Keeyask Generation Project

Environmental Impact Statement

Supporting Volume

Socio-Economic Environment, Resource Use and Heritage Resources

KEEYASK

Hydropower Limited Partnership

June 2012

KEEYASK GENERATION PROJECT

SOCIO-ECONOMIC ENVIRONMENT, RESOURCE USE AND HERITAGE RESOURCES

SOCIO-ECONOMY

Prepared by

Keeyask Hydropower Limited Partnership

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KEEYASK
Hydropower Limited Partnership

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	
AADT	Average Annual Daily Traffic
AC	Alternating Current
AE SV	Aquatic Environment Supporting Volume
AEA	Adverse effects agreement
AGE	Advisory Group on Employment
AIP	Agreement in Principle
AMEC	An engineering, project management and consulting firm
AMP	Access management plan
ANOVA	Analysis of variance
AOL	Aski'Otutoskeo Ltd.
ASI	Area of special interest
asl	above sea level
ATE	Adventure travel and eco-tourism
ATK	Aboriginal traditional knowledge
ATV	all terrain vehicles
BC	British Columbia
BCHCR	Burntwood Community Health Resource Centre
BFI	Brighter Futures Initiative
BHC	Building Healthy Communities
BNA	Burntwood Nelson Agreement
BOD	Biochemical oxygen demand
BP	Before Present
BRHA	Burntwood Regional Health Authority
CAC	Construction Advisory Committee
CBN	Churchill-Burntwood-Nelson
CCFM	Canadian Council of Forest Ministers
CCME	Canadian Council of Ministers of the Environment
CCREM	Canadian Council of Resource and Environment Ministers
CEA	Cumulative effects assessment
CEAA	Canadian Environmental Assessment Agency
CEO	Chief Executive Officer
CETP	Community Employment and Training Program
CFIA	Canadian Food Inspection Agency
CHA	Canadian Hydropower Association
CIA	Comprehensive Implementation Agreement
CINE	Centre for Indigenous Peoples' Nutrition and Environment
CI	Confidence limit
CLFN	Cross Lake First Nation

Acronym / Abbreviation	
CMHC	Canadian Mortgage and Housing Corporation
CNG	Core Negotiating Group
CNP	Cree Nation Partners
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPUE	Catch per unit effort
CRCM	Canadian Regional Climate Model
CRD	Churchill River Diversion
CRDAP	Churchill River Diversion Archaeological Project
CWS	Canadian Wildlife Services
d.w.	Dry weight
dBA	Decibels adjusted (noise power)
DBH	Diameter at breast height
Dbs	Depth below surface (note: Heritage Resources)
DC	Direct current
DELT	Deformities, erosion, lesions, and tumours
DFO	Department of Fisheries and Oceans
DIN	Dissolved inorganic nitrogen
DL	Detection limit
DMA-80	Direct mercury analysis (version 80)
DNC	Direct negotiated contract
e.g.	example
EA	Environmental assessment
EAPF	Environment Act Proposal Form
EC	Environment Canada
EIA	Environmental impact assessment
EIS	Environmental impact statement
EMPA	Excavated Material Placement Areas
EMS	Environmental Management System
ENGO	Environmental non-governmental organizations
EnvPP	Environmental protection plan
EPA	Environmental Protection Agency
EPP	Environmental protection program
ER	Ecological Reserve
ESWG	Environmental Studies Working Group
et al.	and others
ETL	Enviro-Test Laboratories
EUP	Exclusive use permit
FEMP	Federal Ecological Monitoring Program
FFMC	Freshwater Fish Marketing Corporation
FL	Fork length
FLAEA	Fox Lake Adverse Effects Agreement
FLCN	Fox Lake Cree Nation

Acronym / Abbreviation	
FLRMA	Fox Lake Resource Management Area
FMU	Forest Management Unit
FNIHB	First Nations and Inuit Health Branch
FSDA	Federal Sustainable Development Act
FSDS	Federal Sustainable Development Strategy
FSL	Full supply level
GHA	Game Hunting Area
GHG	Greenhouse gases
GIS	Geographic information system
GOT	Generation Outlet Transmission
GPS	Global positioning system
GS	Generating Station
GW	Gigawatt
HBC	Hudson's Bay Company
HGD	Harmonized Gillam Development
HHRA	Human health risk assessment
HNTEI	Hydro North Training and Employment Initiative
HRB	Historic Resources Branch
HRIA	Heritage resources impact assessment
HRPP	Heritage resources protection plan
HTFC	Hilderman Thomas Frank Cram
HVDC	High Voltage Direct Current
HZI	Hydraulic Zone of Influence
i.e.	That is
IHA	International Hydropower Association
IMAC	Interim maximum acceptable concentration
INAC	Indian and Northern Affairs Canada
IPCC	Intergovernmental Panel on Climate Change
ISD	In-service date
ISO	International Organization for Standardization
JKDA	Joint Keeyask Development Agreement
KCNs	Keeyask Cree Nations communities including Tataskweyak Cree Nation (TCN), War Lake First Nation (WLFN), York Factory First Nation (YFFN) and Fox Lake Cree Nation (FLCN),.
KERC	Keeyask External Relations Committee Reference Group
KETA	Keeyask Employment and Training Agency Reference Group
KHLP	Keeyask Hydropower Limited Partnership
KIP	Keeyask Infrastructure Project
KIP EA	Keeyask Infrastructure Project Environmental Assessment
KIRC	Keeyask Internal Relations Committee Reference Group
KPI	Key person interview
KTC	Keewatin Tribal Council

Acronym / Abbreviation	
LC50	Concentration at which 50% mortality of a test organism occurs
LCA	Life-Cycle Assessment
LEL	Lowest effect level
LGD	Local Government District
LK	Local knowledge
LNR	Lower Nelson River
LUC	Land use categories
LWCNRSB	Lake Winnipeg, Churchill and Nelson Rivers Study Board
LWR	Lake Winnipeg Regulation
MAC	Maximum acceptable concentration
MB	Manitoba
MBCDC	Manitoba Conservation Data Centre
MBESA	Manitoba Endangered Species Act
MCWS	Manitoba Conservation and Water Stewardship
MDMNR	Manitoba Department of Mines and Natural Resources
MEMP	Manitoba Ecological Monitoring Program
MESA	Manitoba Endangered Species Act
MH	Manitoba Hydro
MIT	Manitoba Infrastructure and Transportation
MKO	Manitoba Keewatinowi Okimakanak
MMF	Manitoba Metis Federation
MMMR	Canada-Manitoba Agreement on the Study and Monitoring of Mercury in the Churchill River Diversion
MNS	Manitoba Naturalists Society
MOL	Minimum operating level
MOU	Memorandum of Understanding
MPMO	Major Projects Management Office
MTS	Manitoba Telecom Services
MW	Megawatt
MWG	Mammals Working Group
MWQSOG	Manitoba Water Quality Standards, Objectives, and Guidelines
MWS	Manitoba Water Stewardship
n.d.	No date
N/A	Not available/applicable
NCIS	National Contaminants Information System
NCN	Nisichawayasihk Cree Nation
NCS	Northern Collector System
NFA	Northern Flood Agreement
NFFA	Northern Fishermen's Freight Assistance
NLHS	Northern Lights Heritage Foundation
NNADAP	National Native Alcohol and Drug Abuse Program
NRSB	Nelson River Sturgeon Co-Management Board

Acronym / Abbreviation	
NSC	North/South Consultants Inc.
NWPA	Navigable Waters Protection Act
NWT	Northwest Territories
OC	Organic carbon
ON	Organic nitrogen
OWL	Overview of Water and Land
PAL	Protection of Aquatic Life
PD	Project Description
PD SV	Project Description Supporting Volume
PE SV	Physical Environment Supporting Volume
PEL	Probable effect level
PEMP	Physical Environment Monitoring Program
PF	Percent flooded
PIP	Public Involvement Program
PI SV	Public Involvement Supporting Volume
PM	Particulate matter
PPER	Post-Project Environmental Review
ppm	parts per million
PPT	Pre-Project Training
PR	Provincial Road
PRLC	Partners Regulatory and Licensing Committee
PTH	Provincial Truck Highway
PY	Person years
PYLL	Potential years of life lost
RCM	Regional Climate Model
RCMP	Royal Canadian Mounted Police
RMA	Resource Management Area
RNFB	Revised Northern Food Basket
ROW	Right-of-way
RRCS	Renewable Resources Consulting Services Ltd.
RTL	Registered Trapline
SARA	Species at Risk Act
SD	Standard deviation
SE	Standard error
SE SV	Socio-Economic Environment, Resource Use and Heritage Resources Supporting Volume
SEIA	Socio-Economic Impact Assessment
SEMP	Socio-Economic Monitoring Program
SIL	Southern Indian Lake
SLCPPER	Split Lake Cree Post Project Environmental Review
SLRMA	Spilt Lake Resource Management Area
SLRMB	Split Lake Resource Management Board

Acronym / Abbreviation	
sp(p).	species
SV	Supporting volume
TBD	To be determined
TC	Tendered contract
TCN	Tataskweyak Cree Nation
TDS	Total dissolved solids
TE SV	Terrestrial Environment Supporting Volume
TEMA	Tataskweyak Environmental Monitoring Agency
TGH	Thompson General Hospital
TK	Traditional knowledge
TLE	Treaty Lands Entitlement
TSS	Total suspended solids
UCN	University College of the North
UMA	Underwood McLellan and Associates Ltd.
UNESCO	United Nations Educational, Scientific and Cultural Organization
USDA	United Sates Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UV	Ultraviolet
UVA/UVB	Ultraviolet light (type A and B)
VEC	Valued Environmental Component
WHO	World Health Organization
WKTC	Wuskwatim Keeyask Training Consortium
WLFN	War Lake First Nation
WMA	Wildlife Management Area
WMP	Waterways Management Plan
WQG	Water quality guidelines
WRCS	Wildlife Resource Consulting Services
WUA	Weighted usable area
Ya	Years ago
YFFN	York Factory First Nation
YFRMA	York Factory Resource Management Area
YOY	Young-of-the-year

UNITS

Abbreviation	Unit
Btu	British thermal unit
cm	centimetre
CFU/mL	coliform forming units per millilitre
cm^3	cubic centimetre
km^3	cubic kilometre
m^3	cubic metre
m^3/s	cubic metre per second
d	day
d/wk	days per week
d/y	days per year
°C	degrees Celsius
fish/h	fish per hour
fish/m/h	fish per metre per hour
fish/s	fish per second
fc	footcandle
GHz	gigahertz
GJ	gigajoule
GW	gigawatt
GWh	gigawatt-hours
g	gram
g/L	grams per litre
g/m^2	grams per square metre
g/t	grams per tonne
> (use only in tables)	greater than
≥	greater than or equal to
ha	hectare (10,000 m^2)
Hz	hertz
h (not hr)	hour
h/d	hours per day
h/wk	hours per week
h/y	hours per year
" symbol not "	inch
$individuals/m^3$	individuals per cubic metre
individuals/L	individuals per litre
$individuals/m^2$	individuals per square metre
J	joule
kg	kilogram
kg/m^3	kilograms per cubic metre
kg/h	kilograms per hour
kg/m^2	kilograms per square metre
kJ	kilojoule
km	kilometre
km/h	kilometres per hour
kPa	kilopascal
kV	kilovolt
kW	kilowatt

kWh	Kilowatt-hour
< (use only in tables)	less than
≤	less than or equal to
L	litre
L/m	litres per minute
MW	megawatt
MWh	megawatt-hour
m	metre
m/min	metres per minute
m/s	metres per second
t	metric ton (tonne)
µg/g	micrograms per gram
µg/L	micrograms per litre
µm	micrometre
µS/cm	microSiemens per centimetre
mg	milligram
mg/m^3	milligrams per cubic metre
mg/L	milligrams per litre
mL	millilitre
mm	millimetre
M	million
mo	month
ng/L	nanograms per litre
oocyte/L	oocyte per litre
ppb	parts per billion
ppm	parts per million
%	percent
$plants/m^2$	plants per square metre
s	second (time)
cm^2	square centimetre
km^2	square kilometre
m^2	square metre
TWh	terawatt hours
wk	week
yr	Year

MASTER TABLE OF CONTENTS

PART 3: HERITAGE RESOURCES

SECTION 1
INTRODUCTION

KEEYASK
Hydropower Limited Partnership

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

1.0 INTRODUCTION

This Socio-Economic, Resource Use and Heritage Resources Supporting Volume (SE SV) is one of six volumes produced in support of the Response to EIS Guidelines for the Keeyask Generation Project (the Project) Environmental Impact Statement (EIS). The EIS has been developed by the **Keeyask Hydropower Limited Partnership** (the Partnership) as part of the regulatory review of the Project under the *Canadian Environmental Assessment Act* and *The Environment Act* (Manitoba).

The EIS consists of the following:

- A video, *Keeyask: Our Story*, which presents the Keeyask Cree Nations' (KCNs) history and perspectives related to hydroelectric development. Presented through the lens of their holistic Cree worldview, it explains the journey taken by the KCNs as they evaluated their concerns about the Project, the nature of their participation as Partners, and the decisions they ultimately made to support the Project;
- An executive summary;
- A Response to EIS Guidelines (the 'EIS') issued in response to an application by the Partnership for environmental approvals under the government regulatory environmental assessment process. This response includes findings and conclusions, with charts, diagrams, and maps to clarify information in the text, and a concordance table to cross reference requirements of the EIS Guidelines with information in the EIS; and
- The KCNs' Evaluation Reports providing each of the KCNs' own evaluation of the effects of the Project on their community and Members and including **Aboriginal traditional knowledge (ATK)** relevant to the Partnership's Response to the EIS Guidelines.

The six supporting volumes were developed by the Manitoba Hydro environmental team in consultation with the KCNs and their Members to provide details about the Project Description and about the research and analysis of the following topics: Public Involvement Program, Physical Environment, Aquatic Environment, Terrestrial Environment, Socio-Economic Environment, Resource Use and Heritage Resources (the latter three topics are included in this supporting volume). The supporting volumes have been reviewed, commented on, and, as appropriate, finalized in a manner consistent with the arrangements of the Partnership.

The SE SV is comprised of three discrete components:

- **Socio-Economic Impact Assessment (SEIA)**;
- Resource Use; and
- Heritage Resources.

1.1 PURPOSE AND CONTENT OF THE SOCIO-ECONOMIC IMPACT ASSESSMENT

The SEIA section of this SE SV examines the effects of the Project on the people and communities who are part of the existing socio-economic environment in the immediate vicinity of the Project. It also looks at the northern Manitoba region as a whole and the overall economies of Manitoba and Canada. The SE SV presents the following:

- The existing environment, which could be affected by the Project, including the current situation, past influences that have shaped today's existing environment (including past hydroelectric development), as well as how the existing environment may evolve into the future without the Project (when information is available);
- The nature and predicted effects of the Project on the socio-economic environment that describes the context of measures already in place to enhance beneficial effects and to reduce adverse effects of the Project for the KCNs. Measures are identified in the **Joint Keeyask Development Agreement (JKDA)** between Manitoba Hydro and the KCNs, and measures are included in individual **Adverse Effects Agreements (AEAs)** between Manitoba Hydro and each of the KCNs;
- Mitigation measures to reduce adverse socio-economic effects;
- Residual effects that may remain after these measures are applied, including cumulative effects; and
- Monitoring plans, which are designed to keep track of effects as they unfold and to identify unanticipated effects, triggering follow-up action as required.

This supporting volume is organized into the following components of the socio-economic environment to assist regulators, who are accustomed to reviewing assessment documentation by component:

- **Economy** (including employment and training, business, income, cost of living and the resource economy);
- **Population, Infrastructure and Services** (including population, housing, infrastructure and services, transportation infrastructure and land); and
- **Personal, Family and Community Life** (including community governance, goals and plans, community health, mercury and human health, public safety and worker interaction, travel access and safety, culture and spirituality, and aesthetics).

1.2 OVERVIEW OF ASSESSMENT APPROACH

1.2.1 Pre-Project Planning, Joint Keeyask Development Agreement and Adverse Effects Agreements

The Project is proposed in the immediate vicinity of where the KCNs have lived for thousands of years. Engagement of the KCNs has been integral to the planning and design of the Project for over a decade. TCN has been involved in Project planning activities since the early 1990s. As a result, the KCNs became Project partners with Manitoba Hydro in 2009 following referendum votes by the membership of each First Nation.

Initially, engagement activities with Tataskweyak Cree Nation (TCN) and then subsequently with War Lake First Nation (WLFN), York Factory First Nation (YFFN) and Fox Lake Cree Nation (FLCN), focused on early Project planning and the development of a Project partnership. Later, the focus shifted to more detailed Project planning and the **environmental assessment (EA)** process.

A number of early Project planning activities occurred with TCN between 1992 and 1996. Detailed information is provided in CNP's Keeyask Environmental Evaluation Report and is summarized as follows:

Joint Studies on the Impact of Future Hydroelectric Development in the Split Lake Area

A number of studies to analyze the impact of the Birthday and Gull rapids planning options in the community of Split Lake were undertaken in 1992 and 1996 by TCN and Manitoba Hydro, culminating in the publication of the Split Lake Post-Project Environmental Review. In response to a request from TCN, the community and Manitoba Hydro examined the impacts of Manitoba Hydro project initiatives that had occurred within the Split Lake Resource Management Area (SLRMA) between 1957 and 1996. It reviewed the impacts of Manitoba Hydro development in the SLRMA from both traditional knowledge and technical science perspectives and identified baseline research requirements for development of a hydroelectric project at Gull Rapids. The review generated five separate reports that documented the outcome of the review process. This process contributed to the decision by Manitoba Hydro not to pursue high and intermediate dam height options at Birthday and Gull Rapids and to instead adopt a lower dam height option located at Gull Rapids, which had the least amount of flooding of the options available (see Chapter 4, Section 4.5 of the Response to EIS Guidelines).

Between 1998 and 2009, engagement between Manitoba Hydro and the KCNs continued, specifically with TCN and WLFN (together known as the CNP) and, since 2002, with YFFN and FLCN. For convenience, these four in-vicinity First Nations are known as the KCNs, but this term does not represent a legal or political entity. Engagement activities included development of the Keeyask Hydropower Limited Partnership (the Partnership) and other matters, among which were community studies to assess not only possible environmental impacts, but also each community's interests in the Project. The understandings were formalized in the JKDA. In addition, individual AEAs were negotiated between Manitoba Hydro and the KCNs to provide mitigation and compensation for effects identified

by each First Nation. In 2009, this relationship was solidified through the signing of the JKDA and individual AEAs by each of the KCNs following a referendum of their membership.

A brief summary of these agreements follows.

Joint Keeyask Development Agreement (JKDA)

The KCNs and Manitoba Hydro negotiated the JKDA between 2002 and 2008 followed by community referendums in early 2009. These negotiations shaped the key features of the Project and the terms of the Partnership between the KCNs and Manitoba Hydro, including governance of the Partnership and financing and management of the Project. Among other matters, the JKDA also addresses the KCNs' potential income opportunities, training, construction and operations employment, business opportunities, and involvement in the Partnership's environmental and regulatory affairs. Joint working groups were established to address key development issues such as project description, employment and training, reservoir clearing, waterways management, commercial terms and access road routing. Each of the KCNs communities consulted with their respective Members about the JKDA and held a community referendum of Members to support Chiefs and Councils in ratifying the agreement. In May 2009, the JKDA was signed in the community of Split Lake by representatives from each of the KCNs and Manitoba Hydro (see Chapter 2 of the Response to EIS Guidelines).

Adverse Effects Agreements (AEA)

As part of the JKDA negotiation process, each of the KCNs communities negotiated an AEA with Manitoba Hydro containing mitigation and compensation measures to address known or foreseeable adverse effects of the Project, identified by each community. Each AEA was ratified by the respective First Nation following a referendum held concurrently with the JKDA referendum (see Chapter 2 of the Response to EIS Guidelines).

1.2.2 Role of the Keeyask Cree Nations in the Environmental Assessment

The JKDA sets out how the KCNs communities and Manitoba Hydro participate in the EA of the Project. As both proponents of the Project and as affected communities, the KCNs communities played an integral role, along with Manitoba Hydro, in directing and shaping the EA. As co-proponents of the Project, they participated in the EA process through membership on a number of coordination and technical joint working groups, and reviewed the EIS and associated supporting volumes that form this filing. Key aspects of their participation included the following:

- **Keeyask Environmental and Regulatory Protocol (the Protocol):** Schedule 3-1 of the JKDA sets out the way that the KCNs communities and Manitoba Hydro intend to work together to undertake the EA, to develop the EIS for filing with regulatory authorities and to participate in the hearing process associated with environmental licensing. Although set out in the final 2009 JKDA, the initial version of the Protocol was developed in the early 2000s by TCN and Manitoba Hydro. TCN concluded at an early point that they should determine and present their own evaluation of the environmental impacts of the Project on their own community. The 2001 protocol subsequently

incorporated WLFN, YFFN and FLCN and has been adjusted over the years, with the current version incorporated into the JKDA. The Protocol has guided the various stages of the EA process from that time. The Protocol set out an organizational structure for the KCNs, Manitoba Hydro and the **EA Study Team**[1] to work together. Key aspects of this organization are as follows:

- **Partners Regulatory and Licensing Committee (PRLC):** The PRLC is composed of nine Members from the KCNs (three from TCN and two each from WLFN, YFFN and FLCN) and three staff from Manitoba Hydro who collectively govern the Partnership's environmental activities. TCN and Manitoba Hydro co-chair the committee. The PRLC was established to oversee the EA process and to make key decisions, such as the filing of the Environment Act Proposal Form and the EIS.
- **EIS Coordination Team:** The EIS Coordination Team manages the environmental studies, including final coordination and preparation of the EIS and the environmental protection plans. The EIS Coordination Team is made up of representatives from each of the KCNs and Manitoba Hydro; the EA Study Team supports the process. CNP and Manitoba Hydro each have two voting members on the Coordination Team, and YFFN and FLCN each have one non-voting representative. Decisions are made by consensus except on the rare occasions where a vote is needed.
- **Key Issues Working Groups:** Beginning in 2007, a series of working groups was established to address key issues and to act as a forum for discussion of concern to the KCNs communities. These working groups included the Mercury and Human Health Technical Working Group beginning in 2007, the Aquatic Working Group beginning in 2008 and the Mammals Working Group established in 2009. The working groups included representatives from each of the KCNs communities (including community Members and their advisors), Manitoba Hydro, the EA Study Team and external experts.
    - **Issue Workshops:** The EIS Coordination Team also organized one and two-day workshops regarding important EA topics (*e.g.*, ATK, scoping, **valued environmental components (VECs)**, cumulative effects assessment, and sustainable development).

- **Environmental Studies Working Groups:** Manitoba Hydro has established bilateral working groups with each of the KCNs to review issues of importance to each community, including a review of annual fieldwork plans for environmental studies and sharing results of the studies, as well as issues and concerns raised by each of the KCNs in their respective working group.
- **Community-Based Studies and Community Involvement:** Each of the KCNs communities undertook and completed their own studies to gather ATK, to identify effects from their own

[1] The EA Study Team comprised representatives of all the consulting teams from the environmental disciplines: Physical (Stantec), Aquatic (North South Consultants), Terrestrial (Stantec, ECOSTEM, Wildlife Resources Consultants), Socio-Economic (InterGroup Consultants), Resource Use (North South Consultants) and Heritage Resources (Northern Lights Heritage Services).

perspectives and to contribute to the EA and EIS. Associated activities included the extensive involvement of community Members to inform them about the proposed Project, to obtain their input and to contribute to the EIS.

- **Public Involvement Program beyond Keeyask Cree Nation Communities:** In addition to the involvement of the KCNs, a Public Involvement Program (PIP) was implemented to inform the public beyond the KCNs communities about the Project and to obtain their input at key stages. Further detail can be found in the Public Involvement Supporting Volume.

1.2.3 Aboriginal Traditional Knowledge in the Environmental Assessment

ATK was important when undertaking the EA of the Project. In the Protocol noted in Section 1.2.2, the first guiding principle established among the Partnership was that "information collection for the Environmental Impact Assessment will include both ATK and western scientific analysis" (CNP, YFFN, FLCN and the Manitoba Hydro 2009).

In 2008, representatives of the KCNs communities, Manitoba Hydro and the EA Study Team met in a two-day workshop to identify what ATK meant to them. From this workshop, the EIS Coordination Team established the following set of common principles regarding the inclusion of ATK in the Keeyask EA. These principles were agreed to in May 2009 and are as follows:

> The principles set out here have been developed by Manitoba Hydro with TCN, WLFN, YFFN and FLCN (the Keeyask Cree Nations) to reflect how their Aboriginal Traditional Knowledge (ATK) is being and will be included in the Environmental Assessment (EA) for the Keeyask Generation Project.
>
> 1. GIVING EQUAL WEIGHT
>
> The EA process honours and respects ATK and the Cree worldview. The EA aims to give equal weight to ATK and western science. It is recognized that ATK has value in and of itself.
>
> 2. ENSURING VISIBILITY
>
> ATK will have a distinguishable voice in the Environmental Impact Statement (EIS), and will not be melded with western science so as to become invisible.
>
> 3. MAINTAINING AUTHORITY AND CONFIDENTIALITY
>
> Aboriginal people have authority and control over their traditional knowledge. Each of the KCNs, together with its knowledge holders, will choose whether the source of its knowledge is to be acknowledged in the EIS document, or to remain confidential.
>
> 4. LEADING DOCUMENTATION — RIGOROUS AND DEFENSIBLE METHODS
>
> Each of the KCNs is taking the lead role in collecting and documenting their ATK. Rigorous and defensible methods will be used to collect and document ATK.

5. ACKNOWLEDGING WORLDVIEWS

The EA process and the EIS document recognize Cree knowledge and western science as distinct worldviews. ATK is more than just information about resources and resource use. There is a role for ATK in each step of the EA process.

6. BUILDING AND SUSTAINING RESPECTFUL RELATIONSHIPS

The EA process aims to foster communication and knowledge-sharing, and to build and sustain respectful relationships between Manitoba Hydro and the KCNs communities.

7. ACKNOWLEDGING THE PAST

Acknowledge the past in the EA process as providing context for the assessment (including temporal context).

8. REFLECTING CULTURAL VALUES AND SPIRITUALITY

Cree spirituality and cultural values are being and will be reflected in the EA process.

9. ACKNOWLEDGING CAUTION AND ADDRESSING UNCERTAINTY

Acknowledge and respect the caution that many KCNs Members have about predictions of environmental effects of hydroelectric development (*e.g.*, uncertainty associated with predictive models). "It is important to employ a precautionary approach that identifies knowledge gaps and recognizes the uncertainty of predictions."

The organization of the EA process under the Protocol meant that a series of joint working structures were established so that the perspectives of the KCNs, rooted in their ATK, were brought to the EA process. The EIS Coordination Team, in particular, discussed the application of these ATK principles to the EA process as a whole, from issue identification to documenting ATK. In addition, ATK was brought into the SEIA process in the following ways:

- **Issue Identification:** Socio-economic issues of concern were identified by KCNs representatives, including those based on the experience of the KCNs communities during past hydroelectric projects;
- **Joint Planning and Implementation of Socio-Economic Fieldwork Programs:** Joint planning processes were undertaken with YFFN and FLCN to identify and plan the approach for socio-economic fieldwork. A community-based research coordinator and researchers were employed to undertake collection of socio-economic information. The socio-economic study team held bilateral workshops with YFFN and FLCN to review and consolidate key socio-economic effects that were priorities for those First Nations resulting from the fieldwork programs undertaken together. TCN and WLFN conducted a similar socio-economic research program including fieldwork, with assistance from the EA Study Team. In each case, a steering committee was established to guide the process and review results;
- **Drawing from the KCNs Community Studies:** In addition to the collaborative fieldwork programs noted above, this SE SV draws from community-based studies undertaken by each of the KCNs. Specific issue workshops undertaken with YFFN on youth and FLCN on worker interaction contributed issues-specific community knowledge and experience;

- **Drawing from the KCNs Environmental Evaluation Reports:** Each of the KCNs evaluated the impact of the Project on their communities and Members in terms of their own worldview, values and experience with past hydroelectric development; and
- **Community Meetings to Review Draft Socio-Economic Effects and Mitigation Options:** Draft socio-economic effects and mitigation options pertinent to each First Nation were presented for feedback and improvement to the Future Development Group of each of the KCNs.

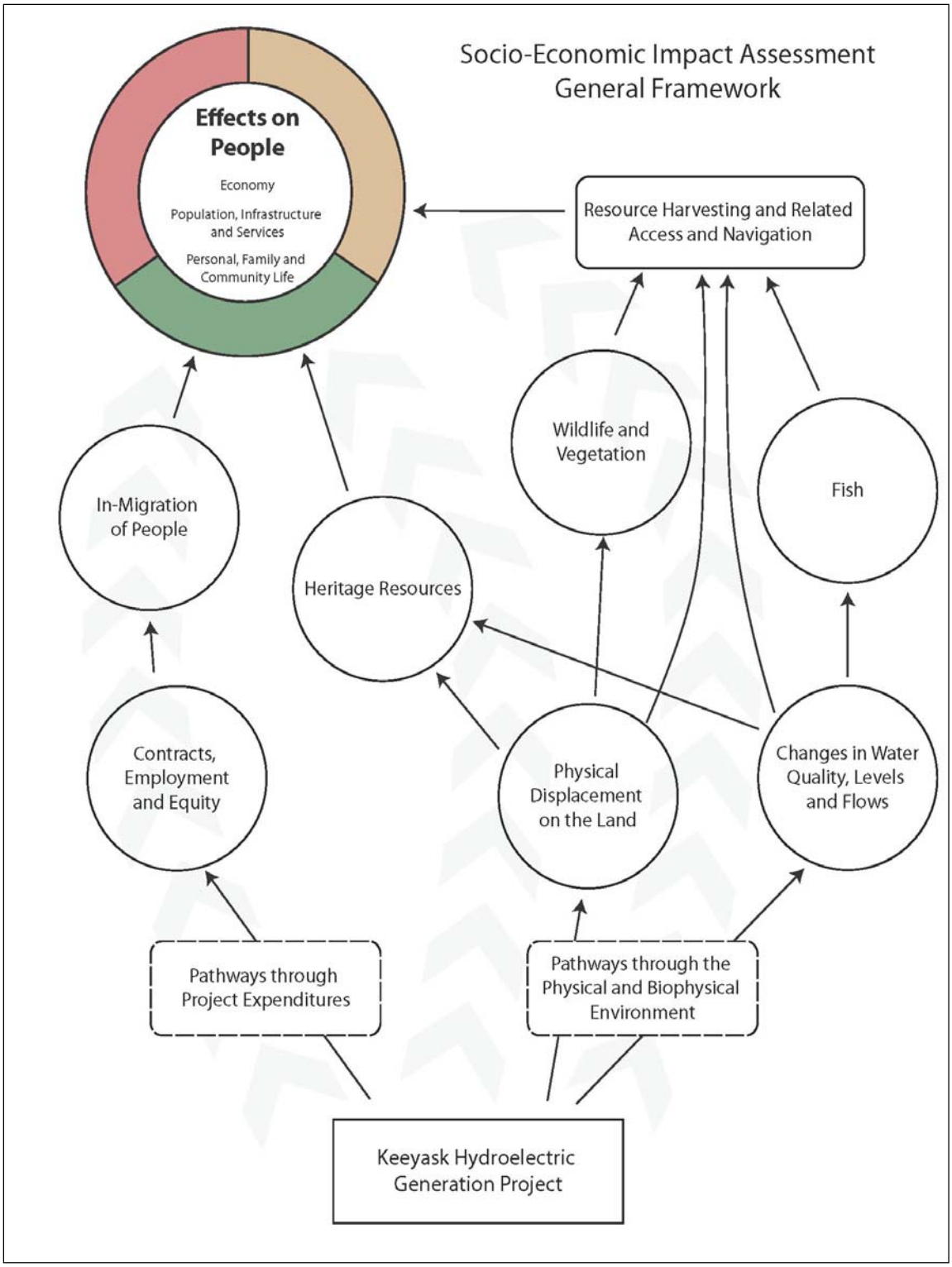
1.2.4 Socio-Economic Framework

This SEIA considers the socio-economic environment — the people, communities, regions and economies potentially affected by the proposed Project. In so doing, it takes into account the array of interrelated factors that contribute to the social and economic well-being of individuals, families and communities.

Figure 1-1 presents a general framework to show the main pathways by which a hydroelectric development could affect people. For simplicity, the figure does not include the detailed connections that occur within and among these pathways. Those are discussed in greater detail in Sections 3, 4 and 5 of this volume.

The framework highlights the following types of pathways:

- **Pathways through the Physical and Biophysical Environment:** Changes in the physical and biophysical environment could have the potential to directly affect the health and well-being of people (*e.g.*, studies examined the quality of water for drinking and the safety of water and ice conditions for travel). They could also affect the water, land and resources that are used by people as part of their living (*e.g.*, country food consumed by people or sold for cash income), their way of life and their culture. Changes could result both from changes to the habitat for fish, mammals and plants used by people, but also through expanded harvest enabled by new access roads (*e.g.*, by local people and by non-local people). Physical changes could also affect heritage resources that are of importance to the history and culture of Cree and other people. Effects on people resulting from changes in the natural environment are of particular importance under both the *Canadian Environmental Assessment Act* and *The Environment Act* (Manitoba); and
- **Pathways through Project Expenditures and Revenues:** This SEIA also considered effects that could result from direct Project expenditures during construction and operation of the Project as well as revenues gained during Project operation. These include employment and business opportunities and training that would be required to build and operate the facility. New employment and business opportunities could also draw people to the region, such as local people returning home after migrating elsewhere or non-local construction workers in-migrating in search of employment. Temporary migrants and long-term populations require housing, facilities and services and have the potential to change the social and economic environment (*e.g.*, social well-being, public safety and human health).



Source: InterGroup Consultants.

Figure 1-1: Socio-Economic Impact Assessment General Framework

1.2.5 Valued Environmental Components

Valued environmental components (VECs) were identified for the socio-economic environment. Socio-economic VECs are aspects of the socio-economic environment that are valued by people (*e.g.*, in-vicinity communities, the proponent, the public or the government involved in the assessment process) and that help to characterize the effects of the Project.

In 2008, VECs were identified initially by the EA Study Team and reviewed in two workshops with representatives of the KCNs communities. Input from Round One of the Keeyask Generation PIP was also used to identify and confirm VECs.

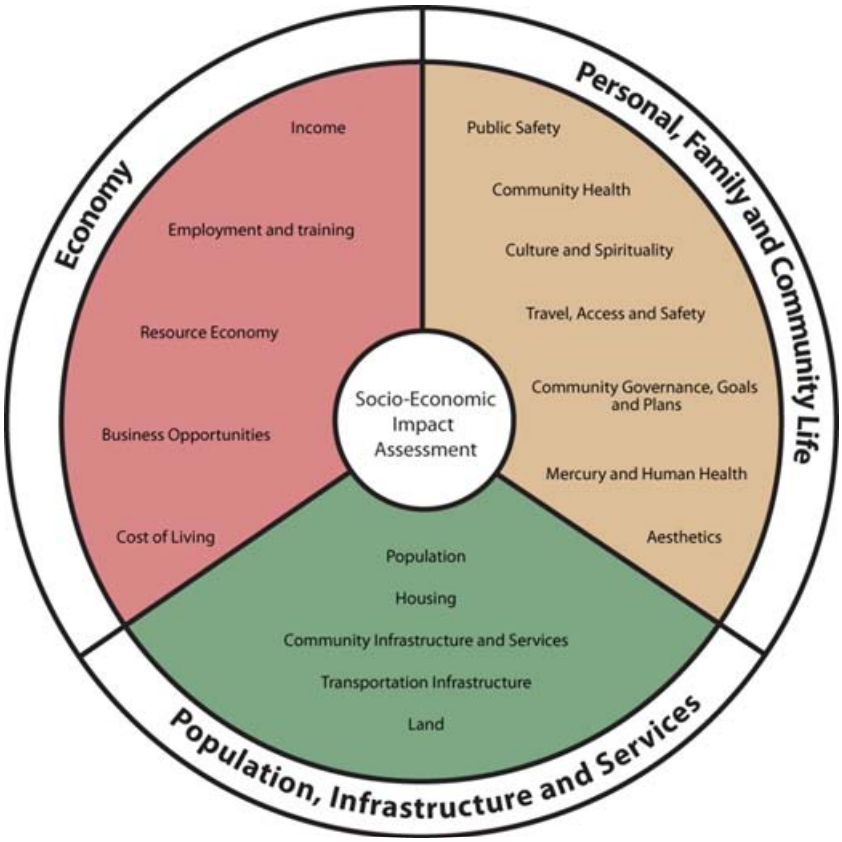
Figure 1-2 illustrates the VECs examined in the SEIA of the Project under the broad components of Economy, Population, Infrastructure and Services, and Personal, Family and Community Life. These have been identified by the EIS Guidelines for the Keeyask Generation Project issued by the Canadian Environmental Assessment Agency in March 2012, and through available studies of other hydroelectric and major development projects (*e.g.*, guidelines, EIS documentation, monitoring studies), as well as through working with the KCNs communities. They are intended to characterize the socio-economic environment using factors that will help to identify changes resulting from the Project. For simplicity, the figure does not illustrate the myriad of connections among these topics, including the following:

- **Economy:** VECs examined include:
  - Employment and training;
  - Business opportunities;
  - Income;
  - Cost of living; and
  - Resource economy.
- **Population, Infrastructure and Services:** VECs examined include:
  - Housing;
  - Community infrastructure and services;
  - Transportation infrastructure; and
  - Land.

