other	0	0	0				
Census	1.	465	420	880	No postsecondary certificate, diploma or degree	605	580	1,185	Agriculture and other	130	20	150
Division 11	2.	135	165	305	Education	30	75	105	resource-based			
(Nunatsiavut)	3.	135	75	205	Visual and performing arts, and communications	15	10	20	industries			
	4.	125	115	235	technologies				Construction	65	0	70
	5.	25	35	55	Humanities	10	15	25	Manufacturing	40	20	65
	6.	35	85	120	Social and behavioural sciences and law	0	40	50	Wholesale trade	10	0	0
					Business, management and public administration	15	85	95	Retail trade	30	50	85
					Physical and life sciences and technologies	10	0	10	Finance and real estate	10	0	10
					Mathematics, computer and information sciences	10	0	15	Health care and social	30	105	140
					Architecture, engineering, and related technologies	125	0	135	services			
					Agriculture, natural resources and conservation	20	10	20	Educational services	40	85	120
					Health, parks, recreation and fitness	10	55	70	Business services	40	35	75
					Personal, protective and transportation services	75	15	80	Other services	140	155	295
					Other	0	0	0				

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
Total	1.	**3,460**	**3,480**	**6,936**	No postsecondary certificate, diploma or degree	**5,265**	**5,880**	**11,150**	Agriculture and other	**2,860**	**530**	**3,395**
Labrador[1]	2.	**1,800**	**2,410**	**4,210**	Education	**205**	**605**	**810**	resource-based			
	3.	**2,205**	**835**	**3,035**	Visual and performing arts, and communications	**50**	**45**	**85**	industries			
	4.	**2,115**	**2,070**	**4,185**	technologies				Construction	**710**	**80**	**800**
	5.	**260**	**395**	**650**	Humanities	**110**	**180**	**290**	Manufacturing	**405**	**295**	**705**
	6.	**675**	**1,120**	**1,795**	Social and behavioural sciences and law	**130**	**295**	**435**	Wholesale trade	**250**	**105**	**350**
					Business, management and public administration	**275**	**1,620**	**1,890**	Retail trade	**575**	**975**	**1,560**
					Physical and life sciences and technologies	**100**	**90**	**185**	Finance and real estate	**145**	**235**	**380**
					Mathematics, computer and information sciences	**175**	**225**	**405**	Health care and social	**225**	**1,155**	**1,390**
					Architecture, engineering, and related technologies	**3,225**	**175**	**3,415**	services			
					Agriculture, natural resources and conservation	**145**	**65**	**200**	Educational services	**295**	**625**	**910**
					Health, parks, recreation and fitness	**120**	**800**	**930**	Business services	**895**	**630**	**1,525**
					Personal, protective and transportation services	**735**	**310**	**1,035**	Other services	**1340**	**1,805**	**3,145**
					Other	**0**	**0**	**0**				
Census Division 10												
Forteau	1.	110	75	180	No postsecondary certificate, diploma or degree	125	90	210	Agriculture and other	50	0	50
	2.	10	15	25	Education	0	0	0	resource-based			
	3.	20	20	40	Visual and performing arts, and communications	0	0	0	industries			
	4.	40	60	95	technologies				Construction	10	0	10
	5.	0	10	10	Humanities	0	0	0	Manufacturing	10	10	20
	6.	10	0	10	Social and behavioural sciences and law	0	0	0	Wholesale trade	10	10	20
					Business, management and public administration	15	15	30	Retail trade	10	15	20
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	0	Health care and social	15	55	70
					Architecture, engineering, and related technologies	25	0	30	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	10	0	10
					Health, parks, recreation and fitness	10	35	40	Business services	10	0	0
					Personal, protective and transportation services	10	30	40	Other services	10	20	35
					Other	0	0	0				
L'Anse-au-	1.	40	15	55	No postsecondary certificate, diploma or degree	50	30	85	Agriculture and other	15	0	20
Clair	2.	10	15	30	Education	10	25	25	resource-based			
	3.	20	15	40	Visual and performing arts, and communications	0	0	0	industries			
	4.	10	0	10	technologies				Construction	0	0	0
	5.	0	25	25	Humanities	0	0	0	Manufacturing	0	0	0
	6.	15	10	20	Social and behavioural sciences and law	10	0	10	Wholesale trade	10	0	0
					Business, management and public administration	0	10	10	Retail trade	10	0	10
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	0	Health care and social	0	10	15
					Architecture, engineering, and related technologies	30	0	30	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	0	10	10
					Health, parks, recreation and fitness	0	10	0	Business services	10	0	10
					Personal, protective and transportation services	10	10	15	Other services	15	25	40
					Other	0	0	0				

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
L'Anse-au-	1.	150	105	260	No postsecondary certificate, diploma or degree	160	165	325	Agriculture and other	40	0	35
Loup	2.	10	60	65	Education	10	0	10	resource-based			
	3.	35	15	50	Visual and performing arts, and communications	0	0	0	industries			
	4.	30	55	85	technologies				Construction	20	10	35
	5.	0	10	15	Humanities	0	0	0	Manufacturing	50	45	95
	6.	0	10	10	Social and behavioural sciences and law	0	0	10	Wholesale trade	15	0	15
					Business, management and public administration	0	40	45	Retail trade	0	30	35
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	25	25
					Mathematics, computer and information sciences	0	0	10	Health care and social	0	20	20
					Architecture, engineering, and related technologies	60	10	75	services			
					Agriculture, natural resources and conservation	10	0	10	Educational services	0	10	15
					Health, parks, recreation and fitness	0	20	20	Business services	10	15	20
					Personal, protective and transportation services	0	0	0	Other services	10	20	30
					Other	0	0	0				
Pinware	1.	50	30	75	No postsecondary certificate, diploma or degree	50	35	85	Agriculture and other	0	0	15
	2.	0	0	0	Education	0	0	0	resource-based			
	3.	0	0	0	Visual and performing arts, and communications	0	0	0	industries			
	4.	0	10	0	technologies				Construction	0	0	0
	5.	0	0	0	Humanities	0	0	0	Manufacturing	0	0	0
	6.	0	0	0	Social and behavioural sciences and law	0	0	0	Wholesale trade	0	0	0
					Business, management and public administration	0	0	0	Retail trade	0	0	0
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	0	Health care and social	0	0	10
					Architecture, engineering, and related technologies	0	0	0	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	0	0	0
					Health, parks, recreation and fitness	0	0	0	Business services	0	0	0
					Personal, protective and transportation services	0	0	0	Other services	0	0	0
					Other	0	0	0				
Red Bay	1.	55	75	130	No postsecondary certificate, diploma or degree	55	90	145	Agriculture and other	25	0	25
	2.	0	10	15	Education	10	0	10	resource-based			
	3.	10	0	20	Visual and performing arts, and communications	0	0	0	industries			
	4.	15	15	35	technologies				Construction	0	0	0
	5.	0	0	0	Humanities	0	10	0	Manufacturing	10	0	0
	6.	10	10	20	Social and behavioural sciences and law	0	0	0	Wholesale trade	0	0	0
					Business, management and public administration	0	10	10	Retail trade	0	0	0
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	10	Health care and social	0	0	0
					Architecture, engineering, and related technologies	10	0	0	services			
					Agriculture, natural resources and conservation	15	15	30	Educational services	0	10	10
					Health, parks, recreation and fitness	0	0	0	Business services	15	20	35
					Personal, protective and transportation services	0	0	10	Other services	10	35	35
					Other	0	0	0				

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
West St.	1.	25	40	65	No postsecondary certificate, diploma or degree	25	50	75	Agriculture and other	10	0	15
Modeste	2.	10	10	15	Education	0	0	0	resource-based			
	3.	10	0	10	Visual and performing arts, and communications	0	0	0	industries			
	4.	10	10	25	technologies				Construction	10	0	10
	5.	0	0	0	Humanities	0	0	0	Manufacturing	0	0	0
	6.	0	0	0	Social and behavioural sciences and law	0	0	0	Wholesale trade	0	0	0
					Business, management and public administration	0	0	0	Retail trade	0	0	0
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	0	Health care and social	0	10	15
					Architecture, engineering, and related technologies	20	0	20	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	0	0	0
					Health, parks, recreation and fitness	0	10	10	Business services	0	0	0
					Personal, protective and transportation services	0	0	0	Other services	10	0	15
					Other	0	0	0				
Subdivision 10	1.	30	0	35	No postsecondary certificate, diploma or degree	35	15	50	Agriculture and other	0	0	0
A	2.	0	10	15	Education	0	10	10	resource-based			
	3.	0	0	0	Visual and performing arts, and communications	0	0	0	industries			
	4.	10	0	15	technologies				Construction	0	0	0
	5.	0	10	10	Humanities	0	0	0	Manufacturing	0	0	0
	6.	0	0	0	Social and behavioural sciences and law	0	0	0	Wholesale trade	0	0	0
					Business, management and public administration	0	0	0	Retail trade	15	0	15
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	10	0	15	Health care and social	0	0	0
					Architecture, engineering, and related technologies	0	0	0	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	0	0	0
					Health, parks, recreation and fitness	0	0	0	Business services	10	0	10
					Personal, protective and transportation services	0	0	0	Other services	0	0	0
					Other	0	0	0				
Cartwright	1.	115	95	210	No postsecondary certificate, diploma or degree	160	165	325	Agriculture and other	35	10	40
	2.	50	70	115	Education	0	10	10	resource-based			
	3.	45	30	70	Visual and performing arts, and communications	10	0	0	industries			
	4.	15	20	35	technologies				Construction	10	0	10
	5.	0	0	10	Humanities	0	0	10	Manufacturing	15	15	30
	6.	0	10	15	Social and behavioural sciences and law	0	0	0	Wholesale trade	0	0	0
					Business, management and public administration	10	20	20	Retail trade	10	15	25
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	10	0
					Mathematics, computer and information sciences	0	10	10	Health care and social	0	15	15
					Architecture, engineering, and related technologies	25	0	30	services			
					Agriculture, natural resources and conservation	10	0	10	Educational services	10	15	20
					Health, parks, recreation and fitness	0	0	10	Business services	15	15	25
					Personal, protective and transportation services	25	10	25	Other services	30	35	70
					Other	0	0	0				

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
Charlottetown	1.	70	35	105	No postsecondary certificate, diploma or degree	90	85	170	Agriculture and other	30	0	35
	2.	25	45	65	Education	0	10	10	resource-based			
	3.	25	10	40	Visual and performing arts, and communications	0	0	0	industries			
	4.	20	25	45	technologies				Construction	10	0	15
	5.	0	0	10	Humanities	0	0	0	Manufacturing	30	40	70
	6.	0	10	15	Social and behavioural sciences and law	0	10	0	Wholesale trade	0	0	0
					Business, management and public administration	0	15	15	Retail trade	0	10	15
					Physical and life sciences and technologies	0	10	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	10	0	Health care and social	0	10	10
					Architecture, engineering, and related technologies	30	0	30	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	10	0	10
					Health, parks, recreation and fitness	0	10	10	Business services	10	10	10
					Personal, protective and transportation services	15	0	20	Other services	0	15	25
					Other	0	0	0				
Mary's Harbour	1.	90	75	165	No postsecondary certificate, diploma or degree	110	115	230	Agriculture and other	30	0	30
	2.	25	40	65	Education	0	10	15	resource-based			
	3.	25	15	35	Visual and performing arts, and communications	0	0	0	industries			
	4.	25	20	45	technologies				Construction	10	0	10
	5.	0	0	0	Humanities	0	0	0	Manufacturing	40	35	75
	6.	0	10	10	Social and behavioural sciences and law	0	0	0	Wholesale trade	0	0	0
					Business, management and public administration	0	15	15	Retail trade	10	10	15
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	10	10
					Mathematics, computer and information sciences	0	0	0	Health care and social	0	15	20
					Architecture, engineering, and related technologies	25	0	25	services			
					Agriculture, natural resources and conservation	10	0	10	Educational services	10	10	15
					Health, parks, recreation and fitness	0	10	10	Business services	10	10	15
					Personal, protective and transportation services	15	0	20	Other services	20	20	40
					Other	0	0	0				
Port Hope Simpson	1.	135	85	225	No postsecondary certificate, diploma or degree	165	145	300	Agriculture and other	55	0	60
	2.	25	55	85	Education	10	10	15	resource-based			
	3.	30	10	40	Visual and performing arts, and communications	0	0	0	industries			
	4.	35	30	70	technologies				Construction	10	0	15
	5.	0	0	0	Humanities	10	0	0	Manufacturing	35	25	60
	6.	0	15	15	Social and behavioural sciences and law	0	0	0	Wholesale trade	0	0	0
					Business, management and public administration	0	15	15	Retail trade	10	15	25
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	10	15	Health care and social	10	25	30
					Architecture, engineering, and related technologies	25	10	30	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	0	15	20
					Health, parks, recreation and fitness	0	10	10	Business services	15	10	15
					Personal, protective and transportation services	20	0	30	Other services	10	25	40
					Other	0	0	0				

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
St. Lewis	1.	55	55	105	No postsecondary certificate, diploma or degree	75	80	150	Agriculture and other	25	0	30
	2.	20	25	45	Education	0	0	0	resource-based			
	3.	20	0	20	Visual and performing arts, and communications	0	0	0	industries			
	4.	10	10	20	technologies				Construction	0	0	0
	5.	0	0	10	Humanities	0	0	0	Manufacturing	15	15	25
	6.	10	0	10	Social and behavioural sciences and law	0	0	0	Wholesale trade	0	0	0
					Business, management and public administration	0	0	0	Retail trade	0	10	0
					Physical and life sciences and technologies	10	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	10	Health care and social	0	10	10
					Architecture, engineering, and related technologies	25	0	25	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	0	10	10
					Health, parks, recreation and fitness	0	0	10	Business services	10	0	10
					Personal, protective and transportation services	10	10	10	Other services	10	10	20
					Other	0	0	0				
Subdivision 10B	1.	130	100	225	No postsecondary certificate, diploma or degree	150	140	290	Agriculture and other	40	10	45
	2.	25	40	65	Education	0	15	15	resource-based			
	3.	30	10	45	Visual and performing arts, and communications	0	0	0	industries			
	4.	20	10	30	technologies				Construction	10	0	10
	5.	10	0	10	Humanities	0	0	0	Manufacturing	35	25	60
	6.	0	10	10	Social and behavioural sciences and law	0	0	0	Wholesale trade	0	0	0
					Business, management and public administration	0	10	10	Retail trade	0	15	20
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	0	Health care and social	0	10	10
					Architecture, engineering, and related technologies	20	10	20	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	10	20	25
					Health, parks, recreation and fitness	10	0	0	Business services	0	10	20
					Personal, protective and transportation services	25	0	35	Other services	25	25	45
					Other	0	0	0				
Happy Valley-Goose Bay[2]	1.	855	870	1,730	No postsecondary certificate, diploma or degree	1,370	1,455	2,825	Agriculture and other	215	75	290
	2.	510	590	1,095	Education	80	190	275	resource-based			
	3.	580	270	850	Visual and performing arts, and communications	15	0	25	industries			
	4.	645	775	1,420	technologies				Construction	255	20	275
	5.	75	125	200	Humanities	35	50	85	Manufacturing	35	25	60
	6.	260	395	650	Social and behavioural sciences and law	60	95	155	Wholesale trade	70	50	125
					Business, management and public administration	110	660	770	Retail trade	240	310	550
					Physical and life sciences and technologies	30	15	45	Finance and real estate	100	95	200
					Mathematics, computer and information sciences	45	85	130	Health care and social	85	455	545
					Architecture, engineering, and related technologies	840	20	855	services			
					Agriculture, natural resources and conservation	45	30	70	Educational services	155	215	370
					Health, parks, recreation and fitness	45	315	365	Business services	545	275	815
					Personal, protective and transportation services	255	90	340	Other services	595	605	1,200
					Other	0	0	0				

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
North West	1.	60	60	110	No postsecondary certificate, diploma or degree	95	85	180	Agriculture and other	20	0	25
River	2.	30	30	65	Education	10	15	20	resource-based			
	3.	45	20	65	Visual and performing arts, and communications	10	0	0	industries			
	4.	45	45	95	technologies				Construction	25	0	25
	5.	10	20	35	Humanities	0	10	10	Manufacturing	10	10	0
	6.	10	35	45	Social and behavioural sciences and law	0	15	15	Wholesale trade	0	0	0
					Business, management and public administration	0	30	40	Retail trade	10	10	15
					Physical and life sciences and technologies	10	0	10	Finance and real estate	10	10	10
					Mathematics, computer and information sciences	0	0	0	Health care and social	10	50	60
					Architecture, engineering, and related technologies	50	10	60	services			
					Agriculture, natural resources and conservation	15	0	15	Educational services	0	15	20
					Health, parks, recreation and fitness	10	35	35	Business services	20	10	30
					Personal, protective and transportation services	25	10	35	Other services	35	50	85
					Other	0	0	0				
Sheshatshit	-	-	-	-	-	-	-	-	-	-	-	-
Subdivision	1.	220	260	480	No postsecondary certificate, diploma or degree	255	290	545	Agriculture and other	45	20	65
10C	2.	35	25	65	Education	0	10	15	resource-based			
	3.	60	25	90	Visual and performing arts, and communications	0	0	0	industries			
	4.	15	25	40	technologies				Construction	15	0	15
	5.	0	10	10	Humanities	0	10	0	Manufacturing	0	0	0
	6.	10	10	10	Social and behavioural sciences and law	0	10	0	Wholesale trade	0	0	0
					Business, management and public administration	10	15	20	Retail trade	0	10	0
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	0	Health care and social	10	45	55
					Architecture, engineering, and related technologies	50	0	55	services			
					Agriculture, natural resources and conservation	10	0	10	Educational services	0	15	25
					Health, parks, recreation and fitness	10	15	15	Business services	10	10	15
					Personal, protective and transportation services	20	0	20	Other services	80	70	150
					Other	0	0	0				
Labrador City	1.	500	685	1,180	No postsecondary certificate, diploma or degree	1,170	1,555	2,730	Agriculture and other	1,470	250	1,720
	2.	675	875	1,545	Education	15	150	165	resource-based			
	3.	845	235	1,085	Visual and performing arts, and communications	0	15	20	industries			
	4.	725	610	1,340	technologies				Construction	205	45	255
	5.	85	90	175	Humanities	35	80	115	Manufacturing	80	30	110
	6.	205	390	595	Social and behavioural sciences and law	30	95	130	Wholesale trade	90	40	130
					Business, management and public administration	80	465	545	Retail trade	200	370	570
					Physical and life sciences and technologies	30	60	90	Finance and real estate	25	70	100
					Mathematics, computer and information sciences	95	75	170	Health care and social	35	245	280
					Architecture, engineering, and related technologies	1,390	95	1,480	services			
					Agriculture, natural resources and conservation	10	0	10	Educational services	10	145	150
					Health, parks, recreation and fitness	20	240	260	Business services	140	200	340
					Personal, protective and transportation services	155	65	220	Other services	195	435	635
					Other	0	0	0				

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
Wabush	1.	100	170	275	No postsecondary certificate, diploma or degree	280	400	675	Agriculture and other	440	55	495
	2.	170	230	405	Education	0	40	45	resource-based			
	3.	185	45	230	Visual and performing arts, and communications	10	0	0	industries			
	4.	210	160	370	technologies				Construction	35	0	35
	5.	25	30	55	Humanities	0	10	10	Manufacturing	0	0	10
	6.	50	80	130	Social and behavioural sciences and law	10	25	30	Wholesale trade	30	0	40
					Business, management and public administration	20	160	180	Retail trade	20	95	110
					Physical and life sciences and technologies	25	0	25	Finance and real estate	0	15	15
					Mathematics, computer and information sciences	0	15	15	Health care and social	20	35	55
					Architecture, engineering, and related technologies	360	10	370	services			
					Agriculture, natural resources and conservation	10	0	10	Educational services	0	25	30
					Health, parks, recreation and fitness	10	20	25	Business services	25	20	45
					Personal, protective and transportation services	30	25	55	Other services	50	125	175
					Other	0	0	0				
Subdivision	1.	70	60	130	No postsecondary certificate, diploma or degree	100	135	235	Agriculture and other	180	55	235
10D (Churchill	2.	30	75	110	Education	10	10	25	resource-based			
Falls)	3.	50	30	80	Visual and performing arts, and communications	0	0	0	industries			
	4.	80	45	130	technologies				Construction	0	0	0
	5.	10	10	15	Humanities	10	0	15	Manufacturing	0	0	0
	6.	45	25	65	Social and behavioural sciences and law	10	10	15	Wholesale trade	0	0	0
					Business, management and public administration	0	45	50	Retail trade	25	15	40
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	10	Health care and social	0	10	0
					Architecture, engineering, and related technologies	115	0	115	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	15	10	20
					Health, parks, recreation and fitness	0	15	10	Business services	10	0	10
					Personal, protective and transportation services	20	15	35	Other services	10	55	70
					Other	0	0	0				
Natuashish	1.	140	165	305	No postsecondary certificate, diploma or degree	150	180	330	Agriculture and other	10	0	10
	2.	10	20	25	Education	15	20	30	resource-based			
	3.	20	10	30	Visual and performing arts, and communications	0	0	0	industries			
	4.	15	15	25	technologies				Construction	10	0	15
	5.	0	10	10	Humanities	0	0	10	Manufacturing	0	0	0
	6.	15	25	40	Social and behavioural sciences and law	0	10	0	Wholesale trade	0	0	0
					Business, management and public administration	0	10	10	Retail trade	0	10	10
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	10
					Mathematics, computer and information sciences	0	0	0	Health care and social	0	30	30
					Architecture, engineering, and related technologies	15	10	25	services			
					Agriculture, natural resources and conservation	10	0	10	Educational services	10	30	40
					Health, parks, recreation and fitness	10	10	10	Business services	0	0	10
					Personal, protective and transportation services	15	10	15	Other services	70	70	140
					Other	0	0	0				
Subdivision 10 E	-	-	-	-	-	-	-	-	-	-	-	-
Census Division 11												

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
Hopedale[3]	1.	105	90	190	No postsecondary certificate, diploma or degree	125	120	245	Agriculture and other	20	0	25
	2.	25	30	55	Education	10	20	30	resource-based			
	3.	35	20	50	Visual and performing arts, and communications	10	0	10	industries			
	4.	25	20	45	technologies				Construction	20	0	20
	5.	0	10	15	Humanities	10	0	10	Manufacturing	10	0	10
	6.	0	20	25	Social and behavioural sciences and law	0	10	15	Wholesale trade	0	0	0
					Business, management and public administration	0	10	15	Retail trade	10	15	15
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	10	0	0	Health care and social	0	25	30
					Architecture, engineering, and related technologies	25	0	25	services			
					Agriculture, natural resources and conservation	0	0	10	Educational services	10	20	35
					Health, parks, recreation and fitness	0	15	20	Business services	0	0	10
					Personal, protective and transportation services	20	0	20	Other services	30	35	60
					Other	0	0	0				
Makkovik	1.	60	60	125	No postsecondary certificate, diploma or degree	90	90	175	Agriculture and other	30	10	40
	2.	25	30	55	Education	0	15	15	resource-based			
	3.	25	15	40	Visual and performing arts, and communications	0	10	10	industries			
	4.	20	20	40	technologies				Construction	10	10	10
	5.	0	0	10	Humanities	0	0	10	Manufacturing	10	10	20
	6.	10	15	20	Social and behavioural sciences and law	0	10	0	Wholesale trade	0	0	0
					Business, management and public administration	0	10	15	Retail trade	10	10	15
					Physical and life sciences and technologies	10	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	10	0	0	Health care and social	0	15	20
					Architecture, engineering, and related technologies	20	0	20	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	0	15	25
					Health, parks, recreation and fitness	0	10	15	Business services	0	10	15
					Personal, protective and transportation services	15	10	15	Other services	20	15	35
					Other	0	0	0				
Postville	1.	35	30	70	No postsecondary certificate, diploma or degree	45	45	90	Agriculture and other	20	0	20
	2.	10	15	25	Education	0	10	15	resource-based			
	3.	25	10	30	Visual and performing arts, and communications	0	0	10	industries			
	4.	10	10	25	technologies				Construction	10	0	10
	5.	10	10	15	Humanities	0	0	0	Manufacturing	10	0	10
	6.	10	10	10	Social and behavioural sciences and law	0	0	10	Wholesale trade	0	0	0
					Business, management and public administration	0	10	15	Retail trade	0	10	10
					Physical and life sciences and technologies	0	0	0	Finance and real estate	0	0	0
					Mathematics, computer and information sciences	0	0	0	Health care and social	0	10	10
					Architecture, engineering, and related technologies	20	0	20	services			
					Agriculture, natural resources and conservation	0	0	0	Educational services	10	15	20
					Health, parks, recreation and fitness	0	10	10	Business services	10	0	0
					Personal, protective and transportation services	15	0	15	Other services	10	15	25
					Other	0	0	0				

Area / Community	Education Levels*				Training				Work Experience			
	Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
Rigolet	1	60	35	105	No postsecondary certificate, diploma or degree	80	70	150	Agriculture and other resource-based industries	10	0	15
	2.	20	30	45	Education	0	10	10	Construction	10	0	10
	3.	10	10	20	Visual and performing arts, and communications technologies	0	0	0	Manufacturing	0	0	0
	4.	20	15	35	Humanities	0	0	0	Wholesale trade	0	0	0
	5.	0	0	10	Social and behavioural sciences and law	0	0	10	Retail trade	10	10	0
	6.	10	10	10	Business, management and public administration	0	10	15	Finance and real estate	0	10	0
					Physical and life sciences and technologies	0	0	0	Health care and social services	10	15	25
					Mathematics, computer and information sciences	0	0	0	Educational services	10	0	10
					Architecture, engineering, and related technologies	15	0	20	Business services	10	0	0
					Agriculture, natural resources and conservation	0	0	10	Other services	15	20	35
					Health, parks, recreation and fitness	0	0	10				
					Personal, protective and transportation services	10	0	10				
					Other	0	0	0				
Subdivision 11C	-	-	-	-	-	-	-	-	-	-	-	-
Nain[4]	1.	200	195	395	No postsecondary certificate, diploma or degree	270	260	525	Agriculture and other resource-based industries	50	10	65
	2.	60	65	125	Education	10	20	30	Construction	20	0	25
	3.	40	25	65	Visual and performing arts, and communications technologies	10	0	10	Manufacturing	20	10	25
	4.	45	50	95	Humanities	0	10	15	Wholesale trade	10	0	10
	5.	0	10	20	Social and behavioural sciences and law	0	20	25	Retail trade	15	25	40
	6.	15	30	50	Business, management and public administration	10	35	40	Finance and real estate	10	0	0
					Physical and life sciences and technologies	0	10	0	Health care and social services	15	40	60
					Mathematics, computer and information sciences	0	0	0	Educational services	15	25	40
					Architecture, engineering, and related technologies	40	0	40	Business services	25	20	45
					Agriculture, natural resources and conservation	10	0	10	Other services	65	75	135
					Health, parks, recreation and fitness	0	20	25				
					Personal, protective and transportation services	20	0	20				
					Other	0	0	0				
Subdivision 11E	-	-	-	-	-	-	-	-	-	-	-	-

- Data not available.

* The data refer to the educational attainment of the population aged 15 years and over. Numbers 1 to 5 refer to the following: 1. No certificate, diploma or degree; 2. High school certificate or equivalent; 3. Apprenticeship or trades certificate or diploma; 4. College, Cégep or other non-university certificate or diploma; 5. University certificate or diploma below the bachelor level; 6. University certificate, diploma or degree.

[1] Obtained by adding entries from Census Division 10 and Census Division 11.

[2] Includes localities of Goose Bay Military Reserve, Goose Bay Canadian Forces Base, Happy Valley, Spruce Park.

[3] Includes unorganized locality of Davis Inlet.

[4] Includes locality of Kauk Bight.

5.5.17.4 Communities in Québec

The following presents data on education, language, training and work experience for Fermont, which is the only community in the MRC de Caniapiscau that lies outside the LSEA. Data on the communities in the other MRCs that form part of the RSEA are provided in Table 5.61.

Education and Language

Approximately 55% of the population of Fermont aged 15 years and more had either a high-school diploma or an apprenticeship/trade certificate in 2006, while another 31% had at least a college degree (Statistics Canada 2009a, Internet site).

The vast majority of the population has French as a mother tongue.

Training

Of the 1,325 persons with a post-secondary certificate in Fermont in 2006, 52% had a diploma in architecture, engineering or related technologies, 15% had one in business/administration and 10% had one in personal, protective or transportation services (Statistics Canada 2009a, Internet site).

Labour Force

The Fermont labour force in 2006 consisted of 2,155 persons (Statistics Canada 2009a, Internet site). Fermont is, of course, a mining community.

Work Experience

Roughly 65% of the experienced labour force in Fermont (1,125/1,715) had worked in resource-based industries as of 2006 (Statistics Canada 2009a, Internet site). It is safe to assume that a significant proportion thereof had worked in the mining industry. Less than 1% of Fermont's experienced labour force had worked in construction.

Table 5.61: Québec North Shore Communities (and Kuujjuaq) in RSEA (excluding LSEA) – Education, Training and Work Experience

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
	Kuujjuaq	1.	300	335	630	No postsecondary certificate, diploma or degree	400	420	825	Agriculture and other resource-	20	0	20
		2.	100	90	190	Education	25	60	90	based industries			
		3.	120	80	200	Visual and performing arts, and communications	10	10	15	Construction	35	0	40
		4.	85	65	150	technologies				Manufacturing	0	0	0
		5.	20	30	45	Humanities	15	10	25	Wholesale trade	0	0	10
		6.	90	115	200	Social and behavioural sciences and law	20	35	60	Retail trade	35	35	70
						Business, management and public administration	50	80	130	Finance and real estate	10	10	25
						Physical and life sciences and technologies	0	0	15	Health care and social services	90	205	295
						Mathematics, computer and information sciences	0	0	10	Educational services	45	95	140
						Architecture, engineering, and related	85	10	90	Business services	110	45	155
						technologies	10	0	10	Other services	210	155	375
						Agriculture, natural resources and conservation	25	60	85				
						Health, parks, recreation and fitness	60	10	70				
						Personal, protective and transportation services	0	0	0				
						Other							
Caniapiscau	Fermont	1.	110	200	310	No postsecondary certificate, diploma or degree	360	470	830	Agriculture and other resource-	970	155	1,125
		2.	250	270	515	Education	0	45	50	based industries			
		3.	450	215	665	Visual and performing arts, and communications	0	10	15	Construction	10	0	10
		4.	290	150	440	technologies				Manufacturing	20	0	30
		5.	10	25	30	Humanities	15	0	20	Wholesale trade	0	0	0
		6.	100	90	190	Social and behavioural sciences and law	0	40	40	Retail trade	35	50	85
						Business, management and public administration	45	160	205	Finance and real estate	0	20	20
						Physical and life sciences and technologies	20	40	60	Health care and social services	0	95	100
						Mathematics, computer and information sciences	0	15	20	Educational services	10	25	30
						Architecture, engineering, and related	665	15	685	Business services	30	45	75
						technologies	20	10	25	Other services	70	170	240
						Agriculture, natural resources and conservation	15	50	70				
						Health, parks, recreation and fitness	50	85	135				
						Personal, protective and transportation services	0	0	0				
						Other							
Manicouagan	Baie-	1.	3,275	3,335	6,615	No postsecondary certificate, diploma or degree	6,21	6,280	12,49	Agriculture and other resource-	1,055	275	1,330
	Comeau	2.	2,935	2,945	5,880	Education	5	925	5	based industries			
		3.	3,395	1,630	5,025	Visual and performing arts, and communications	200	95	1,130	Construction	540	85	625
		4.	1,720	2,495	4,215	technologies	70		160	Manufacturing	3,330	370	3,705
		5.	320	580	900	Humanities		240		Wholesale trade	305	105	410
		6.	925	1,140	2,060	Social and behavioural sciences and law	115	510	360	Retail trade	775	1,180	1,955
						Business, management and public administration	190	1,870	700	Finance and real estate	165	345	505
						Physical and life sciences and technologies	570	115	2,440	Health care and social services	380	1,645	2,030
						Mathematics, computer and information sciences	110	80	225	Educational services	330	685	1,015
						Architecture, engineering, and related	150	245	230	Business services	935	695	1,630
						technologies	3,89	105	4,135	Other services	1,140	1,720	2,855
						Agriculture, natural resources and conservation	0	980	455				
						Health, parks, recreation and fitness	355	670	1,225				
						Personal, protective and transportation services	250	0	1,130				
						Other	455		10				

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
							10						
	Franquelin	1.	50	60	110	No postsecondary certificate, diploma or degree	100	80	180	Agriculture and other resource-	0	0	0
		2.	50	20	70	Education	0	10	10	based industries			
		3.	50	20	75	Visual and performing arts, and communications	0	0	0	Construction	15	10	20
		4.	10	15	15	technologies				Manufacturing	45	10	45
		5.	0	0	0	Humanities	0	0	0	Wholesale trade	10	0	0
		6.	15	30	45	Social and behavioural sciences and law	0	0	0	Retail trade	0	15	20
						Business, management and public administration	10	15	25	Finance and real estate	0	15	20
						Physical and life sciences and technologies	0	0	0	Health care and social services	0	15	20
						Mathematics, computer and information sciences	0	0	0	Educational services	0	0	0
						Architecture, engineering, and related	50	10	55	Business services	10	0	10
						technologies	10	10	10	Other services	10	15	20
						Agriculture, natural resources and conservation	10	10	10				
						Health, parks, recreation and fitness	0	15	15				
						Personal, protective and transportation services	0	0	0				
						Other							
	Godbout	1.	70	50	120	No postsecondary certificate, diploma or degree	100	100	200	Agriculture and other resource-	10	10	20
		2.	30	45	75	Education	0	0	10	based industries			
		3.	45	30	80	Visual and performing arts, and communications	0	0	0	Construction	10	0	10
		4.	10	0	20	technologies				Manufacturing	45	15	60
		5.	10	10	15	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	0	0	10	Social and behavioural sciences and law	0	0	0	Retail trade	0	20	20
						Business, management and public administration	0	25	30	Finance and real estate	0	0	0
						Physical and life sciences and technologies	10	0	10	Health care and social services	10	0	10
						Mathematics, computer and information sciences	0	0	0	Educational services	0	0	0
						Architecture, engineering, and related	60	0	60	Business services	0	0	0
						technologies	0	0	0	Other services	15	10	25
						Agriculture, natural resources and conservation	0	20	20				
						Health, parks, recreation and fitness	0	0	0				
						Personal, protective and transportation services	0	0	0				
						Other							
	Baie-Trinité	1.	95	70	165	No postsecondary certificate, diploma or degree	145	135	280	Agriculture and other resource-	10	0	0
		2.	50	65	110	Education	0	0	0	based industries			
		3.	80	30	105	Visual and performing arts, and communications	0	0	0	Construction	20	10	20
		4.	0	15	25	technologies				Manufacturing	75	45	120
		5.	25	15	40	Humanities	0	10	10	Wholesale trade	0	0	0
		6.	0	0	0	Social and behavioural sciences and law	0	0	0	Retail trade	10	10	15
						Business, management and public administration	15	0	25	Finance and real estate	0	10	0
						Physical and life sciences and technologies	0	0	0	Health care and social services	0	0	0
						Mathematics, computer and information sciences	10	0	10	Educational services	0	0	0
						Architecture, engineering, and related	75	10	85	Business services	20	0	20
						technologies	0	0	0	Other services	30	35	65
						Agriculture, natural resources and conservation	0	15	20				
						Health, parks, recreation and fitness	10	15	20				
						Personal, protective and transportation services	0	0	0				
						Other							

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
Total Manicouagan		1. 2. 3. 4. 5. 6.	**3,490 3,065 3,570 1,740 355 940**	**3,515 3,075 1,710 2,525 605 1,170**	**7,010 6,135 5,285 4,275 955 2,115**	No postsecondary certificate, diploma or degree Education Visual and performing arts, and communications technologies Humanities Social and behavioural sciences and law Business, management and public administration Physical and life sciences and technologies Mathematics, computer and information sciences Architecture, engineering, and related technologies Agriculture, natural resources and conservation Health, parks, recreation and fitness Personal, protective and transportation services Other	**6,56 0 200 70 115 190 595 120 160 4,07 5 365 260 465 10**	**6,595 935 95 250 510 1,910 115 80 265 115 1,025 700 0**	**13,15 5 1,150 160 370 700 2,520 235 240 4,335 465 1,275 1,165 10**	Agriculture and other resource-based industries Construction Manufacturing Wholesale trade Retail trade Finance and real estate Health care and social services Educational services Business services Other services	**1,075 585 3,495 315 785 165 390 330 965 1,195**	**285 105 440 105 1,225 370 1,660 685 695 1,780**	**1,350 675 3,930 410 2,010 525 2,060 1,015 1,660 2,965**
Sept-Rivières	Port Cartier	1. 2. 3. 4. 5. 6.	890 550 695 475 35 120	975 635 345 340 130 215	1,865 1,185 1,040 820 165 335	No postsecondary certificate, diploma or degree Education Visual and performing arts, and communications technologies Humanities Social and behavioural sciences and law Business, management and public administration Physical and life sciences and technologies Mathematics, computer and information sciences Architecture, engineering, and related technologies Agriculture, natural resources and conservation Health, parks, recreation and fitness Personal, protective and transportation services Other	1,44 0 45 20 10 20 115 15 25 860 35 20 160 0	1,610 170 30 40 70 345 20 25 20 0 130 175 0	3,055 210 50 55 95 460 35 55 885 35 140 335 0	Agriculture and other resource-based industries Construction Manufacturing Wholesale trade Retail trade Finance and real estate Health care and social services Educational services Business services Other services	650 145 425 15 105 10 40 45 170 280	150 10 115 30 170 50 175 140 130 440	800 150 540 50 280 60 215 180 300 720
Sept-Rivières	Gallix	1. 2. 3. 4. 5. 6.	100 85 105 40 0 35	80 60 70 45 0 50	180 145 175 85 15 85	No postsecondary certificate, diploma or degree Education Visual and performing arts, and communications technologies Humanities Social and behavioural sciences and law Business, management and public administration Physical and life sciences and technologies Mathematics, computer and information sciences Architecture, engineering, and related technologies Agriculture, natural resources and conservation Health, parks, recreation and fitness Personal, protective and transportation services Other	185 15 0 0 0 15 0 0 125 10 10 15 0	140 50 10 0 10 65 0 0 0 10 30 10 0	325 65 10 0 10 80 0 0 125 15 35 15 0	Agriculture and other resource-based industries Construction Manufacturing Wholesale trade Retail trade Finance and real estate Health care and social services Educational services Business services Other services	60 10 30 0 0 15 10 0 15 65	10 10 0 0 20 0 20 20 40 35	70 20 30 0 25 20 30 25 55 100

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
	Greater	1.	3,300	3,800	7,100	No postsecondary certificate, diploma or degree	5,38	6,250	11,63	Agriculture and other resource-	915	150	1,070
	Sept-Îles	2.	2,085	2,445	4,535	Education	5	765	5	based industries			
		3.	2,810	1,395	4,210	Visual and performing arts, and communications	155	135	920	Construction	675	80	755
		4.	1,685	1,925	3,610	technologies	55		190	Manufacturing	1,425	205	1,630
		5.	265	425	695	Humanities		250		Wholesale trade	245	95	345
		6.	865	1,165	2,035	Social and behavioural sciences and law	175	355	420	Retail trade	690	1,135	1,825
						Business, management and public administration	150	1,560	510	Finance and real estate	255	285	540
						Physical and life sciences and technologies	510	125	2,070	Health care and social services	275	1,495	1,770
						Mathematics, computer and information sciences	120	140	245	Educational services	280	695	975
						Architecture, engineering, and related	140	175	275	Business services	1,250	685	1,940
						technologies	3,48	35	3,655	Other services	1,425	1,865	3,295
						Agriculture, natural resources and conservation	0	845	200				
						Health, parks, recreation and fitness	160	530	1,070				
						Personal, protective and transportation services	230	0	980				
						Other	450		0				
							0						
	Uashat	1.	250	300	550	No postsecondary certificate, diploma or degree	305	350	650	Agriculture and other resource-	10	0	10
		2.	50	50	100	Education	10	30	40	based industries			
		3.	45	20	65	Visual and performing arts, and communications	0	0	0	Construction	20	0	20
		4.	20	45	60	technologies				Manufacturing	20	10	20
		5.	0	10	15	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	0	15	20	Social and behavioural sciences and law	0	10	10	Retail trade	10	15	20
						Business, management and public administration	10	30	30	Finance and real estate	10	0	10
						Physical and life sciences and technologies	0	0	0	Health care and social services	10	40	45
						Mathematics, computer and information sciences	0	0	0	Educational services	10	15	20
						Architecture, engineering, and related	40	0	40	Business services	25	20	50
						technologies	0	0	0	Other services	65	70	135
						Agriculture, natural resources and conservation	0	0	10				
						Health, parks, recreation and fitness	15	10	20				
						Personal, protective and transportation services	0	0	0				
						Other							
	Mani-	1.	235	250	485	No postsecondary certificate, diploma or degree	265	290	555	Agriculture and other resource-	10	0	0
	Utenam	2.	30	35	70	Education	0	15	20	based industries			
		3.	65	25	90	Visual and performing arts, and communications	0	0	10	Construction	25	10	25
		4.	25	45	70	technologies				Manufacturing	15	0	20
		5.	10	10	20	Humanities	0	10	15	Wholesale trade	0	0	0
		6.	10	20	25	Social and behavioural sciences and law	0	15	20	Retail trade	0	15	20
						Business, management and public administration	0	25	30	Finance and real estate	0	0	0
						Physical and life sciences and technologies	10	0	0	Health care and social services	10	30	35
						Mathematics, computer and information sciences	0	0	0	Educational services	0	15	20
						Architecture, engineering, and related	45	0	50	Business services	35	20	60
						technologies	0	0	0	Other services	90	85	175
						Agriculture, natural resources and conservation	0	15	15				
						Health, parks, recreation and fitness	25	0	30				
						Personal, protective and transportation services	0	0	0				
						Other							

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
		1.	4,775	5,405	10,18	No postsecondary certificate, diploma or degree	7,58	8,640	16,22	Agriculture and other resource-	1,645	310	1,950
		2.	2,800	3,225	0	Education	0	1,030	0	based industries			
		3.	3,720	1,855	6,035	Visual and performing arts, and communications	225	175	1,255	Construction	875	110	970
		4.	2,245	2,400	5,580	technologies	75		260	Manufacturing	1,915	330	2,240
		5.	310	575	4,645	Humanities		300		Wholesale trade	260	125	395
		6.	1,030	1,465	910	Social and behavioural sciences and law	185	460	490	Retail trade	805	1,355	2,170
					2,500	Business, management and public administration	170	2,025	645	Finance and real estate	290	335	630
	Total Sept-					Physical and life sciences and technologies	650	145	2,670	Health care and social services	345	1,760	2,095
	Rivières					Mathematics, computer and information sciences	145	165	280	Educational services	335	885	1,220
						Architecture, engineering, and related	165	195	330	Business services	1,495	895	2,405
						technologies	4,55	45	4,755	Other services	1,925	2,495	4,425
						Agriculture, natural resources and conservation	0	1,020	250				
						Health, parks, recreation and fitness	205	725	1,270				
						Personal, protective and transportation services	260	0	1,380				
						Other	665		0				
							0						
Minganie	Rivière-au-	1.	100	95	195	No postsecondary certificate, diploma or degree	130	120	250	Agriculture and other resource-	40	10	45
	Tonerre	2.	25	20	55	Education	0	10	10	based industries			
		3.	45	10	60	Visual and performing arts, and communications	0	0	0	Construction	10	0	0
		4.	25	20	45	technologies				Manufacturing	25	20	50
		5.	0	20	20	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	0	0	10	Social and behavioural sciences and law	0	0	0	Retail trade	0	10	10
						Business, management and public administration	0	20	20	Finance and real estate	15	0	10
						Physical and life sciences and technologies	0	0	0	Health care and social services	10	10	20
						Mathematics, computer and information sciences	0	0	0	Educational services	0	20	20
						Architecture, engineering, and related	55	0	50	Business services	15	10	30
						technologies	15	0	15	Other services	15	25	35
						Agriculture, natural resources and conservation	0	10	10				
						Health, parks, recreation and fitness	0	10	15				
						Personal, protective and transportation services	0	0	0				
						Other							
	Rivière-	1.	95	50	150	No postsecondary certificate, diploma or degree	100	85	185	Agriculture and other resource-	15	15	25
	Saint-Jean	2.	10	25	35	Education	0	0	0	based industries			
		3.	10	10	20	Visual and performing arts, and communications	0	0	0	Construction	25	0	25
		4.	10	0	0	technologies				Manufacturing	0	10	10
		5.	0	0	0	Humanities	0	0	0	Wholesale trade	10	0	0
		6.	0	10	15	Social and behavioural sciences and law	0	0	0	Retail trade	10	15	30
						Business, management and public administration	0	0	10	Finance and real estate	0	0	0
						Physical and life sciences and technologies	0	0	0	Health care and social services	0	0	0
						Mathematics, computer and information sciences	0	0	0	Educational services	0	0	0
						Architecture, engineering, and related	10	10	20	Business services	10	10	15
						technologies	0	0	0	Other services	25	20	45
						Agriculture, natural resources and conservation	0	0	0				
						Health, parks, recreation and fitness	0	0	0				
						Personal, protective and transportation services	0	0	0				
						Other							

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
	Longue-	1.	75	90	165	No postsecondary certificate, diploma or degree	105	110	215	Agriculture and other resource-	30	0	30
	Pointe-de-	2.	35	20	50	Education	0	25	30	based industries			
	Mingan	3.	30	10	40	Visual and performing arts, and communications	10	0	0	Construction	20	0	15
		4.	25	30	55	technologies				Manufacturing	20	35	50
		5.	10	15	25	Humanities	0	10	10	Wholesale trade	0	10	10
		6.	10	30	40	Social and behavioural sciences	0	0	0	Retail trade	0	10	10
						Business, management and public administration	10	25	35	Finance and real estate	0	10	10
						Physical and life sciences and technologies	0	0	10	Health care and social services	0	10	10
						Mathematics, computer and information sciences	0	0	0	Educational services	0	15	25
						Architecture, engineering, and related	30	10	35	Business services	10	10	20
						technologies	15	0	15	Other services	20	15	35
						Agriculture, natural resources and conservation	0	15	15				
						Health, parks, recreation and fitness	10	0	10				
						Personal, protective and transportation services	0	0	0				
						Other							
	Mingan	1.	95	100	195	No postsecondary certificate, diploma or degree	100	110	210	Agriculture and other resource-	15	0	15
	(reserve)	2.	0	10	15	Education	10	10	10	based industries			
		3.	15	15	30	Visual and performing arts, and communications	0	0	0	Construction	10	0	10
		4.	0	15	20	technologies				Manufacturing	0	0	10
		5.	10	0	10	Humanities	0	0	10	Wholesale trade	0	0	0
		6.	0	0	0	Social and behavioural sciences and law	0	10	10	Retail trade	10	0	10
						Business, management and public administration	0	10	10	Finance and real estate	0	0	0
						Physical and life sciences and technologies	10	0	0	Health care and social services	10	25	25
						Mathematics, computer and information sciences	0	0	0	Educational services	0	0	10
						Architecture, engineering, and related	0	0	10	Business services	10	10	15
						technologies	0	0	0	Other services	40	35	75
						Agriculture, natural resources and conservation	0	10	10				
						Health, parks, recreation and fitness	10	0	10				
						Personal, protective and transportation services	0	0	0				
						Other							
	Havre-	1.	340	430	770	No postsecondary certificate, diploma or degree	610	665	1,275	Agriculture and other resource-	275	15	290
	Saint-Pierre	2.	270	230	505	Education	15	90	105	based industries			
		3.	335	160	500	Visual and performing arts, and communications	10	10	15	Construction	65	0	65
		4.	205	250	455	technologies				Manufacturing	50	70	120
		5.	45	40	85	Humanities	40	25	65	Wholesale trade	35	15	50
		6.	90	145	235	Social and behavioural sciences and law	10	15	25	Retail trade	85	165	250
						Business, management and public administration	70	145	215	Finance and real estate	15	10	25
						Physical and life sciences and technologies	20	10	25	Health care and social services	35	185	220
						Mathematics, computer and information sciences	0	10	10	Educational services	55	100	155
						Architecture, engineering, and related	395	20	415	Business services	95	40	135
						technologies	20	20	40	Other services	170	215	380
						Agriculture, natural resources and conservation	25	225	250				
						Health, parks, recreation and fitness	70	30	100				
						Personal, protective and transportation services	0	0	0				
						Other							

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
	Baie-	1.	10	20	25	No postsecondary certificate, diploma or degree	10	25	35	Agriculture and other resource-	10	0	10
	Johan-	2.	0	10	10	Education	0	0	0	based industries			
	Beetz	3.	25	10	30	Visual and performing arts, and communications	0	0	0	Construction	0	0	10
		4.	0	0	0	technologies				Manufacturing	10	0	10
		5.	0	0	0	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	0	15	10	Social and behavioural sciences and law	0	0	0	Retail trade	0	0	0
						Business, management and public administration	0	0	0	Finance and real estate	0	0	0
						Physical and life sciences and technologies	0	0	0	Health care and social services	0	0	0
						Mathematics, computer and information sciences	0	0	0	Educational services	0	0	0
						Architecture, engineering, and related	20	0	20	Business services	0	10	0
						technologies	0	0	10	Other services	0	10	15
						Agriculture, natural resources and conservation	0	0	0				
						Health, parks, recreation and fitness	0	10	0				
						Personal, protective and transportation services	0	0	0				
						Other							
	Aguanish	1.	70	85	155	No postsecondary certificate, diploma or degree	80	120	205	Agriculture and other resource-	25	10	30
		2.	15	35	45	Education	0	10	0	based industries			
		3.	45	10	60	Visual and performing arts, and communications	0	0	0	Construction	25	0	25
		4.	10	0	10	technologies				Manufacturing	0	0	10
		5.	0	0	0	Humanities	0	0		Wholesale trade	0	0	0
		6.	10	0	10	Social and behavioural sciences and law	0	0	0	Retail trade	10	10	15
						Business, management and public administration	0	0	10	Finance and real estate	0	0	0
						Physical and life sciences and technologies	0	0	0	Health care and social services	10	0	15
						Mathematics, computer and information sciences	0	0	0	Educational services	0	0	10
						Architecture, engineering, and related	35	0	35	Business services	15	10	20
						technologies	0	0	0	Other services	10	10	15
						Agriculture, natural resources and conservation	10	0	10				
						Health, parks, recreation and fitness	15	10	20				
						Personal, protective and transportation services	0	0	0				
						Other							
	Natash-	1.	50	50	100	No postsecondary certificate, diploma or degree	70	80	150	Agriculture and other resource-	20	0	25
	quan,	2.	20	30	50	Education	0	20	25	based industries			
	canton	3.	20	10	30	Visual and performing arts, and communications	0	0	0	Construction	10	0	10
		4.	10	10	15	technologies				Manufacturing	0	0	0
		5.	0	10	0	Humanities	0	0	10	Wholesale trade	0	0	0
		6.	10	25	35	Social and behavioural sciences and law	0	10	10	Retail trade	15	15	30
						Business, management and public administration	0	10	10	Finance and real estate	0	0	10
						Physical and life sciences and technologies	0	0	10	Health care and social services	0	0	10
						Mathematics, computer and information sciences	0	0	0	Educational services	10	25	30
						Architecture, engineering, and related	15	0	15	Business services	10	10	20
						technologies	0	0	10	Other services	10	20	35
						Agriculture, natural resources and conservation	10	0	0				
						Health, parks, recreation and fitness	10	10	10				
						Personal, protective and transportation services	0	0	0				
						Other							

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
	Natash-	1.	175	160	335	No postsecondary certificate, diploma or degree	190	190	385	Agriculture and other resource-	15	0	10
	quan,	2.	15	35	50	Education	0	15	10	based industries			
	reserve	3.	40	20	60	Visual and performing arts, and communications	0	0	0	Construction	0	0	10
		4.	15	30	45	technologies				Manufacturing	0	0	0
		5.	0	0	10	Humanities	10	0	0	Wholesale trade	0	0	0
		6.	0	0	15	Social and behavioural sciences and law	0	15	15	Retail trade	0	0	10
						Business, management and public administration	0	0	10	Finance and real estate	0	0	0
						Physical and life sciences and technologies	0	0	0	Health care and social services	15	40	55
						Mathematics, computer and information sciences	0	10	0	Educational services	0	25	30
						Architecture, engineering, and related	10	0	0	Business services	10	10	15
						technologies	10	0	10	Other services	45	35	80
						Agriculture, natural resources and conservation	15	25	40				
						Health, parks, recreation and fitness	25	0	25				
						Personal, protective and transportation services	0	0	0				
						Other							
		1.	**1,010**	**1,080**	**2,090**	No postsecondary certificate, diploma or degree	**1,39**	**1,505**	**2,910**	Agriculture and other resource-	**445**	**50**	**480**
		2.	**390**	**415**	**815**	Education	**5**	**180**	**190**	based industries			
		3.	**565**	**255**	**830**	Visual and performing arts, and communications	**25**	**10**	**15**	Construction	**165**	**0**	**170**
		4.	**300**	**355**	**645**	technologies	**20**			Manufacturing	**105**	**135**	**260**
		5.	**65**	**85**	**150**	Humanities		**35**	**95**	Wholesale trade	**45**	**25**	**60**
		6.	**120**	**225**	**370**	Social and behavioural sciences and law	**50**	**50**	**60**	Retail trade	**130**	**225**	**365**
						Business, management and public administration	**10**	**210**	**320**	Finance and real estate	**30**	**20**	**55**
Total Minganie						Physical and life sciences and technologies	**80**	**10**	**45**	Health care and social services	**80**	**270**	**355**
						Mathematics, computer and information sciences	**30**	**20**	**10**	Educational services	**65**	**185**	**280**
						Architecture, engineering, and related	**0**	**40**	**600**	Business services	**175**	**120**	**270**
						technologies	**570**	**20**	**100**	Other services	**335**	**385**	**715**
						Agriculture, natural resources and conservation	**60**	**285**	**335**				
						Health, parks, recreation and fitness	**60**	**70**	**190**				
						Personal, protective and transportation services	**140**	**0**	**0**				
						Other	**0**						
Basse-Côte-Nord	Côte-Nord-	1.	235	205	435	No postsecondary certificate, diploma or degree	335	305	640	Agriculture and other resource-	110	0	120
	du-Golfe-	2.	100	100	200	Education	10	20	25	based industries			
	du-St-	3.	75	40	115	Visual and performing arts, and communications	0	0	0	Construction	25	0	25
	Laurent	4.	25	50	80	technologies				Manufacturing	30	40	75
		5.	0	10	15	Humanities	10	20	30	Wholesale trade	0	10	0
		6.	15	15	30	Social and behavioural sciences and law	0	0	10	Retail trade	10	15	25
						Business, management and public administration	10	10	20	Finance and real estate	25	10	30
						Physical and life sciences and technologies	0	0	0	Health care and social services	10	85	95
						Mathematics, computer and information sciences	0	0	0	Educational services	15	30	45
						Architecture, engineering, and related	40	10	45	Business services	35	30	60
						technologies	0	0	0	Other services	65	65	130
						Agriculture, natural resources and conservation	0	50	50				
						Health, parks, recreation and fitness	45	10	55				
						Personal, protective and transportation services	0	0	0				
						Other							

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	**Male**	**Female**	**Total**	**Type**	**Male**	**Female**	**Total**	**Industry**	**Male**	**Female**	**Total**
	Unamen	1.	285	265	550	No postsecondary certificate, diploma or degree	295	300	595	Agriculture and other resource-	0	0	0
	Shipu	2.	15	30	40	Education	0	10	10	based industries			
	(La	3.	15	10	30	Visual and performing arts, and communications	0	0	10	Construction	15	0	20
	Romaine)	4.	0	10	10	technologies				Manufacturing	0	0	0
		5.	0	10	10	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	10	10	10	Social and behavioural sciences and law	0	0	10	Retail trade	10	15	20
						Business, management and public administration	0	10	10	Finance and real estate	0	0	0
						Physical and life sciences and technologies	0	0	0	Health care and social services	10	30	35
						Mathematics, computer and information sciences	0	0	0	Educational services	10	25	40
						Architecture, engineering, and related	0	0	0	Business services	0	10	15
						technologies	0	0	0	Other services	60	25	90
						Agriculture, natural resources and conservation	0	0	10				
						Health, parks, recreation and fitness	10	0	15				
						Personal, protective and transportation services	0	0	0				
						Other							
	Gros-	1.	125	150	275	No postsecondary certificate, diploma or degree	165	215	385	Agriculture and other resource-	20	0	25
	Mécatina	2.	40	65	105	Education	0	10	15	based industries			
		3.	50	10	60	Visual and performing arts, and communications	0	0	0	Construction	45	10	55
		4.	0	10	20	technologies				Manufacturing	30	35	65
		5.	0	0	0	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	0	15	20	Social and behavioural sciences and law	10	10	10	Retail trade	10	25	25
						Business, management and public administration	0	0	10	Finance and real estate	0	15	10
						Physical and life sciences and technologies	0	0	0	Health care and social services	10	15	25
						Mathematics, computer and information sciences	0	0	0	Educational services	0	20	20
						Architecture, engineering, and related	40	0	45	Business services	0	0	10
						technologies	0	0	0	Other services	20	0	25
						Agriculture, natural resources and conservation	10	15	15				
						Health, parks, recreation and fitness	0	0	10				
						Personal, protective and transportation services	0	0	0				
						Other							
	Pakua	1.	70	75	145	No postsecondary certificate, diploma or degree	75	85	160	Agriculture and other resource-	0	0	10
	Shipi	2.	0	10	10	Education	10	0	0	based industries			
		3.	0	0	10	Visual and performing arts, and communications	0	0	0	Construction	10	0	0
		4.	10	0	10	technologies				Manufacturing	0	10	0
		5.	0	0	0	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	10	0	0	Social and behavioural sciences and law	0	0	10	Retail trade	0	0	0
						Business, management and public administration	0	0	0	Finance and real estate	0	0	0
						Physical and life sciences and technologies	0	0	0	Health care and social services	0	10	10
						Mathematics, computer and information sciences	0	0	0	Educational services	10	15	15
						Architecture, engineering, and related	0	0	0	Business services	0	0	0
						technologies	0	0	0	Other services	30	20	50
						Agriculture, natural resources and conservation	10	0	0				
						Health, parks, recreation and fitness	0	0	0				
						Personal, protective and transportation services	0	0	0				
						Other							

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
	Saint-	1.	140	95	235	No postsecondary certificate, diploma or degree	180	180	355	Agriculture and other resource-	10	0	15
	Augustin	2.	40	80	120	Education	0	25	25	based industries			
		3.	20	0	25	Visual and performing arts, and communications	0	0	0	Construction	65	10	75
		4.	15	30	45	technologies				Manufacturing	10	0	10
		5.	0	0	0	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	10	30	35	Social and behavioural sciences and law	10	0	10	Retail trade	0	0	10
						Business, management and public administration	0	15	10	Finance and real estate	0	0	0
						Physical and life sciences and technologies	0	0	0	Health care and social services	10	15	20
						Mathematics, computer and information sciences	0	15	15	Educational services	0	40	45
						Architecture, engineering, and related	30	0	30	Business services	20	15	35
						technologies	0	0	0	Other services	40	80	120
						Agriculture, natural resources and conservation	0	10	10				
						Health, parks, recreation and fitness	10	0	10				
						Personal, protective and transportation services	0	0	0				
						Other							
	Bonne-	1.	220	160	380	No postsecondary certificate, diploma or degree	315	230	545	Agriculture and other resource-	60	10	70
	Espérance	2.	95	70	165	Education	0	35	40	based industries			
		3.	30	30	65	Visual and performing arts, and communications	0	0	0	Construction	65	15	75
		4.	0	40	45	technologies				Manufacturing	25	15	45
		5.	10	0	0	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	0	25	25	Social and behavioural sciences and law	0	0	0	Retail trade	20	35	55
						Business, management and public administration	0	25	30	Finance and real estate	10	10	10
						Physical and life sciences and technologies	0	10	10	Health care and social services	0	15	20
						Mathematics, computer and information sciences	0	0	0	Educational services	10	45	50
						Architecture, engineering, and related	30	0	30	Business services	10	10	20
						technologies	0	0	0	Other services	50	50	95
						Agriculture, natural resources and conservation	0	15	20				
						Health, parks, recreation and fitness	0	15	10				
						Personal, protective and transportation services	0	0	0				
						Other							
	Blanc-	1.	220	225	445	No postsecondary certificate, diploma or degree	265	320	590	Agriculture and other resource-	45	0	45
	Sablon	2.	45	95	140	Education	10	45	50	based industries			
		3.	130	45	170	Visual and performing arts, and communications	0	0	0	Construction	60	0	60
		4.	25	40	60	technologies				Manufacturing	20	15	40
		5.	20	15	30	Humanities	0	0	0	Wholesale trade	0	0	0
		6.	40	65	105	Social and behavioural sciences and law	10	20	25	Retail trade	30	30	55
						Business, management and public administration	20	50	75	Finance and real estate	0	10	10
						Physical and life sciences and technologies	0	0	0	Health care and social services	30	160	190
						Mathematics, computer and information sciences	0	0	0	Educational services	40	25	65
						Architecture, engineering, and related	145	0	140	Business services	60	10	75
						technologies	0	0	0	Other services	15	40	55
						Agriculture, natural resources and conservation	20	35	55				
						Health, parks, recreation and fitness	15	0	25				
						Personal, protective and transportation services	0	0	0				
						Other							

MRC	Town	Education Levels[1]				Training				Work Experience			
		Level	Male	Female	Total	Type	Male	Female	Total	Industry	Male	Female	Total
	Total Basse-Côte-Nord	1.	**1,295**	**1,175**	**2,465**	No postsecondary certificate, diploma or degree	**1,63**	**1,635**	**3,270**	Agriculture and other resource-	**245**	**10**	**285**
		2.	**335**	**450**	**780**	Education	**0**	**145**	**165**	based industries			
		3.	**320**	**135**	**475**	Visual and performing arts, and communications	**30**	**0**	**10**	Construction	**285**	**35**	**310**
		4.	**75**	**180**	**270**	technologies	**0**			Manufacturing	**115**	**115**	**235**
		5.	**30**	**35**	**55**	Humanities		**20**	**30**	Wholesale trade	**0**	**10**	**0**
		6.	**85**	**160**	**225**	Social and behavioural sciences and law	**10**	**30**	**75**	Retail trade	**80**	**120**	**190**
						Business, management and public administration	**30**	**110**	**155**	Finance and real estate	**35**	**45**	**60**
						Physical and life sciences and technologies	**30**	**10**	**10**	Health care and social services	**70**	**330**	**395**
						Mathematics, computer and information sciences	**0**	**15**	**15**	Educational services	**85**	**200**	**280**
						Architecture, engineering, and related	**0**	**10**	**290**	Business services	**125**	**75**	**215**
						technologies	**285**	**0**	**0**	Other services	**280**	**280**	**565**
						Agriculture, natural resources and conservation	**0**	**125**	**160**				
						Health, parks, recreation and fitness	**40**	**25**	**125**				
						Personal, protective and transportation services	**80**	**0**	**0**				
						Other	**0**						

[1] The data refer to the educational attainment of the population aged 15 years and over. Numbers 1 to 5 refer to the following: 1. No certificate, diploma or degree; 2. High school certificate or equivalent; 3. Apprenticeship or trades certificate or diploma; 4. College, Cégep or other non-university certificate or diploma; 5. University certificate or diploma below the bachelor level; 6. University certificate, diploma or degree.