Population is considered as a key supporting topic and driver of effects on housing, infrastructure and services.

- **Personal, Family and Community Life:** VECs examined include:
  - Community governance, goals and plans;
  - Community health;
  - Mercury and human health;

- Public safety and worker interaction;
- Travel, access and safety;
- Culture and spirituality; and
- The way the landscape looks (or aesthetics).



Source: InterGroup Consultants.

Figure 1-2: Valued Environmental Components for the Socio-Economic Environment

1.2.6 Scope of Assessment

1.2.6.1 Scope of Project

The Project considered in this SEIA is described in the Project Description Supporting Volume, as well as in Chapter 4 of the EIS. The following activities are not part of the Project:

- The **Keeyask Infrastructure Project** (KIP) (proponent – the Partnership; see discussion that follows);
- The Keeyask Transmission Project (proponent – Manitoba Hydro alone), which includes a transmission line that will bring construction power to the construction site, and transmission lines

that will transmit electricity from the Project to the Radisson Converter Station, where it will enter Manitoba Hydro's integrated power system; and

- The Bipole III Project (proponent – Manitoba Hydro alone), which includes the Keewatinoow Converter Station and a 500 kV HVDC transmission line from the Keewatinoow Converter Station to the Riel Station east of Winnipeg.

The Keeyask Infrastructure Project was licensed in 2011 and began construction in the latter part of 2011. Socio-economic effects of the KIP were assessed in the Keeyask Infrastructure Project Environmental Assessment Report submitted in July 2009.

The Keeyask Infrastructure Project consists of:

- Construction of the 25km north access road that will be used by the Project for vehicle travel to and from the main construction area;
- Construction of Phase 1 of the main construction camp for the Project on the north side of the Nelson River near the Project site. This camp will service workers employed on the Project; and
- Construction and operation of a 125-person start-up camp to service the workers employed on the KIP.

This SEIA accounts for the KIP and its effects as part of the environmental setting for the Project. The KIP and any continuing effects it may create are part of the existing environment to which the Project will be added. Where aspects of the KIP are relevant to assessing the effects of the Project, they are described in the environmental setting and/or in the discussion associated with the assessment of effects.

Monitoring the effects of the KIP is planned. Monitoring results for incorporation in SEIA of the Project were not available at the time of filing.

Effects of the Keeyask Transmission Project will be assessed in a separate EA document that is being submitted to regulators in the fall of 2012.

The Bipole III Project effects are assessed in a separate EIS that was submitted in 2011, prior to the Project EIS.

1.2.6.2 Temporal and Spatial Scope

The assessment focuses on Project-related activities and effects that are expected to occur after the regulatory approvals required to start construction have been received. The temporal scope of the SEIA includes the following phases of the Project:

- **Construction Phase:** Construction of the Project would occur over eight and a half years, with an expected start in 2014. Construction-phase effects on the socio-economic environment are likely to be different in character than those during the operation phase; and
- **Operation Phase:** Beginning in approximately late 2019, the Project would begin operating with the first unit in service. The remaining generation units would be installed and final commissioning completed in 2022. The Project is intended to operate for a century or more with regular

maintenance and upgrades. If the Project is decommissioned at some point in the future, it will be undertaken according to the legislative standards of that time.

A decommissioning phase of the Project has only been dealt with in the main EIS. It notes that, if the Project is due to be decommissioned, a decommissioning plan will be developed well in advance of that phase and according to the standards current at that time. It is expected that such a decommissioning plan would be reviewed with regulatory authorities.

By the time the Project receives its regulatory approvals, the planning and assessment phase, underway since 2000, will be completed and its effects will have occurred already. Where relevant, the nature and effects of the planning and assessment phase are incorporated in the understanding and description of the environmental setting.

The spatial scope of the SEIA is addressed in Section 1.3.

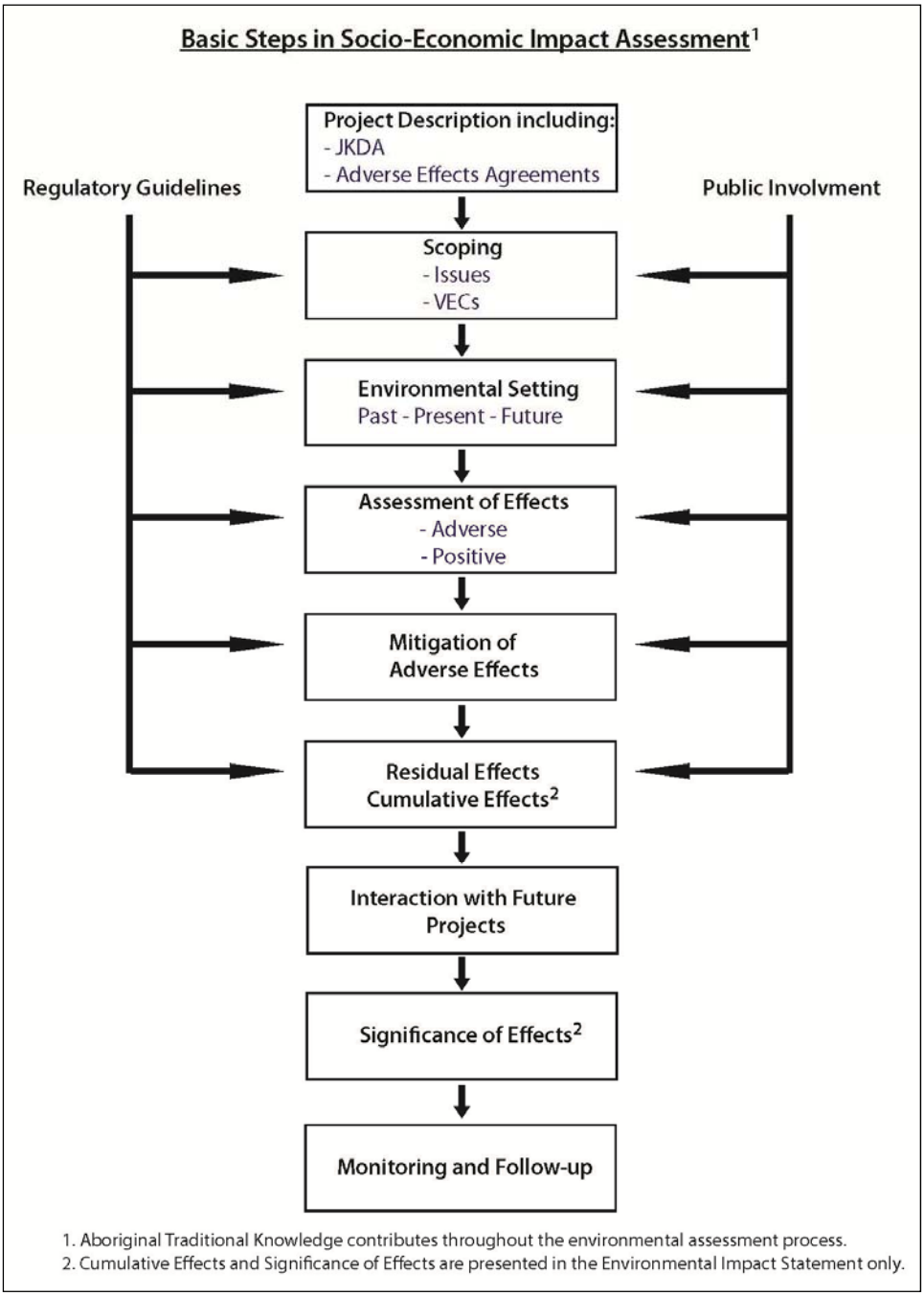
1.2.7 Assessment Methodology

1.2.7.1 Approach

Figure 1-3 presents the basic steps used to assess socio-economic effects of the Project. Key steps included:

- **Project Description:** Defined the characteristics of the Project, which may affect the environment. In this case, the JKDA and AEAs are integral to the implementation of the Project. Therefore, measures identified in these documents (*e.g.*, measures to reduce adverse effects) were considered to be already in place;
- **Scoping:** Identified key issues to be addressed in the EA and VECs that were of importance to people who may be affected by the Project or that helped to clarify the effects of the Project. Regulatory guidelines defined the requirements of the EA process (CEAA 2012). Public involvement, including the KCNs interactions, also helped to identify VECs and issues of concern;
- **Environmental Setting:** Described the existing environment, including the past, the present and the future without the Project (where available);
- **Assessment of Effects:** Assessed the effects of the Project, considering both adverse effects and positive effects;
- **Mitigation of Adverse Effects:** Identified **mitigation** measures to reduce adverse effects;
- **Residual Effects, Cumulative Effects:** Identified the effects that would remain after the application of mitigation measures. Cumulative effects are presented in Chapter 7 of the EIS only;
- **Significance of Effects:** Presented in Chapter 6 of the EIS only; and
- **Monitoring and Follow-up:** Identified monitoring measures to be implemented along with the Project to determine if effects will be as expected and identified follow-up measures to manage effects if they are determined to be different than predicted or to identify unanticipated effects.

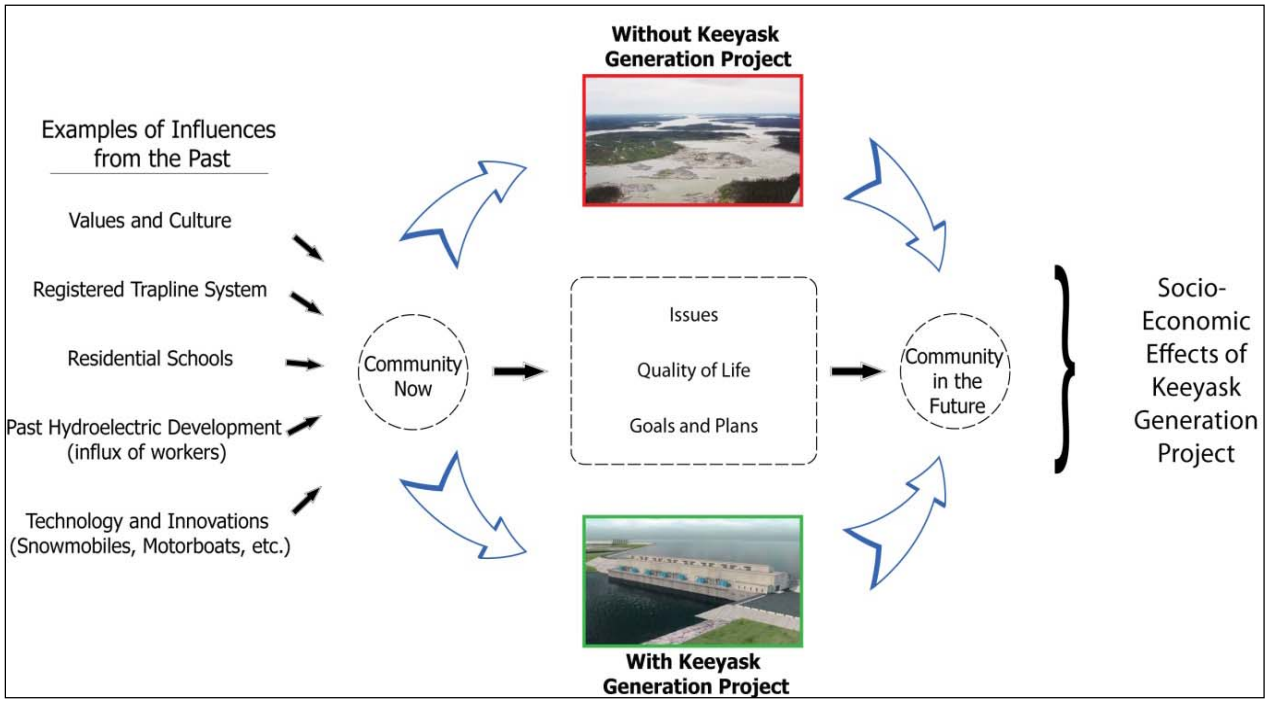
Consistent with the other supporting volumes in this series, cumulative effects assessment and the significance of effects are not presented in the supporting volume; rather they are presented in the EIS Chapter 8, which includes the full range of biophysical and socio-economic effects of the Project.



Source: InterGroup Consultants.

Figure 1-3: Basic Steps in Socio-Economic Impact Assessment

Figure 1-4 presents, at a general level, key concepts employed in the approach of this SEIA. These concepts are applied in Sections 3, 4 and 5 of this supporting volume, which present the environmental baseline and effects assessment for the socio-economic VECs.



Source: InterGroup Consultants.

Figure 1-4: Approach to Socio-Economic Impact Assessment

The figure above illustrates the following:

- **The Importance of the Past in Understanding Today's Socio-Economic Environment:** Communities in the immediate vicinity of the Project have been subject to a wide range of past influences, including actions that shaped the nature, extent and location of their activity on the land (*e.g.*, Treaties, *Natural Resources Transfer Act* and Registered Trapline System), actions that affected their social well-being and culture (*e.g.*, residential schools), technology and innovations (*e.g.*, snowmobiles and motorboats), and of particular relevance to this assessment, past hydroelectric developments. Understanding the past helps to understand the communities today, including their worldview, values, issues and vulnerabilities. The KCNs communities emphasized the importance of examining the past, including learning about and from their experience with previous hydroelectric development;
- **The Understanding of the Future without the Project:** The existing environment will continue to evolve and change without the Project. The influences of the past, as well as the actions of today, would affect the nature of the socio-economic environment in the future. To the extent feasible, the socio-economic assessment examined what that future environment may look like without the

Project. Since the Project would occur in the future, this is the appropriate background against which to ascertain Project effects;

- **The Understanding of Community Goals and Plans for the Future:** Unique to the socio-economic environment is the influence that community goals and plans can have on the future and on how the Project may affect that future. Typically, communities of people have goals and plans that are designed to improve the future of their community, resulting in change. Therefore, an understanding of those goals and plans is important. In addition, the perspectives of people regarding their future can influence how they see effects of a project (*e.g.*, the type of benefits derived from the project may or may not fit with those goals and plans). This could even influence whether a project effect is considered to be adverse or positive; and
- **Identifying Effects:** A socio-economic effect is the difference between what the socio-economic environment would be like in the future with the Project and without the Project.

1.2.7.2 Methods

The SEIA employed both quantitative and qualitative methods to assess effects on VECs.

Quantitative methods were used in three key areas:

- **Economy:** A quantitative supply/demand model was developed to assess the extent to which construction employment opportunities would be filled by the northern Aboriginal **labour force**, the Aboriginal labour force in the Churchill-Burntwood-Nelson area (as defined in the **Burntwood-Nelson Agreement[1] (BNA)**) and the labour force in the KCNs communities. The analysis considered a wide range of factors, including the effect of a major pre-Project training initiative targeted at northern Aboriginal residents. In addition, results of quantitative input-output modelling with respect to the economic effects of Project expenditures on the provincial and Canadian economy were reported;
- **Population, Infrastructure and Services:** Quantitative methods were used to characterize the past and present population of the **Local Study Area**. A population projection model was employed to project that population into the future without the Project. Where available, quantitative estimates of the current and future capacities of housing, infrastructure and services were identified; and
- **Community Health and Human Health Risk Assessment:** A key source of information to characterize health status and health issues in the Local Study Area (see Section 1.3.1) were the results of a quantitative analysis of the rates of disease for communities in the Local Study Area. Where possible, these rates were compared to rates of the Burntwood Health Region and to provincial rates. However, these analyses were supplemented with qualitative information about

[1] The BNA (Hydro Projects Management and Allied Hydro Council 2009) is a collective agreement that sets out employment conditions, including hiring preference for northern Aboriginal residents and northern residents, for the construction of, among other projects, any new hydroelectric generating station on the Nelson and Burntwood rivers, including the Wuskwatim and Keeyask generation projects.

health status and health issues obtained from community-based **Key Person Interviews (KPIs)** and workshops. The specific topic of the methylmercury pathway between Gull Lake and Stephens Lake and people in the Local Study Area was addressed through a quantitative human health risk assessment that calculated the risk to women of child-bearing age, other adults and children from eating a range of country food from this area.

Qualitative methods were used in characterizing other aspects of the socio-economic environment and in assessing effects on them. These techniques primarily relied on information from socio-economic fieldwork programs including KPIs, workshops with KCNs Members and community meetings. Each section in this volume discusses the specific methods used to assess the VECs included in that chapter.

It should also be noted that the socio-economic assessment begins with the conclusions of studies of other components of the environment. In particular, conclusions about effects of the Project on the physical and biophysical environment (as described in the Physical Environment Supporting Volume, Aquatic Environment Supporting Volume and Terrestrial Environment Supporting Volume) were carried forward to examine **pathways of effect** to people in such areas as resource economy, health and culture.

As noted earlier in this chapter, ATK was important throughout the EA process. ATK from community studies and the Environmental Evaluation Reports prepared by CNP, YFFN and FLCN were drawn into the SEIA, particularly with respect to effects on the KCNs in the Local Study Area.

1.2.7.3 Uncertainty

Uncertainty in EA is a fact. Predicting the future socio-economic environment with and without the Project has limitations due to uncertainties associated with a variety of reasons – for example:

- Lack of data and limitations of existing data;
- Lack of literature or experience regarding certain types of effects; and
- Differences in data obtained from various sources.

This SEIA addressed uncertainty in the following ways:

- Identified limitations of data sources used in the analysis;
- Identified limitations of analyses undertaken due to lack of data or experience;
- Wherever possible, identified more than one source of information to attempt to gain a deeper understanding of the topic (*e.g.,* **triangulation)**. This method was used throughout the SEIA wherever feasible;
- Presented ranges where there was substantial uncertainty, such as an estimate of the number of in-migrants, with valid assumptions for both the lower and upper bounds of the range;

- Presented scenarios showing results under different sets of model assumptions (*e.g.*, construction employment results are presented for different scenarios);
- Identified people and processes capable of mitigating effects. If appropriate processes are in place and relevant people are identified, they may adapt and find solutions to effects; and
- Set out monitoring plans to determine the actual changes that occur with implementation, along with associated follow-up actions to manage effects if they are different than predicted, or if unanticipated effects occur.

1.3 STUDY AREA

The extent to which the Project would have an effect on people depends largely on their proximity to and level of involvement in the Project. Two geographic regions were examined:

- The Socio-Economic Local Study Area; and
- The Socio-Economic Regional Study Area.

Each of these is described below.

1.3.1 Socio-Economic Local Study Area

The Socio-Economic Local Study Area (see Map 1-1) for the SEIA focuses on the four KCNs communities of TCN, WLFN, YFFN and FLCN, which are affected by the Project through the following pathways of effect:

- Physical/biophysical effects on **resource use**/traditional use areas and heritage resources;
- Employment and business effects;
- Construction worker interaction within the partners' home communities; and
- Investment income.

In addition to these partner communities, the Town of Gillam and the City of Thompson are included in the Local Study Area for the following reasons:

- The Town of Gillam is Manitoba Hydro's northern operations base and operational staff would be located in Gillam. Gillam is also home to FLCN Members living both on- and off-reserve;
- Construction worker interaction, since some construction workers are likely to visit Gillam and Thompson and possibly Split Lake during their leisure time;
- Transportation/traffic for construction equipment, materials and people would flow primarily through Thompson, with some via Gillam; and
- The City of Thompson is the regional centre for the Project and as such, can be expected to experience increased expenditures on retail goods and services due to re-spending of wages by the

Project construction workforce. Some commercial and industrial services in Thompson could see increased demand, (*e.g.*, air and freight travel through Thompson). As well, Thompson could receive additional pressure on regional health and social services.

The Local Study Area incorporates the Project site as defined and described in the Project Description Supporting Volume.

1.3.2 Socio-Economic Regional Study Area

Certain Project effects, in particular preferential employment of workers in construction jobs, will extend beyond the Local Study Area and cover all of northern Manitoba. For this reason, the Socio-Economic Regional Study Area has been defined using the boundary identified under Schedule D of the current BNA (see Map 1-2). For the purposes of statistical data collection from **Statistics Canada**, this region encompasses Census Divisions 19, 21, 22 and 23.

According to the 2006 Census of Canada, the population for the Regional Study Area was 84,295. Of this population, about 72 %, or 61,000 people self-identified as being of Aboriginal descent (Statistics Canada 2007a).

The Regional Study Area includes the Churchill-Burntwood-Nelson (CBN) communities identified in the 2009 BNA under the employment hiring preference Zone 1 (see Map 1-2 and Table 1-1).

Table 1-1: Communities within the Churchill-Burntwood-Nelson Region

First Nation Communities	Northern Affairs Communities
Nisichawayasihk Cree Nation	Granville Lake
Tataskweyak Cree Nation	Nelson House
York Factory First Nation	Ilford
Fox Lake Cree Nation	Wabowden
War Lake First Nation	Thicket Portage
Norway House Cree Nation	Pikwitonei
Cross Lake First Nation	Norway House
	Cross Lake

Towns	City
Town of Gillam	City of Thompson
Town of Leaf Rapids	
Churchill	

Source: Hydro Projects Management and Allied Hydro Council 2009.

Communities in the Regional Study Area (including the CBN) are important to examine for the construction employment pathway of effect. However, other pathways of effect are not expected to be substantive enough to warrant the type of extensive, detailed study that was required to support the range of effects in the Local Study Area.

It should be noted that the Project would have economic effects on both Manitoba and Canada, and these effects are included in the SEIA analysis. Economic effects from the Project in the provincial and national economies would include contributions to **Gross Domestic Product** as a result of Project expenditures for products, services and labour; direct Project employment; and government revenues earned through income and sales taxes. This analysis is described in Section 3.4.1.12, Economy of Manitoba and Canada, but these broader study areas are not illustrated here.

1.4 SOURCES OF INFORMATION

Information used in the development of the SEIA was derived from the following main sources:

- Statistical data sources including data obtained from Statistics Canada, Aboriginal Affairs and Northern Development Canada (previously Indian and Northern Affairs Canada, or INAC), Health Canada First Nation and Inuit Health Branch (Health Canada), Manitoba Health and Manitoba Infrastructure and Transportation;
- The KCNs Environmental Evaluation Reports;

- Reports prepared by the KCNs, including community reports and memos that are referenced in this filing. Materials from these documents were used with the permission of each First Nation;
- A program of KPIs examined the environmental setting, identified areas where VECs could potentially be affected by the Project and discussed possible means to mitigate adverse effects. KPIs were conducted with KCNs Members and other residents of the KCNs communities as well as residents of Gillam and Thompson;
- Workshops with targeted groups focused on topics of interest within each of the KCNs communities;
- Historical studies and SEIA literature were reviewed with respect to migration of Aboriginal populations, worker interaction, cost of living methodology, determinants of health and other topics in the personal, family and community life section relevant to the Local Study Area; and
- Previous SEIAs and EISs of other relevant projects, particularly large-scale projects in Canada, were used to:
    - Assist in determining the major sources of effects on the socio-economic environment;
    - Assist in identifying or determining the nature or extent of effects; and
    - Identify possible monitoring and effects management strategies based on those that have been used on other similar projects.

Key project EISs/SEIAs and reports considered as part of this review included the following:

- Wuskwatim Generation Project: Both the Environmental Impact Statement (Manitoba Hydro and NCN 2003) and annual monitoring reports (Wuskwatim Power Limited Partnership 2007, 2008, 2009, 2010);
- Split Lake Cree Post Project Environmental Review: A series of volumes focused on a post-project environmental review of hydro projects in the vicinity of Split Lake as part of planning for potential new hydroelectric projects at Gull and Birthday Rapids (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a, 1996b);
- Lower Churchill Hydroelectric Generation Project: Review of the EIS (Nalcor Energy and Newfoundland and Labrador Hydro 2009) in terms of socio-economic impacts and use of ATK; and Lower Churchill Hydroelectric Generation Project: Report of the Joint Review Panel (Joint Review Panel 2011) for socio-economic recommendations;
- Carmacks-Stewart Transmission Project: Review of the Project Proposal Submission (Yukon Energy Corporation 2006) to the Yukon Environmental and Socio-Economic Assessment Board in terms of socio-economic effects, approach and methodology;
- Eastmain 1-A and Rupert Diversion: Review of the EIS (Hydro-Québec 2004) in terms of socio-economic effects and monitoring, use of ATK, and cumulative effects assessment;

- Mackenzie Valley Gas Project: Review of the EIS (Imperial Oil Resources Ventures Limited, Mackenzie Valley Aboriginal Pipeline Limited Partnership, ConocoPhillips Canada (North) Limited, ExxonMobil Canada Properties, and Shell Canada Limited 2004) in terms of socio-economic effects, baseline studies, approach and methodology, and ATK;
- Snap Lake Diamond Mine (De Beers Canada Inc. 2004)/Diavik Diamond Mine (Diavik Diamond Mines Inc. 1998)/Ekati Mine (BHP Diamonds Inc. 1996): Review of the EISs in terms of socio-economic effects and monitoring, cross-cultural training, and employment, training and business development;
- Kemess North Mine Expansion: Review of the EIS (Northgate Minerals Corporation 2005) in terms of approach and methodology and cumulative effects assessment; and
- Primrose East Expansion: Review of the EIS (Canadian Natural Resources Limited 2006) in terms of personal, family and community life topics within the SEIA and ATK.

1.5 SUMMARY OF PROJECT COMPONENTS RELEVANT TO THE SOCIO-ECONOMIC ENVIRONMENT

1.5.1 Project Components Relevant to Construction-Phase Effects

Project components identified as having the potential to affect the socio-economic environment during the construction phase included the following:

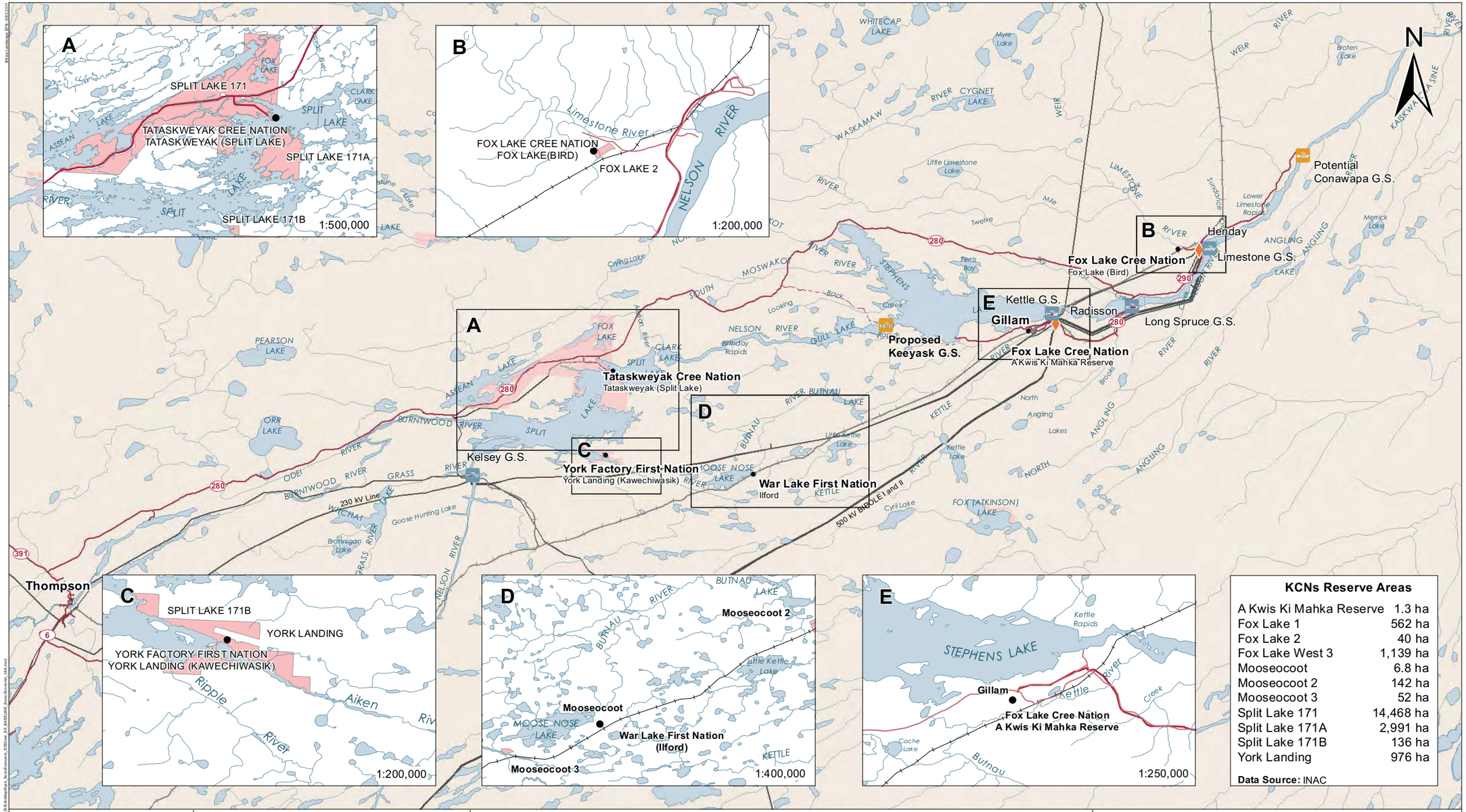
- Physical changes to the land and water that have the potential to affect the health and safety of people;
- Physical changes to the land and water that have the potential to affect heritage resources and the cultural relationships of people to the environment;
- Physical changes that alter the character and appearance of the landscape;
- Project-related changes to terrestrial and aquatic species used by people for domestic or commercial purposes;
- In-migration of construction workers;
- Presence of the main construction camp north of the river and a smaller construction camp south of the river;
- Transportation of equipment, materials and workers to and from the construction site;
- Construction employment opportunities for qualified Aboriginal workers;

- Construction business opportunities through **Direct-Negotiated Contracts (DNCs)** for KCNs businesses;
- Other construction business opportunities; and
- Opportunities associated with the JKDA and AEAs with TCN, WLFN, YFFN and FLCN.

1.5.2 Project Components Relevant to Operations-Phase Effects

Project components identified as having the potential to affect the socio-economic environment during the operation phase included the following:

- Physical changes to the land and water that have the potential to affect health and safety of people;
- Physical changes to the land and water that have the potential to affect heritage resources and the cultural relationships of people to the environment;
- Physical changes that alter the character and appearance of the landscape;
- Project-related changes to terrestrial and aquatic species used by people for domestic or commercial purposes;
- Operation phase employment opportunities associated with the Project;
- Operations employment opportunities throughout Manitoba Hydro's system associated with JKDA commitments and targets;
- Equity income from the KCNs' participation in the Project;
- Financial payments and implementation of programs associated with the KCNs' AEAs;
- Expansion of the town of Gillam in response to operations-phase employment; and
- Changes to PR 280 along the north access road, across the generating facility and along the south access road into Gillam.


A
SPLIT LAKE 171
TATASKWEYAK CREE NATION
TATASKWEYAK (SPLIT LAKE)
SPLIT LAKE 171A
SPLIT LAKE 171B
1:500,000
B
Limestone River
FOX LAKE CREE NATION
FOX LAKE(BIRD)
FOX LAKE 2
NELSON RIVER
1:200,000
N
Potential
Conawapa G.S.
Henday
Limestone G.S.
Fox Lake Cree Nation
Fox Lake (Bird)
Kettle G.S.
Gillam
Radisson
Long Spruce G.S.
Proposed
Keeyask G.S.
Fox Lake Cree Nation
A Kwis Ki Mahka Reserve
Tataskweyak Cree Nation
Tataskweyak (Split Lake)
Kelsey G.S.
York Factory First Nation
York Landing (Kawechiwasik)
War Lake First Nation
Ilford
230 kV Line
500 kV BIPOLE I and II
Thompson
C
SPLIT LAKE 171B
YORK LANDING
YORK FACTORY FIRST NATION
YORK LANDING (KAWECHIWASIK)
1:200,000
D
Mooseocoot 2
Mooseocoot
Mooseocoot 3
War Lake First Nation
(Ilford)
1:400,000
E
STEPHENS LAKE
Gillam
Fox Lake Cree Nation
A Kwis Ki Mahka Reserve
1:250,000
KCNs Reserve Areas
A Kwis Ki Mahka Reserve 1.3 ha
Fox Lake 1 562 ha
Fox Lake 2 40 ha
Fox Lake West 3 1,139 ha
Mooseocoot 6.8 ha
Mooseocoot 2 142 ha
Mooseocoot 3 52 ha
Split Lake 171 14,468 ha
Split Lake 171A 2,991 ha
Split Lake 171B 136 ha
York Landing 976 ha
Data Source: INAC
DATA SOURCE:
Manitoba Hydro, NTS, Stantec Consulting Ltd.
CREATED BY:
Stantec Consulting Ltd.
COORDINATE SYSTEM:
UTM NAD 1983 Z15N
DATE CREATED:
16-DEC-10
REVISION DATE:
18-MAY-12
0 8.5 17 Kilometres
0 7 14 Miles
VERSION NO:
1.0
QA/QC:
GS/YYY/MWZ
Legend
Generating Station (Planned)
Generating Station (Existing)
Converter Station
First Nation Community
Town/City
Highway
Proposed Access Road
Rail
Existing Transmission Line
First Nation Reserve
Waterbody
Communities depicted on the map are included in the Socio-Economic Local Study Area
Socio-Economic
Local Study Area

Map 1-1

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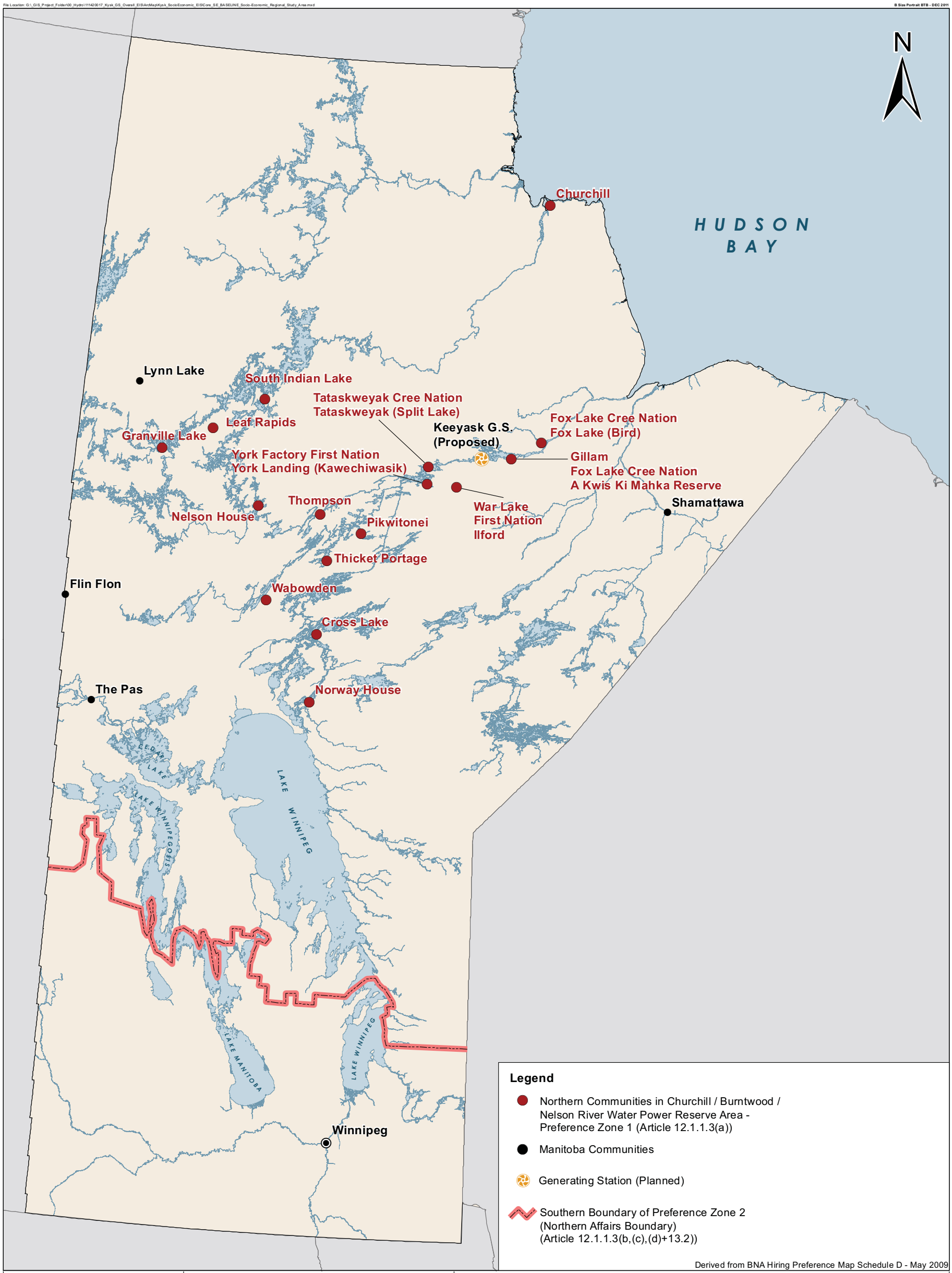

KEEYASK Hydropower Limited Partnership

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Socio-Economic Regional Study Area

Map 1-2

SECTION 2
HISTORICAL CONTEXT

KEEYASK
Hydropower Limited Partnership

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

2.0 HISTORICAL CONTEXT

This section provides an overview of recent and past events that contributed to the current socio-economic environment of the Regional Study Area, which covers northern Manitoba (see Section 1.3 for the definition of the study areas) with a focus on communities in the Socio-Economic Local Study Area. The section includes:

- A discussion of the Regional Study Area and brief summary of the development of northern communities;
- An historical overview and high level summary of the major influences of change in the region;
- A description of hydroelectric development projects and their direct effects on the water, land and communities in the Local Study Area; and
- An historical review of each community in the Local Study Area. The focus of this section is not on developing a comprehensive historical account for each community; rather it focuses on identifying events and patterns of change that shape the current lives and decision-making processes of the people in each of these communities. The following communities are part of the historical review:
  - Cree Nation Partners (CNP), including:
    - Tataskweyak Cree Nation (TCN) and the Split Lake reserve community (formerly known as Split Lake First Nation); and
    - War Lake First Nation (WLFN) at Ilford (prior to 1980 WLFN Members were part of Tataskweyak Cree Nation);
  - York Factory First Nation (YFFN) and the York Landing reserve community;
  - Fox Lake Cree Nation (FLCN) and the reserve community at Fox Lake (formerly Bird) and Gillam (prior to 1947 FLCN was part of YFFN);
  - The City of Thompson; and
  - The Town of Gillam (as noted above, home to FLCN).