5.5.18 Economy in RSEA

5.5.18.1 Uashat mak Mani-Utenam

In 2006, 35% of the labour force of both reserves was employed, while the unemployment rate was 36% (Statistics Canada 2009a, Internet site).

The average median income of the labour force with income was $14,519 in 2005.

The organizations and enterprises located in Uashat and Mani-Utenam are listed in Table 5.62.

Table 5.62: Organizations and Enterprises Located in Uashat and Mani-Utenam

Sector of Activity	Business/Organization Name and Address
Food and Beverage – Sales and Manufacturers	Épicerie Innu 138, rue de l'Église, Mani-Utenam, QC, G4R 4K2 T: (418) 927-2204 F: (418) 927-2635
Arts and Crafts – Sales and Manufacturers	Atelier Shetush 56, Mathieu, Mani-Utenam, QC, G4R 4K2 T: (418) 927-2518
	Innu Apakuai Artisanat 33, du Vieux-Poste, Uashat, QC, G4R 4G5 T: (418) 968-2066 F: (418) 962-1448
Bus Lines	Innu l'Autobus 1146, Dequen, Uashat, QC, G4R 4K1 T: (418) 962-0530 F: (418) 962-7183
Camping and RV Parks	Camping Uashat 1089, Dequen, CP 8000, Sept-Îles, QC, G4R 4L9 T: (418) 962-0327 F: (418) 968-0937
Sports, Amusement and Recreation Centre	Quilles Naneu 1062, Arnaud, Uashat, QC, G4R 5N4 T: (418) 968-8107 F: (418) 968-9433
	Salle communautaire Naneu 100, boul. des Montagnais, Uashat, QC, G4R 5P9 T: (418) 968-1515 F: (418) 968-1308
	Tennis Inter Club 282, boul. des Montagnais, Uashat, QC, G4R 4L9 T: (418) 968-8112 F: (418) 968-1530
Construction – Electrical Work	Shetush Électrique 2003 283, boul. des Montagnais, Uashat, QC, G4R 5R1 T: (418) 968-8112 F: (418) 968-8100
Construction – Building Contractors	Apituamiss Construction enr. 3, rue Atikut, Mani-Utenam, QC, G4R 4K2 T: (418) 927-2017 F: (418) 927-2018
	Uisht Construction Inc. 1035, Brochu, Uashat, QC, G4R 4S8 T: (418) 962-5254 F: (418) 962-6036
Construction – Interior and Exterior Work	Unaman 1049, Arnaud, Uashat, QC, G4R 5N2 T: (418) 968-1905 F: (418) 968-1905
Convenience and Variety Stores	Dépanneur Montagnais enr. 21, du Vieux-Poste, Uashat, QC, G4R 5B5

Sector of Activity	Business/Organization Name and Address
	T: (418) 968-8847 F: (418) 968-8843
Business Support Services – Economic Development Agencies	Corporation de Développement Économique Montagnaise 1005, boul. Laure, bureau 110, Uashat, QC T: (418) 968-1246 F: (418) 962-2449
	Société de développement économique de Uashat et Mani-Utenam 1089, Dequen, CP 8000, Uashat, QC, G4R 4L9 T: (418) 962-4000 F: (418) 968-3131
Publishers	Journal Innuvelle 108-B, boul. des Montagnais, Sept-Îles, QC, G4R 5P9 T: (418) 962-3535 F: (418) 962-3575
Education	Institut Culturel et Éducatif Montagnais (ICEM) 1034, rue Brochu, Uashat, QC, G4R 4L9 T: (418) 968-4424 F: (418) 968-1841
	École Johnny Pilot 100, Pashin, Uashat, QC, G4R 5V2 T: (418) 962-5777 F: (418) 961-2666
	École Manikanitesh 1, rue Ukuiass, Uashat, QC, G4R 4K1 T: (418) 968-1550 F: (418) 962-6509
Electronics and Appliances – Sales, Repairs and Appliances	Parabolique SG Satellite enr. 1073, Arnaud, Uashat, QC, G4R 5N5 T: (418) 962-3190 F: (418) 962-3190
Day Care Services	Garderie Uassis 196, Innut, Mani-Utenam, QC, G4R 4K2 T: (418) 927-3370 F: (418) 927-3394
Government	Regroupement Mamit Innuat 350, rue Smith, bureau 250, Sept-Îles, QC, G4R 3X2 T: (418) 968-2693, (418) 968-2731 F: (418) 962-2591
Real Estate, Property Managers and Related Services	Immobilière Montagnaises 1005, boul. Laure, Sept-Îles, QC, G4R 4S6 T: (418) 962-4979 F: (418) 968-6114
Physicians and Other Health Practitioners	Clinique dentaire Mani-Utenam 115, rue des Montagnais, Mani-Utenam, QC, G4R 4K2 T: (418) 927-3024 F: (418) 927-2165
	Danielle Descent Psychologue 312, Anek, Mani-Utenam, QC, G4R 4K2 T: (418) 927-2985
Museums and Heritage Sites	Musée Shaputuan 290, boul. des Montagnais, Uashat, QC, G4R 5R2 T: (418) 962-4000 F: (418) 962-3131
Senior Citizens Services and Centres	Foyer Mishte An Auass 1126, Dequen, Uashat, QC, G4R 4L9 T: (418) 962-4736
	Foyer Pishimuss 1093, Dequen, Uashat, QC, G4R 4L9 T: (418) 962-4736
	Foyer Tshishennuat 297, Anek, Mani-Utenam, QC, G4R 4K2

Sector of Activity	Business/Organization Name and Address
	T: (418) 927-3117 F: (418) 927-3304
	Foyer Uikupeshakan 2, Shimun, CP 8000, Uashat, QC, G4R 4L9 T: (418) 968-6221 F: (418) 968-6255
Police and Fire Fighters	Securité publique Uashat et Maliotenam 101, boul. des Montagnais, Uashat, QC, G4R 5R1 T: (418) 968-4010 F: (418) 9451
	Service de protection des incendies 101, boul. des Montagnais, Uashat, QC, G4R 5R1 T: (418) 927-3254 F: (418) 968-9451
Outfitters- Hunting and Fishing	Pouvoire Aigle Vollant 1089, Dequen, CP 8000, Uashat, QC, G4R 4L9 T: (418) 962-0327 F: (418) 968-0937
	Pourvoire Camp Trio 600, Mercier, Moisie, QC, G0G 2B0 T: (418) 927-2569 F: (418) 927-2350
	Pourvoire de Lac Vital 1089, Dequen, CP 8000, Uashat, QC, G4R 4L9 T: (418) 962-0327 F: (418) 968-0937
	Pouvoire Messnak 1089, Dequen, CP 8000, Uashat, QC, G4R 4L9 T: (418) 962-0327 F: (418) 968-0937
Radio Stations	Radio CKAU-FM Kushapetsheken, Apetuasmiss (90,1 FM) (104,5 FM) 100, rue des Montagnais, Mani-Utenam, QC, G4R 4K2 T: (418) 927-2476 F: (418) 927-2800
Restaurants	Brasserie Anouk 52, Uishtapish, Mani-Utenam, QC, G4R 4K2 T: (418) 927-2616
	Chez Cora 1006b, boul. Laure, Uashat, QC, G4R 5P1 T: (418) 962-1945
	Salle de danse Bar Nashville et reception 1006a, boul. Laure, Uashat, QC, G4R 5P1 T: (418) 968-1006 F: (418) 968-1006
Social Services	Salle communautaire Teueikan 100, boul. des Montagnais, Mani-Utenam, QC G4R 4K2 T: (418) 968-1223 F: (418) 968-1308
Gas Stations	Station Innu-Ultramar 100, boul. des Montagnais, Uashat, QC, G4R 5P9 T: (418) 967-4866 F: (418) 968-5284
	Station Service Dan Esso CP 52, Moisie, QC, G0G 2B0 T: (418) 962-4748
Taxis	Taxi Innu 1054, Arnaud, Uashat, QC, G4R 5N2 T: (418) 961-6163
Tourism and Travel Agencies	Essor Communauté-Organisation/ECO

Sector of Activity	Business/Organization Name and Address
	100, boul. des Montagnais, bureau 102, Sept-Îles, QC G4R 5P9 T: (418) 968-1223 F: (418) 968-1308
	Corporation touristique Uashat Mani-Utenam Inc. Boul. des Montagnais, Uashat, QC, G4R 5R2 T: (418) 962-4000 F: (418) 927-2262
Addiction – Information and Treatment Centres	Centre Miam Uapukun 191, rue de l'Église, Mani-Utenam, QC, G0G 2B0 T: (418) 927-2254 F: (418) 927-2262
Translation and Interpretation	Traduction Uapikun 16, Blandine, Uashat, QC, G4R 5A8 T: (418) 968-2166
Transportation	Transport ferroviare Tshiuetin 1005, boul. Laure, bureau 305-C, Sept-Îles, QC G4R 4S6 T: (418) 960-0982 F: (418) 960-0984
Video, Film and Sound Recording Industries	Sonorisations CKAU 100, rue des Montagnais, Uashat, QC, G4R 4K2 T: (418) 927-2476 F: (418) 927-2800
	Place Uashat 1005, boul. Laure, Uashat, QC, G4R 4S6 T: (418) 962-4979 F: (418) 968-6114
	Productions Manitou CP 1243, Sept-Îles, QC G4R 4X7 T: (418) 927-2251
	Promotions Innu Nikamu 312, Anik, Mani-Utenam, QC G4R 4K2 T: (418) 927-2985 F: (418) 927-3013
	Tshishe Ameshkuet 1035, Brochu, Uashat, QC, G4R 4S8 T: (418) 962-5254 F: (418) 962-6036

Source: Indiana Marketing (no date)

5.5.18.2 Labrador Innu

The 2006 Census did not contain data on employment/unemployment rates or income for Sheshatshit. The data for Census Subdivision 10C, of which roughly 95% of the population resides in Sheshatshit, were as follows: 36.5% employed; 28.6% unemployed; and a median income of $16,176 for those earning income (Statistics Canada 2009a, Internet site).

In the early 1990s, the Sheshatshit Band Council employed two to four permanent staff and might have been one of the major employers in the community. There were no Innu-run businesses in Sheshatshit in 1992 (MacLaren Plansearch January 1994).

Income for an Innu male from the Sheshatshit region in 1985 was $10,137 – half of the income earned by males in Labrador as a whole; the differential for women was approximately 30% ($7,083 *versus* $10,110) (MacLaren Plansearch January 1994).

The 2006 employment and unemployment rates for Natuashish were 47.7% and 26.8% respectively (Statistics Canada 2009a, Internet site). The median income of the earning labour force was $17,600 in 2005.

Appendix 12 lists for selected categories the businesses that have a majority ownership of Labrador Innu. Joint ventures in which Labrador Innu have a minority ownership are shown in Appendix 13.

5.5.18.3 Communities in Labrador

In 2006, the employment and unemployment rates for Census Division 10 were 57.8% and 17.5% respectively. The 2005 median income of the earning labour force was $24,927 (Statistics Canada 2009a, Internet site).

Labrador West fared better than the whole of Census Division 10: the employment rate was 66%; the unemployment rate was 8.5%; and the median income of the earning labour force was $33,488.

Table 5.58 provides data for other parts of Labrador.

The GNL is an important employer in the public sector (LIM December 19, 2008).

There are 311 companies in Labrador West, 84% of which have less than 20 employees (LIM December 19, 2008). The principal private-sector employers are the IOCC and Wabush Mines, which employ approximately 1,100 and 375 individuals respectively at Labrador City and Wabush (Labrador West Business & Investment 2009, Internet site).

Table 5.63 gives the number of selected types of businesses in Labrador West. The businesses in question are listed in Appendix 13.

Table 5.63: Selected Types of Businesses in Labrador West

Type of Businesses	Number of Businesses by Type
Auto – Sales/Services/Supplies	21
Building Supplies	10
Computer Sales/Services/Training	6
Construction	15
Contractors – General	21
Electrical Contractors and Suppliers	6
Engineering	5
Environmental/Waste Management	7
Fuel Oil	4
Industrial Sales/Services/Equipment	43
Insurance/Adjusting	6
Labour	5
Landscaping	3
Office Supplies/Equipment and Services	5
Plumbing and Heating Services	6
Refrigeration	1
Rentals – Equipment	14
Rentals - Vehicles	2

Type of Businesses	Number of Businesses by Type
Safety Supplies	6
Security Services	3
Truck (Heavy) Service	4

Source: Labrador West Business & Investment (2009, Internet site)

5.5.18.4 Communities in Québec

The 2006 employment rate for Fermont was 76.8%, while the unemployment rate was only 4.1% (Statistics Canada 2009a, Internet site). The 2005 median income of the earning labour force was $58,871.

Table 5.59 presents data for rest of the Québec portion of the RSEA.

An important employer in the Fermont region is Arcelor Mittal, which employs approximately 1,000 persons at its Mont-Wright mine (Arcelor Mittal 2009, Internet site).

5.5.19 Land- and Resource-use in RSEA

5.5.19.1 Uashat mak Mani-Utenam

ITUM declined several requests from NML to undertake, or to take part in, a study of contemporary land- and resource-use by its members in the LSEA and the RSEA. The present section relies, therefore, on publicly available data that may in some cases be outdated or incomplete.

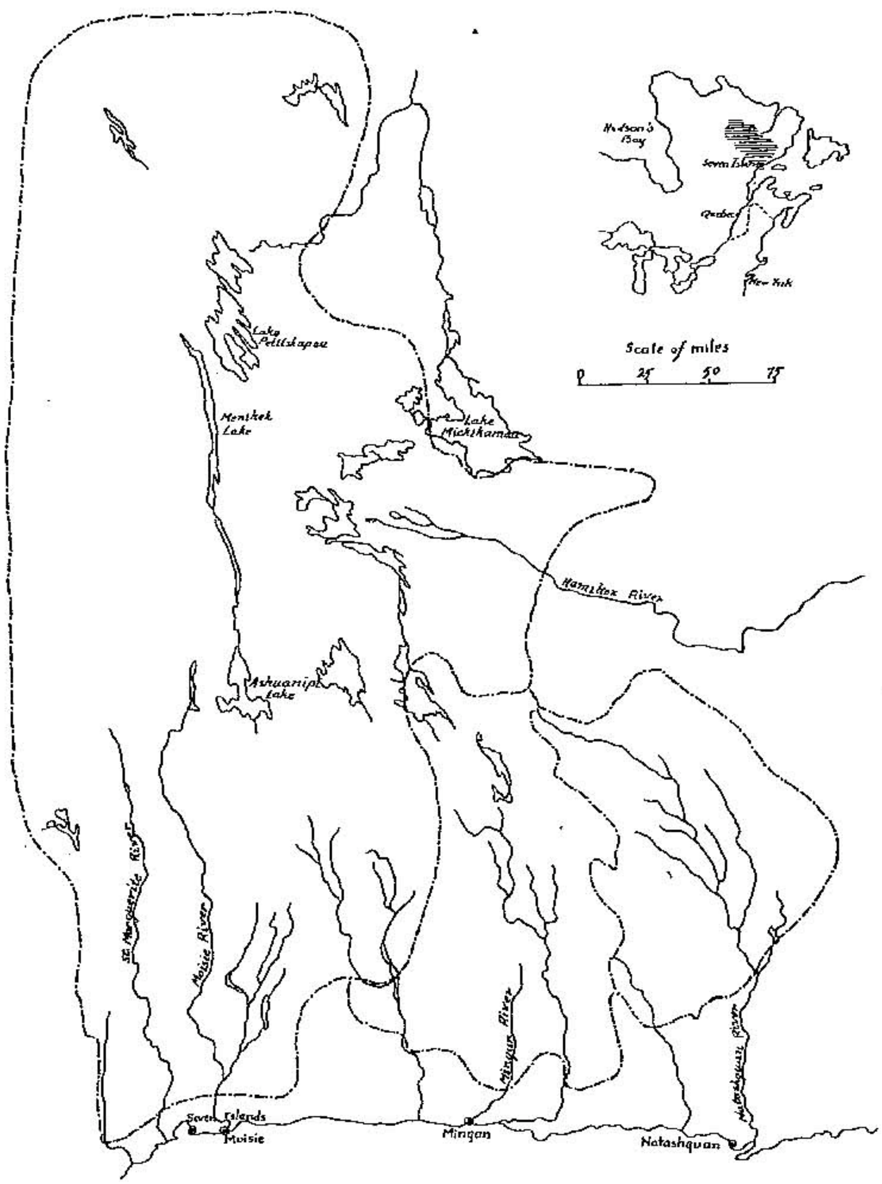
The Innu of Uashat and Mani-Utenam claim traditional lands with a total area of approximately 88,000 km^2; these lands are located in the Province of Québec from the fleuve Saint-Laurent to the 56^{th} paralle of latitude (Figure 5.59), and in the Province of Newfoundland and Labrador between approximately 50^o00' and 53^o50' N and 64^o00' and 68^o00' W (Uashaunnuat de Uashat et de Mani-Utenam *et al*. 2007).

The main axis of travel of the Innu of the Moisie area extended between the mouth of the Moisie River and Menihek Lake to the north. Menihek Lake is at the “crossroads for several trails criss-crossing the eastern slope of the Caniapiscau basin and the head of the George and Whale river basins, in the northern and north-eastern part of the territory and […] the Nascaupi and Hamilton basins in the east” (Laforest 1983) [unofficial translation]. Many secondary routes extending outwards from Menihek Lake allowed hunters to travel in all directions. One in particular extended to the Matimekush area (Clément Mai 2009).

We are aware of no camps belonging to members of ITUM in the Howells River basin, but its lowermost reaches fall at the northern extremity of an area classified as containing gathering places for family clans.

As noted in Section 5.5.15.1, two traplines belonging to members of ITUM overlap with the LSEA. Areas trapped by the Innu of Sept-Îles, Mingan and Natashquan, of whom approximately 140 were from Sept-Îles, in fall 1950 cover the ELAIOM site (Figure 5.67). The trapping territory of the Innu of Québec in 1980 also overlapped with the ELAIOM (Figure 5.68). Armitage (1990) noted that the Innu of Sept-Îles were the primary users of the lac Joseph and Menihek Lake areas.

Figure 5.67: Areas Trapped by the Seven Islands, Mingan and Natashquan Bands in Fall 1950



Areas Trapped by the Seven Islands, Mingan, and Natashquan Bands in the Fall of 1950

Approximate number of trappers: Seven Islands, 140; Mingan, 35; Natashquan, 25.

Source: Leacock (1974)

Up until the 1960s, entire Innu families from Schefferville/Matimekush/Lac John and Sept-Îles/Uashat/Mani-Utenam and, to a lesser extent, Mingan, would go into the interior for eight months a year (ESGD March 1986). In the post-1960 period, the extent of their stays inland decreased gradually.

Figure 5.68: Trapping Territory of Québec-based Innu in 1980

Source: Ratelle (Août 1987)

5.5.19.2 Labrador Innu

IN declined several requests from NML to undertake, or to take part in, a study of contemporary land- and resource-use by its members in the LSEA and the RSEA. The present section relies, therefore, on publicly available data that may in some cases be outdated or incomplete.

NNK and NIMLJ informants state that members of IN have not used the LSEA or the Schefferville area of the RSEA within living memory.

It is difficult to document in detail Labrador Innu land- and resource-use in the pre-1900 period because of a lack of reliable data (Armitage 1990). Specialists rely only on archaeological evidence for that period.

Nonetheless, we can say that, after 1850, the fur-trade had a significant effect on Innu social organization and on their land- and resource-use by reducing their mobility (Armitage 1990). Nevertheless, "…after 1850, numerous Innu groups continued to travel long distances to trade at different posts" (Armitage 1990). The trading posts in Labrador are shown on Figure 5.69. At the time Armitage conducted his study (1990), a number of Innu living in Sheshatshit and Natuashish remembered travelling to Fort Chimo, Lac Caniapiscau, Sept-Îles and Musquaro (Mingan).

Figure 5.69: Trading Posts of Hudson's Bay Company Visited by Innu circa 1860

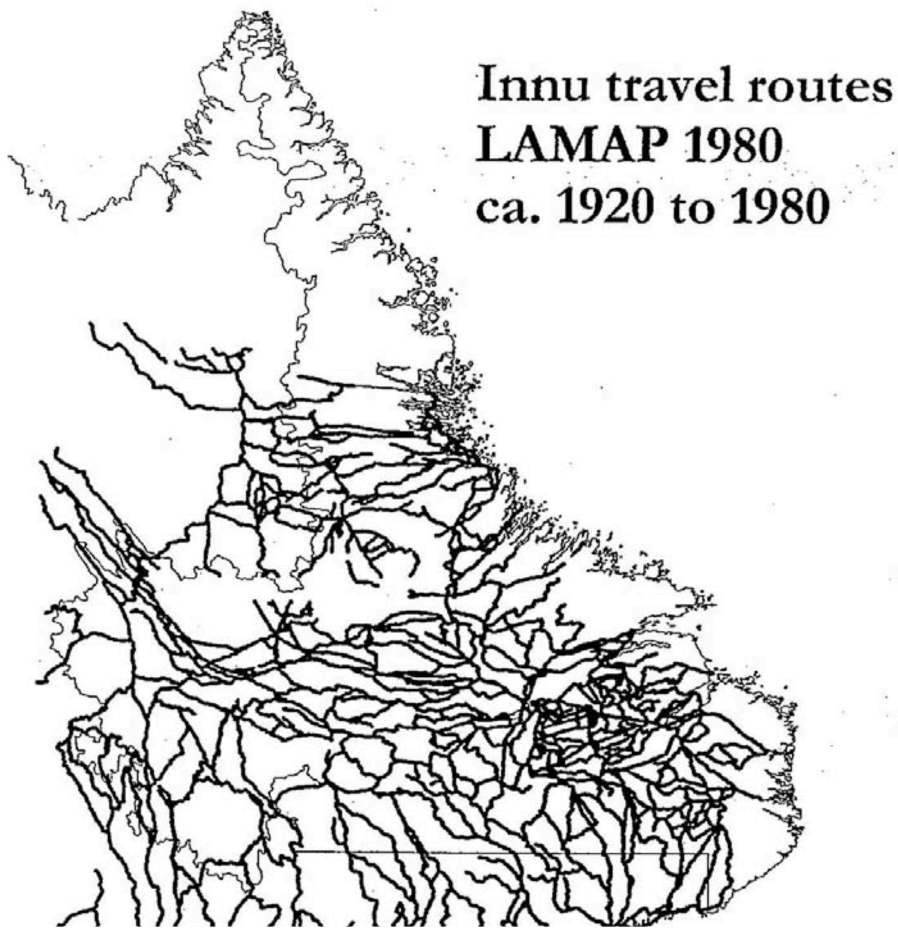
Source: Mailhot (1993)

By the end of the 1950s, the majority of Innu from Sheshatshit had abandoned their nomadic existence and had taken up quasi-permanent residence in the village, although many of them travelled to the interior of Labrador to hunt caribou in fall and winter (ESGD March 1986). Individuals continued to hunt, trap and harvest firewood near the village.

Between 1979 and 1987, Labrador Innu continued to occupy most of the territory occupied during the pre-settlement period and to use harvesting areas for caribou, Black bear, moose, furbearers (including fox, mink, marten, beaver, weasel, lynx and muskrat), small game (including spruce grouse, willow ptarmigan and hare), migratory waterfowl, fish and berries (Armitage 1990).

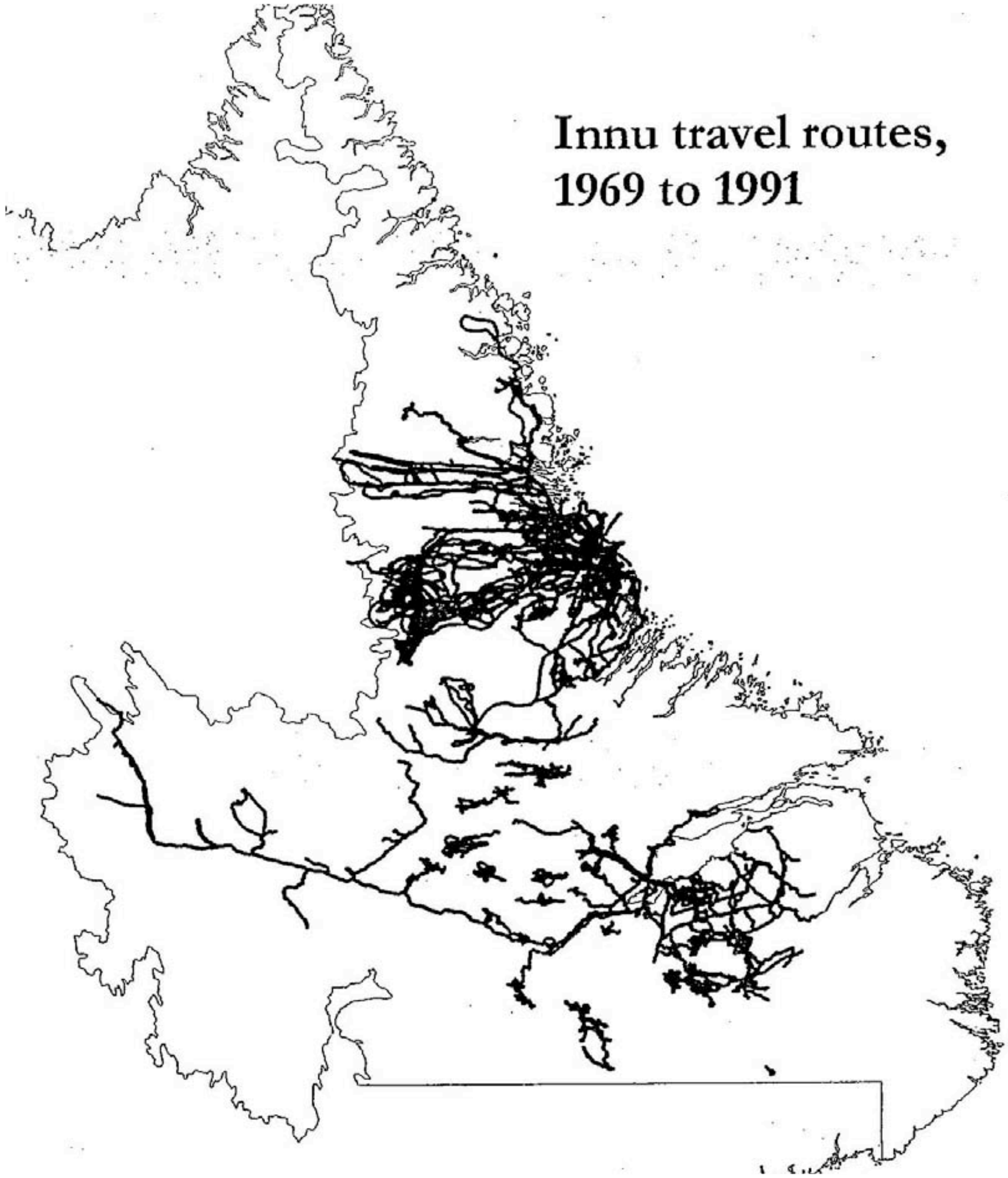
Figures 5.70 and 5.71 respectively show travel routes for the periods 1920-1980 and 1969-1991. They show that three routes recorded for the period 1920-1980 and one route for the period 1969-1991 are close to the ELAIOM sites. Figures 5.72, 5.73 and 5.74 also suggest that Labrador Innu may have used sites in the Schefferville area within the last 20 years, but that they were at best of marginal importance.

Figure 5.70: Innu Travel Routes, 1920-1980



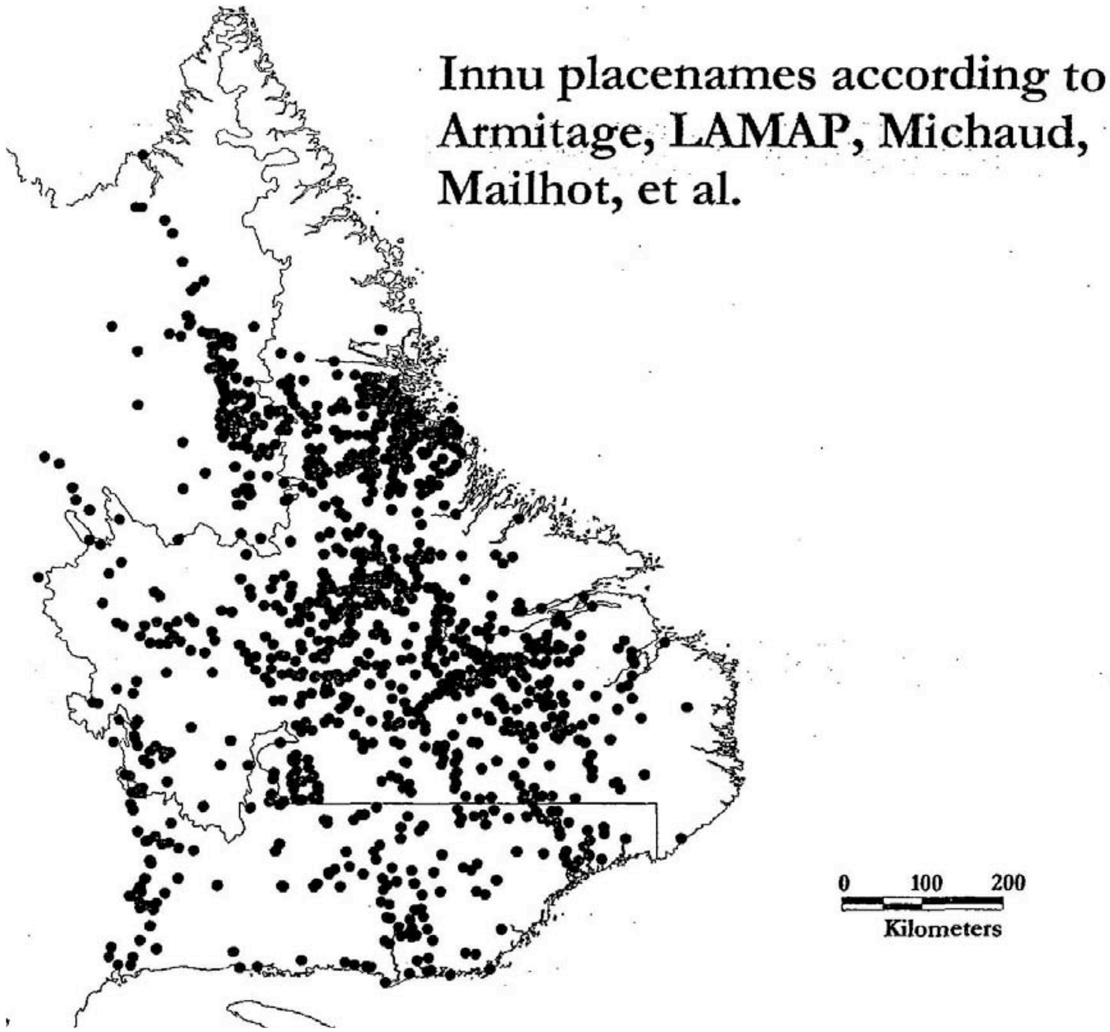
Source: Anonymous (July 1, 1998)

Figure 5.71: Innu Travel Routes, 1969-1991



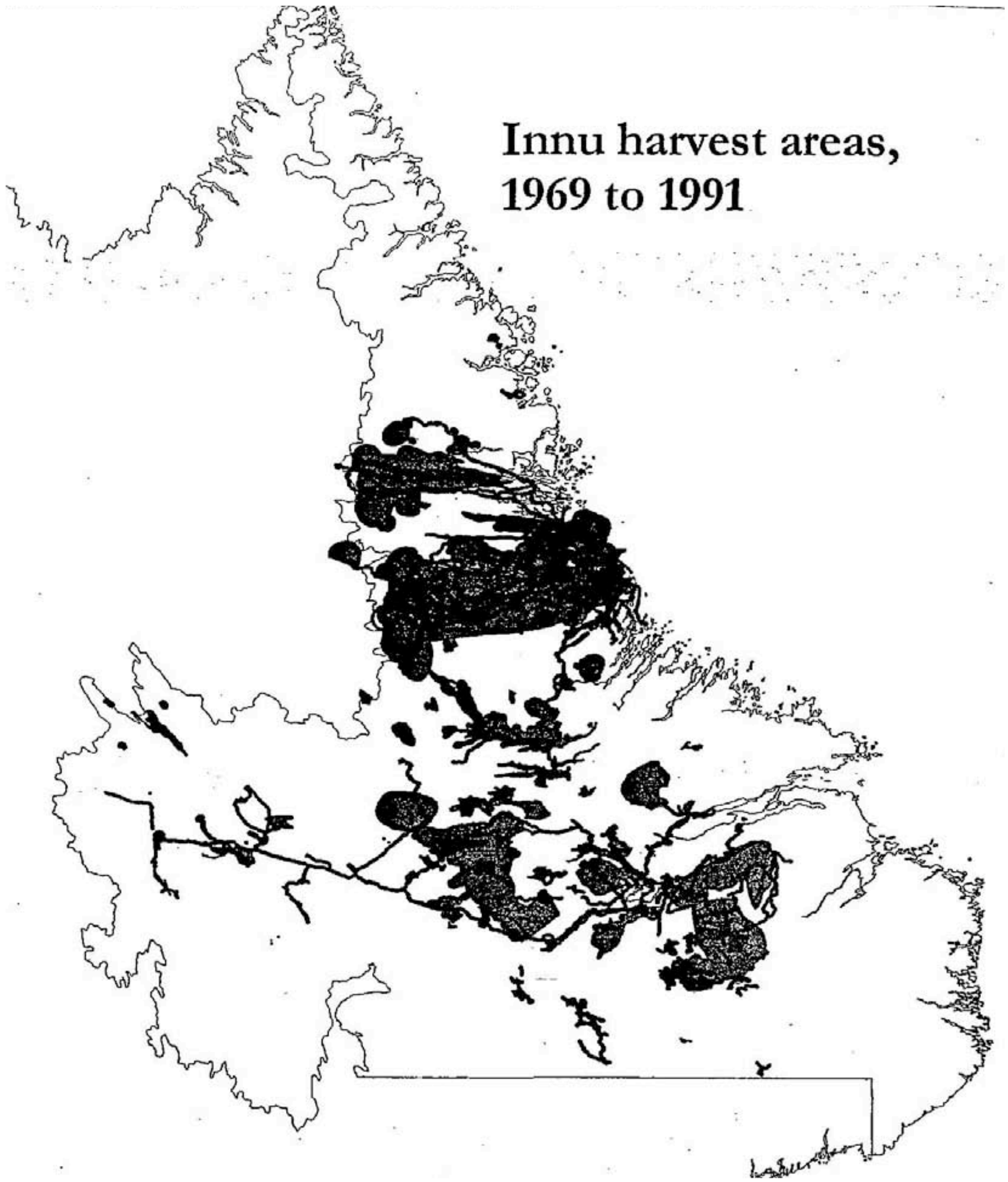
Source: Anonymous (July 1, 1998)

Figure 5.72: Innu Place Names



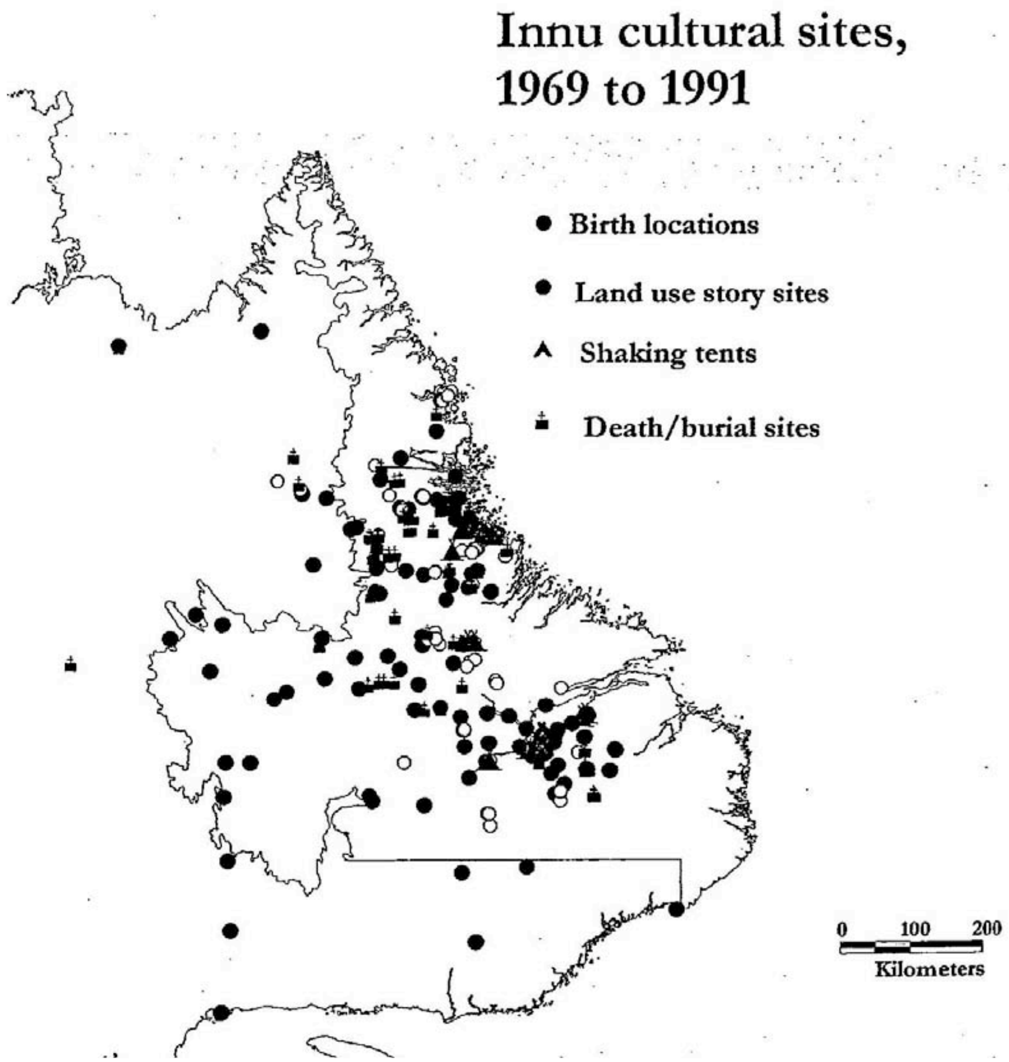
Source: Anonymous (July 1, 1998)

Figure 5.73: Innu Harvesting Areas



Source: Anonymous (July 1, 1998)

Figure 5.74: Innu Cultural Sites



Source: Anonymous (July 1, 1998)

Note: We are unable to explain the significance of the white dots, and we cannot explain the use of two black dots in the legend.

Inter-band mobility, that is hunting on the territory of other bands, was extremely frequent in the pre- and post-settlement periods. Less than one third of Mailhot's (1993) informants had spent all their lives on the territory of the Sheshatshit band, and many had lived in the territory of two, three and even four different bands (including the Innu bands based in Québec).

Although band territories existed, they were open units in a constant and dynamic relationship with adjacent bands. The Innu regularly took advantage of the possibilities that their vast networks of relations offered to use neighboring bands' territories (Mailhot 1993).

Figure 5.75 shows the travel routes between Innu groups of the eastern Québec-Labrador Peninsula before 1960. The Schefferville area formed part of travel routes between Lake Melville and the Menihek drainage.

Inter-band mobility has diminished considerably in the post-settlement period (Armitage 1990).

Figure 5.75: Travel Routes and Band Territories of Eastern Québec-Labrador Peninsula before 1960

Source: Mailhot (1993)

Sheshatshit

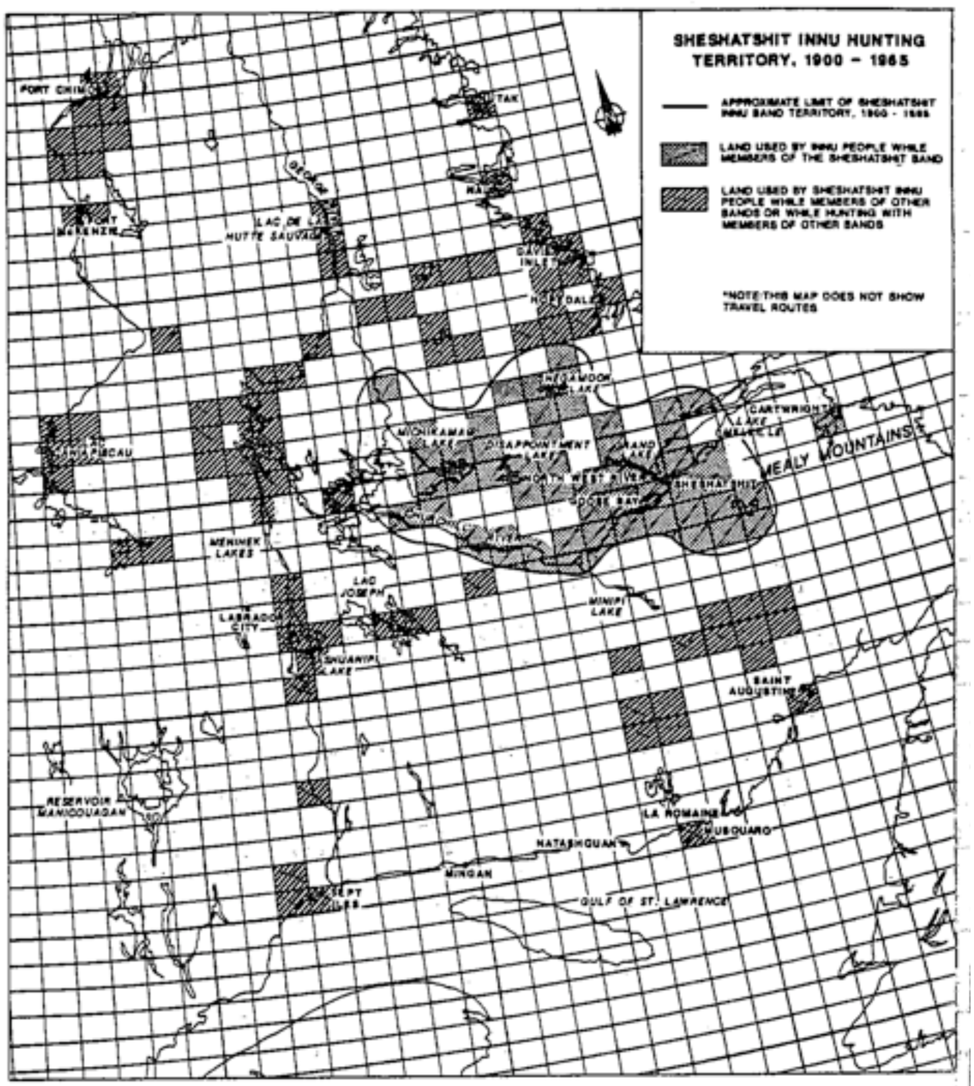
The territory used by the Sheshatshit Innu corresponds more or less to Lake Melville and its drainage basin (Mailhot 1993). It is very difficult to establish its exact extent, because it has changed through time. Since the end of the 19th century, the area occupied and used by the Sheshatshit Innu has been decreasing (Mailhot 1993).

Armitage (1989) mapped land-use by the 32 Sheshatshit informants of Mailhot (1988) who were aged between 42 and 88 years at the time (Figure 5.76). Although the small sample may have distorted the resulting picture of historic land-use, it provides insights into Sheshatshit Innu activities in the vicinity of the LSEA. Areas around Schefferville and the ELAIOM site were used by Sheshatshit Innu when they were members of other bands or when they were hunting with members of other bands. In the same way, other Innu used certain areas when they were members of the Sheshatshit Band. On that basis, the Schefferville area (Québec and Labrador) does not appear to have been a part of the lands of the Sheshatshit Innu.

Figure 5.76 presents the approximate area used by the Sheshatshit Innu in the pre-settlement period, distinguishing between the area occupied by Innu while members of the Sheshatshit band – which does not extend west of Michikamau Lake – and the area occupied by Sheshatshit Innu while members of other bands or while hunting with members of other bands. It does not show the travel routes used to gain access to the various hunting regions or to the trading posts and missions. The Innu harvested small game, fish and other wildlife as they travelled along these routes to their fall and winter hunting and trapping grounds.

The maps showing travel routes between 1920 and 1970 do not extend west as far as Menihek Lake (Armitage 1990).

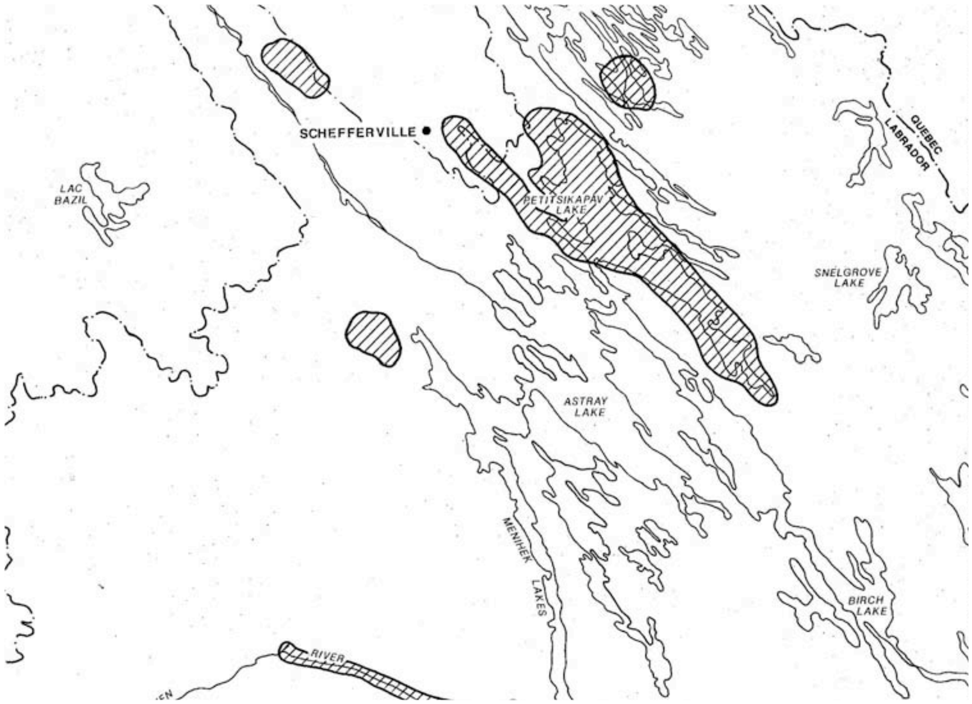
Figure 5.76: Sheshatshit Innu Hunting Territory, 1900-1965



Source: Armitage (1989)

Figure 5.77 presents a portion of a composite harvesting map included in Armitage (1990), which shows harvesting areas of the Sheshatshit Innu for the period 1979-1987. At that time, the Sheshatshit Innu continued to use most of the territory occupied in the pre-settlement period.

Figure 5.77: Contemporary Land Use and Occupancy (1979-1987) Sheshatshit Innu Harvesting Areas – Section of Composite Map (All Species)



Source: Armitage (1990)

Two areas are in or near the LSEA: the first has an area of about 50 km^2, the centre of which is approximately 20 km north-east of Schefferville, in the DSO3 and DSO4 areas; the second is a much larger area encompassing a good part of Petitsikapau Lake, its northern point being 2 or 3 km east of Schefferville and extending south-west for approximately 60 km with a width varying from 5 to 15 km. The latter area is close to DSO1.

In the 1980s, members of this group harvested along Menihek Lake and the Ashuanipi River as far south as Molson Lake (beside the QNS&LR) and in the vicinity of Petitsikapau and Attikamagen Lakes east of Schefferville (Armitage 1990).

The primary areas where Sheshatshit Innu harvested caribou over the 1979-1987 period are located east and north-east of Churchill Falls (Figure 5.78). The same can be said for the harvesting of fish, small game and migratory birds and the trapping of furbearers (Figure 5.79, Figure 5.80 and Figure 5.81).

Figure 5.78: Caribou, Moose and Black Bear Harvesting Areas Used by Sheshatshit Innu, 1979-1987

Source: Nalcor Energy (February 2009)

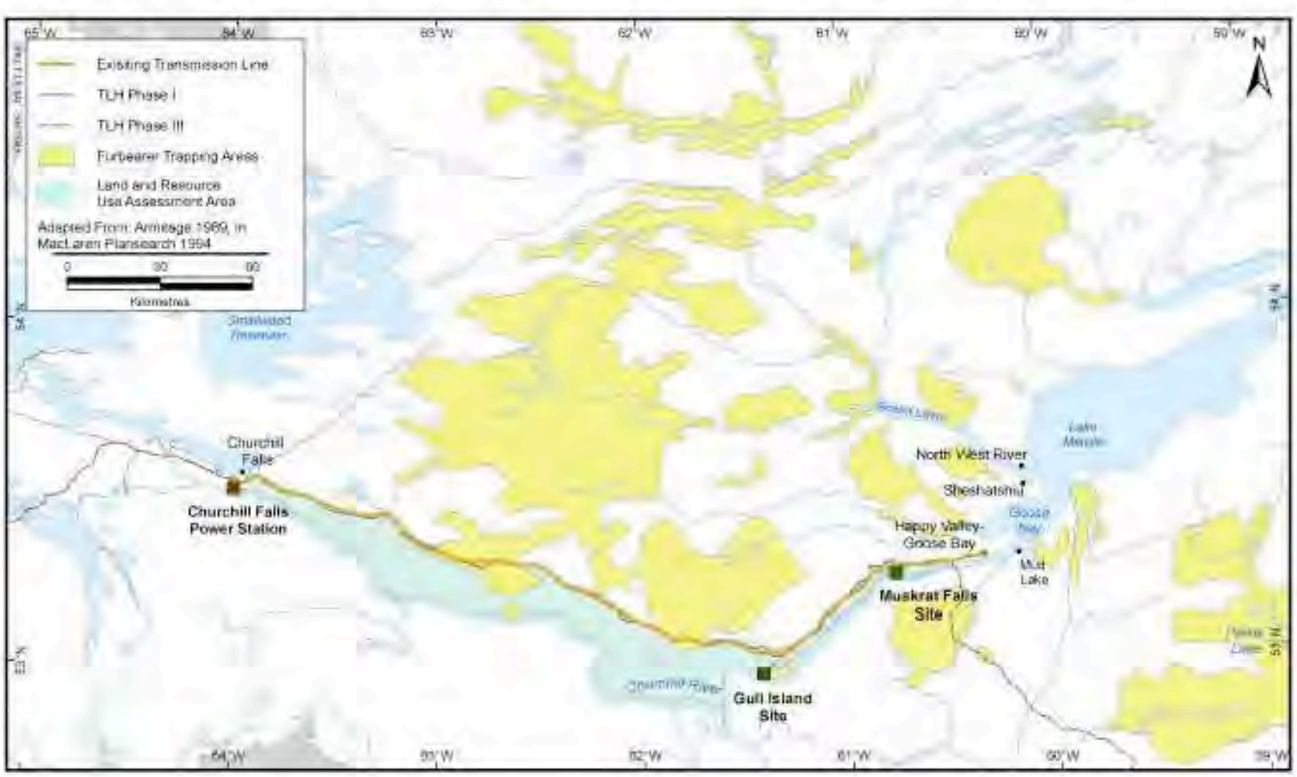
Figure 5.79: Fish and Small Game Harvesting Areas Used by Sheshatshit Innu, 1979-1987

Source: Nalcor Energy (February 2009)

Figure 5.80: Migratory Bird Harvesting Areas Used by Sheshatshit Innu, 1979-1987

Source: Nalcor Energy (February 2009)

Figure 5.81: Furbearer Trapping Areas Used by Sheshatshit Innu, 1979-1987



Source: Nalcor Energy (February 2009)

Caribou hunting does not seem to have the same importance for Sheshatshit Innu as for the Natuashish Innu: in 1987, over half of the adult males from Utshimassit harvested caribou, compared to less than 10% of those from Sheshatshit (Armitage 1990). Sheshatshit Innu harvested 165 caribou in 1987 (Armitage 1990).

More recently, Sheshatshit Innu have travelled along the Trans Labrador Highway to Esker to hunt caribou (Armitage and Stopp 2003).

Land use has declined in the post-settlement period because the Sheshatshit Innu no longer canoe and walk to inland hunting areas and to trading posts and missions. Numerous travel routes throughout Nitassinan are therefore no longer utilized for harvesting small game and other wildlife (Armitage 1990).

Land use by the Sheshatshit Innu further declined as a direct result of: the encroachments by the industrial society and a growing frontier population in Happy Valley/Goose Bay, Churchill Falls, Wabush and Labrador City; non-Innu harvesting activities; and the flooding of the Smallwood Reservoir (Armitage 1990).

Natuashish

Until 1948, the members of the Natuashish band spent most of the year in the vicinity of Indian House Lake and along the George River. The territory that they used lay between Snegamook Lake and the Kogaluk River, which intersected with the George River to include lac de la Hutte Sauvage in the Province of Québec (Armitage 1990; Mailhot 1993).

The Natuashish Innu ceased traveling as far west as the George River after 1948, when the GNL attempted to settle many of them in Nutak, where they were encouraged to participate in commercial fishing (Henricksen 1977). They soon returned to Natuashish, as they disliked both Nutak and commercial fishing.

During the period 1955 to 1970, hunting activities began to shift east (Henricksen 1977). By 1980, the area used regularly was mainly the basins of the Kogaluk and Notowanon rivers. It no longer extended into Québec (Armitage 1990).

Unlike the Innu of Sheshatshit, the Innu of Natuashish were more dependent on caribou and were never fully integrated into the fur trade (Armitage 1990). Caribou hunting therefore occupies the largest geographical area of contemporary harvesting by the Natuashish Innu (Henricksen 1977). Moose and Black bear are harvested in very low numbers.

Contemporary caribou hunting and trapping areas include the region between Adhuapun and Mistastin Lake in fall, and the entire barren-ground region west of Natuashish, between the coast and Ushpuakanish, during winter (Armitage 1990). The use of the LSEA and the adjacent portions of the RSEA is therefore not recorded for the Natuashish Innu.

Conclusion

The documents reviewed suggest that there is some evidence of the use of land and/or resources by some Labrador Innu close to the ELAIOM site, but that it was of peripheral importance. The data reviewed are not precise enough to provide insights into the exact location and the type of usage.

The foregoing evidence is not easy to interpret. It appears that the LSEA and adjacent parts of the RSEA have been used to a small degree by some Innu from Sheshatshit, but that most of that use pre-dates living memory, a point on which Innu and Naskapi informants from the Schefferville area are adamant. The decision of IN to defer a decision on whether to conduct or to participate in a study of land- and resource-use in the LSEA and adjacent areas inhibits more definitive conclusions.

5.5.20 Infrastructure and Services in RSEA

5.5.20.1 Services

The present section deals only with post-secondary education services, of which NML may avail for training purposes.

In Labrador West, the College of the North Atlantic has a campus in Labrador City. It is attended by approximately 300 full-time and 30 part-time students per semester, while over 1,000 students are registered in Continuing Education evening courses (CNA 2009, Internet site). Among the programmes offered in Labrador City are the following:

- Construction/Industrial Electrician Certificate (one year);
- Engineering Technology Diploma (first year);
- Industrial Mechanic (Millwright) Certificate (one year);
- Mining Technician Diploma (two years).

The RSM Safety Insitute, a subisidiary of RSM Mining Services Inc., is located in Labrador City. Founded in 2003, it is registered as a private training institution with the GNL. It offers the mining industry training in health and safety and equipment operation, including heavy equipment simulations and heavy equipment training in a pit (RSM Mining Services Inc. 2009, Internet site). The courses generally last no more than two days. They are given mainly in English, although some are offered in French (LIM December 19, 2008).

For more than 30 years, the Adult and Business Education Department of the Cégep de Sept-Îles has offered to individuals, organizations and businesses a wide range of training and refresher courses adapted to special needs and leading to a recognized qualification. The iron ore industry is one of the Cégep’s focal areas (Cégep de Sept-Îles 2009, Internet site).

The regular curriculum of the Cégep de Sept-Îles includes a course in industrial maintenance technology, which aims to train technicians to work in the industrial sector in general, including companies specializing in metal mining and primary processing as well as metal product manufacturing (Cégep de Sept-Îles 2009, Internet site).

5.5.20.2 Infrastructure

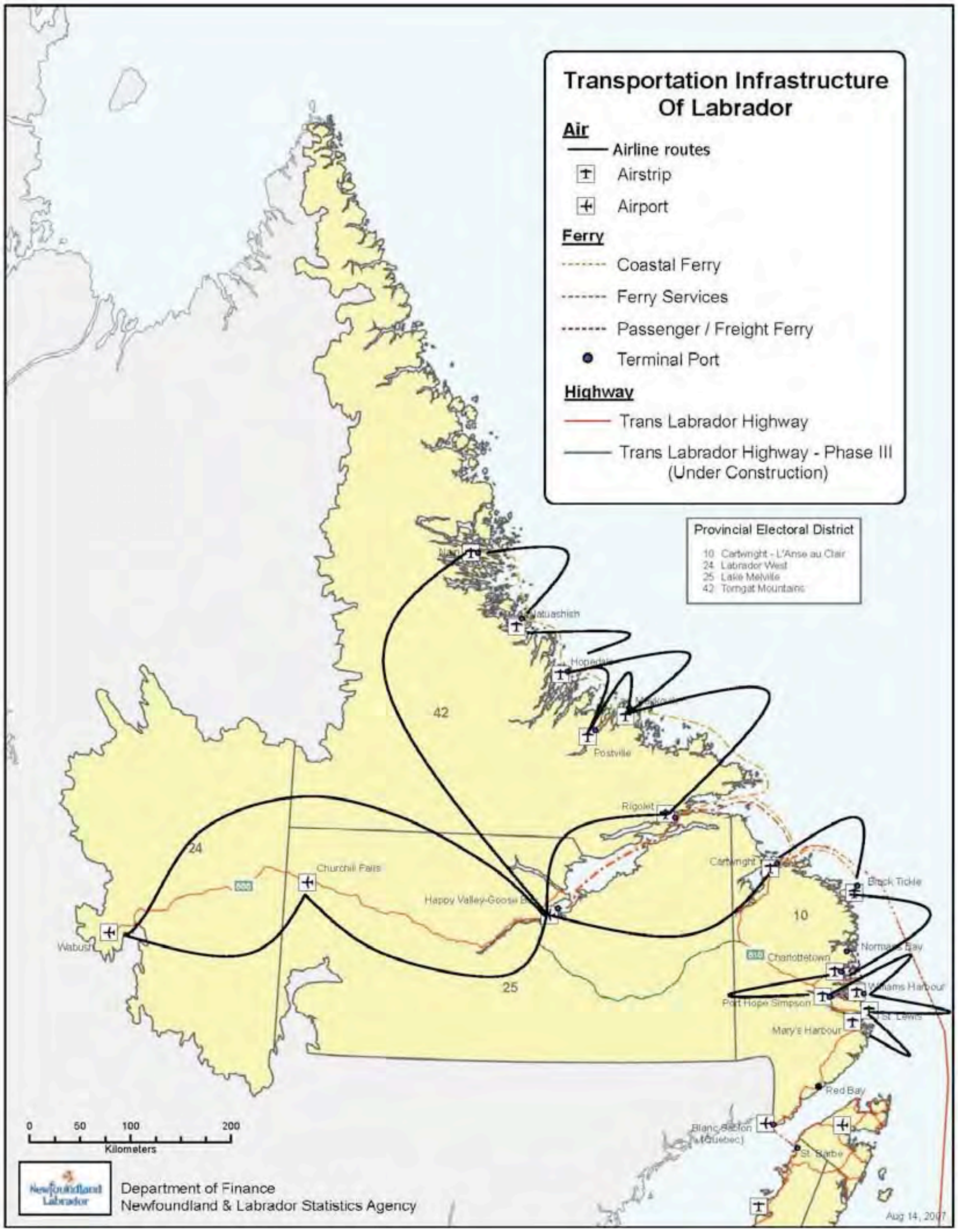
The following focuses on transportation networks and power generation and transmission facilities. Infrastructure related principally to mining, such as pelletizing plants and ship-loading facilities, is described in Section 5.5.21.

Transportation

The Trans Labrador Highway connects Labrador City/Wabush to Sheshatshit via Churchill Falls and Happy Valley-Goose Bay (Figure 5.82). From Labrador West it joins Route 389 in Québec, which goes to Baie-Comeau.

Many Labradorian coastal communities have scheduled air transportation service to Happy Valley-Goose Bay and thence to Churchill Falls and Labrador City/Wabush (Figure 5.82). There are daily flights between Sept-Îles and Schefferville.

Figure 5.82: Major Infrastructure, Labrador



Modified by PFWA, 2009

The 418-km-long QNL&SR, owned by the IOCC, runs from Sept-Îles, Québec, to Emeril, Labrador. The Arnaud Railway, owned by Wabush Mines, runs from the Arnaud Junction over a 34-km link between the QNS&LR and Pointe-Noire.

Figure 5.83 shows the aforementioned railways in addition to those servicing the Scully, Fire Lake and Mont-Wright mines and the railway operated by TSH.

The snowmobile trails recorded by governments and snowmobile associations that occur in the RSEA centre around Labrador City/Wabush/Fermont and Sept-Îles and follow the road between Esker and Churchill Falls (Figure 5.84). None occur in the LSEA.

Electricity

The Menihek Generating Station, located in Labrador some 48 km south of Schefferville, was built between 1950 and 1954 to supply electricity to the mining operations of the IOCC near lac Knob. Equipped with three turbine generators, its maximum generating capacity is 19.5 MW during break-up, declining to 14 MW under normal winter flow regimes and to a minimum of 8 MW during extremely low flows (Chapman 13 August 1991).

The IOCC operated the Menihek Station with its own personnel until November 2002 (CNIMLJ 30 octobre 2008), at which time it contracted out its operation and maintenance to a corporation owned by the NNK, KESI. As of October 2007, NLH is the owner of the electricity infrastructure located in Labrador that serves Schefferville, while HQD owns the electricity infrastructure located in the Schefferville area, including that which formerly belonged to the IOCC and the NNK. HQD also agreed to a five-year period over which the price of electricity in the Schefferville area will be increased to the level charged elsewhere in Québec south of the 53rd parallel. HQD has negotiated a 40-year electricity supply contract with NLH.

In early 2008, KESI was awarded maintenance contracts from HQD and NLH for the Québec- and Labrador-side electricity infrastructure respectively. KESI also manages the billing for electricity consumption in Schefferville and Kawawachikamach (NNK no date (a)).

The Churchill Falls Generating Station has a capacity of 5,428 MW. Completed in 1974, it harnesses approximately 65% of the potential generating capacity of the Churchill River (NLH 2009, Internet site). It provides power to the mining operations in Labrador West.

Figure 5.83: Railways

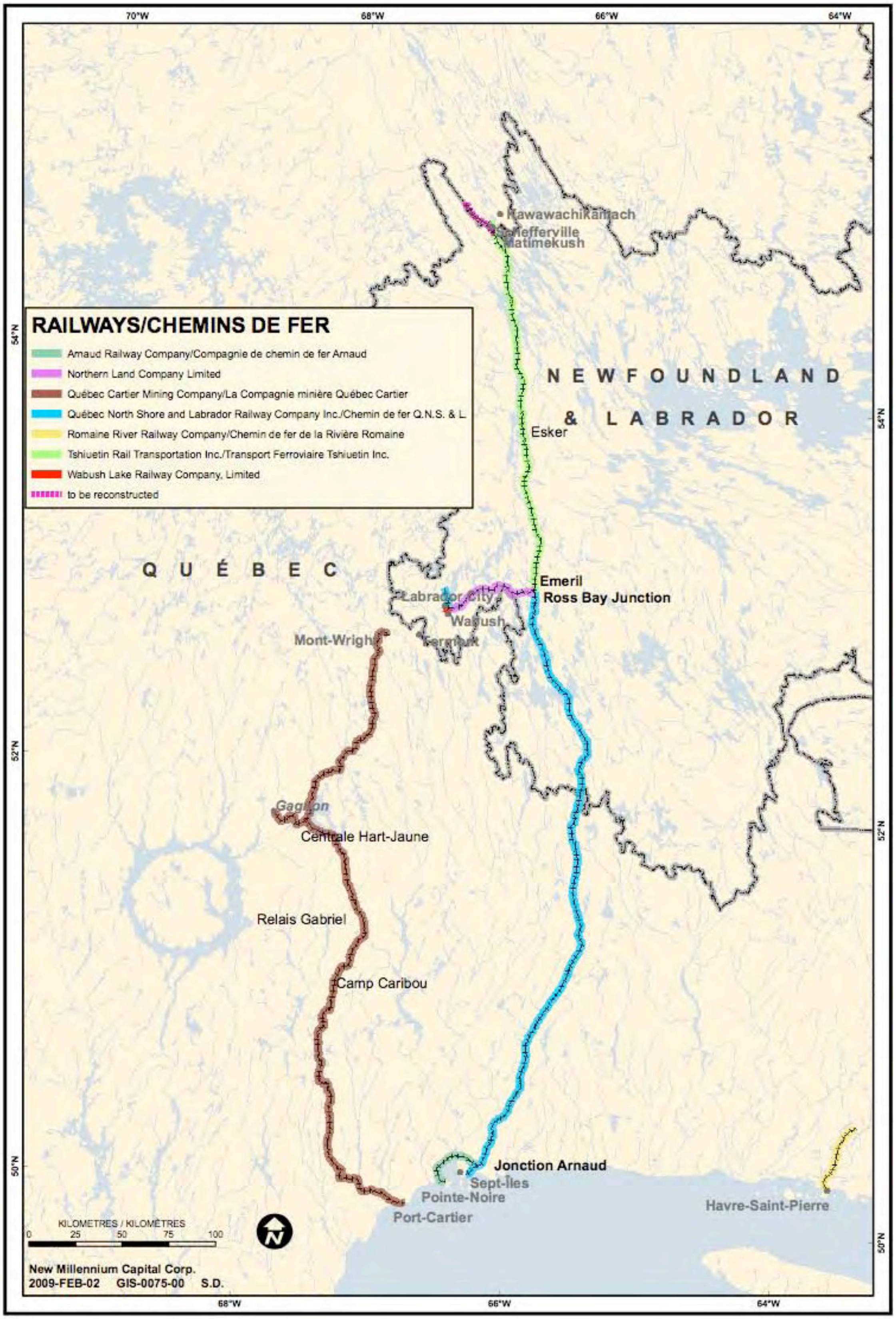
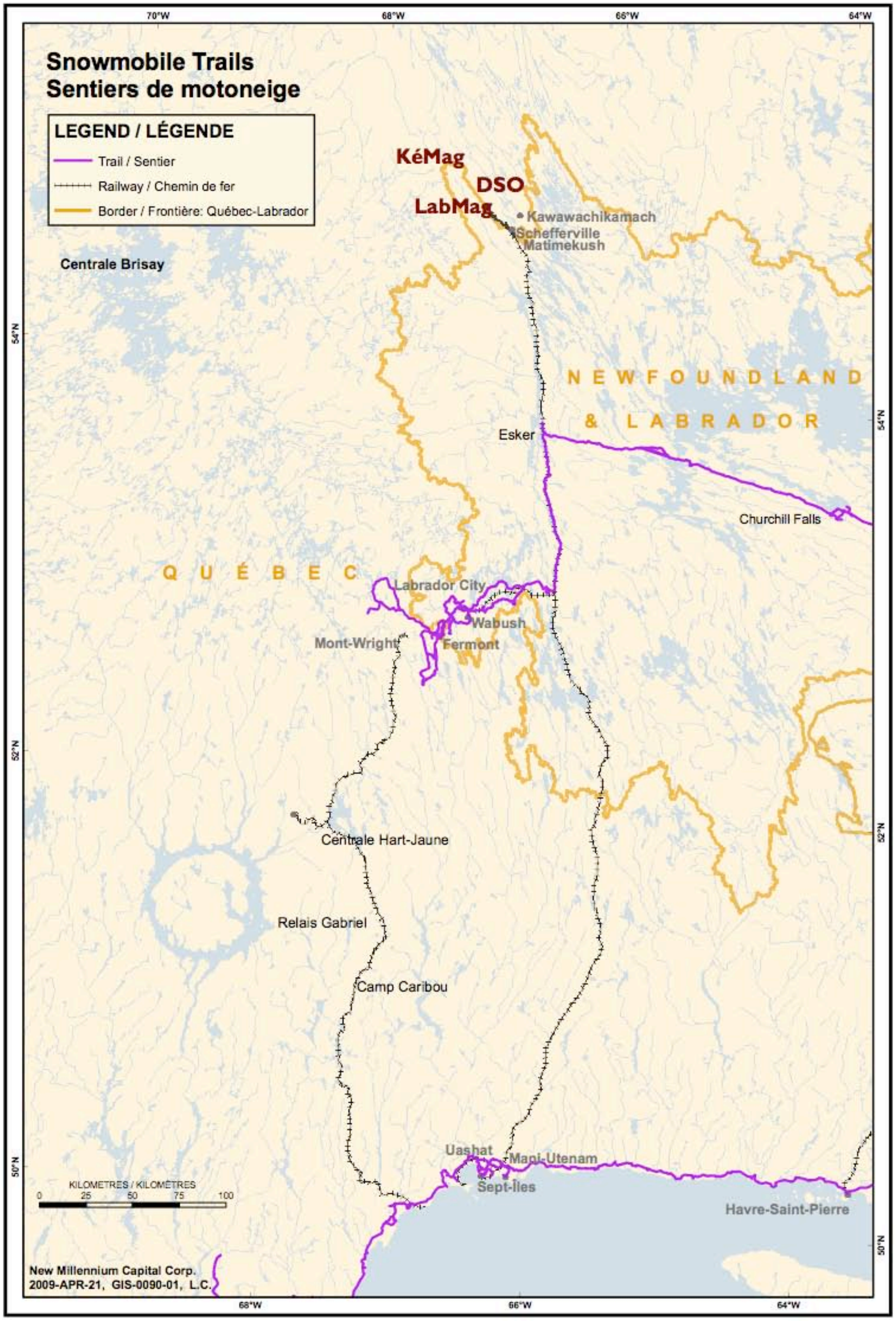


Figure 5.84: Snowmobile Trails



Source: Kent (2009, *personal communication*), NRC (2009, Internet site)

5.5.21 Industry in RSEA

Mining

For purposes of brevity and relevance, the present describes only current iron ore mining operations. Other mining projects in the RSEA, including past and potential projects, are summarized in Appendix 14.

The IOCC operates the Carol Lake mine, a concentrator and a pelletizing plant at Labrador City and port facilities at Sept-Îles. It also operates a 420-km railway connecting the mine to the port. Wabush Mines operates the Scully Mine at Wabush. The concentrate is transported by train to the Pointe-Noire area for pelletizing and ship-loading.

The only mines currently in operation in the RSEA in Québec are the iron ore open-pit mines at Mont-Wright, which is some 17 km from Fermont, and at Fire Lake, located 55 km south of Mont-Wright. The Fire Lake mine operates only from May to October, and its crude ore is transported to Mont-Wright by train for crushing (Arcelor Mittal 2009, Internet site).

Both Labrador City and Wabush were built in the early 1960s to support the mining operations. Fermont was built in the early 1970s.

Iron Ore Pelletizing, Stockpiling and Ship-loading

The Port of Sept-Îles is Canada's most important iron-ore handling port. It handles roughly 23 Mt of merchandise annually, most of which is iron ore (Port of Sept-Îles 2009, Internet site). Open year-round, it consists of 12 docks, six of which belong to the Sept-Îles Port Authority.

The "Pointe-Noire" area has two distinct installations: the Pointe-Noire Sector (which includes the Pointe-Noire Dock); and the La Relance Dock. Both are linked to the railway services of Northern Québec and Labrador. There is also the Railcar Ferry.

The "City" area includes three distinct sites: the Pointe-aux-Basques Dock; the Mgr.-Blanche Dock; and the Tanker Jetty. There are also such other docking installations as the IOCC Dock and the Coast Guard Dock (Port of Sept-Îles 2009, Internet site).

The concentrate produced at Mont-Wright is unloaded at Port-Cartier for pelletizing and ship-loading. Port-Cartier has an annual shipping capacity of over 20 Mt, making it one of Canada's largest private ports. Annual marine traffic tops roughly 450 vessels (Arcelor Mittal 2009, Internet site).

The IOCC's pelletizing plant at Sept-Îles, which opened in 1973, has been out of service since 1981. It was partially upgraded in 2000-2001. Recent plans to restart it were brought to a halt in early 2009 in the light of the marked decline in the demand for steel and iron ore. The plant's buildings will be kept intact for the foreseeable future, as they house important utilities that service the IOCC's rail and port facilities. The processing equipment will be dismantled and removed shortly (IOCC 2009, Internet site).

5.5.22 Aboriginal and Treaty Rights in RSEA

5.5.22.1 Innu Takuaikan Uashat mak Mani-Utenam

The situation concerning the Aboriginal and treaty rights of the members of ITUM is essentially identical to that of the members of the NIMLJ, which is described in Section 5.5.10.2.

5.5.22.2 Innu Nation

In 1977, IN filed a first comprehensive claim to land in central Labrador. Following the allocation of funds to further document its claim, IN refiled its claim in 1990, which led to a Framework Agreement signed by IN, the GNL and the GoC in 1996. The negotiation of treaty rights for the Labrador Innu continues, but the finalization of a land claim agreement is reportedly behind schedule (CBC News June 24, 2009).

The *New Dawn Agreement* was executed by the GNL, Energy Corporation of Newfoundland and Labrador and IN on September 26, 2008. It provides that, upon the conclusion of a land claims agreement, the area of the ELAIOM in Labrador will lie in an economic development area and states that the right applicable to the economic development areas "will be limited to an IBA for any Major Development". Although the Agreement does not define "Major Development" we believe, based on the precedent of the *Labrador Inuit Land Claims Agreement*, that the definition that will be adopted will capture the ELAIOM. IN will therefore have a legal right under its treaty to an IBA for the Labrador portion of the ELAIOM. The target date of January 31, 2009 for concluding a land claims agreement in principle, an IBA for the Lower Churchill River Hydroelectric Project and an agreement on financial compensation for the Upper Churchill River Hydroelectric Project was not respected. There is no target date for concluding a treaty, and experience elsewhere in Canada suggests that it will still take several years. As noted above (CBC News June 24, 2009) the finalization of a land claims agreement is behind schedule.

The land claims of the IN in Québec extend to the Schefferville area, but those claims have not been accepted for purposes of negotiation by the GoQ.

5.5.23 Data Gaps

Given that the description of the RSEA focuses on economic matters, particularly job-creation and contracting, we believe that there are no important data gaps since the findings of the 2006 census provide reasonably up-to-date economic basline data of the concerned communities and regions.

The principal component of the RSEA baseline that lacks current information is the land- and resource-use of the members of ITUM and Innu Nation, since the organizations that represent them did not accept NML's invitation to conduct, or to take part in, contemporary land- and resource-use studies.

5.6 Future Environment

Section 8.0 describes how the ELAIOM will affect the physical, biological and socio-economic environments if it proceeds. The present section addresses briefly the predicted evolution of the environment in the absence of the ELAIOM. The effect predicted would probably not be produced by the mere cancellation of the ELAIOM. Rather, it would occur if none of the Assessment Groups (Table 1.0) were built. We believe that the rejection by the GNL of the ELAIOM would kill any realistic possibility that development of the other Assessment Groups would occur.

5.6.1 Physical and Biological

On the basis of the data presented in Section 8.0, we conclude that the failure of the ELAIOM to proceed would have no serious consequences, whether positive or negative, for the physical and biological environments of the BRSA or the BLSA.

5.6.2 Socio-economic

At the level of the RSEA the principal consequences if the Project did not proceed would be relatively unimportant, since the ELAIOM is a short project that is of minor economic importance compared with, for example, the existing mining operations in Labrador City and Wabush or probable projects such as the Lower Churchill Hydroelectric Project.

At the level of the LSEA, the consequences would be potentially much more dramatic.

The two FN communities in the Schefferville region have permanent villages there only because of the existence of the mines of the IOCC between 1954 and 1982. Had it not been for the presence of the two FN populations, it is likely that Schefferville would have been completely demolished after the closure of the mines of the IOCC, much the same as occurred at Gagnon after the closure of the lac Jeannine mine by the QCM: the mines at Lac Jeannine and Fire Lake were closed in 1977 and 1984 respectively; and the town was demolished in 1985.

The fact that Schefferville was not demolished is largely attributable to the presence there of the two FNs, particularly the NNK, which argued successfully that it had a treaty right to remain there in its recently-completed community of Kawawachikamach pursuant to the NEQA. Those FNs were, however, deprived of a primary-sector economic base.

Over the ensuing years, the populations of the two concerned FNs have grown rapidly, virtually doubling, and their young members have acquired relatively high levels of education, training and work experience (see Section 5.5.4). Consequently, many of them have expectations for a type and quality of life that can be sustained only by a wage-based economy.

That is not to downplay the economic, social and cultural importance of traditional activities (see Section 5.5.7), but traditional activities alone cannot support sedentary populations of several hundreds of persons.

The only possible primary-sector economic activity in the Schefferville region is mining:

- Schefferville is several hundred kilometers north of the northern limit of commercial forestry;
- being on the height of land that separates the provinces of Québec and Newfoundland and Labrador, there is no useful hydroelectric potential. In any case, once they are in operation, hydroelectric projects create little employment;

- there may be a potential for wind energy, but it cannot be exploited economically, because the Schefferville area is not connected to the transmission grids in Labrador or Québec. In any case, wind energy projects create little employment after construction;
- the capacity of tourism to create large numbers of year-round jobs is extremely limited.

If mining projects such as the ELAIOM and the proposed iron ore mine of LIM do not proceed, it is highly likely that the younger members of the two local FN populations will have no alternative but to migrate from the area to communities where their expectations can be satisfied.

Over the course of a couple of generations, that would lead to the virtual disappearance of the Naskapis as an ethnic and cultural group, since there is no other Naskapi community to which they might become affiliated. In the case of the Innu, there is always the option of returning to the Sept-Îles area or to other Innu communities, from where most of them came in the mid 1950s (see Sections 5.5.2 and 5.5.3).

The non-Native population of Schefferville would also leave, since it exists primarily to provide the two local FNs with goods and services that they are not yet able to provide for themselves.

The outcome of the foregoing scenario would almost certainly be the closure and demolition of Schefferville, which would provoke the abandonment of the railway between Schefferville and Emeril (which is subsidized by the federal government to the extent of approximately $6 million annually only because of the populations of the Schefferville area) and the closure of the Menihek Generating Station, since it would be uneconomic to connect it to the transmission grid in Labrador.

Without an airport, a rail connection and a source of electricity, the likelihood that other mining projects would proceed in that portion of Newfoundland and Labrador and Québec would be very greatly reduced.

In other words, the establishment of mining operations in the LSEA in the short term is essential to forestall compromising, probably irrevocably and permanently, the area's long-term socio-economic potential, the consequences of which for the population of the LSEA and for the population and government of Newfoundland and Labrador would be long-term and extremely negative.

6.0 PUBLIC CONSULTATION AND PARTICIPATION, PUBLIC CONCERN AND INTEREST AND VALUED ECOSYSTEM COMPONENTS

Appendices 15, 16 and 17 present an overview of NML's efforts to inform and consult all of the groups interested in and potentially affected by the ELAIOM.

6.1 Legislative Framework

As far as the GNL is concerned, the only legislative requirement for public consultation is section 58 of the *Environmental Protection Act*, which provides that

> "During the preparation of an environmental impact statement, the proponent shall provide an opportunity for interested members of the public to meet with the proponent at a place adjacent to or in the geographical area of the undertaking, or as the minister may determine, in order to
>
> (a) provide information concerning the undertaking to the people whose environment may be affected by the undertaking; and
>
> (b) record and respond to the concerns of the local community regarding the environmental effects of the undertaking."

The Guidelines required NML to hold public information sessions (the number of which was not specified) in the community of Labrador City-Wabush. As described more fully in Sections 6.4.2 and 6.7, meetings were held there on January 22, 2009, and June 2, 2009.

Given that Schefferville is also "…in the geographical area of the undertaking…", public meetings were held there on February 18, 2009, and July 13, 2009 (Sections 6.4.3 and 6.7).

The Guidelines require NML to "…consult with…" each Aboriginal group to assist in ensuring that the EIS provides the necessary information to address issues of concern to those groups. The Guidelines did not identify the Aboriginal groups in question.

In line with the preference expressed by the representatives of IN at a meeting held on April 17, 2008, NML provided information on the ELAIOM to IN, which assumed responsibility for disseminating that information at Sheshatshit and Natuashish. The only exception was NML's efforts to hold meetings at Natuashish and Sheshatshit to explain the contents of the draft EIS. NML decided to deal directly with the communities for that purpose, since it was interested in obtaining directly from the Innu themselves reactions to the predicted effects of the ELAIOM and in forming its own judgment as to the level of concern of the members of those communities about the ELAIOM. Section 6.3.2 summarizes the consultation/information meetings with IN, and Section 6.7 summarizes the information session held at Natuashish on June 30, 2009. Sheshatshit never responded to repeated efforts by NML to organize a public information session there.

Sections 6.3.3, 6.3.4, 6.3.5 and 6.7 summarize the consultation/information meetings with the concerned First Nations that now have permanent communities in Québec, but that traditionally practised and contemporaneously practise land- and resource-use in the relevant portion of Newfoundland and Labrador.

6.2 Policy on Community Disclosure

NML's policy has been to share with the concerned communities all of the information that, as a publicly traded company, it is permitted to make public. Appendix 15 contains samples of the PowerPoint presentations that were delivered, so as to communicate a sense of the range of the information that NML shared with the concerned groups and communities.

NML kept detailed notes on all of the meetings that it held, and it provided copies of them to the participants with a request that they comment on them. Few comments were received. Those notes are not appended to this EIS, however, because some of them contain material that the participants might consider to be confidential or sensitive.

In the context of the IBA negotiations, NML will disclose to certain representatives of the FNs the commercially sensitive information that they need in order to satisfy themselves that the provisions of their IBAs, especially the financial ones, are just and reasonable.

6.3 First Nations

6.3.1 Identification Criteria

NML employed the following criteria to identify FNs for the purposes of information/consultation and the negotiation of IBAs:

- FNs living within or adjacent to the area expected to be directly affected by the Project, generally the LSEA or the BLSA;
- FNs known to use for traditional purposes the area expected to be directly affected by the Project, but who do not live in or immediately adjacent to it. Those FNs do, however, live in the RSEA;
- FNs whose comprehensive claims in and to the area likely to be directly affected by the Project have been accepted for purposes of negotiation by all of the concerned governments;

- FNs known from public sources to assert Aboriginal title or rights to the area likely to be directly affected by the Project, even when the asserted rights and title have not yet been recognized by all the concerned levels of government.

The last criterion was selected in light of the *Haida* and *Taku River* decisions of the Supreme Court of Canada, even though those judgments determine that the duty to consult belongs to government and cannot be delegated to industry.

The following sections summarize the information meetings and consultations on the ELAIOM held with the concerned parties. Further details on the meetings are provided in Appendix 15. Data on meetings devoted exclusively or primarily to discussing or negotiating IBAs are not included because of their confidentiality.

6.3.2 Innu Nation

- Meetings in Toronto on April 17, 2008 and in Montréal on December 10, 2008 and January 23, 2009.

6.3.3 Nation Innu Matimekush-Lac John

- Meetings in Matimekush in 2008 (March 12, April 10, May 16, August 26 and September 8) and in 2009 (January 6, January 29, January 30, March 9 and June 15); in Montréal on December 3, 2008; and by telephone on November 18, 2008;
- Supper hosted by NML in the context of the Forum autochtone conference in Québec City on March 26, 2008 (NIMLJ representatives were sponsored by NML to attend the event);
- Public meeting in Matimekush on April 10, 2008;
- Presentations to students from École Kanatamat in Matimekush on April 28 and November 20, 2008.

6.3.4 Naskapi Nation of Kawawachikamach

- Meetings in Kawawachikamach in 2008 (January 18, April 23, May 15, August 18, August 26, September 8) and in 2009 (January 29 and June 15);
- Supper hosted by NML in the context of the Forum autochtone conference in Québec City on March 26, 2008 (NNK representatives were sponsored by NML to attend the event);
- Joint NML-NNK presentations at Learning Together 2008 conference held in Winnipeg on April 9-10, 2008;
- Public meeting in Kawawachikamach on April 23, 2008;
- Presentations to students from JSMS in Kawawachikamach on April 28 and November 20, 2008;

- Joint NML-NNK presentation at Canadian Aboriginal Minerals Association conference held in Saskatoon on November 2-4, 2008.

6.3.5 Innu Takuaikan Uashat mak Mani-Utenam

- Meetings in Sept-Îles on January 15 and June 10, 2008; in Montréal on October 30 and November 27, 2008;
- Supper hosted by NML in the context of the Forum autochtone conference in Québec City on March 26, 2008 (ITUM representatives were sponsored by NML to attend the event);
- Public meeting in Uashat on June 10, 2008;
- Lunch meeting (TSH was also present) hosted by NML in Sept-Îles in the context of a visit by representatives of Tata Steel on June 16, 2009.

6.3.6 Other

- Participation in Rendez-vous régional des grandes entreprises organized by the Conférence régionale des élus de la Côte-Nord in Baie-Comeau on November 15-16, 2007. ITUM, NIMLJ and NNK representatives also attended the event;
- Meetings with National Chief Phil Fontaine in Kawawachikamach and Matimekush on May 15-16, 2008;
- Meeting with Acting Director General and Executive Director of First Nations of Québec and Labrador Sustainable Development Institute and First Nations of Québec and Labrador Economic Development Commission in Wendake on July 8, 2008;
- Meeting with the Assembly of First Nations of Québec and Labrador in Wendake on November 19, 2008.

6.3.7 Notices

Each FN was informed in writing in advance of all field activities, including environmental studies. A toll-free telephone line was provided for persons wishing to request information or to make complaints.

6.4 Non-Natives

6.4.1 Identification Criteria

Non-Native communities were selected on the basis of the instructions contained in the Guidelines and their proximity to the site of the ELAIOM and its appurtenant works (see Section 2.1.2).

6.4.2 Wabush and Labrador City

- Meeting with Labrador City representatives in Labrador City on January 22, 2009;
- Public meeting in Town of Wabush for residents of Wabush and Labrador

City on January 22, 2009.

6.4.3 Schefferville

- Meetings with the Ville de Schefferville Administrator in Schefferville on January 17, 2008, January 30, 2009 and February 18, 2009;
- Public meeting in Ville de Schefferville on February 18, 2009.

6.4.4 Fermont

- Meeting with representatives of Municipal Council and Centre local de développement de Fermont in Fermont on January 21, 2009;
- Meeting with CSSS de l'Hématite in Fermont on January 22, 2009.

6.5 Governments

6.5.1 Provincial

6.5.1.1 GNL

- Meeting with GNL representatives in St. John's on May 12, 2008, following the tabling of the Project Registration;
- Meeting in St. John's on July 21, 2008;
- Meetings with Environmental Assessment Committee in St. John's on September 4 and September 25, 2008;
- Site visit to ELAIOM vicinity by Environmental Assessment Committee on September 19, 2008.

6.5.1.2 GoQ

- Meetings with MDDEP representatives in Sept-Îles on June 10, 2008 and November 10, 2008;
- Meeting with MRNF representatives in Sept-Îles on August 5, 2008; in Québec City on September 15, 2008 and February 11, 2009; and by telephone conference on April 21, 2009.

6.5.2 Federal

- Meeting with GoC representatives in St. John's on May 12, 2008, following the tabling of the Project Registration;
- Telephone conference with CTA, Major Projects Management Office, and CEAAg on June 26, 2008;
- Participation of GoC in meetings with Environmental Assessment Committee in St. John's on September 4 and September 25, 2008;
- Meeting with DFO (Newfoundland and Labrador) in St. John's on September 4, 2008; and by telephone conference on October 14, 2008;
- Participation of GoC in site visit to ELAIOM vicinity by Environmental

Assessment Committee on September 19, 2008;

- Meetings with DFO-Québec Region in Montréal on October 1, 2008 and May 11, 2009;
- Conference call with DFO-Québec Region on November 27, 2008;
- Meeting with INAC in Québec City on December 5, 2008.

6.6 Other

- Meeting with SIPA on February 21, 2008;
- Meeting with TSH representatives on February 29, 2008;
- Meeting with NLH in St. John's on July 21, 2008;
- Presentation to representatives of the Ville de Sept-Îles, Cégep de Sept-Îles, SIPA and Corporation de promotion industrielle et commerciale de Sept-Îles in Sept-Îles on November 12, 2008.

The purposes of all of the foregoing meetings were:

- to present the ELAIOM;
- to collect baseline data;
- to learn about the concerns of the participants;
- where relevant, to report on the follow-up to previous meetings.

6.7 Public Consultation on Draft Environmental Impact Statement

NML decided in May 2009, to present the draft EIS to the potentially affected Native and non-Native communities, so that their questions could be answered and their concerns addressed in the final version.

All of the concerned communities except for Sheshatshit agreed to participate. Sheshatshit did not refuse, but numerous attempts to obtain a suggested date from elected officials and staff proved to be unsuccessful.

Table 6.1 summarizes the principal features of the meetings in question.

Appendix 17 contains copies of the relevant documentation.

Table 6.1: Public Information/Consultation Meetings on Draft Environmental Impact Statement

Date	Group	Participants	Principal Issues Raised
June 2, 2009	Councils of Wabush and Labrador City	9	Local/regional employment and contracting Inter-provincial labour mobility
June 2, 2009	Citizens of Wabush and Labrador City	9	Local/regional employment and contracting Inter-provincial labour mobility Wolverine NML's strategic partner
June 7, 2009	Members of NIMLJ	26	Restoration/rehabilitation Compensation for losses of fish and fish habitat in Québec Training Racial tension on work site Local employment and opportunities for promotion Access to territory for traditional activities
June 8, 2009	Members of NNK	±30	Caribou and caribou-hunting Access to territory for traditional activities Racial tension on work site Equal treatment of Naskapis and Schefferville Innu Training Restoration/rehabilitation Role of Elders Participation in preparing compensation plans for losses of fish and fish habitat in Québec
June 11, 2009	Members of ITUM	3	Restoration/rehabilitation Disposal of water Sport hunting of caribou by NML employees Inter-provincial labour mobility Traditional land-/resource-use by Labrador Innu in Labrador near Schefferville
June 30, 2009	Members of Natuashish First Nation	1	None

Date	Group	Participants	Principal Issues Raised
July 13, 2009	Citizens of Schefferville	7	Inter-provincial labour mobility Noise effects in Schefferville Contamination of drinking water source (Knob Lake) Effects on local services, including sanity landfill Increased road traffic Local employment Local contracting Cumulative effects in Québec of NML and LIM projects Pressure from GNL for disproportionate share of benefits

6.8 Public Concern and Interest

The notion of public concern and interest appears in the *Environmental Protection Act* in the following contexts:

- Section 58.(1) provides that a proponent who is preparing an EIS shall meet with interested members of the public in order to, among other things, "…record and respond to the concerns of the local community regarding the environmental effects of the undertaking";
- Section 63.(1) stipulates that the minister may advise the Lieutenant-Governor in Council to order public hearings to be conducted by an environmental assessment board "…where the minister believes there is a strong public interest in an undertaking for which an environmental impact statement is required".

The terms "concern" and "interest" are not defined, but it is clear that the "concerns" contemplated by Section 58.(1) are limited to those regarding the "environmental" effects of an undertaking. For its part, the "interest" addressed by Section 63.(1) is, more broadly, for the "undertaking" in question.

"Environmental effect" is defined at Section 2.(0) of the EPA to mean "…a change in the present or future environment that would result from an undertaking."

"Environment" is defined at Section 2.(m) of the EPA to include:

(i) air, land and water;

(ii) plant and animal life, including human life;

(iii) the social, economic, recreational, cultural and aesthetic conditions and factors that influence the life of humans or a community;

(iv) a building, structure, machine or other device or thing made by humans;

(v) a solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from the activities of humans; or

(vi) a part or a combination of those things referred to in subparagraphs (i) to (v) and the interrelationships between 2 or more of them.

The term "local community" is not defined in the EPA, but Section 9. of the Guidelines (GNL December 12, 2008) suggests that it should be understood to be Wabush and Labrador City.

The "interested members of the public" referred to in Section 58.(1) of the EPA is a self-defining group.

NML believes that public interest in or concern about the ELAIOM in Newfoundland and Labrador, and particularly in Labrador West and on the part of IN and its member communities, are low, for the following reasons:

- it understands that no comments on the draft guidelines were received from the public when they were made available for review by the GNL pursuant to Section 59.(1) of the EPA;
- notwithstanding its well-publicized toll-free telephone line and its office in Labrador City, over the course of the last 18 months only one member of the public has contacted NML to identify a concern relating to the ELAIOM. The individual in question was the

owner of one of the outfitting camps referred to in Section 5.5.7.3, who was concerned about the possible effects of NML's exploration activities on his caribou hunt from mid August through early October 2009. NML provided an outline of its planned exploration activities in 2009 and expressed the view that it did not think that they would affect the activities of the outfitter in question. It has had no further reaction from the individual in question;

- the low attendance at the two public meetings held in Wabush-Labrador City, the nature of the topics raised at those meetings (Table 6.1) and the positive comments contained in the evaluation forms completed by the participants;
- reports in the regional and provincial media;
- the fact that the Sheshatshit First Nation evinced no interest in having a presentation on the draft EIS;
- the fact that the Innu Nation manifested no reticence about negotiating an IBA for the ELAIOM;
- the attendance of only one person (who was not a Mushuau Innu) at the meeting held in Natuashish on June 30, 2009;
- no NGOs active in the field of mining have expressed any concern about the ELAIOM or its environmental effects.

The Councils of Wabush and Labrador City have demonstrated a sustained interest in the ELAIOM through their good attendance at meetings and the nature of their participation in those meetings. The interest manifested by the two Councils has related largely to the economic benefits that would flow to Labrador West. They have not expressed any opposition to the ELAIOM, nor any concern about its environmental effects.

6.9 Identification of Valued Ecosystem Components

The present section lists the VECs that have been retained for the purposes of identifying and evaluating the environmental effects of the ELAIOM.

6.9.1 Introduction

The Canadian Environmental Assessment Agency (CEAAg 2009, Internet site) defines a valued ecosystem component as: "The environmental element of an ecosystem that is identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance".

Furthermore, it is specified that: "The value of an ecosystem component may be determined on the basis of cultural ideals or scientific concern. Valued ecosystem components that have the potential to interact with project components should be included in the assessment of environmental effects".

The VECs were identified on the basis of the description of the receiving environment in Section 5.0 and the public consultation and participation activities described in Sections 6.3-6.7, taking into account the requirements of the Guidelines (GNL December 12, 2008) and the experience and judgment of NML's project team.

Especially with respect to socio-economic matters, the concept of VEC has been interpreted very broadly so as to encompass the full range of issues and concerns raised in the Guidelines and the public consultation and participation programme.

6.9.2 Biophysical Valued Ecosystem Components

Table 6.2 lists the biophysical environmental components considered in the present EIS as well as the associated VECs selected for the detailed assessment of effects on the biophysical environment. A brief description of each environmental component and the reasons justifying the selection of the VECs follows.

Table 6.2: Biophysical Environmental Components and Valued Ecosystem Components

Environmental Components	Selected VECs	Justification
Physical Environment		
Atmosphere	Air quality and noise	Component protected by federal and provincial legislation. Dust might affect workers and edibility of berries (Clément Mai 2009).
Water	Water quality	Mining operations and transportation might affect surface water turbidity. Water quality is retained as a VEC since it has a high ecological, biophysical, social and economic value. It is also essential for the health and ecological equilibrium of local populations, wildlife and flora.
	Water balance	There might be a risk of lowering the level of the water in streams and the water table during the operations phase. Water balance is retained as a VEC because it has a high ecological, biophysical, social and economic value. It is also essential to the health and equilibrium of local populations, wildlife and flora.
Bedrock geology	—	Bedrock geology was not considered as a VEC, because it does not have a unique geological character or socio-cultural value.
Geormorphology, Glacial history and Surficial deposits	Surficial deposits	Surficial deposits were retained as a VEC because they play an essential role in ecosystem distribution, the growth of plants and recharging the water table.
Quality of soils and sediments	—	No high risk of soil or sediment contamination is associated with the Project. Results obtained from former mining sites indicate no contamination downstream.
Biological Environment		
Terrestrial ecosystems	Wetlands	Wetlands are the ecosystems having the highest ecological value and sheltering the highest diversity of wildlife and flora. They are particularly sensitive to anthropogenic disturbances at this latitude. They are protected by legislation.
Large mammals	Caribou and caribou habitat	A species of great importance for the local populations (migratory ecotype). A protected ecotype (forest/sedentary ecotype) may be present in the BLSA.
Furbearers and other small mammals	Mammals harvested	Considered as a VEC because they are harvested and valued by the local communities.
	Species at risk	Species protected by federal and provincial legislation (wolverine).

Environmental Components	Selected VECs	Justification
Micromammals	—	Not considered as a VEC because of their very low population density. They do not have a special socio-cultural value for the Innu or the Naskapis.
Chiroptera	—	Not considered as a VEC because of their very low population density. They do not have a special socio-cultural value for the Innu or the Naskapis.
Herpetofauna	—	Not considered as a VEC because of their very low population density. They do not have a special socio-cultural value for the Innu or the Naskapis.
Insects	—	Not considered as a VEC because there is no chance of finding protected species in the area. They do not have a special socio-cultural value for the Innu or the Naskapis.
Avifauna	At-risk and migratory species	Some avifauna species are protected by federal and provincial legislation. Migratory species are protected by federal legislation.
Fish	Fish and fish habitat	Fish are retained as a VEC because of their high ecological, social and economic value. Fish might be affected by disturbances to their habitat and effects on water quality.

6.9.2.1 Atmosphere

The atmosphere is the vector for, among other things, the particles and gases emitted by the operation of the ELAIOM and the noise generated by its construction and operation. Air quality can affect the health of ecosystems, including humans.

6.9.2.2 Water

Water is one of the most important components that might be affected and is retained as a VEC. Water has an environmental, biophysical, social and economic importance. Water is essential to the survival of local populations, wildlife and flora. Basically it is essential to the proper functioning of the natural ecosystem. Water is also very important for atmospheric regulation and for shaping landscapes. The removal, displacement and contamination of water can have significant effects on the environment at different scales and on local human populations. The use of water is governed by the *Water Resources Act*.

Short-term effects on water quality are to be expected. Conductivity, pH and turbidity of surface water within DSO3 might be affected. Low-level metal contamination (mainly iron) may also occur.

From a hydrogeological point of view, the use of dewatering wells to lower the level of the water table in the pits might lower the level of streams, rivers, ponds and lakes as well as the local groundwater table. Furthermore the displacement of the pumped groundwater may affect the integrity of local waterbodies (stream velocity, width and flow).

6.9.2.3 Bedrock Geology

The Project would not exist without the presence of the geological formation called the Sokoman, with its high iron concentration. This formation, which extends regionally, is part of the geological Churchill Province, which extends to Ungava Bay and includes the Labrador Trough. Consequently, the part of it in the BLSA is neither exceptional nor unique from a geological point of view. It is not known to have a special social or cultural value for the citizens of Schefferville or for the members of the Innu and Naskapi Nations today, although chert outcrops in the Fleming geological formation were a source of raw material for stone tools in the Schefferville area as long ago as 3,500-2,500 B.P. (McCaffrey March 2004). For these reasons, bedrock geology was not retained as a VEC.

6.9.2.4 Physiography, Glacial History and Surficial Deposits

The selection of surficial deposits as a VEC is based on several reasons. Surficial deposits support all terrestrial ecosystems. Each type of surficial deposit has its own drainage and soil features, which, in a given climate, determine the types of ecosystems that can grow upon it. For example, a mature coniferous forest will grow on thick, well-drained till deposits, whereas fens develop on poorly-drained organic deposits. The top one meter of deposits, or topsoil, plays a crucial role in plant growth. That is where most of the root system and nutrient-rich organic matter are found. Surficial deposits also play an essential role in replenishing the water table, since water must seep through them before reaching bedrock.

6.9.2.5 Quality of Soils and Sediments

The soils and sediments sampled within the BLSA showed no sign of contamination (see Sections 5.3.6 and 5.3.7), even though the IOCC carried out mining activities on this territory for more than 25 years. Since the same mining methods will be used in the ELAIOM, it is unlikely that soils and sediments in the BLSA and the BRSA will be contaminated. Consequently, this component was not retained as a VEC.

6.9.2.6 Terrestrial Ecosystems

As discussed in Sections 5.4.2 and 5.4.3, the terrestrial ecosystem component includes flora, forested and non-forested ecosystems, wetlands and wildlife habitats.

With the exception of wetlands, which are not common at DSO3, the ecosystems present in the BLSA are common within both the BLSA and the BRSA. Surveys revealed no floristic species at risk, and none are potentially present in the area. Some plants are used by the First Nations (see Section 5.5.7). They are all, however, common throughout the BLSA and the BRSA.

Quality wildlife habitats, however, are rare within the BLSA and are associated principally with wetlands and riparian environments. The wildlife habitats specific to a species or a group of species, particularly those of caribou, are addressed in other sections of the report (see Section 5.4.3).

Within the terrestrial ecosystem component, only wetlands are considered as a VEC. The main reason for this selection is that wetlands are recognized by the scientific community as habitats to be protected and conserved. They are used by the members of First Nations for berry-picking, hunting and trapping.

As far as the ELAIOM is concerned, wetlands are the ecosystems that have the highest ecological value, since the majority of wildlife habitats in the BLSA are associated with them. Furthermore, wetlands have a diversified flora, and species that occur in them usually cannot colonize other types of ecosystems. Wetlands and riparian environments occupy a small part of the BLSA, but they support a high percentage of wildlife and floristic species there. Consequently, they must be given priority in the assessment of environmental effects.

Finally, the importance of conserving and protecting wetlands constitutes a consensus within the scientific community (Canards Illimités 2009, Internet site), and they are protected by the *Water Resources Act*.

6.9.2.7 Large Mammals

As discussed in Sections 5.4.3.1 and 5.4.3.2, large mammals include moose, Black bear and caribou.

Moose are rare in the BLSA and its immediate vicinity, but individuals have been recorded there, including during the survey of caribou conducted by NML and LIM in spring 2009 (D'Astous and Trimper June 2009, *in preparation*). Regionally, good moose habitat is very scarce, since the forests are too open. Since the species is rare and a recent arrival, it is little harvested by the Innu and the Naskapis (see Sections 5.4.3.1, 5.4.3.2 and 5.5.7). Moose are not therefore considered as a VEC.

Black bears are present in the BLSA and vicinity. The Howells River valley is thought to support a fairly dense population of Black bears. In fact, it is in that area that Black bears are hunted by the Naskapis. Black bears are not, however, considered as a VEC, since the most important population does not live within the limits of the BLSA, and bear hunting does not seem to be practised there.

As mentioned in Section 5.4.3.1, caribou is at times abundant in the BLSA and vicinity. The migratory caribou is the most numerous ecotype, and the Project is located within its migration area. The presence of the sedentary ecotype remains to be confirmed despite the helicopter-based survey conducted by LIM and NML in spring 2009 (D'Astous and Trimper June 2009, *in preparation*).

As measured by the weight of meat harvested, caribou is probably the most important species for the Innu and the Naskapis. It may be harvested occasionally in the BLSA, but the small size of the BLSA means that most hunting of caribou is conducted in the BRSA. Large concentrations of migratory caribou are sometimes found north of the BLSA, on the vast tundra plateaus.

Sedentary caribou, which are designated as threatened under federal and provincial legislation, may also use the BLSA, but the habitats in that area are not especially suitable for them, in addition to which they tend to avoid areas of human activity. According to Innu informants, sedentary caribou are rare in the region and are thought to occur outside the BLSA, south of Schefferville.

Caribou is considered as a VEC, since it is an important species for the First Nations and because the sedentary caribou, which is federally and provincially designated, may be present in the BLSA and the BRSA.

Furbearers and Other Small Mammals

Section 5.4.3.3 described all the furbearers and other small mammals found in the BRSA and that may use the BLSA. In all, 15 species were discussed. Generally, the likelihood of finding those species in the BLSA is low, since the habitats are not suitable. Several of those species are associated with wetlands or riparian habitats, which are rare within the BLSA.

The species that are hunted or trapped are, however, considered as a VEC. These are: beaver, marten, mink, Arctic fox, Arctic hare, weasel, Grey wolf, muskrat, porcupine, otter, Red fox, Snowshoe hare and lynx. Those species are harvested in the BRSA by Naskapi and Innu hunters and may also be harvested in the BLSA. The BLSA, however, does not seem to be a preferred hunting and trapping ground. Indeed, for the Naskapis, the Howells and Swampy Bay river basins have habitats better suited to these activities (Weiler November 2006).

Furbearers at risk are also a VEC. A single species, the wolverine, may be present in the area; it is designated as endangered under both federal and provincial legislation.

6.9.2.8 Micromammals

Micromammals are not considered as a VEC. Surveys carried out by Envirotel 3000 inc. (see Section 5.4.3.4) showed that the population density is low. Few species are present in the BLSA, and no species at risk were found in the BLSA or its vicinity. Furthermore, this is not a significant species group for the First Nations, and no mention of their use is found in Clément (Mai 2009) or Weiler (January 2009).

6.9.2.9 Chiroptera

Chriroptera are not considered as a VEC. Even though the scientific community considers this group of animals as important, surveys carried out by Envirotel 3000 inc. (see Section 5.4.3.5) indicated that the population density is very low and that only one species is present in the region. In addition, no resting or hibernation sites were found in or close to the BLSA, which supports the view that the use of the territory by chiroptera is not intensive.

There is no record of the use of chiroptera by the local First Nations.

6.9.2.10 Herpetofauna

The Project site coincides with the northern limit of the range of most amphibian and reptilian species in Québec. Four species were found during the surveys carried out by Envirotel 3000 inc. (see Section 5.4.3.6), and four others may be present. Most of these species are common. No species at risk were found or are potentially present in the BLSA and the adjacent BRSA. The population density is also very low, and the presence of only a few individuals of each species was recorded.

Amphibians and reptiles are considered as pests by the Innu, mostly because they are not edible.

6.9.2.11 Insects

Insects were not classified as a VEC. Even though the scientific community considers them as important, no insect species at risk and no insect species of interest were recorded in the BLSA and the BRSA (see Section 5.4.3.7). None of the ecosystems recorded within the BLSA includes unique insect habitat. In addition, the Innu consider insects as pests.

6.9.2.12 Avifauna

As discussed in Section 5.4.3.8, the avifauna component includes aquatic birds, birds of prey, passerines and species at risk.

The aquatic birds group includes waterfowl, which are significant for the Innu and the Naskapis, who hunt geese and ducks during the seasonal migrations. This group is not, however, considered as a VEC, since the BLSA is not an important breeding or gathering area for migrating waterfowl. The waterfowl hunting grounds for the Naskapis close to DSO3 are located in the Howells River basin (spring) and in the northern part of the ridge (fall). Consequently, waterfowl hunting is practised only a little or not at all in the BLSA.

The birds of prey group is not considered as a VEC. The number of species found in the area is low, and those species that are found are common. In addition, birds of prey are not valued by the First Nations. The same applies to the passerines; the species recorded in the BRSA were generally common.

Birds at risk are the only VEC retained within the avifauna component. Four species at risk may be present in the BLSA: Harlequin duck, Anatum peregrine falcon, Short-eared owl and Rusty blackbird. Except for the Rusty blackbird, these species do not nest in the BRSA, but they may be present in it. These species are protected under federal and provincial legislation and must be considered in the analysis of effects.

6.9.2.13 Fish

As explained in Section 5.4.3.9, the three species of fish found within the BRSA are Brook trout, burbot and Lake chub. These three species could be affected by changes in the water quality of some waterbodies. Of the three species, Brook trout and Lake chub, which were found in the BLSA, have been retained as VECs.

These species, in particular Brook trout, are harvested at the regional level by the Naskapis and the Innu. Even though the BLSA is not considered to be an important fishing area for more than a few members of the First Nations and the community of Schefferville, it could potentially be used.

No species of fish at risk were found or may potentially be found within the BLSA and the BRSA.

6.9.3 Socio-economic Valued Ecosystem Components

Table 6.3 lists the socio-economic VECs and identifies why they were selected.

Table 6.3: Socio-economic Valued Ecosystem Components

Project Phase		Socio-economic VEC	Reason Selected
Construction	Operations		
✓	✓	Caribou Subsistence Hunting	Public consultation programme.[1]
✓	✓	Local Employment	Public consultation programme.[1]
✓	✓	Local Contracting	Public consultation programme.[1]
✓	✓	Newfoundland and Labrador Benefits	GNL Guidelines.[2]
✓	✓	Treaty Rights	Professional judgment.
✓	✓	Comprehensive Land Claims Negotiations	Public consultation programme.[1]
✓	✓	Caribou Sport Hunting	Professional judgment.

Project Phase		Socio-economic VEC	Reason Selected
Construction	Operations		
✓	✓	Subsistence Fishing	Public consultation programme.[1]
✓	✓	Trapping	Public consultation programme.[1]
✓	✓	Local Infrastructure and Services	Public consultation programme[1]; professional judgment.
✓	✓	Archaeological / Heritage / Palaeontological Sites	Professional judgment.
✓	✓	Sites of Cultural and Spiritual Importance	Public consultation programme[1]; professional judgment.
✓	✓	Community Cohesion	Professional judgment.
✓	✓	Family and Interpersonal Relations	Professional judgment.
✓	✓	Maintenance of Community Populations	Professional judgment.
✓	✓	Road Safety	Professional judgment.
✓	✓	Commercial Fishing	GNL Guidelines.[2]
✓	✓	Maintenance of Local Labour Forces	Professional judgment.
✓	✓	Maintenance of Social Stability	Professional judgment.
	✓	Rail Transportation of Ore	GNL Guidelines[2]; professional judgment.
✓	✓	Inter-provincial Labour Mobility	Public consultation programme.[1]
✓	✓	Availability of Labour Force	GNL Guidelines[2]; professional judgment.
✓	✓	Restoration / Rehabilitation	Public consultation programme.[1]
✓	✓	Training	Public consultation programme.[1]
✓	✓	Access to Territory for Traditional Activities	Public consultation programme[1]; Clément (Mai 2009).
✓	✓	Racial Tension on Work Site	Public consultation programme.[1]
✓	✓	Sport Hunting of Caribou by NML Employees	Public consultation programme.[1]
✓	✓	Quality of Berries and Medicinal Plants	Clément (Mai 2009).
✓	✓	Goose Hunting	Clément (Mai 2009).
✓	✓	Small Game Hunting	Clément (Mai 2009).
✓	✓	Gender Relations	GNL Guidelines[2].
✓	✓	Health	GNL Guidelines[2]; professional judgment.
✓	✓	Language in workplace	Meeting with GNL officials on July 16, 2009.

[1] Includes consultations for the LIOP and the KéMag Project and consultation reported in Clément (Mai 2009).
[2] Refers to Government of Newfoundland and Labrador (December 12, 2008).

7.0 EFFECTS ASSESSMENT METHODOLOGY

7.1 Introduction

The present section explains how the effects of the Project on the environment, including its cumulative effects, are identified and their importance assessed, distinguishing where appropriate between the effects of construction, operations/maintenance and decommissioning.

7.2 Definition of "Environmental Effects"

"Environmental effect" is used with the meaning assigned to it by Section 2.(o) of the *Environmental Protection Act*, namely "…a change in the present or future environment that would result from an undertaking", in this case the ELAIOM.

"Environment" has the meaning assigned to it by Section 2.(m) of the EPA:

"(i) air, land and water,

(ii) plant and animal life, including human life,

(iii) the social, economic, recreational, cultural and aesthetic conditions and factors that influence the life of humans or a community,

(iv) a building, structure, machine or other device or thing made by humans,

(v) a solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from the activities of humans, or

(vi) a part or a combination of those things referred to in subparagraphs (i) to (v) and the interrelationships between 2 or more of them."

Environmental effects include both direct and indirect effects and the consequences of accidents and malfunctions.

As required by the Guidelines (GNL December 12, 2008), "environmental effect" is also used with the meaning assigned to it by section 2.(1) of the CEAA, namely:

"(a) any change that the project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the *Species at Risk Act*,

(b) any effect of any change referred to in paragraph (a) on

(i) health and socio-economic conditions,

(ii) physical and cultural heritage,

(iii) the current use of lands and resources for traditional purposes by aboriginal persons, or

(iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, or

(c) any change to the project that may be caused by the environment.

whether any such change or effect occurs within or outside Canada."

The CEAA defines "environment" as follows:

" "environment" means the components of the Earth, and includes:

(i) land, water and air, including all layers of the atmosphere,

(ii) all organic and inorganic matter and living organisms, and

(iii) the interacting natural systems that include components referred to in paragraphs (a) and (b)."

The relevant terms from the SARA are:

> " "critical habitat" means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species";
>
> " "individual" means an individual of a wildlife species, whether living or dead, at any development stage and includes larvae, embryos, eggs, sperm, seeds, pollen, spores and asexual propagules";
>
> " "List" means the List of Wildlife Species at Risk set out in Schedule 1";
>
> " "listed" means listed on the List";
>
> " "wildlife species" means a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and
>
> (a) is native to Canada; or
>
> (b) has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
>
> (2) For the purposes of the definition "wildlife species" in subsection (1), a species, subspecies, variety or geographically or genetically distinct population is, in the absence of evidence to the contrary, presumed to have been present in Canada for at least 50 years."

The principal difference between the EPA and the CEAA is that the latter is more restrictive than the former with respect to effects on health and socio-economic conditions, physical and cultural heritage, current use of lands and resources for traditional purposes by Aboriginal persons and structures, sites or things of historical, archaeological, paleontological or architectural significance. The CEAA requires those matters to be addressed only if effects on them result from a change referred to in paragraph 2.(1)(a), whereas the EPA requires them to be addressed even if the effect on them is not mediated through an effect on another ecosystem component.

The present EIS will adopt the less restrictive approach of the EPA.

7.3 Temporal Boundaries

The temporal boundaries of the present assessment are approximately two years for the preparation/construction phase, three years for the operations phase and a variable number of years for post-closure monitoring and follow-up.

7.4 Spatial Boundaries

The spatial boundaries of the present assessment are, broadly speaking, the BLSA, the BRSA, the LSEA and the RSEA.

7.5 Methods of Identification of Effects and Assessment of Importance

The biophysical and socio-economic VECs subject to assessment in the manner described below are:

Ecological: air quality, including noise; water quality; water balance; surficial deposits; wetlands; migratory and sedentary caribou and habitat; hunted and trapped mammals; wolverine; birds; fish and habitat.

Socio-economic: caribou subsistence hunting; local and regional employment; local and regional contracting; Newfoundland and Labrador benefits; trapping.

The principal analytical steps are the following:

- to identify the sources of effects at each phase of the Project (construction, operations/maintenance, decommissioning);
- based on professional experience, ecological principles and knowledge of similar projects in similar environments, to identify the likely interactions between the sources of effect and the VECs identified in Section 6.9;
- to assess the importance of the likely effects on the basis of the criteria set forth below;
- where the potential for important effects is identified, to identify mitigating measures designed to reduce or eliminate them or, in the case of positive effects, to maximize them;
- to assess the importance of the post-mitigation residual effects on the basis of the criteria used to assess the original effects;
- where possible and appropriate, to propose compensation measures for residual effects that cannot be mitigated;
- to propose compliance, effectiveness and effects monitoring and follow-up programmes.

The following sections describe briefly each of the preceding steps.

7.5.1 Sources of Biophysical Effects

Based on the detailed descriptions in Section 4.0, the principal sources of biophysical effects described below were selected. The list is not an exhaustive list of all the Project-related activities, but it strives to address the principal sources of biophysical effects. In the case of mining projects, the disposal of tailings is usually considered to be an important source of biophysical effects. That is not the case for the ELAIOM, however, since tailings will be sent by pipeline to the abandoned Timmins 2 pit, which has been demonstrated not to be fish habitat.

For the reasons explained in Section 7.5.1.4, the sources of socio-economic effects are not considered here.

7.5.1.1 Preparation/Construction Phase

The estimated duration of the preparation/construction phase is one to two years. Construction will occur year-round.

Site-clearing and Preparation

Site clearing will be required at some sites where infrastructure is to be built and at the site of some of the pits.

Where it is required, clearing will involve mechanical removal of the organic layer and vegetation and the creation of gravel pads suitable for building.

Construction and Upgrading of Access Roads

Most of the required access roads exist and are of the appropriate dimensions. In some cases, they require upgrading and the repair of potholes, which is not expected to be a source of effects. In other cases, access roads will have to be built using standard construction practices. New roads will be designed in such a way as to avoid valuable or sensitive sites and areas.

Construction, Upgrading and Installation of Infrastructure

Buildings and Service Infrastructure - Camp Area

The camp area, which will cover approximately 12,000 m^2, will be composed of three 50-room residential units or equivalent and recreation and kitchen/dining complexes plus the associated water/sewage and electricity infrastructure. The camp will be located on a previously undisturbed site.

Buildings and Mine Infrastructure - Processing Complex

The principal infrastructure at the processing complex will be: the crushing/screening/ washing facility; four ore stockpiles; five principal buildings (dispatch, garage, warehouse, administrative complex and laboratory) and explosives factory and magazines; and a railway siding dedicated to storing on a short-term basis petroleum products. The associated infrastructure will include: drainage ditches; water/sewage system; electricity distribution; pipelines to and from Timmins 2. The processing complex will be built on a previously disturbed site, and the explosives factory and magazines and the sanitary landfill will be built on abandoned waste rock piles.

Railway

Construction of the railway from M353 to the processing complex will involve principally laying sleepers and rail on the existing bed. No culverts will have to be built, and only a few of the existing culverts will require repair. A loading station, including siding tracks, will be built adjacent to the processing complex.

All of the foregoing activities will take place on previously disturbed sites.

Electric Lines

The principal transmission line will extend from the Schefferville Substation to the processing complex. A part of the transmission line will be in the ROW of the former transmission line, and the balance will be adjacent to the main access road. Distribution lines from there will serve the processing complex and camp area. Electricity at other sites will be provided by diesel generators. The main construction tasks will be placing the poles, stringing the wire and constructing the substation near the processing complex. Construction of the distribution network will involve primarily placing poles and stringing wire.

Given the emphasis on reusing previously disturbed areas, electric distribution lines will be located along existing roads. No structures will be built in or near streams.

Transportation and Traffic

Until the rail extension from M353 is operational, tentatively scheduled for the end of Year 1, all supplies, fuel, construction materials and personnel will be transported from Schefferville along the main access road. On average, four semi-trailers and four light vehicles will be required, each making several trips per day.

Restoration of Temporary Work Areas

Given the emphasis on reusing disturbed areas, the number of temporary work areas to be restored will be limited to two. Restoration will involve spreading stored soil over the areas, reseeding or replanting them with local species and implementing measures to reduce erosion until the plant cover has been restored.

Accidents and Failures

The main potential for accidents at the preparation/construction phase will be associated with transportation, the use of heavy equipment and the temporary storage of fuel. It is not expected that much blasting will be required during this phase. The use of safety equipment and the respect of safe working procedures will be enforced (see Appendix 4). The absence of structures such as tailings ponds or reservoirs reduces the potential for failures very considerably.

7.5.1.2 Operations Phase

The operations phase for Phase 1, the object of the present document, will be three years, while that for Phases 1 and 2 combined will be approximately 15 years.

Removal and Storage of Overburden

The removal and storage of overburden will be required only at the Ferriman 4 pit (Tables 4.4 and 4.5), the total area of which is approximately 14.0 ha. Overburden will be removed using blasting and heavy machinery and transported by truck to storage areas. Ferriman 4 does not, however, for most purposes form part of the present EIS.

Dewatering

It is anticipated that all of the pits will have to be progressively dewatered so as to maintain the level of the water table safely below the level at which mining is occurring at any given time. Dewatering will generally have to begin several months in advance of the start of mining.

In most cases, several wells will be drilled around the periphery of the pit. They will start to operate in advance of the start of mining and will remain in operation until its end (with the exception of Timmins 3N, which will serve as a source of a small quantity of clean water throughout the operations phase). During mining, there will probably be one or more pumps in the deepest part of each active pit (the sump) to remove precipitation and surface run-off.

The peripheral wells will collectively pump 15-30 m^3/min (probably closer to 15 m^3/min) (Appendix E). The pumped water will be disposed of within the same drainage basin in a manner that avoids erosion, usually by sending it to an existing mined-out pit.

Blasting and Ore-extraction

Blasting, preceded by drilling, and heavy equipment will be used to extract the ore, which will be loaded into trucks for transportation to the processing complex.

Establishing Waste Rock Piles

There will be one waste rock pile for each pit.

Transportation of Ore and other Traffic

Ore will be transported from the pits to the processing complex by truck. When only one pit is in operation, one ore truck will enter it approximately every 15 minutes and one truck hauling waste will enter approximately every 20 minutes. In the more normal circumstance of at least two pits being in operation at any given time, the preceding frequency will be roughly halved.

Once the rail extension from M353 to the Timmins area is operational, the volume of traffic along the main access road between Schefferville and the Timmins 1 area will decline very significantly.

The roads within active pits and between active pits and waste rock storage areas will be closed to the public. In some cases, the trucks involved in transporting ore will have to use the main access road.

An estimated 20 vehicles per day, none larger than five-tonne flatbed trucks, will use the main access road.

Ore-crushing

The primary crushing and the associated storage piles may release particulates into the atmosphere. The secondary crushing is not expected to be a source of release of particulates, since it will be conducted indoors, and dust-collectors will be used.

Ore-washing and Recirculation of Process Water

Process water will come from the abandoned Timmins 2 pit by means of a surface pipeline at the rate of 3,600 m^3/h. The process water, mixed with tailings, will be returned to Timmins 2.

Ore-drying

The crushed ore will be filtered and dried in winter by means of horizontal pan filters and steam and a fluidized bed dryer.

Storage and Rail Transportation of DSO Product

Processed ore will be stored in stockpiles, one for SF and one SPF. The processed ore will be transported to the rail car loading station by means of belt feeders in a tunnel to a surge bin, from where it will be loaded into rail cars. The rail cars will be taken to M353, at which point they will be transferred to TSH and will cease to be a part of the ELAIOM.

Solid Waste Management

Solid wastes will be disposed of in a landfill site to be built and operated in conformity with the legislation of the GNL.

Hazardous Wastes

Petroleum products and explosives will be the only hazardous wastes used in large quantities. Explosives will be handled in conformity with the *Explosives Act* and its regulations.

Unconsumed petroleum products and other hazardous products used in small quantities (*e.g.*, paint, solvents) will be shipped by train to Sept-Îles, Québec, which is permitted by the applicable legislation of the GoQ, and disposed of in a licensed facility there.

Treatment and Disposal of Sanitary Wastewater

Section 4.10.4.18 explains how sanitary wastewater will be treated. Sludge, the estimated annual quantity of which will be 20 m^3/y will either be disposed of in the sanitary landfill or will be stored and used later for restoring disturbed sites. The effluent will be used in the wash plant and will eventually be disposed of in Timmins 2.

Accidents and Failures

There are several potential sources of accidents with environmental consequences: during transportation of the ore from the pits to the processing complex by truck; a derailment between the rail car loading station and M353; an explosion at the explosives factory or magazines; a major leak at the fuel storage area or along the pipeline transporting tailings.

7.5.1.3 Decommissioning Phase

Virtually all of the infrastructure will continue to be used through Phase 2, at the end of which it will be decommissioned in conformity with the applicable legislation. The decommissioning phase is not, therefore, included in the matrix of potential effects, but the present section describes summarily some of the restoration activities that will be carried out at the end of the Phase 1. For the purpose of the EIS, restoration activities will therefore be considered as part of the operations phase.