This section addresses and responds to the joint planning for the Keeyask Environmental and Regulatory Protocol outlined in Section 1.2.2, including Aboriginal traditional knowledge (ATK). One of the values acknowledged as important to the EA process and inherent in the ATK principles is to provide a historical review of the Local Study Area as context for the assessment. This section focuses on how the KCNs have an interrelated history with Manitoba Hydro.

To describe the historical context of northern Manitoba, this section compiles information provided through the KCNs' own community studies and environmental evaluation reports, key person interview (KPI) programs with northern communities conducted by the socio-economic study team as well as other sources of information including the Hudson Bay archives. Past studies related to hydro

development and the Environmental Impact Statement (EIS) are incorporated into the discussion where applicable.

2.1 REGIONAL STUDY AREA OVERVIEW

This section presents an overview of the Regional Study Area and focuses on the development of northern Manitoba communities. For thousands of years Aboriginal people have inhabited these lands, situated on the Canadian Shield and along the Manitoba Hudson's Bay coastline and its interior. European settlement and influence began in the 1600s in northern Manitoba. In the past 200 years, a wide range of influences and activities have transformed the diversity of demographics, economy, infrastructure and use of the natural resources of the region.

The Regional Study Area includes a land area of approximately 438,929 km². Map 1-2 illustrates the general boundaries of the Regional Study Area, which are consistent with those defined under Schedule D of the current Burntwood-Nelson Agreement (BNA). The Regional Study Area is also relatively consistent with Statistics Canada Census Divisions 19, 21, 22 and 23, differing slightly in the most southeastern and southwestern boundaries. The communities of the Regional Study Area are also depicted in Map 1-2. The southern boundary of the BNA hiring preference zone is depicted as context for the geographic size of the Regional Study Area.

Table 2-1 shows the population of the Regional Study Area for each census year from 1991 to 2006. According to Statistics Canada data, the population of the Regional Study Area was approximately 84,600 in 2006. Approximately 72% of the people self-identified as Aboriginal.

Table 2-1: Population of Regional Study Area

Census Year	Total Regional Study Area
1991	76, 591
1996	83,134
2001	82,427
2006	84,600

Source: Statistics Canada 1992, 1997, 2002 and 2007a.

Note:

- This is the total populations of Census Divisions 19, 21, 22 and 23.

2.1.1 Historical Influences on Settlement

The original inhabitants of Manitoba were nomadic Aboriginal tribes, who lived off the land and typically followed a seasonal cycle, timing their movements to take advantage of the region's natural resources. The first Europeans to arrive to what is now the Province of Manitoba were fur traders in the 1600s. With them came new external economic and social influences to the Aboriginal people who had occupied the area for several thousands of years. Between the 1600s to early 1900s, the fur trade expanded and

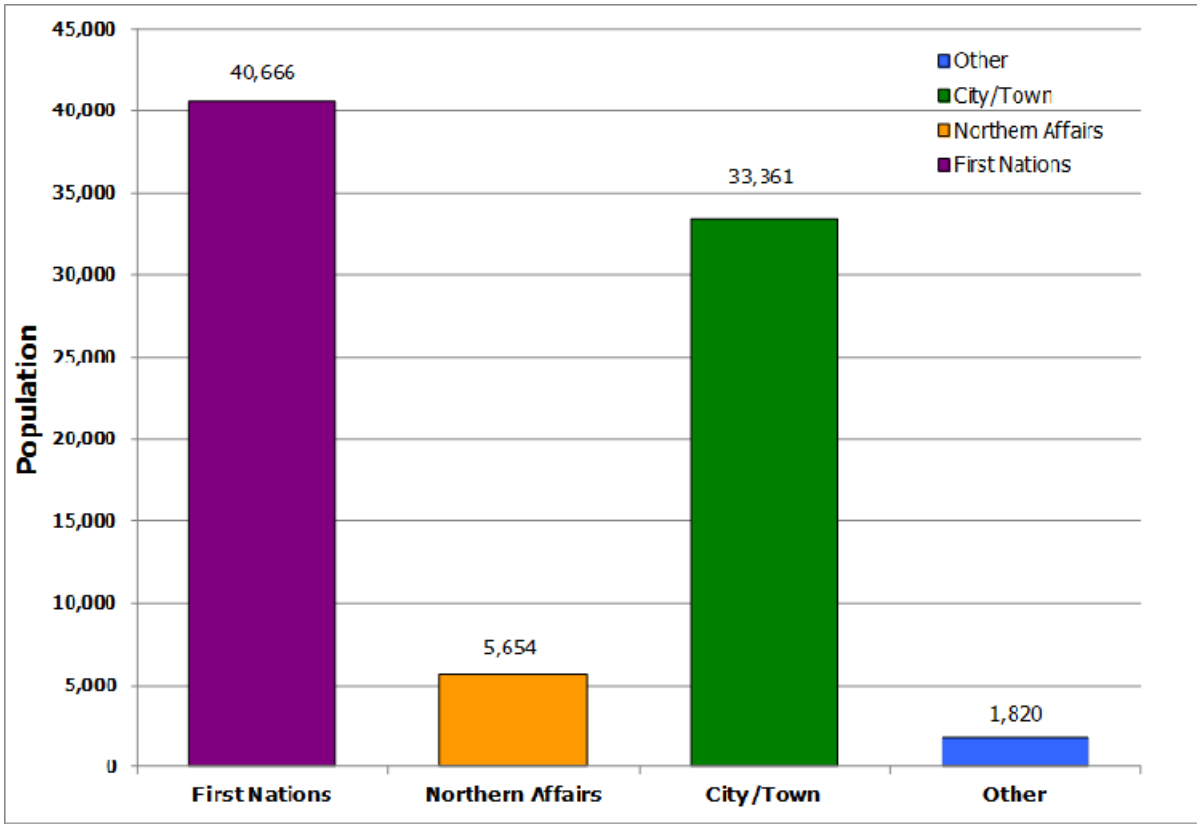
many Aboriginal people were introduced to external economic and social influences on the northern region. Although colonization of the southern regions of Manitoba began in the 1800s, it was not until the late 1800s that increased interest in northern Manitoba occurred.

In the 1800s, colonization began to fully claim and develop the southern regions of the province. Treaties were negotiated and implemented to transfer ownership of lands from Aboriginal tribes to the Crown for development by new immigrants in return for the protection of Treaty rights and reserve lands. Within eight years of Canada's confederation, Treaty 5 was negotiated (in 1875), and adhesions to the treaty were signed in 1908 and 1910 by Split Lake and York Factory First Nations, respectively. In 1912, Manitoba's political boundaries were extended northward to include the entire northern area of what is known today as the Province of Manitoba (Manitoba Historical Society 2010).

Among the many other external forces that followed were the *Natural Resources Transfer Act* of 1930, the registered trapline system, residential schools and the development of transportation and communication infrastructure. The Hudson Bay Railway, which had been under construction off and on since 1910, was completed in 1929 (Malaher 1984). These influences opened the north to further industrial expansion of forestry, mining and hydroelectricity. This historical influence and new settlement in the region affected the way of life and culture of the Aboriginal population, transforming their seasonal, more nomadic way of life to a more sedentary way of life in communities.

2.1.2 Community Development in the Regional Study Area

The Regional Study Area's communities have evolved into three distinctive groupings: First Nations reserve communities, Northern Affairs communities, and industrial towns and cities. The vast majority of the population live in these types of communities with a very small proportion of individuals living in other more remote areas classified under rural municipalities, crown land or server lands (NMEDC 1992). Figure 2-1 provides a visual representation of the proportion of the Regional Study Area population that lives in each type of community.



Notes:
1. Since Statistics Canada uses random rounding and other procedures to ensure confidentiality, the totals in this figure do not equal the total population counts for 2001 in the Regional Study Area.
2. The total population of First Nation communities was obtained by summing the population of each community in Census Divisions 19, 21, 22 and 23 that Statistics Canada defines as a First Nation.
3. The total population of Northern Affairs communities was obtained by summing the 2001 total population of each community listed as a Northern Affairs community by Manitoba Aboriginal and Northern Affairs (Government of Manitoba 2011).
4. The total population of cities and towns, which includes local government districts and rural municipalities, was obtained by summing the total population for each community in Census Divisions 19, 21, 22 and 23 that Statistics Canada defined as a city, town, local government district or rural municipality.
5. The total population included in "other" was obtained by summing the unorganized census division data in Census Divisions 19, 21, 22 and 23 but excluding all communities listed as Northern Affairs communities. This number is not precise as there could be overlap with Northern Affairs populations. This number has been rounded to the nearest 100.

Figure 2-1: Total Population[1] of the Regional Study Area by Community Type: First Nation[2], Northern Affairs[3], Cities and towns[4] and Other[5] (2001)

First Nations make up nearly half of the 2001 Regional Study Area population (49.9%). The next largest portion of the population (41%) resides in cities and towns in the Regional Study Area. Although the number of Northern Affairs communities is similar to the number of First Nation communities, the total Northern Affairs population represents the third lowest of the Regional Study Area, at 6.9%. The remaining population (2.2%) falls into the "Other" category living in rural, unorganized communities (Statistics Canada 2002). The information supports the diverse demographics now present in the Regional Study Area.

2.1.2.1 First Nations Communities

Today, the population living in First Nations communities is primarily Status Indian. As shown on Map 1-2 (Socio-Economic Regional Study Area), there are 41 First Nation reserve communities listed. In 2001, the total population of these reserves was approximately 40,666 (Statistics Canada 2002). This is the largest segment of the population in the Regional Study Area.

2.1.2.2 Northern Affairs Communities

Present-day Northern Affairs communities have developed as Non-Status Indians and Metis dispersed throughout the Regional Study Area. Many found employment on the Canadian National Railway and founded a number of small communities along the Canadian National Railway rail line (NMEDC 1992). The Northern Affairs communities include Metis communities and settlements adjacent to reserves. Together, all the Northern Affairs communities had a population of about 5,654 in 2001 (Statistics Canada 2002). Some had larger populations ranging from 300 people to about 700 people, while the majority had fewer than 100 residents and some had 10 or fewer people (NMEDC 1992).

2.1.2.3 Growth of Incorporated Municipalities as Industrial Communities

As demand for natural resources increased, a number of single-industry communities were created across the north. These communities provided housing and services for employees in the mining, forestry, electricity and transportation sectors. Although some single-industry communities, such as Flin Flon, remain vibrant today, others experienced a decrease in population related to economic declines in industry employment. Approximately 41% of the Regional Study Area's population lived in incorporated industrial cities or towns in 2001. The City of Thompson represents over 42% of this population, with approximately 14,040 people in 2001. Together, the incorporated municipalities had a total population of about 33,361 in 2001 (Statistics Canada 2002).

Incorporated municipalities and industrial communities in the Regional Study Area have flourished and declined with the northern economy and demand for resources. The two largest communities in the Regional Study Area today are Thompson and Flin Flon, which were mining communities that diversified and became regional centres. The Town of The Pas was incorporated in 1912 and was the first regional centre to emerge in northern Manitoba. The Pas was built on the fur trade, the Hudson's Bay Railway, agriculture and the provision of government services. The forestry sector further diversified the economic base of northern Manitoba communities in the 1960s. Churchill is the region's most northerly incorporated municipality, which functions as a transportation centre and also relies on tourism for economic diversity. Gillam and Grand Rapids grew into industrial communities when Manitoba Hydro began major hydroelectric power development in the north. Snow Lake is a mining community in the Regional Study Area with an economy linked to the mining sector.

2.2 LOCAL STUDY AREA

Section 2.2.1, below, describes drivers of change and community development in the Local Study Area from pre-contact to present day.

2.2.1 Historical Overview of the Local Study Area

This section describes the history of the Cree and outlines the development of Cree communities and industrial communities in the Local Study Area. Emphasis is placed on key drivers of change since European settlement and industrial development, beginning with the Hudson Bay Company York Factory Post of 1682 and ending with the present day Project Partnership. The overall purpose is to provide a snapshot of the past and to place each Local Study Area community in its historical context as related to the planning and environmental assessment (EA) process for the Project.

Figure 2-2 shows the overall themes of change that have influenced all of the main communities in the Local Study Area[1]. The figure illustrates major influences affecting development of the Local Study Area communities. Figure 2-2 highlights the common historic threads, drivers of change and major transitions that resulted in inter-cultural connections between the Cree and outsiders, including often distant outside institutions. The figure follows a temporal and visual history with the following key components:

- Blue rectangles represent the development of the KCNs communities;
- Orange rectangles illustrate communities that developed through European and industrial influences; and
- Yellow octagons reflect influences integral to change within the communities that were imposed by government and industrial development such as agreements, policy implementation processes and major developments.

2.2.1.1 Pre-Contact

The Cree have resided on the land that is now northern Manitoba since before recorded history. Archaeological evidence suggests that ancestors of the KCNs have lived in and around the Local Study Area for over 5000 years (see the Heritage Resources section). They were not part of a community defined strictly by place, as their communities did not have defined or rigid geographic boundaries. Prior to first contact with European settlers, members of communities had a long nomadic history of living off the land in areas along the coast of the Hudson Bay and its interior northern region. Their territory covered the land and waterways surrounding the Nelson River and Hudson Bay Coast (Split Lake Cree – Manitoba Hydro Joint Study Group 1996b; WLFN 2002; FLCN 2009a Draft; YFFN Evaluation Report (*Kipekiskwaywinan*)). Many lived in scattered hunting clans and followed an annual cycle of migration prescribed by the natural yearly cycle of the water and lands in northern Manitoba. The clans were comprised of extended families, who gathered at certain times of the year to share in harvest and engage in other traditional activities. There were customary areas where families would winter, and then reconvene with other family groups in the summer at specific gathering places. Knowledge of these traditional migration routes was passed on to younger generations through oral history, which taught how the waterways and lands provided travel routes and resources to sustain their lives. These clans were not associated with a specific First Nation but referred to themselves as *Ininewak*. In history documents, the

[1] The Figure is located at the end of the chapter.

Cree name *Maskego-Eniniwuk*, meaning Swampy Cree, is given to the group of *Ininewak* who lived in the Hudson Bay lowlands. Archaeological evidence shows their occupation of the land along these traditional routes and encampments date back several thousand years (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a; WLFN 2002; FLCN 2009a Draft; YFFN Evaluation Report (*Kipekiskwaywinan*)).

2.2.1.2 Early Contact and Fur Trade

Europeans journeyed into the Hudson Bay early in the seventeenth century and by the latter half of the century Europeans were settling within the Regional Study Area (Manitoba Historical Society 2010). The Cree's first contact with outsiders centered on the fur trade and Christian missions. These two elements foreshadowed the development of communities in the region as well as the Cree's transition from a more nomadic lifestyle to a settled lifestyle in communities. Fur trade posts were often located near traditional gathering spots and seasonal camps of the Cree, and more permanent communities grew out of the camps. York Factory was one of the first European settlements and was based around the Hudson Bay Company York Factory Fur Trade Post, which was built in 1684 (see Figure 2-2). Later, fur trade posts were established inland, creating a fur trade corridor to the south, with two documented posts along Split Lake. In 1886, a post was established at the north end of Split Lake. This was followed by the construction of a permanent Anglican Mission house in 1906 (Split Lake Cree – Manitoba Hydro Joint Study Group1996a). In general, throughout the 1800s and early 1900s, the Cree maintained an independent way of life during European settlement despite the increased permanence of outsiders. The Cree way of life and use of seasonal travel patterns remained fundamentally unchanged.

Throughout this early history there were Cree (some known as the Homeguard Cree) who began to establish more permanent settlements. They remained in close proximity to York Factory and other trading posts to support and benefit from trade and the European-influenced economy. Over time, the Homeguard and other Cree along the fur trade corridor began to rely on their work in the European driven economy and on York boats for goods, food items, alcohol and other provisions. In addition, lasting ties with Europeans were created through marriage, thereby creating children of mixed ancestry (Government of Saskatchewan 2010).

2.2.1.3 Government, Treaty 5 and the Bayline

European colonization and the establishment of the Dominion of Canada in 1867 resulted in the formation of an independent political structure, government controls and an even greater influx of European immigrants. The establishment of the *Indian Act* (1876) brought additional changes to the way of life of Aboriginal people. The *Indian Act* introduced a formal western system of governance and legislated the transfer of land to Canada through the Department of Indian and Northern Affairs (Split Lake Cree – Manitoba Hydro Joint Study Group1996a; Henderson 2012). Soon after the *Indian Act*, Treaties were negotiated, including the Treaty 5 adhesion in the Regional Study Area. At the time of the signing of Treaty 5 in southern Manitoba (1875), the Federal Government was mainly interested in obtaining lands that could be developed for agriculture. The later signing of the adhesion to Treaty 5 in northern Manitoba took place between 1908 and 1910. A number of Aboriginal Chiefs were involved in the Treaty 5 adhesions, including those from the Local Study Area. Signing events took place at the settlement of Split Lake in 1908 and at York Factory in 1910.

At this time, the formalization of Indian status members associated with the Split Lake Band (later named the Split Lake Cree Nation and now named Tataskweyak Cree Nation) and the Fort York Band (later renamed the York Factory First Nation) consisted of the Cree families and clans from the Local Study Area who travelled to a Treaty event to sign and receive their benefits (Beardy and Coutts 1996). The Treaty was a constitutionally recognized agreement between the government and the Aboriginal people. In general, the agreement was for the Split Lake Band and York Factory Band to give up rights to large parcels of agricultural and resource rich lands in exchange for compensation, the promise of reserve lands and provisions for their livelihood (Applied History Research Group 2001). The Treaty was seen as a way to protect the rights and the way of life for Aboriginal people, while at the same time helping them survive the political and economic changes occurring due to the influx of European immigrants. The administration of Treaties introduced the concept of Indian status and reserve lands (Henderson 2012). Formal and legal recognition of reserve lands was not provided under Treaty until much later for each of the KCNs communities. These factors were integral to changing the shape of communities in the Local Study Area and affected the ability of the Cree to maintain an independent way of life because the land they had always inhabited was now claimed by outsiders.

After Treaty 5 adhesions were enacted, the Hudson Bay Railway was built from The Pas to the Hudson Bay coast at Churchill. Completed in 1929, the railway increased access to the north and led to the creation of new Bayline communities on this new route (Malaher 1984). York Factory was not one of the Bayline communities; therefore, access to the community continued to be travel by boat. The Bayline service centres added to the decline of York Factory, and the post closed in 1957. YFFN was relocated to York Landing because the York Factory Post had become isolated and would be difficult to maintain as a reserve without an economic or transportation base.

Bayline communities at Ilford and Gillam became busy service centres. Both of these communities were inhabited by First Nation Members who lived in the region and who were looking for more regular wage employment. These Bayline stops provided reasonable and economical travel options for Indian Agents, other government personnel and outsiders to access the northern areas of Manitoba. This access facilitated the implementation and administration of the Department of Indian Affairs programs, such as residential schools and welfare, which were to have profound influences on where people lived, their loss of culture and the disruption of families.

The other key drivers of change on First Nation people within the Local Study Area were the management of natural resources and the RTL System. The history of resource management in Manitoba is complicated and interconnected with the onset of political and government structures discussed above. However, a complete recount is beyond the scope of this section. In general, the recommendations of the Manitoba Natural Resources Commission lead to *The Manitoba Natural Resources Transfer Act* of 1930, which transferred management of natural resources to the Province (Weir 2012). The Manitoba Department of Natural Resources became the administrative body, and the development of the RTL system was implemented in 1940. The RTL system was put in place to address the overharvesting of furbearers in the region. The RTL system altered the patterns of traditional harvesting for First Nation Members and placed defined geographic boundaries on the hunting, trapping and fishing areas of individual harvesters. In addition, once the Province gained authority over resource management there was increased access to the region by prospectors and the mining and forestry industries, which

contributed to overharvesting in northern Manitoba. Ilford became one of the centres for administering the RTL system through a provincial office of the Department of Natural Resources. Ilford was also a hub for the local commercial fishery. Winter freighting facilitated by Ilford's establishment as a Bayline community increased its presence as a government and economic service centre. Most Ilford residents, many of whom were Members of TCN, eventually became part of the newly established War Lake First Nation in 1980.

2.2.1.4 Industrial and Hydroelectric Development

Thompson was the first industrial community to be constructed after *The Manitoba Natural Resources Transfer Act*. The city of Thompson was established in 1959 as the centre for housing the new International Nickel Company (Inco) Mining and Smelting Operations. The construction of the Inco mining operations was completed and in operation by 1961. Thompson infrastructure included all the modern amenities of a western town and by 1965, was home to 8,500 people. In 1966, the construction of Provincial Trunk Highway (PTH) 6 connected Thompson to Grand Rapids, creating road access to the north (Thompson Unlimited 2007). The mining and smelting operations and town site required large amounts of electricity, which led to the construction of the Kelsey Generating Station, the first hydroelectric development along the Nelson River. Thompson would eventually replace Ilford as the service centre of northern Manitoba.

Between 1957 and 1995, four large hydroelectric generating stations and works associated with the Lake Winnipeg Regulation (LWR) and the Churchill River Diversion (CRD) water management system were developed. In conjunction with the first of three hydroelectric projects on the lower Nelson River, the Town of Gillam was modernized and expanded in the mid 1960s to serve as the operations and administration base for Manitoba Hydro's Nelson River generation, conversion and transmission activities. Construction and operation of these northern hydroelectric projects resulted in life altering changes to the water, land, and traditional way of life of First Nation Members living in the Local Study Area. Section 2.2.2 describes the first order effects of the Nelson River hydro development projects.

These developments were planned and implemented with little to no involvement or consultation with nearby communities whose traditional lands and ways of life were soon to be substantially altered. In 1974, TCN and YFFN joined together with three other First Nations to form the Northern Flood Committee. The Northern Flood Committee provided the foundation for these First Nations to begin asserting their rights by creating systems and processes to protect their use of land and water in the north and also to regain components of their traditional way of life. In 1977, the Northern Flood Agreement (NFA) was signed but the agreement was difficult to implement (Split Lake Cree – Manitoba Hydro Joint Study Group1996a).

After much delay and well after LWR and CRD had been planned, built and began operations, four First Nations, including TCN and YFFN, negotiated and entered into Comprehensive Implementation Agreements (CIA) with Manitoba Hydro, Manitoba and Canada. The CIAs addressed adverse effects caused by past Manitoba Hydro projects and outlined how the NFA would be implemented in each of these communities. A CIA with TCN was signed in 1992 and with YFFN in 1996. The CIAs clarified the obligations of each party and in addition, provided economic development funds and additional lands,

beyond the recommendations of the NFA. Those KCNs who were not a party to the NFA, including WLFN and FLCN, began independent negotiations with Manitoba Hydro after the NFA was signed. FLCN finalized an Impact Settlement Agreement addressing past adverse effects in 2004 while WLFN reached an agreement for past damages in 2005.

These agreements set the stage for a new era of local First Nation involvement in hydroelectric development, which is exemplified in this Project. TCN, WLFN, YFFN and FLCN were all invited and have become equity partners with Manitoba Hydro in the Project. They have participated jointly with Manitoba Hydro in Project planning and review of the Project EIS, and have negotiated community-specific Adverse Effects Agreements (AEA) with Manitoba Hydro in advance of Project construction beginning. Involvement of the KCNs in evaluation of Project alternatives, partnership development and detailed Project planning has been an integral and vital component of the Project. TCN's involvement has been since the early 1990s[1] and in May 2001, YFFN and FLCN signed the Keeyask Negotiating Principles and Process Agreement with CNP and Manitoba Hydro as a critical step towards concluding the Joint Keeyask Development Agreement (JKDA). This process culminated in the KCNs and Manitoba Hydro signing the 2009 JKDA, formalizing their partnership and marking a new era of the KCNs' involvement and decision-making in the Project.

2.2.2 Overview of Hydro Development First Order Effects

Since the late 1950s, Manitoba Hydro has been transforming the natural energy of waterways in Northern Manitoba into electricity to meet the power needs of Manitobans and earn income from export power sales. From the late 1950s to the present, more than 35 Manitoba Hydro generation, conversion and transmission projects have greatly altered the lives of the KCNs communities by modifying water levels and flows in waterways located in the traditional areas of these communities; changing the character of land used by community residents; and adding to the region's workforce and population. These effects have in turn resulted in changes to the surrounding environments and their use, including the following broad categories of environmental and socio-economic effects:

- Physical environment: water levels and flows, debris, erosion, ice;
- Biological environment: plants, animals, fish;
- Resource use patterns: trapping, hunting, fishing, gathering; and
- Socio-economic environment: economy, social and cultural well-being, lifestyle, governance, navigation and travel, and community infrastructure and cohesion.

Particularly influential have been the construction and operation of four generating stations along the lower Nelson River: Kelsey, Kettle, Long Spruce and Limestone as well as the LWR and the CRD water management projects.

[1] A detailed review of the KCNs engagement in pre-Project planning is included in the CNP Keeyask Environmental Evaluation Report.

This section also provides a snapshot of hydroelectric projects and first order effects[1] of the past 60 years of Manitoba Hydro development in northeastern Manitoba. This will provide context for understanding the environmental and socio-economic implications of Manitoba Hydro development on the KCNs communities discussed later in this section. The projects are identified and the most direct and obvious effects on water (change in levels and flows), land (area disturbed) and workforce (peak and/or total workforce requirements) are summarized based on available sources, most notably:

- Manitoba Hydro History and Timeline 1873-2010 (n.d.);
- Volume 1: Split Lake Cree First Nation: Analysis of Change (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a);
- Volume 2: Manitoba Hydro Projects and Related Activities in the Split Lake Cree Study Area: History and First Order Effects (Split Lake Cree – Manitoba Hydro Joint Study Group 1996b);
- FLCN History Project July 31, 2009 (draft);
- YFFN Traditional Values, Occupancy and Community History Project (2010); and
- WLFN OWL Process Keeyask Project Draft Report 2002.

Table 2-2 outlines Manitoba Hydro projects in the traditional areas occupied by the KCNs communities and groups them into six time periods. The table indicates the years that construction initially took place and the in-service date of each hydroelectric project. For each project, additions and upgrades requiring construction have taken place after the in-service date and are not included in the original years of construction shown in Table 2-2.

[1] The term first order effects is taken from the 1996 Split Lake Cree Post Project Environmental Review (Volume Two), and is defined as follows: "the most direct and obvious changes to the land and water environment arising from hydro electric development in the region [and] are the first step in a typical hierarchy of associated physical, biological and socio-economic changes".

Table 2-2: Summary of Hydro Development in the Local Study Area

Hydro Project Time Period	Description of Related Projects	Construction Years	In-service Date
Kelsey Time Period	Kelsey Generating Station Airstrip at Kelsey construction site Rail Spur Transmission Thompson town site and INCO nickel mining and smelting plant electrified.	1957-1961	1960
Kettle Time Period	Kettle Generating Station Butnau Diversion Radisson Converter Station Transmission Kelsey-Radisson/Kettle-Radisson Bipoles I and II (HVDC) Gillam town site Expansion Telecommunications Towers Rail spur	1966-1974	1973
Long Spruce Time Period	Long Spruce Generating Station Roads: • Gillam to Long Spruce • Long Spruce to Sundance • Thompson to Split Lake Rail spur Henday Converter station Transmission: • Kelsey-Mystery Lake/ Kelsey-Radisson/ Long Spruce – Radisson/ Long Spruce – Henday • Henday to Radisson (HVDC) Sundance town site	1971-1979	1979
Lake Winnipeg Regulation and Churchill River Diversion	Lake Winnipeg Regulation Churchill River Diversion Northern Flood Agreement Implementation	1973-1977	1977

Table 2-2: Summary of Hydro Development in the Local Study Area

Hydro Project Time Period	Description of Related Projects	Construction Years	In-service Date
Limestone Time Period	Generating Station Road: Split Lake - Long Spruce Rail spur Transmission: • Radisson-Churchill/Radisson-Limestone • Henday Collector lines • HVDC#2 backup	1985-1990	1991
Transmission	The Nelson River DC Transmission System (consists of Bipole I and Bipole II)	Bipole I: 1971-1977 Bipole II: 1978-1985	1972

Source: Manitoba Hydro 2012.

Below, a brief description of each time period is provided along with a summary of first order effects that can be discerned from available sources. Discussion of how these first order effects changed the way of life for each KCNs community is reviewed in Section 2.2.3.

2.2.2.1 Kelsey Generating Station

The Kelsey Generating Station is located on the upper Nelson River close to where it enters Split Lake. It is at the southern edge of the Split Lake Resource Management Area (RMA), about 25 km kilometres downstream from York Landing and 40 km south of the reserve community of Split Lake. Kelsey was the first hydroelectric generating station developed on the Nelson River, built in response to the request of Inco for Manitoba Hydro to provide over 100 MW of power to serve the new nickel mining and smelting operations, as well as the associated town site development now known as Thompson. The main construction took place over four years between 1957 and 1961. It began with the building of an airstrip and the rail spur line from the construction site to the Bayline, which was used for transporting the construction workforce and materials to and from the site. The town site of Thompson, 90 km from the western edge of the Split Lake RMA, was constructed during this time. Thompson did not exist prior to its development as the Inco workforce town site (Fraser 1985).

Kelsey's forebay raised water levels by approximately 9.5 m above natural levels, and flooded approximately 5,767 ha of shoreline for 150 km along the upper Nelson River from Kelsey to Sipiwesk Lake. No shoreline was cleared in advance, leading to considerable debris in the river along with flooding and erosion impacts on the upper Nelson (Split Lake Cree – Manitoba Hydro Joint Study Group1996a,1996b). Kelsey did not result in any measurable changes in the water flows along the Nelson due to its operational parameters. A fire at the dam site in 1968 caused a release of stored up water, causing slush ice with effects felt at the communities of Split Lake and York Landing.

In terms of transmission projects, the first order effects in the Local Study Area were limited. A 93 km transmission line was built from Kelsey to Thompson with about 50 km traversing the southern edge of the Split Lake RMA. In addition, a rail spur was built from the Bayline to the construction camp at Kelsey. The influence of the Kelsey construction workforce on local communities was restricted due to lack of access between the construction site and the communities (Split Lake Cree – Manitoba Hydro Joint Study Group1996b). Thompson, by 1965, had a population of 8,500 and was connected to Winnipeg through the extension of PTH 6 from Grand Rapids.

2.2.2.2 Kettle Generating Station

The Kettle Generating Station, located at the Big Kettle Rapids (*Kitchi Askiko Powstik*) site, is within the eastern part of the Split Lake RMA, and is about 7 km north east of Gillam (Split Lake Cree – Manitoba Hydro Joint Study Group1996b; FLCN 2009a Draft). The Kettle Project is about 80 km downstream of Split Lake. At the time of construction, the vast majority of the about 300 people living in Gillam and the surrounding area were FLCN Members (FLCN 2009a Draft). Development of the Kettle Generating Station was the first of four projects, outlined in Phase I of the framework for northern hydroelectric development recommendations submitted by the Nelson River Programming Board in 1965. Demand for electricity in Manitoba was forecast to exceed available supply by the winter of 1970/71, thus providing the rationale for developing the Kettle Generating Station (Split Lake Cree – Manitoba Hydro Joint Study Group 1996b). The main construction activities took place from 1966 to 1974. Construction involved several large related projects above and beyond the Generating Station, which had lasting first order effects on the Local Study Area, namely, the construction of the Radisson Converter Station, transmission lines from Kelsey to Radisson, modernization and expansion of Gillam to accommodate the construction workforce (and later operation personnel), a new airstrip and a road. Work camps to house project workers were also constructed, and both the Gillam town site and nearby work camps housed well over 1,000 outside workers during peak periods. Shortly after 1966, 24 km of dike was constructed along with a cofferdam, borrow pits and quarries, and the Butnau River dam. The forebay was closed in 1970, allowing the Kettle Generating Station to begin producing power. It was fully operational by 1974.

Closure of the forebay resulted in water levels at the structure to be raised by 30.48 m, tripling the size of Moose Nose Lake, and creating a reservoir named Stephens Lake, which flooded over 21,853 ha of land and inundated the traditional land use area of Moose Nose Lake area and the Butnau River. The water diversion of the Butnau into the Kettle River resulted in increased flows between Cache Lake/Butnau River, adding to the flooding and erosion.

Large tracts of land were used, with approximately 13,818 ha used for related projects, which included the expansion and modernization of Gillam and the Radisson Converter Station. This land area also included telecommunication towers, the Kelsey-Kettle transmission lines, the Kettle-Radisson Transmission lines, the Bipole I (HVDC) and Bipole II (HVDC) transmission lines and a right-of-way clearing that is 895 km long from the Radisson Converter Station to the Dorsey Converter Station northwest of Winnipeg. The Bipole I and Bipole II traverse south of Ilford and cross over much of the land used by WLFN and comprise a portion of land within the Regional Study Area.