Exhausted Pits

Once pumping ceases, the pits will fill with water to the level of the water table, which in DSO3 can be expected to range from 10 m to 55 m below the surface (Appendix E). Where it is feasible to do so, the steepness of the slope from the lip of the mine to the surface of the water will be reduced to diminish the danger that caribou will fall into the pits and will be unable to get out.

Waste Rock Piles

The waste rock piles associated with exhausted pits will be sloped, rehabilitated and revegetated.

7.5.1.4 Matrix of Relationships

Figure 7.1 contains a preliminary evaluation of the importance of the interactions between the sources of effects and the biophysical VECs.

Figure 7.1: Matrix of Relationships between Sources of Effects and Biophysical Valued Ecosystem Components

Phases and Activities (sources of effects) / Valued Ecosystem Components		Atmospheric quality	Noise	Water quality	Water budget	Surficial deposits	Wetlands	Caribou and its habitat	Harvested mammals	Wolverine	Avifauna at risk	Fish and fish habitat
		Physical Environment					**Biological Environment**					
Preparation/Construction	Clearing and land-preparation		1	2	1	1	1	2	2	1	1	
	Construction and improvement of access roads	1	1	1	1	1	1	2	2	1		
	Construction, improvement and installation of infrastructure											
	Buildings and service infrastructure (workers' camp area)		1			1		1	1	1		1
	Buildings and infrastructure (plant area)		1			1		1	1	1		1
	Railway	1	1					1	1	1		1
	Electricity transmission and distribution lines		1							1	1	
	Transport and traffic	1	1				1	2	1	2	1	
	Restoration of temporary work areas		1	1				1+	1+	1+	1+	1+
	Accidents and malfunctions		1	1			1					1+
Operations	Stripping and storage of overburden (Ferriman 4)	2	1	1	1	2	2	2	2	1	1	
	Dewatering			1	2		2					1+
	Blasting and ore extraction	2	2	1	1		2	2	1	2	1	2
	Creation of waste rock piles	1	1	2	1	2	2	2	2	1	1	
	Transport of ore and other transport or traffic	2	2					2	1	2	1	
	Ore-crushing	2	2					2	1	2	1	
	Ore-washing and recirculation of process water	2	2	1	1			2		2		1
	Ore-drying (winter)	2	1					1	1	1		
	Storage and transport of ore by railway car	2	2					2	1	2	1	1
	Management of non-hazardous wastes			1		1	1		1	1	1	
	Management of hazardous wastes			1			1		1			
	Treatment and disposal of wastewater											
	Accidents and malfunctions	1	1	1			1		1			1
	Restoration of waste rock piles and of pits	1+	1	1+	1+	2+		2+	1+	1+	1+	1+

2	Important interrelation between the activity and the component
1	Unimportant interrelation
(blank)	No interrelation
+	Potential positive effect

The basis of those judgments is described more fully in Section 8.0.

A similar matrix was constructed for the socio-economic effects, but it was ultimately discarded on the grounds that most socio-economic effects flow from multiple sources. Explaining why most interactions between sources and socio-economic VECs are not individually important would be repetitive and would be inconsistent with the requirement of the Guidelines (GNL December 12, 2008) to make the EIS as concise as possible while presenting the information necessary for making an informed decision.

Moreover, there are many cases in which it is not helpful to draw a distinction between the construction and the operations phases of a project for purposes of addressing its socio-economic effects, since the sources of effects at each are essentially identical.

Appendix 18 replaces the matrix of interrelationships. It suggests that the socio-economic VECs most likely to experience important effects are the following: caribou subsistence hunting; local employment; local contracting; Newfoundland and Labrador benefits; and trapping.

The potential effects of the Project on the Gender Equity VEC cannot be estimated, although they are likely to be important (Appendix C). NML will however formulate and implement an employment equity plan (see Appendix 19). It will monitor the attainment of the goals that it sets in the light of Appendix C and will react appropriately to acquired experience in its implementation.

7.5.2 Assessment of Importance

The criteria used to determine the importance of effects were defined as follows:

Nature

Effects may be direct, indirect or both. The nature of an effect is not, of course, a criterion for determining its importance, but it is an indispensable descriptor of effects.

Direct effects are those that follow as a direct cause-effect consequence of a Project activity (Sadar 1996: 74). The destruction of terrestrial or fish habitat is an example of a direct effect.

Indirect effects are those that are at least one step removed from a Project activity in terms of cause-effect linkages. A reduction in the size of an animal population resulting from the destruction of habitat is an example of an indirect effect.

Effects on health may be direct or indirect: direct if, for example, dust at a work site causes pulmonary disease; indirect if resulting from the introduction of a pollutant into the flesh of mammals or fish eaten by humans.

Especially in the case of biophysical effects, the EIS focuses on the direct effects of the ELAIOM.

Direction

The direction of effects may be positive or negative. Like their nature, the direction of effects is not a criterion of importance, but it is included for the same reason as is their nature.

Broadly speaking, the negative effects of a project are its costs, while the positive effects are its benefits.

In the case of biological VECs, positive effects are those that result in improvements in the health of individual organisms, the growth of populations and the improved functioning of the ecosystems of which they are a part. Negative effects are those that have the opposite effect.

Determining the direction of socio-economic effects is a subjective exercise that reflects the value system of those making the judgment. Positive socio-economic benefits are generally thought of as those that promote the health (broadly defined) or, especially, the economic well-being of society as a whole or of some component of it. Positive effects are thought by some to be synonymous with economic growth, whereas others would argue the economic effects are truly positive only when they result in qualitative improvement in an economy (Rees 2009).

Particularly in recent years, First Nations have made it clear that they sometimes have a different perspective from that of mainstream society as to what constitute positive and negative socio-economic effects.

One purpose of the consultation programme described in Section 6.0 was to gain insights into how the groups and individuals consulted would define the direction of the effects of the Project.

Nevertheless, the evaluation presented below will be made from the mainstream perspective of NML. Where NML is aware that potentially affected First Nations or other interveners may have a different perspective on a given effect, that difference will be noted, and an effort will be made, where economically and technologically feasible, to accommodate it through mitigation or compensation measures.

As noted by Lawrence (2004), social and economic effects tend to be considered more important when the disadvantaged, vulnerable and marginalized members and segments of society are adversely or disproportionately affected. Such a weighting has been applied in the present case, albeit in a subjective manner.

In the case of each VEC, an attempt will be made to define more precisely what is meant by the direction of the predicted effect.

Spatial Extent

Spatial extent refers to the area that will be affected by the effect on a given VEC. It is not necessarily identical for each VEC. Table 7.1 presents the definitions employed for the biophysical and the socio-economic VECs.

Table 7.1: Determination of the Spatial Extent of an Effect

Criterion	Definition of Importance		
	Site-specific	Local	Regional
Biophysical	Effect limited to mine site, site of processing complex or other activity site.	Effect extends from activity site into BLSA.	Effect extends beyond BLSA.
Socio-economic	Affects only populations/activities in LSEA.	Affects also populations in RSEA.	Affects also populations outside RSEA.

Duration

Duration refers to the period that a given effect will last. It is related to the criterion of reversibility in the sense that some effects might persist even after their source ceases to be operational. Table 7.2 presents the definitions used for the biophysical and the socio-economic VECs.

Table 7.2: Determination of the Duration of an Effect

Criterion	Definition of Importance		
	Short	Medium	Long
Biophysical	Limited to the construction or rehabilitation phase.	12-24 months. Extends after preparation/construction phase, but shorter than Project duration.	>24 months. As long as the Project duration, or even longer.
Socio-economic	During all or part of preparation/construction phase.	Preparation/construction phase and first 24 months of operations phase.	Throughout preparation/construction phase and operations phase and beyond.

The preceding definition of duration assumes that Assessment Groups 1b, 2a, 2b and 2c (see Table 1.0) will proceed and will be causing similar effects within the BLSA or the BRSA (see Table 5.1) to those caused by the ELAIOM. This approach was adopted in order to present a worst-case scenario and to avoid any implication that a consequence of the creation of five Assessment Groups might be to reduce the apparent importance of environmental effects.

Frequency

Frequency describes the number of times that a given effect source is active. Table 7.3 presents the definitions used for the biophysical and socio-economic VECs.

Table 7.3: Determination of the Frequency of an Effect

Criterion	Definition of Importance		
	Once	Intermittent	Continual
Biophysical	One time.	Occasional/intermittent.	Year-round (continual).
Socio-economic	~once per year.	Occasional/intermittent.	Year-round (continual).

Magnitude

Magnitude refers to the scope, scale or extent of a given effect. Table 7.4 presents the definitions used for the biophysical and socio-economic VECs.

Table 7.4: Determination of the Magnitude of an Effect

Criterion	Definition of Importance		
	Low	Moderate	High
Biophysical	No perceptible effect on environmental integrity, quality of component or human	Environmental integrity, quality of component or human use affected but not compromised.	Environmental integrity, quality of component or human use compromised.

Criterion	Definition of Importance		
	Low	Moderate	High
	use.		
Socio-economic	Affects <5% of the population in the LSEA or 5% of the activity in question and few or no persons in the RSEA.	Affects 5%-15% of the population in the LSEA or of the activity in question and a few persons in the RSEA.	Affects >15% of the population in the LSEA or of the activity in question and more than a few persons in the RSEA.

Level of Certainty

Predicting effects involves trying to forecast a future state. Given that the future state of the VEC in question can be affected by many factors other than the project under study, combined with the uncertainty inherent in any prediction, such predictions inevitably involve varying amounts of uncertainty. Table 7.5 presents the definitions used for the biophysical and the socio-economic VECs. The level of certainty is used to justify the value of a given effect but it is not included in the calculation of the overall value (Table 7.9).

Table 7.5: Determination of the Level of Certainty of an Effect

Criterion	Definition of Importance		
	Low	Moderate	High
Biophysical and Socio-economic	No relevant data from other studies.	Data from other studies partly supporting and partly conflicting.	Much supporting data from other studies and little or no conflicting data.

Reversibility

Ecosystems, including their human components, are dynamic and have, to varying degrees for each VEC, the capacity to return to a pre-existing state when a source of effects ceases to operate. Table 7.6 presents the definitions used for the biophysical and the socio-economic VECs.

Table 7.6: Determination of the Reversibility of an Effect

Criterion	Definition of Importance		
	Total	Partial	None
Biophysical and Socio-economic	Full restoration of pre-development situation likely.	Partial restoration of pre-development situation likely.	Little/no restoration of pre-development situation likely.

Ecological Value

Ecological value refers to the role that a given biophysical VEC plays in the structure and functioning of the ecosystem of which it is a part. Table 7.7 presents the definitions of ecological value employed. Certain socio-economic VECs are treated as having no ecological value.

Table 7.7: Determination of the Ecological Value of a Valued Ecosystem Component

Criterion	Definition of Importance		
	Low	Moderate	High
Ecological Value	Does not play an important or essential role in ecosystem functioning; contributes little to biodiversity.	Contributes to ecosystem functioning but is not essential; contributes to biodiversity but is not essential.	Plays essential role in ecosystem functioning; is critical for biodiversity.

Socio-economic Value

The socio-economic value attached to a given VEC can be inferred from, for example, the legal protection that society gives it, the role that it plays in the local or larger economy and the place that it occupies in Aboriginal cultures and values. Table 7.8 presents the definitions of socio-economic value employed. Certain biophysical VECs are treated as having no socio-economic value.

Table 7.8: Determination of the Socio-Economic Value of a Valued Ecosystem Component

Criterion	Definition of Importance		
	Low	Moderate	High
Socio-economic Value	No legal/ regulatory/ LSEA First-Nation recognition/ protection. Little or not used.	No legal/ regulatory/ LSEA First Nation recognition/ protection. Is used without being essential.	Benefits from legal or regulatory recognition/ protection. Highly valued by First Nations in LSEA. Essential for health/survival.

Tables 7.9 and 7.10 illustrate how an index of overall value is calculated and how it is combined with the criteria of magnitude and reversibility to yield a measure of effect intensity. As noted above, certain VECs may have only an ecological value or a socio-economic value. In those cases, the ecological or the socio-economic value replaces the overall value in calculating the importance of effects on it.

Table 7.9: Determination of Overall Value

Socio-economic Value	Ecological Value		
	High	Moderate	Low
High	High	High	Moderate
Moderate	High	Moderate	Low
Low	Moderate	Low	Low

Table 7.10: Calculation of Effect Intensity

Magnitude	Reversibility	Overall Value		
		High	**Moderate**	**Low**
High	None	High	High	Moderate
	Partial	High	High	Moderate
	Total	Moderate	Moderate	Moderate
Moderate	None	High	Moderate	Moderate
	Partial	High	Moderate	Low
	Total	Moderate	Moderate	Low
Low	None	High	Moderate	Moderate
	Partial	Moderate	Low	Low
	Total	Moderate	Low	Low

7.5.2.2 Calculation of Effect Importance

Table 7.11 shows how the criteria of Intensity (Table 7.10), Spatial Extent (Table 7.1) and Duration (Table 7.2) are combined to yield a measure of the importance of a given effect. It reflects the fact that, especially in the case of socio-economic VECs, the attribution of importance contains a high level of subjectivity. It also reflects the expectation that the majority of the effects that will be caused by a short, small-scale iron ore mining project located predominantly in areas previously disturbed by mining will be low.

In certain cases, the importance of effects calculated using Table 7.11 may have to be adjusted in the light of professional judgment and Project-specific circumstances. Those cases are explained on a case-by-case basis in Section 8.0.

Table 7.11: Calculation of Effects Importance

		Duration								
		Long			Medium			Short		
Intensity	**Spatial Extent** / **Frequency**	Continual	Intermittent	Once	Continual	Intermittent	Once	Continual	Intermittent	Once
High	Regional	Very high	Very high	High	Very high	Very high	High	High	High	Moderate
	Local	High	High	Moderate	High	High	Moderate	High	High	Moderate
	Site-specific	High	High	Moderate	High	Moderate	Moderate	High	Moderate	Moderate
Moderate	Regional	High	Moderate	Moderate	High	Moderate	Moderate	Moderate	Moderate	Moderate
	Local	High	Moderate	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Low
	Site-specific	Moderate	Moderate	Low	Moderate	Moderate	Low	Low	Low	Low
Low	Regional	Moderate	Low	Low	Moderate	Low	Low	Moderate	Low	Low
	Local	Low	Low	Low	Low	Low	Very low	Low	Very low	Very low
	Site-specific	Low	Low	Very low	Low	Very low	Very low	Low	Very low	Very low

7.6 Methods of Identification of Residual Effects

Residual effects are those that remain after the application of mitigating measures.

In our opinion, mitigating measures such as using best-available control technologies, applying environmental good practices and meeting legislative standards for environmental criteria such as water and air quality are non-discretionary and must be implemented at all times. Consequently, our initial evaluation of the importance of effects takes into account the use of such measures. In that sense, mitigation means going beyond the foregoing.

Wherever important effects are identified, suitable mitigating measures are identified. Where appropriate, the importance of those effects after the application of the mitigating measures is reevaluated using the criteria described in Section 7.5. It is possible that the application of mitigating measures will cause an effect to disappear.

Appendix 5 presents a list of standard mitigating measures that are routinely applied to biophysical effects. It includes some of the legislative standards and other approaches that serve to mitigate effects but that do not constitute mitigation in the strict sense in which we have defined it above.

Some of the measures described in Appendix 5 will serve to reduce socio-economic effects, particularly those indirect effects that are mediated through effects on biophysical VECs. The mitigating measures for other socio-economic effects are, however, specific to the social, cultural and economic context in which the effect occurs. For that reason, they do not lend themselves to a compilation such as Appendix 5. They are, rather, identified on a case-by-case basis in Section 8.0.

Where residual effects are rated as "very high" or "high" according to Table 7.11, efforts are made to identify compensatory measures. Indeed, compensation is considered to be a form of mitigation in the sense in which mitigation is defined in the CEAA.

Perhaps the best-known compensation measures involve the creation of fish habitat to replace such habitat in which HADD cannot be avoided or mitigated. The effect of such a category of compensation measures is effectively to eliminate the effect in question. In other cases, however, of which IBAs are the best-known example, the compensation may induce the individuals or groups affected to accept the effect, but they do not reduce the scale of the effect itself.

7.7 Cumulative Effects

<u>Background</u>

Paragraph 16(1)(a) of the CEAA requires that every screening or comprehensive study and every mediation or assessment by a review panel include consideration of, among other things "…any cumulative effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out."

The EPA does not contain a definition of cumulative effects or require an assessment of such effects, but the Guidelines (GNL December 12, 2008) require such an analysis, which must take into account both past and future projects and activities.

In conformity with standard practice, the analysis of cumulative effects will address principally the interactions between the important residual effects of the ELAIOM on VECs and the important residual effects of other projects and activities. The logic behind that practice is that unimportant ("non-significant") effects are unlikely to interact to cause important ("significant") ones.

<u>Identification of Effect Sources</u>

Appendix 14 identifies the projects that were considered for inclusion in the discussion of cumulative effects and explains why some were retained and others discarded. Figure 7.2 shows the locations of those projects.

Figure 7.2: Projects Considered for Cumulative Effects Assessment

Table 7.12 lists the projects that were retained for cumulative effects assessment.

Table 7.12: Projects and Activities Retained for Cumulative Effects Assessment

Project	Category	Relevance
IOCC, Labrador City	Current	Sedentary caribou. Rail transportation of ore. Availability of workers. Newfoundland and Labrador benefits.
Wabush Mines' Scully Mine	Current	Sedentary caribou. Rail transportation of ore. Availability of workers. Newfoundland and Labrador benefits.
Québec Cartier Mining, Mount Wright and Fire Lake	Current	Sedentary caribou. Availability of workers. Newfoundland and Labrador benefits.
Menihek Generating Station	Current	Newfoundland and Labrador benefits.
Tshiuetin Rail Transportation Inc.	Current	Availability of workers.
Québec North Shore & Labrador Railway	Current	Newfoundland and Labrador benefits.
Bloom Lake Iron Ore Mine	Current (under construction)	Sedentary caribou. Newfoundland and Labrador benefits. Availability of workers.
Northern Strategic Plan	Current	Availability of workers. Newfoundland and Labrador benefits.
Lower Churchill Hydroelectric Project	Reasonably Foreseeable	Availability of workers. Newfoundland and Labrador benefits.
Labrador Iron Mines Limited, Schefferville Area Iron Ore Mine	Reasonably Foreseeable	Sedentary caribou. Newfoundland and Labrador benefits. Availability of workers. Subsistence hunting and trapping.
LabMag Iron Ore Project	Hypothetical	All biophysical and socio-economic effects.
KéMag Project	Hypothetical	All biophysical and socio-economic effects.

Ideally, the criteria of importance applied to cumulative effects should be the same as those described above. In practice, that is rarely possible, for the following reasons:

- in the case of past projects, few or no environmental data are available, since there was in many cases no requirement for environmental impact assessment, monitoring or follow-up when they were carried out;
- recent projects (*e.g.*, Génivar Décembre 2006; LIM December 19, 2008) were subject to environmental impact assessment, but they did not necessarily collect or present the data relevant to assessing the cumulative effects of the ELAIOM. In addition, the methods that they employed do not always permit comparisons with the results of the present study;

- in most cases, no environmental information is available for future projects.

In most cases, therefore, the discussion of cumulative effects will be based on the application of professional judgment to the incomplete data that are available.

8.0 EFFECTS ASSESSMENT

8.1 Assessment of Effects on the Biophysical Environment

8.1.1 Noise

8.1.1.1 Interrelations of the Project with Noise and Potential Effects

Preparation/Construction Phase

Unimportant Interrelation

An unimportant interrelation was noted between the noise environment and the following activities:

- clearing and land-preparation;
- construction and improvement of access roads;
- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex area);
- railway;
- electricity transmission and distribution lines;
- transport and traffic;
- restoration of temporary work areas;
- accidents and malfunctions.

The noise generated by these activities should not cause an effect on the various receptors in the region given the distance between the construction sites and the receptors.

Operations Phase

No Interrelation

The following activities at the operations phase will have no interrelation with noise:

- disposal of dewatering water;
- management of non-hazardous wastes;
- management of hazardous wastes;
- wastewater treatment and disposal.

These activities generate no noise.

Unimportant Interrelation

The following activities will have an unimportant interrelation with the noise environment:

- stripping and storage of overburden;
- creation of waste rock piles;
- ore-drying;
- accidents and malfunctions;
- restoration of waste rock piles and of pits.

All these activities generate noise. Given the distance between the sites where they will be carried out and the receptors, the noise will not be perceivable by the receptors.

Important Interrelation

The following activities will have an important interrelation with the noise environment:

- transport of the ore and other transport or traffic;
- storage and transport of ore by rail;
- ore-crushing;
- blasting and ore-extraction.

During the operations phase, the sources of noise will be essentially related to blasting, transport and handling activities. Table 8.1 shows the sources of noise and the frequency of occurrence that were considered in the assessment of effects on the noise environment. The identification of the sources of noise in relation to the principal potential receptors was based on the operations scenario developed for Year 3, which was selected as being representative of a typical year of activity.

Table 8.1: Sources of Noise

Sources of Noise		Frequency
Mining operations (Ferriman 4, Timmins 4, Fleming 7N)	Drilling and blasting	12 months/year blasting: once/week per deposit
	Excavation and loading: • front-end loader (10 m^3) • ore transport truck (135 tonnes) • grader • tracked bulldozer • wheeled bulldozer	12 months/year 24 hours/day
Transportation (heavy trucks)	Ferriman 4: 18 400 trips/year (51/day) Timmins 4: 2 070 trips/year (6/day) Fleming 7N: 20 800 trips/year (58/day)	12 months/year 24 hours/day
Transportation (train)	Treated ore transportation – 1 train/2 days	12 months/year
Wash plant	Primary crusher	12 months/year 24 hours/day
	Conveyor belts	12 months/year 24 hours/day
	Loading rail cars	12 months/year 24 hours/day
	Generators	5 months/year 24 hours/day

Transporting the ore by trucks between the deposits and the wash plant will constitute a source of noise that might be a nuisance for the workers residing in the camp. This activity will be carried out on a continual basis, 12 months per year. For a stationary receptor, the noise generated by the passage of trucks is perceptible for only a short period, but the frequency of passing vehicles is relatively important and this activity will be occurring 24 hours per day (see Appendix 8.1).

The passage of trains also constitutes a source of noise. From the wash plant, a train will transport the treated ore. The passage of one train every other day is anticipated.

The wash plant includes generators to produce electricity, which may also constitute a nuisance for the workers residing in the camp.

Ore-crushing, which will be carried out at the wash plant, and the conveyor belts outside the building will generate noise. The conveyor belts will be located as follows:

- between the primary crusher and the crushed-ore stockpile (two conveyor belts);
- between the wash plant and the two treated-ore stockpiles;
- between the treated-ore stockpiles and the hopper of the railcar-loader (two conveyor belts).

Noise generated by blasting will be perceived at all the receptors. It is anticipated that blasting will occur approximately once a week at each deposit in operation.

The potential effects generated by these activities are the following:

↳ **Noise nuisance (without blasting)**

↳ **Noise nuisance (with blasting)**

Summary of Potential Effects

Table 8.2 shows the relationship between the Project activities and the potential effects of noise.

Table 8.2: Summary of Potential Effects of Noise

Project Activities	Potential Effects	
	Noise Nuisance (without blasting)	**Noise Nuisance (with blasting)**
Preparation/Construction		
Operations		
Transport of ore and other transport or traffic	X	
Storage and transport of ore by rail	X	
Ore-crushing	X	
Blasting and ore-extraction		X

8.1.1.2 Assessment of Noise Nuisance (Without Blasting)

Given that blasting generates high noise levels for a very short period, two assessments were conducted: one for the level of noise generated by all activities without blasting; and one for the level of noise generated by blasting. The first section presents the assessment without blasting.

Description of the Study Area and the Sensitive Receptors

The study area for the assessment of the effects of noise is the same as that used for the air quality assessment. Starting at UTM coordinates East – 628 000 m, North –

6 081 000 m, it extends 10 km to the north and the south and 15 km to the east and the west. It is characterized by rugged relief, with changes in elevation of up to 300 m.

The main sensitive receptors identified are:

- the communities of Schefferville, Matimekush and Lac John, located in the south-east sector of the study area;
- an outfitting camp (Wishart Lake);
- ten Innu camps (near Denault, La Cosa and Star lakes);
- four Naskapi camps (near Elross Lake); and
- the workers' camp.

Figure 8.1 shows the location of these sensitive receptors.

Method of Assessment of the Resulting Noise

In order to assess the effects on the noise environment at various potential receptors, the level of noise that would be perceived at those receptors was evaluated taking into account the following:

- all potential sources of noise within a 10-km radius of each group of receptors;
- the distance between the groups of receptors and the sources of noise;
- the topography (the elevation of the sources of noise in relation to that of the receptors);
- the presence (or absence) of natural obstacles (and their elevation).

For all the equipment (lift truck, truck, bulldozer, grader, conveyor belt, crusher), the level of noise generated was assumed to be 85 dBA at 1 m from the source. For blasting, it was assumed that the level of noise generated during the detonation would be 150 dBA.

The noise level emitted at the exhaust of a generator when it is functioning at 75% of its capacity was estimated to be 115 dBA (data provided by NML). It could, however, be lower depending on the energy recovery system fitted to it.

Two scenarios were assessed: one in which all the sources present within a 10-km radius are in use at the same time; and another corresponding to the blasting period. It was assumed that the other equipment usually associated with mining operations (loaders, bulldozers) will not be in use at a given deposit when blasting is occurring. Only the grader, which will be assigned mostly to road maintenance, was considered as being in use during blasting. In Year 3, three deposits will be in operation. The level of noise generated by blasting was assessed for each deposit, bearing in mind that mining and transport activities would be ongoing at the other deposits.

The tables presenting the baseline data and the results of the noise level assessment for each group of receptors are shown in Appendix 8.1.

Table 8.3 shows the noise levels assessed at the main sensitive receptors for the scenario without blasting. The resulting noise was assessed taking into account the previously measured ambient noise level (see Section 5.3.2.4). Detailed calculations for the various groups of receptors are presented in Appendix 8.1.

The results show that the level of noise generated by the various Project activities (mining, transport, wash plant, generators) will be perceived only at the workers' camp. For all other receptors, there will be no increase in the noise level in comparison with current levels, or the increase (less than 1 dBA) will not be perceptible.

Consequently, there is an important interrelation only for receptors at the workers' camp. According to the Government of Québec Directive 019 on the mining industry, the maximum noise level for habitations in industrial zones (Zone IV) is 50 dBA at night and 55 dBA during the day. The results obtained at the workers' camp show that these levels could be exceeded, but only when the generators are in use. As mentioned above, an energy recovery system may help to reduce the level of noise emitted by the generator. It should also be mentioned that the workers at the camp will usually be inside the building, which will reduce the noise levels to which they will be exposed.

Table 8.3: Assessment of the Noise Nuisance (Without Blasting)

Receptors	Sources of Noise Considered	Distance (km)	Noise (dBA)	Noise at Receptor (dBA) (1)	Ambient Noise (dBA)	Resulting Noise (dBA)
Schefferville	Ferriman 4 (drilling, loading and transportation)	9.5	0	0	N.D.	--
	Railway	2.0	0			
Wishart Lake Camp	Ferriman 4 (drilling, loading and transportation)	7.0	0	0	36.0	36.0
	Ore trucks (Ferriman 4)	10	0			
Innu Camps - Lac Star	Ferriman 4 (drilling, loading and transportation)	1.0	10	27.4	36.0	36.6
	Ore trucks (Ferriman 4)	0.8	26.9			
Workers' Camp	Timmins 4 (drilling, loading and transportation)	4.0	3.0	45.5 55.5 (2)	36.0	45.9 55.5 (2)
	Fleming 7N (drilling, loading and transportation)	1.0	25.0			
	Ore trucks (Ferriman 4)	0.1	45.0			
	Ore trucks (Timmins 4)	0.8	26.9			
	Ore trucks (Fleming 7N)	1.0	25.0			
	Generator	1.0	55.0			
	Wash plant	1.0	25.0			
Naskapi Camps - Elross Lake	Timmins 4 (drilling, loading and transportation)	5.0	0	0 16.1 (2)	36.0	36.0 36.0 (2)
	Fleming 7N (drilling, loading and transportation)	8.0	0			
	Ore trucks (Ferriman 4)	8.0	0			
	Ore trucks (Timmins 4)	5.0	0			
	Ore trucks (Fleming 7N)	8	0			
	Generator	7.0	16.1			

Receptors	Sources of Noise Considered	Distance (km)	Noise (dBA)	Noise at Receptor (dBA) (1)	Ambient Noise (dBA)	Resulting Noise (dBA)
	Wash plant	7.0	0			
Innu Camps - Lac Denault and Lac La Cosa	Ferriman 4 (drilling, loading and transportation)	2.0	9,0	18.3 20.2 (2)	36.0	36.1 36.1 (2)
	Ore trucks (Ferriman 4)	2.0	14.0			
	Ore trucks (Fleming 7N)	10.0	0			
	Fleming 7N (drilling, loading and transportation)	10.0	0			
	Generator	10.0	15.0			
	Wash plant	10.0	0			

(1) Noise was assessed at the receptor taking into account the distance separating the sources of noise and the receptors, their respective elevations and the mitigating effect due to the presence of natural obstacles where applicable.

(2) Level of noise considering the generator is in use during 5 months/year.

The standard mitigation measure that will be applied to mitigate the effect on the noise environment is as follows:

- an equipment selection criterion was adopted: all equipment will have to be designed so that the noise level generated is less than 85 dBA at one meter, except for the generators: MO2.

Importance of the Effect (Without Blasting)

The nature of this effect is “negative”. Its spatial extent is “site-specific”. The duration is “long”, since the potential effect on the noise environment will be felt throughout the life of the Project. The frequency is “continual”, since operations will be ongoing 12 months per year and 24 hours per day.

The magnitude is rated as “moderate”, since the level of noise emitted when the generator is in use could exceed the 50 dBA criterion for noise at night.

The level of certainty is “high”, since the data on the sources and levels of noise were relatively detailed. The reversibility is “total”, since the noise environment will return to its initial condition when the activities will stop. The ecological value is rated as “moderate”, since the noise environment is not an essential component of the human environment, although it is closely associated with the quality of life. The socio-economic value is also rated as “moderate” for the same reason. Based on reversibility, magnitude and overall value, the intensity was calculated as “moderate”.

Considering all the above criteria, the importance of the effect is “moderate”.

Scientific Knowledge and Mitigation Measures

The special mitigation measure suggested is to ensure that an energy-recovery system is fitted to the generator.

Importance of the Residual Effect

Assuming that the level of noise emitted by the generator fitted with the energy recovery system will be lower than 107 dBA, the level of noise at the workers’ camp will be lower than 50 dBA at all time. In that case, the magnitude and intensity will be low, and the importance of the residual effect will be low.

Follow-up Programme

The level of noise emitted by the generator fitted with the energy-recovery system will be measured during the first days that it is in operation. The levels of noise at the workers' camp at various periods during the day and the night will be measured in order to confirm the actual level of noise.

Compensation Measures

No compensation measure is anticipated.

Summary of the Effect - *Noise Nuisance (Without Blasting)*

Table 8.4 shows the various elements that contributed to the assessment of the effect *Noise nuisance (without blasting)*.

Table 8.4: Summary of the Effect - *Noise Nuisance (Without Blasting)*

Assessment of Importance	
Nature	Negative
Spatial extent	Site-specific
Frequency	Continual
Duration	Long
Level of certainty	High
Intensity	Moderate
Importance of the effect	Moderate
Special Mitigation Measure • Installation of an energy-recovery system on the generator	
Importance of the Residual Effect • Low	
Follow-up Programme • Measure noise level at generator and at workers' camp	
Compensation Measures • n/a	

8.1.1.3 Assessment of the Noise Nuisance (With Blasting)

Table 8.5 shows the results of the assessment of the levels of noise when blasting is carried out at the deposit closest to the receptors. The assessment method is the same as that described above.

The resulting noise was assessed taking into account the previously measured ambient noise level (see Section 5.3.2.4). Detailed calculations for the various groups of receptors are presented in Appendix 8.1.

The results show that the noise generated by blasting will be perceived by practically all receptors. This level of noise will, however, occur over a very short period (a few seconds). Its anticipated frequency is relatively low (two to three times per week), and blasting will occur during the day at a set hour (around noon). The highest level of noise will be perceived at the workers' camp, but the application of the 128 dBL maximum air pressure criterion renders the effect acceptable in the context of a mining operation.

Table 8.5: Assessment of the Noise Nuisance (With Blasting)

Receptors	Sources of Noise Considered	Distance (km)	Noise (dBA)	Noise at Receptor (dBA) (1)	Ambient Noise (dBA)	Resulting Noise (dBA)
Schefferville	Ferriman 4 - blasting	9.5	45.4	45.4	N.D.	--
	Railway	2.0	0			
Wishart Lake Camp	Ferriman 4 - blasting	7.0	48.1	48.1	36.0	48.4
	Ore trucks (Ferriman 4)	10	0			
Innu Camps - Lac Star	Ferriman 4 - blasting	1.0	75.0	75.0	36.0	75.0
	Ore trucks (Ferriman 4)	0.8	26.9			
Workers' Camp	Timmins 4 - (drilling, loading and transportation)	4.0	3.0	90.0	36.0	90.0
	Fleming 7N - blasting	1.0	90.0			
	Ore trucks (Ferriman 4)	0.1	45.0			
	Ore trucks (Timmins 4)	0.8	26.9			
	Ore trucks (Fleming 7N)	1.0	25.0			
	Wash plant	1.0	25.0			
Naskapi Camps – Elross Lake	Timmins 4 - blasting	5.0	51.0	51.0	36.0	51.2
	Fleming 7N - (drilling, loading and transportation)	8.0	0.0			
	Ore trucks (Ferriman 4)	8.0	0			
	Ore trucks (Timmins 4)	5.0	0			
	Ore trucks (Fleming 7N)	8.0	0			
	Wash plant	7.0	0			
Innu Camps - Lac Denault and Lac La Cosa	Ferriman 4 - blasting	2.0	74.0	74.0	36.0	74.0
	Ore trucks (Ferriman 4)	2.0	14.0			
	Ore trucks (Fleming 7N)	10.0	0			
	Fleming 7N - (drilling, loading and transportation)	10.0	0			
	Wash plant	10.0	0			

(1) Noise was assessed at the receptor taking into account the distance separating the sources of noise and the receptors, their respective elevations and the mitigating effect due to the presence of natural obstacles where applicable.

The following standard mitigation measure will be applied to limit the effect associated with the noise environment:

- blasting will be carried out in such a way as to ensure that air pressure at the receptors (habitations) is lower than 128 dBL: DD24.

Importance of the Effect

The nature of this effect is “negative”. It spatial extent is “local”. The duration is “long”, since the effect will be felt throughout the life of the Project. The frequency is “intermittent”, since blasting will occur two to three times per week.

The magnitude is rated as “low”, since the air pressure at the receptors will remain below 128 dBL.

The reversibility is “total”, since the noise environment will return to its initial condition when the activities stop. The ecological value is rated as “moderate”, since the noise environment is not an essential component of the human environment, although it is closely associated with the quality of life. The socio-economic value is also rated as “moderate”, for the same reason. Based on reversibility, magnitude and overall value, the intensity was calculated as “low”.

Considering all the above criteria, the importance of the effect is “low”.

Scientific Knowledge and Mitigation Measures

No special mitigation measures are proposed.

Importance of the Residual Effect

Since no special mitigation measure has been proposed, the residual effect remains “low”.

Follow-up Programme

A record of blasting data will be maintained: vibration speed, ground vibration frequency, air pressure, blasting patterns.

Compensation

No compensation measure is anticipated.

Table 8.6 shows the various elements that contributed to the assessment of the effect *Noise nuisance (with blasting)*.

Table 8.6: Summary of the Effect *Noise Nuisance (With Blasting)*

Assessment of Importance	
Nature	Negative
Spatial extent	Local
Frequency	Intermittent
Duration	Long
Level of certainty	High
Intensity	Low
Importance of the effect	Low
Special Mitigation Measures • None	
Importance of the Residual Effect • Low	
Follow-up Programme • Keep a record of blasting data: vibration speed, ground vibration frequency, air pressure, blasting patterns	
Compensation Measures • n/a	

8.1.2 Air Quality

8.1.2.1 Interrelations between the Project Activities and the Air

This section describes Project activities that might affect air quality.

Preparation/Construction Phase

No Interrelation

The following activities at the preparation/construction phase will have no interrelation with air quality:

- clearing and land-preparation;
- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex);
- electricity transmission and distribution lines;
- restoration of temporary work areas;
- accidents and malfunctions.

Unimportant Interrelation

An unimportant interrelation will exist between air quality and the following activities:

- construction and improvement of access roads;
- railway;
- transport and traffic.

During site-preparation and construction, effects on air quality could occur because of the dust generated by traffic on unpaved roads and site-preparation work. Moreover, vehicles transporting equipment and construction materials and the machinery used for site-preparation/construction could cause atmospheric pollution. However, it is anticipated that these particulate emissions will be limited to the construction sites and will not affect air quality at the receptors.

Operations Phase

No Interrelation

During the operations phase, the following activities will have no interrelation with air quality:

- dewatering;
- management of non-hazardous wastes;
- management of hazardous wastes;
- effluent treatment and disposal.

These activities will not generate atmospheric emissions.

Unimportant Interrelation

The following activities will have at most an unimportant interrelation with air quality:

- creation of waste rock piles;
- accidents and malfunctions;
- restoration of waste rock piles and of pits.

It is not anticipated that these activities will represent important sources of atmospheric emissions.

Important Interrelation

The following activities will potentially have an important interrelation with air quality:

- stripping and stockpiling of overburden or waste rock;
- blasting and ore-extraction;
- transport of ore and other transport or traffic;
- ore-crushing;
- ore-washing and recirculation of process water;
- ore-drying;
- stockpiling and transport of ore by rail.

The potential effects generated by these activities are:

↳ **Air quality deterioration**

Summary of Potential Effects

Table 8.7 shows the relationship between the Project activities and the potential effects on air quality.

Table 8.7: Potential Effects on Air Quality

Project Activities	Potential Effects: Air Quality Deterioration
Preparation/Construction	
Operations	
Stripping and stockpiling of overburden	X
Blasting and ore-extraction	X
Transport of ore and other transport or traffic	X
Ore-crushing	X
Ore-washing and recirculation of process water	X
Ore-drying	X
Stockpiling and transport of ore by rail	X

8.1.2.2 Assessment of Potential Effects on Air Quality

Pollutants

The atmospheric emissions related to the operations phase of the ELAIOM will be mainly particulate matter (dust). In winter, the following combustion sources will be in operation at the wash plant:

- a dryer fired by fuel oil will be used to dry the ore;
- two diesel-fired generators will be used to produce electricity;
- a boiler fired by fuel oil will produce the steam required for the ore-drying.

The preceding combustion sources will emit nitrogen oxides (NO_x), sulfur oxides (SO_x), carbon monoxide (CO) and particulate matter. These pollutants will be also produced by vehicles, equipment and locomotives. The blasting will produce carbon monoxide (CO) and small quantities of nitrogen oxides (NO_x) and hydrogen sulfide (H_2S). Given the foregoing, the pollutants evaluated were nitrogen oxides (NO_x), sulfur oxides (SO_x), carbon monoxide (CO) and particulate matter (TPM, PM10 and PM2.5).

Emission Sources

Particulates will be emitted mainly from fugitive sources related to blasting, transporting, handling and stockpiling unprocessed ore, waste rock and treated ore. The potential sources of particulate emissions were identified and assessed in order to determine for each of them the emission rates for TPM, PM10 and PM2.5. The following sections describe the sources of emissions of particulate matter and the methodology used to estimate emission rates. Table 8.8 lists the sources of emissions of particulates and the estimated emission rates used to assess the concentrations in the ambient air by means of atmospheric dispersion modelling. Detailed calculations to establish emission rates for each sources are presented in Appendix 8.4.

Table 8.8: Particulate Matter Emission Sources

Sources	Estimated Emission (kg/h)			Frequency/Duration
	TPM	PM10	PM2.5	
Drilling and blasting	0.69	0.36	0.31	12 months per year 24 h/d
Excavation and loading	12.3	3.2	0.86	12 months per year 24 h/d
Unloading waste rock	0.88	0.31	0.047	12 months per year 24 h/d
Transport of ore to processing complex (Ferriman)	31.9	10.2	1.0	12 months per year 24 h/d
Transport of ore to processing complex (Timmins)	1.0	0.32	0.032	12 months per year 24 h/d
Transport of ore to processing complex (Fleming)	7.7	2.5	0.25	12 months per year 24 h/d
Unloading the ore	0.32	0.11	0.017	12 months per year 24 h/d
Primary crusher	7.2	2.9	1.4	12 months per year 24 h/d
Transfer points on conveyors and drop points (including loading rail cars)	0.22	0.072	0.020	12 months per year 24 h/d
Stockpiles of ore (wind erosion)	0.75	0.38	0.15	12 months per year 24 h/d
Waste rock piles (wind erosion)	18.1	10.1	4.0	12 months per year 24 h/d

The emissions were estimated on the basis of the operations scenario developed for Year 3, which was selected as being representative of a typical year for the ore and waste rock tonnage handled and for the transportation of the ore to the processing complex. During Year 3, ore will be extracted from five deposits: Ferriman 4, Timmins 4, Timmins 3N, Timmins 7 and Fleming 7N (see Table 4.6). For the purposes of modelling, the operating scenario is based on the assumption that ore is extracted from three deposits at the same time during all the year.

Mining

The first operation consists in removing the overburden, known as "stripping". In the ELAIOM, this operation will be carried out only at Ferriman 4, since the other deposits to be mined have already been stripped. The rate of emission of particulates generated by overburden removal depends on the wetness of the material and on its clay content. Given the high moisture content at Ferriman 4, emissions of particulates during the removal of overburden there will be negligible. That emission source was not therefore taken into account in the modelling.

Mining operations also include the following four activities:

- drilling;
- blasting;
- excavating; and
- loading (ore and waste rock).

The emission of particulates generated by drilling and blasting are related to the number of holes drilled and the number of explosions at each site, which depend on the tonnage to be extracted annually. The emissions produced by these activities were estimated on the basis of Publication AP-42 of the USEPA (USEPA 1998a; USEPA 1998b).

Blasting operations also generates emissions of pollutants. Table 8.9 presents an estimate of those emissions based on information obtained from one of the potential suppliers of explosives, taking into consideration the tonnage of ore and waste rock to be extracted in Year 3.

Table 8.9: Emissions of Pollutants from Blasting – Year 3

Pollutants	Emission Rates (kg/y) (1)
Carbon monoxide (CO)	11,909
Nitrogen oxides (NO_x)	1.4
Hydrogen sulfide (H_2S)	0.4

(1) Based on tonnage of ore and waste rock anticipated for Year 3 operations.

The emission rates of particulates generated by excavation (using a bulldozer) and loading trucks vary according to the degree of wetness of the material (ore and waste rock) and the average speed of the wind. For each of the three sites considered, the emission rates were estimated on the basis of the total quantity of extracted material. Loading ore and waste rock will be carried out year-round. Waste rock will be transported by truck and dumped at piles located close to each deposit, whereas the ore will be transported to the wash plant. Particulate emission rates related to excavating, loading and unloading the waste rock and the ore were estimated on the basis of Publication AP-42 of the USEPA (USEPA 2006a).

Transportation

Transporting ore by trucks on unpaved roads between the deposits and the processing complex constitutes an important source of dust emissions. It is, however, anticipated that the roads will be sprayed in dry weather to reduce dust. In evaluating the emission rates of particulates, it was estimated that spraying the roads regularly would reduce the production of dust emissions by 75%.

The evaluation of the emission rates of particulates was based on the equation taken from Publication AP-42 of the USEPA (USEPA 2006b). This equation evaluates the emission rate per kilometer travelled on the basis of the silt content of the road surface and the average weight of the vehicle. Since the roads will be built with waste rock, the silt content was determined using granulometric data for samples collected at Ferriman 4, Timmins 7 and Fleming 7N (six samples). Table 8.10 shows the data used to evaluate the total distance covered during Year 3.

Table 8.10: Emissions - Transport of Ore

	Distance (km)	Number of Trips per Year
Ferriman 4	19.6	18,400
Timmins 4	5.4	2,070
Fleming 7N/Timmins 3N/ Timmins 7	4.1	20,980

Wash Plant

At the wash plant, the main sources of emissions of particulate matter will also be fugitive sources related to ore handling and stockpiling. The ore arriving at the plant will be sent to the primary crusher, which will be installed outdoors, or dumped on the unprocessed ore pile.

The primary crushing will produce particulate emissions. They were estimated using the emission factors taken from Publication AP-42 of the USEPA (USEPA 1982).

The ore exiting the crusher will be transported by conveyors to the crushed ore stockpile. Water-sprinkling stations are planned to limit dust emissions at transfer points on the conveyors and at the dropping point on the stockpile.

The ore will be reclaimed from beneath the crushed ore stockpile by conveyors installed in a tunnel. In the reclaim tunnel, two dust collectors will be installed at the discharge chute to control dust in the reclaim area.

The ore will be conveyed inside the building to the drum scrubber, where it will be mixed with water, which will reduce emissions significantly in the subsequent operations of screening, crushing, separation and sorting.

In the secondary crusher section of the building, a baghouse will control the emissions of particulates from the secondary crusher and the handling of the ore there (conveyors).

Given the high efficiency of baghouses in filtering particulates (over 99%), this equipment will not be a important source of particulates. Consequently, it was not taken into account in modelling the emissions.

Ore Handling

Particulates are emitted during ore handling operations, particularly at points of transfer on the conveyors (changes of direction), at the stockpile drop points and when rail wagons are loaded. There will be four transfer or drop points outside buildings. The emission factors taken from Publication AP-42 of the USEPA for conveyor transfer points were used to estimate those emissions (USEPA 2004). With respect to the handling of the crushed ore, the emission factor for controlled emissions was used to take into account the planned water sprinkling system. One of these drop points corresponds to the loading of ore into rail cars. Considering that the type of chute which will be used at this point reduces significantly dust emissions, the particulate emission rate was considered to be reduced by 90%.

There will be four transfer or drop points inside the building covering the finished product stockpiles. The particulate emissions from these points were considered to be 10% (TCEQ

2002) of the emission rates taken from Publication AP-42 of the USEPA for conveyor transfer points (USEPA 2004).

Ore Stockpiles

The ore will be stored in four stockpiles at the processing complex:

- the ROM (unprocessed ore) stockpile;
- the coarse ore stockpile;
- the SF stockpile;
- the SPF stockpile.

The ROM pile will be located near the primary sizer. This pile will be used on the rare occasions when the primary sizer is out of operation for maintenance and for blending purposes.

The coarse ore from the primary sizer will be sent to a stockpile located roughly south-west of the wash plant.

The SF stockpile and the SPF stockpile (products stockpiles) will be covered by an inflatable dome which will prevent any emission of particulates by wind erosion.

Wind erosion of the unprocessed ore and coarse ore stockpiles will generate emissions of particulates. These emissions were estimated using an equation (Environment Canada 2009, Internet site) that takes into account the following data:

- average number of days per year with precipitation of at least 0.254 mm;
- silt content of the material;
- percentage of time per year that the unobstructed wind speed exceeds 19.3 km/h;
- exposed surface area of the stockpile.

The average content of silt estimated on the basis of granulometric data for six samples collected at Ferriman 4, Timmins 7 and Fleming 7N was used to establish the silt content of the unprocessed ore (ROM) and the coarse ore. Given that the moisture content of the ore is relatively high, a reduction of emissions in the order of 40% was applied to estimate the emissions from the two ore stockpiles.

Waste Rock Piles

The creation of waste rock piles also constitutes a source of fugitive emissions of particulates. Once the pile is in place, the material tends to aggregate, and emissions due to wind erosion of its surface decrease progressively. The emissions from the waste rock piles were estimated using the same methodology as for the stockpiles. Taking into account the high moisture content and the fact that a part of the surface area will not be reworked, a 60% reduction of emissions was applied to the waste rock piles that will be active during Year 3. The emissions from the piles created during the two previous years at Timmins 4, Timmins 7 and Fleming 7N were also estimated, but with a 75% reduction of emissions to account for the fact that wind erosion of them, which will no longer be active, will diminish with time.

Combustion Sources

At the wash plant, the fluidized bed dryer and two generators will be in operation only in winter (five months per year, from mid-November to mid-April). Also, two boilers will be used (seven months per year, from mid-October to mid-May) to produce steam, which will be used to reduce the moisture of the product. Table 8.11 gives the estimated emission rates used to assess the concentrations in the ambient air by means of atmospheric dispersion modelling.

The fluidized bed dryer will be equipped with cyclones and baghouses to control particulate emissions. The emission rate of particulate matter and nitrogen oxides (NO_x) from the dryer was established from data provided by its potential supplier. Considering the collection efficiency of baghouses for larger particulates, it was assumed that all particulates emitted at the dryer stack have a diameter lower than 2.5 µm (PM2.5). The emission rate of carbon monoxide (CO) was established using the emission factor taken from Publication AP-42 of the USEPA (USEPA 1998c). The emission rate of sulfur oxides (SO_x) was estimated based on the fuel consumption rate and the average sulfur content in fuel oil of 0.2% (Environnement Canada Octobre 2002).

Two generators, each with a capacity of 3.3 MW, will be installed. For the modelling, it was considered that the two generators would operate at 75% of their capacity. The emission rates of particulate matter, carbon monoxide (CO) and nitrogen oxides (NO_x) from the generators were evaluated based on the technical data sheet provided by a potential supplier. It was assumed that all the particulates emitted are PM2.5 (USEPA 1996). The emission rate of sulfur oxides (SO_x) was estimated based on the fuel consumption rate and the average sulfur content in fuel oil of 0.2% (Environnement Canada Octobre 2002). The generators will be located near the substation.

Two boilers with a steam-producing capacity of 5,000 kg/h will produce the steam required for the drying process. In normal operation, a total of 7,500 kg/h of steam is required. For the modelling study, it was considered that the two boilers will operate at 75% of their capacity. The emission rates of particulate matter, carbon monoxide (CO) and nitrogen oxides (NO_x) were established using the emission factors taken from Publication AP-42 of the USEPA (USEPA 1998c) and assuming that they will be equipped with low-NO_x burners. The emission rate of sulfur oxides (SO_x) was estimated based on the fuel consumption rate and the average sulfur content in fuel oil of 0.2% (Environnement Canada Octobre 2002).

Table 8.11: Combustion Sources

Source	Estimated Emission Rates (kg/h)						Frequency/ Duration
	CO	NO_x	SO_x	TPM	PM10	PM2.5	
Dryer	1.7	3.8	9.3	5.8	5.8	5.8	5 months per year 24 h/d
Generators	2.4	41.2	2.1	3.3	3.3	3.3	5 months per year 24 h/d
Boilers	0.32	0.64	1.8	0.13	0.064	0.016	7 months per year 24h/d

Mitigation Measures

The following standard mitigation measures will be implemented for air quality:

- drilling and blasting (DD): DD20, DD21, DD22, DD23;
- construction equipment on roads (EC): EC14;
- management of ore, stockpiles, tailings, mine waste and overburden (OR): OR6;
- mining operations (MO): MO1;
- air quality control (AQ): AQ1, AQ2, AQ3, AQ4.

Atmospheric Dispersion Modelling

The effects on air quality were estimated by means of atmospheric pollution dispersion modelling of the emissions from the above-described sources using the CALPUFF programme of the USEPA. The methodology used for the modelling and the results obtained are presented in the following sections.

Methodology

The methodology comprised the following three elements:

- the description of the dispersion model used;
- the description of the study area;
- the modelling parameters.

Description of the Dispersion Model Used

The CALPUFF model is the atmospheric pollution dispersion model recommended in the *Guideline for Plume Dispersion Modelling* of the Department of Environment and Conservation of the Government of Newfoundland and Labrador (GNL June 2002).

CALPUFF is a Gaussian puff modelling system for the simulation of variable spatial and temporal conditions. Atmospheric emissions are modelled as a series of puffs which disperse according to wind direction over a given period. These puffs disperse vertically and horizontally in the atmosphere. They are influenced by the topography. Thus, a change in wind direction will influence the results of the modelling. The CALPUFF model adapts easily to various modelling situations. The flexibility of the model allows for the various characteristics associated with the local context to be taken into account. CALPUFF is especially useful in situations in which particulate matter is transported over long distances, with light and calm wind conditions (speed less than 0.5 m/s), wind inversions, such as landbreezes and seabreezes, and complex wind configurations associated with very rugged terrains.

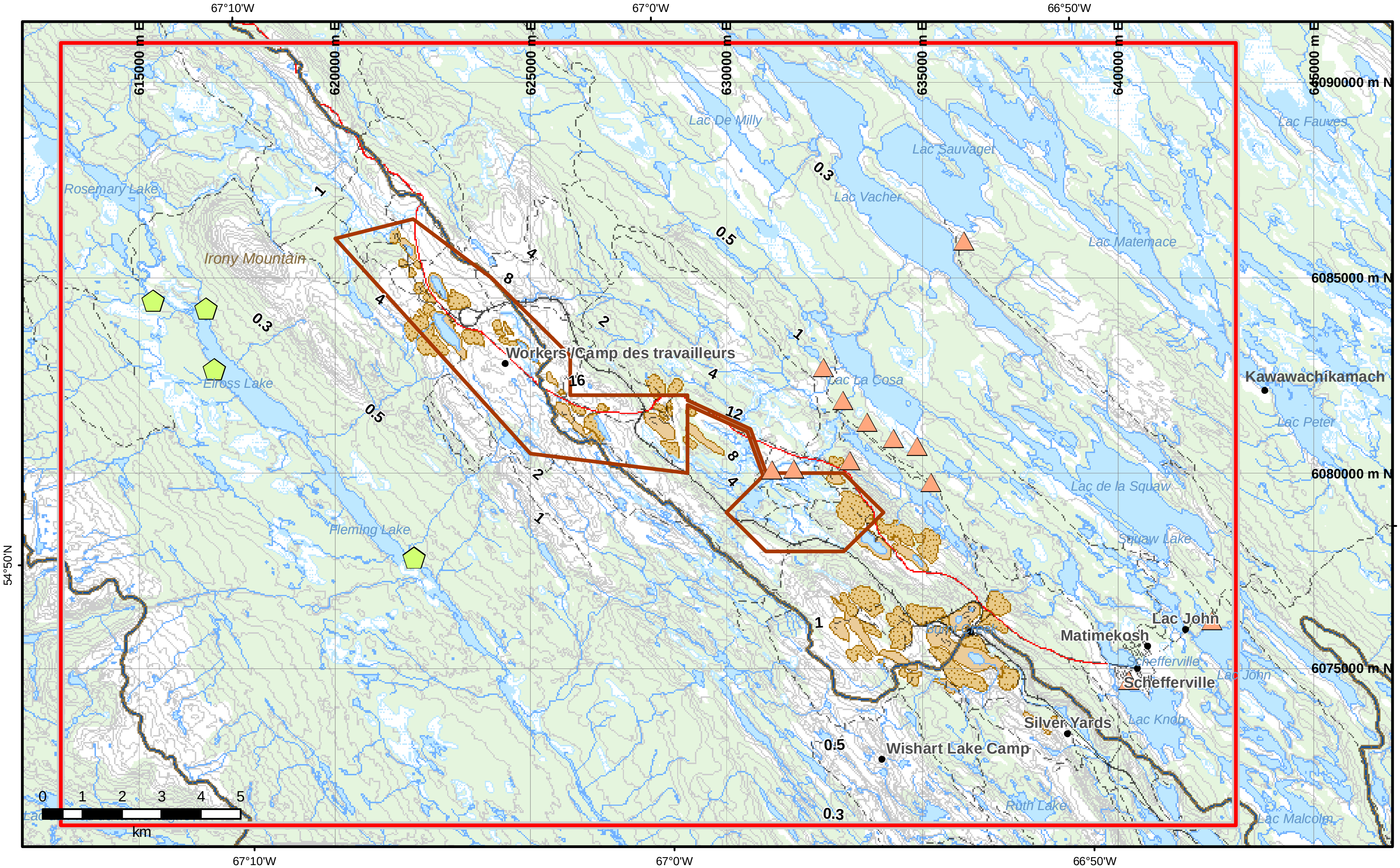
The system is made up of three programmes: CALMET, CALPUFF and CALPOST. CALMET allows for the processing of meteorological data and the obtaining of hourly tridimensional meteorological data specific to the study area. Once processed, the meteorological data obtained with CALMET are used by CALPUFF, the atmospheric dispersion modelling programme. Lastly, CALPOST allows for the processing and analysis of the modelling results. The V6.326, V6.262 and V6.221 versions of CALMET, CALPUFF and CALPOST were used. They were the most recent versions at the time of this study.

Description of the Study Area

The study area for the purposes of modelling the dispersion of pollutants covers an area of 600 km^2. Starting at UTM coordinates East – 628 000 m, North – 6 081 000 m, half way between DSO2 and DSO3, this area extends 10 km to the north and to the south and 15 km to the east and to the west.

The study area is characterized by rugged relief, with drops of up to 300 m. It is covered in large part by coniferous forests and tundra. The populated zones are Schefferville, Matimekush and Lac John, all located in the south-east sector of the study area. The study area also includes 10 Innu and four Naskapi camps as well as one camp operated by an outfitter.

Figure 8.1 shows the study area and the main inhabited zones (Innu camps, Naskapi camps, communities, workers' camp, *etc*.) that were considered as sensitive receptors. It also shows the boundaries of the territory for which a request for exclusive use by the ELAIOM was tabled with the Government of Newfoundland and Labrador and the Government of Québec.



LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main Access Road/ Route d'accès principale
- Road/route
- Exclusive use territory/ Territoire d'usage exclusif
- Study area/Aire d'étude
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out Pit/ Fosse existante épuisée
- Existing Waste Dump/ Halde de stériles existante

Sensitive receptors/ Récepteurs sensibles

- Innu Camp/ Camp des Innus
- Naskapi Camp/ Campement des Naskapis
- Camp or City Camp ou ville

ELAIOM Project
Study area for purposes of modeling the atmospheric dispersion of emissions

Projet ELAIOM
Aire d'étude pour l'étude de dispersion atmosphérique

SCALE/ECHELLE:
1:140 000

UTM 19N NAD 83

SOURCES:

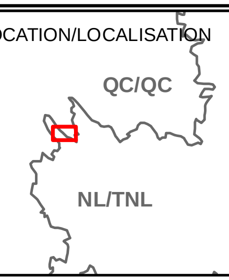
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.1

LOCATION/LOCALISATION



Modelling Parameters

This section presents the data necessary for modelling. The modelling parameters are divided into three categories: data related to emission sources; meteorological data; and data related to receptors. As an example, the input and output files for the modelling of sensitive receptors is presented in Appendix 8.4.

Data Related to Emission Sources

The data related to emission sources are the physical characteristics of the sources, the emission rates of pollutants and their duration. They are presented in Table 8.8.

In total, 29 sources of emissions were modelled. The pollutants evaluated were nitrogen oxides (NO_X), sulphur oxides (SO_x), carbon monoxide (CO), total particulate matter (TPM), PM10 and PM2.5. The activities of the wash plant (primary crusher, conveyors and drop points) were modelled as volume sources. These activities accounted for five sources of emissions. The activities at the blasting sites and waste rock piles were treated as surface sources. They represent a total of eight sources. The activities of transport were modelled as surface sources. The roads were segmented into 13 surface sources measuring 100 m in width and a maximum length of approximately 1,000 m. Finally, the dryer stack, the generator stacks and the boiler stack were modelled as point sources.

Nitrogen oxide (NO_x) emissions from a combustion source are a combination of NO and NO_2. NO_2 is the primary component of concern in NO_x. The ratio of in-stack emissions of NO and NO_2 was not available. The conservative assumption that all the NO_x emitted from the combustion sources would be NO_2 was used for this study.

Meteorological Data

The CALMET programme was used to generate meteorological data files. The programme used the following elements to generate wind fields:

- meteorological data obtained by a nonhydrostatic mesoscale assessment technique using Mesoscale Model (MM 5) (operated by the Canadian company Lakes Environmental) for the years 2004 to 2008 were used as baseline data. The data grid provided by Lakes Environmental had a resolution of 14 km and covered an area of 40 km by 40 km. The UTM coordinates of the central point were: East – 628 000 m, North 6 081 000 m. An explanatory document is provided in Appendix 8.4;
- the domain of the meteorological grid generated by the programme had an area of 600 km^2, which extends 10 km north and south, and 15 km east and west, in relation to the central point (UTM East – 628 000 m, North 6 081 000 m), located halfway between DSO2 and DSO3. The resolution of the meteorological grid was 500 m by 500 m;
- the vertical levels of the meteorological grid data were 20 m, 50 m, 100 m, 200 m, 500 m, 1,000 m, 2,000 m and 3,300 m;
- the CALMET land use grid is shown in Appendix 8.4. Land use data were obtained from 2003 LANDSAT imagery data and were converted so that they could be processed by CALMET. The main land use categories found in the study area are presented in Table 8.12. The land use data in the study area were used by CALMET to calculate parameters such as surface roughness. Even though land use varies within

the study area, the capabilities of CALMET are such that a given land use can be associated with each section of the meteorological grid;

- terrain elevation data were obtained from digital databases with a precision greater than 5 m;
- all other CALMET default options and factors were selected.

Table 8.12: Land Cover in LANDSAT vs CALMET

LANDSAT Data (2003)		Equivalent CALMET Category	
12	tundra	80	shadow
20	small waterbody	51	water
31	tundra	80	snow
32	barren land	70	rock/rubble
33	tundra	80	exposed barren land
40	tundra	80	(bryoids) lichen/moss
52	tundra	80	shrub low
82	tundra	80	wet shrub
211	forest land	40	coniferous dense
212	forest land	40	coniferous open
213	forest land	40	coniferous sparse

Receptors Data

In order to meet the requirements of the *Guideline for Plume Dispersion Modelling* of the Department of Environment and Conservation of the GNL (GNL June 2002), two Cartesian grids of receptors and discrete receptors were defined.

The first Cartesian grid covers the entire study area as described above. Its resolution is of 500 m by 500 m.

The second Cartesian grid covers an area of 60 km^2. It extends along the DSO2 and DSO3 facilities for a distance of 15 km and covers a strip of land 4 km wide. Its resolution is 100 m by 100 m. It was not necessary to use a grid of 50 m resolution (as required in the *Guideline for Plume Dispersion Modelling*), because the zone for which such a grid is required falls within the boundaries of the territory for which a request for exclusive use has been tabled.

The following elements were defined as discrete receptors: the workers' camp; the communities of Schefferville, Matimekush and Lac John; 10 Innu camps; four Naskapi camps; and one camp operated by an outfitter. With respect to the workers' camp, the receptors were distributed in a 50-m resolution grid. The receptors covering Schefferville were distributed in a 200-m resolution grid.

The receptors were positioned 1.5 m above the ground. The receptors located within the territory for which a request for exclusive use has been tabled were removed from the modelling file in order to evaluate the ambient concentrations outside this boundary.

Receptors located less than 100 m from roads were also removed. Receptors located at a distance less than the width of the source were removed so as to ensure unbiased results.

The terrain elevation data used in the grid were obtained from the digital database having a precision greater than 5 m.

Modelling Results

Table 8.13 shows the maximum ambient concentrations calculated by modelling for the receptors. Background concentrations were added to the maximum concentrations calculated. The background concentrations used were provided by the Environmental Assessment Division from the Department of Environment and Conservation of GNL (Madden 2009, *personal communication*). The resulting concentrations were compared to the ambient air quality standards of the GNL or the GoQ depending on the location of the receptors. The detailed results of the dispersion modelling are presented in Appendix 8.4.

Figures 8.2 to 8.17 illustrate the profiles of the maximum ambient concentrations evaluated by the atmospheric dispersion modelling for TPM, PM2.5, PM10, SO_2, NO_X and CO between 2004 and 2008 for the prescribed periods. More precisely, Figures 8.2 to 8.4 show the maximum concentrations calculated over annual, 24-hour and 1-hour periods for TPM. Figures 8.5 to 8.8 illustrate the profile for 24-hour and 1-hour periods for PM10 and PM2.5. Figures 8.9 to 8.12 illustrate the profile of annual, 24-hour, 3-hour and 1-hour maximum concentrations for SO_2. Figures 8.13 to 8.15 illustrate the profile of annual, 24-hour and 1-hour maximum concentrations for NO_2. Figures 8.16 and 8.17 illustrate the profile of 8-hour and 1-hour maximum concentrations for CO.

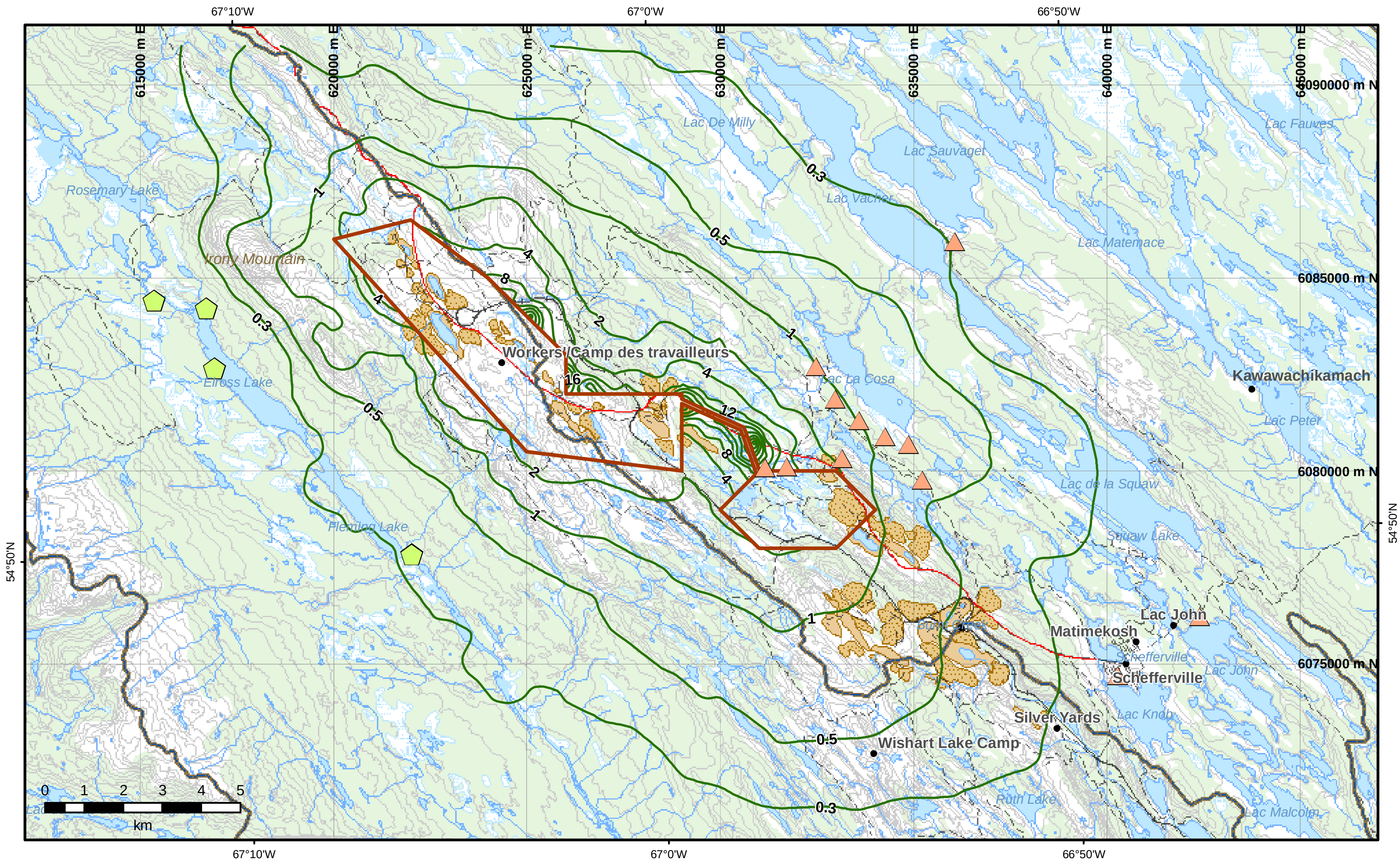
The results of the modelling show that, even in the worst meteorological conditions for dispersion, the ambient air concentrations in the communities of Schefferville, Matimekush and Lac John are always lower than the air quality standards of the GoQ for all the pollutants evaluated.

Table 8.13: Maximum Concentrations Modelled at the Main Receptors Identified

Sensitive Receptor	Pollutant	Period	Estimated Background Concentrations (µg/m³) (1)	Results: Modelled Max. Conc. (µg/m³)	Results: Max. Conc, including Background Conc. (µg/m³)	NL Atmospheric Quality Standards (2)	QC Atmospheric Quality Standards (3)	% in Relation to Standard
Workers' Camp (NL)	TPM	1 y	15	17.3	32.3	60	--	54%
		24 h	15	355.5	370.0 (4)	120	--	308%
		1 h	15	764.8	779.8	--	--	--
	PM10	24 h	10	114.0	124.0 (5)	50	--	248%
		1 h	10	240.4	250.4	--	--	--
	PM 2.5	24 h	5	16.7	21.7	25	--	87%
		1 h	5	57.0	62.0	--	--	--
	SO_2	1 y	5	0.44	5.4	60	--	9.0%
		24 h	5	10.8	15.8	300	--	5.3%
		3 h	5	31.3	36.3	600	--	6.1%
		1 h	5	52.0	57.0	900	--	6.3%
	NO_2	1 y	3.8	0.71	4.5	100	--	4.5%
		24 h	3.8	23.5	27.3	200	--	14%
		1 h	3.8	242.9	239.1	400	--	60%
	CO	8 h	114	11.4	125.4	15,000	--	0.84%
		1 h	114	25.4	139.4	35,000	--	0.40%
Innu Camps (Lac Star) (QC)	TPM	1 y	15	6.8	21.8	--	70	31%
		24 h	15	41.6	56.6	--	150	38%
		1 h	15	191.8	206.8	--	--	--
	PM10	24 h	10	19.5	29.5	--	--	--
		1 h	10	61.0	71.0	--	--	--
	PM2.5	24 h	5	4.7	9.7	--	--	--
		1 h	5	14.5	19.5	--	--	--
	SO_2	1 y	5	0.02	5.02	--	52	9.7%
		24 h	5	0.77	5.8	--	288	2.0%
		3 h	5	3.0	8.0	--	--	--
		1 h	5	4.4	9.4	--	1,310	0.7%
	NO_2	1 y	3.8	0.05	3.85	--	103	3.7%
		24 h	3.8	2.9	6.7	--	207	3.2%
		1 h	3.8	21.0	24.8	--	414	6.0%
	CO	8 h	114	14.7	128.7	--	15,000	0.86%
		1 h	114	23.1	137.1	--	34,000	0.40%
Other Innu Camps (QC)	TPM	1 y	15	1.8	16.8	--	70	24%
		24 h	15	19.0	34.0	--	150	23%
		1 h	15	125.8	140.8	--	--	--
	PM10	24 h	10	6.4	16.4	--	--	--
		1 h	10	42.2	52.2	--	--	--
	PM2.5	24 h	5	1.8	6.8	--	--	--
		1 h	5	11.0	16.0	--	--	--
	SO_2	1 y	5	0.02	5.02	--	52	9.6%
		24 h	5	0.57	5.6	--	288	1.9%
		3 h	5	2.7	7.7	--	--	--
		1 h	5	4.9	9.9	--	1,310	0.8%
	NO_2	1 y	3.8	0.04	3.84	--	103	3.7%
		24 h	3.8	2.7	6.5	--	207	3.1%
		1 h	3.8	20.7	24.5	--	414	5.9%
	CO	8 h	114	3.6	117.6	--	15,000	0.78%
		1 h	114	7.5	121.5	--	34,000	0.36%

Sensitive Receptor	Pollutant	Period	Estimated Background Concentrations (µg/m³) (1)	Results		NL Atmosphe-ric Quality Standards (2)	QC Atmosphe-ric Quality Standards (3)	% in Relation to Standard
				Modelled Max. Conc. (µg/m³)	Max. Conc, including Background Conc. (µg/m³)			
Naskapi Camps (NL)	TPM	1 y	15	0.3	15.3	60	--	26%
		24 h	15	13.9	28.9	120	--	24%
		1 h	15	114.4	129.4	--	--	--
	PM10	24 h	10	5.3	15.3	50	--	31%
		1 h	10	44.3	54.3	--	--	--
	PM2.5	24 h	5	1.8	6.8	25	--	27%
		1 h	5	14.8	19.8	--	--	--
	SO_2	1 y	5	0.01	5.01	60	--	8.4%
		24 h	5	0.82	5.8	300	--	1.9%
		3 h	5	3.9	8.9	600	--	1.5%
		1 h	5	8.1	13.1	900	--	1.5%
	NO_2	1 y	3.8	0.05	3.85	100	--	3.9%
		24 h	3.8	5.5	9.3	200	--	4.7%
		1 h	3.8	50.9	54.7	400	--	13.7%
	CO	8 h	114	1.2	115.2	15,000	--	0.8%
		1 h	114	3.9	117.9	35,000	--	0.3%
Schefferville/ Matimekush/ Lac John (QC)	TPM	1 y	15	0.23	15.2	--	70	22%
		24 h	15	3.5	18.5	--	150	12%
		1 h	15	41.1	56.1	--	--	--
	PM10	24 h	10	1.5	11.5	--	--	--
		1 h	10	13.1	23.1	--	--	--
	PM2.5	24 h	5	0.57	5.6	--	--	--
		1 h	5	2.4	7.4	--	--	--
	SO_2	1 y	5	0.01	5.01	--	52	9.6%
		24 h	5	0.36	5.4	--	288	1.9%
		3 h	5	1.2	6.2	--	--	--
		1h	5	2.3	7.3	--	1,310	0.56%
	NO_2	1 y	3.8	0.02	3.82	--	103	3.7%
		24 h	3.8	1.2	5.0	--	207	2.4%
		1 h	3.8	8.9	12.7	--	414	3.1%
	CO	8 h	114	0.3	114.3	--	15,000	0.76%
		1 h	114	1.5	115.5	--	34,000	0.34%

(1) Reference: GNL (2009)
(2) Reference: Air quality standards of the GNL, Schedule A - Table I: Ambient Air Quality Standards at Reference Conditions
(3) Reference: *Regulation respecting the quality of the atmosphere (Q-2, r.20),* Section 6 Air quality standards
(4) TPM concentration for 24-h period exceeds air quality standard of 120 µg/Nm³ 38 days over five years (including background concentration)
(5) PM10 concentration for 24-h period exceeds air quality standard of 50 µg/Nm³ 23 days over five years (including background concentration)



LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main Access Road/ Route d'accès principale
- Road/route
- Exclusive use territory/ Territoire d'usage exclusif
- Average annual concentration in µg/m³/ Concentration moyenne annuelle en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out Pit/ Fosse existante épuisée
- Existing Waste Dump/ Halde de stériles existante

Sensitive receptors/ Récepteurs sensibles

- Innu Camp/ Camp des Innus
- Naskapi Camp/ Campement des Naskapis
- Camp or City Camp ou ville

ELAIOM Project
Average annual concentrations of TPM from modeling

Projet ELAIOM
Concentrations moyennes annuelles de MPT obtenues par modélisation

SCALE/ECHELLE:
1:140 000

UTM 19N NAD 83

SOURCES:

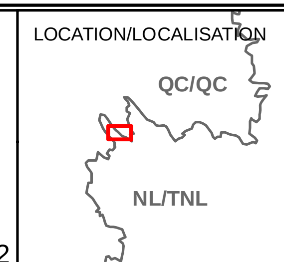
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

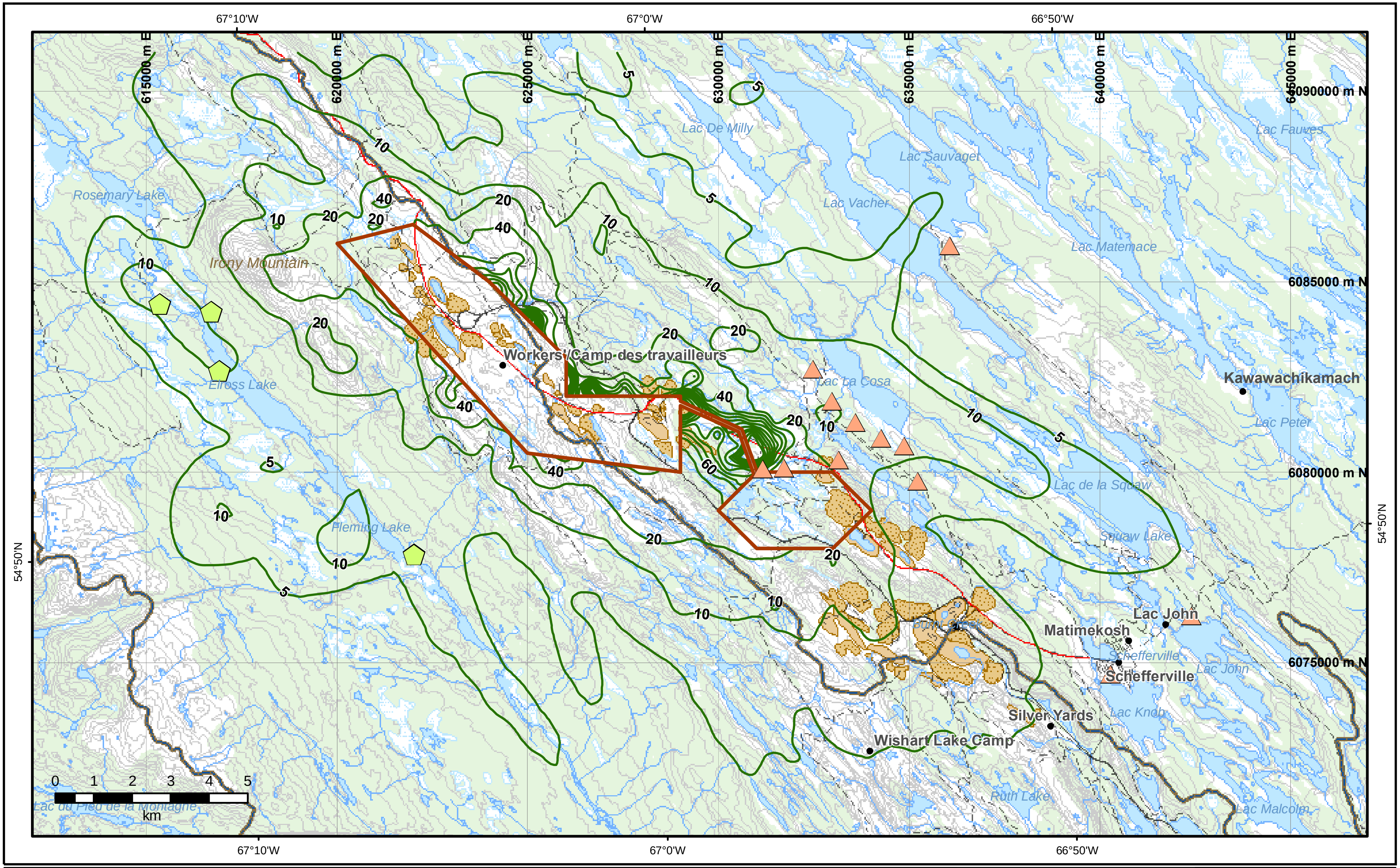
BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.2

LOCATION/LOCALISATION





LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Maximum daily concentration in µg/m³/ concentration maximale journalière en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

ELAIOM Project
Maximum daily concentrations of TPM from modeling

Projet ELAIOM
Concentrations maximales journalières de MPT obtenues par modélisation

SCALE/ECHELLE:
1:140 000

N

UTM 19N NAD 83

SOURCES:

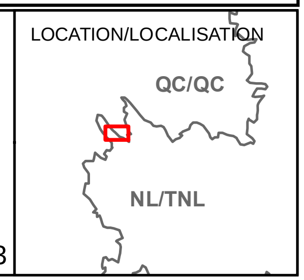
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

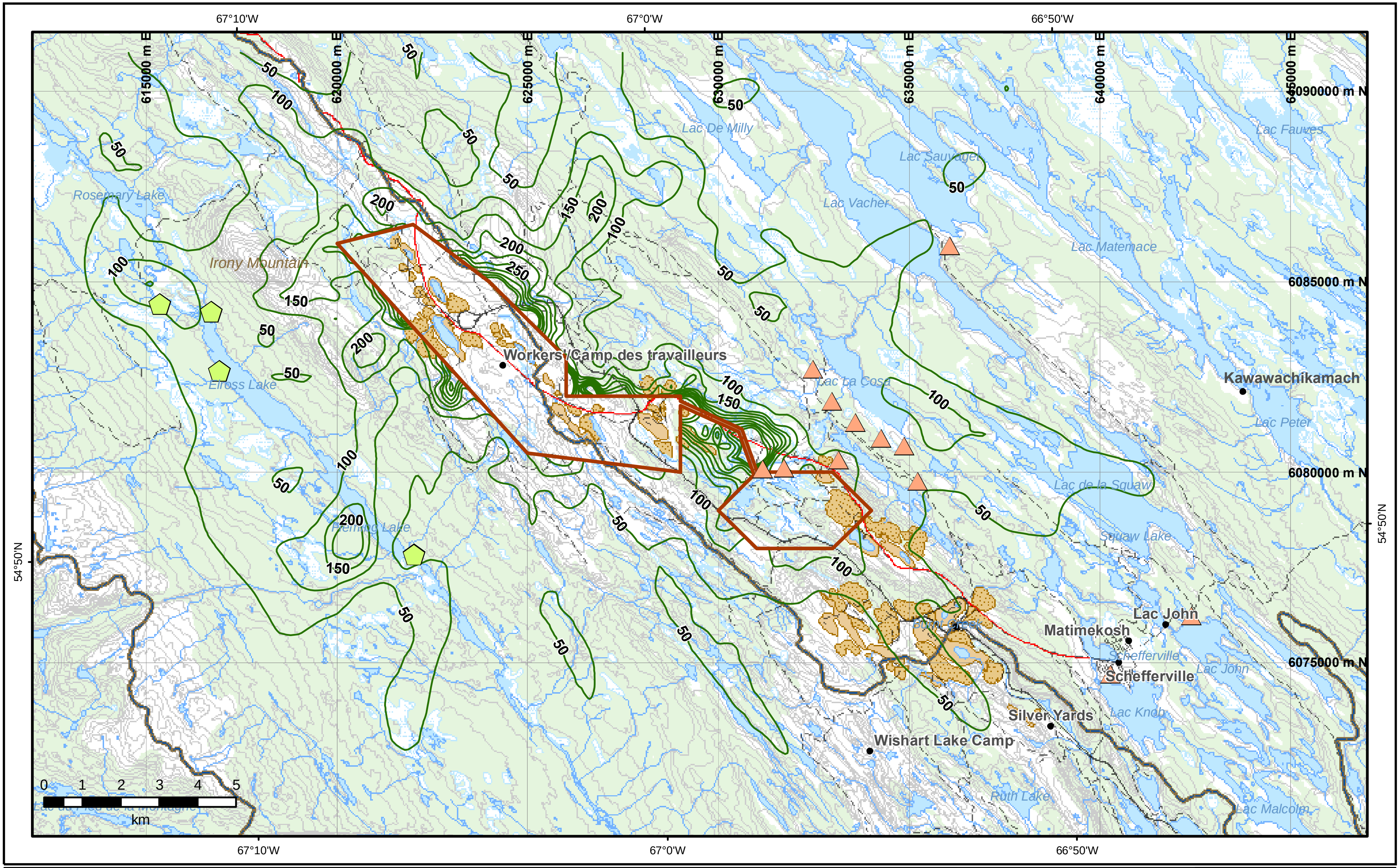
BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.3

LOCATION/LOCALISATION





LEGEND/LÉGENDE

Border/frontière
Railway/voie ferrée
Main access road/ route d'accès principale
Road/route
Exclusive use territory/ territoire d'usage exclusif
Maximum hourly concentration in µg/m³/ concentration maximale horaire en µg/m³
Watercourse/cours d'eau
Wetland/milieu humide
Waterbody/plan d'eau
Existing mined-out pit/ fosse existante épuisée
Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

Innu Camp/ Camp des Innus
Naskapi camp/ camp des Naskapis
Camp or city/ camp ou ville

ELAIOM Project
Maximum hourly concentrations of TPM from modeling

Projet ELAIOM
Concentrations maximales horaires de MPT obtenues par modélisation

SCALE/ECHELLE:
1:140 000

UTM 19N NAD 83

SOURCES:

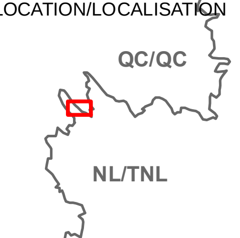
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

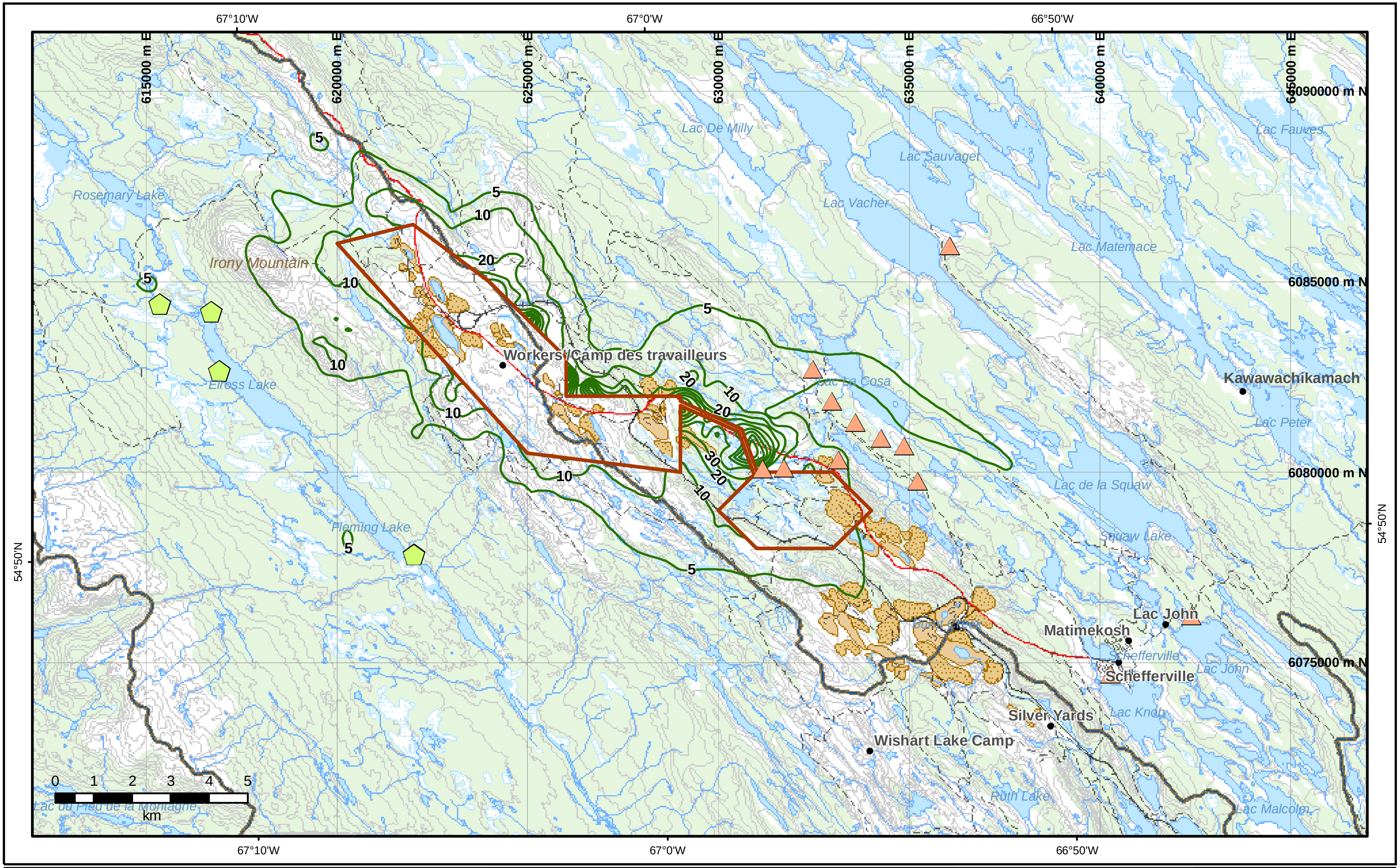
BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.4

LOCATION/LOCALISATION





LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main Access Road/ Route d'accès principale
- Road/route
- Exclusive use territory/ Territoire d'usage exclusif
- Maximum daily concentration in µg/m³/ Concentration maximale journalière en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out Pit/ Fosse existante épuisée
- Existing Waste Dump/ Halde de stériles existante

Sensitive receptors/ Récepteurs sensibles

- Innu Camp/ Camp des Innus
- Naskapi Camp/ Campement des Naskapis
- Camp or City Camp ou ville

ELAIOM Project
Maximum daily concentrations of PM10 from modeling

Projet ELAIOM
Concentrations maximales journalières de MP10 obtenues par modélisation

SCALE/ECHELLE:
1:140 000

UTM 19N NAD 83

SOURCES:

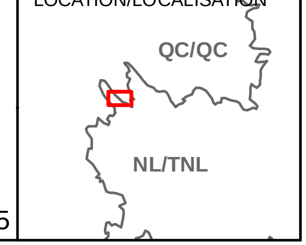
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

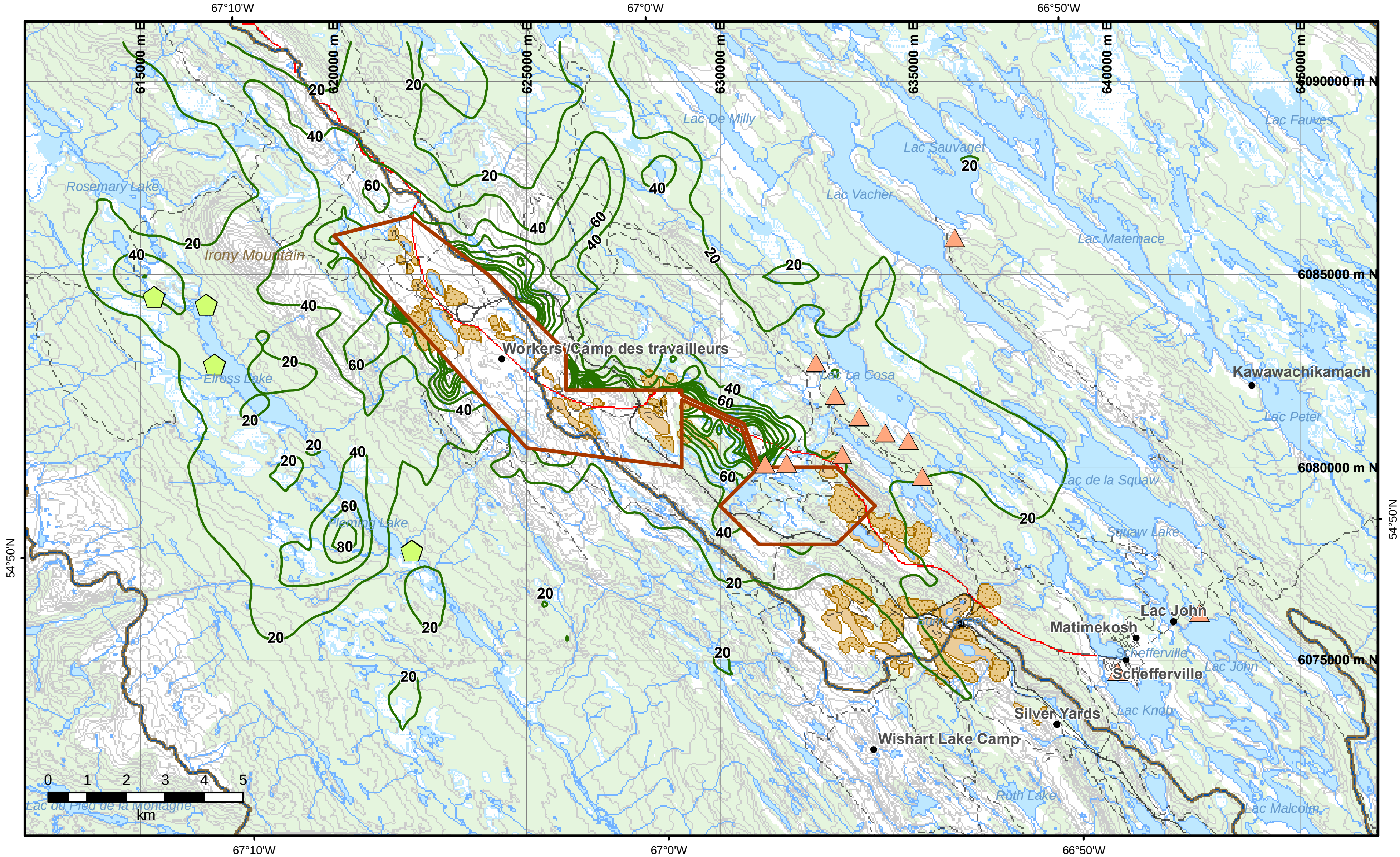
BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.5

LOCATION/LOCALISATION





LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Maximum hourly concentration in µg/m³/ concentration maximale horaire en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

ELAIOM Project
Maximum hourly concentrations of PM10 from modeling

Projet ELAIOM
Concentrations maximales horaires de MP10 obtenues par modélisation

SCALE/ECHELLE:
1:140 000

N

UTM 19N NAD 83

SOURCES:

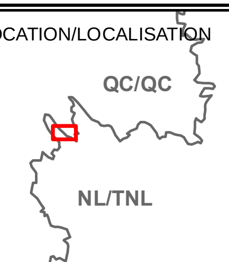
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

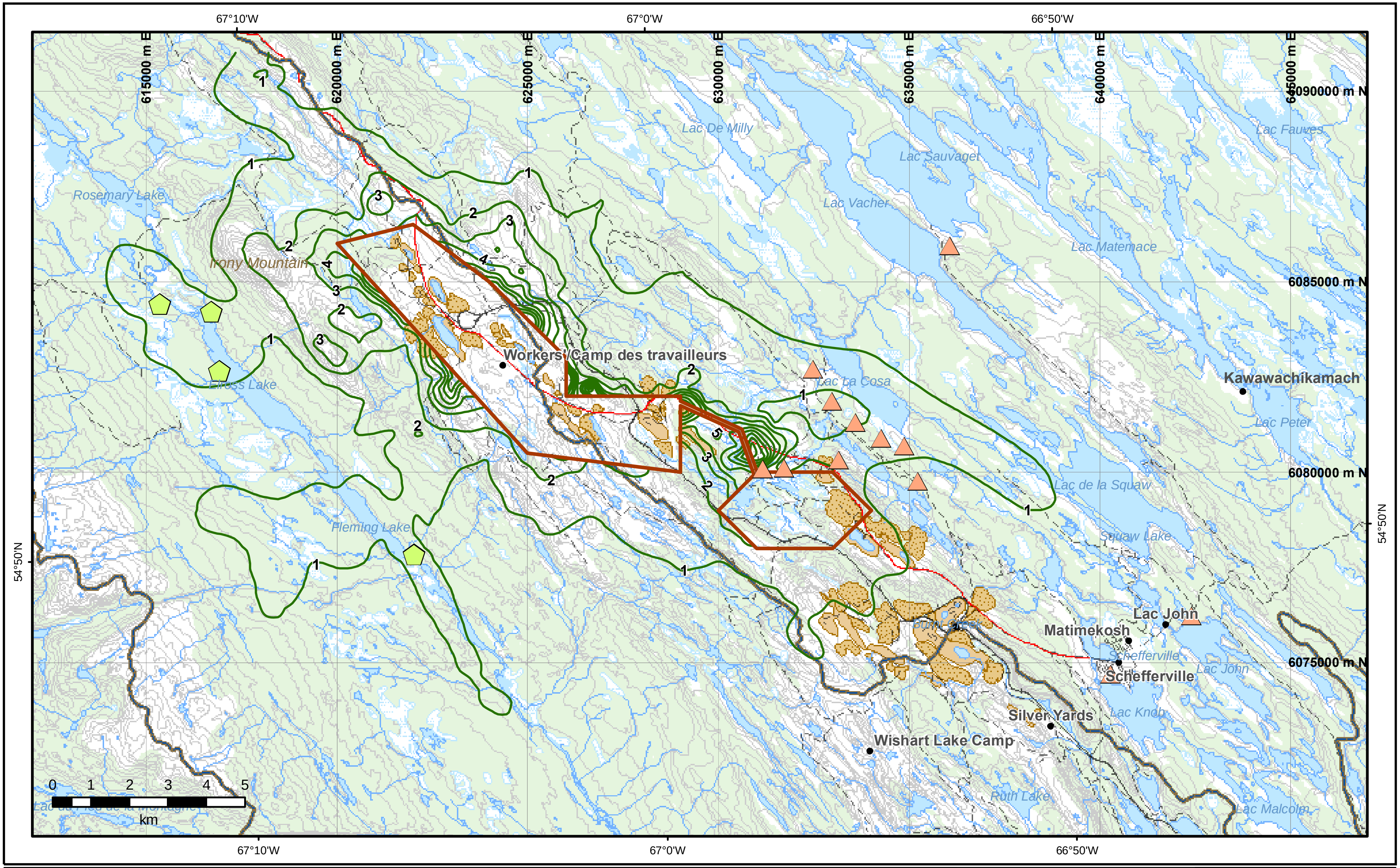
BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.6

LOCATION/LOCALISATION





LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Maximum daily concentration in µg/m³/ concentration maximale journalière en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

Maximum Daily Concentrations of PM2.5 from Modelling

Concentrations maximales journalières de MP2.5 obtenues par modélisation

SCALE/ÉCHELLE:
1:140 000

N

UTM 19N NAD 83

SOURCES:

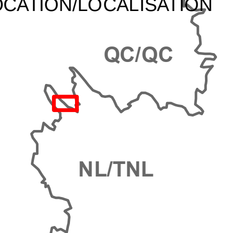
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

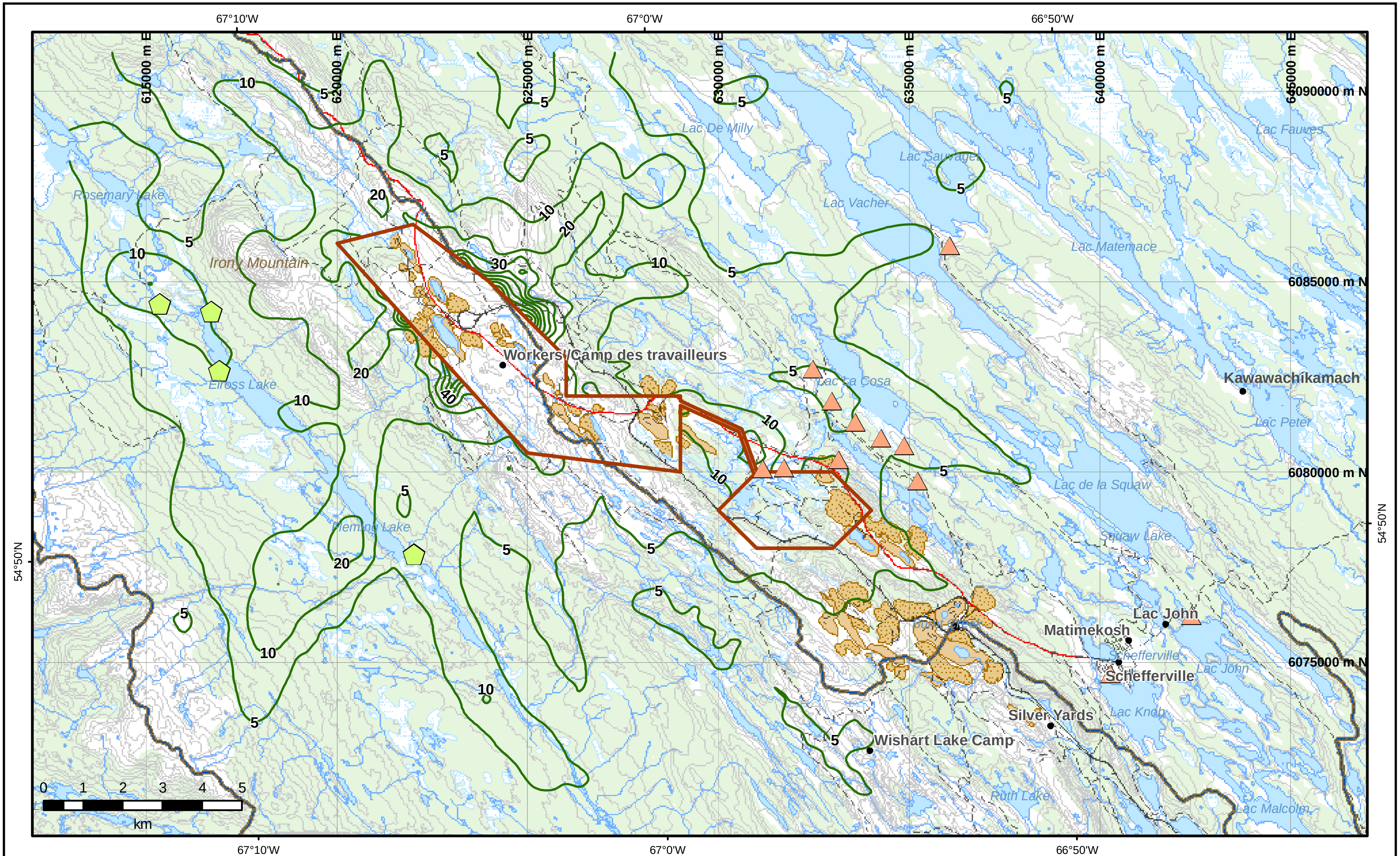
BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.7

LOCATION/LOCALISATION





LEGEND/LÉGENDE

Border/frontière
Railway/voie ferrée
Main Access Road/ Route d'accès principale
Road/route
Exclusive use territory/ Territoire d'usage exclusif
Maximum hourly concentration in µg/m³/ Concentration maximale horaire en µg/m³
Watercourse/cours d'eau
Wetland/milieu humide
Waterbody/plan d'eau
Existing mined-out Pit/ Fosse existante épuisée
Existing Waste Dump/ Halde de stériles existante

Sensitive receptors/ Récepteurs sensibles
Innu Camp/ Camp des Innus
Naskapi Camp/ Campement des Naskapis
Camp or City / Camp ou ville

ELAIOM Project
Maximum hourly concentrations of PM2.5 from modeling

Projet ELAIOM
Concentrations maximales horaires de MP2.5 obtenues par modélisation

SCALE/ECHELLE:
1:140 000

UTM 19N NAD 83

SOURCES:

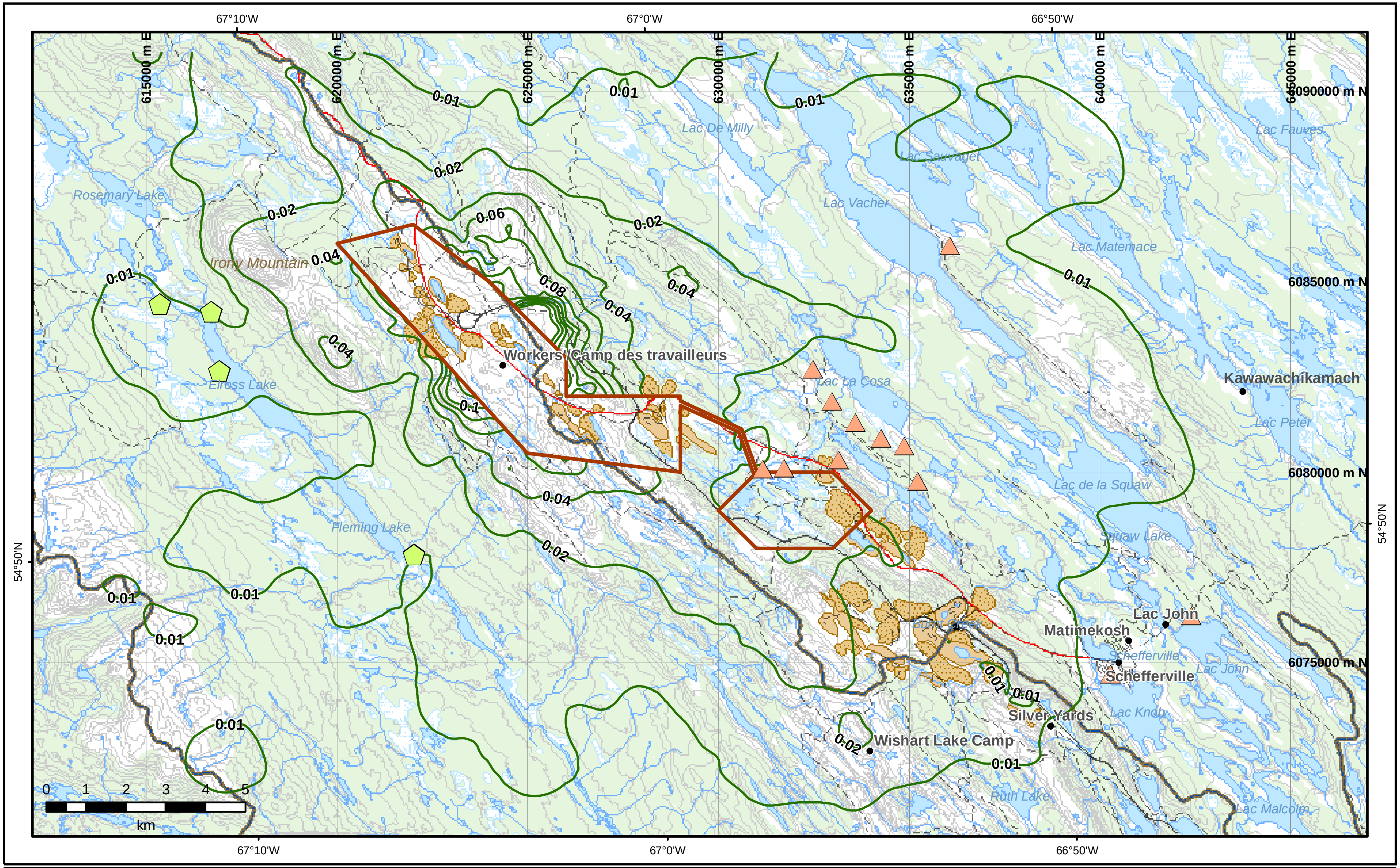
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.8

LOCATION/LOCALISATION
QC/QC
NL/TNL



LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main Access Road/ Route d'accès principale
- Road/route
- Exclusive use territory/ Territoire d'usage exclusif
- Average annual concentration in µg/m³/ Concentration moyenne annuelle en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out Pit/ Fosse existante épuisée
- Existing Waste Dump/ Halde de stériles existante

Sensitive receptors/ Récepteurs sensibles

- Innu Camp/ Camp des Innus
- Naskapi Camp/ Campement des Naskapis
- Camp or City Camp ou ville

ELAIOM Project
Maximum annual average concentrations of SO2 from modeling

Projet ELAIOM
Concentrations moyennes annuelles de SO2 obtenues par modélisation

SCALE/ECHELLE:
1:140 000

UTM 19N NAD 83

SOURCES:

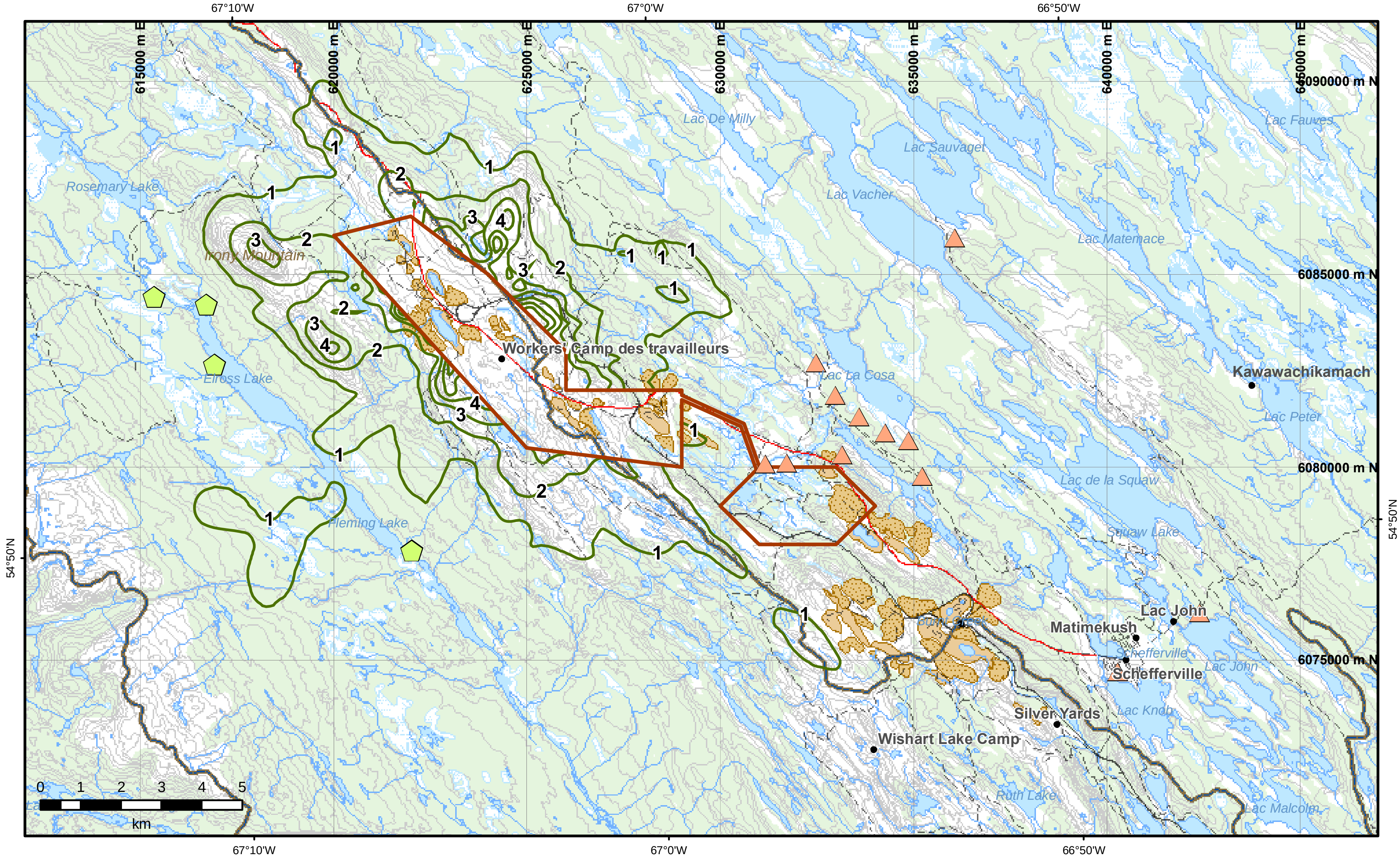
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.9

LOCATION/LOCALISATION



LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Maximum daily concentration in µg/m³/ concentration maximale journalière en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

Maximum Daily Concentrations of SO2 from Modelling

Concentrations maximales journalières de SO2 obtenues par modélisation

SCALE/ÉCHELLE: 1:140 000

N

UTM 19N NAD 83

SOURCES:

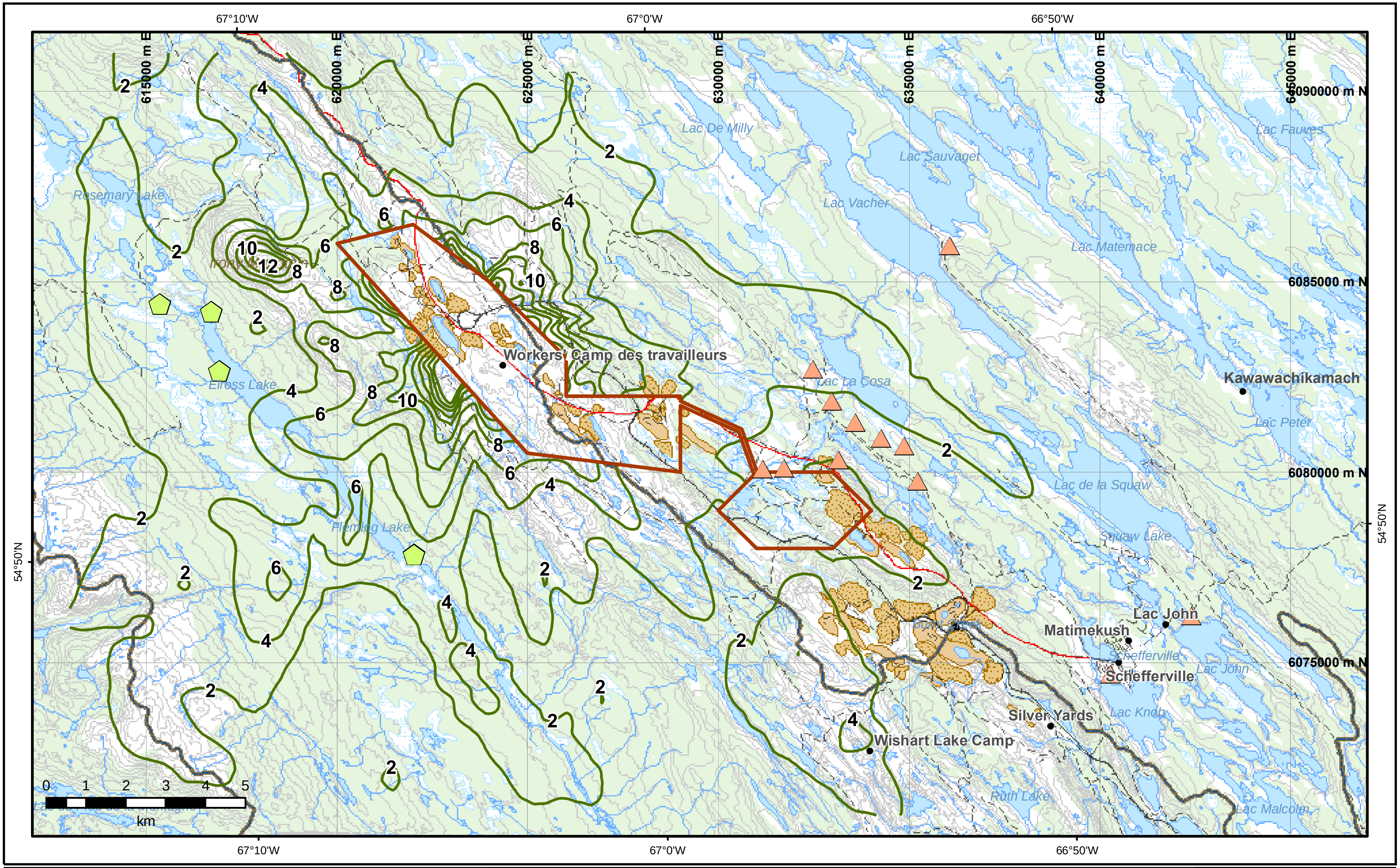
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.10

LOCATION/LOCALISATION



LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Maximum 3-hourly concentration in µg/m³/ concentration maximale 3 heures en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

Maximum 3-hourly Concentrations of SO2 from Modelling

Concentrations maximales 3 heures de SO2 obtenues par modélisation

SCALE/ÉCHELLE:
1:140 000

N

UTM 19N NAD 83

SOURCES:

NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

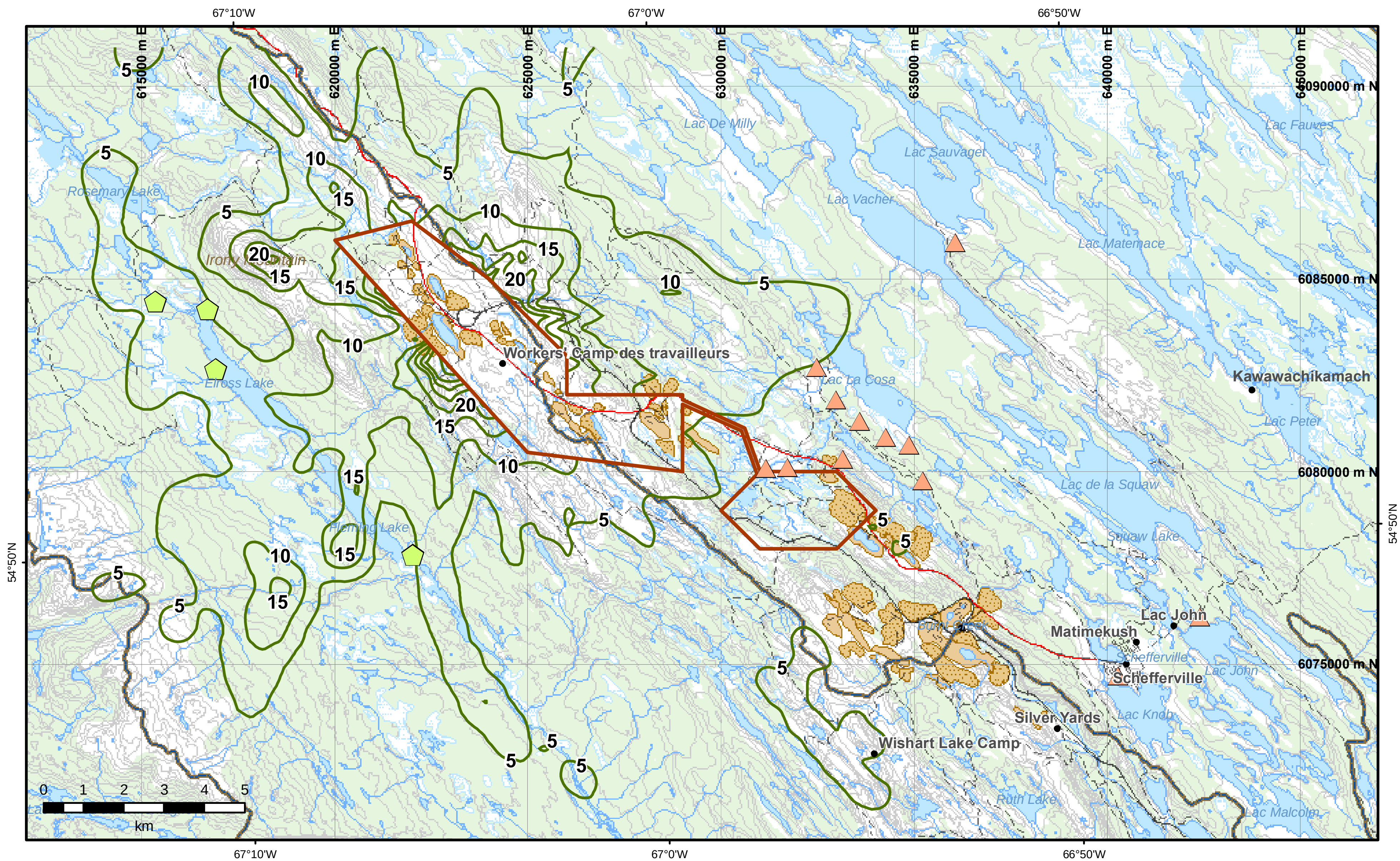
DATE: 2009-07-14

Figure 8.11

LOCATION/LOCALISATION

QC/QC

NL/TNL



LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Maximum hourly concentration in µg/m³/ concentration maximale horaire en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

Maximum Hourly Concentrations of SO2 from Modelling

Concentrations maximales horaires de SO2 obtenues par modélisation

SCALE/ÉCHELLE: 1:140 000

UTM 19N NAD 83

SOURCES:

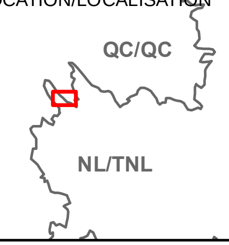
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

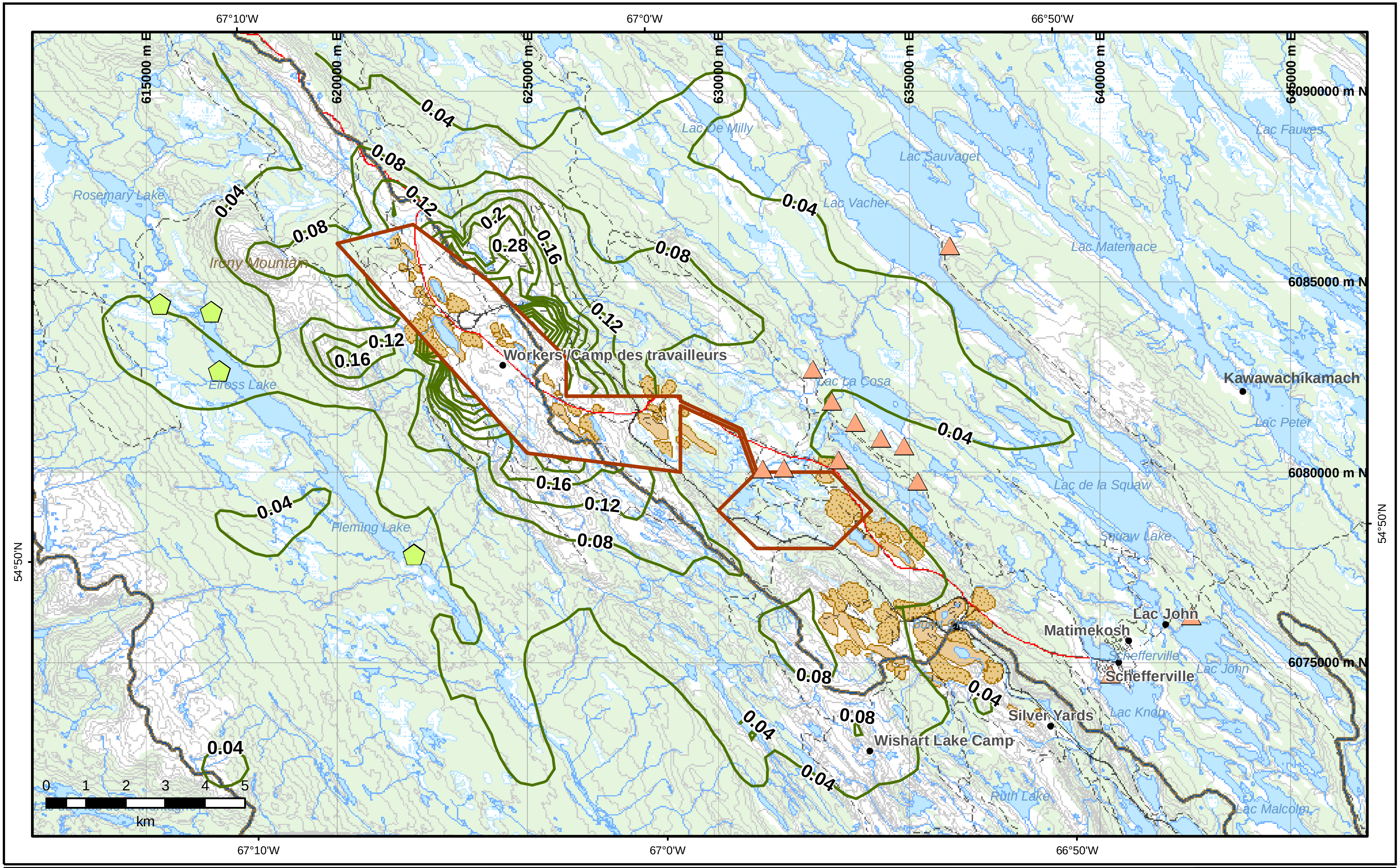
BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.12

LOCATION/LOCALISATION





LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main Access Road/ Route d'accès principale
- Road/route
- Exclusive use territory/ Territoire d'usage exclusif
- Average annual concentration in µg/m³/ Concentration moyenne annuelle en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out Pit/ Fosse existante épuisée
- Existing Waste Dump/ Halde de stériles existante

Sensitive receptors/ Récepteurs sensibles

- Innu Camp/ Camp des Innus
- Naskapi Camp/ Campement des Naskapis
- Camp or City Camp ou ville

ELAIOM Project
Maximum annual average concentrations of NO2 from modeling

Projet ELAIOM
Concentrations moyennes annuelles de NO2 obtenues par modélisation

SCALE/ECHELLE:
1:140 000

UTM 19N NAD 83

SOURCES:

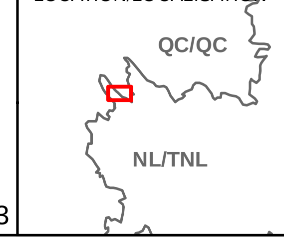
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