During the late 1960s and early 1970s, Gillam changed in population from 300 to over 2,500 people to accommodate project workers and their families as well as workers needed to service the added population. In addition to the population boom of Gillam, the construction camp at the site resulted in an influx of over 1,500 workers into the town of Gillam (Split Lake Cree – Manitoba Hydro Joint Study Group1996b). During construction, the peak workforce at the site reached 2,500 people (Manitoba Hydro 1973). Following construction, the demographics of Gillam changed permanently from being a predominantly First Nation and Metis community, to a larger and modern industrial town site comprised largely of Manitoba Hydro operation and administration staff and their family members (Split Lake Cree – Manitoba Hydro Joint Study Group1996b; FLCN 2009a Draft).

2.2.2.3 Long Spruce Generating Station

The Long Spruce Generating Station is located 16 km downstream of Kettle and approximately 27 km east of Gillam, between the communities of Bird (now known as Fox Lake) and Gillam on the Nelson River, and is approximately 96 km north east from Split Lake (Split Lake Cree – Manitoba Hydro Joint Study Group1996b; FLCN 2009a Draft). Long Spruce was the next set of rapids after Kettle Rapids and was identified for hydro development along the lower Nelson River to meet growing electricity demands in Manitoba. The main construction activities for Long Spruce took place over seven years from 1971 to 1979.

Effects due to flooding and surface land use were far less than those experienced as a result of Kettle; however, the permanence of outsiders, the increased development of a road network and expanding hydro-related projects within the Local Study Area were part of the construction of Long Spruce. When the Long Spruce forebay was created in 1977, water levels rose at the structure by about 25.9 m, resulting in approximately 1,376 ha of land being flooded upstream. Related project activities, including roads, a converter station and transmission projects, affected over 9,308 ha of land during this time period.

Among the related infrastructure built during this time was an all-weather road from Thompson to Split Lake, which was to become the first phase of an all-weather road from Thompson to Gillam. By the onset of Long Spruce construction, Gillam had already experienced the boom-bust effect associated with the construction of Kettle and had changed into a modern hydro industry town site. Long Spruce construction employed over 2,000 workers at its peak, virtually all of whom were from outside the region. Most were housed at the project construction camp. Exact workforce numbers were not readily available through public sources. Operation and maintenance requirements of Long Spruce added to the Manitoba Hydro operation and maintenance workforce, including their associated families living in Gillam.

2.2.2.4 Lake Winnipeg Regulation and the Churchill River Diversion

The operation of LWR and CRD altered the Nelson River and its tributaries in the Local Study Area by reversing the seasonal water level highs and lows and changing the natural cycle of flows. There was no construction of physical works related to LWR and CRD within the Local Study Area. The major components outside the Local Study Area included control dams at Missi Falls and Notigi, the Jenpeg Generating Station, a dam at Kiskitto Lake, and several control channels.

The LWR and CRD were the result of the 1966 Agreement between the Federal and Provincial Governments. Lake Winnipeg Regulation enabled Manitoba Hydro to control the natural flow of water into the Nelson River from Lake Winnipeg to make more outflow available in the fall and winter when demand for electricity is at its highest. In addition to helping Manitoba Hydro meet demand for electricity in the fall and winter, LWR provided a flood control mechanism for communities in southern Manitoba (Wojczynski, *et al.* 2010).

The CRD diverted part of the flow of the Churchill River into the Burntwood and Nelson river systems to maximize hydroelectric output. The main construction activities occurred between 1973 and 1977, although no construction workforce activity occurred within the Local Study Area. The diversion of water flows from the Churchill River into the Nelson River resulted in dewatering of approximately 6,880 ha of lakes and waterways, exposing new surface land, particularly on the Churchill River in the northern part of the Split Lake RMA. Even though CRD was beneficial to developing hydroelectric projects, the seasonal reversal of water levels and altered flows resulted in many changes to the environment and to the KCNs Members living in the Local Study Area.

2.2.2.5 Limestone Generating Station

The Limestone Generating Station is located approximately 25 km downstream from the Long Spruce Generating Station, at the eastern edge of the Split Lake RMA near the border of the Fox Lake RMA, approximately 6 km east of Fox Lake (Bird) and 50 km north east of Gillam (Manitoba Hydro 1986). The original start of construction for infrastructure associated with Limestone began in 1976, with the development of a road, rail spur and the construction of the Sundance town site. In 1979, construction was suspended because growth in electricity demand dropped, limiting the need to expand generating supply. Major construction recommenced after a sale of power to the Northern States Power Corporation was in place. The main construction activities took place from 1985 to 1990.

First power from Limestone occurred in 1990, and once the generating station was fully operational in 1992, the water levels at the station were raised by 33.53 m. The increase in water levels was largely contained within the Nelson River banks, resulting in 208.8 ha of flooding. Directly downstream of the Limestone Generating Station, the effects of dewatering and lowered water levels exposed new riverbed and rocks, and dried up at least one tributary of the river (FLCN 2009a Draft). Transmission projects associated with Limestone took up approximately 1,138 ha of surface land. At the same time, the road from Split Lake to Long Spruce completed the all-weather road system from Thompson to Gillam, with this new stretch of road network connecting from Split Lake to Long Spruce and occupying 667 ha of land. The construction work force peaked between 1,500 and 1,800 workers. The construction camps at Limestone and Sundance accommodated 1,400 and 400 workers, respectively. Very few workers and their families moved into Gillam because the Sundance community was an attractive residential option, and was located close to the Limestone project site.

2.2.3 Keeyask Cree Nations

This section provides a summary of the events and influences of change for each of the KCNs, individually known as TCN, WLFN, YFFN and FLCN. The summary is based on public documents and materials shared by the KCNs communities. Each of the KCNs is discussed separately, to acknowledge the history that has changed and shaped each community, in order to provide context for the Project EA.

The KCNs share much of the same experiences and patterns of change, including their history with national and provincial policy and government, hydroelectric development and the substantial changes to their way of life that these precipitated. The history of Canadian First Nations is complex and spans many years. The pace of change has intensified over the past 200 years with many changes to social and economic conditions of First Nations people and communities throughout the 20th century (TCN 2001).

In addition to a shared history, each of the KCNs has had different experiences with hydroelectric development. A number of factors have influenced the experience each of the KCNs has had with hydroelectric development, including, but not limited to, the proximity of the main reserve community to a hydroelectric project and construction workforce; the location of family ancestral territories and RTLs to areas affected by hydroelectric development; the First Nation's level of political and community organization; and the extent of previous involvement with the outside world. These differences and others, to some degree, have influenced how a community has perceived and responded to the outside influence of change, and therefore, how Members have been affected in their day-to-day lives. Each of the KCNs has provided its own environmental evaluation report that illustrates differences in how it sees the Project and the Partnership. These unique aspects of the KCNs history, especially as it relates to more recent events, relay how each First Nation perceives community well-being and decision-making processes.

The following provides an overview of the history of the KCNs. A holistic and meaningful history of each of the KCNs requires the perspectives and traditional knowledge of the KCNs. Please refer to community documents referenced in each of the following sections, as well as their own Keeyask Environmental Evaluation Reports for details on each of the communities.

2.2.3.1 Cree Nation Partners

TCN and WLFN signed a Memorandum of Co-operation and Understanding in May 2001, and began working together as the Cree Nation Partners (CNP) in the planning, studies and partnership processes related to the Project. The CNP share much of the same history, as many of WLFN Members were originally TCN Members. Community history sections are provided first for TCN, with discussion that covers sequential influences on the community. This is followed by a section on WLFN, with a review of early history and a focus on information after WLFN became a separate First Nation.

Representatives from each community sit on several key committees that oversee the regulatory, licensing and EA processes. Issue-specific working groups involving CNP representatives have included the following multi-lateral groups: Mercury and Human Health Technical Working Group, Aquatic Working Group and Mammals Working Group. As well, there was a bilateral CNP Socio-Economic Steering

Committee focused on participating in, reviewing and informing the socio-economic fieldwork studies needed for the EIS.

2.2.3.1.1 Tataskweyak Cree Nation

Several documents that speak to the history of the living and ancestral experience of hydroelectric development from the perspective of TCN have been produced. Information provided in this section is from these key TCN documents:

- The collected volumes of a post project environmental review (Split Lake Cree – Manitoba Hydro Joint Study Group1996a, 1996b);
- The CNP Keeyask Environmental Evaluation Report; and
- Our People, Our Lands and Waters, Our Vision, Our Voice: The position of Tataskweyak Cree Nation Regarding Developments in the Split Lake Resource Management (TCN 2001).

The documents cited above provide a more in-depth understanding of the story and history of TCN.

Tataskweyak means "the place of tall trees" and is the Cree name given to Split Lake. TCN has historically been referred to as the Split Lake Cree – or Split Lake First Nation. However, in recent years the community reclaimed its traditional name and now refers to itself as Tataskweyak Cree Nation. The reserve community is still known as Split Lake.

Prior to the colonization and industrial development within the Local Study Area, TCN had ancestral family territories relatively consistent with their current RTL block and the Split Lake RMA (CNP Keeyask Environmental Evaluation Report). TCN for centuries has made extensive use of their traditional territories interior to the coast along the Nelson River, travelling on boat and foot and harvesting the resources of the waterways and lands. It should also be noted that there are TCN Members with ancestral territories that extend beyond the RMA but, in general, the discussion focuses on the ancestral territories indigenous to the Split Lake RMA and RTL System. The Split Lake reserve is situated along the north shoreline of Split Lake at the heart of their homeland ecosystem, where many families of TCN ancestry gathered for thousands of years (Split Lake Cree – Manitoba Hydro Joint Study Group1996a; CNP Keeyask Environmental Evaluation Report).

INTRODUCTION OF THE EUROPEAN FUR TRADE AND RELATIONSHIPS WITH OUTSIDERS

Throughout much of its history, TCN has used and harvested the territories located inland from the Hudson Bay coast. The introduction of and relationships with the Europeans and the integration into an economy of trade were not instantaneous, and occurred more slowly. In general, for the ancestors of TCN, involvement with European settlers evolved over the latter part of the 1700s and in the 1800s, when there was a greater influx of population. Records show the Split Lake Cree were interested in the Hudson's Bay fur trade and relationships with settlers, but did not view early involvement as essential to their survival. They were able to maintain their traditional way of life for hundreds of years after first contact with Europeans (Split Lake Cree – Manitoba Hydro Joint Study Group1996a). In 1886, a trading post was built at the present day location of Split Lake, which facilitated the establishment of a more permanent community. During this time, Cree from York Factory and other areas of the vast Hudson

Bay region came to settle around Split Lake to find relief from a scarcity of game and resources in their traditional family territories. The movement of the *Ininewak* from York Factory into Split Lake meant that extended traditional routes outside those indigenous to Split Lake would become part of TCN's ancestral history (Split Lake Cree – Manitoba Hydro Joint Study Group1996a).

DEVELOPMENT OF A CHRISTIAN FAITH

Shortly after Split Lake was established as a more permanent settlement, Anglican missionaries visited. In 1897, they built a log school, followed by a church and mission in 1906. The first missionaries stayed in the community for many years, and introduced Christianity to the Cree of Split Lake in a way that was widely accepted. Historical accounts show that the Cree have had strong beliefs and values based on their relationship with the land and a deep connection to *Askiy*. For those Cree at Split Lake, the Christian faith fit well within Cree world views (Split Lake Cree – Manitoba Hydro Joint Study Group1996a; CNP Keeyask Environmental Evaluation Report).

TREATY 5 ADHESION AND THE FORMATION OF THE SPLIT LAKE BAND

The 1908 signing of Treaty 5 adhesion at Split Lake came three decades after the first Treaty 5 was signed in southern Manitoba (Applied History Research Group 2001; CNP Keeyask Environmental Evaluation Report). Through the 1908 Treaty the Split Lake Band was formalized. Immediately after signing the Treaty, TCN's traditional lifestyles continued. Family groups left the Split Lake Band Reserve in the fall and winter and returned in the summer. The Split Lake settlement housed an Anglican Church and school, and those unable to leave with their family groups for hunting and gathering remained year round. The Split Lake settlement became the main region surveyed for a reserve in 1913; however, the area was not formally confirmed by the Crown as the Split Lake reserve until 1959 (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a). The Split Lake reserve had become a community with defined geographic boundaries and over the past century, the community has had to adapt to changes from the political and government structures that would unfold.

HUDSON BAY RAILWAY OPENS ACCESS TO THE NORTH

The construction and operation of the Hudson Bay Railway brought changes to TCN. The development of the Bayline stop at Ilford, located along the Aiken River, became a frequented stop and service centre used by TCN. Some TCN Members who stayed year round in the community moved to Ilford, to take advantage of wage employment opportunities, the Hudson Bay store and other services based there (Split Lake Cree – Manitoba Hydro Joint Study Group1996a; CNP Keeyask Environmental Evaluation Report). While many Members continued to be self-sufficient based on traditional lifestyles, interest in wage employment grew as opportunities became more prevalent. Many Members sought to maintain a balance between their traditional patterns of living and wage employment.

NATIONAL POLICIES AND CHANGES TO COMMUNITY LIVING

Ilford became the location for district offices to administer national programs and policies. While some of these programs were beneficial, others had a very disruptive and negative influence. For TCN, the most negative was the residential school system that started in 1929. Under this program, the Federal

Government required the eldest child from each family at Split Lake be sent to residential school, removing them from their home (CNP Keeyask Environmental Evaluation Report). This resulted in great hardship and distress for the students attending the schools and for the parents whose children were no longer with them.

By the 1930s, attending school was a requirement for school-aged children whether they attended residential school or remained in the community. To conform to this requirement, women and children had to leave the traplines to live in houses closer to the local school. Families could no longer travel together into the bush and pursue their traditional lifestyle during the school year. Cree children had much less opportunity to learn the traditional way of life, including the skills in resource harvesting and oral traditions.

Other changes in government would have additional effects on TCN, including *The Manitoba Natural Resources Transfer Act* of 1930, which resulted in provincial ownership of traditional TCN lands and the eventual creation of the RTL system.

Family allowance was introduced in 1950, leading to further concentration of the TCN population in the community of Split Lake. By the 1950s, virtually all TCN families were living in the community of Split Lake and at Ilford. A few Members continued to live off the land year round. This type of planned, permanent community living resulted in unfamiliar patterns of living and a changed physical and social environment (Split Lake Cree – Manitoba Hydro Joint Study Group1996a).

RESOURCE MANAGEMENT AFFECTS TRADITIONAL HARVESTING

Changes in the pattern of resource use and the associated economy placed strains on available resources and created problems associated with competition. In the 1940s, the provincial RTL system was established. This resulted in the development of the Split Lake RTL Block, a series of traplines registered with the Manitoba Department of Natural Resources for the use of any Split Lake Cree Member. Individual trappers were registered to a trapline and later the provision of community-use traplines was established. This changed the communal aspects of traditional harvesting pursuits to more individualistic endeavours. In addition, individuals who were not Members of Split Lake Cree Nation were provided traplines in the area.

Mineral rights and exploration were also granted through the Department of Natural Resources. As a result, Inco developed a nickel mining and smelting operation at Thompson, on the edge of TCN traditional territories. As noted earlier, the Inco development and construction of Thompson was the impetus for the Kelsey Generating Station, which was the first generating station built in the Local Study Area. Kelsey was located near where the upper Nelson River enters Split Lake, an area that had traditionally been used by TCN Members. Provincial ownership of land and water resources in the region set the stage for hydroelectric development along the Nelson River from the 1960s to the 1990s. These developments would have a profound effect on the lifestyle and culture of TCN through effects on resources and traditional pursuits in the area, by increased TCN contact with the outside world and modernization.

PERMANENT CHANGES TO WATER LEVELS AND FLOWS IN LAKES AND RIVERS

As presented in Section 2.2.2, construction and operation of hydroelectric development began with Kelsey in 1956, and subsequently, the Kettle, Long Spruce and Limestone generation stations along with LWR and CRD were developed in the traditional resource area of TCN. The Split Lake reserve community and the RMA are surrounded by hydroelectric projects. The changes to water and land resources caused by these projects and their associated works were widespread and pronounced, resulting in adverse economic, social and cultural impacts on TCN that continue to be felt today. TCN experienced cultural disruption and changes to their way of life that reduced their ability to rely on the land and water for sustenance. TCN has described the changes as a "devastation of our homeland ecosystem caused by hydroelectric development" (CNP Keeyask Environmental Evaluation Report).

These changes undermined the confidence Members had in using the land and water around Split Lake and in Members' ability to protect their rights. Travelling, drinking water, and the harvests from the land and waters they traditionally relied upon became unfamiliar due to the changes experienced. Many TCN Members were no longer able to sustain their way of life. These environmental effects added to an already growing rate of change in the social environment from increased resource competition, cash reliance, modernization and access to outside urban centers.

TCN describes the devastation felt by hydroelectric development and LWR and CRD:

> The adverse effects caused by this development were beyond the worst fears of our people. The Nelson River pattern of higher flows in the spring and summer, with declining and low flows in the fall and winter, dictated by Mother Nature, was reversed. Flooding of our lands occurred. Our local environment was fundamentally and permanently disrupted. There was damage to property and loss of homes. Wildlife patterns and habits we knew and depended upon changed. Hydro Development was the final step in removing forever our opportunity to fully support and sustain ourselves in our traditional ways (TCN 2001).
>
> The LWR and CRD increased flows down the Burntwood River eight-fold, flooding 1,500 acres (600 hectares) of our home Reserve at Split Lake, caused enormous amounts of debris, and dewatered the Churchill River in the northern portion of our homeland ecosystem. Seasonal flows were reversed all along the Nelson and Burntwood rivers, and in combination with CRD raised winter water levels on Split Lake by about three feet (less than one metre) and reduced summer levels by about one foot. It also caused water level fluctuations such as never before occurred, or could occur naturally. The utterly-changed water regime and debris severely impacted transportation throughout our resource area, eroded shorelines, contaminated fish with mercury, disrupted access and seasonal cycles of harvesting and completely upset the state of harmony and balance throughout our homeland ecosystem (CNP Keeyask Environmental Evaluation Report).

THE NORTHERN FLOOD COMMITTEE AND THE 1977 AGREEMENT

Hydroelectric development precipitated the need for TCN to develop capabilities to interact and negotiate with Manitoba Hydro, which eventually strengthened the community's internal capacity and its ability to acquire a central role in shaping the development and use of resources in its traditional area (Split Lake Cree – Manitoba Hydro Joint Study Group1996a). "The negotiation of the Northern Flood Agreement (NFA) from 1974 to 1977 marked a formal beginning to reclaiming the power and authority we once held" (CNP Keeyask Environmental Evaluation Report). A key development in this

regard was the creation and operation of the Northern Flood Committee, comprised of five First Nations, including TCN, whose reserve lands had been affected by LWR and the CRD. The committee was established to redress the lack of meaningful consultation by Manitoba Hydro, the Government of Manitoba and the Government of Canada; to assert First Nation rights over the development and use of their traditional lands; and to advance the expectation that effects from these projects would be mitigated and the loss of reserve land, resource use, infrastructure and culture caused by these projects would be compensated for. The process of presenting a case for mitigation and compensation agreements with Manitoba Hydro, Manitoba and the Government of Canada, and the eventual negotiation of these agreements over a 15 year span, played an important role in building TCN's confidence in dealing with outside organizations and in engendering interest and capacity for becoming a self–sufficient community with its worldview intact[1] (TCN 2001). Over this period, the governance of First Nations changed and younger generations who were educated in English participated in negotiations at the provincial and national level. The result was a generational shift in leadership that, among other things, extended the role of community leadership from internal community governance to include political involvement outside the community.

The first major achievement of the Northern Flood Committee was the 1977 NFA. The agreement promised to replace affected reserve land and to provide compensation for adverse effects. However, it would be many years before the NFA was satisfactorily implemented, as it was an agreement containing promised actions that were open to widely varying interpretations. This made it very difficult to translate the agreement into action, thereby creating long delays in its implementation. TCN felt that the years after the NFA had been signed but was not implemented were some of the most difficult:

> The people had believed that the promises in the NFA, had trusted that its terms would provide a vehicle to counteract the adverse effects of the hydro projects, protect the integrity of their lands and waters, and foster the social and economic recovery of their community. The failure of these expectations to be realized led to bitter disappointment and mistrust (Split Lake Cree – Manitoba Hydro Joint Study Group1996a).

COMMUNITY DEVELOPMENT AT SPLIT LAKE

During the same years the negotiations took place on the NFA and its implementation agreement, TCN experienced a number of events in their community that destroyed infrastructure and utility services. Flooding (both natural and related to both the LWR and the CRD), the loss of several community-used buildings (school, store) to fire and damages to electrical supply were among those events that occurred in the community during the 1980s. As noted in one document, "there was conflict between external values and Aboriginal cultural traditions" (Split Lake Cree – Manitoba Hydro Joint Study Group1996a). Instead of leading to a downward spiral, these unfortunate events helped prompt a new stage of energetic development in Split Lake. TCN began to plan, advocate and develop the Split Lake community to meet the future needs of their people. Among the community infrastructure projects that took place in the 1980s and 1990s, were a major water and sewer project, a new store, a new school and education centre,

[1] These agreements included the signing of the Northern Flood Agreement in 1977 and the signing of the NFA Comprehensive Implementation Agreement in 1992.

an all-weather road to connect the community to Thompson, hook-up to the grid from Kelsey, an arena, the introduction of mail service, and the installation of telephone lines. TCN continues to build and develop the services, programs and infrastructure of the Split Lake community to focus on a future that fosters a "revival of cultural practices throughout the community" (Split Lake Cree – Manitoba Hydro Joint Study Group1996a) and assists active and successful participation in contemporary society.

COMPREHENSIVE IMPLEMENTATION AGREEMENT OF 1992

Beginning in the mid 1980s, TCN took the lead in pursuing negotiations for a Comprehensive Implementation Agreement (CIA) that would essentially bring into action the recommendations of the NFA, instead of continuing with the approach that was being used at the time. These efforts resulted in the first CIA in 1992 with TCN, Manitoba Hydro, the Province of Manitoba and the Government of Canada. The CIA used the NFA as a foundation to assign land and other compensations for TCN. Manitoba Hydro was also required to undertake joint planning with TCN for any future hydroelectric development affecting their traditional area. The CIA also enabled the creation of the Split Lake RMA (SLRMA) and its associated board, which greatly strengthened TCN's influence over development and the use of resources in its traditional territory.

The years since the signing of the CIA have seen TCN build capacity, actively participate in community development and pursue complete self-governance. There has also been an increased resurgence in the pursuit of traditional activities and interest in the intergenerational transfer of knowledge, as it relates to the traditional Cree culture. TCN's signing of the CIA meant they could take action to understand and move toward mitigating the **deleterious** effects of the historical events they had experienced, including embarking on an assessment of the effects experienced as a result of hydroelectric development through the Split Lake Post Project Environmental Review between 1992 and 1996. The TCN community has stated their aim to govern themselves and find systems, processes and programs for their community that will allow them to be successful, both in maintaining their traditions and culture, and in forging a successful role in modern society.

KEEYASK PLANNING

The 1992 CIA set the stage for TCN to engage in discussions regarding their participation and partnership in the development of the hydroelectric project at Keeyask Rapids (formerly Gull Rapids) on the Nelson River. "The 1992 Agreement sets out the basis for a continuing, sustainable relationship with Hydro as a party with interests in the SLRMA, protecting TCN's interests with respect to any future hydro development which may affect our lands and waters" (CNP Keeyask Environmental Evaluation Report).

With the Project being located in the SLRMA, TCN entered into joint discussions and negotiations about Project development very early in the planning stages. A number of early Project planning activities occurred involving TCN between 1992 and 2000, including joint studies on the impact of future hydroelectric development at Birthday and Gull rapids and the community at Split Lake. These activities, which were strongly influenced by TCN, contributed to the decision by Manitoba Hydro not to pursue high head and intermediate head development options at Birthday and Gull rapids, but to focus future

planning on low head development at Gull Rapids. These activities also identified lessons from past hydroelectric projects in the SLRMA that informed TCN's and Manitoba Hydro's approach to dealing with Project development. The eight years of joint studies helped improve relations between TCN and Manitoba Hydro to the point where both parties were prepared to begin discussions on future development at Gull Rapids.

In October 2000, TCN and Manitoba Hydro entered into an **Agreement in Principle (AIP)** that set out the basis for pursuing a partnership arrangement in development of the Project. TCN took strong positions in negotiating the AIP and secured key commitments in a number of areas including participation in Project planning, the EA, partnership shares, job targets and negotiated contracts. In addition:

> The AIP recognized TCN's right to participate in the environmental assessment of the Keeyask Project, and to conduct its own assessment of potential adverse effects on us, which would be the basis for determining whether TCN would proceed with the Project (CNP Keeyask Environmental Evaluation Report).

The AIP provided funding for TCN to conduct its own assessment of the socio-economic effects of the Project as well as to review and approve planned Manitoba Hydro studies on the physical, biophysical and socio-economic environments. Technical committees were formed to address key development issues pertaining to the Project. Community representatives and technical experts from each of the KCNs were on these committees and were integral in the development of the Keeyask Hydro Limited Partnership. The agreement set out how the Project would address matters related to potential income opportunities, training, construction and operations employment, business opportunities, as well as other related matters.

In September 2001, Manitoba Hydro and the KCNs signed the Principals' Memorandum that set out the negotiating principles for concluding the JKDA. In October of 2002, the parties signed the Negotiating Principles and Process Proposal, which set out in greater detail, the negotiating principles and process for concluding the JKDA. Negotiations on the JKDA started in 2002 and culminated in community referendums in early 2009. This resulted in the formal signing of the JKDA in Split Lake in May 2009 by representatives from each of the KCNs and Manitoba Hydro (see Chapter 2 of the Response to EIS Guidelines).

In addition to the JKDA, TCN negotiated an Adverse Effects Agreement (AEA). The AEA provided mitigation measures, community-based programming and cash compensation, to avoid, offset or compensate for anticipated Project effects. Unlike past projects, where adverse effects negotiations took place after the start of construction, the negotiations and implementation of the Project-related AEA programs preceded the approval and construction of the Project. In another departure from the past, Cree Nation ATK was incorporated into the analysis underlying the negotiations, their own Environmental Evaluation Report and subsequently this EIS (CNP Keeyask Environmental Evaluation Report).

The JKDA and AEA were presented to TCN Members in 2008 and 2009 through a community consultation process about becoming partners in the Project. A ratification vote of the membership was

held in February 2009. TCN membership voted in favour of becoming partners in the Project according to the terms set out in the JKDA.

TCN, as part of CNP, conducted their own community-driven, self-assessment of the Project using the Overview of Water and Land (OWL) approach and application of the Mother Earth Ecosystem Model, which eventually became the Ancestral Homeland Ecosystem Model. The assessment relies heavily on concepts and views provided by community Members obtained through an elaborate consultation process that focused heavily on Elders and resource users.

In terms of TCN's involvement in the EA, representatives from TCN, as part of CNP, sit on several key multi-lateral committees that oversee the regulatory, licensing and environmental assessment processes (see Sections 1.2.2 and 2.2.3.1).

2.2.3.1.2 War Lake First Nation

Information on the history of WLFN is based on the following sources:

- War Lake Owl Process Keeyask Project (WLFN 2002);
- History of War Lake. (WLFN 2008);
- The collected volumes of a post project environmental review (Split Lake Cree – Manitoba Hydro Joint Study Group1996a, 1996b); and
- CNP Keeyask Environmental Evaluation Report.

WLFN is located at Ilford, along the Hudson Bay Railway, and became a separate band in 1980.

WLFN and TCN share the same early history (described above) as many WLFN Members were previously Members of TCN who resided near Ilford. The following highlights the history of Ilford as it is connected to the history of WLFN Members. Ilford was once a popular place to live because, as a Bayline service centre, it offered both employment and access to natural resources. Ilford has experienced several changes since its role as a service and economic centre that have led to the community becoming more isolated and secluded. Below is a summary of changes that have altered community life for WLFN Members, with a focus on events that happened at Ilford.

CONNECTION TO THE HUDSON BAY REGION AND THE SPLIT LAKE RESERVE

The Cree in Ilford live in much the same area as their ancestors (WLFN 2002). Cree families lived along the shore of the Mooseocoot Lake and made their living from lands around the lake. During this period, people moved with the seasons and there were no permanent settlements, rather, there were known areas where families would meet at specific times during the year and set up a temporary camp to visit, hunt, fish and trap together. Although integrated into the trapping economy, as specifically noted by WLFN Members, their decision to live in the Mooseocoot Lake area was not "influenced by the European fur trade" (WLFN 2002). Originally, Members of the Split Lake Band, the predecessors of the WLFN were signatories to the 1908 Treaty 5 adhesion. This way of life continued with little change until the community of Ilford was established.

GROWTH OF ILFORD AS A BAYLINE COMMUNITY AND SERVICE CENTRE

Ilford originated as a construction and service centre during the building of the Hudson Bay Railway and became one of the Bayline communities to service the route from The Pas to Churchill. For the Cree living in its vicinity, travel became easier. Trappers could now transport their families, dog sleds, and other supplies for trapping on the train. Furthermore, trappers were able to access a larger portion of the north.

The Ilford area experienced a boom after 1917, when the railway to Ilford was completed. The town began to develop and grow, especially with the introduction of gold mining in the region. The completion of the railway brought new technologies and industries to the community that were blended into traditional means of subsistence. The railway to Ilford increased access to the north, as well as contact with outsiders. The railway also provided easy access to Manitoba's northern resources and wage employment opportunities with Hudson Bay Railway, the service industry and the commercial fishery, as well as opportunities in the south, such as summer employment as farm hands.

NATIONAL POLICIES AND CHANGES TO COMMUNITY LIVING

The railway facilitated the implementation and administration of government with the opening of a district office for Indian and Northern Affairs at Ilford. By the 1940s, Ilford had become home to other government offices related to resource management and the implementation of federal programs in the north. Local Cree relied on the community at Ilford for wage employment, goods and services. The Department of Indian and Northern Affairs used Ilford as the access point for federal program implementation (*e.g.*, social allowance cheques, school, and Treaty payments). By the 1940s, the residential school system and compulsory schooling were enforced at Ilford. Additionally, fur blocks and trapping zones were also introduced, affecting the activities and seasonal cycle of the Cree (WLFN 2002).

The time period between 1935 and 1943 saw the town of Ilford gain importance as a freight and supply center. Ilford became a central depot for commercial fishing, winter freighting to outlying communities and a support centre for mining development in the north. God's Lake Gold Mining Company was established in the 1930s, and by 1941 the company had both established a freight receiving and tractor train camp in the Ilford area and a winter road from Ilford to God's Lake. The tractor train was more heavily relied on throughout the 1940s, as were the systems of winter and ice roads built by the freight hauling Sigfasson family who, over the next 30 years, established a connected winter road system throughout northern Manitoba, Ontario and Saskatchewan (WLFN 2008).

ESTABLISHMENT OF COMMERCIAL FISHING

Commercial fishing at Ilford became an important local industry during this period and continued until the mid 1980s, providing stable employment for residents. In addition to employment provided by the fishery at Ilford, additional employment was generated by a number of supporting businesses, including the provision of local ice and crates. For the local Cree, Ilford allowed access to a wage economy and to their traditional life. In the 1930s, float planes gained popularity and the town of Ilford again provided a valuable service refuelling commercial planes used to transport fish from remote lakes to the commercial

fishery at Ilford. WLFN noted in their own study "[E]lders recall the dozens of float planes docked at Moosenose Lake and the exciting energy associated with a bustling industry" (WLFN 2002).

The commercial fishery and mining industries required the construction of homes for employees and offices for businesses in Ilford. This spurred the need for a variety of skilled and general construction labourers and provided additional employment in the community. Additional jobs necessitated additional community services and local entrepreneurs jumped on the opportunity (WLFN 2008). The Hudson Bay Store was very popular for many Aboriginal people of the region. In addition to the local Cree, some TCN Members looking for wage employment and other services moved to Ilford.

PERMANENT CHANGES TO WATER LEVELS AND FLOWS OF THE LAKES AND RIVERS

WLFN Members felt the effects of hydroelectric projects in northern Manitoba, especially the changes experienced after LWR and CRD and the related Kettle, Long Spruce and Limestone generation stations. These changes included flooding, reversal of the seasonal patterns of water flow on the Nelson River, changes to general land use related to the introduction of transmission lines and related projects, and changes to population via the workforce influx into the region. WLFN traditional harvesting areas were also traversed by a series of transmission projects, including Bipole I and Bipole II. The effects of hydroelectric and transmission projects on the biophysical environment placed pressures on the availability of resources and the resource based economy at Ilford.

During the late 1970s and early 1980s, Ilford experienced major economic collapse partially due to the closure of the commercial fishery and the relocation of government offices to Thompson, which had become a larger, more accessible community in the preceding 20 years. The decline of the commercial fishery was in part related to the effects on lakes in the vicinity of the LWR and CRD, to changes to Freshwater Fish Marketing Corporation regulations and to other changes to economic activities in the region. As a result, secondary industry left, the store closed and many publically provided services were relocated to Thompson. This was compounded by the decline in rail service to the community as the Split Lake reserve was now connected by road to Thompson and the Bayline was in disrepair (Manitoba Historical Society 1982). In a few short years, the population declined, wage employment was rare and the ability to rely on the waterways and lands for sustainability was limited in part by the effects of hydroelectric development. Within Ilford, infrastructure began deteriorating and unemployment became the norm (Split Lake Cree – Manitoba Hydro Joint Study Group1996a; WLFN 2002). Ilford evolved into an isolated community with no major economic base, no road access and very limited services.

WAR LAKE FIRST NATION ESTABLISHED AS AN INDEPENDENT FIRST NATION

In 1976, Cree leaders began efforts to obtain a reserve at Ilford and to form an independent First Nation. In 1980, WLFN was established as a separate band at Ilford, which provided access to federal First Nation programs. Obtaining full access to these programs would prove to be a slow process. These programs allocated funding to make improvements to housing and other infrastructure in the community during the past two decades. Nevertheless, since the economic decline, limited infrastructure remains as part of the War Lake community. There is, for example, a health centre, school and multi-purpose band hall. WLFN at Ilford continues to be relatively isolated due to the lack of an all-weather road. Feasibility

studies for an all-weather road are currently underway. Planning is also underway to improve services and access at Ilford for WLFN community Members.

PAST ADVERSE EFFECTS AGREEMENT

Five Manitoba First Nations, including some TCN Members who resided at Ilford, signed the NFA in 1977. As discussed in earlier sections, the agreement proved difficult to implement. As a result, the First Nations pursued negotiations for CIAs that were specific to the impacts they experienced. After 1980, WLFN became separate from TCN and therefore were no longer part of the ongoing negotiations for a CIA. As a result, the Split Lake CIA of 1992 did not include former Split Lake Members who were now Members of WLFN. WLFN Members therefore, were not party to the benefits of the Split Lake CIA. To redress this situation, WLFN decided to pursue its own settlement agreement. The March 2005 Past Adverse Effects Agreement, among WLFN, Manitoba and Manitoba Hydro, recognized WLFN's use of lands adversely affected by past hydro development with payment of compensation for adverse effects from past hydroelectric development (as defined in the Agreement). The Agreement included a provision for a Future Development process, whereby WLFN would work with Manitoba Hydro to address adverse effects on future projects on the Churchill, Nelson, Rat and Burntwood river systems.

KEEYASK PLANNING

As noted above, an AIP was signed between TCN and Manitoba Hydro in 2000 that outlined the process for TCN participation in Project planning and the Keeyask environmental assessment. The AIP also outlined the terms by which a partnership agreement would be negotiated. WLFN signed a Memorandum of Understanding with TCN in May 2001 to consider participation in the proposed Keeyask Project. This led to the formation of the Cree Nation Partners (CNP) in 2003; and WLFN's signing of the 2003 Agreement Respecting the Terms of Participation with TCN and Manitoba Hydro. Since 2001, WLFN as part of CNP has been actively involved in Keeyask planning, development of the Keeyask environmental assessment, and negotiations of the JKDA. In 2009, WLFN voted to become an equity partner in the Project, recommending that their Chief and Council sign the JKDA and their AEA.

WLFN participated in Project-related activities as part of CNP and also received funding to conduct studies of the effects of the Project on WLFN using the approach outlined in their Overview of Water and Land. These are reported in the CNP Keeyask Environmental Evaluation Report.