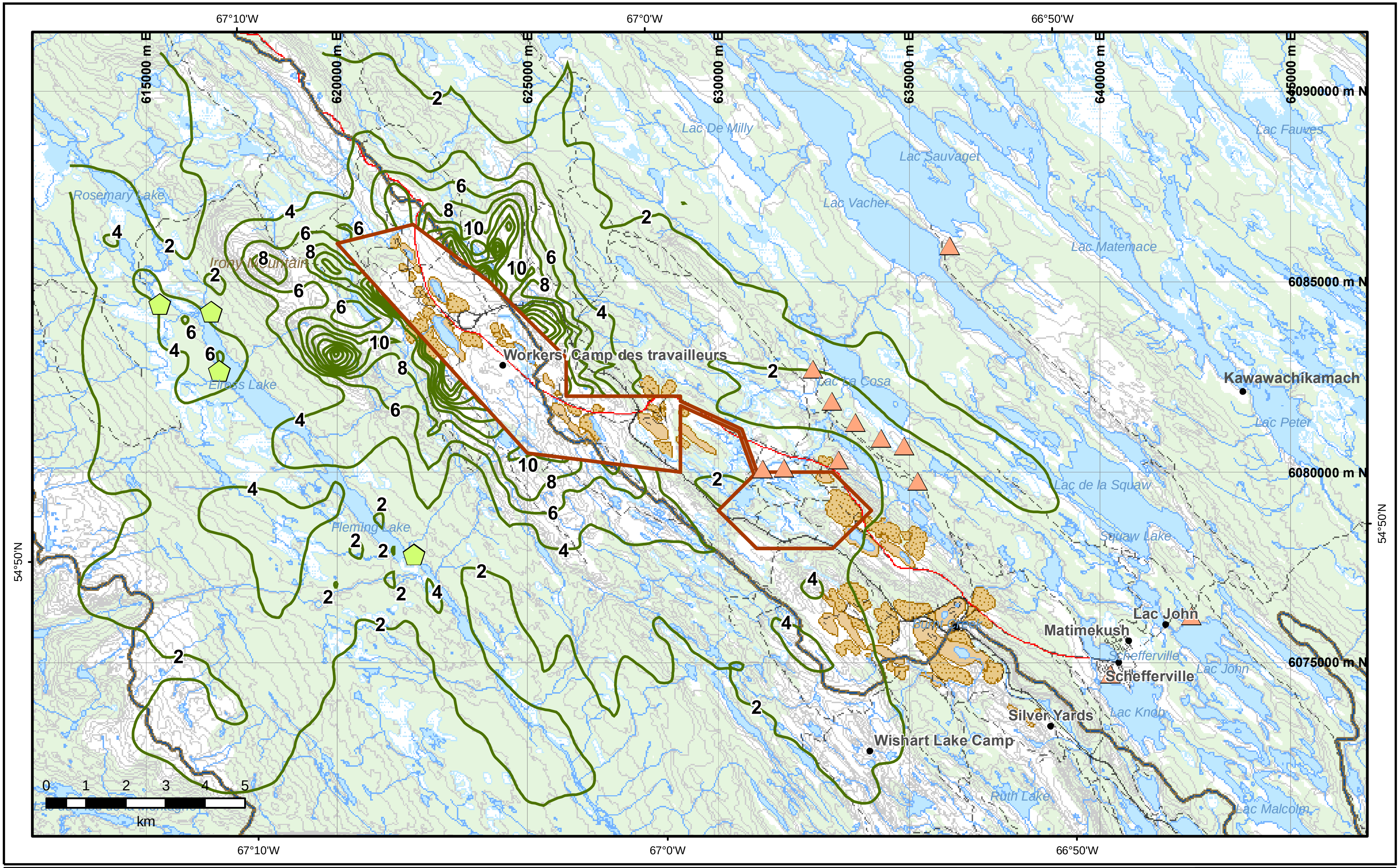
BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.13

LOCATION/LOCALISATION





LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Maximum daily concentration in µg/m³/ concentration maximale journalière en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

Maximum Daily Concentrations of NO2 from Modelling

Concentrations maximales journalières de NO2 obtenues par modélisation

SCALE/ÉCHELLE:
1:140 000

N

UTM 19N NAD 83

SOURCES:

NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

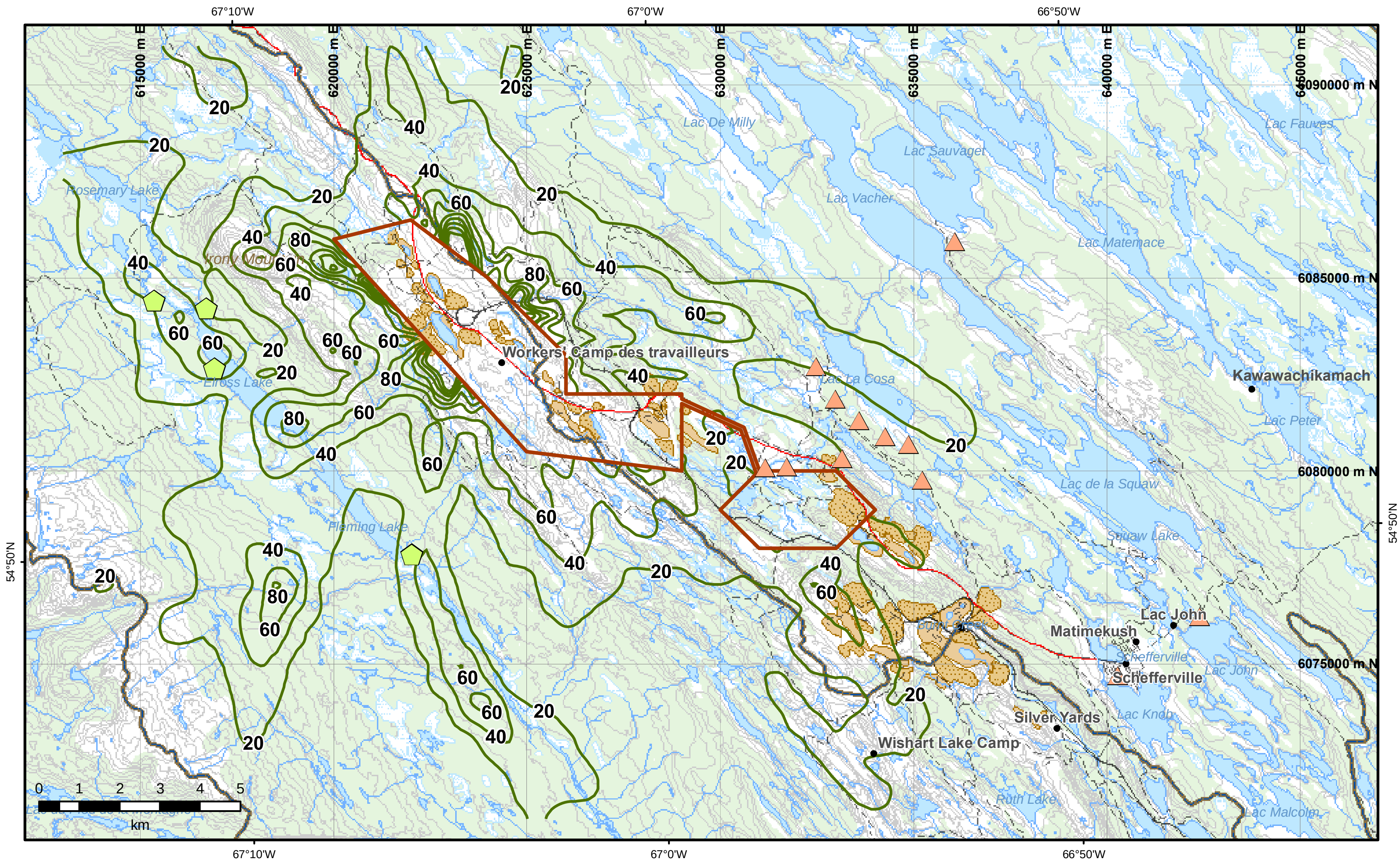
DATE: 2009-07-14

Figure 8.14

LOCATION/LOCALISATION

QC/QC

NL/TNL



LEGEND/LÉGENDE

Border/frontière

Railway/voie ferrée

Main access road/ route d'accès principale

Road/route

Exclusive use territory/ territoire d'usage exclusif

Maximum hourly concentration in µg/m³/ concentration maximale horaire en µg/m³

Watercourse/cours d'eau

Wetland/milieu humide

Waterbody/plan d'eau

Existing mined-out pit/ fosse existante épuisée

Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

Innu camp/ camp des Innus

Naskapi camp/ campement des Naskapis

Camp or city/ camp ou ville

Maximum Hourly Concentrations of NO2 from Modelling

Concentrations maximales horaires de NO2 obtenues par modélisation

SCALE/ÉCHELLE: 1:140 000

N

UTM 19N NAD 83

SOURCES:

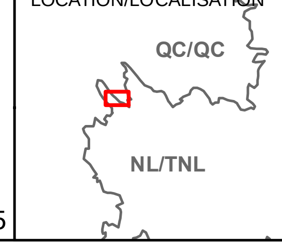
NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

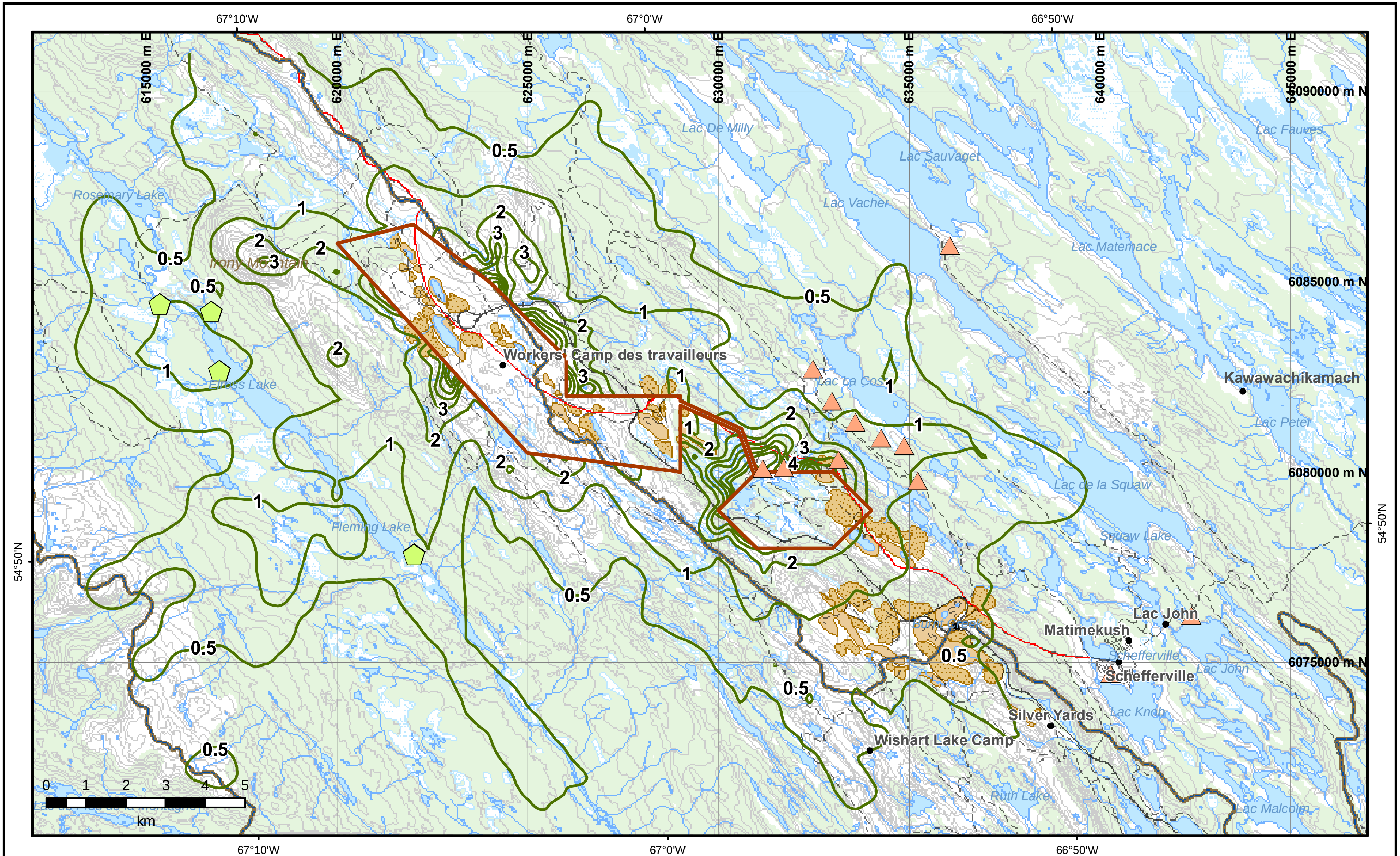
BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.15

LOCATION/LOCALISATION





LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Maximum 8-hourly concentration in µg/m³/ concentration maximale 8 heures en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ Fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

Maximum 8-hourly Concentrations of CO from Modelling

Concentrations maximales 8 heures de CO obtenues par modélisation

SCALE/ÉCHELLE: 1:140 000

N

UTM 19N NAD 83

SOURCES:

NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

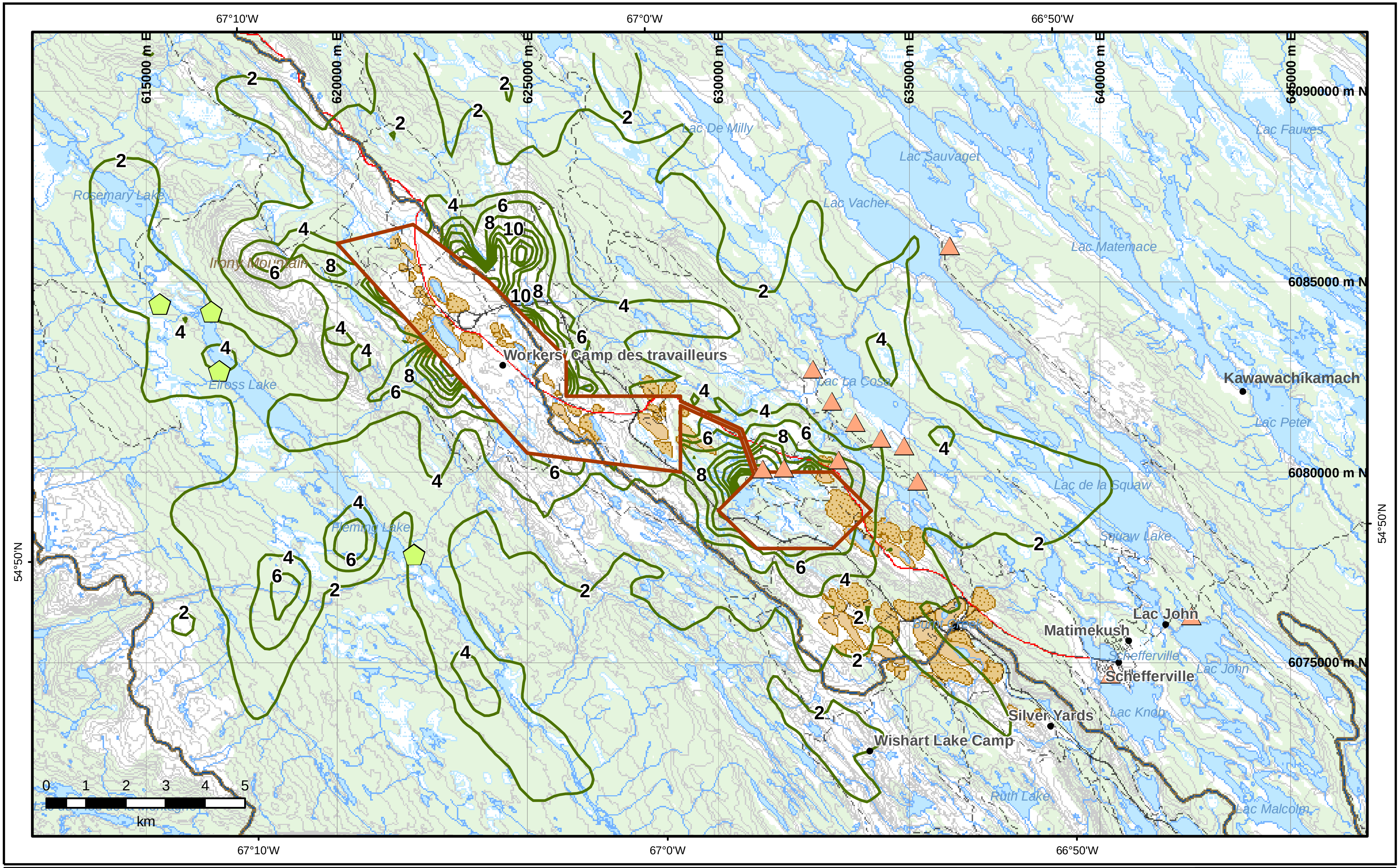
DATE: 2009-07-14

Figure 8.16

LOCATION/LOCALISATION

QC/QC

NL/TNL



LEGEND/LÉGENDE

- Border/frontière
- Railway/voie ferrée
- Main access road/ route d'accès principale
- Road/route
- Exclusive use territory/ territoire d'usage exclusif
- Maximum hourly concentration in µg/m³/ concentration maximale horaire en µg/m³
- Watercourse/cours d'eau
- Wetland/milieu humide
- Waterbody/plan d'eau
- Existing mined-out pit/ fosse existante épuisée
- Existing waste dump/ halde de stériles existante

Sensitive receptors/ récepteurs sensibles

- Innu camp/ camp des Innus
- Naskapi camp/ camp des Naskapis
- Camp or city/ camp ou ville

Maximum Hourly Concentrations of CO from Modelling

Concentrations maximales horaires de CO obtenues par modélisation

SCALE/ÉCHELLE: 1:140 000

N

UTM 19N NAD 83

SOURCES:

NTDB, 1:50,000, 1979
Gov. of NL and Gov. of Qc, Border
NML, Mining sites and roads
GH, Hydrology update, 2008

BNDT, 1/50 000, 1979
Gouv. de T-N-L et Gouv. du Qc, frontière
NML, gisements et routes
GH, mise-à-jour de l'hydrologie, 2008

DATE: 2009-07-14

Figure 8.17

LOCATION/LOCALISATION

QC/QC

NL/TNL

Under certain meteorological conditions, however, the ambient air concentrations of TPM and PM10 could exceed the air quality standards of the GNL at the workers' camp. Indeed, the maximum concentrations calculated over a 24-hour period for the workers' camp are three times higher than the established standards (concentration of TPM: 308% of the standard; concentration of PM10: 248% of the standard). The workers' camp will be located less than 1 km from several important emission sources and less than 200 m from the access road to Ferriman 4. Based on the modelling results, concentrations at the workers' camp exceeding standards occur on 38 days over five years for TPM and on 23 days over five years for PM10. That represents less than 2% of the time on a five-year period. The results from the modelling can be considered as conservative, since they are based on the maximum particulate emission rate for the dryer (equivalent to 50 mg/Nm^3), and they assume that all sources will emit simultaneously, which is not necessarily the case during normal operations. Also, the TPM were modelled without considering the deposition rate, since the size distribution of the particulates was not available. Lower concentrations would be expected at workers' camp if the deposition rate were taken into consideration. Another aspect to be considered is the moist climate of the region, which will limit dust propagation in the atmosphere.

Finally, the workers' camp is located inside industrial boundaries. Generally, air quality standards are applicable only outside those boundaries. Workers at the camp will mainly be inside buildings, which will further reduce their exposure to particulates in the ambient air.

Importance of the Effect

The direction of the *air quality deterioration* effect is “negative”. Its spatial extent is “local”. The duration is “long”, because the effect will be felt throughout the life of the Project. The frequency is “intermittent”, because the sources of the effect operate only from time to time.

The magnitude is rated as “moderate”, since the quality of the component will be affected but not compromised.

The level of certainty is “high”, since predicted atmospheric concentrations were evaluated using a recognized dispersion model and detailed data on all emission sources were available.

The reversibility should be “total”, since the air quality will return to its initial state once Project activities stop.

The ecological value is “high”, because air quality is essential to a healthy ecosystem. The socio-economic value is “high”, since air quality is protected by regulatory standards.

Since air quality has a “high” ecological and socio-economic value, the overall value of the component is “high”. Based on reversibility, magnitude and overall value, the intensity is evaluated as “moderate”.

Considering all the above criteria, the importance of the effect is “moderate”.

Scientific Knowledge and Mitigation Measures

No additional mitigation measures are anticipated for this effect.

An information session for workers should be provided in order to inform them of the situation and to suggest the use of additional protection in order to reduce exposure to dust.

Importance of the Residual Effect

In the absence of additional mitigation measures, the importance of the residual effect is “moderate”.

Follow-up Programme

TPM and PM10 will be sampled on the roof of the workers’ camp for one or two months when Timmins 3N is in operation.

Compensation Measure

No compensation measure is anticipated for this effect.

Summary of the Effect

Table 8.14 shows the various elements that contributed to the assessment of the effect *Air quality deterioration.*

Table 8.14: Summary of the Effect Air Quality Deterioration

Assessment of Importance	
Direction	Negative
Spatial extent	Local
Frequency	Intermittent
Duration	Long
Level of certainty	High
Intensity	Moderate
Effect importance	Moderate
Special Mitigation Measures • No additional mitigation measures	
Importance of Residual Effect • Moderate	
Follow-up Programme • See Table 9.1	
Compensation Measures • None	

8.1.3 Water Quality

8.1.3.1 Sources of Effects and Potential Effects

This section describes any Project activity that could affect the quality of water within the BLSA and identifies the potential direction and importance of those effects.

The processing complex will require water for domestic use (drinking water, sanitary services) and industrial use (explosives) and for the wash plant (process water). It will also be the site of activities that may alter water quality, such as the creation of piles and processed ore and the disposal of tailings, tree-cutting, modification of drainage and a risk of spills of hazardous products. During the operations phase, water pumped from the pits will be returned to the Timmins 2 or Timmins 6 abandoned pits, which will act as sedimentation ponds. Water for the wash plant will come partly from Timmins 2, partly from surface run-off and partly from dewatering Timmins 3N.

Surface run-off may contain suspended matter resulting from precipitation on waste rock piles and other areas of the processing complex. In addition, residues from explosives could be transported with the tailings into Timmins 2.

Any contaminants introduced into Timmins 2 or Timmins 6 would be highly diluted in those pits. Thus, although the likelihood of seepage of such water into the adjacent water table is not known, the likelihood of contamination of the water table is considered to be negligible.

The location of the drinking water well will be such as to eliminate any possibility of contamination.

Preparation/Construction Phase

No Interrelation

The following activities at the preparation/construction phase will have no interrelation with water quality:

- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex);
- railway;
- electricity transmission and distribution lines;
- transport and traffic.

The construction activities will involve the interception of surface run-off, which may modify water sedimentation, but this issue will be considered below in the discussion of clearing and land-preparation. The bed of the railway and the main access road are already in place, and the culverts along them require no modifications. Consequently, the associated reconstruction and resurfacing will not influence water quality.

Unimportant Interrelation

An unimportant interrelation will exist between the quality of water and the following activities:

- construction and improvement of access roads;
- restoration of temporary work areas;
- accidents and malfunctions.

These activities might have at most a slight effect on water quality:

- the new road, 1.6 km in length, will not cross any waterways (Figure 4.3);
- the improvement of existing secondary roads and the restoration of temporary work areas will not involve work within 200 m of any waterbody.

Important Interrelation

There may be important interrelations between the following activity and the quality of surface water:

- clearing and land-preparation.

Since the processing complex and the workers' camp areas will be located close to Timmins 1, clearing and land-preparation (± 37 ha) may, given the local topography, introduce suspended matter into this body of water via surface run-off. Watercourses in the vicinity of the explosives factory may also be similarly affected. The risk of the foregoing will, however, be greatly diminished by the fact that none of this work will be done within 200 m of any waterbody.

The potential effects are:

- **Contamination of surface water**
- **Contamination of groundwater**

Operations Phase

No Interrelation

During the operations phase, the following activities will have no interrelation with water quality:

- transport of ore and other transport or traffic;
- ore-crushing;
- ore-drying;
- stockpiling and transport of ore by rail;
- wastewater treatment and disposal.

No effect is anticipated on water quality from crushing ore, because the crusher cooling water will circulate in a closed circuit between the processing complex and Timmins 2.

Treated wastewater will also be reused as process water and will end up in Timmins 2.

No effect is anticipated from ore-drying, as the dryer will have no interaction with the surface or groundwater.

The stockpiled ore will have already been washed, and any run-off from the stockpiles will be introduced into the above-cited closed circuit as process water.

Unimportant Interrelation

The following activities have an unimportant interrelation with water quality:

- removal and storage of overburden;
- dewatering;
- blasting and ore-extraction;
- ore-washing and recirculation of process water;
- management of non-hazardous wastes;
- management of hazardous wastes;
- restoration of waste rock piles and of pits;
- accidents and malfunctions.

The preceding assumptions are justified as follows:

- in no case will the removal and storage of overburden and the extraction of ore be carried out less than 100 m of any body of water;
- Section 5.3.3.5 shows that the water from the dewatering process will be of excellent quality, in addition to which it will be returned to the aquifer from which it originated, thereby avoding any effect on the water table;
- since water from the processing complex will be disposed of in a monitored sedimentation pond (Timmins 2) with no outflow to the surface drainage system and since the pipeline will be watertight, monitored and located away from any body of water and with no surface outflow, no contamination of surface water can occur;
- given the important volume of water in Timmins 2, any contaminants deposited there will be highly diluted before they come into contact with the adjacent groundwater;
- the only chemicals that may be used in the vicinity of surface waters (Section 4.12.6.4) will be calcium chloride in a 30% solution, which may be used to suppress dust on roads and to inhibit ore from freezing to the bottom of rail cars during transportation, and a polymer that might be sprayed onto the DSO products in rail cars to eliminate wind erosion. Those products will either be used in areas far from surface waters or used in a manner that ensures that they are not released into surface waters. The other chemicals that may be used during ore-processing will be within the closed circuit between Timmins 2 and the processing complex;
- the restoration of the waste rock piles could theoretically have a positive interrelation with water quality, but it will in practice be unimportant, since the piles will be located further than 100 m from any waterbody;
- fuel (mainly diesel oil) used for loading and rolling equipment and for the auxiliary and emergency generators will be stored at Timmins 1 in double-walled tank cars parked near the railway loop. Human errors when filling up or using fuel could result in spills. The seriousness of a spill depends on the nature and the volume of the material that is spilt and on the location and the season (*e.g.*, soil frozen or not). The standard mitigation measures presented below are aimed at minimizing such risks. In the event of a reservoir leaking or rupturing, emergency and clean-up measures will be implemented to quickly confine and clean up the spill.

Important Interrelation

The following activity will potentially have an important interrelation with the quality of water:

- creation of waste rock piles.

The potential effects generated by these activities are as follows:

↳ **Contamination of surface water**

↳ **Contamination of groundwater**

Summary of Potential Effects

Table 8.15 shows the relationship between the Project activities and the potential effects on water quality.

Table 8.15: Potential Effects on Water Quality

Project Activities	Potential Effects	
	Contamination of Surface Water	**Contamination of Groundwater**
Preparation/Construction		
Clearing and land-preparation	X	
Operations		
Creation of waste rock piles	X	

8.1.3.2 Assessment of Surface Water Contamination

During clearing and land-preparation as well as during the creation of waste rock piles, suspended matter from run-off could reach the surface water.

Risks of acidification and seepage from the waste rock are considered to be very low or non-existent, since the sulfur content of the soil and ore samples analyzed in no case exceeded 0.03% (Table 4.10). With respect to a possible release of metals, geological knowledge indicates that the ore and waste rock are already naturally leached and should therefore not significantly leach in the local environment. According to Lafleur (May 2007): “the concentration of the iron is believed to be the result of weathering and groundwater interaction. The process leaches out the silica and concentrates iron as hematite-limonite, the non-magnetic component.”

The following standard mitigation measures will be put into place with respect to the quality of surface water:

- tree-cutting and management of wood (TW): TW5, TW8, TW11, TW14, TW15;
- erosion and sedimentation control (ES): ES1, ES2, ES3, ES4, ES5, ES6, ES7, ES8, ES10, ES11, ES14, ES15, ES16, ES18, Es19, ES21, ES22, ES23, ES24;
- management of hazardous material (HM): HM1, HM2, HM3, HM4, HM5, HM6, HM7, HM8, HM9, HM10, HM11, HM12;
- drilling and blasting (DD): DD2, DD4, DD11, DD14;
- construction equipment (CE): CE2, CE3, CE4, CE5, CE9, CE10;
- mining operations (MO): MO3;
- ore, piles, tailings, mining waste and overburden management (OM): OM1, OM5;
- water management (WM): WM6;
- process water and effluent (PE): PE1.

Importance of the Effect

The present section addresses both the preparation/construction and the operations phases.

The direction of the surface water contamination effect is “negative”. Its spatial extent is “site-specific”, since it involves only a few waterbodies in the BLSA located downstream from the infrastructure construction site or the creation of waste rock piles. The duration is “long”, because the effect will be felt throughout and beyond the life of the Project. It should be noted, however, that the possible effect of run-off on water quality will dissipate prior to the decommissioning stage of the ELAIOM, since the piles will be rehabilitated once the mining operations at each deposit are completed. The frequency is “intermittent”, because there will be no run-off during the months of freeze-up.

The level of certainty is “high” with respect to the possible erosion of cleared land and the creation of waste rock piles, because the phenomenon is known and such conditions already exist in the general area.

The reversibility should be “total”, since the waste rock piles will have gentler slopes than those of the IOCC and will be restored as the mining of each deposit is phased out. The magnitude is rated as “low”, since no waste rock pile is anticipated to be located at less than 100 m from any waterbody, and no clearing and land-preparation for infrastructure construction will be done less than 150 m from any waterbody, which reduces greatly the effect of run-off (see detailed explanation further below in this section). This distance between work areas and water surface also means that risks of accidents or malfunctions should not affect this component of the environment.

The ecological value is “high”, because clean surface water is essential to a healthy aquatic ecosystem. Since the surface water of DSO3 has a low socio-economic value — it is little or not used by the local communities — the overall value of the component is “moderate”. Based on reversibility, magnitude and overall value, the intensity was calculated as “low”.

Considering all the above criteria, the importance of the effect is “low”.

Scientific Knowledge and Mitigation Measures

With respect to suspended matter, the research conducted by Dubreuil (December 1979) and by Mansikkaniemi (1980), as well as recent visual inspections of waste rock piles that have been in place for periods extending up to 50 years, indicates that there is no effluent coming from the waste rock piles left from former IOCC mining operations.

Mansikkaniemi (1980) showed that, after a heavy rain of 11 mm, the majority of suspended matter coming from waste rock piles was deposited at the base of their slopes. Less than 1% of suspended matter was transported over a distance of 100 m towards the Slimy Creek area. During 14 days of observation, the concentration of suspended matter noted by Mansikkaniemi in Star Creek was always less than 1 mg/L, even though sizeable waste rock piles were located 600 m from the sampling point.

Table 8.16 shows the average concentration of six metals, some of which exceed the aquatic life protection criterion of the CCME. Whether a sampling point is upstream or downstream from a former mining site does not seem to increase the probability that surface water will be more contaminated by metals. There are more sampling points upstream, in an undisturbed watershed, that exceed the CCME criteria. The greatest difference concerns iron; it is likely that naturally acidic environments, such as bogs, are releasing this metal in surface water.

Table 8.16: Average (Mean Deviation) Concentration of Various Metals in Phase 1 Surface Water Exceeding the CCME Criteria

Parameter/Position	Upstream (n=12)	Downstream (n=3)
Aluminium (mg/L)	0.046 (0.059) *	0.127 (0.163) *
Cadmium (µg/L)	0.099 (0.030) *	0.120 (0.029) *
Copper (µg/L)	1.542 (1.559) *	3.833 (4.537) *
Iron (mg/L)	0.692 (0.749) *	0.027 (0.008)
Mercury (µg/L)	0.013 (0.009) *	0.010 (0.000)
Selenium (µg/L)	0.500 (0.000)	1.000 (0.866) *

* Includes one or more sampling points exceeding the CCME criteria.

The following special mitigation measures are suggested to avoid surface water contamination:

- digging drainage ditches around the processing complex and the workers' camp and connecting them to sedimentation basins *prior to* stripping and land-preparation;
- locating waste rock piles more than 100 m from any waterbody.

Importance of the Residual Effect

With the implementation of the special mitigation measures, the magnitude as well as the importance of the residual effect remain low.

Follow-up Programme

The *in situ* physico-chemical parameters already presented (temperature, pH, conductivity, oxygen and turbidity) and the metals already sampled will be monitored in Timmins 1, 2 and 6, in the tailings/effluent pipeline joining the processing complex and Timmins 2 and in Elross and Goodream creeks three times per year.

Compensation Measure

No compensation measure is anticipated for this effect.

Summary of the Effect *Contamination of Surface Water*

Table 8.17 shows the various elements that contributed to the assessment of the effect *Contamination of surface water.*

Table 8.17: Summary of the Effect *Contamination of Surface Water*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Intermittent
Duration	Long
Reversibily	Total
Level of certainty	High
Intensity	Low
Importance of the effect	Low
Special Mitigation Measures • Digging of peripheral ditches • Locate waste rock piles more than 100 m from any waterbody	
Importance of Residual Effect • Low	
Follow-up Programme • See Table 9.1	
Compensation Measures • n/a	

8.1.3.3 Assessment of Groundwater Contamination

The risks for groundwater contamination are similar to those for surface water contamination. Since between 5 and 15% of the quantity of emulsion used could survive a blasting operation (Wiber *et al.* January 1992), chemicals from explosives (ammonium nitrates and some metals) could leach into the groundwater through the bottom of pits, from under waste rock piles and following the disposal of tailings in Timmins 2. For the reasons explained above, the risk of contaminating groundwater with ARD is virtually non-existent. Finally, accidents and malfunctions also pose a risk for the quality of groundwater.

The use of emulsion explosives as opposed to ANFO produces less ammonium waste and nitrates in dewatering (Hoss 27 July 2007). Droplets of emulsion saturated with ammonium nitrate and surrounded by diesel fuel are, unlike ANFO, resistant to water and produce a high-velocity explosion with a quick release of energy. The emulsion is less sensitive to humidity than is ANFO, which leads to fewer incomplete explosions (Holmberg and Folkesson 2008). Incomplete explosions using ANFO leave large amounts of ammonia in the ore.

The following standard mitigation measures will be implemented to protect the quality of groundwater:

- control of erosion and sedimentation (ES): ES21;
- transmission lines rights-of-way (TR): TR8;
- management of non-hazardous wastes (SW): SW1, SW2, SW4;
- management of hazardous material (HM): HM1, HM2, HM3, HM4, HM5, HM6, HM8, HM9, HM10, HM11, HM13;

- drilling and blasting (DD): DD1, DD2, DD9, DD14, DD15;
- construction equipment (CE): CE3, CE4, CE5, CE9, CE10;
- ore, piles, tailings, mining waste and overburden management (OM): OM1, OM5;
- water management (WM): WM6;
- process water and effluent (PE): PE1;
- restoration (R): R1, R2, R3.

Importance of the Effect

The direction of the effect *Contamination of groundwater* is "negative". Its spatial extent is "site-specific", since it involves the pits, the piles and all areas with infrastructure as well as an undefined (although small) diffusion area around the infrastructure. The duration is "long", as the effect will be felt throughout and even beyond the Project life. In addition, although an accident or malfunction may be short-lived, its consequences could be felt over the long term. The frequency is "intermittent", since no sedimentation can occur during the months when the soil is frozen.

The level of certainty is "high", since all the risks associated with blasting have been documented and those associated with accidents or malfunctions have been identified. The reversibility will take some time, but it will be "total". Recent observations of groundwater quality have shown no signs of contamination downstream from former pits or old piles. The magnitude is rated as "low" for several reasons: the quantity of explosives used per tonne of rock will be lower than in some other cases, because emulsion will be used and because the rock is so friable as to often require no blasting at all (Guérin 2009, *personal communication*). Once the ore is washed, a large part of the ammonium waste will be deposited in Timmins 2, where the volume of water is sufficient to ensure adequate dilution; finally, the resurgence of this groundwater is thought to occur further downstream in Elross Creek, where dilution will be even greater.

The ecological value is "low". The relationship between the ecosystems and the groundwater is slight, since the groundwater does not come into contact with the various biological components of the ecosystem. The groundwater in the Project area has only a "moderate" socio-economic value — local communities do not use it but it will supply drinking water to the Project. Consequently, the overall value of this component is "low". Based on reversibility, magnitude and overall value, the intensity was calculated as "low".

Considering all the above criteria, the importance of the effect is "low".

Mitigation Measures

The following special mitigation measures are proposed to avoid contamination of groundwater:

- locate waste rock piles more than 100 m from any waterbody;
- when blasting, prepare each charge so that it is as powerful as possible in order to minimize the quantity of blasting residue, as recommended by Hoss (27 July 2007).

Importance of the Residual Effect

The implementation of the special mitigation measures will be beneficial, but it will not reduce the importance of the effect, which remains "low".

Follow-up Programme

See Table 9.1.

Compensation Measures

No compensation measure is anticipated for this effect, since the importance of the residual effect is low.

Summary of the Effect *Contamination of Groundwater*

Table 8.18 shows the various elements that contributed to the assessment of the effect *Contamination of groundwater*.

Table 8.18: Summary of the Effect *Contamination of Groundwater*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Intermittent
Duration	Long
Reversibility	Total
Level of certainty	High
Intensity	Low
Importance of the effect	Low
Special Mitigation Measures • Locate waste rock piles further than 100 m from any body of water; • When blasting, prepare each charge so that it is as powerful as possible in order to minimze the quantity of blasting residue.	
Importance of the Residual Effect • Low	
Follow-up Programme • See Table 9.1	
Compensation Measures • n/a	

8.1.4 Water Budget

8.1.4.1 Interrelations of the Project with Hydrology and Potential Effects

The water budget component describes any change that could affect the quantity of water within the BLSA.

No activity will displace water from one watershed to another (see Section 4.12.7.2).

Dewatering the pits will lower the water table by means of dewatering pumps located around the periphery of the pits and sump pumps installed at the bottom of the pits. The water for the workers' camp and some of the process water will come from one of the dewatering wells at Timmins 3N. The dewatering pumps and the sump pumps will be piped to Timmins 2 or, in the case of Timmins 4, to the abandoned Timmins 6 pit (to stay in the same watershed). The water to wash the ore will come from Timmins 2, and it will be reused in a closed-circuit system.

Some areas of water will dry out locally, particularly around the pits. The monthly flow regimen of Elross Creek will be modulated, in the sense that the difference between the high flood discharge water levels and the very low water levels at the end of winter will be reduced.

Preparation/Construction Phase

No Interrelation

The following activities at the preparation/construction phase will have no interrelation with the water budget:

- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex);
- railway;
- electricity transmission and distribution lines;
- transport and traffic;
- restoration of temporary work areas;
- accidents and malfunctions.

Construction and restoration activities might interfere with surface run-off or modify water sedimentation, which could have some effects on the water budget, but these issues will be addressed below.

The bed of the railway and the main access road already exist, so rebuilding the railway and repairing the main access road will not affect surface run-off or groundwater flow.

The presence of the workers' camp and of the processing complex will cause rainwater or snowmelt that would have otherwise infiltrated to flow to their peripheries. The construction of drainage ditches connected to the sedimentation basin (see below) at the periphery of these areas prior to the construction of the infrastructure should ensure that run-off does not increase flood flows downstream. During the operations phase, rainwater and snowmelt will be collected to be used as process water. This water will be piped to Timmins 2, which is the expression of the groundwater table and is located in the same watershed as the processing complex, so that this activity will not alter the water budget.

Unimportant Interrelation

An unimportant interrelation was noted between the water budget and the following activities:

- clearing and land-preparation;
- construction and improvement of access roads.

These activities may have a slight effect on the water budget. Infiltration will increase and evapotranspiration will cease in areas cleared of vegetation. At this latitude, however, evapotranspiration exerts only a weak effect on the water budget.

Constructing and improving access roads renders their surfaces impermeable, which increases the run-off. Roadbeds can create local obstacles to the flow of groundwater. Such effects will, however, be negligible because the soil, the surficial deposits and even the bedrock in the BLSA are generally very permeable (see Sections 5.3.3.5 and 5.3.5).

Operations Phase

No Interrelation

The following activities at the operations phase will have no interrelation with the water budget:

- transport of ore and other transport or traffic;
- ore-crushing;
- ore-drying;
- storage and transport of ore by rail;
- ore-washing and recirculation of process water;
- management of non-hazardous wastes;
- management of hazardous wastes;
- wastewater treatment and disposal;
- accidents and malfunctions.

These activities do not consume quantities of water; nor do they add water to the water budget. Some water will be taken from the reservoir of well water to cool the equipment used to crush ore, but it will be recirculated. The wastewater treatment method is such that the water will remain in the same watershed. In any case, the quantities of water required are negligible compared to the water budget of the watershed.

Unimportant Interrelation

The following activities will have an unimportant interrelation with the water budget:

- stripping and storage of overburden;
- blasting and ore-extraction;
- creation of waste rock piles;
- ore-washing and recirculation of process water;
- restoration of waste rock piles and of pits.

These activities could have an influence on the water budget. For example, the removal of overburden will accelerate sedimentation in the stripped area, while the weight of piles will cause the groundwater beneath it to rise. As mentioned above, the natural terrain is already very permeable, so that the preceding effects will be negligible. The process water, which represents the greatest quantity of water used for the Project, will be constantly recirculated from Timmins 2, an exhausted pit without inlet, outlet or fish habitat. Finally, the restoration of the stockpiles and pits will increase evapotranspiration due to the presence of newly established vegetation or, in the case of the pits, the exposure of groundwater to the atmosphere. As mentioned above, however, evapotranspiration is not important at this latitude.

Important Interrelation

The following activity will have an important interrelation with the water budget:

- disposal of dewatering water.

The potential effects generated by this activity are as follows:

- **Localized dry-out**
- **Modulation of the water regimen**

Summary of the Potential Effects

Table 8.19 shows the relationship between the Project activities and the potential effects on the water budget.

Table 8.19: Potential Effects on the Water Budget

Project Activities	Potential Effects	
	Localized Dry-out	**Modulation of Water Regimen**
Preparation/Construction		
Operations		
Disposal of dewatering water	X	X

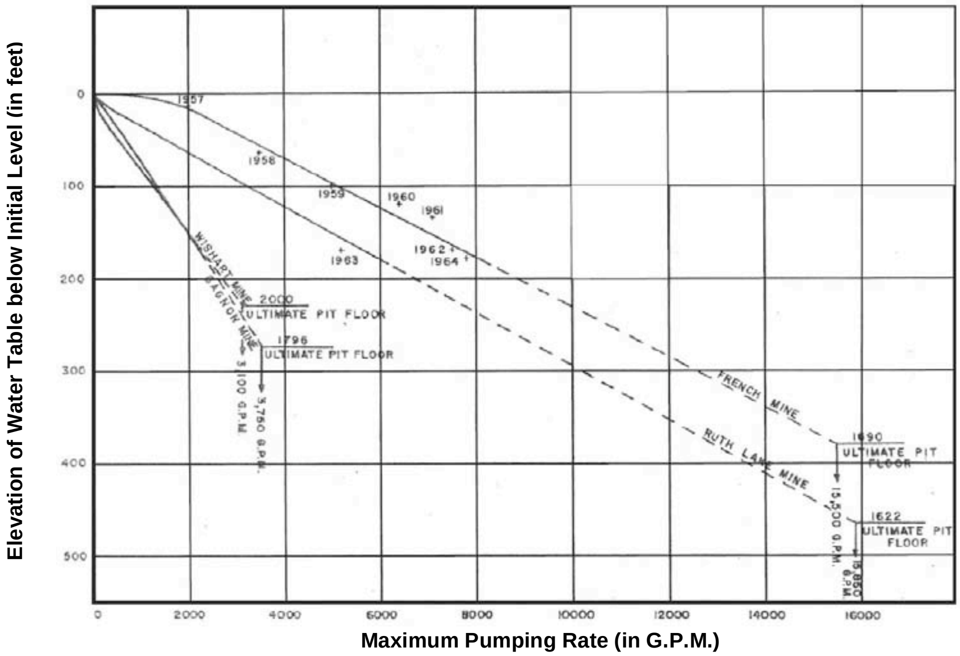
8.1.4.2 Assessment of Localized Drying-out

Documents describing the dewatering of former mine pits of the IOCC give information on expected drawdown and flows. Recent photo-interpretation of the areas formerly used by the IOCC revealed that watercourses are more likely to dry out than wetlands. This section addresses dry-out at the periphery of the pits and, in particular, dry-out of the watercourses in DSO3. Section 8.1.6 discusses the dry-out of wetlands.

Background Data on Equivalent Dewatering

Figure 8.18 shows the relationship between the drawdown and the pumping rate required for various former DSO mines near Schefferville. For equal drawdown, the French and Ruth Lake mines required a pumping effort three times greater that required by the Gagnon and Wishart mines.

Figure 8.18: Relationship between Pumping Rate and Level of Water Table in Four Mines in the Schefferville Region (Stubbins and Munro 1965)



Based on historical data, the drawdown of the water table for the ELAIOM is not expected to exceed 100 m. The maximum pumping rate is expected to be between 15 and 50 m^3/min depending on the hydrogeological characteristics of the deposits. Field observations, the literature review on recharge areas and other relevant features suggest that the required pumping effort will be less for DSO3 than for DSO2, since the recharge area and the surface water channel storage are clearly lower at the former area than at the latter. The pumping test carried out at Ferriman 4 in DSO2 (Appendix E) indicated that the pumping rate required to drawdown the water table by 100 m would be similar to that of about 50 m^3/min applied at the French and Ruth Lake mines by the IOCC. The dewatering rate at DSO3 is expected to be close to the 15 m^3/min required at the Gagnon and Wishart mines by the IOCC.

Dewatering Simulation at Timmins 3N

To obtain an approximate idea of the zone of influence of dewatering at Timmins 3N, a simulation of the groundwater flow was carried out with the Aquifer_test_4.2 software using the Theis equation. This equation was selected because it allows for speedy evaluation of the depression cone and requires little data in comparison with more complex equations. This type of equation is based on the following hypotheses:

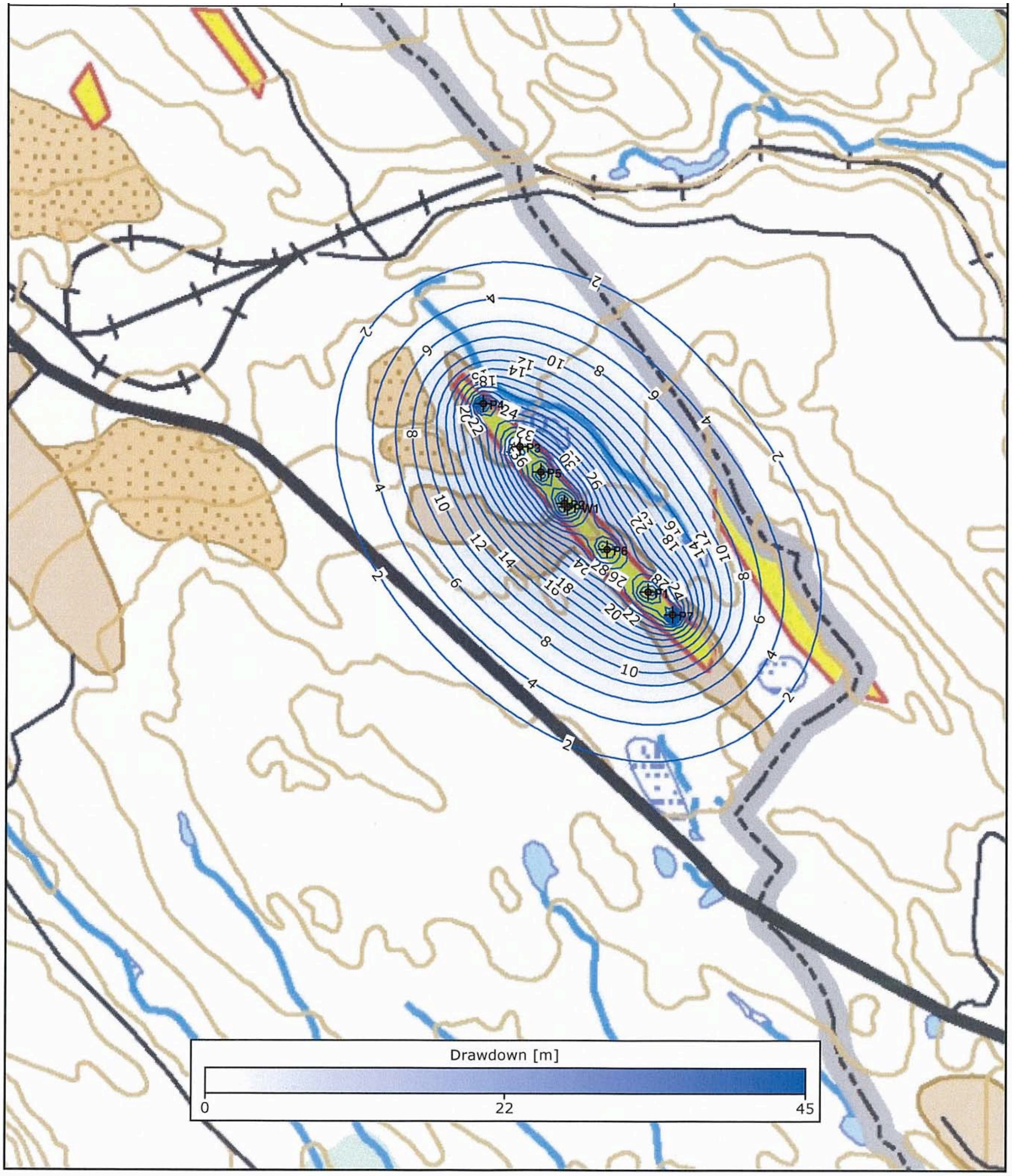
- the laminar flow is governed by Darcy's law;
- water is instantaneously freed from the channel storage;
- the aquifer is homogeneous, isotropic and of constant thickness;
- the lateral extension of the aquifer is very large;
- the water table is initially at rest (very low hydraulic gradient).

These conditions are not entirely those of the geological configuration of Timmins 3N: the aquifer is anisotropic, with a network of fractures dominating in the main geological direction, which is that of the deposit. Thus, the depression cone will be greatest in the direction of the deposit. The model overestimated the depression cone perpendicular to the deposit.

Figure 8.19 shows the depression cone calculated after eight months of pumping at a rate of 17,000 m^3/day. The hydrogeological parameters obtained for Ferriman 4 during the pumping test carried out in the fall of 2008 were used to estimate the zone of influence of pumping (see report in Appendix E). The working hypothesis is that the geological context of the two iron deposits is similar.

The zone of influence obtained is 450 m in both directions. The pumping should, however, have less influence perpendicular to the deposit. In addition, the simulation did not account for the fact that the pumping rate would be lowered once the desired drawdown had been obtained, which would reduce the zone of influence.

Figure 8.19: Dewatering Simulation at Timmins 3N



The following standard mitigation measures will be implemented for the water budget:

- water management (WM): WM2;
- restoration (R): R1.

Importance of the Effect

The direction of the effect *Localized dry-out* is "negative". Its spatial extent is "site-specific", since it involves only the streams on the periphery of the pits. The duration is "long", since the effect will be felt throughout and even beyond the life of the Project, as was observed in the old mining pits in the sector, where some former watercourses remain dry to this day. The frequency is "intermittent", since the pumps used to lower the water table will function only when the depth of mining activities reaches groundwater level, which is generally between 10 and 55 m in DSO3.

The level of certainty is "moderate", since the simulation described above was based on data obtained from a pumping test in DSO2.

The reversibility is "partial", since some of the watercourses will revert to their initial conditions when mining operations cease because, when water pumping stops, the water table will rise to a certain point. The magnitude is rated as "high", since one intermittent stream (segments DSO3-3 and DSO3-6, Figure 5.3) will certainly be dried out by the excavation of Timmins 3N, as illustrated in Figure 8.19. The other watercourses, however, are located sufficiently far from the pits and should not dry out significantly. The ecological value is "low", since the DSO3-3 and DSO3-6 stream is already intermittent and is not fish habitat. DSO3 has only a low socio-economic value, as it is little or not used by the local communities. The overall value of the component is therefore "low". Based on reversibility, magnitude and overall value, the intensity was calculated as "moderate".

Considering all the above criteria, the importance of the effect is "moderate".

Scientific Knowledge and Mitigation Measures

The following special mitigation measures are suggested to reduce localized drying-up:

- conducting pumping tests *in situ* in summer 2009 in order to determine how to attain the required drawdown level with as few wells as possible;
- pumping will be carried out progressively during the operations phase so as to dewater only the part of the aquifer above the level to be mined at any given time.

Importance of the Residual Effect

We do not anticipate that it will be possible to avoid the large-scale or total drying-up of the DSO3-3 and DSO3-6 intermittent stream by means of the proposed mitigation measures. Consequently, the residual effect will remain "moderate".

Follow-up Programme

The 2009 pumping tests will leave in place a series of piezometers, which should thereafter be read monthly.

The installation of two sampling stations to measure the flow of the streams in the western sector of the BLSA, namely the DSO3-13 and DSO3-14 downstream from Timmins 4, will show whether or not the streams are drying up during the operations phase. In the case of

DSO3-13, which is fish habitat, an appropriate quantity of the dewatering from the dewatering pumps could be redirected to its source should the stream dry out.

Compensation Measures

No compensation measure is anticipated for the net loss of the intermittent stream DSO3-3 and DSO3-6, since it is neither a fish habitat nor a unique ecosystem in the BLSA or the BRSA.

Summary of the Effect *Localized Drying-up*

Table 8.20 shows the various elements that contributed to the assessment of the effect *Localized drying-up*.

Table 8.20: Summary of the Effect *Localized Drying-up*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Intermittent
Duration	Long
Reversibility	Partial
Level of certainty	Moderate
Intensity	Moderate
Importance of the effect	Moderate
Special Mitigation Measures • Pumping test and optimization prior to the construction of the wells • Progressive pumping	
Importance of the Residual Effect • Moderate	
Follow-up Programme • See Table 9.1	
Compensation Measures • None	

8.1.4.3 Assessment of the Modulation of the Water Regimen

The continuous pumping and disposal of dewatering water during the operations phase has the potential to modify somewhat the regimen of the receiving watercourses.

The process water that is recirculated and the dewatering water will be disposed of in Timmins 2. It is assumed that it will eventually seep into the groundwater, since the water level in Timmins 2 is believed to be the expression of the roof of the aquifer.

Timmins 1 will continue to receive most of its water input from the water table as was the case prior to the beginning of operations, but the inflow will be more constant from month to month and, therefore, will tend towards a modulation of the water regimen.

No standard mitigation measure will be implemented for the water regimen.

Importance of the Effect

The direction of this effect is “positive”, since the flood discharge in Elross Creek will be lower and its minimum discharge will be greater, which will improve fish habitat. The spatial extent is “site-specific”, since it involves only Elross Creek. The duration is “long”, since the effect will be felt throughout the operations phase. The frequency is “intermittent”, since the pumps used to lower the water table will function only when the depth of mining activities reaches the level of the groundwater, which is generally between 10 and 55 m below the surface at DSO3.

The level of certainty is “high”, since the effects of pumping on the modulation of the water regimen are well known (see Sections 5.3.3.5 and 5.3.3.6).

The reversibility is “total”, since the water regimen will return to its initial condition once the pumps cease to function. The magnitude is rated as “moderate”, since the effect of modulation will affect mostly minimum discharge, which should be less pronounced, an effect that may be seen as positive for the aquatic fauna, since the fish will not have to move downstream in periods of minimum discharge. The ecological value is “high”, since Elross Creek is a confirmed fish habitat. The sector has only a low socio-economic value as a source of water supply, since it is little or not used by local communities. The overall value of the component is thus rated as “moderate”. Based on reversibility, magnitude and overall value, the intensity was calculated as “moderate”.

Considering all the above criteria, the importance of the effect is “moderate”.

Scientific Knowledge and Mitigation Measures

The following special mitigation measures are suggested to optimize the positive effect of modulating the water regimen:

- conducting pumping tests *in situ* in the near future to optimize to the extent possible the number and the depth of wells required to yield the required drawdown;
- pumping progressively during the operations phase so as to dewater only the part of the aquifer above the anticipated floor level of the layer to be mined.

Importance of the Residual Effect

At Timmins 1, the aquifer is the point of convergence of the watershed in which the main mining operations will be located. The effect on the water budget of dewatering the pits that are further upstream will be practically null if the pumped water is returned to the same watershed. The residual effect remains “positive” and “moderate” after the application of the special mitigation measures.

Follow-up Programme

Even though a positive effect is expected, a pressure-sensitive water level gauge will be installed at the edge of the body of water in Timmins 1 and fluctuations in levels will be checked daily. A level-flow relation curve will be established at the outlet.

Whilst it would be desirable to monitor flow in Elross Creek directly, we believe that doing so is not feasible, because the torrential flows at periods of high water would destroy the equipment.

Compensation Measures

No compensation measure is necessary, since the effect is positive.

Summary of the Effect *Modulating the Water Regimen*

Table 8.21 shows the various elements that contributed to the assessment of the effect *Modulating the water regimen*.

Table 8.21: Summary of the Effect *Modulating the Water Regimen*

Assessment of Importance	
Direction	Positive
Spatial extent	Site-specific
Frequency	Intermittent
Duration	Long
Level of certainty	High
Intensity	Moderate
Importance of the effect	Moderate
Special Mitigation Measures • Pumping test and optimization prior to the construction of the wells • Progressive pumping	
Importance of the Residual Effect • Moderate	
Follow-up Programme • See Table 9.1	
Compensation Measures • Unnecessary since the effect is positive.	

8.1.5 Surficial Deposits

Surficial deposits include organic and mineral deposits as well as soil.

This section addresses: the *loss of substrate and topsoil*.

8.1.5.1 Interrelations of the Project with Surficial Deposits and Potential Effects

Preparation/Construction Phase

No Interrelation

The following activities at the preparation/construction phase will have no interrelation with surficial deposits:

- railway;
- electricity transmission and distribution lines;
- transport and traffic;
- restoration of temporary work areas;
- accidents and malfunctions.

None of those activities will require partial or total removal of surficial deposits.

Unimportant Interrelation

An unimportant interrelation was noted between the surficial deposits and the following activities:

- clearing and land-preparation;
- construction and improvement of access roads;
- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex area).

During the preparation/construction phase, clearing and land-preparation will be limited to access roads and to the sites of mining and infrastructure. For the most part, the roads already exist (Figure 5.10). Surficial deposits will be disturbed only for the construction of 1.6 km of new road. According to the preliminary plans, the infrastructure is mostly located on a site that was already disturbed by former mining operations (Figure 5.10). The service infrastructure will be located in part in an undisturbed zone. Out of a total area of 37 ha that will be occupied by the new infrastructure, 10 ha are undisturbed (natural ecosystem), and 27 ha are disturbed.

Operations Phase

No Interrelation

During the operations phase, the following activities will have no interrelation with surficial deposits:

- disposal of dewatering water;
- blasting and ore-extraction;
- transport of the ore and other transport or traffic;
- ore-crushing;
- ore-drying;
- ore-washing and recirculation of process water;
- storage and transport of ore by rail;
- management of hazardous wastes;
- treatment and disposal of wastewater;
- accidents and malfunctions.

None of these activities will require total or partial removal of surficial deposits. Overburden will have been removed prior to blasting and ore-extraction.

Unimportant Interrelation

The following activity will have an unimportant interrelation with surficial deposits:

- management of non-hazardous wastes.

The waste disposal site will be located in a disturbed area, a waste rock pile west of Timmins 1 (Figure 4.3), which will minimize the effect of its establishment on surficial deposits (Figure 5.10).

Important Interrelation

The following activities will have an important interrelation with surficial deposits:

- removal and storage of overburden;
- creation of waste rock piles;
- restoration of waste rock piles and of pits.

The potential effect generated by these activities is as follows:

➯ **Loss of substrate and topsoil**

Summary of Potential Effects

Table 8.22 shows the relationship between the Project activities and the potential effects on surficial deposits.

Table 8.22: Potential Effects on Surficial Deposits

Project Activities	**Potential Effects**
	Loss of Substrate and Topsoil
Preparation/Construction	
Operations	
Removal and storage of overburden	X
Creation of waste rock piles	X
Restoration of waste rock piles and of pits	X

8.1.5.2 Assessment of the Loss of Substrate and Topsoil

All surficial deposits, also called overburden in the mining industry, on the sites of the pits must be removed before the start of mining. In total, 57 ha of surficial deposits will be either removed or buried.

The superficial layer of a surficial deposit interacts with the vegetation to form what is called topsoil. The vast majority of the flora root systems are distributed in the topsoil, where the organic matter essential to plant growth also accumulates (Brady 1990). The topsoil layer also contains the seed bank of the plant species found in a given ecosystem. The thickness of the topsoil varies according to the type of surficial deposit and ecosystem (Groupe Hémisphères Mars 2009). In dry or mesic tundra ecosystems, this layer is less than 30 cm thick (TSS01, TSS02, TSS03), but it can exceed one meter in certain particularly rich ecosystems (TSS05, TSS07, FSM06, FSM07, FSM15). The thick organic deposits that were found in some wetlands (TSS06, FSM11, FSM12, FSM13) represent considerable quantities of organic matter (Groupe Hémisphères Mars 2009).

When surficial deposits have to be disturbed, it is desirable to preserve the topsoil and the organic deposits in order to reuse them beneficially.

The following standard mitigation measures will be implemented for surficial deposits:

- tree-cutting and management of wood (TW): TW5, TW19;

- control of erosion and sedimentation (ES): ES1, ES2, ES5, ES24;
- watercourse crossings (SC): SC13;
- drilling and blasting (DD): DD12, DD16;
- management of ore, stockpiles, tailings, mining waste and overburden (MO): MO4;
- restoration (R): R1, R2, R3.

Importance of the Effect

The direction of this effect is "negative", since the surficial deposits removed will cease to serve as substrate for terrestrial ecosystems. Its spatial extent is "site-specific", since only the sites of pits and stockpiles will be affected, and because the Timmins 3N and Fleming 7N sites were stripped during the former mining activities. The duration is "long", since the effect will be felt beyond the Project life. The frequency is "intermittent", since surficial deposits will be stripped or covered over only at the beginning of activities at each pit.

Finally, the level of certainty is "high", since numerous studies confirm the importance for terrestrial ecosystems of the type, integrity and distribution of surficial deposits.

The reversibility is "nil", since stripped or covered surficial deposits will not return to their initial condition after the operations phase. The magnitude is rated as "high", since the surficial deposits will be entirely stripped and removed from the site or covered over. The ecological value is "high", since the surficial deposits of DSO3 support terrestrial ecosystems and their biodiversity. The socio-economic value is "low", since the terrestrial ecosystems of DSO3 are little used by the local population for subsistence or sport fishing and hunting. The overall value of the component is therefore "moderate". Based on reversibility, magnitude and overall value, the intensity was calculated as "high".

Considering all the above criteria, the importance of the effect is "high".

Scientific Knowledge and Mitigation Measures

The following special mitigation measures are proposed:

- removing the topsoil and organic deposits from the areas that will be occupied by waste rock piles and using them as described in the following paragraph;
- storing the material removed and using it during restoration (see the following section for more details). The topsoil (fertile layer) would have to be separated from the rest of the surficial deposits and preserved in windrows 4 m high, on a site selected for this purpose. The selected site should be flat or gently sloping and located further than 50 m from any waterbody. The organic deposits should be stored in the same manner as the topsoil, but in separate windrows. Separate storage is necessary to preserve the seed bank in the topsoil. The topsoil and organic deposits should be used, if possible within two years, to restore disturbed areas;
- storing the rest of the surficial deposits (overburden other than topsoil or organic deposits) on an accessible site so as to be able to reuse it for restoring disturbed areas;
- following in detail all the recommendations in the restoration plan prepared pursuant to Appendix 8.

Importance of the Residual Effect

Using surficial deposits to restore disturbed areas will lower the magnitude of the effect from “high” to “low”. Since the disturbed areas will be restored and revegetated, the surficial deposits will be returned to their initial use, which will render the reversibility “partial” instead of “null”. Consequently, the importance of the effect will change from “high” to “low”.

Follow-up Programme

The following measures will be put in place:

- ensure through frequent inspections that the disturbed area corresponds to that anticipated herein;
- prior to putting a pit in operation, ensure by means of an inspection that surficial deposits have been adequately removed and stored;
- the storage sites should be inspected annually to assess conformity with the following elements: height of the windrows; separate storage of topsoil and organic deposits; level of decomposition of the stored organic matter; signs of seepage or heat coming from the windrows.

The monitoring measures associated with the success of restoration will be included in the restoration plan.

Compensation Measures

No compensation measure will be put into place, since the proposed mitigation measures will reduce the importance of the effect.

Summary of the Effect *Loss of Substrate and Topsoil*

Table 8.23 shows the various elements that contributed to the assessment of the effect *Loss of substrate and topsoil.*

Table 8.23: Summary of the Effect *Loss of Substrate and Topsoil*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Intermittent
Duration	Long
Reversibility	Nil
Intensity	High
Level of certainty	High
Importance of the effect	High
Special Mitigation Measures • Properly store the topsoil and organic deposits in designated area • Use the topsoil and organic deposits for restoring pits and waste rock piles • Use the rest of the surficial deposits (not the topsoil or organic material) for restoring the waste rock piles and other disturbed areas	
Importance of the Residual Effect • Low	
Follow-up Programme • See Table 9.1	
Compensation Measures • Unnecessary	

8.1.6 Wetlands

8.1.6.1 Interrelations of the Project with Wetlands and Potential Effects

Preparation/Construction Phase

No Interrelation

The following activities at the preparation/construction phase will have no interrelation with wetlands:

- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex area);
- railway;
- electricity transmission and distribution lines;
- restoration of temporary work areas.

None of these activities takes place close to wetlands and, consequently, none can have an effect on them.

Unimportant Interrelation

An unimportant interrelation can be anticipated between wetlands and the following activities:

- clearing and land-preparation;

- construction and improvement of access roads;
- transport and traffic;
- accidents and malfunctions.

According to the preliminary plans, no wetland will be directly affected by these activities. Indeed, no work nor disposal is anticipated within any wetland environment. Transport and traffic will use existing roads that cross wetlands, but this will have little effect on them, since the infrastructure has been in place for many years.

Operations Phase

No Interrelation

During the operations phase, the following activities will have no interrelation with wetlands:

- transport of ore and other transport or traffic;
- ore-washing and recirculation of process water;
- ore-crushing;
- ore-drying;
- storage and transport of ore by rail;
- treatment and disposal of wastewater;
- restoration of waste rock piles and of pits.

These activities will not be take place in or close to wetlands and will therefore have no influence on these environments. Process water will not come into contact with any natural environment.

Unimportant Interrelation

The following activities will have an unimportant interrelation with wetlands:

- management of non-hazardous wastes;
- management of hazardous wastes;
- accidents and malfunctions.

These activities will all take place at a considerable distance from any wetlands.

Important Interrelation

The following activities will have an important interrelation with wetlands:

- removal and storage of overburden;
- disposal of dewatering water;
- blasting and ore-extraction;
- creation of waste rock piles.

The potential effects generated by these activities are as follows:

- **Loss of wetlands**
- **Localized drying-up of wetlands**

Summary of Potential Effects

Table 8.24 shows the relationship between the activities of the Project and the potential effects.

Table 8.24: Potential Effects on Wetlands

Project Activities	Potential Effects	
	Loss of Wetlands	Localized Drying-up of Wetlands
Preparation/Construction		
Operations		
Removal and storage of overburden	X	
Disposal of dewatering water		X
Blasting and ore-extraction	X	
Creation of waste rock piles	X	

8.1.6.2 Assessment of the Loss of Wetlands

According to the preliminary plans, parts of some wetlands are located within the limits of pits and waste rock piles at Fleming 7N. These wetlands (numbers 2 and 13 on Figure 5.20) are uniform herbaceous fens (TSS06) and are considered to have a “moderate” ecological value (Section 5.18).

Approximately 5.5 ha of these wetlands will be destroyed by the above-mentioned activities. That represents about 53% of all wetlands of type TSS06 in the BLSA and 5.4% of the total area of wetlands in the BLSA.

The following standard mitigation measures will be put into place with respect to wetlands:

- tree-cutting and wood management (TW): TW5, TW14, TW19;
- erosion and sedimentation control (ES): ES4, ES5;
- watercourse crossings (SC): SC1, SC2, SC3, SC5, SC9, SC10, SC21;
- transmission lines rights-of-way (TR): TR1, TR2, TR6, TR7, TR8;
- management of non-hazardous wastes (SW): SW3;
- restoration (R): R1.

Importance of the Effect

The direction of this effect is “negative”. Its spatial extent is “site-specific”, since only two wetlands located in the same area will be affected. The duration is “long”, since the effect will be felt beyond the life of the Project. The frequency is “continual”, since material will be brought regularly to the pile and mining in the pit will be uninterrupted during its life.

The level of certainty is “high”, since it has been confirmed that the pile will cover a considerable part of wetland no 13 and that wetland no 2 will be partially destroyed by the Fleming 7N pit.

The reversibility is “null”, since the disturbed wetlands will not return to their initial condition after the operations phase. The magnitude is rated as “moderate”, since the integrity and the quality of only two wetlands covering a small area will be affected, while the integrity of other wetlands in the BLSA and their interconnection will not be affected. The ecological value is “low”, since, although it is important for wildlife and flora, the disturbed wetland covers a small area and is common in the BRSA. The socio-economic value, however, is “high”, since wetlands are protected by laws and regulations, including the EPA (Section 16). The overall value of the component is therefore “moderate”. Based on reversibility, magnitude and overall value, the intensity was calculated as “moderate”.

Considering all the above criteria, the importance of the effect is “moderate”.

Scientific Knowledge and Mitigation Measures

The following special mitigation measures are proposed:

- stripping the entire area at one time rather than progressively, so as to shorten the stress on the wetland;
- the top layer of the stripped organic matter (the 40-50 cm layer that includes the roots) should be preserved. To the extent possible, the organic matter should be excavated in blocks, without disturbing the various horizons. It should then be deposited in, for example, a disturbed area. The area selected should be an isolated depression (far from any watercourse, so as to avoid increasing suspended matter), which will promote revegetation and, eventually, the regeneration of a wetland. If this activity is carried out less than one year after the removal of the organic matter, the seed bank should still be intact, and the probability of recreating a similar wetland should be high. Studies of deciduous forests have shown that the life of ungerminated seeds is less than a year (Bierzychudek 1982), but there are no comparable data for northern ecosystems. Few data are available on restoring of wetlands using stripped organic soil. In Maryland, however, a habitat was restored using soil excavated from a floodplain, and natural vegetation has recolonized the new environment (USEPA 2003). The rest of the stripped organic matter should be preserved in windrows and used for restoration.

Importance of the Residual Effect

By implementing these two special mitigation measures, the reversibility goes from “null” to “partial”, since the destroyed wetland will be partially recreated in a disturbed area. The quality of the new environment will be less, however, than that of the initial environment. Despite integrating partial reversibility into the assessment, the importance of the effect remains “moderate”.

Follow-up Programme

Field visits should be conducted to compare the number of hectares of wetlands destroyed with the number predicted herein.

Annual inspections should be carried out over a four-year period in the depression in which the top 50 cm layer of organic deposits was relocated. If the attempt to recreate the wetland does not succeed, the organic matter could then be reused to restore other areas.

Compensation Measures

No compensation measure will be put into place, since the mitigation measures suggested should cancel out the net loss of wetlands at the level of the BLSA.

Summary of the Effect *Loss of Wetlands*

Table 8.25 shows the various elements that contributed to the assessment of the effect *Loss of wetlands*.

Table 8.25: Summary of the Effect *Loss of Wetlands*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Continual
Duration	Long
Level of certainty	High
Intensity	Moderate
Importance of the effect	Moderate
Special Mitigation Measures • Strip wetlands in one single pass • Use the stripped organic layer to recreate a natural wetland elsewhere	
Importance of the Residual Effect • Moderate	
Follow-up Programme • See Table 9.1	
Compensation Measures • n/a	

8.1.6.3 Localized Drying-up of Wetlands

The disposal of dewatering water could modify the local hydrology, which could lead to a drying-up of wetlands. This effect is discussed in detail in Section 8.1.4.

The following standard mitigation measures will be put into place with respect to wetlands:

- water management (WM): WM2;
- restoration (R): R1.

Importance of the Effect

The direction of this effect is “negative”. Its spatial extent is “site-specific”, the effect being limited to the wetlands located north-west of the Timmins 4 pit. The duration is “long”, since the effect will last throughout the operation of Timmins 4, which is three years. The frequency is “intermittent”, since the pumps used to lower the water table will operate only when the mining of a deposit reaches the level of the groundwater, which is generally at a depth of 10 to 55 m in DSO3.

The level of certainty is “moderate”, since the hydrogeological study (Appendix E) was based on data from pumping tests in DSO2.

The reversibility is “total”, since the wetlands disturbed by the dewatering will revert to their initial condition when the pumping stops, since they are located at least 450 m from the Timmins 4 pit. The magnitude is rated as “moderate”: according to the hydrogeological study (Appendix E), the effect of pumping on wetlands in question will be moderate, since they are located at least 450 m from the pit in the vast majority of cases. The ecological value is “low”, since, although they are important for wildlife and flora, the disturbed wetlands are common and cover large areas in the BRSA. The socio-economic value is “high”, since wetlands are protected by laws and regulations, including the EPA (Section 16). The overall value of the component is therefore “high”. Based on reversibility, magnitude and overall value, the intensity was calculated as “moderate”.

Considering all the above criteria, the importance of the effect is “moderate”.

Scientific Knowledge and Mitigation Measures

The potentially affected wetlands are found in the basin of Goodream Creek. Since there will be no exchange of water between the basins, it becomes necessary to examine separately the potential for drying-up of each basin.

The total area covered by wetlands in the BLSA is 100 ha (Table 5.26). The Elross Creek basin includes 66 ha (66%) and the Goodream Creek basin 34 ha (34%) of wetlands.

Elross Creek Watershed

Four wetlands, (nos 5, 8 (in part), 11 and 14) (on Figure 5.19), located downstream from the site of the pumping should not be affected: they represent 58% of the wetlands in this basin and are located more than 1,500 m from Timmins 3N. In addition, according to Appendix E, the groundwater around Timmins 3N and Fleming 7N flows towards Timmins 1 rather than towards these wetlands. In any case, these basin fens are not fed by the water table, but rather by surface water from permanent and intermittent streams. Their location could also be explained by the existence of an impermeable layer, probably permafrost, which would limit the likelihood that they would dry up, since they would not be connected to the water table.

Wetlands nos 2 and 13 will be partially destroyed as mentioned above, representing 16% of the wetland area in the Elross Creek watershed.

Consequently, four wetlands could be affected by the dewatering: wetlands nos 1, 2 (undestroyed portion), 10 and 13 (undestroyed portion). They represent 26 % of the total wetland area of the Elross Creek watershed. They are close to and at similar elevations to the Fleming 7N and Timmins 3N pits.

Wetlands nos 1, 2 and 13 are basin fens. As mentioned above, they are probably not connected to the water table, which means that they are not vulnerable to the effects of dewatering. Wetland no 10 is a riparian fen, principally fed by an adjacent watercourse. It is not possible to confirm whether it is also connected to the water table. It is, thus, the only wetland that could be affected by the pumping of the water table.

Goodream Creek Watershed

The only pit in the Goodream Creek watershed will be Timmins 4. Given its location it is possible to assert that some wetlands will not be affected by the pumping of groundwater there, even considering the dimensions of the drawdown cone. The wetlands in question are nos 3, 4, 9, 12 and 15, which represent 30% of the wetland area in the Goodream Creek watershed.

Wetlands nos 6, 7, 8 (in part) and 14, which represent 70% of the wetland area in the Goodream Creek watershed, could be affected by the dewatering of Timmins 4. The direction of these wetlands suggests that they are connected to the water table (see Section 5.18 for more details) and are possibly fed in part by surface water and in part by groundwater.

The risk that those wetlands will be affected is, however, low, since they are located approximately 450 m from Timmins 4 pit. The topography of the area supports the view that the risk of affecting them is low. The surface of the Timmins 4 pit is located at a minimum elevation of 673 m, whereas the maximum elevation of the wetlands in question is 655 m. Thus, excavation at Timmins 4 will have to reach a depth of 18 m before attaining the level of the wetlands, which reduces proportionately the influence of the drawdown cone that will be generated by the dewatering of Timmins 4. Furthermore, Timmins 4 is located in an area of discontinuous permafrost, the thickness of which can reach 100 m, and the water table may be located under that layer (Appendix E). Since the maximum excavation depth at Timmins 4 will be 100 m, it is possible that the water table will not be affected.

The special mitigation measures proposed in Section 8.1.4 are also proposed for the localized drying-up of wetlands.

Importance of the Residual Effect

Although the magnitude of the effect can be lowered from moderate to low by reducing pumping to a minimum and by applying the hydrogeological follow-up measures described in Section 8.1.1.4, the importance of the effect remains moderate.

Follow-up Programme

Wetlands in DSO3 that will not be destroyed, but the water content of which is likely to be modified, will be selected for purposes of monitoring.

The water content will be monitored annually so as to assess whether the drainage and the water content of the soil are changing. One piezometer will be installed in each wetland selected.

Since the wetland complex located close to Timmins 4 has the greatest value and is the more likely to dry up, two of its wetlands, one upstream and one downstream from the pit, will be monitored.

Compensation Measures

Even though the proposed mitigation measures will not reduce the effect from moderate to low, no compensation is currently planned. Compensation might be proposed, however, if a marked drying-up of wetlands in DSO3 is revealed by the follow-up programme.

Summary of the Effect *Localized Drying-up of Wetlands*

Table 8.26 shows the various elements that contributed to the assessment of the effect *Localized drying-up of wetlands*.

Table 8.26: Summary of the Effect *Localized Drying-up of Wetlands*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Intermittent
Duration	Medium
Reversibility	Total
Level of certainty	Moderate
Intensity	Moderate
Importance of the effect	Moderate
Special Mitigation Measures • See Section 8.1.1.4	
Importance of the Effect • Moderate	
Follow-up Programme • See Table 9.1	
Compensation Measures • Unnecessary until proven otherwise	

8.1.7 Caribou and its Habitat

This section discusses the potential effects of the Project on the two caribou ecotypes that may be present in the BLSA, namely the migratory and the sedentary ecotypes. Mitigation measures are presented separately for each ecotype.

8.1.7.1 Interrelations of the Project with Caribou and Potential Effects

Preparation/Construction Phase

No Interrelation

During the preparation/construction phase, two activities will have no interrelation with caribou:

- electricity transmission and distribution lines;
- accidents and malfunctions.

These activities do not have the potential to affect caribou, because they will not affect their habitat and will be carried out over too short a period to affect caribou behaviour.

Unimportant Interrelation

An unimportant interrelation is predicted between the following activities and caribou and their habitat:

- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex area);
- railway;
- restoration of temporary work areas.

These activities will have little effect on caribou, since they will cover a limited area and will be carried out over short periods of time.

Important Interrelation

The following activities may have important effects on caribou or their habitat:

- clearing and land-preparation;
- construction and improvement of access roads;
- transport and traffic.

The potential effects associated with these interrelations are:

➷ **Noise disturbance**
➷ **Destruction of habitat**

Operations Phase

No Interrelation

The following activities at the operations phase will have no interrelation with caribou:

- disposal of dewatering water;
- management of non-hazardous wastes;
- management of hazardous wastes;
- treatment and disposal of wastewater;
- accidents and malfunctions.

These activities will not affect caribou, because they will not affect their habitat and will not generate noise.

Unimportant Interrelation

The followings activity will have an unimportant interrelation with caribou:

- ore-drying.

The activity “ore-drying” is considered as unimportant with regard to caribou, because the related habitat disturbed is very small (less than 1 ha) and the noise generated is insignificant compared to that generated by other activities.

Important Interrelation

Sedentary caribou, the females in particular, are sensitive to human disturbance (Schaefer and Mahoney 2006; Dyer *et al.* 2002; Dyer *et al.* 2001). The following activities may have important interrelations with caribou and caribou habitat:

- removal and storage of overburden;
- blasting and ore-extraction;
- creation of waste rock piles;
- transport of ore and other transport or traffic;
- ore-crushing;

- ore-washing and recirculation of process water;
- storage and transport of ore by rail;
- restoration of waste rock piles and of pits.*

The following potential effects are associated with these activities:

↳ **Noise disturbance**
↳ **Destruction of habitat**

* It should be noted that the restoration of waste rock piles and of pits could cause both a negative effect (noise) and a positive one (habitat restoration).

Summary of Potential Effects

Table 8.27 shows the relationship between the Project activities and caribou of the migratory and sedentary ecotypes.

Table 8.27: Potential Effects on Caribou of the Migratory and Sedentary Ecotypes

Project Activities	Potential Effects	
	Noise Disturbance	Destruction of Habitat
Preparation/Construction		
Clearing and land-preparation		X
Construction and improvement of access roads		X
Transport and traffic	X	
Operations		
Removal and storage of overburden		X
Blasting and ore-extraction	X	X
Creation of waste rock piles		X
Transport of ore and other transport and traffic	X	
Ore-crushing	X	
Ore-washing and recirculation of process water	X	
Storage and transport of ore by rail	X	
Restoration of waste rock piles and of pits	X	X

8.1.7.2 Assessment of Noise Disturbance

Noise from traffic, the transportation of workers, heavy machinery, blasting, drilling and crushing during the preparation/construction or operations phases may disturb migratory and sedentary caribou.

The following standard mitigation measures will be implemented:

- drilling and blasting (DD): DD1, DD3, DD4;
- construction equipment (CE): CE7, CE8, CE11, CE13;
- restoration (R): R1.

Importance of the Effect

Migratory Caribou

The direction of this effect is “negative”. Its spatial extent is “local”, since noise from the ELAIOM will not manifest itself beyond the BLSA. The duration of the effect is “long”, since noise will be generated throughout the life of the Project. The frequency is “intermittent”, since the migratory caribou are present in the vicinity of the ELAIOM only seasonally, and the most important source of noise, blasting, will occur only once per week at each active mine site.

The level of certainty is “high”, since the disturbance of caribou by noise is well-documented.

The reversibility is “total”, since the noise will cease once the Project has ended. The magnitude is considered as “high”, since the associated disturbance might compromise the use of the vicinity of the ELAIOM by caribou. The ecological value is “high”, since caribou constitute an essential element of northern ecosystems. The socio-economic value is “high”, since caribou is hunted in the BLSA and has a great social and cultural importance for the First Nations. The overall value of the component is therefore “high”. Based on reversibility, magnitude and overall value, the intensity is rated as “moderate”.

Considering all the above criteria, the importance of the effect is rated as “moderate”.

Sedentary Caribou

The direction of this effect is “negative”. Its spatial extent is “local”, since all effects related to disturbance will occur within the BLSA. The duration of the effect is “long”, since noise will be generated throughout the life of the Project. The frequency is “intermittent”, since sedentary caribou is present in the vicinity of the ELAIOM only occasionally, if at all.

The level of certainty is “moderate”, since the disturbance of caribou by noise is well-documented, but the presence of sedentary caribou in the vicinity of the ELAIOM is uncertain.

The reversibility is “total”, since the noise will cease once the Project has ended. The magnitude is considered as “high”, since the associated disturbance might compromise the use of the area of the ELAIOM by sedentary caribou. The ecological value is “high”, since caribou constitute an essential element of northern ecosystems. The socio-economic value is “high”, since caribou is hunted in the BLSA and has a high social and cultural importance for the First Nations. In addition the sedentary caribou is classed as threatened. The overall value of the component is therefore “high”. Based on reversibility, magnitude and overall value, the intensity is rated as “moderate”.

Considering all the above criteria, the importance of the effect is rated as “moderate”.

Scientific Knowledge and Mitigation Measures

Migratory Caribou

Migratory caribou may cross the BLSA during its fall migration (see Section 5.4.3.1) and early in the spring when it is moving towards its calving grounds (Weiler January 2009; Clément Mai 2009). No caribou have been seen in the past few years, however, in the immediate vicinity of Schefferville. The migration patterns noted by Clément (Mai 2009) are perhaps more representative of the historical movements noted by the members of the First Nations than of contemporary behaviour.

The disturbance generated by noise could result in the modification of the migration route of migratory caribou. A study of the effects of a gold mine in the south-western part of the Island of Newfoundland showed that, within a 6-km radius of the mine, the number of caribou decreased as the mining activity increased (Weir *et al.* 2007).

The effects of noise disturbance on the seasonal movements and distribution of migratory caribou are difficult to predict. Their movements and distribution tend to vary in accordance with the size of the population (Bergerud *et al.* 1984) and its use of wintering areas (Schmelzer and Otto 2001). Migratory caribou are believed, therefore, to modify their migration patterns according to their number and the use of resources in wintering areas. A reduction in the size of the herd could explain why no caribou have been seen in the Schefferville region in the past few years. The most direct effect of any avoidance of the BLSA by migratory caribou would be a decrease in hunting success by Native hunters in this sector.

The following special mitigation measures are proposed for the disturbance of migratory caribou by noise:

- under an agreement to be negotiated with the concerned governments, the on-site Project managers will be notified when migratory caribou, which are monitored via satellite collars, come within 100 km of the ELAIOM. In that regard, the recent decision of the GNL and the GoQ to equip up to 80 more caribou from the George River Herd with radio collars in 2010 (CBC News July 19, 2009) is timely and welcome.

  Upon receipt of such a notice, operations will continue with caution, in the sense that available satellite information on the movements of the animals in question would, if possible, be monitored daily.

  If data from the radio collars indicate that some of the migratory caribou have moved to within 20 km of the ELAIOM, NML will institute surveys within that radius to monitor their movements in greater detail. The most appropriate form of survey will be evaluated during the early years of operation. Initially, a preference will be given to observations from fixed points along the high ground adjacent to the ELAIOM activity sites and to snowmobile-/ATV-based searches by members of the local First Nations hired by NML. The surveyors will be cautioned about not approaching any caribou observed too closely. The surveys would benefit from the knowledge of members of the local First Nations about the movements of caribou in the area. If ground-based surveys prove not to be useful or feasible, NML will initiate aerial surveys at times when the ground is snow-covered. Care will at all times be taken not to interfere with the activities of First-Nation hunters or of outfitters.

  The data collected during the preceding surveys (number, age and sex; location of sightings; topography of sighting location) will be communicated frequently to a designated representative of the Wildlife Division of the NLDEC, who will be asked for advice with respect to the course of action (*e.g.*, suspension of activity, cautious continuation) to be followed.

  Should a group of roughly 100 migratory caribou move within 5 km of a pit in operation or of the processing complex, all blasting, crushing and ore-transport activities will be suspended. Those activities will also be suspended when approximately 10 migratory caribou move within 3 km;

- a workers' awareness programme will be implemented to avoid the chasing or harassing of caribou;
- firearms will be prohibited in the workers' camp, except for two that may be used by security personnel in a case of emergency;
- speed limits (probably 70 km/h, see Section 4.12.3) and a muffler preventive maintenance programme will be enforced on all vehicles.

Sedentary Caribou

Sedentary caribou are more sensitive to human disturbance than are migratory caribou (Schaefer and Mahoney 2006; Dyer *et al.* 2001; Dyer *et al.* 2002). In general, females return each year to the same calving grounds, although their movements in winter are less predictable (Schaefer *et al.* 2000; Ferguson and Elkie 2004). The effect of disturbance will be more important, therefore, at calving time than at other seasons. Calving grounds generally offer good visibility, so that females can avoid attacks by predators. If they move to new calving grounds because of human disturbance, females may become more vulnerable to predation (Harrington and Veitch 1992). There is no evidence that sedentary caribou calve in or near the BLSA.

The following special mitigation measures are proposed with respect to noise disturbance of sedentary caribou:

- under an agreement to be negotiated with the concerned governments, the on-site Project managers will be notified when sedentary caribou, which would have to be monitored via satellite collars, move within 100 km of the ELAIOM. Upon receipt of such a notice, operations will continue with caution, in the sense that NML will institute measures to monitor the information from the satellite collars to determine whether the caribou in question continue to move towards the site of the ELAIOM. NML will also liaise more intensively with the Wildlife Division of the NLDEC.

  Activity will cease under the following circumstances:

  - if 10 or more sedentary caribou are within 20 km of an active pit or the processing complex;
  - if five or more sedentary caribou are within five kilometers of an active pit or the processing complex;
  - if one or more sedentary caribou are within one kilometer of an active pit or the processing complex.

  Whenever activity ceases pursuant to the foregoing, NML's on-site personnel will immediately contact the Wildlife Division of the NLDEC to discuss any further steps to be taken.

  NML does not propose to conduct any ground-based surveys of sedentary caribou within a 20-km radius of the ELAIOM because of the high likelihood that news of the location of those caribou might become known and might lead to their being hunted. If, however, NML is instructed by the Wildlife Division of the NLDEC to conduct such surveys, it will do so.

  If at any given time there are no collared sedentary caribou belonging to a group that might visit the vicinity of the ELAIOM, NML will conduct a helicopter-based survey within a 20-km radius of the ELAIOM each year in early May. That survey will follow the protocol described in D'Astous and Trimper (June 2009, *in preparation*) and will include an attempt to collar any adult females observed and to collect samples of tissue for genetic analysis.

The data collected during the preceding surveys (number, age and sex; location of sightings; topography of sighting location) will be communicated frequently to a designated representative of the NLDEC, who will be asked for advice with respect to the course of action (*e.g.*, suspension of activity, cautious continuation) to be followed.

The preceding surveys will be in addition to the four-year surveys over a 50-km radius proposed in Table 9.1.

If it is not known whether a given group of caribou belongs to the migratory or the sedentary ecotype, NML will assume that they are sedentary caribou and will act accordingly (see Appendix 20);

- a workers' awareness programme will be implemented to avoid the chasing or harassing of caribou;
- at the present time, sport hunting of caribou in the Québec portion of the LSEA is effectively prohibited. Sport hunting of caribou in the Labrador portion of the LSEA is permitted only during a limited season and under the auspices of an outfitter. Hunting by non-Native workers will be prohibited during work rotations;
- firearms will be prohibited in the workers' camp, except for two that may be used by security personnel in a case of emergency;
- speed limits (probably 70 km/h, see Section 4.12.3) and a muffler preventive maintenance programme will be enforced on all vehicles.

Importance of the Residual Effect

Migratory Caribou

The magnitude of the effect can be reduced from "high" to "low", since activities generating noise will be interrupted should caribou be present in the vicinity of the Project. Nevertheless, the importance of the residual effect will remain "moderate".

Sedentary Caribou

Since noise will cease when caribou approach the ELAIOM, the magnitude of the effect will be reduced from "high" to "low". Nevertheless, the importance of the residual effect will remain "moderate".

Follow-up Programme

Migratory Caribou

<u>Financial Contribution to Population Monitoring</u>

The George River Herd is already being studied by the biologists of the GNL and various university research groups. Studying caribou dispersed over a territory as large as the Québec-Labrador Peninsula is very expensive. NML will consider making a modest contribution to the monitoring programme of the George River Herd in exchange for access to its results.

A new research programme was launched on March 26, 2009. It is entitled “Dynamics of and Territorial Occupation by Québec-Labrador Migratory Caribou Populations: Effects of Industrial Activity and Climate Changes”. It is being carried out through a partnership between Université Laval and corporations such as Hydro-Québec and Xstrata. NML will assess its capacity to participate in this initiative in exchange for information.

Participation in CARMA

The CircumArctic Rangifer Monitoring and Assessment Network is an international group of researchers, experts on habitat and climate, and community and government representatives. The NNK has participated in CARMA since its inception. One of CARMA's objectives is to coordinate the collection of comparative data on all caribou herds in the world. To this end, CARMA is involved with various hunter groups to collect data on the physical condition of caribou. CARMA has developed a very straightforward data collection protocol for hunters. A demo video already exists in English.

NML will assess how it could support CARMA's initiatives with respect to migratory and sedentary caribou.

Sedentary Caribou

Validation and Documentation of the Presence of Sedentary Caribou

Ascertaining whether sedentary caribou are present in or near the ELAIOM is essential. Differentiating between the two ecotypes is, however, difficult, especially where there may have been contact in the past between the two ecotypes, introducing the possibility of genetic exchange. The most reliable way to identify sedentary caribou populations is to genetically analyze samples of tissue from pregnant females (Boulet *et al.* 2007). The use of remote sensing collars (Argos) to monitor movements could be complementary, but this type of research does not produce speedy or definite answers.

The helicopter-based survey conducted by LIM and NML in May 2009 (D'Astous and Trimper June 2009, *in preparation*) has not yet yielded any definitive results, since the tissue samples collected for genetic analysis will not be analyzed until early 2010.

If the genetic analyses reveal that either or both of the females sampled belong to the sedentary ecotype, that will represent the first confirmation of the presence of that ecotype in the BLSA for 30 years. The challenge for NML will, however, be to know whether caribou observed near the ELAIOM in the future, especially during or close to the calving season, belong to the migratory or the sedentary ecotype.

NML will conduct surveys similar to the one conducted in May 2009 every fourth spring. Tissue samples for genetic analysis will be collected, and females will be fitted with satellite collars. NML will also try to conclude an arrangement with local Native hunters and outfitters to collect tissue samples for genetic analysis, the cost of which will be borne by NML.

Over the long term, it is to be hoped that a sufficient number of female caribou will be fitted with satellite collars that it will be possible for NML to know with a high degree of confidence whether there are any caribou of the sedentary ecotype in the vicinity of the ELAIOM, especially during or around the calving season. Until that situation has been achieved, NML will assume that any caribou observed near the ELAIOM that cannot confidently be identified as to belong to the sedentary caribou ecotype, and it will act accordingly (see Appendix 20).

Compensation Measures

Financial participation in various studies, as presented in the follow-up programme, is the only compensation measure developed so far. Should the presence of sedentary caribou in the vicinity of the ELAIOM be confirmed, the pertinence and feasibility of establishing other compensation measures will be discussed with the concerned authorities.

Summary of the Effect *Noise Disturbance*

Table 8.28 shows the various elements that contributed to the assessment of the effect *Noise disturbance for migratory caribou*.

Table 8.28: Caribou – Assessment of the Importance of the Effect *Noise Disturbance for Migratory Caribou*

Assessment of Importance	
Direction	Negative
Spatial extent	Local
Frequency	Intermittent
Duration	Long
Level of certainty	High
Intensity	Moderate
Importance of the effect	Moderate
Special Mitigation Measures • Implementation of a workers' awareness programme • Speed limit and muffler preventive maintenance programme • Interruption of noise-generating activities should a group of approximately 100 migratory caribou approach within 5 km or when a group of approximately 10 caribou approaches within 3 km • Hunting prohibited for workers	
Importance of the Residual Effect • Moderate	
Follow-up Programme • See this section and Table 9.1	
Compensation Measures • Potential participation in various programmes	

Table 8.29 shows the various elements that contributed to the assessment of the effect *Noise disturbance for sedentary caribou*.

Table 8.29: Caribou – Assessment of the Importance of the Effect *Noise Disturbance for Sedentary Caribou*

Assessment of Importance	
Direction	Negative
Spatial extent	Local
Frequency	Intermittent
Duration	Long
Level of certainty	Moderate
Intensity	Moderate
Importance of the effect	Moderate
Special Mitigation Measures • Implementation of a workers' awareness programme • Speed limit and muffler preventive maintenance programme • Interruption of noise-generating activities should any sedentary caribou approach within 10 km	
Importance of the Residual Effect o Moderate	
Follow-up Programme • See this section and Table 9.1	
Compensation Measures • Potential participation in various programmes	

8.1.7.3 Assessment of Habitat Destruction

Clearing and land-preparation, construction and the improvement of access roads and the removal and stockpiling of overburden during the preparation/construction and operations phases of the Project will destroy some of the habitat of sedentary and migratory caribou.

The following standard mitigation measures will be implemented:

- tree-cutting and management of wood (TW): TW5, TW6, TW10, TW14, TW19;
- management of hazardous material (HM): HM1;
- restoration (R): R1, R2, R3.

Importance of the Effect

Migratory Caribou

The direction of this effect is "negative". Its spatial extent is "site-specific", since the areas destroyed will be limited to the site of the proposed infrastructure. The duration is "long", since the effect will be felt throughout and beyond the life of the Project. The frequency is "intermittent", since the George River Herd is present in the vicinity of the ELAIOM only during migrations, if at all.

The level of certainty is "moderate", since habitats will certainly be destroyed by the Project activities, and the importance of some of those habitats for caribou is unequivocal. However, although caribou has been present in the vicinity of the ELAIOM historically, it has not been seen in large numbers in the last few years and may no longer be using these habitats.

The reversibility is “partial”, since some of the habitats that will be destroyed will not return completely to their initial state after the Project. The magnitude is considered as “low”, since habitat during migration is virtually unlimited and the loss of a small part of it will not compromise survival on a large scale. The ecological value is “high”, because caribou are an essential component of northern ecosystems. The socio-economic value is “high”, since the species is hunted and has a high socio-cultural value for the First Nations. The overall value of the component is therefore “high”. Based on reversibility, magnitude and overall value, the intensity is rated as “moderate”.

Considering all the above criteria, the importance of the effect is “moderate”.

Sedentary Caribou

The direction of this effect is “negative”. Its spatial extent is “site-specific”, since the areas destroyed will be limited to the site of the proposed infrastructure. The duration is “long”, since the effect will be felt throughout and beyond the life of the Project. The frequency is “intermittent”, since sedentary caribou is present in the vicinity of the ELAIOM only occasionally, if at all.

The level of certainty is “low”, since habitats will certainly be destroyed by the Project activities, but sedentary caribou is not known not to be limited by habitat availability. Moreover, although sedentary caribou may have been present in the BLSA historically, it has not been proven that they are still using these habitats.

The reversibility is “partial”, since some of the habitats that will be destroyed will not return fully to their initial state after the Project. The magnitude is considered as “moderate”, since habitat itself is not a limiting factor for sedentary caribou, but may exert an indirect effect through predation. The ecological value is “high”, because caribou are an essential component of northern ecosystems. The socio-economic value is “high”, since the species is hunted, has a high socio-cultural value for the First Nations and is protected by law. The overall value of the component is therefore “high”. Based on reversibility, magnitude and overall value, the intensity is rated as “high”.

Considering all the above criteria, the importance of the effect is “high”.

Scientific Knowledge and Mitigation Measures

Migratory Caribou

Caribou is known to consume large quantities of terrestrial and arboreal lichens, especially in winter. In summer, it adds to its diet the stems of herbaceous and grass-like plants as well as twigs from various shrubs, including willow, birch and blueberry if available (D’Astous *et al*. 2004). Lichen is less abundant on the calving grounds than on the wintering grounds. It is thought that, in winter, females avoid sites that were used in preceding years, which is believed to ensure access to good feeding areas (Schmelzer and Otto 2001). A maximum of approximately 51 ha of undisturbed caribou habitat will be destroyed in DSO3. In comparison to the thousands of square kilometers that migratory caribou cover each year, any loss associated with the Project would be minimal.

Nonetheless, the following special mitigation measures are proposed to reduce the destruction of migratory caribou habitat:

- during clearing, special attention should be paid to the limits of work areas so as not to needlessly damage or destroy caribou habitat;
- stripping, clearing, excavation and filling should be kept to a strict minimum so as to use the smallest possible area.

Sedentary Caribou

For sedentary caribou, a loss of habitat might translate into increased predation and hunting rather than a diminution of available food (Courtois 2003; Courtois *et al.* 2003). In the boreal forest, the quantity of food available to caribou is not a limiting factor. Industrial development projects in forested regions, however, render sedentary caribou more vulnerable to predators (Bergerud *et al.* 1984; James and Stuart-Smith 2000). Indeed, if a part of their habitat is destroyed, sedentary caribou are more likely to find themselves exposed to predators, since they select habitats so as to avoid them. Other studies clearly showed that sedentary caribou females avoid roads, seismic lines and transmission lines (Dyer *et al.* 2001, Dyer *et al.* 2002; Nellemann *et al.* 2001) so as to avoid predators. In the Caniapiscau region, mortality rates of 19 to 27% were estimated among female sedentary caribou that had been equipped with radio-collars in the mid-1980s, the main causes of mortality being predation by wolves and Black bears and drowning (Huot et Paré 1986). For purposes of comparison, in the same period, the mortality rate of the George River Herd migratory caribou was in the order of 10% (Hearn *et al*. 1990). It is therefore necessary to reduce to a minimum the loss of habitat and human access to the territory in order to protect sedentary caribou (if they are present).

The same special mitigation measures used for migratory caribou are proposed in order to reduce the destruction of sedentary caribou habitat.

Importance of the Residual Effect

Migratory Caribou

Even with the special mitigation measures, the intensity of the effect will remain “low”. The importance of the residual effect will, therefore, remain “moderate”.

Sedentary Caribou

Even with the special mitigation measures, the intensity of the effect will remain “low”. The importance of the residual effect will, therefore, remain “moderate”.

Follow-up Programme

Monitoring Areas Destroyed

Monitoring the number of hectares destroyed by means of field visits, using the terrestrial ecosystem mapping carried out for the EIS as a comparative tool, will make it possible to ensure that the area destroyed corresponds to that forecast herein.

Monitoring Sedentary Caribou Habitat

An approach to monitoring the habitat of sedentary caribou will be determined once the results of the programme to monitor noise disturbance are available.

Compensation Measures

No compensation measures are proposed for the loss of habitat. The special mitigation measures proposed in Section 8.1.5 will help to limit the loss of habitat, since operations sites will be restored as they cease to be used.

Summary of the Effect *Destruction of Habitat*

Table 8.30 shows the various elements that contributed to the assessment of the effect *Destruction of habitat for migratory caribou.*

Table 8.30: Caribou – Summary of the Effect *Destruction of Habitat for Migratory Caribou*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Intermittent
Duration	Long
Level of certainty	Moderate
Intensity	Moderate
Importance of the effect	Moderate
Special Mitigation Measures • During clearing, special attention should be paid to the limits of work areas so as not to needlessly damage caribou habitat • Stripping, clearing, excavation and filling should be kept to a strict minimum so as to use the smallest possible area	
Importance of the Residual Effect • Moderate	
Follow-up Programme • See Table 9.1	
Compensation Measures • No compensation measure is proposed for the loss of caribou habitat	

Table 8.31 shows the various elements that contributed to the assessment of the effect *Destruction of habitat for sedentary caribou.*

Table 8.31: Caribou – Summary of the Effect *Destruction of Habitat for Sedentary Caribou*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Intermittent
Duration	Long
Level of certainty	Low
Intensity	High
Importance of the effect	High
Special Mitigation Measures • Same as for migratory caribou	
Importance of the Residual Effect o Moderate	
Follow-up Programme • See Table 9.1	
Compensation Measures • No compensation measure is proposed for the loss of caribou habitat	

Commitment of NML

The Guidelines (GNL December 12, 2008) state "The EIS should include a commitment to apply the mitigation plan developed for woodland caribou while a monitoring plan is undertaken to determine the identity of any caribou using the area."

Appendix 20 contains a written commitment from NML to respect that requirement.

8.1.8 Harvested Mammals

The harvested mammals VEC includes 13 species harvested by the Innu and the Naskapis, which, for purpose of effect analysis, were classified in two groups, terrestrial and aquatic. The terrestrial group includes American marten, Arctic fox, Arctic hare, weasel, Grey wolf, Red fox, Snowshoe hare and Canada lynx. The aquatic group includes American beaver, American mink, muskrat and Canadian otter.

8.1.8.1 Interrelations of the Project with Harvested Mammals

Preparation/Construction Phase

No Interrelation

The following activities at the preparation/construction phase will have no interrelation with harvested mammals:

- electricity transmission and distribution lines;
- accidents and malfunctions.

These two activities will not damage the habitats of harvested mammals or disturb the animals themselves.

Unimportant Interrelation

The following activities at the preparation/construction phase will have an unimportant interrelation with harvested mammals:

- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex area);
- transport and traffic;
- restoration of temporary work areas;
- railway.

These activities will occupy little space and create no disturbance.

The restoration of temporary work areas will have an unimportant positive interrelation, since it will help reduce the area of habitat destroyed.

Important Interrelation

The following activities will have important interrelations with harvested mammals:

- clearing and land-preparation;
- construction and improvement of access roads.

The potential effect associated with these interrelations is:

↳ **Destruction of habitat**

Operations Phase

No Interrelation

The following activities at the operations phase will have no interrelation with harvested mammals:

- disposal of dewatering water;
- treatment and disposal of wastewater;
- ore-washing and recirculation of process water.

These activities will not affect the habitat of the harvested mammals and will create no disturbance.

Unimportant Interrelation

An unimportant interrelation was noted between harvested mammals and the following activities:

- management of non-hazardous wastes;
- management of hazardous wastes;
- accidents and malfunctions;
- restoration of waste rock piles and of pits.

These activities could theoretically affect aquatic mammals, but they will take place far away enough from any wetland or watercourse that effects are not anticipated. Furthermore, disposal of hazardous wastes or of wastewater in wetlands or watercourses will not be tolerated. The restoration of waste rock piles and of pits will allow for the reestablishment of some habitats used by harvested mammals, which represents a positive interrelation. These habitats are, however, common in the BLSA and the BRSA and of low value for the concerned species.

Certain activities could cause disturbances for harvested mammals, but the effect is expected to be negligible. These activities are:

- blasting and ore-extraction;
- transport of ore and other transport or traffic;
- ore-crushing;
- ore-drying;
- storage and transport of ore by train.

The disturbance caused by these activities will be unimportant, since they will be carried out far from habitats likely to shelter the species in question, namely forested ecosystems and wetland and riparian environments covering large areas.

Important Interrelation

There will be an important interrelation between the following activities and harvested mammals:

- removal and storage of overburden;
- creation of waste rock piles.

The potential effect associated with these interrelations is:

↳ **Destruction of habitat**

Summary of Potential Effects

Table 8.32 shows the relationship between the Project activities and the potential effects.

Table 8.32: Potential Effects on Harvested Mammals

Project Activities	Potential Effects
	Destruction of Habitat
Preparation/Construction	
Clearing and land-preparation	X
Construction and improvement of access roads	X
Operations	
Removal and storage of overburden	X
Creation of waste rock piles	X

8.1.8.2 Assessment of the Destruction of Habitat

Clearing and land-preparation, the construction and improvement of access roads, the removal and storage of overburden and stockpiling during the preparation/construction and operations phases of the Project will entail some destruction of the habitats of harvested mammals.

The following standard mitigation measures will be implemented:

- tree-cutting and management of wood (TW): TW5, TW6, TW7, TW8, TW10, TW14, TW19;
- watercourse crossings (SC): SC1, SC2, SC3, SC21;
- transmission lines rights-of-way (TR): TR1, TR2, TR6, TR7;
- management of non-hazardous wastes (SW): SW1, SW2, SW4, SW8;
- management of hazardous wastes (HM): HM1;
- drilling and blasting (DD): DD9;
- construction equipment (CE): CE7, CE8, CE11;
- quarries, sandpits and borrow pits (QB): QB1, QB2, QB4, QB5, QB6;
- restoration (R): R1, R2, R3.

Importance of the Effect

The direction of this effect is “negative”. Its spatial extent is “site-specific”, since the areas destroyed will be limited to the proposed facilities. The duration is “long”, since the effect will be felt throughout and beyond the life of the Project, since some habitats will be destroyed. The frequency is “continual”, since some of the activities entailing the destruction of habitat will be carried out year-round throughout the operations phase.

The level of certainty is considered “high”, since the effect of the loss of habitat on harvested mammals is well-documented (see Section 5.4.2).

The reversibility is “partial”, since some of the habitats affected (those at the site of pits) will be irreversibly destroyed, but others will regenerate after the Project. The magnitude is rated as “moderate”, since the destruction of habitat will affect the harvested mammals, but it will not compromise their survival at the local or regional scales. The ecological value is “low”: although these species contribute to biodiversity and are essential to the functioning of the ecosystems, they are not numerous in the BLSA, which contains few suitable habitats. The socio-economic value is also “low”: even though these species are valued by the First Nations, they are not numerous in the BLSA. The overall value is therefore “low”. Based on reversibility, magnitude and overall value, the intensity was calculated as “low”.

Considering all the above criteria, the importance of the effect is “low”.

Scientific Knowledge and Mitigation Measures

The BLSA includes few habitats suitable for the harvested mammal species (Groupe Hémisphères Mars 2009). The First Nations do not practise trapping much in this sector, except at lac Pinette, and it will not be directly affected by the Project. The habitats most suited for trapping in the region are found in the Howells River and Swampy Bay river basins (Weiler 2006). In addition, Clément (Mai 2009) noted that the Innu trap less and less, mostly for lack of time.

Aquatic Species

The BLSA contains little suitable habitat for aquatic mammals, which tend to be associated with riparian habitats, which account for less than 1% of the area of the BLSA. Only one beaver lodge was identified within the BLSA, downstream from lac Pinette, which will not be affected by the Project (Figure 5.31).

As mentioned in the assessment of effects on wetlands (Section 8.19), 5.5 ha of a wetland will be destroyed. It is a uniform herbaceous fen of the Alpine Subarctic Tundra ecoregion and is not favoured by the aquatic mammal species potentially present (Groupe Hémisphères Mars 2009).

Terrestrial Species

In total, 94 ha will be disturbed by the above-mentioned activities, of which 43 ha are already disturbed (Table 8.33). No forested habitats will be destroyed. Most of the harvested terrestrial mammals live in the forest and should not be affected by the loss of habitat.

Table 8.33: Loss of Habitats (Natural and Disturbed) in DSO3

	Natural (ha)	Disturbed (ha)	Total (ha)
Infrastructure	10	27	37
Pits and stockpiles	41	16	57
Total (ha)	**51**	**43**	**94**

No special mitigation measure is proposed for harvested mammals. The special mitigation measures applied to caribou (Section 8.1.7), however, will also be beneficial to the harvested mammals, since the area of habitat destroyed will be kept to a minimum and will be concentrated in zones already partially or completely disturbed.

Importance of the Residual Effect

The mitigation measures proposed for caribou will contribute to reducing the magnitude of the effect from “moderate” to “low”.

Despite decreasing the magnitude from “moderate” to “low”, the importance of the effect remains remains “low”.

Follow-up Programme

Monitoring of the number of hectares destroyed through field visits, using the terrestrial ecosystem mapping carried out for the EIS as a comparative tool, will make it possible to ensure that the area destroyed corresponds to that forecast herein.

The five-year survey of hunting and trapping success by the First Nations will provide insights into the effects of the Project on the harvested mammals (see Table 9.1).

Compensation Measures

Since the importance of the effect is rated as “low”, no compensation measure is proposed.

Summary of the Effect *Destruction of Habitat*

Table 8.34 shows the various elements that contributed to the assessment of the effect *Destruction of habitat.*

Table 8.34: Harvested Mammals – Summary of the Effect *Destruction of Habitat*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Continual
Duration	Long
Reversibility	Partial
Level of certainty	High
Intensity	Low
Importance of the effect	Low
Special Mitigation Measures • Same as applied to caribou	
Importance of the Residual Effect • Low	
Follow-up Programme • See Table 9.1	
Compensation Measures • None	

8.1.9 Wolverine

An assessment of effects was carried out for wolverine, which is designated provincially and federally as endangered.

8.1.9.1 Interrelations of the Project with Wolverine and Potential Effects

Preparation/Construction Phase

No Interrelation

During the preparation/construction phase, only one activity will have no interrelation with wolverine:

- accidents and malfunctions.

This activity will not affect the habitat of the wolverine and will create no disturbance.

Unimportant Interrelation

Several activities of the preparation/construction phase may have effects on wolverine, but they will be unimportant because those activities will be restricted to small areas. These activities are the following:

- clearing and land-preparation;
- construction and improvement of access roads;
- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex area);
- railway;
- electricity transmission and distribution lines;

- restoration of temporary work areas.

The restoration of temporary work areas will produce a positive, although unimportant, interrelation, since it will reduce the affected area.

Important Interrelation

An important interrelation was noted with respect to the following activity:

- transport and traffic.

The potential effect associated with this interrelation is:

↳ **Disturbance**

Operations Phase

No interrelation

Several activities at the operations phase will have no interrelation with wolverine. They are:

- disposal of dewatering water;
- management of hazardous wastes;
- treatment and disposal of wastewater;
- accidents and malfunctions.

These activities will not affect the habitat of the wolverine and will create no disturbance.

Unimportant Interrelation

During the operations phase, the following activities will have an unimportant interrelation with wolverine:

- removal and storage of overburden;
- creation of waste rock piles;
- ore-drying;
- management of non-hazardous wastes;
- restoration of waste rock piles and of pits.

These activities will entail a loss of habitat, but one that must be considered as unimportant. The home range of wolverine varies between males and females, but is generally large: from 335 km^2 to 963 km^2 for males (Banci 1987; Magoun 1985; Hornocker and Hash 1981; Landa *et al*. 1998). The area affected by the Project is small in comparison. The restoration of waste rock piles and of pits will have an unimportant positive interrelation, since the areas in question are negligible compared to the home range of wolverine.

Wolverine could be affected by the management of non-hazardous waste because they could feed on it. Nevertheless, the waste management site will be properly fenced and operated to ensure that food is not left lying on the surface.

Important Interrelation

Important interrelations were noted with the following activities:

- blasting and ore-extraction;

- transport of ore and other transport or traffic;
- ore-crushing;
- ore-washing and recirculation of process water;
- storage and transport of ore by rail.

The potential effect associated with these activities is:

↳ **Disturbance**

Table 8.35 shows the relation between the Project activities and potential effects on wolverine and wolverine habitat.

Table 8.35: Potential Effect on Wolverine

Project Activities	Potential Effect
	Disturbance
Preparation/Construction	
Transport and traffic	X
Operations	
Blasting and ore-extraction	X
Transport of ore and other transport or traffic	X
Ore-crushing	X
Ore-washing and recirculation of process water	X
Storage and transport of ore by rail	X

8.1.9.2 Assessment of the Disturbance

The activities identified as potentially having an effect on wolverine are the same as those that entail noise disturbance for caribou (see Section 8.1.7), since wolverine prey on caribou.

The following standard mitigation measures will be implemented with respect to wolverine:

- management of non-hazardous wastes (SW): SW4, SW8;
- drilling and blasting (DD): DD1, DD4;
- construction equipment (CE): CE7, CE8, CE11, CE13;
- restoration (R): R1.

Importance of the Effect

The direction of this effect is “negative”. Its spatial extent is “local”, since all the activities will occur within BLSA, except for transport, which will be occurring nearby. The duration is “long”, since the disturbance will be felt throughout the life of the Project. The frequency is “continual”, since noise will be a permanent occurrence during the life of the Project.

The level of certainty is “moderate”, since wolverine are unlikely to be present in or near the BLSA except, possibly, on a very sporadic basis. The presence of wolverine cannot, however, be completely discounted, since historical observations of wolverine have been recorded.

The reversibility is “total”, since noise will cease after the end of the Project. Noise disturbance may compromise the use of the BLSA by caribou and, consequently, wolverine. The BLSA is, however, little used by caribou (Section 5.4.3.2). The magnitude is rated as “low”. The ecological value is low, since wolverine no longer play an essential role in the functioning of the ecosystem. The socio-economic value is “high”, because the species is protected by federal and provincial legislation. The overall value of the component is therefore “moderate”. Based on reversibility, magnitude and overall value, the intensity was calculated as “low”.

Considering all the above criteria, the importance of the effect is “low”.

Scientific Knowledge and Mitigation Measures

In Northern Québec and Labrador, wolverine is considered to be possibly present, although in significantly reduced numbers (Feldhamer *et al.* 2003).

The habitat used by wolverine is quite varied, extending from the boreal forest to the taiga and the tundra. Its presence is mostly linked to the abundance of prey. The Project is not expected to make migratory caribou change their migration route to avoid the BLSA, so the chances that wolverine would use the BLSA are even slimmer.

According to a variety of sources (Hatler 1989; Banci 1994; Copeland 1996), wolverine populations are more likely to survive in areas where there is little human activity. The potential of the BLSA to shelter wolverine is very low, since it has already been developed and the roads are still used by the local populations.

Given the very slim chances of finding wolverine in the BLSA, the effect of the Project on that species should be very low, if not negligible. It should be remembered that the Native people have reported very few observations of wolverine in the region. The observations recorded by Clément (Mai 2009) occurred generally further north.

No special mitigation measure will be specifically implemented for wolverine. The measures proposed to mitigate the effect of noise disturbance on caribou (see Section 8.1.7) will also be beneficial for wolverine.

Importance of the Residual Effect

By implementing the mitigation measures proposed for caribou, the frequency of the effect will be reduced from “continual” to “intermittent”. With an intermittent frequency, the importance of the effect remains “low”.

Follow-up Programme

The follow-up programme will have three components:

- baited posts will be set up within a 50-km radius of the ELAIOM and will be monitored for one year (see Envirotel 3000 inc. Février 2008);
- NML will monitor the work of the recovery team for the Eastern Canada wolverine population;

- questions about wolverines will be included in the questionnaire to be administered at five-year intervals to the First Nations (see Table 9.1).

Compensation Measures

No compensation measures will be developed.

Summary of the Effect *Disturbance*

Table 8.36 shows the various elements that contributed to the assessment of the effect *Disturbance.*

Table 8.36: Wolverine – Summary of the Effect *Disturbance*

Assessment of Importance	
Direction	Negative
Spatial extent	Local
Frequency	Continual
Duration	Long
Reversibility	Total
Level of certainty	Moderate
Intensity	Low
Importance of the effect	Low
Special Mitigation Measures • No specific measures for wolverine: same measures as for caribou	
Importance of the Residual Effect • Low	
Follow-up Programme • See Table 9.1	
Compensation Measures • None	

8.1.10 Birds at Risk and Migratory Birds

8.1.10.1 Interrelations of the Project with Birds at Risk and Migratory Birds

Preparation/Construction Phase

No Interrelation

The following activities at the preparation/construction phase have no interrelation with birds at risk and migratory birds:

- construction and improvement of access roads;
- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex area);
- railway;
- accidents and malfunctions.

These activities have little or no interrelation with migratory birds, since they have no effect on habitats used as resting or feeding areas. Migrating birds are less demanding with respect to habitat than they are at nesting time. It is highly probable that migrating birds that stop in the BLSA (see Section 5.4.3.8) during mining operations will feed and rest nearby with little disturbance.

The only important resting area for migrating birds in the BLSA is lac Pinette. According to Clément (Mai 2009), lac Pinette is a site of goose hunting in spring. This lake is at some distance from the future mining sites (the closest pit is more than 800 m away), which suggests that waterfowl may continue to use it during migrations.

According to the preliminary infrastructure plans, no nesting habitat of birds at risk will be directly affected by the work. The BRSA includes nesting habitat of the Rusty blackbird, but it will not be affected by the Project. The three other species at risk that may occur in or near the BLSA, namely the Short-eared owl, the Harlequin duck and the Peregrine falcon, do not nest there.

Finally, none of the accidents or malfunctions is likely to affect at-risk bird species.

Unimportant Interrelation

An unimportant interrelation was noted between birds at risk, migratory birds and the following activities:

- clearing and land-preparation;
- electricity transmission and distribution lines;
- transport and traffic;
- restoration of temporary work areas.

Clearing and land-preparation and the construction of the transmission line will entail a loss of habitat, but it is not considered as important because of its small area. The habitats affected by these activities are common in the BLSA and do not support a high diversity (see Section 5.4.2).

In order to comply with regulations on migratory birds, time constraints should be considered for work in the concerned habitats so that land-clearing does not take place during the nesting period (see Appendix 8.3). The effects on migratory birds will be negligible or non-existent if those time constraints are respected.

The restoration of temporary work areas will have a negligible but positive effect on at-risk birds and migratory birds, since it will allow for the reestablishment of part of the habitats lost through land-clearing.

Some of the existing roads cross wetlands, but Project-related transport and traffic will have little additional effect on at-risk birds that have already been disturbed by the existing infrastructure and traffic.

Operations Phase

No Interrelation

During the operations phase, the following activities will have no interrelation with at-risk birds and migratory birds:

- disposal of dewatering water;
- ore-washing and recirculation of process water;
- ore-drying;

- management of hazardous wastes;
- treatment and disposal of wastewater;
- accidents and malfunctions.

The presence of the infrastructure will have little effect on migratory birds: the risks of collisions with infrastructure and transmission/distribution lines are considered very low since the line length in Newfoundland/Labrador is less than 4 km.

The disposal of dewatering water, ore-washing and the recirculation of process water will have no effect on at-risk or migratory birds, since none of those activities will affect their habitat.

The disposal of hazardous wastes and wastewater will have no effect on the habitats that are most valued by birds, namely forests and wetlands.

Finally, none of the accidents or malfunctions is likely to affect at-risk or migratory birds.

Unimportant Interrelation

An unimportant interrelation was noted between the following activities and endangered birds and migratory species:

- removal and storage of overburden;
- creation of waste rock piles;
- blasting and ore-extraction;
- management of non-hazardous wastes;
- ore transport and other transport or traffic;
- ore-crushing;
- storage and transport of ore by train;
- restoration of waste rock piles and of pits.

The removal and storage of overburden and the stockpiling will entail a loss of habitat. Forty-one hectares of undisturbed habitat and 16 ha of disturbed habitat will be destroyed by these two activities (Table 8.33).

A very small part of the wetland (5.5 ha) will be destroyed by these activities. All the habitats destroyed are common both in the BLSA and the BRSA. Consequently, the activities of removal and storage of overburden and stockpiling waste rock were considered as having an unimportant interrelation with the component *Birds at risk and migratory birds*.

Blasting, ore-extraction, ore-transport and other transport or traffic, ore-crushing and transport of ore by rail will generate noise (see Section 8.1.1), but will not cause an important disturbance to birds.

Birds could be affected by the management of non-hazardous waste because they could feed on it. The waste management site will, however, be managed in such a way as not to be attractive to birds.

The restoration of waste rock piles and of pits will have a positive interrelation, since it will allow for the improvement of disturbed habitats. It will, however, be unimportant, since it will not substantially increase the usable habitat of at-risk bird species and migrating species.

In the absence of important interrelations, the analysis of the effects on birds at risk and migratory birds ends at this point. Nonetheless, surveys will be conducted every five years using the techniques described in Appendix F to test the prediction that there will be no negative effects. If effects attributable to the Project are identified, mitigation/compensation measures will be discussed with the concerned governments.

8.1.11 Fish and Fish Habitat

8.1.11.1 Interrelations of the Project with Fish and Fish Habitat and Potential Effects

Preparation/Construction Phase

No Interrelation

The following activities at the preparation/construction phase will have no interrelation with fish and fish habitat:

- construction and improvement of access roads;
- clearing and land-preparation;
- electricity transmission and distribution lines;
- transport and traffic.

None of these activities will take place close to fish habitat. No road crosses a fish habitat, and ditches excavated to channel surface run-off will not be connected to any streams.

Unimportant Interrelation

An unimportant interrelation was noted between the following activities and fish and fish habitat:

- buildings and service infrastructure (workers' camp area);
- buildings and infrastructure (processing complex area);
- railway.

According to the preliminary plans, no fish habitat will be directly affected by this work. The railway will cross no fish habitat in DSO3, but will do so at Silver Yards. The existing right-of-way for the railway includes culverts, which will need no modifications. The installation of rails and ties should not affect to any degree the fish habitat that was presumably disturbed when the infrastructure was put into place several decades ago. The construction of new roads in DSO3 will not require the crossing of watercourses, but it may generate marginal sediment production.

Other unimportant interrelations with potential positive and negative effects were noted between the following activities and fish and fish habitat:

- accidents and malfunctions;
- restoration of temporary work areas.

As discussed above, since all work areas are distant from any body of water and no crossings were found in the Project area, the likelihood of an accident or malfunction affecting fish habitat is very low. The restoration of temporary work areas will have a negligible but positive effect on fish and fish habitat by reducing run-off from temporary work areas into the watercourses and decreasing floods and suspended matter (see Section 8.1.3 and Section 8.1.4).

Important Interrelation

No important interrelation is anticipated with fish habitat.

Operations Phase

No Interrelation

During the operations phase, the following activities will have no interrelation with fish and fish habitat:

- removal and storage of overburden;
- creation of waste rock piles;
- transport of ore and other transport or traffic;
- ore-crushing;
- ore-drying;
- management of non-hazardous wastes;
- management of hazardous wastes;
- treatment and disposal of wastewater.

All these activities will take place at a sufficient distance from any fish habitat to eliminate any potential for effects. The disposal in watercourses of non-hazardous and hazardous wastes or of wastewater will not be tolerated. The management of hazardous wastes (mostly hydrocarbons and explosives) will be restricted to the areas selected for this purpose.

Unimportant Interrelation

The following activities will have an unimportant interrelation with fish and fish habitat:

- disposal of dewatering water;
- ore-washing and recirculation of process water;
- storage and transport of ore by train;
- accidents and malfunctions;
- restoration of waste rock piles and of pits.