2.2.3.2 Fox Lake Cree Nation

This section relied on the history and ATK of FLCN from the following key sources:

- Ninan: The story of the Fox Lake Cree - Draft (FLCN 2009a Draft);
- Fox Lake First Nation – Forgotten nation in the shadow of dams (FLCN 1997);
- Gillam Land Use Requirements and Availability (HTFC 2008); and

- Report on the Issues Related to the Setting apart of the Gillam Trailer Court as a "Reserve" within the Meaning of the Indian Act for the Use and Benefit of the Fox Lake Cree Nation (Grahame McLeod and Associates 2007).

FLCN was recognized as an independent band in 1947. The FLCN primary reserve communities are surrounded by the Split Lake RMA and are located at Gillam and the community of Fox Lake (Bird). The Fox Lake Cree have inhabited the camps around Gillam, Fox Lake, and Bird for many years. Prior to 1947, the FLCN Members were part of YFFN and as such, were signatories to the 1910 Treaty 5 adhesion.

Much of FLCN's early history is shared with that of YFFN. The onset of the railway settlement at Gillam in the early 1900s and the events and patterns of change since that time have resulted in experiences unique to FLCN, which are the focus of the following section.

CONNECTION TO THE HUDSON BAY REGION AND THE YORK FACTORY FIRST NATION

Like other KCNs, Members of FLCN are people with deep ancestral ties to the land and waterways of the Hudson Bay region that date back thousands of years. Family ancestral regions linked to FLCN extend from the coast of the Hudson Bay to the interior:

> For the Fox Lake Cree…summers on the Bay were integrated with life within the interior territory, reaching from the Fox River/Fox Lake area on the upper Hayes River, along the Kettle and Butnau Rivers to the lower Nelson River, and along the Nelson and its tributaries for several hundred miles to the north and east from Gull Lake (FLCN 1997).

With the onset of the fur trade, many FLCN ancestors traveled from their inland locations to York Factory in the summer to participate in the fur trade and exchange furs for European goods. Prior to the construction of the railway, the York Factory Post expanded its operations. Ancestors of the Fox Lake Cree gradually became more involved as *Ininewak* to support the Hudson Bay Company and to work in the summer on the York boats.

In 1910, the Cree inhabiting the area surrounding Fox Lake and Gillam, along with many others throughout the northeastern Manitoba, travelled to York Factory to sign the Treaty 5 adhesion. The Fox Lake people were then considered part of the York Factory Band. Some Fox Lake family territories were not traditionally around York Factory. Treaty membership for families who occupied the interior region may have been seen more as an arbitrary allocation at the time since their primary camps surrounded the Fox Lake, Gillam and Kettle region. Later, the desire to have reserve status and independence at Gillam would begin a lengthy process of requesting independence from YFFN (Grahame McLeod and Associates 2007).

GILLAM BECOMES A BAYLINE COMMUNITY AND SERVICE CENTRE

In 1912, with the construction of the Hudson Bay Railway, a small settlement existed approximately four miles east of the present town site of Gillam. This early settlement was largely an Indian-Metis village involved in the Hudson Bay fur trade and was transformed into the railway construction and survey camp that housed railway workers and families, including Members of FLCN (FLCN 1997; HTFC 2008). By

1920, there were many Cree who left York Factory for Fox Lake, Gillam and settlements inland due to a decline in activities and resource scarcity at York Factory (FLCN 2009a Draft).

A few years after completion of the Hudson Bay Railway, the Canadian National Railway established a new repair and works yard west of the small settlement leading to relocation of Gillam to its current geographic location. The new settlement consisted of a small cluster of buildings belonging to the Hudson Bay Railway and its workers on the north side of the "Y" in the tracks. On the east of the Y were homes belonging to Members of FLCN (HTFC 2008). In addition, the Hudson Bay Company built a store, which was popular among northerners. Gillam became a popular gathering place for surrounding Cree and outsiders now accessing the region by rail. The settlement and surrounding camps grew with an influx of Cree, Metis and others.

Over time, more Cree settled in the Gillam area and along the common railway stops where they could take advantage of wage employment and of the resources and land base around the region, including "Askiko Sipi (Kettle River), Kitchi Sipi (Nelson River) and Wabuttnakh Sipi (Butnau River)" (FLCN 2009a Draft). FLCN Elders have described the settlement of their people in the Gillam area during the 1930s and 1940s as deliberate and logical:

> They found themselves in an enviable position since, in addition to offering a steady supply of goods and sundries, Gillam offered full access to the Nelson River…and other rivers and areas of importance where traditional pursuits could be enjoyed (FLCN 2009a Draft).

The railway had been built through Cree traditional territory, thereby altering the landscape. The benefits of a wage economy through the railway were another means of sustenance within the traditional territory that could be used, while continuing other more traditional forms of living.

NATIONAL POLICIES AND CHANGES TO COMMUNITY LIVING

The implementation of national and provincial policies, such as mandatory schooling and family allowance or social assistance, as well as the Cree's desire for establishing formal reserve lands, began to change the relationship of Cree living at Gillam with their parent nation, YFFN. York Factory, as the primary community of YFFN, became the location of administration and implementation of these policies, including the ongoing requests for reserve lands. This was no longer acceptable or convenient to Treaty Members living at Gillam.

In Gillam, there was a one-room day school established in 1928 for the families of Canadian National Railways workers. Treaty children were not allowed to attend this school. A day school was available to Treaty Members at York Factory. By 1930, after mandatory schooling was in place, many FLCN children were sent to residential boarding schools across Manitoba. The effects of the residential school system are far reaching for Cree families. In general, the residential school system isolated children from their families, resulting in a loss of family attachment, language, and the ability to pass the knowledge on to younger generations (FLCN 2009a Draft). The implications and consequences of the residential school system in Manitoba are beyond the scope of this document.

In the early part of the 1940s, the Manitoba Department of Resource Management had established the RTL system. The Cree at Gillam were not assigned their own trapline block because they were not a

formally recognized First Nation when the RTL system was first established. As a result, Fox Lake Cree used the RTL blocks in both the Split Lake District and the Limestone District.

Treaty Members at Gillam felt isolated from their Band at York Factory, a location not connected by rail. York Factory began to decline and experienced reduced levels of activity and travel in and out of the community because it no longer was a custom port of entry. Communications between the Crown and the Band slowed and became increasingly complicated as the delivery of ground mail and visits from Indian Agents decreased considerably (FLCN 1997; YFFN Evaluation Report (*Kipekiskwaywinan*)). The Cree living at Gillam wanted to have independent Band status in order to formalize reserve land and receive services locally.

FOX LAKE CREE NATION ESTABLISHED AS AN INDEPENDENT FIRST NATION

Requests to the Department of Indian and Northern Affairs for independence from YFFN were sent as early as the 1930s by Treaty Members living in the vicinity of Gillam. The requests indicated the need for reserve lands, Treaty benefits and rights at Gillam. After considerable delays, FLCN was unofficially recognized as an independent Band from YFFN in 1947. Originally named the Gillam Band, they were renamed the Fox Lake Band in 1949 and are now referred to as the Fox Lake Cree Nation. The formal separation without reserve lands or identified RTL section caused unease. Until the 1960s, FLCN continued to live as the majority population in Gillam and in surrounding camps, waiting for confirmation of reserve lands.

GILLAM DEVELOPED AS MANITOBA HYDRO'S NORTHERN HEADQUARTERS

FLCN forwarded several requests after 1947 for reserve lands at Gillam, where their people had been long established and considered the Gillam area home. In the mid-1960s, FLCN was informed that their request for reserve lands would not be granted. Manitoba hydroelectric development along the Nelson River in northern Manitoba was approved and construction of the Kettle Generating Station began in 1966, near the Town of Gillam. With two other major hydroelectric projects to be developed near Gillam, Manitoba Hydro entered negotiations with Manitoba and Canada, and was granted claim to all lands necessary for the development of the Local Government District (LGD) of Gillam. From 1967-1971, Manitoba Hydro completely re-developed Gillam into a modern industrial town site to house the northern Manitoba Hydro headquarters that would operate and administer Manitoba Hydro's projects on the Nelson River. Gillam was a central location to the planned Kettle, Long Spruce and Limestone Generating Stations. The town experienced a marked increase in population, followed by fluctuations in population size that mirrored the construction and operation phases of Manitoba Hydro projects. In addition, Manitoba Hydro became the dominating political and administrative force in Gillam:

> Prior to the projects, the Fox Lake people lived in relative freedom, with little outside interference. But in short order, outside business and political structures were imposed on the community, and strangers assumed new decision making authority. The government and its Crown corporation were not the "protectors" of the people; instead, they became the primary actors in the people's exclusion, disempowerment and marginalization" (FLCN 2009a Draft).

At this time, FLCN families residing in the area were labelled as squatters, despite their long-standing residence in the Gillam area. At the time, there were 48 homes in and around the Gillam townsite (FLCN 1997). All of their homes and buildings were classified as "substandard" and relocated or demolished without compensation (FLCN 1997). Many FLCN Members moved to surrounding regions. Approximately 51 FLCN families remained in Gillam once Manitoba Hydro redeveloped the community. These FLCN families were relocated within the town site to make room for planned, modernized infrastructure to service Manitoba Hydro's employees (FLCN 1997).

The planning and construction of Kettle in the late 1960s saw the population in Gillam increase from approximately 350 to 2,500 – a change that took place in a matter of weeks. An additional 1,500 outsiders working for Manitoba Hydro were located in a nearby construction camp. During construction of the Long Spruce Generating Station, the population increased again with an influx of 2,800 workers (FLCN 1997). FLCN became the large minority in Gillam, overwhelmed by the influx of non-Aboriginal workers associated with hydroelectric development. The composition of the community changed from predominantly Cree families to mainly single men working in construction who came from outside the Northern Region. The outsiders were not aware of Cree values and were not respectful of the lands, the waters and, more importantly, the people. In addition to the social issues associated with an influx of population, outsiders used the resources for hunting and fishing and placed strains on local resources. The identified struggles included loss of resources, language, family cohesion and community organization. An example of the disruption to community life can be characterized as follows:

> Also at this time was the opening of one of the largest bars in all of Manitoba, at the Kettle Rapids construction camp. The male-only bar quickly became a social center for many workers, and consuming alcohol became one of the most popular leisure activities in the camps (FLCN 2009a Draft).

The impacts of Manitoba Hydro laying claim to Gillam, along with the development of hydroelectric projects, have been profoundly adverse and long lasting on the FLCN people. Today, community Members recall what came of the relationship with Manitoba Hydro: the loss of control of the community; a sense of disenfranchisement; limited land for resource use; and negative worker interactions with FLCN Members, which included pressure on women and safety issues during construction projects of Kettle, Long Spruce and Limestone. Members were also falling into lifestyles involving alcohol and drugs (FLCN KPI Program 2009-2011). For further details related to social issues, see Section 5, Personal, Family and Community Life.

The social and cultural environment was transformed:

> Our people identify the arrival of outside workers and availability and abundance of alcohol as two of the most detrimental effects of the Kettle project. As their personal stories demonstrate, the quiet town our people once knew was transformed almost overnight into a place where street parties, brawls and violence were commonplace (FLCN 2009a Draft).

PERMANENT CHANGES TO THE WATER LEVELS AND FLOWS OF THE LAKES AND RIVERS

For FLCN, the most substantial historical influence of change on their traditional way of life has been hydroelectric development:

> The fur trade and the expansion of the railway did not alter the social or environmental landscape to a great extent. In contrast, the hydro dams prevented our people from living a lifestyle that they determined and managed (FLCN 2009a Draft).

The greatest effects to FLCN's traditional lands and waters were caused by the Kettle Generating Station and by LWR and CRD. The flooding of Kettle created a large reservoir at Stephens Lake that inundated Fox Lake traditional hunting, fishing and trapping areas, including the Moose Nose area (*Mososkot*) and Butnau River (*Wabuttnow Sipi*). The LWR and CRD also caused life-altering changes to the environment described by FLCN:

> Unheard of in our community's history, the seasonal flow volumes of the "mighty Nelson" were reversed, so that water levels no longer peaked between May and June, but rather during the months of November and January. Not only did this reversal of natural cycles impact the safety and freedom of our people's river travel, it made it more difficult to predict the behaviour of the river year round (FLCN 2009a Draft).

The increase and changes to the flows of the river increased shoreline erosion, turbidity and mercury levels in fish in Stephens Lake. FLCN was not able to readily adapt to the level of environmental disruption being experienced and their ability to maintain a traditional lifestyle, based on reliance on resource harvesting for sustenance, was limited (FLCN 2009a Draft).

The Limestone Generating Station dropped water levels below the dam along the Nelson River, exposing the riverbed along nearby estuaries. This changed the ecology of the rivers and the waterways became dangerous. As described by FLCN:

> The affected tributaries included time-honoured fishing, camping, hunting, and gathering areas such as the Limestone River and the Moondance and Sundance Creeks…These changes have had catastrophic effects on the community's ability to maintain its relationship with the land (FLCN 2009a Draft).

FOX LAKE CREE NATION RESERVE SETTLEMENT AT BIRD

The first formal and legal reserve land was provided to FLCN at Fox Lake and Armstrong Lake[1], however these lands were not inhabited by their people. In 1985, the Department of Indian and Northern Affairs formalized Fox Lake (Bird), approximately 53 kilometres north east of Gillam, as the FLCN reserve community. Many FLCN Members and their families had been living at Bird since at least the 1950s when the community was a railroad stop. The reserve at Bird included homes, a band hall, a school, and other community-shared infrastructure, including utilities, water and sewer treatment facilities built to accommodate the community. However, many FLCN Members remained in Gillam and began integrating themselves into the Gillam community. This emphasized the dislocation of the FLCN

[1] Armstrong Lake is approximately 190 km from Fox Lake (Bird) as the crow flies.

Members, whereby only a small portion of the total population remained in their home communities of Fox Lake (Bird) and Gillam. The reserve community at Bird was renamed Fox Lake in 2010.

DELAYED INVOLVEMENT IN MANITOBA HYDRO NEGOTIATIONS AND THE 2004 FOX LAKE CREE NATION SETTLEMENT AGREEMENT

FLCN was originally part of the Northern Flood Committee. Although they were equally affected by the hydroelectric developments, especially LWR and CRD, they were not signatories to the 1977 NFA (FLCN 2009a Draft). Negotiations to resolve FLCN's outstanding grievances with Manitoba Hydro did not begin until 1993. In 1997, the FLCN formally identified the scope of impacts needing to be addressed in negotiations with Manitoba Hydro and released a formal report titled Fox Lake First Nation: Forgotten Nation in the Shadow of the Dams – Grievance Statement (FLCN 1997). The FLCN Settlement Agreement was formally signed in 2004, resulting in compensation for the past adverse effects and provisions for a Future Visions Trust Fund. The Settlement Agreement also included other programs that involved mitigation, remedial works, compensation and future development. This agreement outlined the requirement that FLCN be provided a substantive role in the planning, construction and monitoring of future hydroelectric projects (FLCN 2009b).

HARMONIZED GILLAM DEVELOPMENT PROCESS

In February 2007, FLCN and Manitoba Hydro entered the Harmonized Gillam Development (HGD) process. The HGD is a framework for Manitoba Hydro, FLCN, the Town of Gillam and the Province of Manitoba to work together undertaking projects and initiatives that are mutually beneficial to them and that strive to improve relations between them. The HGD process is a series of processes developed to overcome years of strained relationships. The hope is activities under the HGD will contribute to a positive change in relationships between the parties and will bring the FLCN presence in Gillam to the forefront (HFTC and FLCN, *pers. comm.*, 2009). Included as part of the HGD is the Gillam Land Use Requirements and Availability Study that uses a cooperative process in land use planning for the primary needs of FLCN and Manitoba Hydro (HTFC 2008). Negotiations for additional reserve lands at several locations, including Gillam are ongoing and recognized as part of the HGD (Grahame McLeod and Associates 2007). In 2010, a small urban reserve was legally recognized at Kettle Crescent in Gillam.

KEEYASK PLANNING

FLCN has been more heavily involved in the planning and assessment of the Project than in the previous Nelson River hydroelectric projects. FLCN's involvement has increased the awareness of Manitoba Hydro and its consultants to the distinctive socio-economic effects that FLCN experienced during past hydroelectric projects. Effects resulted in part from interactions between project workers and Band Members and the transformation of Gillam to the main centre for Manitoba Hydro northern operations.

Engagement of FLCN in the planning and design of the Project has been ongoing since 2001 and included the signing of the Principals' Memorandum, agreeing to the framework outlined in the AIP signed by TCN and WLFN. FLCN did not finalize their Impact Settlement Agreement for past adverse effects of hydroelectric development until 2004. Until the agreement was completed and signed, it was

difficult for FLCN to participate in discussions about partnering in the Project (FLCN 2009b). FLCN representatives participated in the various JKDA technical committees that dealt with Project description, employment, business opportunities and commercial terms. In addition, FLCN negotiated and signed their own AEA with Manitoba Hydro that identifies mitigation and compensation measures to deal with the potential adverse effects of the Project. The AEA and JKDA were ratified by FLCN through a referendum in May 2009. Shortly after, the KCNs and Manitoba Hydro signed the JKDA to formalize participation in the Project.

FLCN continues to be involved in the EA and regulatory process for the proposed Project. The FLCN has also undertaken their own studies of the community's history and traditional resource use by Members, incorporating their worldview and other components of ATK. This is to support and contribute to the requirements of the EA process for the EIS.

FLCN has representatives sitting on several key committees that oversee the regulatory, licensing and EA processes. Issue-specific multi-lateral working groups FLCN representatives have participated in include: Mercury and Human Health Technical Working Group, Aquatic Working Group and Mammals Working Group. As well, there is a bilateral FLCN Environmental Studies Working Group focused on participating in, reviewing and informing the fieldwork studies needed for the EIS. FLCN also participated on a Socio-Economic Steering Committee with members of the EA Study Team related to collaborative socio-economic fieldwork undertaken with FLCN in Fox Lake (Bird) and Gillam (FLCN KPI Program 2009-2010).

2.2.3.3 York Factory First Nation

Information on YFFN reviewed for this section includes:

- The YFFN Evaluation Report: (*Kipekiskwaywinan)*: Our Voices;
- York Factory First Nation Traditional Values, Occupancy and Community History Project (YFFN 2010);
- Voices from Hudson Bay: Cree Stories from York Factory (Beardy and Coutts 1996);
- Community-Identified Socio-Economic Conditions and Future Priorities: A Background Report for the Environmental Assessment Proposed Keeyask Project. Final Report (YFFN 2004a); and
- Initial Community-Based Environmental Overview for the Proposed Keeyask Hydro Project (YFFN 2002).

YFFN have ancestral ties with those Cree who camped along the Hudson Bay coast, and were among the first to have contact with Europeans. YFFN was relocated in 1957 and given a small reserve community at York Landing (*Kawechiwasik*) along the southern shoreline of Split Lake, within the Split Lake RMA. The heritage site of York Factory remains part of YFFN's traditional territory and is important as the location of their ancestors and traditional land use area.

EARLY CONTACT AND THE FUR TRADE

YFFN have their ancestry and roots along the coast and were among the first involved in providing services and furs for trade to the Europeans. The Hudson Bay Company York Factory Post was built in 1684, marking the beginning of permanent settlement and community in the region (Beardy and Coutts 1996; YFFN Evaluation Report *(Kipekiskwaywinan)*). In general, the ancestors of YFFN, the *Ininewak*, were the first to be referred to as the Homegaurd Cree, a name given by Europeans to the Cree along the coast who were integral to York Factory's success in the fur trade and commerce of the region (YFFN Evaluation Report *(Kipekiskwaywinan)*). At this time, life on the Hudson Bay coast centred around the fur trade: "As provisioners for the forts our people ensured a reliable source of food, clothing and many other services to the Europeans at the forts" (YFFN Evaluation Report *(Kipekiskwaywinan*); or:

> [A] small band of coastal Cree who inhabited the area around York Factory, had long specialized in supplying the post with a variety of country goods and services. The small furs, provisions, country technology, and services of the hunters, guides, packers, and couriers known as the Home-Guard Cree, were indispensable to the profitability of the fur trade at York (Beardy and Coutts 1996).

At first, YFFN *Ininewak* maintained their role while still following their usual seasonal pattern of living, in which springs and summers were spent along the coast both pursuing traditional activities and providing services for the fur trade. In the winter they would go inland to their family territories. Much later, some YFFN *Ininewak* would remain year round at the York Factory Post along the coast.

THE ARRIVAL OF MISSIONARIES AND CHRISTIANITY

YFFN's history with missionaries and the development of Christianity among its Members is varied and complex. Over the years, missionaries from several religious backgrounds arrived at the York Factory Post; however, most did not stay long and did not fully integrate into the lives of the Cree, resulting in varying degrees of acceptance of Christianity by the Cree of the region. There were both Protestant and Anglican missionaries introducing Christianity among YFFN Members. The church that remains at the York Factory Post Heritage Site is the Anglican Church and is referred to as the "iron or tin" church. There are YFFN ancestors who adopted or melded Christianity through the Anglican Church as part of their worldview (Beardy and Coutts 1996; YFFN 2002). In addition, the early arrival of missionaries brought early schooling to York Factory, and some Cree children attended the day school before mandatory schooling and the residential school system were enforced.

TREATY 5 ADHESION FORMS THE YORK FACTORY BAND

The 1910 signing of the Treaty 5 adhesion at York Factory came two years after the adhesion was signed at Split Lake. Through the 1910 Treaty, the York Factory Band was formalized (the Band was later renamed York Factory First Nation). YFFN signatories included the Cree surrounding York Factory and those from surrounding regions who had not been signatories to the 1908 Split Lake adhesion. Treaty Members of the York Band came from Gillam, Bird, Shamattawa, Split Lake and Ilford. Initially, changes to the way of life of YFFN Members were minimal. Those already integrated and active in the York Factory Post lived at its edge on a small settlement. The remaining families continued their seasonal

patterns of traditional harvesting and camps, often located a considerable distance from the York Factory settlement. Historically, YFFN would still go out on the land to their family territories that included "Fort Severn (Wasahoo), Big Trout Lake (Namakoos Sakahegan), Kaskatamakan, Shamattawa, York Factory (Kischewaskehekan), Port Nelson (Pawinakaw), the Bay line (Otapan Maskanow) and Churchill (Mantayo Seepee)" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

THE DECLINE OF YORK FACTORY AND THE HUDSON BAY RAILWAY

By the early 20th century, overharvesting placed a strain on animal populations at York Factory, which, coupled with other issues, resulted in YFFN wanting to sign the Treaty 5 adhesion. In addition to depleted animal populations, the railway provided outsiders with access to the region and changed the transportation patterns of the fur trade. York Factory had experienced decline in its economic viability as a fur trade post, warehouse and shipment centre. The construction and operation of the Hudson Bay Railway provided service and shipment of goods to several Bayline stops along its route from The Pas to Churchill. The Bayline became a more favourable transportation option than travelling by water to York Factory. The York Factory Post was not one of the Bayline service stops. Churchill replaced York Factory as a customs port of entry and became the main headquarters for export and warehouse storage. This added to the economic downturn and would contribute to the eventual closure of the York Factory Post. The wage economy became integrated as a component of livelihood for YFFN and many Members participated in both paid employment and traditional resource harvesting. As a result, many YFFN families moved away from the settlement to communities with rail access and services for employment, to pursue resource harvesting from these locations.

> In 1933, the York Factory post lost its status as a customs port of entry, leading to a reduced level of traffic and trading. As well, Port Nelson (Pawinakaw) was abandoned and many of our relatives moved to Split Lake (Tataskweyak), Shamattawa, Churchill (Mantayo Seepee) and other sites along the railway line (YFFN Evaluation Report (*Kipekiskwaywinan*)).

NATIONAL POLICIES MEAN CHANGES TO COMMUNITY LIVING

As with other First Nations discussed in this section, the Department of Indian and Northern Affairs implemented policies and programs that had various impacts and on YFFN, with the most prominent impacts deriving from residential schooling. Families with their children could no longer travel into the bush together to pursue their traditional lifestyle. There was a day school available for children at York Factory, and by the 1930s, many children were sent to residential school. The willingness of government to pay for transportation of children to residential schools was minimal, so once children left the community, they did not return until their schooling was completed years afterward (Beardy and Coutts 1996). Some other First Nations along the railway were more fortunate and were able to arrange visits occasionally (FLCN 2009a Draft). The need to stay year round at York Factory to receive the family allowance or social assistance and have children attend school, together with the lack of economic activity that coincided with this timeframe, resulted in changes to YFFN patterns of living and to the physical and social environment (Split Lake Cree – Manitoba Hydro Joint Study Group1996a).

In addition to federal policies, the Manitoba Department of Natural Resources instituted the Manitoba RTL System in 1940. The idea of a RTL district was supported by YFFN because it would place

limitations on already overharvested territories that were experiencing worrisome declines in animal populations. This was to restore species to their natural numbers, something essential to maintaining a lifestyle of living off the land. However, the implementation of a RTL district did not reach YFFN until 1948 when an RTL section was established at York Factory along the coast, covering most of the traditional territory of YFFN (YFFN Evaluation Report (*Kipekiskwaywinan*)).

For YFFN, a number of problems converged at this time: the displacement of its Members living in several distant communities (Bird, Gillam, Kettle and Shamattawa), the push for programs to be implemented at central and accessible reserve settlements, the dramatic decline in country food and the downturn of the York Factory Post economy. Members around the region of Gillam and Shamattawa were lobbying for formal separation from York Factory to acquire independent reserves and RTL sections. In 1947, Fox Lake and Shamattawa were provided formal independence from York Factory, which created additional demographic changes (FLCN 1997). York Factory had become increasingly isolated in terms of access and the Hudson Bay Company closed its business at York Factory in 1957. The location became undesirable as a centre from which to implement YFFN's programs and policies.

RELOCATION TO YORK LANDING

At the same time that the Hudson Bay Company closed the York Factory doors in 1957, the Government of Canada relocated YFFN to York Landing (*Kawechiwasik*). This relocation to an inland settlement was a major event changing the lives of YFFN Members and their ability to successfully participate in resource harvesting.

Prior to their relocation inland, YFFN Members relied on coastal and marine-related harvesting. In addition, the region immediately inland from the coast provided for YFFN through the hunting of large game, the trapping of furbearers, fishing and other harvests for their traditional lifestyle. Because York Landing (*Kawechiwasik*) was further inland, Members were much more isolated in terms of access to the resources of their coastal region. In addition, there was limited land available for YFFN resource use because TCN already had reserves established in the area, and held a large RTL section for most of the surrounding Split Lake area. York Landing (*Kawechiwasik*) was provided the Community Trapline 13 by TCN for their resource harvesting needs, and had access to Split Lake through a summer ferry and winter road.

> At York Landing (Kawechiwasik) there was no resource area like at the coast. While the York Registered Trap Line Section on the coast existed until 1973, access to the area was not viable on a continuous basis. The RTL system, which had first served us well, ended up being a jurisdictional confinement to our people, given our relocation. When we were relocated to York Landing (Kawechiwasik), Tataskweyak Cree Nation gave up one of their traplines, Trap Line No. 13, for our community to use within the large Split Lake Trap Line Section, but it was small, crowded and insufficient to support our people, even though it is still being used today. (YFFN Evaluation Report (*Kipekiskwaywinan*)).

As a result, Members who relocated to York Landing (*Kawechiwasik*) were faced with new patterns of resource harvesting, and were limited in the regions they were allowed to trap. Members had no access via rail or road to their coastal region and had lost Members to FLCN and the Shamattawa Band (YFFN Evaluation Report (*Kipekiskwaywinan*)). The daily lives of YFFN Members were altered dramatically due to the relocation of the community. Daily life became characterized by a lack of access to the resources

that shaped the Cree way of life and isolation from both other Cree people and the coastal region that provided the basis of sustenance and livelihood since time immemorial.

The time it would take for adaptation to the surroundings and the creation of a community at York Landing (*Kawechiwasik*) are part of YFFN history:

> Our younger Members were born in York Landing (Kawechiwasik)and take only occasional trips to York Factory, Port Nelson, and Kaskatamakan. We now have homes, memories and a friendly community in this new place. Though we continue to be frustrated by isolation, resource access and conditions on Split Lake, and though we work hard to maintain ties to our coastal territory, York Landing (Kawechiwasik) has become a home to us as well (YFFN Evaluation Report (*Kipekiskwaywinan*)).

PERMANENT CHANGES TO THE WATER LEVELS AND FLOWS OF THE LAKES AND RIVERS

Manitoba Hydro began construction of the Kelsey Generating Station a few kilometres away from York Landing (*Kawechiwasik*) one year after YFFN were relocated to the community. A construction crew arrived in York Landing (*Kawechiwasik*) without prior notice or consultation; YFFN found this particularly disturbing. This was further exacerbated when Kelsey began operations in 1961, flooding and bringing substantial changes to the water, ice formation, shorelines and surrounding environment (YFFN Evaluation Report (*Kipekiskwaywinan*)):

> We no sooner were re-settled on the Aiken River at Split Lake when the first Hydro dam at Kelsey was built. Our new homelands and waters were changed, before we had barely begun to understand and learn about them (YFFN Evaluation Report *(Kipekiskwaywinan*)).

Over the next three decades, LWR, CRD and the related Kettle, Long Spruce and Limestone generation projects were developed and caused flooding and changes in water levels and flows in the region. For YFFN, the effects of LWR and CRD were felt in the context of adapting to changes they were already experiencing from their recent relocation to York Landing (*Kawechiwasik*). Members felt that they had never completely adjusted, and that the effects of past development still affected the Nelson River system (YFFN Evaluation Report (*Kipekiskwaywinan*)).

The LWR and CRD projects resulted in the reversal of seasonal water flow levels on Split Lake, Stephens Lake and along the lower Nelson River. As with the other First Nations affected, YFFN felt hydroelectric development substantially altered what had been readily available to them. Specifically, the changes identified by Members of YFFN as life-altering were: declining water quality, damaged fish and fishing conditions, decline in the number of wildlife, decline in the health of birds and animals, the lost safe travel on ice and water, shoreline erosion and changes to important cultural locations (YFFN Evaluation Report (*Kipekiskwaywinan*)).

The environmental effects of hydroelectric development also caused the following: limited access to habitat for acquiring country food, health issues related to elevated levels of methylmercury in fish, dangerous travel conditions, and a loss of traditional knowledge related to lack of intergenerational transfer of traversing the waterways and aquatic environment. Changes associated with hydroelectric development created further isolation from traditional lands along the coast and immediately inland. From the perspectives of YFFN Members, "there is nothing they can do to make it any worse…the damage has already been done" (YFFN KPI Program 2009-2010). These hydroelectric developments and

their environmental impacts added to the already strained and changing social environment. "Many of the changes that we have described are ongoing. They began with changes in the flow of the water and have passed along through the fish, animals, birds, shorelines and our community" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

THE NORTHERN FLOOD COMMITTEE AND THE 1977 AGREEMENT

For YFFN, the effects of the hydro developments were met with the sense of loss over their own ability to influence and address concerns for the community (YFFN Evaluation Report (*Kipekiskwaywinan*)). In response to their perceived lack of community influence, YFFN joined as one of five allied First Nations (TCN, Nelson House, YFFN, Norway House and Cross Lake) to form the Northern Flood Committee. The committee became increasingly organized around the negotiations of mitigating and compensating the adverse effects felt by the First Nations related to both LWR and CRD. This was a time when the governance of First Nations changed, and younger generations who were educated in English needed to participate in leadership roles in negotiations at the provincial and national levels. The result was a generational shift in leadership and a national recognition of political involvement with the outside community:

> We became defined as a Northern Flood Agreement (NFA) community by outsiders, rather than a proud Cree community that shared vast territories, history and culture with Cree now living in different places like Shamattawa, Churchill (Mantayo Seepee), Gillam (Akwayskimamaykuk), Bird, Fort Severn (Wasahoo), Split Lake (Tataskweyak) and Ilford (Moosokoochisik). We became a community under threat; under siege from outside forces, especially Hydro development (YFFN Evaluation Report (*Kipekiskwaywinan*)).

As noted previously, the Northern Flood Committee successfully negotiated the NFA in 1977. Although the recommendations of the Northern Flood Committee were positive and provided for compensations and future mitigation, the NFA experienced problems in implementation (as noted earlier). This led most of the First Nations that participated in the Northern Flood Committee to begin to negotiate independent agreements for mitigation and compensation of the adverse effects.

YFFN negotiated and finalized a CIA in 1995. Compensation and mitigation programs have had a hand in helping YFFN reconnect to their traditional routes and improve their community well-being. In recent years, the community has worked to reclaim their land of traditional use around York Factory on the Hudson Bay coast. The RMA formalized in the agreement is a part of YFFN history, but as noted by YFFN, the current RMA is not a good proxy of all ancestral territories. Funding has been available for cultural camps, sites and programs to support the objectives of reclaiming YFFN's Cree language and traditions and to improve intergenerational relationships in the community. These efforts have met with varying degrees of success (YFFN 2004a; YFFN Evaluation Report (*Kipekiskwaywinan*)). "As noted earlier, these agreements have helped to identify us as 'flood communities' to outsiders, blurring where we come from and who we are as a community" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

YFFN have goals and objectives for managing and overseeing their own programs and community development. YFFN would like future community planning to include a focus on improving their Members' connection to Cree culture, customs and traditions while enabling successful and active participation in the surrounding modern society. YFFN has a desire to connect fully with their history at

York Factory. York Landing (*Kawechiwasik*) and York Factory remain relatively isolated from the outside world and YFFN have identified the need for infrastructure to assist in achieving their new goals (YFFN 2004a). YFFN has chosen to move forward in the Partnership planning process of the Project to facilitate opportunities to address these goals, and to shape the Project in a way that ensures their views, knowledge and concerns are respected and addressed (YFFN Evaluation Report (*Kipekiskwaywinan*)).

KEEYASK PLANNING: YORK FACTORY FIRST NATION UNDERTAKING FUTURE DEVELOPMENT INITIATIVES

In 2002, YFFN began undertaking research and negotiations for partnership development in the Project as well as participating in detailed Project planning. Early in the process, YFFN signed a process agreement (2002) and contribution agreement (2004) with Manitoba Hydro. This provided funding for support, consultants and research to assist with negotiations and further inform YFFN's consideration of the Project (YFFN Evaluation Report (*Kipekiskwaywinan*)). These agreements provided for community involvement and the use of ATK in preparing the EA. YFFN has participated in the research and process of planning for the Project, although their view of the development and of their participation is shadowed by the perspective that the Project will continue to degrade the lands and waters beyond predictions in the technical science-based EA. YFFN have taken the following stance with their Partnership:

> We believe that a commitment to on-going reconciliation is the first step to forming a strong partnership; building effective advisory committees; and developing innovative cross-cultural approaches to monitoring and project management (YFFN Evaluation Report (*Kipekiskwaywinan*)).

YFFN was active in developing the JKDA for the Project. YFFN had representatives on technical committees that worked out the framework of the JKDA, including the minimum and maximum investment required by the KCNs, prospective construction jobs, operation jobs, **direct negotiated contracts** available to YFFN and YFFN's role in environmental monitoring and management of the Project (YFFN Evaluation Report (*Kipekiskwaywinan*)). At the same time, YFFN negotiated an AEA with Manitoba Hydro that provided mitigation measures, community-based programming and cash compensation to avoid, offset or compensate for anticipated Project effects. Unlike prior hydroelectric projects, these negotiations considered community priorities and knowledge to identify potential adverse effects and related compensation and mitigation prior to their occurrence.

In March 2009, YFFN held a referendum and ratified the JKDA and the AEA, with a majority of voters in favour of signing the agreements. In May 2009, YFFN Chief and Council signed the JKDA and AEA. In spite of this outcome, many in YFFN remain apprehensive about the Project and partnering with Manitoba Hydro in its development:

> We recognize that these long-standing sentiments will not change quickly, but feel that as Partners, we must commit to reconcile our past interactions and work to build trust and respect between YFFN and Manitoba Hydro. In order to build trust and respect, our Members need to feel that Manitoba Hydro respects our First Nation, our values, and our concerns. Our people need to trust that they are not being managed or manipulated, but are meaningfully engaged as experts and stewards of our environment (YFFN Evaluation Report (*Kipekiskwaywinan*)).

As with the other KCNs, YFFN has also been integrally involved in the EA of the Project and has had YFFN representatives participate in several key committees that oversee the regulatory licensing and EA processes. Issue-specific multi-lateral working groups that YFFN representatives have participated in include the Mercury and Human Health Technical Working Group, the Aquatic Working Group and the Mammals Working Group. As well, a YFFN Environmental Studies Working Group was developed to focus on participating in, reviewing and informing the fieldwork studies needed for the EIS. YFFN also participated on a Socio-Economic Steering Committee with members of the EA Study Team related to collaborative socio-economic fieldwork undertaken with YFFN (YFFN KPI Program 2009-2010).

2.2.4 Gillam

Throughout its history, the Town of Gillam has gone through a series of community transformations. The town was named after 17th century fur traders for the Hudson's Bay Company named Captain Zachary Gillam and his son Benjamin, who resided in the region from 1668-1670 (Town of Gillam 2010). The area has served as a traditional harvesting camp for the Cree, as a railway construction and survey camp and as a divisional Hudson Bay Railway service centre (Bayline community). In the late 1960s, Gillam expanded and modernized to become Manitoba Hydro's northern centre of operations and administration.

A common thread in this history has been the presence of Cree people. FLCN and its predecessors have, and continue to be, an integral part of the population and life in Gillam. The interconnectedness of Gillam with FLCN cannot be separated. The following description of the town of Gillam draws primarily from these documents:

- Gillam Land Use Requirements and Availability (HTFC 2008);
- Report on the Issues Related to the Setting apart of the Gillam Trailer Court as a "Reserve" within the Meaning of the Indian Act for the Use and Benefit of the Fox Lake Cree Nation (Grahame McLeod and Associates 2007);
- Fox Lake First Nation – Forgotten nation in the shadow of dams (FLCN 1997); and
- Ninan: The story of the Fox Lake Cree - Draft (FLCN 2009a Draft).

SETTLEMENT ESTABLISHED AT GILLAM

Prior to the railway, the Cree inhabited the area around Gillam, trapping and fishing in the Nelson River area. Eventually, a small Hudson Bay Company post was established in the area. By 1912 and 1913, Gillam was a "quiet, largely Cree, rail hamlet" (FLCN 1997) with an estimated population of 350 that consisted largely of railway workers and their families (Town of Gillam 2010).

The early settlement located just east of where Gillam is today was used as a construction and survey camp for the Hudson Bay Railway. Before the railway to Churchill was completed, Gillam had earned the Cree name *Kaquayskimukkakh* or 'the place where trains turned around'. With the closure of York Factory, many FLCN families settled in Gillam and other encampments in proximity to the rail line, which offered them convenient access from the coast to other northern communities inland (FLCN

2009a Draft). Settling along the rail stops allowed the men to participate in rail maintenance work while still living off the land. "The Hudson's Bay Company started a store in 1927/28 where the current Royal Canadian Legion stands. It was rumoured to be purchased for a single barrel of beer" (Town of Gillam 2010). The first one-room school was constructed in the community in 1927. In 1930, the Canadian National Railway established a new repair and works yard west of the small community at the divisional section of railway. The Gillam settlement was built up around this switch point where the railway, shaped like a Y, redirected trains northward to Churchill (Town of Gillam 2010). FLCN Members tended to settle on the east side of Gillam, along the south switch of the track (FLCN 2009a Draft; Town of Gillam 2010), while TCN families settled on the north side of the tracks (Town of Gillam 2010). In 1932, Len Gordon arrived in Gillam and took over the general store, which was operated as the White Fox Store. The first church built in Gillam was Anglican. The Roman Catholic Church was established later in 1942. "Ministers and religious teachers were brought into Gillam from the Northern Evangelical Mission" (Town of Gillam 2010).

Until the late 1960s, the settlement remained fairly small with the two churches, a small school, a hotel, a store, and a legion hall providing the majority of services to the community. The population remained small and included a large proportion of Cree families (FLCN 1997; FLCN 2009a Draft).

MANITOBA HYDRO HEADQUARTERS AT GILLAM

The latter half of the 20th century brought change in the form of modernization and the development of Manitoba Hydro's northern generation headquarters in Gillam. In 1963, a study of the hydroelectric potential of the Nelson River began, which considered the economic feasibility of developing generating stations from Split Lake to the Hudson Bay. In 1966, the Federal and Provincial Governments entered into an agreement to jointly undertake the development of the hydroelectric potential of the Nelson River, to bring power from northern Manitoba to the southern parts of the province. With this agreement in place, Manitoba Hydro began to develop the Kettle Generating Station (Manitoba Hydro 2010a), which would transform the community of Gillam entirely. Between 1966 and 1971, Gillam was transformed into a modern town site and the new generating station would accommodate increases in population for construction and operation crews of hydroelectric developments.

Manitoba Hydro continued to develop housing and infrastructure in Gillam to accommodate the operation and administration staff of large hydroelectric projects including the Kettle, Long Spruce and Limestone generating stations, as well as the Radisson and Henday converter stations and associated transmission infrastructure. Construction and modernization of the town included the development of modern municipal infrastructure such as hydroelectric power, modern medical services, housing, a new school, commercial and retail services, an airport and road access to other parts of the province. The political and government structure also changed with an elected Mayor and Council. Manitoba Hydro becoming the primary landlord and economic contributor (HTFC 2008; Town of Gillam 2010).

Population increases associated with hydroelectric development in Gillam also caused the community demographics to shift to predominantly young families from the south who were employed by Manitoba Hydro; FLCN Members became the largest minority in the community.

Gillam's population boomed during the 1970s, reaching close to 3,000 residents at its peak during the Kettle and Long Spruce construction eras (see Section 2.2.2). During this time, some FLCN Members moved out of the community to other locations, including the York Factory Reserve, Split Lake and surrounding camps. Other FLCN Members continued to live and be integral parts of the community, although they began to feel unwelcome in their own community (FLCN 1997). Large tracts of land had been secured for future development by Manitoba Hydro. Many sites that were regularly used by FLCN for resource harvesting around Kettle, Long Spruce and Limestone projects were fenced and restricted from their use. The restricted areas included construction sites for the generating stations as well as construction camps, dykes, borrow pits, quarries, access roads and the Butnau Diversion works. In addition, the large influx of non-local workers during the construction period of hydro development on the lower Nelson River, at construction camps and at Gillam, increased the use of land for recreational purposes by these outsiders. As a result, and in combination with limiting access to parcels of land for construction and operation of hydroelectric development, the ability for FLCN to continue harvesting activities for recreation, commercial gain or for Cree subsistence, became strained. The relationship of FLCN with Gillam is described further under Section 2.2.3.2. Aside from offering a place to live, the town also provided services to people from the surrounding construction camps for the Limestone, Long Spruce and Kettle Rapids projects.

Today, the population has stabilized with a relatively constant population base between 1,200 to 1,500 residents. The population of Gillam is often described as transient, as a sizeable portion of the population, consisting mostly of Manitoba Hydro employees and their families, move into the community for a number of years and then return to southern communities for a variety of reasons. Between 20% and 30% of Gillam's current population are considered long-term residents and are largely FLCN Members (HTFC 2008).

GILLAM IDENTIFIED AS PREFERRED RESERVE SETTLEMENT

Many Cree who used the area around Gillam, Fox Lake, Kettle Rapids, Limestone River and Bird were signatories to the 1910 Treaty 5 adhesion as YFFN Members. After the Bayline became operational, the majority population in Gillam were families who referred to themselves as Fox Lake Cree and considered themselves independent from their parent First Nation. YFFN Treaty Members living in and around Gillam felt their rights and traditional lands were not protected without reserve and Treaty land unique to their geography (FLCN 1997). They requested reserve land and independent Indian status for their community as early as the 1930s (HTFC 2008). They hoped being separate from YFFN would result in Treaty land entitlements and RTLs around Gillam, Fox Lake and the surrounding area.

In federal communications, the Department of Indian Affairs began referring to those former YFFN Members living around Gillam as the Gillam Band and in 1947 Canada formally recognized them as a new Treaty band.

The newly formed Gillam Band found it difficult to secure a reserve settlement in Gillam. The RTL system was already established, leaving FLCN without independent RTLs. Without securing a reserve settlement or land, FLCN Members made use of RTLs from Split Lake to Limestone. The FLCN requested reserve land at Gillam was still waiting approval when, in 1966, the Province and Manitoba

Hydro entered into an agreement that established the LGD of Gillam, which meant that the Gillam reserve would not be approved at that time (Grahame McLeod and Associates 2007).

THE HARMONIZED GILLAM DEVELOPMENT PROCESS

Since 1966, the Town of Gillam has been funded by Manitoba Hydro, which has had a strong influence over the town's activities and development. This, in combination with the failure of the Provincial and Federal Governments to set apart reserve land for FLCN at Gillam, resulted in frustration for FLCN and a strain on the relationships among the stakeholders of Gillam (FLCN 1997).

By the mid 2000s, the stakeholder groups involved in Gillam's future development agreed on a process where Manitoba Hydro, FLCN, the Town of Gillam and the Province of Manitoba, joined together to undertake projects and initiatives that are mutually beneficial to the stakeholders and that strive to improve relations between them.

In February 2007, Manitoba Hydro and FLCN signed and agreed to a Joint Statement on HGD:

> Harmonized Gillam Development must focus on building a community where all residents live, work, play and prosper together, where there is mutual use and enjoyment of community facilities and services and where residents respect and support the interests and ambitions of their neighbours (HTFC 2008).

The HGD process is a series of activities, discussions and projects developed to overcome years of strained relationship. The hope is that the activities and decision-making processes will improve the relationship between Manitoba Hydro and FLCN and will bring FLCN presence in Gillam to the forefront. Activities under the HGD have been ongoing since 2007 and have included key issue studies, development of working groups, committees and organizations and special one-time events or actions. Also included are:

- Report on the Issues Related to the Setting apart of the Gillam Trailer Court as a "Reserve" within the Meaning of the Indian Act for the Use and Benefit of the Fox Lake Cree Nation (Grahame McLeod and Associates 2007);
- Gillam Land Use Requirements and Availability Study (HTFC 2008);
- Joint Employment Business Opportunities (JEBO) meetings and organization;
- Hydro Town of Gillam and FLCN Apprenticeship Program;
- Via Rail Sub-Committee – looking at developing the railway station as a Heritage Building or some form of commercial development;
- Hydro-FLCN cultural awareness programs including history sessions about FLCN to Hydro employees;
- Cooperative Community events planning committees (for example, FLCN invited to Gillam Spring Clean Up, Manitoba Hydro employees invited to FLCN festival); and
- Initiatives to increase awareness of FLCN history to Gillam (for example, new and large sign welcoming the incoming people to Gillam as FLCN's traditional territory).

It is noted that:

> In general, Manitoba Hydro continues to be the primary economic driver and landlord in Gillam and has made a commitment over the next several years to increase public education of FLCNs ties and history in Gillam. Together Manitoba Hydro and FLCN have been committed to the Harmonized Gillam Development Process. Related activities have contributed to positive attitude changes but the process is slow moving and all stakeholders will need to continue their commitment to the process (HTFC 2009).

2.2.5 Thompson

In 1956, the mining company Inco announced the discovery of a large nickel ore body at Cook Lake, where present-day Thompson is located. Thompson was built as an industrial community, providing services and housing to workers employed in the nickel mining operations. Over the past 60 years, Thompson, now known as the "Hub of the North", has evolved from a single-industry town to a regional centre serving much of northern Manitoba (Thompson Unlimited 2007). Development in Thompson has been different from other communities in the north, since many other northern communities began as Aboriginal hunting and fishing sites that eventually developed into trading posts or Bayline service communities, with in-migration of non-Aboriginal and Metis people. Thompson began as a planned industrial town but has experienced an increase in the number of Aboriginal residents in recent years and has developed into an important economic and governance centre for the northern Aboriginal population. This has led to increases in the provision of services and resources in Thompson for the local and regional Aboriginal population (NMEDC 1992).

The following overview of Thompson is based on several sources including documents referenced in each of the KCNs discussions above (see Section 2.2.3) which were useful in understanding the evolution and context of Thompson and its increased importance in the Regional and Local Study Area. In addition, several other key documents referenced include:

- The City of Thompson Tourist and Economic Development materials, which include The Spirit Way Official Guide Book and the Thompson Unlimited Community Profile (Thompson Unlimited 2007); and
- A journey north: The great Thompson nickel discovery (Fraser 1985).

THOMPSON CONSTRUCTION AND THE KELSEY GENERATING STATION

A government policy at the time provided the provincial Minister of Mines and Natural Resources with the power to incorporate any community for industrial development as a LGD (Robson 1993). This policy enabled Inco to enter into agreement with Manitoba regarding the acquisition of land and the development of related infrastructure for the construction of the Thompson Inco Nickel Mine and town site. A town site was to be developed for 8,000 people that included the construction of roads and sidewalks, sewers, a drainage system, a water treatment plant, schools and a civic administration building that also housed the jail and fire hall. The agreement with the Province also had provisions for Manitoba Hydro to develop the Kelsey Generating Station to provide power to the Thompson mining operations

as well as to the community. During the winter of 1957 and 1958, development of the town site occurred rapidly and coincided with the construction of the Kelsey Generating Station.

Kelsey was designed to provide over 100 MW of power to serve the new nickel mining and smelting operations and to serve Thompson. The Kelsey power plant started generating power in 1960, and in 1966, Kelsey was connected to the Province's electrical grid. By 1966, the town had expanded with several infrastructure projects including the library, theatre and recreation centre. Provincial Trunk Highway 6 (PTH 6) was constructed and connected Thompson to Grand Rapids (Thompson Unlimited 2007).

Located 90 km from the western edge of the Split Lake RMA, the modern town site of Thompson was also connected by road to southern parts of the province and would eventually develop into an important service centre. External influences would contribute to modernization throughout the Local Study Area.

ECONOMIC DIVERSITY THROUGH RESOURCE AND INDUSTRY DEVELOPMENTS

By 1961, the first nickel was produced from the Thompson Nickel Mining Centre and was sold on the world market. The development of the mine has continued to be very profitable for Manitoba and Inco. Since its origin, Thompson has relied on nickel mining and processing as its primary economic base; however, in the past 30 years, the economy has diversified, moderating the impact of changes in the nickel sector.

While continuing to serve the nickel mining sector, the city of Thompson has become a service centre to the northern Manitoba and opened its doors to a number of industries including fishing, forestry, mining, and construction. Within the past decade, the diversification of Thompson's service and economic sectors are estimated to have brought as many as 60,000 people into the community for varying lengths of time (Thompson Unlimited 2007). Residents of surrounding communities use Thompson as a shopping centre and rely on it for access to health and other publically provided services that are not available in other northern communities. The resource industry of northern Manitoba often relies on Thompson as a place to conduct business meetings and provide training. Thompson is also known as the Winter Weather Testing Capital of North America. Every year, companies from the automobile, helicopter, snowmobile and other high-tech industries test their equipment and vehicles in the winter conditions of Thompson (Thompson Unlimited 2007). The city is also a marshalling point for a wilderness adventure tourism industry that is especially of interest to many out-of-country tourists (Tourism North 2008). Manitoba Hydro has also continued with hydroelectric development in northern Manitoba and much work and planning is done through Thompson.

POPULATION CHANGE

Thompson has continued to experience overall positive growth over a short period of time. The community was originally designed for 8,000 residents. In 1959, its first year of existence, there were approximately 2,500 residents in Thompson. This number quickly jumped to 8,500 by 1966, and by 1970, the population reached 20,000 and Thompson was incorporated as an urban municipality. During the early years, Thompson operated very much as a one-industry town. The population was transient and primarily consisted of young couples and their children. These families moved in and out of Thompson

relatively quickly, working at Inco for only short terms. Municipal planning, undertaken by the Thompson Municipal Planning Branch in 1975, indicated that the young and transient population identified certain social issues that needed attention. Specifically, a high turnover rate in the middle of school years was felt to be a barrier to a quality education. Additionally, marital stress and juvenile delinquency were identified as problems related to low community attachment and a lack of informal support systems in Thompson.

Since the 1970s, the population growth in Thompson has slowed and shifted from transient, young families employed by Inco to a diversified population using the city as a regional centre. Today, over 13,000 people reside in Thompson (Statistics Canada 2007) and more families are choosing Thompson as a permanent place to live. While first generation residents tended to leave the community upon retirement, many of their children who were born and raised in the community are remaining and intend to retire in Thompson. As well, the Aboriginal population in Thompson is growing through in-migration. Thompson is a primary service centre and meeting place for First Nation and Metis communities across northern Manitoba.

THOMPSON INFRASTRUCTURE AND SERVICES EVOLVE AS TRANSPORTATION HUB OF NORTHERN MANITOBA

Prior to the construction of a railway spur connecting Thompson to the Hudson Bay Railway at Sipiwesk, the major economic and service centre in northern Manitoba was The Pas. Permanent communities established along the Hudson Bay Railway became known as Bayline communities that relied on goods and services shipped along the Bayline from The Pas, which was then known as the gateway to the north (Earl 1958).

Prior to 1958, Thompson and the surrounding District of Mystery Lake were generally inaccessible, but by 1966, a road and air transportation system connected Thompson to southern and northern regions of the province. This access, along with the declining reliance on the Bayline, resulted in Thompson assuming the role of a regional service centre. The boom in Thompson led to several large projects, including Canada's first indoor shopping mall, government offices, a full-service hospital, the Mystery Lake School District, a personal care home, a large commercial base of businesses, banks and other infrastructure traditionally found in modern Canadian cities.

Residential, government and business infrastructure are in high demand today as Thompson adjusts to serving northern Manitoba and industry demands. These demands include increased levels of day-to-day business that have resulted in increased access to technology, including high speed internet and cell phone coverage.

THOMPSON AS MAJOR ABORIGINAL CENTRE FOR NORTHERN MANITOBA

In parallel with Thompson's development as the regional centre of the north, Aboriginal people have also had a large influence on the day-to-day organization and activities of the community. Thompson has become a central location for Aboriginal agencies, services and government administration (NMEDC 1992). The city experiences a regular influx of Aboriginal and Metis people from across Manitoba and Canada who visit for education and training, health care, employment, social services, and other

Aboriginal organizational planning initiatives (Thompson Unlimited 2007). Additionally, Aboriginal organizations and government agencies that service northern First Nations and Metis communities often have central offices in Thompson. Thompson was also used as a central meeting location for First Nation partnership planning with Manitoba Hydro and newly proposed hydroelectric developments.

Thompson acts as a health service centre for northern Manitoba. Based in Thompson, the Burntwood Regional Health Authority administers health care for northern Manitoba (except the areas around Flin Flon, The Pas and Churchill) and operates a full-service hospital. The northern Manitoba Aboriginal population rely on the hospital at Thompson for acute care (hospital stays and emergency services) and specialty health services (such as dialysis, chemotherapy, obstetrics, neurology, *etc.*). As such, there is a continuous flow of Aboriginal and Metis people into the city to deal with a variety of social and health issues.

EXPANDING GOVERNANCE AND ORGANIZATION

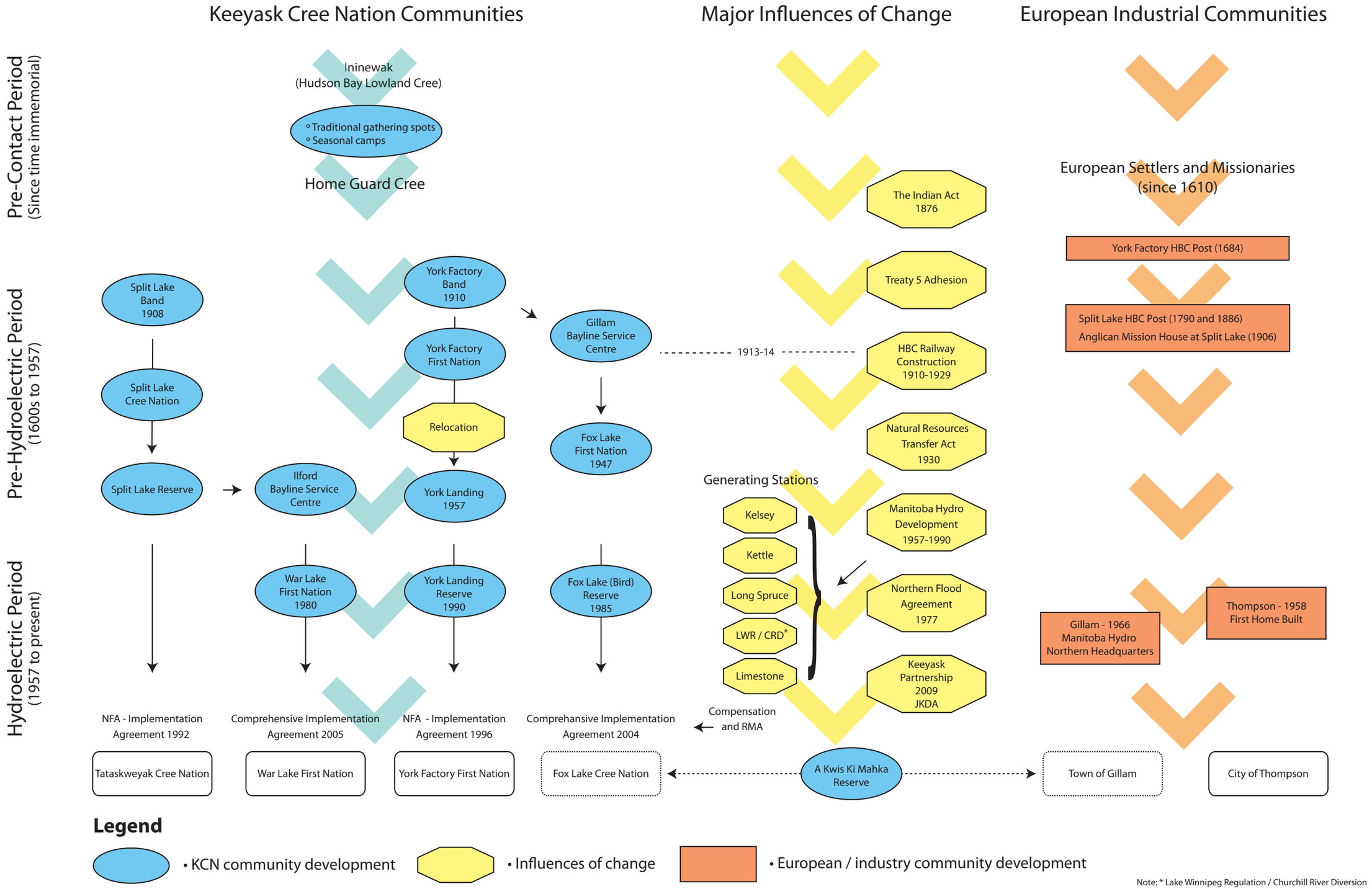
In 1966, Inco turned over the community infrastructure to the City of Thompson and in 1967 Thompson was incorporated as a town and administered as a LGD. Inco Ltd. and the Province of Manitoba (Taunton 1978) jointly appointed the administrator. In June of 1970, Thompson was incorporated as a City of 20,000 residents and was governed by an elected Mayor and Council (Thompson Unlimited 2007). The LGD of Mystery Lake remained to provide services to the area outside of the City of Thompson and to operate a number of other facilities, such as the airport (Taunton 1978). Currently, the City has an area of 17.18 km^2 and has experienced a period of substantial growth in recent years (Thompson KPI Program 2008-2010).

By the latter half of the 1970s, studies were undertaken to help address issues and pressures on Thompson from industries and services outside the mining industry. These studies suggested that municipal planning needed to increase informal community leadership and greater government organization in the community (Kuz 1977). The past three decades have seen several levels of government and organizations involved in planning various aspects of community in Thompson. The Mayor and Council are faced with an expanding portfolio of planning issues and a decreased reliance on Inco to provide fiscal and political support to the community.

The City of Thompson has made a commitment to the sustainable future of Thompson. A Sustainable Community Plan was developed by the City and the LGD in 2010 to "address the challenges and opportunities for the benefit of current residents and future generations" (City of Thompson 2010a). In 2006, Inco was acquired by the Brazilian company Vale and was known for some time as Vale Inco (currently known as Vale). In 2008, Vale Inco engaged in a wide range of expansion and construction activities and the company committed to keeping Thompson mining operations going until 2027. Overall, Vale Inco has been the main driver of economic growth in the Thompson economy. In 2009, the company announced that plans to increase investments in the Thompson operations were dependant on changes in market conditions (Blout and Simoes 2009).

Vale's activities have an important influence and contribute to fluctuations in Thompson's economy and population. Prior to Vale acquiring the mining and processing facilities in Thompson, the company was publically talking about mine closures starting in 2013. Vale is on record stating that they were "working

to keep the mines operating until 2027 and possibly even until 2030" (Western Investor 2007). However, on November 17, 2010, Vale announced plans to close the Thompson smelter and refinery by the end of 2015 and to reduce the local workforce by about 40% or 500 jobs. Despite this announcement, Vale is focusing work on finding new sources of ore as the company transitions to mining and milling. According to a Vale press release, Vale sees a "strong and long-term future for [its] operations in Manitoba" (Vale 2010).



Note: * Lake Winnipeg Regulation / Churchill River Diversion

Figure 2-2: Community Development in the Local Study Area

SECTION 3

ECONOMY

KEEYASK

Hydropower Limited Partnership

TABLE OF CONTENTS

APPENDICES

APPENDIX 3A Supplementary Data Tables

APPENDIX 3B Cost of Living in Keeyask Communities Technical Report

APPENDIX 3C Economic Impact Assessment

LIST OF TABLES

Page

LIST OF FIGURES

Page

3.0 ECONOMY

3.1 INTRODUCTION

This section addresses effects of the Project on the economy, and responds to Sections 8.3 (Existing Environment) and 9 (Environmental Effects Assessment) of the Final EIS Guidelines for the Project, as issued by the Canadian Environmental Assessment Agency in March 2012 (CEAA 2012).

Economic activities affect the material well-being of people, as well as other factors that impact society as a whole (Vanclay 2002). Material well-being and other economic factors relate to the prosperity of individuals, families and communities. These represent aspects of social well-being or quality of life (Vanclay 2002). Community goals and plans often focus on improvements to local and regional economic activities, from employment and business opportunities to quality of life and other social aspects. Economic activities also reflect the culture, traditions and values of a community.

As Vanclay (2002) points out, the key social effects of a proposed project are likely to vary from one project to another, with the relative importance of each varying depending on the community in question, as well as different groups within a community. As such, a comprehensive checklist of effects of any kind, including economic effects, is not desirable. Instead, Vanclay (2002) and other practitioners (Lockie 2001; Lee 2005) emphasize the importance of community participation in the process of determining the factors that should be considered during the assessment process.

Public consultation and engagement, as well as the Keeyask Cree Nations (KCNs) community-based research programs, including interviews with local residents and stakeholders, were important in developing an analysis of the economy and the assessment of effects on the economy due to the proposed Project. These processes of consultation and engagement were particularly important in negotiating agreements between Manitoba Hydro and the KCNs partner communities, which included considerable focus on local and regional economic effects.

In addition, as background research for the assessment, the Environmental Assessment (EA) Study Team reviewed a number of environmental impact statements (EIS) from recent projects as well as regulatory guidelines for project proponents to follow in order to evaluate best practices related to assessment of effects on the economy (from a methodological perspective). The reviewed projects included the Mackenzie Valley Gas Project (Imperial Oil *et al.* 2004), the Eastmain-1-A and Rupert Diversion (Hydro-Québec 2004) and the Lower Churchill Falls Hydro Project (Nalcor Energy and Newfoundland and Labrador Hydro 2009). While each of these projects developed a unique approach to economic effects assessment, the topics that these EISs and regulatory guidelines addressed employment and income, procurement and business opportunities, business capacity, locally negotiated agreements and arrangements with communities, economic spin-offs (including local and regional economic development proposals), training initiatives, analysis of cost of living and participation in the resource economy (including traditional resource use activities).

Based on the case study analyses noted above, recent experience from the Wuskwatim Generation Project and consultations with the KCNs communities, this section considers the effects of the Project on economic activities in the Socio-Economic Local Study Area and the Socio-Economic Regional Study Area, including the following topics for the valued environmental components (VEC) of economy:

- Employment and training (during the construction and operation phases);
- Business opportunities;
- Income (during the construction and operation phases);
- Cost of living; and
- Resource economy.

The Project has the potential to positively affect, in a material way, the economy of the Local Study Area communities and, to a lesser extent, the economies of other communities located in the Regional Study Area. The magnitude and nature of these effects differ between the construction and operation phases. The Project is expected to create substantial employment, business activity and income within the Local Study Area and Regional Study Area during the construction phase. Effects during the operation phase are expected to be localized to Gillam and the KCNs communities, which may take advantage of operation jobs.

This section is divided into the following three main sections:

- Approach and Methodology (Section 3.2);
- Environmental Setting (Section 3.3); and
- Project Effects, Mitigation and Monitoring (Section 3.4), including consideration of residual effects.

Each section includes, where relevant, consideration of the Local Study Area (including the KCNs, Gillam and Thompson) and the Regional Study Area.

3.2 APPROACH AND METHODOLOGY

This section describes the approach and methodology used to assess the effects of the Keeyask Generation Project (the Project) on the VECs examined in this section. The methodologies used varied among VECs and between the construction and operation phases. Some methodologies were complex, such as the employment analysis, which used an elaborate employment supply/demand model, while others were straightforward, such as business opportunities analysis, which relied on allocations of Direct Negotiated Contracts (DNCs) prescribed in the Joint Keeyask Development Agreement (JKDA). Selection of appropriate methodologies also considered the nature and quality of data required for the analysis. The approaches selected were built on pathways of effect that connect relevant features of the Project to the socio-economic environment in which the Project would occur.

3.2.1 Employment Opportunities

3.2.1.1 Construction Phase Employment

Construction of the Project will require a large, skilled workforce comprised mainly of designated trades (*e.g.*, apprentice and journeymen carpenters and electricians) and non-designated trades (*e.g.*, truck drivers and heavy equipment operators), along with construction support occupations (*e.g.*, caterers and security personnel)[1][2][3]. Filling the job opportunities arising from these workforce requirements presents an opportunity to reduce unemployment during the construction years and expand skills in the Manitoba labour force, in particular the northern Aboriginal labour force.

- The construction employment analysis focuses on determining the extent to which Project employment opportunities would flow to three groups in the Local and Regional Study Area. Each group has employment needs and has been targeted for pre-project training and preferential hiring for Project construction jobs. Effects of direct employment on the Project will be most pronounced for these groups: KCNs Members: that is, Members of the four First Nations in the vicinity of the Project that are partners in the Project's development and operation;
- Aboriginal residents of the communities located along the Churchill, Burntwood and Nelson (CBN) River systems that have been affected to some degree by past hydroelectric development (the boundaries of this area are defined in Section 12.1.1.3 of the Burntwood/Nelson Agreement (BNA), which is the collective agreement governing the Project); and
- Aboriginal residents of the Regional Study Area, as defined in the BNA.

The CBN area and northern Manitoba are defined in the BNA Schedule D, which is shown in Figure 3-1 (Hydro Projects Management and Allied Hydro Council of Manitoba 2009). The locations of the KCNs communities are also provided on this map.

As well, the Project is of sufficient size that it can positively and noticeably affect the Manitoba and Canadian economies through the purchase of materials and equipment, labour supply, payments to the Provincial and Federal governments (*e.g.,* payroll tax, personal income tax, fuel tax and provincial sales tax) and re-spending of employment wages and other Project-related income. These effects are presented in a later section that covers the full range of economic effects on Manitoba's and Canada's economy (Section 3.4.1.12).

[1] Designated trades are governed by regulations under provincial legislation that describe the standards and conditions for training in specific trades, including how to become an apprentice, curriculum content and certification or accreditation protocols.
[2] Non-designated trades are skilled occupations that are not governed by regulations under provincial legislation.
[3] Construction support trades represent the remaining occupational categories that fall outside of the designated and non-designated trades.

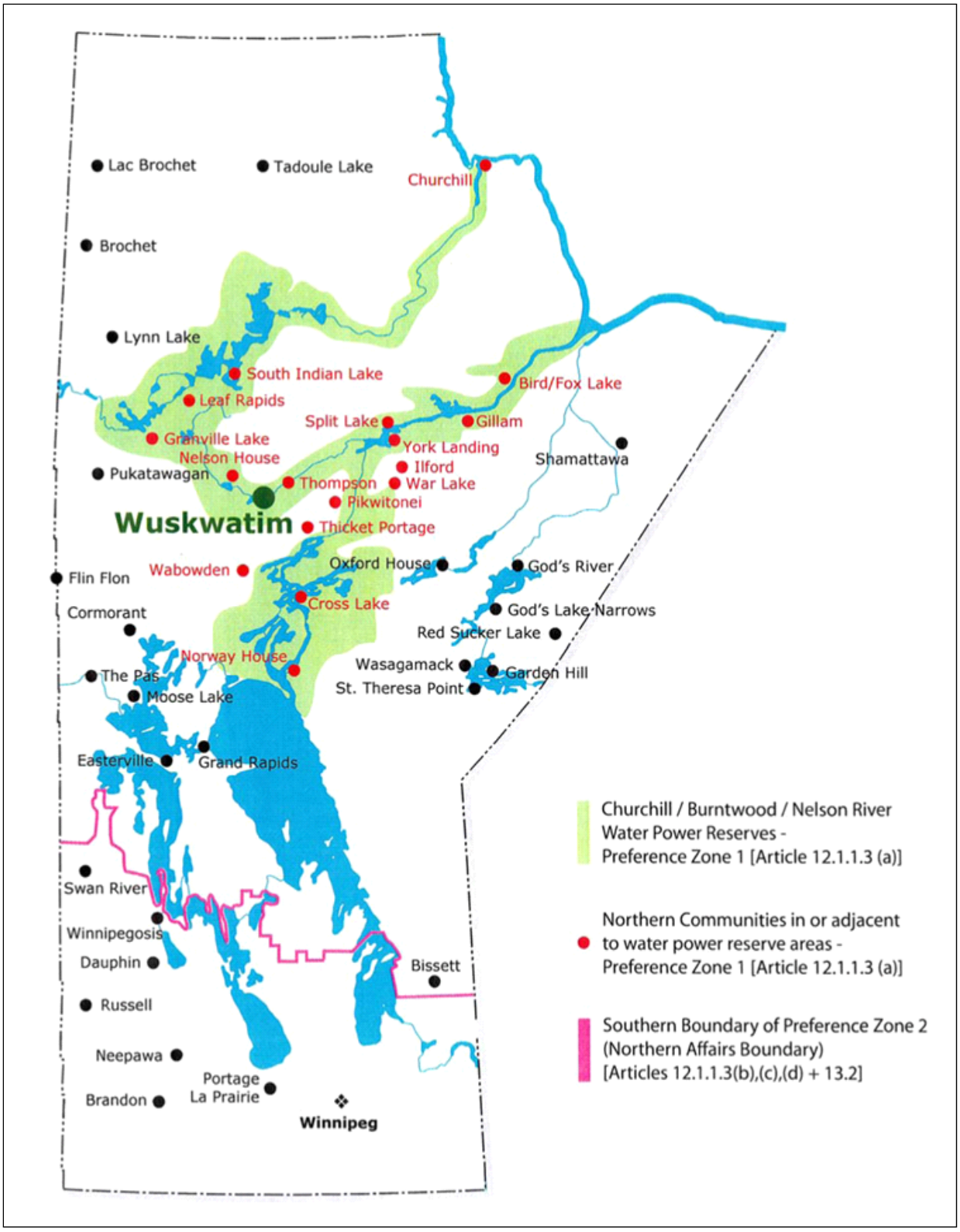


Figure 3-1: BNA Schedule D - CBN Area and Northern Manitoba Boundaries

Qualified members of these three groups, along with northern union members, have been targeted for preferential treatment with respect to employment and training for the Project[1].

The Project construction employment opportunities analysis model was developed to estimate the participation of KCNs, CBN and northern Aboriginal people in Project construction employment opportunities. Key aspects of this model included the following:

- Matching Manitoba Hydro's estimated labour demand with estimates of KCNs, CBN and northern Aboriginal labour supply on a quarterly basis to characterize potential Project employment;
- Consideration of the role of DNC and tendered contract (TC) hiring preferences and processes in the matching process;
- Analysis that took into account known challenges impeding participation in Project job opportunities (*e.g.*, availability for employment once a job order is initiated); and
- Analysis of KCNs effects that included all of the KCNs communities combined. To the extent that community specific labour force information was available, this information was used to inform development of the model, in particular the analysis of factors or challenges that may limit employment.