The disposal of dewatering water will have an unimportant interrelation with fish and fish habitat, but that interrelation may be positive or negative. It may be positive, since the flow of some watercourses may be increased, which may facilitate the passage of fish into the DSO3-15 segment of Elross Creek (see Section 8.1.4). On the other hand, an unimportant negative effect may occur in one of the tributaries of lac Pinette, since the disposal of dewatering water from Timmins 4 in Timmins 6 could result in a partial drying-up of Goodream Creek. Hydrogeological modelling has, however, shown that Timmins 4 is too far (more than 600 m) and 60 m higher from lac Pinette for pumping to have an important effect on the hydrology of the watercourse.

Given that dewatering water and process water will be disposed of in Timmins 2, no suspended matter will reach any watercourse. With respect to other potential contaminants reaching the groundwater, the watershed is large enough to ensure that dilution will be sufficient to protect aquatic life at the point of resurgence, Timmins 1.

The storage of ore will be done at a safe distance (more than 100 m) from any body of water or watercourse. Run-off from the storage areas will be directed towards a sedimentation basin and will eventually be piped to Timmins 2.

The restoration of waste rock piles and of pits will have an unimportant positive interrelation with fish and fish habitat, since it will reduce the erosion of the stockpiles and pits. As the stockpiles will all be located more than 100 m from any watercourse or waterbody, the effect becomes unimportant, as mentioned in Section 8.1.3.

Important Interrelation

The following activity potentially has interrelation with fish and fish habitat:

- blasting and ore-extraction.

The potential effect generated by this activity is as follows:

➪ Fish mortality caused by blasting

Summary of Potential Effects

Table 8.37 shows the relationship between the Project and *Fish and fish habitats*.

Table 8.37: Summary of Potential Effect on Fish and Fish Habitat

Project Activities	**Potential Effects**
	Fish Mortality Caused by Blasting
Preparation/Construction	
Operations	
Blasting and ore-extraction	X

8.1.11.2 Assessment of Fish Mortality Caused by Blasting

Blasting close to watercourses could injure or kill fish and their eggs. The DSO3-3 – DSO3-6 watercourse (Figure 5.3) is the only one located close to a future pit (Timmins 3N and Fleming 7N), but surveys have shown that it contains no fish or fish habitat. The closest fish habitat is Pinette Creek, which feeds lac Pinette (Figure 5.3), but it is located 650 m from Timmins 4. The other watercourses are located too far away to experience an important effect during blasting.

The following standard mitigation measures will be applied for fish and fish habitat:

- drilling and blasting (DD): DD1, DD3, DD4, DD5, DD6, DD7, DD8, DD9, DD11, DD14, DD17, DD18, DD19.

Importance of the Effect

The direction of the effect is “negative”. Its spatial extent is “site-specific”, being limited to the area of Timmins 4. The frequency is “intermittent”, since blasting will occur on average twice weekly. The duration is “long”, since blasting at Timmins 4 will occur for three years. The level of certainty is “high”, since the effect of blasting on fish is well-documented.

The reversibility is “total”, as the effect will cease with the end of blasting. The ecological value of fish and fish habitat in the BLSA is “moderate”: only three fish species were inventoried, and no rearing areas were found. The socio-economic value is “low”: although fish play an important role in the subsistence of the Naskapis and the Innu, the BLSA is not an important fishing territory. Furthermore, NML’s workers will not be allowed to fish during working hours, which further reduces the socio-economic value. Given the “moderate” ecological value and the “low” socio-economic value, the overall value is “low”. The magnitude is rated as “low”, since only one segment of a watercourse that was confirmed as fish habitat could be affected by blasting, and the abundance of fish in that segment is low. While no rearing area was found in the BLSA, one may exist downstream of lac Pinette or in Elross Creek. Taking into account the total reversibility, the low overall value and the moderate magnitude, the intensity of the effect is rated as “low”.

Taking into account all the above criteria, the importance of the effect is deemed to be “low”.

Scientific Knowledge and Mitigation Measures

Wright and Hopky (1998) provide a mathematical formula to calculate the minimum distance required to respect the upper limit of instantaneous pressure change (*i.e.*, positive pressure) in the air bladders of fish. The upper limit is 100 kPa (14.5 psi). The calculation uses the following data:

Factor K = 5.03 (for rock)

The shortest distance from Timmins 4 to the watercourse is 650 m

$$\text{The maximum quantity of explosive to be used (kg)} = [\text{Distance (m)} / \text{Factor K}]^2$$
$$= (650/5.03)^2 = 16{,}699 \text{ kg}$$

Incorporating a minimal safety margin, the maximum quantity of explosive to be used per detonation at Timmins 4 should not exceed 15,000 kg, which can be considered to be a special mitigating measure for that site.

Importance of the Residual Effect

Given the application of the preceding special mitigation measure, the residual effect will be reduced from “low” to “nil”.

Follow-up Programme

Fish mortality should be monitored in the parts of Pinette Creek closest to Timmins 4. During the first three blasts at Timmins 4, an observer posted at Pinette Creek will observe whether there is any fish mortality. If none is observed, no further monitoring will be necessary. If mortality is observed, the charge should be reduced to a maximum of 10,000 kg, and the effect of the three subsequent blasts should be observed.

Compensation Measures

No compensation measure will be put into place, since the proposed mitigation measure will prevent any fish mortality as a result of blasting.

Summary of the Effect *Fish Mortality Caused by Blasting*

Table 8.38 shows the various elements that contributed to the assessment of the effect *Fish mortality caused by blasting*.

Table 8.38: Summary of the Effect *Fish Mortality Caused by Blasting*

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Intermittent
Duration	Long
Reversibility	Total
Level of certainty	High
Intensity	Low
Importance of the effect	Low
Special Mitigation Measures • No more than 15,000 kg of explosive should be used per detonation	
Importance of the Residual Effect • Nil	
Follow-up Programme • See Table 9.1	
Compensation Measures • Unnecessary	

8.2 Assessment of Effects on the Socio-economic Environment

For the reasons explained in Section 7.0 and Appendix 18, the present section addresses only the following socio-economic VECs:

- caribou subsistence hunting;
- local employment;
- local contracting;
- Newfoundland and Labrador benefits; and
- trapping.

The small number of socio-economic VECs meriting detailed consideration (as compared to the more than 25 addressed in Appendix 18) is consistent with our view that a small-scale project such as the ELAIOM that is located primarily in a previously disturbed area and that will be operational for a short period compared to many other iron ore mines (*e.g.*, Labrador City, Wabush, Minnesota) is unlikely to cause a large number of important socio-economic effects. It would, of course, have been possible to apply the full set of evaluation criteria set out in Section 7.0 to each of the VECs addressed in Appendix 18, but doing so would have been duplicative and inconsistent with the requirement of the Guidelines to be as concise as possible while presenting all the information required to permit informed decisions.

8.2.1 Caribou Subsistence Hunting

Preparation/Construction and Operations Phases

The sources of effects appear to us to be identical for the preparation/construction and operations phases, which will therefore be considered jointly. For the reasons explained in Section 7.5.13, the decommissioning phase will not be considered, save that certain restoration activities will be considered as part of the operations phase.

Nature: The potential effects are indirect and would arise from the loss of habitat occasioned by Project activities or from a reduction in the number of caribou in the LSEA as a result of the noise and odours generated by such activities as blasting, heavy equipment and trucks.

Tables 8.28 and 8.29 rate the importance of the residual effects of noise disturbance on caribou as “moderate”. Tables 8.30 and 8.31 rate the importance of the residual effect of destruction of caribou habitat also as “moderate”.

Another potential source of indirect effects is local hiring and contracting, which might deprive the Aboriginal workers of NML and its contractors of the time needed to hunt caribou in the LSEA. On the other hand, the increased income associated with local employment and local contracting may provide those employees with the wherewithal to purchase improved harvesting equipment or to charter aircraft for themselves or their friends and families, which might maintain or even increase subsistence hunting of caribou in the LSEA or elsewhere, especially at times, such as recent years, when caribou are rare in or absent from the LSEA.

Given that NML will adapt the work rotations and shifts of its employees to permit them to take part in traditional activities and that it will not close roads other than those in active pits or, very temporarily (maximum of twice weekly for approximately one hour per blast), those close to sites of blasting to the general public, we consider the potential for effects on the Caribou Subsistence Hunting VEC to be low.

Direction: The predominant direction of most of the foregoing effects would be “negative”, in the sense that they would result in a decline in the importance of the subsistence hunting of caribou, which, as demonstrated by the public consultation programme described in Section 6.0 and the review of the literature and the field studies described in Sections 5.4.3 and 5.5, is highly valued for economic and cultural reasons.

To the extent that there is some potential for the Project to facilitate an increase in the subsistence hunting of caribou, however, the direction of some of the associated effects could also be “positive”.

Spatial Extent: Based on Table 7.1, the effect would be "site-specific", since it would affect only activities in the LSEA.

Duration: Based on Table 7.2, the duration of the effect would be "long", since it would last throughout the life of the Project.

Frequency: Based on Table 7.3, the frequency of the effect would be "continual", since the source of effect would be operational year-round.

Magnitude: Based on Table 7.4, the magnitude of the effect would be "low", since we estimate that it would affect less than five per cent of the population in the LSEA and only a few persons in the RSEA, namely some members of ITUM. Moreover, it would affect only a tiny part of the area in which the subsistence hunting of caribou is practised.

Certainty: Based on Table 7.5, the level of certainty of the effect would be "moderate". The low importance of the LSEA for caribou hunting is reliably known, as are the effects of mining on caribou. On the other hand, we recognize the possibility of some positive effects, as described above.

Reversibility: Based on Table 7.6, the reversibility of the effect would be “partial”, for the following reasons:

- the sources of the effect would continue throughout Phase 2 of the DSOP;
- Naskapi and Innu hunters report that it took many years after the closing of the mines of the IOCC for them to be able to resume hunting in the LSEA, since it took that long for caribou to return to that area;
- if young Native persons have a reduced opportunity to hunt caribou for subsistence in the LSEA for several years, some of them may not start to do so once the source of the effect is removed.

Ecological Value: The subsistence hunting of caribou is not considered to have an ecological value. Alternatively, if it does, its ecological value is not known.

Socio-Economic Value: Based on Table 7.7, the socio-economic value of the subsistence hunting of caribou as a whole is “high” for the concerned FNs, since it is essential for health/survival. That said, the socio-economic value of the hunting of caribou in the LSEA is "low", since there are many other areas near Schefferville where caribou can be hunted, and because caribou are not available to be hunted in the LSEA on a regular or a year-round basis.

Overall Value: Based on Table 7.9, the overall value of the subsistence hunting of caribou is "low", being the same as its socio-economic value.

Effect Intensity: Based on Table 7.10, the intensity of the effect on the subsistence hunting of caribou is "low" (“low” magnitude; “partial” reversibility; “low” overall value).

Importance: Based on Table 7.11, the importance of the effect on the Caribou Subsistence Hunting VEC is "low" (“low” intensity; “site-specific” spatial extent; “continual” frequency; “long” duration).

Mitigating Measures: The preceding assessment of the importance of the effect is based on the residual effects identified in Tables 8.28 to 8.31. It therefore takes into account the mitigation measures proposed in Section 8.1.7.

We do not suggest any additional mitigation measures of a socio-economic nature.

Importance of Residual Effect: In the absence of specifically socio-economic mitigation measures, the importance of the residual effect remains “low”.

Compensation Measures: NML's objective is to negotiate IBAs with all of the FNs whose members practise the subsistence hunting of caribou in the LSEA. One objective of those IBAs will be to compensate for all of the effects of the ELAIOM, including any effects on the subsistence hunting of caribou in the LSEA. In exceptional circumstances, NML will consider making *ad hoc*, short-term arrangements with individual harvesters.

Monitoring: As described in Table 9.1, the effects of the ELAIOM on the Caribou Subsistence Hunting VEC will be included in a programme of interviews with members of the concerned First Nations to be conducted at five-year intervals using the methodology described in Appendix D.

Overview: Table 8.39 presents an overview of the effect on the Caribou Subsistence Hunting VEC.

Table 8.39: Summary of the Effect on the Caribou Subsistence Hunting VEC

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Continual
Magnitude	Low
Duration	Long
Reversibility	Partial
Level of certainty	Moderate
Intensity	Low
Importance of the effect	Low
Special Mitigation Measures • None	
Importance of the Residual Effect • Low	
Follow-up Programme • See Table 9.1	
Compensation Measures • Impacts and benefits agreements • Possibly, *ad hoc* arrangements with affected individual hunters	

8.2.2 Local Employment

NML is committed to hiring in accordance with Table 3.1 at both the preparation/construction phase and the operations phase. Consequently, the two phases will be considered together.

Preparation/Construction and Operations Phases

NML's objective for local hiring is almost identical for the preparation/construction and operations phases. The situation regarding the decommissioning phase is described in Section 8.2.1.

Nature: Local employment is limited to employment by NML and is therefore a direct effect.

Direction: Based on the desire for employment on the Project expressed by the local groups consulted (see Section 6.0), the creation of local employment is considered to be a positive effect.

Spatial Extent: Based on Table 7.1, the effect would be "site-specific", since it would by definition be limited to residents of the LSEA.

Duration: Based on Table 7.2, the duration of the effect would be "long", since it would last through the life of the Project.

Frequency: Based on Table 7.3, the frequency of the effect would be "continual", since the Project would create year-round employment.

Magnitude: Based on Table 7.4, the magnitude of the effect would be (marginally) "moderate", since NML's target of local hiring represents approximately 5.0% of the Aboriginal labour force.

Certainty: Given the characteristics of the local labour force and its apparent interest in obtaining employment, the certainty of the prediction is considered to be “high” (Table 7.5), especially since the IBAs that NML intends to conclude with the concerned FNs are expected to contain measures relating to training and employment.

Reversibility: Based on Table 7.6, the reversibility of the effect on the Local Employment VEC will be "total", since all of the jobs created will be lost when the Project comes to an end. Unlike the situation with negative effects, a high degree of reversibility of a positive effect is not a desirable characteristic.

Ecological Value: The notion of ecological value does not apply to a VEC such as employment.

Socio-Economic Value: Based on Table 7.8, the socio-economic value of the Local Employment VEC is "high", since all the local groups and persons consulted (Section 6.0) expressed a high desire for the jobs that would be created by the Project.

Overall Value: In the absence of a rating of ecological value, overall value will be considered to be the same as socio-economic value, namely "high".

Effect Intensity: Based on Table 7.10, the effect intensity will be "moderate" (“moderate” magnitude; “total” reversibility; “high” overall value).

Effect Importance: Based on Table 7.11, the importance of the effect on the Local Employment VEC will be “moderate” (“moderate” intensity; “site-specific” spatial extent; “continual” frequency; “long” duration).

Mitigating Measures: The concept of mitigation measures does not apply in the present case, since the effect is positive. NML does intend, however, that the IBAs that it hopes to conclude with the concerned FNs will contain measures designed to ensure that the desired level of hiring will be attained.

Importance of Residual Effect: The residual effect will be "moderate".

Compensation Measures: Given that the predicted effect on the Local Employment VEC is positive, the concept of compensation measures is not applicable. Indeed, the commitment on the part of NML to achieve the targets set out in Table 3.1 is itself in part a compensation measure for the other anticipated effects of the ELAIOM.

Monitoring: As noted in Table 9.1, monthly, quarterly and annual reports on local employment will be prepared. If the target of local hiring has not been attained, the reports will strive to explain why, and NML will do its best to eliminate those causes.

Overview: Table 8.40 presents a summary of the effect on the Local Employment VEC.

Table 8.40: Summary of the Effect on the Local Employment VEC

Assessment of Importance	
Direction	Positive
Spatial extent	Site-specific
Frequency	Continual
Magnitude	Moderate
Duration	Long
Reversibility	Total
Level of certainty	High
Intensity	Moderate
Importance of the effect	Moderate
Special Mitigation Measures • Not applicable	
Importance of the Residual Effect • Moderate	
Follow-up Programme • See Table 9.1	
Compensation Measures • Not applicable	

8.2.3 Local Contracting

Given the lack of space for expansion in Schefferville (see Section 5.5.6.1) the local companies available to accept contracts are expected to be substantially identical at both the preparation/construction and the operations phases, since there is little space in which new companies could establish themselves. Consequently, the two phases will be considered simultaneously. The situation of the decommissioning phase is described in Section 8.2.1.

Preparation/Construction and Operations Phases

<u>Nature</u>: Local contracting refers to local contracts as contemplated in Section 3.2.2. It is a direct effect.

<u>Direction</u>: Based on the desire for increased employment and income expressed by all of those consulted locally (see Section 6.0), the awarding of contracts to local companies is considered to be a positive effect.

<u>Spatial Extent</u>: Based on Table 7.1, the effect would be "site-specific", since it would by definition be limited to the LSEA.

<u>Duration</u>: Based on Table 7.2, the duration of the effect would be from "short" to "long", since some contracts might last for the life of the Project, and others might be in effect only for a part of it, such as the preparation/construction phase.

<u>Frequency</u>: Based on Table 7.3, the frequency of the effect would be “intermittent” to “continual”, since some of the contracts might be year-round and others might be seasonal.

<u>Magnitude</u>: In the case of the Local Contracting VEC, magnitude could refer either to the number of contracts awarded to local companies or to their monetary value. In either case,

based loosely on Table 7.4, the magnitude is likely to be “low”, since there are relatively few companies based in the LSEA (see Tables 5.46, 5.47 and 5.48), and their capacity to undertake large contracts is limited. In any case, NML’s commitment is to award a very high percentage of contracts at both the preparation/construction and operations phases to companies and individuals based in Newfoundland and Labrador.

It is true that local groups, individuals and companies might create joint ventures with third parties from outside the Schefferville area once the ELAIOM is confirmed, but awarding contracts to such joint ventures would not count as local contracting as defined herein.

Certainty: Based on Table 7.5, the level of certainty would be “high”, since NML’s experience since 2005 has demonstrated that there are local companies capable of performing to a satisfactory standard.

Reversibility: Based on Table 7.6, the reversibility of the effect on the Local Contracting VEC will be “total”, since there will be no contracts upon the termination of the ELAIOM. As noted for the Local Employment VEC, the full reversibility of a positive effect is not a desirable characteristic. The experience gained by local companies working for NML might, however, assist them in getting other contracts in the Schefferville area or elsewhere.

Ecological Value: The notion of ecological value does not apply to a VEC such as local contracting.

Socio-Economic Value: Based on Table 7.8, the socio-economic value of the Local Contracting VEC will be ”high”, since all local groups and persons consulted expressed the desire for employment and contracts (see Section 6.0).

Overall Value: in the absence of a rating of ecological value, overall value will be considered to be the same as the socio-economic value, namely “high” (Table 7.9).

Effect Intensity: Based on Table 7.10, the effect intensity will be "moderate" (“low” magnitude; “total” reversibility; “high” overall value).

Effect Importance: Based on Table 7.11, the importance of the effect on the Local Contracting VEC will be "low" to "moderate" (“moderate” intensity; “site-specific” spatial extent; “intermittent” or “continual” frequency; “short” to “long” duration).

Mitigating Measures: The concept of mitigating measures does not apply in the present case. Businesses belonging to the concerned FNs are, however, likely to benefit from the provisions relating to contracting that are likely to be found in the IBAs that NML hopes to conclude with them.

Importance of Residual Effect: The residual effect is predicted to be "low" to "moderate".

Compensation Measures: Given that it is not feasible to set targets for the number or value of contracts to be awarded locally and given that local contractors do not have any right to be awarded contracts, the notion of compensation measures does not really apply.

In order to ensure the continuing social acceptability of the ELAIOM and in the hope of enhancing its economic viability (based on the hypothesis that local companies that are not required to mobilize and demobilize should be cheaper than outside companies), NML would like local companies to receive contracts proportionate to their size, skills and experience.

If NML feels that local companies are not receiving a satisfactory number or value of contracts, it would consider initiating measures to improve their chances, such as breaking large contracts down into smaller units ("unbundling") and providing training and assistance with bid-preparation.

Monitoring: As noted in Table 9.1, local contracting will be addressed in the monthly, quarterly and annual reports.

Overview: Table 8.41 presents a summary of the effect on the Local Contracting VEC.

Table 8.41: Summary of the Effect on the Local Contracting VEC

Assessment of Importance	
Direction	Positive
Spatial extent	Site-specific
Frequency	Intermittent or continual
Magnitude	Low
Duration	Short to long
Reversibility	Total
Level of certainty	High
Intensity	Moderate
Importance of the effect	Low to moderate
Special Mitigation Measures • Not applicable	
Importance of the Residual Effect • Low to moderate	
Follow-up Programme • See Table 9.1	
Compensation Measures • Unbundling contracts • Training/assistance with bid-preparation	

8.2.4 Newfoundland and Labrador Benefits

An evaluation of the effect on the Newfoundland and Labrador Benefits VEC based on a 10-year analysis using the econometric modelling of Locke and Strategic Concepts Inc. (April 6, 2009) concluded that the importance of the residual effect over the 10-year period would be "very high".

Given that the employment and contracting benefits flowing to PNL Residents, PNL-based Suppliers and the GNL at both the construction and the operations phases of the ELAIOM (Table 3.1) pursuant to the Newfoundland and Labrador Benefits Plan (Section 3.2.2.2) will be higher than those calculated over a 10-year period, the importance of the effect on the Newfoundland and Labrador Benefits VEC flowing solely from the ELAIOM (*i.e.*, Phase 1, Assessment Group 1a (Table 1.0)) will also be "very high".

In the absence of econometric modelling, however, it is not possible to quantify the effect using the criteria described in Section 7.5.2.

As noted in Section 3.2.2, precise hiring initiatives addressing such groups as journeypersons, apprentices and engineering/technology students will be addressed in the NLBP. Opportunities for under-represented groups will be addressed during the preparation phase. The employment of members of First Nations will be addressed in the proposed IBAs.

8.2.5 Trapping

Given that the sources of effects will be essentially identical for the preparation/construction and the operations phases, they will be considered simultaneously. The situation relating to the decommissioning phase is described in Section 8.2.1.

Nature: The potential effects are both direct and indirect, arising from the loss of habitat occasioned by Project activities or from a reduction in the number of fur-bearers in the LSEA as a result of the noise, odours and other disruptions generated by such activities as blasting and the operation of heavy trucks and equipment.

Section 8.1.8 predicted a “low” residual negative effect on the Harvested Mammals VEC, which includes several species that are trapped.

As was hypothesized for the Caribou Subsistence Hunting VEC, local hiring and contracting may also be sources of indirect effects to the extent that they deprive persons who would otherwise have been trapping in the LSEA of the time to do so.

In the case of the Caribou Subsistence Hunting VEC, we noted that individuals unable to hunt because they were working might use their extra income to subsidize family or friends to harvest caribou on their behalf. That may be less the case for trapping, since trapping is a more territorially restricted activity than hunting, being practised by families on the traplines that "belong" to them, although that pattern may be declining in importance (Clément Mai 2009: 6.3.6) (Appendix D).

Direction: Effects that reduce the intensity of trapping are considered to be negative given the social, cultural and economic importance of trapping, even though its economic importance has probably declined greatly in recent decades.

Spatial Extent: Based on Table 7.1, the effect would be "site-specific", since it would affect only populations and activities in the LSEA.

Duration: Based on Table 7.2, the duration of the effect would be "long", since it would last for the duration of the Project, or even longer.

Frequency: Based on Table 7.3, the frequency of the effect would be "continual", since its sources would be operational throughout the trapping season.

Magnitude: Based on Table 7.4, the magnitude of the effect would be "low", since it would affect less than five percent of the population of the LSEA and only one or two of the 126 traplines in the RSEA (Figure 5.56).

Certainty: Based on Table 7.5, the level of certainty of the prediction is "high" given the abundance of data collected by Weiler (January 2009) (Appendix K) and Clément (Mai 2009) (Appendix D) and the analysis of the effects on harvested mammals presented at Section 8.1.8.

Reversibility: Based on Table 7.6, the reversibility of the effect is considered to be “partial”, for the following reasons:

- despite NML’s planned measures to restore damaged and lost terrestrial habitats, some losses (*e.g.*, areas of abandoned pits, which will fill with water) will be permanent and other habitats may never recover their full original suitability for fur-bearers or may recover it only slowly;

- trappers who lose the opportunity to trap in the relevant portion of the LSEA for over a decade may start to trap elsewhere or may abandon trapping altogether;
- young persons who would have been taught to trap in the relevant portion of the LSEA may gain no attachment to that portion of the LSEA or may never learn to trap.

Ecological Value: Trapping is not considered to have an ecological value in the sense in which that term is employed in this EIS.

Socio-Economic Value: Based on Table 7.8, we consider the contemporary socio-economic value of trapping in the LSEA to be "moderate". The rating balances the fact that trapping no longer appears to be essential for social, cultural or economic purposes against the fact that the traplines in question do have regulatory recognition by governments and by the Innu.

Overall Value: In the absence of an ecological value, the overall value (Table 7.9) of the Trapping VEC is the same as its socio-economic value, namely "moderate".

Effect Intensity: Based on Table 7.10, the intensity of the effect on the Trapping VEC will be "low" (“low” magnitude; “partial” reversibility; “moderate” overall value).

Effect Importance: Based on Table 7.11, the importance of the effect on the Trapping VEC will be "low" (“low” intensity; “site-specific” spatial extent; “continual” frequency; “long” duration).

Mitigation Measures: No mitigation measures other than those described in Section 8.1.8 are planned.

Importance of Residual Effect: In the absence of additional mitigation measures, the importance of the residual effect will be "low".

Compensation Measures: NML anticipates that the IBAs that it intends to sign with the concerned FNs will serve, among other things, to compensate the affected families and trappers and to render the ELAIOM acceptable to them. In exceptional circumstances, NML might consider additional, *ad hoc* arrangements with affected individuals.

Monitoring: As described in Table 9.1 trapping will be addressed in the five-year surveys of harvested mammals.

Overview: Table 8.42 presents a summary of the effect on the Trapping VEC.

Table 8.42: Summary of the Effect on the Trapping VEC

Assessment of Importance	
Direction	Negative
Spatial extent	Site-specific
Frequency	Continual
Magnitude	Low
Duration	Long
Reversibility	Partial
Level of certainty	High
Intensity	Low
Importance of the effect	Low
Special Mitigation Measures • None	
Importance of the Residual Effect • Low	
Follow-up Programme • See Table 9.1	
Compensation Measures • Impacts and benefits agreements • Possibly, *ad hoc* arrangements with affected individuals	

8.3 Cumulative Effects

> "We have come to the conclusion at this time that the promise and the practice of cumulative effects assessment are so far apart that continuing the kinds and qualities of cumulative effects assessment currently undertaken in Canada is doing more damage than good."
>
> Duinker and Greig (2006).

As explained in Section 7.7, the present section will address only the potential cumulative effects of important (often referred to as "significant") effects, namely the Air Quality VEC and the Newfoundland and Labrador Benefits VEC.

Nevertheless, we shall also offer some other comments relating to cumulative effects relating primarily to the projects listed in Table 7.12 and under reserve of the limitations listed in Section 7.7.

8.3.1 Air Quality VEC

The only reasonably foreseeable project that has the potential for cumulative effects on air quality with the ELAIOM is the Schefferville Area Iron Ore Mine of LIM, which is approximately 3 km south-west of Schefferville.

Table 8.43 shows the evaluation of the cumulative effects on air quality of those two projects for the Ville de Schefferville, which is the only receptor where quantifiable cumulative effects could be measured. The data on the atmospheric emissions of the Schefferville Area Iron Ore Mine were taken from LIM (December 19, 2008).

The results show that the maximum concentrations estimated at receptors located in Schefferville are all below the ambient air quality standards defined by the GoQ. The cumulative effect is therefore considered as unimportant.

Table 8.43: Evaluation of the Cumulative Effects - Estimated Maximum Concentrations

Receptor	Pollutant	Period	Results				Air Quality Standards (GoQ) (1)	% in Relation to Standard
			Estimated Background conc.(1) (µg/m³)	Max. conc. LIM (µg/m³)	Max. conc. ELAIOM (µg/m³)	Total conc. (µg/m³)		
Schefferville	TPM	1 y	15	0.4	0.23	15.6	70	22%
		24 h	15	10.3	3.5	28.8	150	19%
		1 h	15	48	41.1	104.1	--	--
	PM10	24 h	10	6.5	1.5	18.0	--	--
		1 h	10	31.5	13.1	54.6	--	--
	PM2.5	24 h	5	1.7	0.57	7.3	--	--
		1 h	5	7.6	2.4	15.0	--	--
	SO_2	1y	5	0.2	0.01	5.2	52	10%
		24 h	5	5.2	0.36	10.6	288	3.7%
		3 h	5	17.9	1.2	24.1	--	--
		1 h	5	19.3	2.3	26.6	1310	2.0%
	NO_2	1 y	3.8	0.8	0.02	4.6	103	4.5%
		24 h	3.8	20.2	1.2	25.2	207	12%
		1 h	3.8	75.5	8.9	88.2	414	21%
	CO	8 h	114	18.8	0.3	133.1	15 000	0.89%
		1 h	114	33.0	1.5	148.5	34 000	0.44%

(1) Reference: *Regulation respecting the quality of the atmosphere (Q-2, r.20),* Section 6 Air quality standards.

8.3.2 Newfoundland and Labrador Benefits VEC

An analysis of the cumulative effect of several of the projects identified in Table 7.12 on the Newfoundland and Labrador Benefits VEC based on 10-year econometric modelling (Locke and Strategic Concepts April 6, 2009) concludes that there will be a modest but positive cumulative contribution to the Newfoundland and Labrador Benefits VEC.

Based on the three-year analysis presented in Section 8.2.4, we believe that that conclusion still stands.

8.3.3 Varia

8.3.3.1 Sedentary Caribou

Table 7.12 listed the following projects with which the ELAIOM might interact to produce cumulative effects on sedentary caribou:

Current Projects: the IOCC in Labrador City; Wabush Mines' Scully Mine; Québec Cartier Mining, Mount Wright and Fire Lake mines; Bloom Lake Iron Ore Mine.

Reasonably Foreseeable Projects: Labrador Iron Mines Limited, Schefferville Area Iron Ore Mine.

Hypothetical: LabMag Iron Ore Project; KéMag Project.

D’Astous and Trimper (June 2009, *in preparation*) concluded that it is not known whether sedentary caribou are present in the general vicinity of the ELAIOM.

Section 8.1.7 concluded that the importance of the residual effects of noise disturbance and destruction of habitat on sedentary caribou would be “moderate”.

For its part, LIM (December 19, 2008: Table 6.12) concluded that there would not be any “significant” cumulative effect on caribou between the Schefferville Area Iron Ore Mine and the ELAIOM. Its analysis was, however, based on the assumption that only migratory caribou were present in the 10,000-km^2 Assessment Area.

The most comprehensive assessment of cumulative effects on sedentary caribou was that carried out for the Bloom Lake Iron Ore Mine (Génivar Décembre 2006). It focused on the effects of mining and hydroelectric projects after 1960, taking into account also the effects of hunting and natural disturbances and habitat-protection initiatives over an area of 59,000 km^2 centred on the mine.

Génivar (Décembre 2006) concluded that the Bloom Lake Project would result in the loss of approximately 25 km^2 of good habitat for sedentary caribou, but that the few individuals using that area (an average population density of less than one caribou per 100 km^2 was cited) could easily relocate to other good habitats.

The cumulative effect related to disturbance was also considered to be minimal, since the Bloom Lake mine is located in an area that already contains several sources of disturbance, including the mine at Mount Wright and Highway 389.

As far as we can ascertain, LIM (December 19, 2008) does not identify the area of habitat that would be lost as a result of the Schefferville Area Iron Ore Mine or evaluate its suitability for caribou.

The ELAIOM will result in the loss of only approximately 94 ha of terrestrial habitat, none of which is good habitat for sedentary caribou. It too is in an area where there have been and continue to be numerous sources of disturbance.

Even if the planned genetic analyses (see D’Astous and Trimper June 2009, *in preparation*) or NML’s planned monitoring (see Section 8.1.7 and Table 9.1) reveal the presence of sedentary caribou near the site of the ELAIOM, we believe that the potential for important cumulative effects on them is very small.

8.3.3.2 Rail Transportation of Ore

Section A18.19 demonstrated that the three concerned railways have the capacity to transport the DSO product that will be produced by the DSOP. There is, therefore, no potential for adverse cumulative effects in that regard.

The issue remains open, however, regarding the potential cumulative effect on the economic viability on the rail transporters in question arising from planned increased production by the IOCC and Wabush Mines and new production by CLM, LIM and NML.

The tariffs that CLM, LIM and NML will be paying are either not established or not publicly known. Nor is information on the financial performance of the concerned rail carriers in the public domain.

Table A18.1 permits the following conclusions:

- the weight of ore transported by TSH will increase from 0 to approximately 6 Mt/y;

- the weight of ore transported by QNS&LR will increase from approximately 23 Mt/y to approximately 45 Mt/y, an increase of approximately 95%;
- the weight of ore transported by the Wabush Lake Railway Company will increase from approximately 6 Mt/y to approximately 20 Mt/y, an increase of approximately 300%.

Even if the revenues to be generated for the rail carriers are not known, it is clear that the cumulative effect will be important for all of them, but particularly for TSH, which currently does not transport any ore at all, and for the Wabush Lake Railway Company. In all cases, the cumulative effect will be positive.

8.3.3.3 Availability of Workers

Section A18.21 concluded that NML need not anticipate any particular difficulty in recruiting the employees that it needs. That conclusion took into account available knowledge about the construction labour force of the Lower Churchill Hydroelectric Project.

Construction of the Bloom Lake Iron Ore will be complete by the time that construction of the ELAIOM starts. The direct labour force at the operations stage will be approximately 250 persons (Génivar Décembre 2006).

It is not certain whether the Schefferville Area Iron Ore Mine will be under construction or in operation when construction of the ELAIOM starts. The number of direct employees during the preparation/construction phase will be approximately 100, while that at the operations phase will be approximately 65 (LIM December 19, 2008).

Given the size of the concerned labour forces and the unemployment rates (Tables 5.58 and 5.59), there seems to be no realistic possibility of an important cumulative effect on the Availability of Workers VEC.

8.3.3.4 Subsistence Hunting and Trapping

The relevant conclusions of Section 8.0 are as follows:

- a low residual effect on harvested mammals at the preparation/construction and operations phases (Section 8.1.8);
- no potential for important effects on migratory birds at the preparation/construction and operations phases (Section 8.1.10);
- no residual effect on fish and fish habitat at DSO3 (Section 8.1.11);
- a low residual effect on caribou subsistence hunting (Section 8.2.1);
- a low residual effect on trapping (Section 8.2.5).

The relevant conclusions of Appendix 18 are as follows:

- no potential for an important effect on subsistence fishing (Section A18.7);
- no potential for an important effect on access to the territory for traditional activities (Section A18.24);
- no potential for an important effect on the quality of berries and medicinal plants (Section A18.27);
- no potential for an important effect on goose hunting at lac Pinette (Section A18.28);
- no potential for an important effect on small game hunting along main roads (Section A18.29).

For reasons of proximity, the only one of the current or reasonably foreseeable projects listed in Table 7.12 that might interact with the ELAIOM to produce a cumulative effect on subsistence hunting and trapping is the Schefferville Area Iron Ore Mine.

LIM (December 19, 2008) does not, however, list subsistence hunting or fishing or traditional activities as a VEC. Consequently, it presents no data about effects on those activities.

In the light of the foregoing, nothing can be said about the potential for cumulative effects on subsistence hunting and trapping.

8.4 Effects of the Environment on the Project

As explained in Section 4.5, the principal effect of the environment on the ELAIOM was that it dictated the division of the DSOP into two phases: Phase 1 was defined in large part by the environmental criterion of location within disturbed areas. It also dictated the siting of the infrastructure so as to use to the fullest extent areas that were already disturbed.

The other effects of the environment on the ELAIOM were as follows:

- the freezing temperatures in winter dictated the need to dry the ore before transportation at that season;
- the existence of abandoned pits that are not fish habitat guided the strategy for disposing of tailings;
- the social environment of the Schefferville area influenced the decision to locate the workers' camp some 20 km from the town;
- the wet and cold climate led to the decision in principle to locate certain infrastructure in buildings;
- the constant winds motivated the decision to reduce the extent of atmospheric pollution by locating some of the ore stockpiles under cover;
- the fact that water from Timmins 1 feeds the fish habitat of Elross Creek led to the decision to take water from one of the dewatering wells at the Timmins 3N pit rather than from Timmins 1;
- the high water content in the ore bodies led to the decision to use emulsion rather than ANFO as an explosive, thereby reducing the likelihood of contaminating the ore with ammonia.

In the light of the data presented in Section 5.3.2.6, especially the finding of Tremblay *et al*. (2006), the influence of global climate change on a project as short as the ELAIOM is not considered. That decision was influenced by the fact that the tailings and effluents will be disposed of in Timmins 2. Had the plan been to dispose of them in a structure that might have been vulnerable to warming conditions, our decision would have been different.

Since all structures and infrastructure will be designed and built to conform to applicable codes, we do not consider it helpful to consider the effects of extreme weather events, since the codes in question allow for them.

In the light of Section 5.3.8, seismicity is not considered to be an important source of environmental effects on the Project.

9.0 MONITORING AND FOLLOW-UP AND EMERGENCY RESPONSE/ CONTINGENCY PLAN

9.1 Monitoring and Follow-up

The Guidelines (GNL December 12, 2008) differentiate between compliance, effectiveness and effects monitoring. The latter two are captured in the definition of "follow-up programme" in the CEAA:

" " follow-up programme" means a programme for

a) verifying the accuracy of the environmental assessment of a project, and

b) determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the project."

The purpose of compliance monitoring is to ascertain whether applicable legislative measures have been respected and whether the commitments made in the EIS or in related documents, such as IBAs, have been respected.

NML will ensure compliance monitoring in several ways:

- through the application of the standard mitigating measures listed in Appendix 5;
- through the reporting requirements that form part of the permits and other authorizations that it requires from the GNL or other jurisdictions;
- through the work of its environment, health and safety staff, who will prepare quarterly and annual reports for its Board, which reports will be shared (subject to issues of confidentiality and commercial sensitiveness) with governments and other concerned parties;
- through the reporting mechanisms that it anticipates will be built into the authorization of the ELAIOM.

Consequently, compliance monitoring will not be addressed further.

The purpose of effectiveness monitoring is to evaluate the degree to which the mitigating measures applied attained their objectives.

The purpose of effects monitoring is to ascertain whether predicted effects actually occurred and whether, alternatively or additionally, effects that were not predicted occurred.

Table 9.1 illustrates some of the probable major components of the effectiveness and effects monitoring programme that will be formulated in detail upon the approval of the Project.

Table 9.1: Monitoring Programme

Valued Ecosystem Component	Activity	Objective
Air Quality	Sampling for TPM and PM10 at workers' camp over 1-2 months during mining at Timmins 3N.	To test the prediction of a moderate negative effect on air quality at the workers' camp when operations are ongoing at the site nearest to it. Consideration will be given to continuing the monitoring depending on the results of the first monitoring.
Noise	*Without Blasting* Monitor noise at workers' camp during day and night. Monitor the noise emitted by the generator fitted with the energy-recovery system during the first days that it is in operation. *With Blasting* Maintain record of blasting data (vibration speed, ground vibration frequency, air pressure, dynamiting patterns).	*Without Blasting* To test the prediction of no important effects, with particular reference to the workers' camp. *With Blasting* To test the prediction of no important effects.
Water Quality	*Surface Water* Periodic (three times yearly) monitoring of water quality parameters (temperature, pH, conductivity, oxygen, turbidity and previously analyzed metals) using the techniques described in AMEC (January 2009) and other appropriate techniques. Sampling stations: Timmins 1, 2 and 6; tailings/effluent pipeline between processing complex and Timmins 2; Elross Creek; Goodream Creek. *Groundwater* Parameters described for surface water, plus nitrates and metals, will be sampled in at least four observation wells three times yearly and in the drinking water well six times yearly.	*Surface Water and Groundwater* To test the prediction of low importance of residual effect. If higher than predicted levels of contaminants are found, mitigation measures will be implemented.
Water Budget	*Localized Drying-up* Read piezometers monthly. Monitor flow-gauging stations in DSO3-13 and DSO3-14.	To test the predictions of moderate effects on localized drying-up and on modulation of water regimen.

Valued Ecosystem Component	Activity	Objective
	Modulating Water Regimen Monitor fluctuations in level of Timmins 1.	
Surficial Deposits	Field visits during removal of substrate and topsoil. Annual inspection of storage sites.	To ensure that area disturbed does not exceed the area predicted. To ensure storage conditions are respected.
Wetlands	*Loss of Wetlands* Field visits to check that area of wetland destroyed does not exceed the area predicted. Annual inspection to evaluate success of relocating wetland. *Drying-up of Wetlands* Install piezometers in two wetlands near Timmins 4 to monitor water content and drainage.	To test the predictions of moderate loss of wetlands and moderate localized drying-up.
Migratory and Sedentary Caribou	*Noise Disturbance* Migratory: Financial contribution to population monitoring by government/academia in exchange for results. Participation in CARMA. Sedentary: Helicopter-based survey in spring of every fourth year over a 50-km radius, including collection of samples, for genetic analysis and satellite collaring. *Ad hoc* collection of samples for genetic analysis from Native hunters and outfitters' clients. *Loss of Habitat* Migratory/Sedentary: Monitoring of losses of habitat of sedentary caribou. The results of other surveys will also be reviewed.	To ascertain if sedentary caribou are present in the vicinity of the ELAIOM, especially during the calving season. To test the predictions of moderate residual effects from noise disturbance and destruction of habitat on migratory and sedentary caribou. Note: The schedule of helicopter-based surveys assumes that Phase 2 (Assessment Group 2b) (Table 1.0) proceeds.
Harvested Mammals	Hunting and trapping success by the concerned FNs will be monitored at five-year intervals using the techniques described in Appendix D. Results of monitoring of losses of habitat of sedentary caribou will be	To test the prediction that the residual effect on harvested mammals will be low. To obtain indirect insights into the health of mammal populations. If declines in catches are identified, efforts will be made to determine

Valued Ecosystem Component	Activity	Objective
	employed. The results of government surveys and of scientific studies will also be reviewed.	if they are attributable, in part or in whole, to the ELAIOM. If they are, an effort will be made to identify mitigation or compensatory measures. Note: Monitoring will occur in Year 5 of Phase 1, which foresees two years for preparation/construction and three years for operations. Monitoring will continue at five-year intervals should Phase 2 (Table 1.0) proceed.
Wolverine	Baited posts will be set up within a 50-km radius of the ELAIOM every five years and will be monitored for one year (see Envirotel 3000 inc. Février 2008). The work of the recovery team for the Eastern Canada wolverine population will be monitored. Wolverines will be included in the interviews with the concerned FNs.	To test the view that wolverines are very rare in or absent from the vicinity of the ELAIOM. If wolverines are identified in the vicinity of the ELAIOM, appropriate measures will be discussed with the recovery team and the concerned governments and FNs. Note: See “Note” for Harvested Mammals above.
Birds	Surveys will be conducted every five years using the techniques described in Appendix F.	To test the prediction that there will be no negative effects on at-risk or migratory species. If effects are identified and can be attributed to the ELAIOM, mitigation or compensatory measures will be discussed with the concerned governments. Note: See “Note” for Harvested Mammals above.
Fish and Habitat	Visual inspection for post-blasting fish mortality in Pinette Creek.	To test the prediction of no effect on fish near Timmins 4.
Caribou Subsistence Hunting	This VEC will be addressed in the five-year surveys of harvested mammals described above.	To test the prediction that the Project will not cause an important decline in the number of caribou killed for subsistence purposes. If an important decline is observed and can reasonably be attributed, at least in part, to the ELAIOM, an effort will be made to

Valued Ecosystem Component	Activity	Objective
		identify compensatory measures, such as subsidizing the cost for hunters to travel to another area or organizing community hunts. Note: See "Note" for Harvested Mammals above.
Local Employment	Monthly, quarterly and annual reports on place of residence, ethnic affiliation and gender of all employees at the mine site will be prepared.	To identify whether the target of local hiring at each of the construction and operations phases has been reached. If not, an understanding of the reasons will be sought. If appropriate, measures to increase local hiring will be implemented.
Local Contracting	Will be addressed in the reports on local employment mentioned above.	No target for local contracting could be established. The question to be asked will be whether there are local contractors who have tried to obtain contracts, but who have failed. If there are, efforts to identify causes and solutions (*e.g.*, unbundling of contracts, assistance in preparing bids) will be implemented on a case-by-case basis.
Newfoundland and Labrador Benefits	The monthly, quarterly and annual reports described in the NLBP will identify the benefits (employment, contracting, taxes, royalties) flowing to Newfoundland and Labrador.	To ascertain whether the levels of employment and contracting predicted in Section 3.2.2 have been attained. If not, an attempt will be made, guided by Appendix 3, to identify the reasons and to implement corrective measures.
Trapping	Trapping will be addressed in the five-year surveys of harvested mammals.	To test the prediction that the Project will not cause an important decline in the number of animals trapped. If an important decline is observed and can reasonably be attributed, at least in part, to the ELAIOM, an effort will be made to identify compensatory measures. Note: See "Note" for Harvested Mammals above.
Family and Interpersonal Relationships	NML' s human resources personnel will work individually	To evaluate to what extent commuting creates or aggravates

Valued Ecosystem Component	Activity	Objective
	with employees who commute to identify problems relating to family and interpersonal relationships. Subject to issues of confidentiality, examples of problems and solutions will be addressed in the annual report described above.	problems relating to family or interpersonal relationships. Mitigation or compensatory measures will be identified on a case-by-case basis.
Community Cohesion	The effects of the ELAIOM on community cohesion will be monitored at five-year intervals. Note: See "Note" for Harvested Mammals above.	To test the prediction of no important effects, if required.
Maintenance of Community Populations	The monitoring for local employment, local contracting and Newfoundland and Labrador benefits will collect data on the place of residence of employees. Those data will be analyzed every fifth year for changes of residence that might indicate an important effect on this VEC. Note: See "Note" for Harvested Mammals above.	To test the prediction of no important effects.
Gender Equity	The reports on local employment and Newfoundland and Labrador benefits will address also gender issues. Prepare and implement an employment equity/women's employment plan before start of construction; monitor implementation of plan yearly.	To ascertain whether the commitments made in the employment equity plan (Appendix 19) have been respected. If not, methods of achieving them will be identified, and implemented.
Caribou Sport Hunting	Annual discussion with the four outfitters in Section 5.5.7.3 to discuss any perception of effects of ELAIOM on their business.	To test the prediction of no effect on their caribou-hunting activities.
Local Infrastructure and Services	Annual meetings with Schefferville Administrator, airport manager, health and social services personnel. Maintain regular contact with CSSS de l'Hématite, which administers the Schefferville Dispensary.	To test the prediction of no important effects.
Road Safety	NML's security personnel will record all accidents and compile	To test the prediction of no effect on this VEC.

Valued Ecosystem Component	Activity	Objective
	an annual report.	
Maintenance of Social Stability	Maintain a register of "incidents" involving non-Native workers and local persons. Monitor appearances before itinerant court.	To test the prediction of no important effects.
Maintenance of Local Labour Forces	The number of former employees of the NNK and the NIMLJ hired for the ELAIOM will be recorded annually in the report on local employment.	To evaluate whether the ELAIOM has an important effect on this VEC.
Other	Annual meetings will be held with all levels of government, the concerned FNs, communities, concerned individuals and other organizations.	To identify issues not related to the VECs described above and, where appropriate, to identify and implement mitigating and compensatory measures.

The concept of adaptive management was first proposed by Holling (1978). Based on the recognition of uncertainty and the likelihood that the unexpected will happen, it recommends flexibility in the management of effects based on the collection of data on the actual effects of a project. NML will take such an approach.

9.2 Emergency Response/Contingency Plan

Upon the approval of the ELAIOM, an ERCP will be prepared in time for the start of the preparation/construction phase. It will be based on a thorough analysis of hazards and identification of risks and will respect the philosophy and provisions of NML's emergency preparedness policy (Appendix 21). It will be submitted to the GNL for approval.

The ERCP will describe procedures to mitigate the effects of accidents and malfunctions and natural disasters.

Provisionally, the ERCP will be divided into two main sections, one for natural disasters, the other for technological failures, accidents and deliberate acts.

The section on natural disasters will address such events as severe weather (including unusually prolonged hot and cold spells, lightning, flooding, ice storms), forest fires and earthquakes.

The section on technological failures, accidents and deliberate acts will probably address:

- train derailments between M353 and Timmins 1;
- vehicle/equipment accidents (including such accidents on roads and in pits);
- prolonged power outages;
- blockage of main access road;
- spill of chemicals or hydrocarbons (especially at the storage area near Timmins 1);
- fire;
- explosion (explosives factory, magazines, pit, between M353 and Timmins 1);

- civil unrest or terrorism;
- contamination of drinking water;
- medical emergencies;
- discovery of archaeological/heritage/palaeontological materials;
- wall failures in pits;
- prolonged breakdown of pit-dewatering pumps;
- wildlife encounters.

The response portion of the ERCP will describe procedures for responding to each of the above categories. It will undoubtedly address, among other things:

- on-site personnel, resources and equipment;
- personnel, resources and equipment available in the Schefferville/Kawawachikamach area;
- mine-related expertise, resources and equipment available elsewhere in the RSEA, with particular reference to Labrador City/Wabush and Fermont for assistance with mine-related incidents and to QNS&LR for assistance with railway-related accidents;
- contact information for all individuals and agencies needing to be informed.

The first-aid station to be located in the mine dispatch (see Section 4.10.4.5) will play a critical role, as will the communications systems (see Section 4.10.4.22). Redundancy was built into the communications system in the event of emergencies.

Essential materials for responding to accidents will be stored throughout the site at strategic locations.

10.0 ENVIRONMENTAL PROTECTION PLAN

10.1 Purpose

An EPP serves as a tool in attaining the proponent's goals and objectives in terms of environmental management. It is a practical document that consolidates all the measures that are to be applied in the field to ensure the protection of the environment. In brief, an EPP:

- describes the corporate policy and commitments towards environmental protection;
- sets out the roles of those who are responsible for implementing and updating the EPP;
- outlines, for each major activity of each Project phase, the specific measures that will be applied to ensure the proper implementation of the mitigation, monitoring, contingency planning, health and safety, and permitting programmes;
- provides a method for assessing the performance of the Project staff and contractors in applying the EPP; and
- presents the documentation and reporting processes that are to be followed.

10.2 Content

The EPP will be a comprehensive document that will be subdivided into sub-EPPs addressing each Project component by phase (preparation/construction; operations; decommissioning). Its principal components can be summarized as follows:

- distribution record;
- table of contents;
- introduction and organization of EPP;
- implementation officers and their roles/responsibilities;
- corporate environmental policy;
- Project layout and development;
- potential environmental effects;
- standard environmental protection/mitigation measures (see Appendices 8.3 and 5);
- specific environmental protection/mitigation measures (see Section 8.0);
- environmental effects monitoring and follow-up (see Section 9.0);
- regulatory compliance monitoring (see Section 9.0);
- anticipated permits, approvals or authorizations (see Section 3.4);
- contingency measures for unplanned events;
- occupational health and safety (see Appendix 4);
- workers' environmental awareness and orientation;
- adaptive environmental management system, including:
    - assessment of performance;
    - documentation and communication/reporting of results;

- revision process;
- key contacts;
- references.

10.3 Preparation and Implementation

An EPP for the preparation/construction phase will be prepared immediately following the release of the ELAIOM from the EIA process. It will be submitted to the relevant regulatory authorities for review and, where required, approval and to other interested parties, including First Nations, for comment.

Similarly, the EPPs for the following phases, *i.e.*, operations and decommissioning, will be prepared prior to their initiation and shared in advance with the relevant entities for review/approval or comment, as the case may be.

11.0 CONCLUSIONS

11.1 Sustainable Development

As noted in Section 1.7, our approach is to ask whether the Project will contribute towards attaining ecological and community sustainability at both the local and regional levels.

The answer must be set in the context of our prediction (Section 5.6.2) that, in the absence of the Project or of other mining projects in the near future, the local communities will inevitably disappear.

We believe that the Project will contribute to community sustainability in the following principal ways:

- by making it possible for the populations of the Schefferville area to remain in that area;
- by ensuring the survival of the airport and the rail link north of Ross Bay Junction, making it possible for non-residents to access the area for recreational and subsistence purposes;
- through the preservation of transportation and other infrastructure and other mining operations;
- the training and work experience that it will provide will enhance the capacity of members of the local communities to find employment on other projects locally, regionally or elsewhere;
- the successful execution of the Project will increase the likelihood that the LIOP or the KéMag Project will go ahead, since NML will invest some of its profits in those projects. Collectively, those projects would extend employment and contracting opportunities by up to an additional 120 years;
- the revenues generated from transporting ore will allow TSH to upgrade the Menihek Division. That will potentially attract other mining companies to the area and allow TSH to contribute to attracting tourists to the area, thereby diversifying the local economy and promoting cultural tourism and the sustainable use of wildlife and other elements of the landscape;
- the money to be paid pursuant to the IBAs will permit their beneficiaries to strengthen cultural and traditional activities, to contribute to educational and training initiatives, to improve their infrastructure and to diversify their economies (subject always to the inherent limits of the Schefferville region) so as to minimize the social and economic effects of the completion of the Project;
- the successful execution of the Project will increase the likelihood that other known deposits of DSO will be mined or that new deposits of DSO will be identified and mined;
- the user fees or other contribution to be paid to the Ville de Schefferville will allow it maintain, or even improve, services without any additional burden on taxpayers;
- the restoration activities that NML will undertake in areas that were disturbed by its own and prior mining operations will make a modest contribution towards attaining ecological sustainability. More important, our evaluation of the biophysical effects of the Project is that their contribution to reducing ecological sustainability will be minimal.

11.2 Conclusions

The data presented in the preceding chapters support the following conclusions:

- TEK played a useful role in identifying VECs, as a source of data not available from other sources, especially concerning migratory and sedentary caribou, and of insights into the value placed on VECs by the members of the concerned First Nations (Section 1.6, Table 6.3 and D'Astous and Trimper June 2009, *in preparation*);
- the ELAIOM will be designed and implemented so as to contribute to sustainable development (Sections 1.7 and 11.1);
- the design and execution of the ELAIOM benefitted from taking into consideration the precautionary principle (Section 1.7);
- the construction and operation of the ELAIOM will disturb or destroy very little habitat: approximately 94 ha will be disturbed at DSO3, some 46% of which has already been disturbed by prior mining activities (Section 5.2). Some 31% of the habitat that will be disturbed will be restored (Section 2.2);
- the ELAIOM will be economically viable (Section 3.2.1);
- there are no alternatives to the ELAIOM at the macro scale (Section 3.3.1);
- the most environmentally desirable alternative methods of carrying out the ELAIOM have been selected (Section 3.3.2);
- the most important consequence of the null hypothesis would be to compromise the long-term economic development of a large sector of Labrador West and Labrador North (Section 3.3.3);
- the ELAIOM will respect all applicable legislation and policies (Section 3.4);
- the duration of the ELAIOM will be short: approximately two years for construction and three years for the operations phase (Table 4.6);
- a thorough description of the ELAIOM is available (Sections 4.10, 4.11, 4.12 and 4.13);
- NML took advantage of numerous opportunities to avoid effects (Section 4.5);
- the ELAIOM will be designed and implemented in such a way as to minimize negative effects, maximize positive effects and prevent pollution to the fullest extent technologically and economically possible (Sections 4.4 and 4.6);
- NML has adhered to best management practices during the design phase of the ELAIOM, and it will continue to do so throughout the preparation/construction and operations phases (Section 4.7);
- throughout the design and preparation phase, NML has accorded priority to contracting with and procuring from corporations and individuals based in Newfoundland and Labrador (Section 4.9.1);
- the planning and preparation phases of projects offer few prospects for education and training, but NML has made important efforts in those regards and will give them greater priority during the preparation/construction and operations phases of the ELAIOM (Sections 4.9.2 and 4.9.3);

- the processing complex and most of the other infrastructure built for Phase 1 of the ELAIOM will be used throughout Phase 2. Most decommissioning will, therefore, occur at the end of Phase 2, at which time it will be carried out in conformity with a rehabilitation and closure plan that will be prepared and implemented in conformity with the legislation of the GNL (Sections 4.13 and 7.5.1.3, Appendix 8);
- the ELAIOM will produce approximately 37,000 tonnes of CO_2 annually (Section 4.14);
- abundant high-quality data are available describing the physical and biological environments of the ELAIOM and its vicinity (Sections 5.3 and 5.4). They were complemented by several studies commissioned by NML (Volume 3). The only important data gap identified relates to the lack of information about sedentary (forest-ecotype) caribou in the vicinity of the ELAIOM (Section 5.4.3.1). Until reliable data are available, mitigation measures will assume that all caribou in the vicinity of the ELAIOM that cannot confidently be assigned to the migratory ecotype are sedentary caribou (Section 8.1.7.2 and Appendix 20);
- numerous, high-quality data about the socio-economic environment are available from the literature and from the studies conducted by NML (Section 5.5 and Volume 3). The only important data gaps relate to land- and resource-use in the vicinity of the ELAIOM by the Labrador Innu and the members of ITUM (Sections 5.5.4 and 5.5.23). Both those organizations refused the offer of NML to finance studies of their land- and resource-use;
- in the absence of the ELAIOM, the future biophysical environment would be little changed from its present form (Section 5.6.1);
- in the absence of the ELAIOM, the future socio-economic environment would be radically different and would probably involve the disappearance of the communities and populations in the Schefferville area and the loss of the associated infrastructure, which would in turn virtually eliminate any serious likelihood that the mineral potential of large segments of Labrador West and Labrador North could be developed in the foreseeable future (Section 5.6.2);
- the potentially affected First Nations are the Innu Nation, the NIMLJ, the NNK and ITUM (Section 6.3.1);
- the potentially affected non-Native communities are primarily Schefferville, with some direct socio-economic effects on Wabush, Labrador City and Fermont (Section 6.4);
- there appears to be little public concern about or interest in the ELAIOM in Labrador West (Section 6.8);
- based on the guidelines, the literature review, professional judgment and the public consultation programme, the following are the biophysical VECs: air quality; water quality; water balance; surficial deposits; wetlands; caribou and caribou habitat; harvested mammals; species at risk; at-risk and migratory birds; and fish and fish habitat (Table 6.2);
- based on the guidelines, the literature review, professional judgment and the public consultation programme, the following are the socio-economic VECs: caribou subsistence hunting; local employment; local contracting; Newfoundland and Labrador benefits; treaty rights; comprehensive land claims negotiations; caribou sport hunting;

subsistence fishing; trapping; local infrastructure and services; archaeological/heritage/palaeontological sites; sites of cultural and spiritual importance; community cohesion; family and interpersonal relations; maintenance of community populations; road safety; commercial fishing; maintenance of local labour force; maintenance of social stability; rail transportation; inter-provincial labour mobility; availability of labour force; restoration/rehabilitation; training; access to territory for traditional activities; racial tension on work site; sport hunting of caribou by NML employees; quality of berries and medicinal plants; goose hunting; small game hunting; gender relations; health; and language in the work place (Table 6.3);

- the following residual effects on the biophysical VECs are predicted (Section 8.1):

VEC	Residual Effect
Air quality	Moderate
Noise (without blasting)	Low
Noise (with blasting)	Low
Surface water	Low
Groundwater	Low
Water budget	Moderate
Water regimen	Moderate
Substrate/topsoil	Low
Wetlands (loss)	Moderate
Wetlands (drying)	Moderate
Caribou (noise) Migratory Sedentary	 Moderate Moderate
Caribou (habitat loss) Migratory Sedentary	 Moderate Moderate
Harvested mammals	Low
Wolverine	Low
At-risk and migratory birds	None
Fish and habitat	None

- no effects are predicted on the following socio-economic VECs (Appendix 18): treaty rights; comprehensive land claims negotiations; caribou sport hunting; subsistence fishing; local infrastructure and services; archaeological/heritage/palaeontological sites; sites of cultural or spiritual importance; community cohesion; family and interpersonal relations; maintenance of community populations; road safety; commercial fishing; maintenance of local labour forces; maintenance of social stability; rail transportation; inter-provincial labour mobility; availability of labour force; restoration/rehabilitation; training; access to territory for traditional activities; racial tension on work site; sport hunting of caribou by NML employees; quality of berries and medicinal plants; goose hunting at lac Pinette; small game hunting along main roads; gender equity; health; language of the work place;

- the following residual effects on socio-economic VECs are predicted (Section 8.2):

VEC	Residual Effect
Caribou subsistence huning	Low
Local employment	Moderate
Local contracting	Low to moderate
Newfoundland and Labrador Benefits	Very high
Trapping	Low

- the language of the ELAIOM work place will be English, and efforts will be made to accommodate French and Native languages (Appendix 18, Section A18.32);
- the potential for cumulative effects with eight current projects, two reasonably foreseeable projects and two hypothetical projects exists (Appendix 14 and Table 7.12), but in many cases the information required to make a detailed evaluation of those cumulative effects does not exist or is not available (Section 7.7);
- the cumulative effect on air quality of the ELAIOM and the Schefferville Area Iron Ore Mine of LIM will not exceed the applicable regulatory standards for ambient air quality (Section 8.3.1);
- the potential for a cumulative negative effect on sedentary caribou is considered to be small (Section 8.3.3.1);
- the cumulative effect of NML's activities on the economic health of the concerned rail carriers cannot be quantified, but it will be positive (Section 8.3.3.2);
- there will not be an important cumulative effect on the availability of workers (Section 8.3.3.3);
- it is not possible to determine if there will be a cumulative effect between the ELAIOM and LIM's Schefferville Area Iron Ore Mine on subsistence hunting and trapping (Section 8.3.3.4);
- the ELAIOM will have a modest positive cumulative effect on the Newfoundland and Labrador Benefits VEC (Section 8.3.2);
- the environment had important effects on determining the location, the design and the construction and operating methods of the ELAIOM (Section 8.4);
- a monitoring programme has been devised for purposes of compliance, effectiveness and effects monitoring (Table 9.1);
- upon approval of the ELAIOM, an Emergency Response and Contingency Plan will be prepared prior to the start of the preparation/construction phase;
- upon approval of the ELAIOM, an Employment Equity Plan will be prepared prior to the start of the preparation/construction phase (Appendix 19);
- prior to the start of the preparation/construction phase, an EPP will be prepared in conformity with the applicable standards of the GNL (Section 10.0);
- the ELAIOM will contribute to sustainable development in numerous ways (Section 11.1).

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