The remainder of this section provides an overview of the model's methodology and assumptions.

The model was comprised of three components:

- Supply;
- Demand; and
- Matching.

3.2.1.1.1 Labour Supply

The Supply portion of the model estimated future labour supply levels by occupation for people who fall into the KCNs, CBN and northern Aboriginal hiring preference categories. The model considered:

- People already in the workforce; and
- Trainees who completed courses or programs of the pre-Project training program (the Hydro Northern Training and Employment Initiative or HNTEI) (see Section 3.3.1.1 for details on this program), established to provide training to KCNs Members and other northern Aboriginal people in anticipation of construction employment on the Wuskwatim and Keeyask generation projects[2].

[1] The term "qualified" is used to refer to candidates for employment who meet or exceed training, accreditation, skill and experience stipulated in a Contractor's job order (Section 12.1.1 of the BNA).

[2] The Wuskwatim Generation Project is a 200 MW facility currently under construction. The project represents a partnership between Manitoba Hydro and Nisichawayasihk Cree Nation. Construction began in 2006 with completion anticipated in 2011.

Labour supply projections were made for each of these categories using the following data sources:

- **2001 Census Data:** Data on the occupational skills of northern Aboriginal people were used to establish the number and occupational mix of people already in the workforce. The year 2001 was the most recent year for which complete labour force and employment data were available for the Local Study Area. The 2006 Statistics Canada census data were incomplete and 2011 data were not available when the EIS was being prepared. These data represent a relatively complete source of occupational information for Aboriginal residents of the Regional Study Area. These data were available for the entire northern Aboriginal population only, and not by community or other breakdowns. Furthermore, primary data about community labour supply, including for the KCNs communities, were not available at the time when this study was being prepared. These limitations meant that labour supply data for the CBN area and the KCNs communities were derived using a pro-rating method on the basis of their share of the northern Aboriginal population. For example, according to the 2001 census, KCNs Members, including those living on- and off-reserve, comprised 8% of the Regional Study Area's Aboriginal population. Similarly, the Aboriginal population of the CBN area, including the Aboriginal populations of Thompson and Gillam, made up 33% of the Regional Study Area's Aboriginal population in 2001[1]. For example, if there were 100 northern Aboriginal journeyman carpenters in 2001, the estimates would be that 33 were residents of the CBN area and eight were Members of the KCNs communities.
- **Hydro Northern Training and Employment Initiative Data**: These data were used to establish the number, skill level and occupation of trainees of the HNTEI program. This program started in 2002 and continued through to March 2010. The employment model incorporated HNTEI data regarding trainees who completed courses or programs to the end of March 2010. Projected census data were used to forecast new entrants to the labour force from 2010 (after the HNTEI program ended) until completion of the Project.

These data sources were combined to create a workforce profile for the KCNs, CBN and Aboriginal residents of the Regional Study Area. The model calculated how the workforce for each group would change through time. Age distribution data from Statistics Canada were incorporated into the model to "retire" workers once they reached age 65 and added new entrants once the HNTEI program ended. The model also made assumptions about the rate at which apprentices would be able to advance to journeymen positions[2].

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[1] This assumption was made by comparing available 2001 INAC data regarding off-reserve KCNs members with the Aboriginal populations of Gillam and Thompson provided by 2001 Statistics Canada data. Further analysis indicated that approximately 80% of off-reserve KCNs Members resided in the CBN Area. This represented about one-third of the total KCNs population. The 2001 data were chosen because of problems identified in the 2006 data set for Aboriginal communities in the Regional Study Area: that is, there were data suppression and data quality challenges.

[2] The employment model provides for modest progression of HNTEI trainees to increasing skill levels in the occupations for which they are hired.

3.2.1.1.2 Labour Demand

The demand portion of the model contained estimates by year and occupation of workforce requirements for the Project, based on data provided by Manitoba Hydro. The analysis was based on the 2010 version of the workforce requirements. In the analysis, the Project job categories were placed into four groupings:

- Construction support (*e.g.*, caterers);
- Non-designated trades (*e.g.*, heavy equipment operators);
- Designated trades (*e.g.*, carpenters); and
- Manitoba Hydro and contractor supervisory positions.

Other employment opportunities, although small in number relative to these estimates, are expected to be available. While not included in the modelling, these are added separately into employment analysis and include opportunities associated with the KCNs Future Development (or Implementation) offices, community consultation support and others.

3.2.1.1.3 Labour Supply/Demand Matching

The matching portion of the model compared demand estimates with supply estimates by job category on a quarterly basis, based on the hiring preferences for job-qualified Aboriginal residents of the KCNs communities, the CBN area and the Regional Study Area; these hiring preferences were set out in the BNA and the JKDA.

Relevant BNA and JKDA provisions are as follows:

- Construction employment for the Project is governed by the BNA. The BNA is the collective agreement between the Hydro Projects Management Association and the **Allied Hydro Council of Manitoba** that applies to construction of northern hydroelectric projects, including the Wuskwatim Generation Project and Keeyask Generation Project. The agreement identifies various approaches to hiring northern Aboriginal residents for TCs and DNCs. The BNA also sets out hiring preferences for other workers.
- As noted in Section 1, the JKDA is the agreement among Manitoba Hydro and the KCNs communities that established the Keeyask Hydropower Limited Partnership (the Partnership) and governs how the Project will be jointly planned and developed. The JKDA provides a working framework for implementing aspects of the BNA. In addition, the JKDA includes the details with respect to hiring preferences for KCNs Members working on DNCs. The JKDA was intended to clarify the following:
    - The BNA and JKDA hiring preference provisions, which were designed to increase employment among northern Aboriginal people, particularly among KCNs Members and residents of the CBN area;
    - DNCs, which are targeted toward KCNs contractors, could follow the direct-hire process allowed for in the BNA; and

- Hiring under the TCs, excluding contractor supervisors, would follow a job-order process specified in the BNA.

Section 2.9 of the BNA specifies that northern Aboriginal businesses that are engaged in DNCs could directly hire northern Aboriginal residents for their workforce. This provision would apply to the DNCs offered to KCNs businesses and to joint ventures in which KCNs organizations or Members maintain majority ownership. These contracts are expected to account for about 36% of contract employment (not including Manitoba Hydro or contractor supervisory employment). Once the supply of qualified northern Aboriginal workers has been exhausted under Section 2.9 of the BNA, employment opportunities must be filled using the job-order process (Section 12.1.1.3 of the BNA) (Hydro Projects Management and Allied Hydro Council of Manitoba 2009).

The job-order process for TCs identifies and recommends qualified job applicants according to the preference hierarchy. Employment Manitoba, a branch of Manitoba Entrepreneurship, Training and Trade, will be responsible for maintaining the referral database, in conjunction with local organizations in the CBN area. Tendered contract contractors who require on-site employees will be required to submit job orders to Employment Manitoba, which will refer any job-qualified candidates directly to the contractor. The job referral service will be required to verify each candidate's qualification and status as a CBN resident (as defined in Section 12.1.1.3 of the BNA), a northern Aboriginal person, a northern resident or as a union member, as appropriate. Candidates for employment on TCs will be referred according to the following sequence:

- **Northern Aboriginal residents of the CBN Area:** Section 13.1 of the BNA defines a northern Aboriginal person as "status Indians, Metis, non-status Indians and Inuit who qualify as Northern residents in accordance with the definition set out in Article 13.2";
- **Northern residents (unionized):** Any northern Aboriginal or non-Aboriginal resident who is a member of a local union;
- **Northern Aboriginal person:** Any northern Aboriginal person (as defined by Section 13.1 of the BNA); and
- **Northern resident**: Any northern Aboriginal or non-Aboriginal resident (Hydro Projects Management and Allied Hydro Council of Manitoba 2009).

The main exclusions from these hiring provisions include Manitoba Hydro and contractor supervisory positions, which account for about one-quarter of the total construction workforce.

Any employee covered by the BNA would be required to belong to a union while employed on the Project. These employees receive the benefits of the BNA and are subject to the conditions set out in the agreement. Section 2.2 and 12.3.1 of the BNA exclude Manitoba Hydro staff and contractor supervisory positions from union membership (Hydro Projects Management and Allied Hydro Council of Manitoba 2009).

Section 13.1.6 of the JKDA further elaborates on how the direct-hire provisions for DNCs would be implemented through the following preference hierarchy:

- First preference to qualified Members of the KCNs that the contractor represents;
- Second preference to qualified Members of the remaining KCNs; and
- Third preference to other northern Aboriginal residents.

In matching the workforce demand to available supply, the following steps were followed:

- KCNs labour was first assigned to DNC employment; remaining DNC employment was assigned to northern Aboriginal residents[1].
- For TC jobs, Aboriginal residents of the CBN area were given first preference. Therefore, any KCNs labour not required for DNCs was assigned to TC employment along with all other available CBN labour supply (the model allocated employment equally to both KCNs Members and CBN residents based on the available supply from each group).
- Remaining TC employment was then assigned to available northern Aboriginal labour.
- Any unallocated employment opportunities were then attributed to other sources of labour, which could include non-Aboriginal workers in the Regional Study Area or workers from elsewhere in Manitoba and Canada.

The total number of apprentices required for the Project was determined according to the ratios outlined in the BNA that define how many journeyperson/experienced workers would be required for each apprentice/entry-level workers. The matching process was performed at both the journeyperson/experienced level and at the apprentice/entry-level of worker, for each of the job categories identified for the Project and for each quarter of the construction period.

3.2.1.1.4 Analysis of Challenges Affecting Employment

Analysis of factors or challenges that may limit participation levels in Project construction opportunities by the KCNs, CBN and northern Aboriginal labour force was also included in the employment supply/demand model. These potential challenges were identified by KCNs participants during community-based research programs and community engagement processes undertaken to prepare this Socio-Economic Impact Assessment (SEIA), and through experience on the Wuskwatim project currently under construction[2]. Based on this input, the model was expanded to include the following

[1] This differs slightly from the process outlined in the BNA whereby first preference would be given to KCNs Members that the contractors represent. It was not possible to achieve a breakdown of supply by each specific First Nation.

[2] It should be noted that experience from the Wuskwatim project is particularly relevant since it is currently nearly constructed and used a comparable employment approach as has the Project with the use of the job referral system, application of the BNA and similar employment preferences.

three factors that could affect employment participation levels by KCNs, CBN and northern Aboriginal workers.

Attraction: Many will be attracted to work at the Project construction site based on the nature of the work, high wages, opportunities for overtime, and free room and board at the construction camp. However, it is also expected that a sizeable portion of the KCNs, CBN and northern Aboriginal labour force will not be interested in pursuing Project construction jobs for a variety of reasons. These could include employment elsewhere, a lack of comfort with the construction work environment, not wanting to be away from family and friends, or a lack of awareness about Project opportunities or how to apply for these opportunities. As a result, the pool of workers considered potential candidates for Project employment is less than the overall available labour force in these areas.

Availability: For those who are interested in work on the construction site, there are factors which may limit their availability to take advantage of these opportunities. These could include the extent to which a candidate maintains their status in the job referral system (there is a need to renew status every 6 months or the profile is considered dormant), the ability of the contractor to contact a referred candidate, a candidate's interest in the specific job opportunity once contacted, and the ability of the candidate to make arrangements to get to the job site.

Qualifications: There are circumstances where a referred worker appears to be qualified for a Project opportunity, but does not actually fulfill the job requirements upon review by the contractor and is therefore, not hired. For example, some applicants may have completed applicable training programs, but may not necessarily have enough work experience to qualify for a Project construction job. Carpenters with years of house-building experience, for example, may not be qualified for the type of carpentry formwork required on the Project. The Wuskwatim Generation Project experience suggests that while differences in qualifications occurred, this was not a major factor affecting participation in construction jobs.

Each of the above was included in the model by applying a percentage adjustment to the employment estimates derived through the supply-demand matching. The percentages adopted were derived from experience with the Wuskwatim Generation Project and professional judgement. To account for uncertainty, high and low percentages were applied to each challenge. These provided the basis for producing a corresponding range of high to low employment estimates, Table 3-1 provides the values for each of the challenges considered in the model to produce the employment estimates.

Table 3-1: Value of Factors Affecting KCNs, CBN and Northern Aboriginal Construction Employment Estimates

Factors[1]		High Employment Estimates	Low Employment Estimates
Attraction	Keeyask Cree Nations	60%	30%
	Aboriginal Workers in Churchill-Burntwood-Nelson Region and the Regional Study Area	40%	20%
Availability	Applies to KNCs, CBN and Regional Study Area	25%	5%
Qualifications	Applies to KNCs, CBN and Regional Study Area	90%	80%

Note:
1. Determination of values were informed by data from the Wuskwatim Generation Project, perspectives of Manitoba Hydro staff about employment experience on the Wuskwatim Generation Project and professional judgement of senior Study Team members.

Employment estimates calculated by the model are provided in two forms as follows:

- Quarterly peak employment is the number of workers estimated to be required during each quarter of construction. Peak employment analysis is most useful for understanding the number of people affected by Project employment opportunities.
- Person-years of employment defined as the amount of work that one worker could complete during twelve months of full-time employment. This would equate to between to 2,090 and 2,295 hours per year (rounded based on regular weekly hours of 40 to 44 hours). Person-year analysis is most useful for understanding the economic benefits arising from Project employment opportunities. One person-year is defined in Section 12.6.3 of the JKDA as any 12 individual months of employment, regardless of whether the employment occurred in consecutive months, by the same person or in the same job.

3.2.1.1.5 Employment Model Limitations

A number of limitations should be noted with respect to this employment model:

- Detailed labour supply data were not specifically available for the CBN or for each of the KCNs communities. Therefore, these data were derived using a pro-rating method (on the basis of their share of the northern Aboriginal population).

- The analysis was carried out using workforce demand data that were current at the time of writing and based on engineering estimates with respect to construction methods, sequence and schedule. Actual workforce requirements will be defined by the contractors selected to undertake the work, within parameters set out in tender specifications.
- Percentage adjustments used in the model to capture challenges affecting employment levels are highly uncertain and are largely based on the Wuskwatim Generation Proejct experience and professional judgement applied to qualitative experiences reported in community-based research programs. To account for this uncertainty, a wide range of rates was used, resulting in a wide range of employment estimates.

3.2.1.2 Operation Phase Employment

The analysis of operation phase employment opportunities examined effects that flow from Project operation and maintenance employment. The operation and maintenance employment generated by the Project will primarily affect Gillam since these jobs will be based at Manitoba Hydro's offices in the community. These effects are derived from the number, type and location of the Project's operation and maintenance employment and Manitoba Hydro's experience with the uptake of these types of jobs.

Consideration is also given to the potential effect of operation employment opportunities that would be available to KCNs Members through provisions in the JKDA. Operation employment effects on the KCNs would flow largely from provisions in Section 12.7.1 of the JKDA, which set out 20-year targets for KCNs employment in Manitoba Hydro's operations throughout the province.

3.2.2 Business Opportunities

This analysis was undertaken primarily to characterize the involvement of the KCNs communities in DNCs for the Project. These contracts would provide KCNs businesses with substantial amounts of contract work during Project construction and would be their predominant source of business opportunities for the Project. Business effects on Gillam and Thompson were also examined. Business effects on the Regional Study Area are expected to be minimal in comparison to those on the KCNs communities, Thompson and Gillam in the Local Study Area. As such, limited analysis related to the Regional Study Area was undertaken.

The KCNs business opportunities analysis focused on the contracts identified in the JKDA as being available for possible direct negotiation with these partner First Nations. The main part of the analysis describes the nature and total value of these contracts based on allocations set out in the JKDA. In addition to these financial benefits, potential non-monetary benefits that are likely to flow to communities from the DNCs were identified.

Analysis of Project effects on Thompson businesses from construction-related expenditures is also presented. These Project-related effects should be largely beneficial if the community's economy stabilizes or declines as a result of the announced closure of the nickel smelter in Thompson. A scenario approach based on possible future states of the Thompson economy was used to examine the nature and magnitude of potential effects.

The Gillam business community could be affected by in-migration of Project operation and maintenance workers and their families. The effects of this population growth on Gillam's business community were examined based on information obtained from the key person interview (KPI) program undertaken as part of the socio-economic community-based research programs associated with the Project.

3.2.3 Income

The intent of this analysis was to estimate the amount of income that would be earned within the Local Study Area as a result of the Project. There are three main forms of income that would result from the Project in the Local Study Area: employment income, business income and equity investment income. Indirect income is also discussed, but no quantitative estimates were prepared because of the difficulty of tracking indirect income from construction projects of this kind.

Income analysis was based on data generated from a variety of sources. Calculation of construction employment income was based on the Manitoba Hydro workforce estimates and BNA wage rates currently expected to be in effect for the Project. During the operation phase, wages were estimated based on existing Manitoba Hydro pay scales. Potential business income was based on expected values for DNC construction packages, joint-venture participation rates and industry-standard profit margins as compiled by Industry Canada. Specific business income estimates were not provided in order to protect the ongoing DNC negotiation process. Estimates of equity investment income to the KCNs are not presented since this is commercially sensitive information, and will depend on the nature and level of investment chosen by each of the KCNs communities.

3.2.3.1 Construction Employment Income

Estimates of employment income were based on the person-year results from the employment analysis multiplied by expected wages for each category. Expected wages for each job category and other employment details are set out in BNA Appendices 1-17.

Manitoba Hydro identified job categories that fall into three main groupings: construction support, non-designated trades and designated trades (Manitoba Hydro and contractor supervisory jobs are excluded from this analysis). Within each of these job categories, there were often additional sub-categories, plus wage variances for foremen and apprentices and different calculations for overtime increases.

To account for these variations, high and low estimates were developed to provide an indication of the range of potential wages expected to result from Keeyask employment. The high-wage range is based on the highest individual wage that could potentially be applied to all workers in each of the job categories. Premiums paid to foremen were not applied because these premiums are only paid to a percentage of the workforce. The low-wage range is based on the lowest individual wage in each of the job categories. Apprentice wage levels were not used since they would only apply to a percentage of the workforce.

The total hours in a person-year varied by job category, because of the different overtime calculation methods applied to each job category. All job categories were assumed to work a 10-hour day and six-day week, as described in BNA Section 15.1. With overtime, a 60-hour week translated into either 68 or 75 regular-wage hours for most job categories. Workers also would receive a 10.5% premium on all actual

hours worked as vacation pay and to compensate for working through statutory holidays. This added 6.3 regular-wage hours to a 60-hour workweek.

Gross income for the high-wage range was calculated by multiplying the highest wage in each category by the total hours in a person-year for that category and the total person-years required by the Project as estimated by the employment model. To calculate gross income for the low-wage range the same calculation was applied, but based on the lowest wage in each category.

No wage ranges were provided for Manitoba Hydro and contractor supervisory workers. Wage estimates for Manitoba Hydro workers were based on 40 hours per week, 50 weeks per year; for the contractor supervisory workers, estimates were based on 60 hours per week, 52 weeks per year and a wage adjustment to reflect differences with other occupations involved in the Project.

The criteria for selecting the high- and low-wage ranges were intended to identify the widest possible range of reasonable outcomes. The results still provided a relatively narrow income range for total estimated Project employment income, with the low-wage range result only 12% less than the high-wage range result.

When analyzing income for northern Aboriginal communities, however, this range was much wider. The 12% income range from employment demand was compounded by the high and low employment estimates developed for each northern Aboriginal population. For example, the high employment results were more than two times the low employment results for KCNs employment. Therefore, the KCNs income estimates for the high wage range were three times those provided in the low range. This effect was most pronounced for the KCNs, which, as the smallest study group, was generally subject to the highest levels of variation. The combined variation in employment estimates and the wide range in income illustrate the compounding effect that these two factors have and the large range of potential income results from the Project.

3.2.3.2 Operation Employment Income

The methodology for estimating operation employment income was similar to that used for construction employment income. In this case, effects were primarily calculated for the KCNs and Gillam. Gillam would experience increased operational workforce requirements related to the new facility. Gillam operation employment income was based on projected operation workforce estimates multiplied by current salaries for those positions, and expected overtime premiums.

KCNs operation income effects were also estimated for employment resulting from the twenty-year hiring commitments as described in Section 12.7.1 of the JKDA. Operation employment income was estimated on the basis of an average salary, including overtime income, of approximately $108,000 per year. Benefits, such as a northern allowance, housing subsidy and southern vacation allowance, were not included.

3.2.4 Cost of Living

The cost of living for communities in the Local Study Area was examined using data collected through the socio-economic community-based research programs, as well as existing literature. The community-

based research programs included KPIs, along with a survey using the Revised Northern Food Basket (RNFB) methodology, developed by Indian and Northern Affairs of Canada (INAC, now called Aboriginal Affairs and Northern Development Canada [AANDC]), under the auspices of their Northern Food Mail Program (RNFB 2008a; RNFB 2008b). In addition, the Government of Canada's Isolated Posts and Government Housing Directive were used to confirm and better understand differentials of cost among the northern communities in the Local Study Area (National Joint Council 2010).

A literature review was undertaken to determine best practices and evaluate national studies with components for assessing the cost of living. These studies approach the cost of living by examining prices of goods and services in several categories, including housing, food and household items (*e.g.*, groceries), transportation, entertainment, clothing and education. Other studies reviewed for the cost of living analysis include the Consumer Price Index, the Isolated Posts and Government Housing and Statistics Canada's Market Basket Measure and Survey of Household Spending. While elements of each of these measures were incorporated into the analysis, each has inherent limitations. For example, while the Consumer Price Index is commonly used in Canada to measure variations in food and household items, it was designed to track cost differentials among large homogenous populations, particularly in urban centres across the country. As a result, it was not well suited to assessing costs for smaller populations living in the unique conditions experienced in northern Canada.

Considering potential pathways of effects in consultation with the KCNs communities, three main categories of costs were identified and included in this cost of living analysis: the cost of food and household items, the cost of housing, and the cost of transportation.

The cost of food and household items analysis relied primarily on survey data collected across the Local Study Area and in Winnipeg using an approach based on INAC's RNFB survey instrument. The RNFB was developed in 2007 by INAC's Northern Food Mail Program to monitor the weekly cost of purchasing a typical basket of food items in northern communities. Price data were collected using the RNFB survey instrument, which includes 67 foods generally available in remote northern grocery stores, as well as their service centres (*e.g.*, Thompson or Winnipeg). Selected food items reflected a balanced diet according to Canada's Food Guide, including the Aboriginal Food Guide released in April 2007, and took into account current food consumption patterns in northern communities. However, some foods, such as traditional or country foods and restaurant meals, were not part of the RNFB calculations.

The aim of the RNFB was to illustrate average food prices, rather than the lowest prices available in a community. Price data collected through the RNFB methodology should represent what consumers would typically pay to purchase the basket of goods, while minimizing the effects of product availability and price differences within communities. The RNFB also provided a uniform procedure for analysing comparative data among communities and a standard unit of measurement to determine weekly food costs for individuals or families, allowing for factors such as household composition, age, gender and pregnancy. The RNFB price survey was conducted in two KCNs communities – Split Lake (TCN) and York Landing (*Kawechiwasik*)(YFFN) – as well as the communities of Gillam, Thompson and Winnipeg between June and November 2009. WLFN (Ilford) and FLCN Fox Lake (Bird) did not have grocery stores at the time of the community-based research program. The Mooseocoot Convenience Store and Gas Bar opened in Ilford on April 27, 2010.

Support from, and personal communications with, the Food Mail Program Coordinator allowed the approach and methodology for the RNFB survey to be followed as closely as possible. However, the RNFB survey guidelines are very rigorous and the survey requires tight timelines for the collection of data, with the same individuals having the responsibility for collecting price data in all communities. Due to constraints in collecting data from communities in the Local Study Area, a slightly modified approach was adopted. The data should be interpreted with caution for two reasons. First, price data were collected by different individuals within each community, which may have led to minor variations in the recording of data. During analysis, the variations were minimized to the extent possible in order to make the data comparable to that of other communities. Second, the timeline for collecting food prices was over a longer period than is usually expected for the RNFB survey. For example, while initial data collection was undertaken in late June 2009 in the communities of Gillam and York Landing (*Kawechiwasik*), Thompson data were collected in mid-September and data for Split Lake and Winnipeg were recorded in November. As a result, some of the price variance may be attributable to seasonal factors, such as availability and access to the communities. In particular, the data collected in Winnipeg and Split Lake in November may reflect a different set of market conditions than the data collected in Gillam, York Landing (*Kawechiwasik*) or Thompson during the summer months. In spite of these variations, every attempt was made to conform as closely as possible to the RNFB methodology.

Taking into account the purpose of the RNFB survey, it should be noted that the RNFB pricing information presented in this analysis was not intended to be definitive. In addition, due to variations in collection methods, the data should not be compared to other RNFB studies undertaken by INAC. Instead, these data serve as a series of snapshots of consumer costs and a useful example of the range of prices encountered in the different-sized communities of the Local Study Area.

There were no formal tools similar to the RNFB available for surveying the costs of transportation and housing. Instead, a direct sampling approach was used to gather as much available pricing information as possible. This information was gathered within a regional context, including details from KPIs, to offer a more qualitative analysis than was used for the food and household items analysis.

Cost of living indexes calculated by the Treasury Board of Canada Secretariat and the National Joint Council as part of the Isolated Posts Allowance, provided comparison data and validation of the cost of living differentials estimated for the Local Study Area. These indexes are used to determine living allowances for Federal employees living in remote communities. The Federal Price Index Differential, part of the Isolated Post Allowance, was presented as a comparative index for a more diverse basket of goods and services in the communities. Details of the methodology used to determine the Price Index Differential allowance for each community were not publically available. However, survey components were known to include approximately 250 price indicators for items such as food, household supplies and operation, insurance premiums, transportation expenses, personal care supplies and services, pharmaceuticals, entertainment and other costs. The Price Index Differential was presented as a percentage representing the cost of these items in each community over their associated costs in Winnipeg.

A more detailed summary of the Cost of Living Analysis is provided in Appendix 3B – Cost of Living in Keeyask Communities Technical Memo.

3.2.5 Resource Economy

Effects on employment and income in the domestic and commercial resource sectors in the Local Study Area are examined in this section. Two main sources of effect were included, as noted below.

Direct changes to resource use activity were assessed. The Resource Use Section of the Socio-Economic, Resource Use and Heritage Resources Supporting Volume examined how the Project would affect various types of resource use that are occurring in the Local Study Area. Relevant findings were extracted and summarized in terms of their effects on employment and income in the resource sector of the local economy.

An examination was also undertaken of the potential for resource harvesters in the Local Study Area to participate in Project construction or operation phase employment. The high wage levels from Project employment opportunities could be expected to attract some resource harvesters to Project jobs. The implications of this for resource harvesting were examined based, in part, on experience with other projects. This was examined in relation to Project workforce requirements to determine when this effect could be most pronounced.

3.3 ENVIRONMENTAL SETTING

3.3.1 Employment and Training Opportunities – Local Study Area

This section describes existing training and employment opportunities in the Local Study Area. First, it describes the training outcomes of the HNTEI. Second, the section presents selected labour, education and economic indicators for the KCNs communities, Gillam and Thompson.

Employment rates across the Local Study Area are highly variable. KCNs communities have young and growing labour forces that currently experience high unemployment rates. In 2001[1], the unemployment rate in KCNs communities as a whole was 40.0%. In the Town of Gillam and City of Thompson, unemployment rates were 6.4% and 7.1%, respectively, in the same year. These lower unemployment rates for Gillam and Thompson reflect the high level of industrial development in both communities. The Town of Gillam includes two populations – a portion of the membership of FLCN who have traditionally inhabited the area and a largely non-Aboriginal population that has migrated to Gillam to take up Manitoba Hydro jobs associated with the operation of the northern hydroelectric system. The City of Thompson has greater economic diversity than other communities in the Local Study Area. As of fall 2010, Vale (formerly Vale Inco) mining and smelting operations continue to be the main economic driver for the local economy; however this may change with Vale's plans to close the smelter and refinery by 2015 (Government of Manitoba 2010g). However, the city's role as a regional centre for government services, retail and commercial services and transportation has helped to expand economic diversity.

[1] 2001 was chosen as a standard reference point for employment analysis because it provides the highest quality and most complete Statistics Canada data for all the communities.

3.3.1.1 Pre-Project Training – Hydro Northern Training and Employment Initiative

A pre-project training initiative, called the Hydro Northern Training and Employment Initiative (HNTEI was implemented to prepare Aboriginal northerners to participate in the construction employment and business opportunities available from northern hydroelectric development, including the Wuskwatim and Keeyask Projects. This initiative sought to add skills to the labour forces of the KCNs and of the Aboriginal labour force of the Regional Study Area as a whole. In addition, this initiative was intended to increase the size of the northern Aboriginal labour force that could be employed during the construction phase of the Project.

The HNTEI framework was modelled after aspects of a training initiative started by TCN's Community Education Training Program (CETP), which emphasized community-based training and First Nation responsibility for the design and delivery of the program, key features of the CETP approach. Under the initiative, the following First Nations and Aboriginal organizations designed and delivered most of the training, largely through community-based programs.

- Cree Nation Partners (CNP);
- Fox Lake Cree Nation (FLCN);
- York Factory First Nation (YFFN);
- Nisichawayasihk Cree Nation (NCN);
- Manitoba Keewatinowi Okimakanak (MKO); and
- Manitoba Metis Federation (MMF).

The non-profit corporation, Wuskwatim and Keeyask Training Consortium (WKTC), acted as the administrative and coordinating body for the HNTEI. The HNTEI sought to provide educational upgrading and enhance general job readiness, skills development and work experience. This was undertaken primarily so that Aboriginal people could take advantage of employment opportunities generated by construction of the Wuskwatim and Keeyask Projects in the Regional Study Area and also so that Aboriginal people could gain skills and experience that could be applied directly in home communities. The training partners offered a range of training based in communities and in academic institutions that included assessment services, academic preparation, academic and technical instruction and on-the-job training. Support programs to promote participation in training and to help retain trainees were also provided. Over half of the courses offered through the HNTEI were at the community level. This meant that residents did not have to leave their community and move to unfamiliar settings to take advantage of much of the training offered. Training was provided for a wide variety of construction occupations as well as several occupations based in the participating communities. The $60.3 million training initiative was funded by Manitoba Hydro, Canada and the Province of Manitoba. Manitoba Hydro and the Province of Manitoba began providing funding directly to the communities in 2002. Canada began funding the initiative in 2005 when WKTC was established to administer the initiative. The HNTEI was originally scheduled to end March 31, 2009, but Manitoba Hydro and the Province of

Manitoba agreed to extend it by one year to allow the Aboriginal partners additional time to utilize funding.

Over the life of the initiative, approximately 2,600 Aboriginal training opportunities were provided in communities throughout the Regional Study Area. Of that total, over 1,070 Aboriginal people were registered in occupational training courses or programs. Nearly all of the participants were from communities in the CBN area, which includes communities affected by past hydroelectric development and a sizable proportion from the KCNs.

The HNTEI also placed hundreds of trainees into jobs and facilitated several hundred work placements for their trainees. Partnerships with employers and various government departments resulted in job placements to complement training, allowing participants to accumulate valuable on-the-job work experience.

While the focus on education and training was to encourage and enable individual trainees to build specific skill sets, many individual trainees still need work experience to reinforce the classroom and demonstration training they completed in order to qualify for Keeyask construction jobs.

Information and insights gained from the HNTEI were instrumental in developing and refining the model to estimate employment effects of the construction phase of the Project. Specifically, the portion of the model that estimated the supply of labour to fill Project employment incorporated data regarding HNTEI participants who completed skill development courses and programs. These participants were included in the current labour supply and then forecasts were developed to estimate how the labour force would change between 2014 and 2021 when they would be required for the construction workforce.

Table 3-2 shows that an estimated 595 Aboriginal workers with relevant skills according to broad job categories required for Project construction from the Regional Study Area completed a training course or program that was funded through the HNTEI. The largest number undertook training in the non-designated trades, followed by designated trades. The majority in designated trades are at the apprentice level, although some trainees were accredited as journeymen as a result of the HNTEI program. A further 82 trainees with completed courses or program in the Regional Study Area are in the construction support category, with an additional 67 in skills related to business and management.

In the Local Study Area, 242 Members of the KCNs completed a training course or program that was funded through the HNTEI, with 116 in the non-designated trades, 31 in designated trades, 47 in construction support and 48 in business and management.

Table 3-2: Hydro Northern Training and Employment Initiative Participants with Completed Courses or Programs by Job Category and First Nation or Aboriginal Organization (2009, 2010)

HNTEI Completions (as at Q4 2009/2010)	CNP	FLCN	YFFN	KCN (Total)	MKO	MMF	NCN	Northern Region
Designated Trades	25	5	1	**31**	23	9	38	101
Construction Support	16	15	16	**47**		12	23	82
Non-Designated Trades	50	38	28	**116**	90	70	69	345
Business and Management	24	10	14	**48**	3		17	67
Construction Workforce Available from HNTEI Training	**115**	**68**	**59**	**242**	**115**	**91**	**147**	**595**

Source: Derived from Wuskwatim Keeyask Training Consortium 2009/10 fourth quarter report and other WKTC derived data.
Note:

- Table includes a portion (5%) of apprentices that have achieved less than Level 1 apprenticeship.
- Table includes trainees that have completed courses or programs through the HNTEI in occupational classifications that align with Keeyask workforce estimates as of August 2010.
- Numbers are subject to rounding.

3.3.1.2 Keeyask Cree Nations

This section provides a description of key labour, education and economy indicators based on Statistics Canada Census of Canada data. Data are presented for KCNs Members living in the communities located in the Local Study Area and do not include KCNs Members living off-reserve.

Included in the data are the following:

- TCN Members living in Split Lake;
- WLFN Members living in Ilford;
- YFFN Members living in York Landing (*Kawechiwasik*); and
- FLCN Members living in Fox Lake (Bird), but not Gillam (the FLCN urban reserve in Gillam was created in 2009, after the dataset presented in this section).

The data from each of those four communities were summed to arrive at the total for the KCNs. Where averages are reported, they are weighted to account for the relative size of the communities.

With respect to the data presented in this section, Statistics Canada attempts to enumerate 100% of the population in rural areas and on Indian Reserves, although reaching the entire population is not always possible. In some instances, data have been suppressed due to a low response rate, or to protect confidentiality in communities with small populations. All data have been rounded. The data from the KCNs communities are discussed in comparison to the Regional Study Area (represented as census divisions 19, 21, 22 and 23) and residents of the Province of Manitoba as a whole. Where necessary, data have been summed and weighted. Regional Study Area and Manitoba labour force characteristics are based on Statistics Canada 20% sample surveys.

Community-based research programs were undertaken in the KCNs communities to obtain first-hand data, where available, and perspectives from those knowledgeable about employment and training. Findings from the programs are incorporated in the presentation which follows in order to create as complete a picture as possible of employment and training in the KCNs communities. The majority of the community-based research programs took place in July, August and September of 2009, with some interviews conducted later in the fall and follow-up during February and March of 2010.

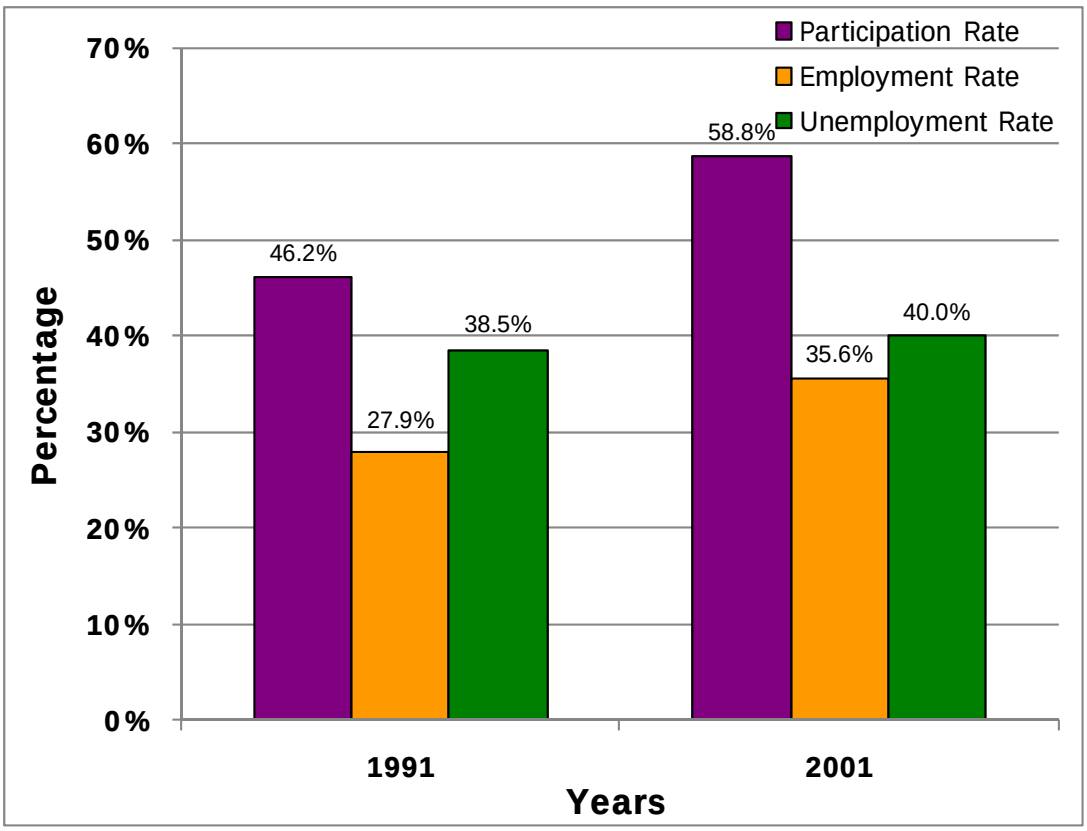
3.3.1.2.1 Labour Force

Figure 3-2 provides a synopsis of selected KCNs labour force indicators for 1991 and 2001 (for a more detailed analysis, see Appendix 3A, Table 3A-1). The potential labour force in the KCNs communities, which is the population 15 years and older, grew by almost 40% over the ten year period 1991 - 2001. This corresponds to a high rate of growth in the overall population of these communities (see Section 4.3.1).

The labour force participation rate also increased over the period 1991 - 2001, which represents the proportion of KCNs Members actively involved in the labour force: that is, employed, about to be employed or looking for work.

The 2006 labour force data for the communities of TCN and FLCN have been suppressed by Statistics Canada due to data quality issues (see Appendix 3A, Table 3A-1). Therefore, an accurate portrayal of KCNs labour force growth and other labour force measures could not be determined for 2006.

KCNs employment increased by almost 8 percentage points between 1991 and 2001, with the number of employed Members increasing from 290 to 515 (see Appendix 3A, Table 3A-1).



Source: Statistics Canada 1992, 2002.
Notes:

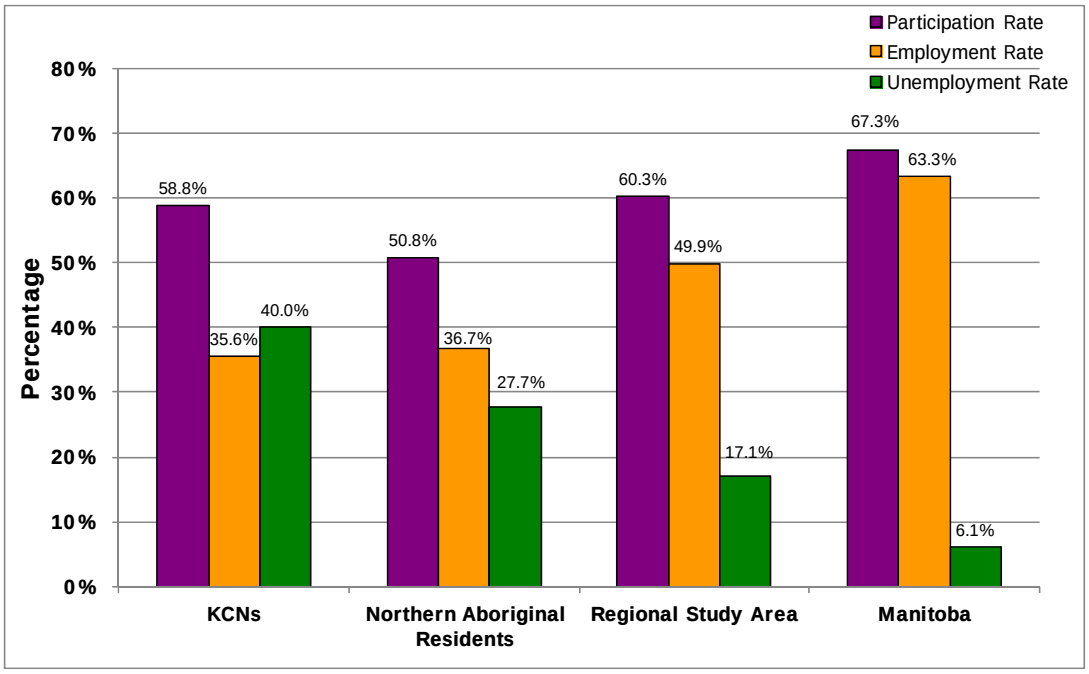
- Complete data set provided in Appendix 3A (Table 3A-1).
- KCNs includes Members of TCN, WFLN, YFFN and FLCN. Statistics Canada refers to these communities as Split Lake, Ilford, York Landing (*Kawechiwasik*) and Fox Lake 2, respectively.
- Participation rate refers to the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the population 15 years of age and over. The participation rate for KCNs was calculated by InterGroup Consultants as the weighted average of the populations of TCN, WLFN, YFFN and FLCN 15 years and over. All data subject to rounding.
- Employment rate refers to the number of persons employed in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the total population 15 years of age and over. The employment rate for KCNs was calculated by InterGroup Consultants as the weighted average of the populations of TCN, WLFN, YFFN and FLCN 15 years and over. All data subject to rounding.
- Unemployment rate refers to the unemployed persons, expressed as a percentage of the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001). The unemployment rate for KCNs was calculated by InterGroup Consultants as the weighted average of the populations of TCN, WLFN, YFFN and FLCN 15 years and over. All data subject to rounding.

Figure 3-2: Labour Force in Keeyask Cree Nations Communities (1991, 2001)

In 2001, the employment rate in KCNs was one percentage point below the employment rate of all northern Aboriginal residents; however, the employment rate was about 14 and 28 percentage points below the average employment rate for all residents of the Regional Study Area and Manitoba, respectively (Figure 3-3) (for a more detailed analysis, see Appendix 3A, Table 3A-2). The disparity in employment rates reflects a shortage of employment opportunities in KCNs communities, compounded

by existing barriers to accessing available employment (CNP 2010a, YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2010).

In 2001, KCNs communities also had a high unemployment rate, about 34 percentage points above the provincial unemployment rate. Also, the unemployment rate in KCNs communities was about 12 percentage points greater than the corresponding rate for northern Aboriginal residents (Figure 3-3).



Source: Statistics Canada 2002, 2011a.
Notes:
Complete data set provided in Appendix 3A (Table 3A-2).

- KCNs includes Members of TCN, WFLN, YFFN and FLCN. Statistics Canada refers to these communities as Split Lake, Ilford, York Landing (*Kawechiwasik*) and Fox Lake 2, respectively.
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- Participation rate refers to the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the population 15 years of age and over. The participation rate for KCNs was calculated by InterGroup Consultants as the weighted average of the populations of TCN, WLFN, YFFN and FLCN 15 years and over. All data subject to rounding.
- Employment rate refers to the number of persons employed in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the total population 15 years of age and over. The employment rate for KCNs was calculated by InterGroup Consultants as the weighted average of the populations of TCN, WLFN, YFFN and FLCN 15 years and over. All data subject to rounding.
- Unemployment rate refers to the unemployed persons, expressed as a percentage of the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001). The unemployment rate for KCNs was calculated by InterGroup Consultants as the weighted average of the populations of TCN, WLFN, YFFN and FLCN 15 years and over. All data subject to rounding.

Figure 3-3: Employment, Participation and Unemployment Rates in Keeyask Cree Nations Communities and Comparison Populations (2001)

The appearance of higher unemployment rates compared to other populations in the province does not present the full picture in the KCNs communities, since seasonal jobs and short-term contracts appear not to be fully reflected in Statistics Canada data. Findings from community-based research programs indicate that the majority of job opportunities tend to be seasonal and short-term (rather than full-time). These seasonal jobs tend to experience relatively high turnover (YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2010). Depending on whether or not they were working in the week prior to Census Day (May 15, 2001), people with short-term and seasonal contracts (*e.g.*, debris clearing, heavy equipment operators on construction sites, catering contracts, Manitoba Hydro environmental studies, *etc.*), may have been described as "not in the workforce" or "unemployed" when, in fact, they were employed at some point during the year. The tendency towards seasonal and contract work in these communities may lead to a large proportion of workers collecting employment insurance in the off-season, rather than actively pursuing work. In particular, this could be the case in the winter, spring or late fall when fewer opportunities exist for additional contract work or part-time work.

The Census enumerates individuals at their usual place of residence; therefore, the number of KCNs Members who have relocated for work in other centres, such as Thompson, Brandon and Winnipeg would not be counted as residents of KCNs communities. In addition, the unemployment rate does not capture KCNs Members living in their own community that have never worked, have not pursued work for a period of time, or who operate in the informal economy. If these individuals were counted, the unemployment rate would be found to be higher than the rate published by Statistics Canada.

Findings from community-based research programs indicate that the most common reasons for people to leave their community are related to education and employment. The two factors would seem to go hand-in-hand since people are often required to pursue post-secondary training, particularly at the college and university level and in some cases a high school diploma, outside their home community. Once the person has successfully graduated, he (or she) may stay where he received his education if a job opportunity arises, as opposed to returning home where there may be fewer opportunities (CNP 2010a; YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2010). Students who are educated locally might also leave their communities after graduation in search of opportunities elsewhere. Residents may also be forced to leave their community for health reasons – that is, to seek health care or to move closer to available health care (*e.g.*, people with diabetes). Migration of KCNs Members to and from their home communities can create enumeration problems, adding to the uncertainties in the Census data.

Community-based interviewees identified a number of barriers preventing people in KCNs communities from obtaining employment. In addition to a lack of full-time job opportunities, these barriers include family responsibilities, particularly caring for young children and an acknowledged lack of day care spaces and funding for community day care services. Other factors preventing people from obtaining employment include requirements for high school diplomas or higher levels of education, a mandatory driver's license, criminal record checks and the requirement that applicants have job-related experience. Personal reasons may also prevent people from obtaining employment, such as health problems, having to care for family members, addictions, a lack of confidence and the fear that they may lose their home if the employment requires work outside the community (YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2010). Another factor noted is adapting to long work rotation schedules characteristic of construction site work, which interviewees felt would affect the strong family networks that people both

rely on and support. Community-based education and training facilities typically provide drivers' education and life skills courses to help Members of First Nation communities overcome some of these barriers (CNP 2010a; YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2010).

3.3.1.2.2 Education

Education is an important factor influencing the extent to which Project employment opportunities may be filled by the labour force from the KCNs communities. Basic education levels for Members of the KCNs communities were determined using the 2001 Census of Canada, the year before HNTEI began in these communities. In 2001, the Census of Canada determined the highest level of education attained for individuals aged 20 years and over, which is presented in Table 3-3 (for a more detailed analysis, see Appendix 3A, Table 3A-3).

Table 3-3: Highest Level of Education in Keeyask Cree Nations Communities and Comparison Populations (2001)

Characteristics[1,2,3]	KCNs Members[4]	Northern Aboriginal Residents[5]	Regional Study Area[6]	Manitoba
Less than high school certificate	60.3%	59.6%	48.2%	34.4%
High school certificate or equivalent	6.7%	5.8%	8.5%	11.4%
Trades certificate or diploma	7.9%	n/a	13.0%	11.7%
Some post-secondary education	11.5%	10.4%	10.2%	11.4%
Post-secondary education certificate, diploma, degree, *etc.*[7,8]	13.1%	24.1%	20.2%	31.0%

Source: Statistics Canada 2002, 2011a.
Notes:
1. Complete data set provided in Appendix 3A (Table 3A-3).
2. Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
3. Columns may not add to 100% due to rounding and/or unavailable data ("n/a").
4. KCNs includes Members of TCN, WFLN, YFFN and FLCN. Statistics Canada refers to these communities as Split Lake, Ilford, York Landing (*Kawechiwasik*) and Fox Lake 2, respectively.
5. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
6. Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
7. For columns "KCNs Members", "Regional Study Area" and "Manitoba", "Post-secondary education certificate, diploma, degree, *etc.*" is the sum of "Post secondary non-university certificate or diploma", University certificate or diploma" and "University degree" in the corresponding table in Appendix 3A.
8. For column "Northern Aboriginal Residents", "Post-secondary education certificate, diploma, degree, *etc.*" is the sum of "Trades, college or university certificate or degree (below bachelor's level" and "University degree" in the corresponding table in Appendix 3A.

In 2001, approximately 25% of KCNs Members over 20 years of age had some post-secondary education or achieved a post-secondary education certificate, diploma, degree or other, which is 10 percentage points less than Northern Aboriginal residents, five percentage points less than Regional Study Area residents, and 17 percentage points less than Manitoba residents. Regional Study Area residents and Manitoba residents achieved trades certificates or diplomas at a rate that were about five percentage

points and four percentage points, respectively, above the KCNs Members' rate of about eight per cent (Table 3-3).

Findings from community-based research programs indicate that school enrolment has been on the rise due to increases in population within the community. FLCN, for example, saw increased enrolment from 60-70 students in the 2008/09 school year to 120 students in 2009-2010. The increase may be attributed to families moving back to the community. In one of the KCNs communities, there was a suggestion that the trend over the next ten years is toward an increase in enrolment, due to people moving back to the community and people choosing to have more children (FLCN KPI Program 2009-2010).

In 2001, the majority of Members from the KCNs communities, approximately 60%, had an education level of less than a high school certificate or equivalent (Table 3-3). The percentage of residents without high school diplomas was less than one percentage point higher than for northern Aboriginal residents, more than 12 percentage points higher than for residents of the Regional Study Area and nearly 26 percentage points higher than for residents of Manitoba[1].

Community-based research findings indicate that communities were particularly challenged with respect to technical trades, graduation past Grade 10 and university or college graduation. For TCN, in 2005, 23 people graduated with a high school diploma; eight people with Bachelors' degrees in arts, nursing, social work, education and general studies; and 11 people graduated with a college or university preparation certificate (TCN 2005). Graduation rates for TCN have been gradually rising, with 26 graduates reported in 2009 (CNP 2010a).

With respect to high school, a higher percentage of KCNs Members without diplomas may be due, in part, to the need for Members to access educational services elsewhere. This challenge is especially pronounced for WLFN and YFFN where students can go as high as grade eight and nine respectively, after which students must leave their communities for further education[2]. Once graduated, some may stay in those centres to find work, particularly if jobs in their home communities are unavailable or offer low wages. With respect to post-secondary education, successful completion of a diploma, certificate or degree in a larger urban centre requires overcoming a range of obstacles. For example, people choosing to leave their communities to pursue training opportunities often face culture shock. In the case of younger people especially, there may be more temptation to succumb to peer pressure leading to unhealthy behaviours or they may be bullied. Loneliness, resulting from students being away from family and friends for long periods of time, is also a real obstacle. General family instability and stress may occur in some cases where entire families move with their children or make frequent trips to stay in contact with them (CNP 2010a; YFFN KPI Program 2009-2010). Students may also be unprepared for higher expectations in large urban settings, as opposed to the schools in their home communities, ultimately leading to frustration and potentially withdrawal from their programs. Completion rates for students also tend to vary. Findings from community-based research programs suggest that graduation rates were on

[1] Highest level of education attained for northern Aboriginal residents is determined based on the population 25 years of age and over.

[2] TCN has a school up to Grade 12, as does Gillam, which FLCN Members attend. Fox Lake (Bird), YFFN and WLFN students must travel outside their home communities for high school.

the rise recently, with one community achieving a rate of 90% graduation from post-secondary programs (YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2010).

Another noteworthy challenge to leaving the community for education and training relates to family responsibilities, including caring for young children or ailing or aged family members. Some members of KCNs communities who were willing to leave the community to access training opportunities were most likely to be single people with no family responsibilities (YFFN KPI Program 2009-2010). Lack of available childcare can prevent people from having the freedom to take courses, especially once this difficulty is added to others, like insufficient healthcare and education services. Strategies suggested for achieving success in training include bringing together all potential service providers to serve students in a coordinated fashion (for example, Awasis, National Native Alcohol and Drug Abuse Program and Community Health Representatives) (TCN 2008).

It is common for Members with post-secondary education to leave the community for jobs (YFFN KPI Program 2009-2010). Pursuing studies outside of community-based occupations may result in settling elsewhere to find employment.

3.3.1.2.3 Characteristics of the Workforce

Table 3-4 and Figure 3-3 provide an occupational breakdown for the KCNs (with comparison populations) for 2001, based on Statistics Canada (for a more detailed analysis, see Appendix 3A, Table 3A-4). Almost one-quarter of workers in KCNs communities are employed in the sales and service sector (retail, hotel and catering), which is more than any other sector. In the Regional Study Area and Manitoba, the percentage of sales and service workers is about three percentage points and one percentage point more than in KCNs communities, respectively. In Manitoba, the sales and service sector also comprised a larger percentage of the population than any other sector. Approximately one-third of Aboriginal residents living in the Regional Study Area work in the sales and service industry.

Other employment in the KCNs communities includes occupations in social science, health, education, government service and religion, which together make up the second largest employment sector. This sector employs a larger percentage of the population of KCNs communities than the percentage of the populations of northern Aboriginal, Regional Study Area or Manitoba residents (Table 3-4).

The trades, transport and equipment operators and related occupations sector is the third largest employer in the KCNs communities. The percentage of the populations employed by this sector is similar between the KCNs communities and the comparison populations: the comparison populations lie within about two percentage points of this sector's employment rate in the KCNs communities (Table 3-4).

Table 3-4: Labour Force by Occupation Classification in Keeyask Cree Nations Communities (2001)

Characteristics[1,2]	KCNs[3]	Comparison Populations		
		Northern Aboriginal Residents[4]	Regional Study Area[5]	Manitoba
Not applicable[6]	23.1%	n/a	5.8%	1.4%
All occupations[7]	76.3%	n/a	94.1%	98.6%
Management, business, finance and administration occupations[8]	13.0%	17.1%	18.1%	26.1%
Sales and service occupations	23.1%	33.2%	26.2%	23.9%
Social science, health, education, government service and religion[9]	19.6%	17.9%	16.1%	14.1%
Trades, transport and equipment operators and related occupations	16.6%	18.7%	17.2%	14.6%
Other	4.8%	13.3%	16.5%	19.9%

Source: Statistics Canada 2002, 2011a.
Notes:
1. Complete table provided in Appendix 3A [Table 3A-4].
2. Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
3. KCNs includes Members of TCN, WFLN, YFFN and FLCN. Statistics Canada refers to these communities as Split Lake, Ilford, York Landing (*Kawechiwasik*) and Fox Lake 2, respectively.
4. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
5. Northern Region defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
6. Not available for Northern Aboriginal Resident population.
7. Not available for Northern Aboriginal Resident population.
8. Row "Management, business, finance and administration occupations" is sum of rows "Management occupations" and "Business, finance and administration occupations" in the corresponding table in Appendix 3A.
9. Row "Social science, health, education, government service and religion" is sum of rows "Health occupations" and "Social science, education, government service and religion" in the corresponding table in Appendix 3A.

The high number of KCNs Members working in trades, transport and equipment operation corresponds with findings from the community-based research program. In addition, since 2001, training and certification for these types of jobs tend to be where communities focused their HNTEI training efforts. These programs also facilitated training and placement of trainees into the workforce. Twenty-five people in YFFN were noted as having construction experience and 83 FLCN Members had experience in construction, which includes renovations, building of dams, dykes and residential construction. TCN estimate that about 89 Members have construction experience (CNP 2010a), while WLFN estimate that 41-50 Members have construction experience (CNP 2010d). There were 10 FLCN Members with experience as heavy equipment operators, 15 as large truck drivers, 16 as trades apprentices and nine as journeyman trades people (FLCN KPI Program 2009-2010). Among YFFN Members, 33 individuals have completed training or are experienced heavy equipment operators and 14 individuals are trained or experienced in truck driving. Among YFFN Members, approximately 35 individuals have varying degrees

of training or experience in carpentry and small numbers have experience in plumbing, training in diesel mechanics and as electricians (YFFN KPI Program 2009-2010). TCN Members have experience in operating heavy equipment, carpentry, catering, ironworking and other occupations (CNP 2010a). WLFN Members have experience in operating heavy equipment, cooking, as skilled general labourers, carpentry, environmental monitoring, heavy mechanics, security guards, and truck drivers (CNP 2010d).

Notably, the percentage of KCNs Members employed in social science, education, government service and religion was higher than any comparison population, including twice the rate for the province as a whole. The high percentage of KCNs Members working in this sector corresponds with information gathered from the communities, which indicated that a number of the jobs available in their communities are with the First Nation government (typically full-time), the community school and with local training initiatives and programs. For TCN, 86-90 Members were employed full-time in the education sector, with an additional 9-20 Members working in part-time, temporary, or seasonal positions (CNP 2010a). For WLFN, no employment numbers were provided for the education sector; however, WLFN operates an elementary school, which serves about 25 children annually. Members of WLFN have identified a high turnover rate for teaching-staff as a serious issue in the community (CNP 2010d). For FLCN, 10 people were employed at the school and seven at Fox Lake Employment and Training. For YFFN, 21 people were employed at the school; of those, 15 were First Nation Members. An additional 13 YFFN individuals were trained, were taking training or had experience in early childhood education and childcare (YFFN KPI Program 2009-2010).

Few KCNs Members were employed in the category of occupations unique to primary industry or natural and applied sciences, with numbers notably lower overall compared to the other populations[1]. Findings from community-based research suggest that students expecting to obtain work on hydroelectric developments (construction and/or operation jobs) were not taking the courses that are required for these jobs, such as science and math courses (CNP 2010a; YFFN KPI Program 2009-2010). In addition, there is evidence that effort is being made to strengthen math and science curricula at Split Lake: Brandon University sponsors a mini-university in the summer months with math, science, and university exposure courses; Chief Sam Cooke High School coordinates organized trips to the University of Manitoba for science and technology events; two computer labs were scheduled for the next school term; and a Cultural Science Pilot Program was being developed to include courses in electricity and featuring visits to Manitoba Hydro dams. Community representatives have indicated that under-funding of on-reserve schooling is a serious impediment to achieving solid high school and post-secondary credentials (CNP 2010a; CNP 2010d).

3.3.1.2.4 Skills Pertinent to Project Construction Employment

As noted in Figure 3-4, a consistent and comparable skills inventory for the four KCNs communities was not available. Therefore, 2001 Statistics Canada occupational data and information about graduates from the HNTEI were used to forecast the skills available within the KCNs communities by the start of

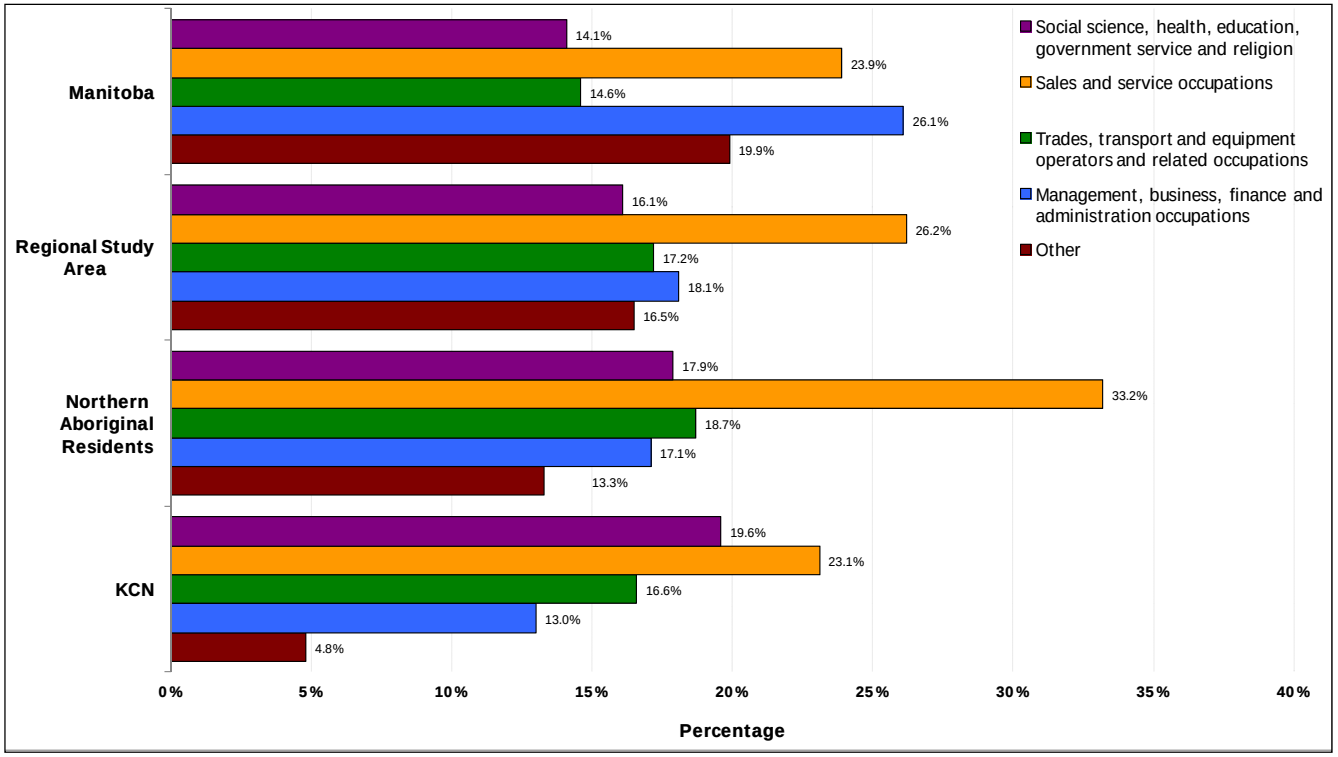
[1] Primary industry is defined by Statistics Canada (North American Industry Classification System) as jobs related to natural resources – "mining, forestry, fishing and agriculture, including secondary employment related with these industries."

Project construction[1]. These estimates include all KCNs Members living in the Regional Study Area, both on- and off-reserve[2]. Table 3-5 presents estimates of the number of KCNs Members with relevant skills according to broad job categories required for Project construction[3] (for a more detailed analysis, see Appendix 3A, Table 3A-5). The estimates are for 2014 when construction begins and 2021 when construction is approaching completion.

[1] While the total KCNs workforce is modelled, more certainty can be attributed to the HNTEI data, which represents actual data collected while the HNTEI was in operation.

[2] A factor of 80% was applied to off-reserve KCNs Members.

[3] This skills inventory identifies the estimated maximum number of KCNs Members available to work on the Project and includes people who are already employed, may not have the proper qualifications required by hydro projects and who may not be available to secure employment opportunities when they arise. These and other factors are taken into account during the scenario analysis portion of the employment modeling process.



Source: Statistics Canada 2002, 2011a.
Notes:

- Complete table provided in Appendix A (Table 3A-4).
- Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
- KCNs includes Members of TCN, WFLN, YFFN and FLCN. Statistics Canada refers to these communities as Split Lake, Ilford, York Landing (*Kawechiwasik*) and Fox Lake 2, respectively.
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- "Management, business, finance and administration occupations" is sum of "Management occupations" and "Business, finance and administration occupations" in the corresponding table in Appendix 3A.
- "Social science, health, education, government service and religion" is sum of "Health occupations" and "Social science, education, government service and religion" in the corresponding table in Appendix 3A.

Figure 3-4: Comparison of Labour Force by Occupation Classification (2001)

Table 3-5: Keeyask Cree Nations Employment Model Skills by Job Category (2014, 2021)

Skills By Job Category[1]	2014 (Construction Start)		2021 (Construction End)	
	KCNs Labour Supply Resulting From HNTEI[2]	KCNs Total Labour Supply[3]	KCNs Labour Supply Resulting From HNTEI[2]	KCNs Total Labour Supply[3]
Designated Trades (Construction, Transportation and industrial)	31	85	31	90
Non-Designated Trades (Construction, Transportation and Industrial)	116	165	116	170
Construction Support and Service Trades	95	230	95	255
TOTAL	**242**	**480**	**242**	**515**

Source: Source: Derived from Wuskwatim Keeyask Training Consortium 2009/10 fourth quarter report and other WKTC derived data. Analysis prepared by InterGroup Consultants Inc. 2010.

1. Complete data set provided in Appendix 3A (Table 3A-5).
2. Table includes a portion (5%) of apprentices that have achieved less than Level 1 apprenticeship. Table includes trainees that have undertaken training through the HNTEI in occupational classifications that align with Keeyask workforce estimates as of August 2010.
3. Derived from HNTEI labour supply projection and projection of Statistics Canada occupational data (2001). Analysis prepared by InterGroup Consultants Inc, 2010.
4. Numbers are subject to rounding.

The HNTEI program ended in 2010. In subsequent years, there may be some opportunities for training new labour force entrants, but they will be much smaller in number and likely concentrated in regional centres, such as Thompson and The Pas, rather than in the KCNs communities. The analysis shows that a large portion of the KCNs workforce expected to be available for the start of construction in 2014 will have received some training through the HNTEI Program (*i.e.,* approximately 50%). New entrants trained after the HNTEI program ended in March 2010 would increase the total labour pool to some degree during the construction period, although this is not expected to have a substantial effect on the total available KCNs labour supply.

Carpenters account for more than half of the KCNs' Members in the designated trades, with approximately 45% of these carpenters receiving some training through the HNTEI program. Heavy equipment operators are the most common non-designated trade, accounting for more than one-third of all non-designated trade jobs. More than three-quarters of heavy equipment operators received some HNTEI. Clerks and typists are the most common construction support and service trades, accounting for about 50% of these kinds of jobs. Approximately three-quarters of those clerks and typists received some training through HNTEI (Appendix 3A, Table 3A-5).

3.3.1.3 Gillam

This section provides a description of key labour, education and economy indicators, based on Statistics Canada Census of Canada data. All data for the Town of Gillam have been rounded. For comparison, Gillam data are discussed in reference to northern Aboriginal residents, residents of the Regional Study Area and residents of the Province of Manitoba as a whole. The Regional Study Area is represented as Census Divisions 19, 21, 22 and 23; and data have been summed and weighted where necessary. Northern Aboriginal residents are characterized as those residents of the Regional Study Area who self-identify as Aboriginal. Regional Study Area and Manitoba labour force characteristics are based on 20% samples.

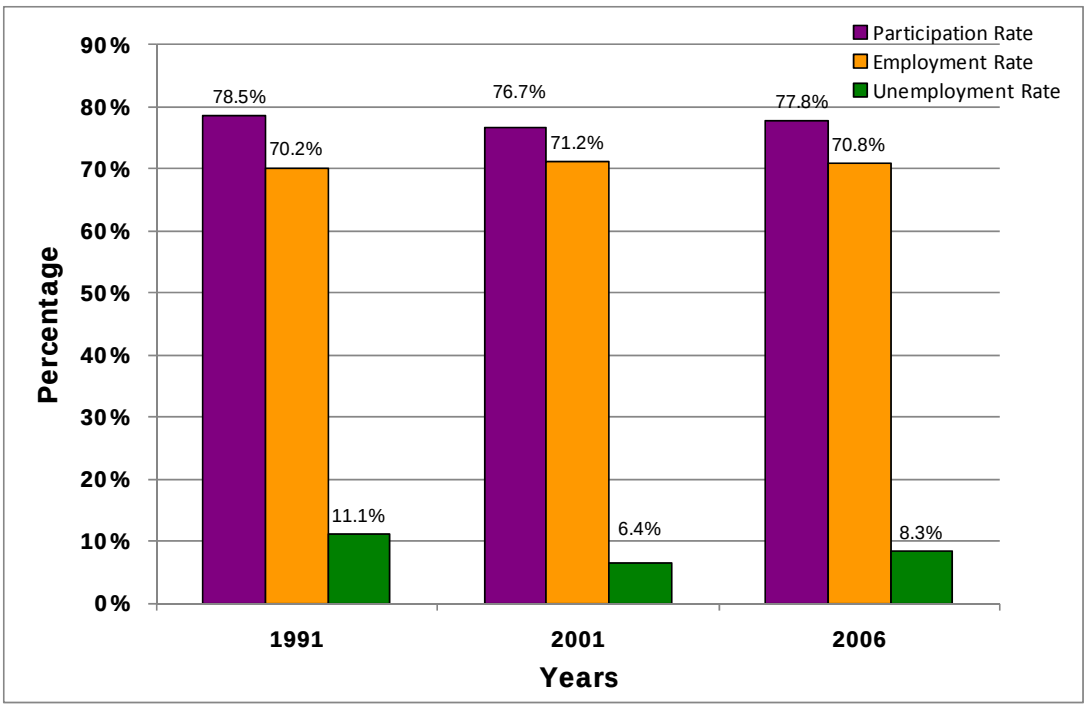
A community-based research program was undertaken in Gillam to obtain first-hand data, where available, and perspectives from those knowledgeable about employment and training. The majority of the KPI programs took place in July, August and September of 2009, with some interviews conducted later in the fall; follow-up interviews took place during February and March of 2010. For the most part, the interviews were undertaken with community members.

3.3.1.3.1 Labour Force

Figure 3-5 provides a summary of selected labour force indicators for Gillam for 1991, 2001 and 2006 (for a more detailed analysis, see Appendix 3A, Table 3A-6). The potential labour force in Gillam, defined as the population aged 15 years and older, experienced a notable decrease between 1991 and 2001, dropping over 38% (see Appendix 3A, Table 3A-6). This decrease likely occurred due to a reduction in the required labour force employed by Manitoba Hydro between those years. Since employment in Gillam is largely dependent on the needs of Manitoba Hydro, much of the decrease in the potential labour force should reflect the out-migration of former Manitoba Hydro employees and their families from the community. The population of Gillam also declined by 38% during this time. In the period 2001 to 2006, the potential labour force in the community increased by approximately 5% (see Appendix 3A, Table 3A-6).

Although the potential labour force and population of Gillam fell through the 1990s, the participation rate remained relatively stable over this time, declining by less than two percentage points over the decade. The rate increased by more than one percentage point from 2001 to 2006.

Employment rates in Gillam remained relatively stable among the years presented in Figure 3-5, although the number of individuals employed in the community declined by about 350 from 1991 to 2001 (see Appendix 3A, Table 3A-6). Partially due to an overall decline in the potential labour force from 1991 to 2001, the employment rate increased slightly during those years, since fewer individuals remained to compete for employment. The employment rate declined from 2001 to 2006 by less than one percentage point.



Source: Statistics Canada 1992, 2002, 2007a.
Notes:

- Complete data set provided in Appendix 3A (Table 3A-6).
- Participation rate refers to the labour force in the week (Sunday to Saturday) prior to Census Day (June 4, 1991; May 15, 2001; May 16, 2006), expressed as a percentage of the population 15 years of age and over.
- Employment rate refers to the number of persons employed in the week (Sunday to Saturday) prior to Census Day (June 4, 1991; May 15, 2001; May 16, 2006), expressed as a percentage of the total population 15 years of age and over.
- 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 (June 4, 1991; May 15, 2001; May 16, 2006).

Figure 3-5: Change in Employment, Participation and Unemployment Rates in Gillam (1991, 2001, 2006)

The unemployment rate in Gillam fluctuated from 1991 to 2006, with a 4.7 percentage point decrease between 1991 and 2001 and a 1.9 percentage point increase between 2001 and 2006. The number of unemployed individuals in Gillam dropped by 75 between 1991 and 2001 and increased by 15 between 2001 and 2006 (see Appendix 3A, Table 3A-6).

Throughout the course of the community-based research programs, local employers identified the challenges associated with losing their skilled workers to other employers – in some cases to Manitoba Hydro. This challenge was exacerbated by the low unemployment rates and lack of suitable potential employees in the community. Other employers noted the difficulties associated with recruiting staff due to high wage expectations. Even maintaining their existing workforce was cited as difficult by some employers. Similarly, employers in skilled and professional sectors referred to challenges in hiring people from out-of-town aside from the spouses of Manitoba Hydro or the Royal Canadian Mounted Police (RCMP) employees. Several employers stated that those individuals who were willing to work were

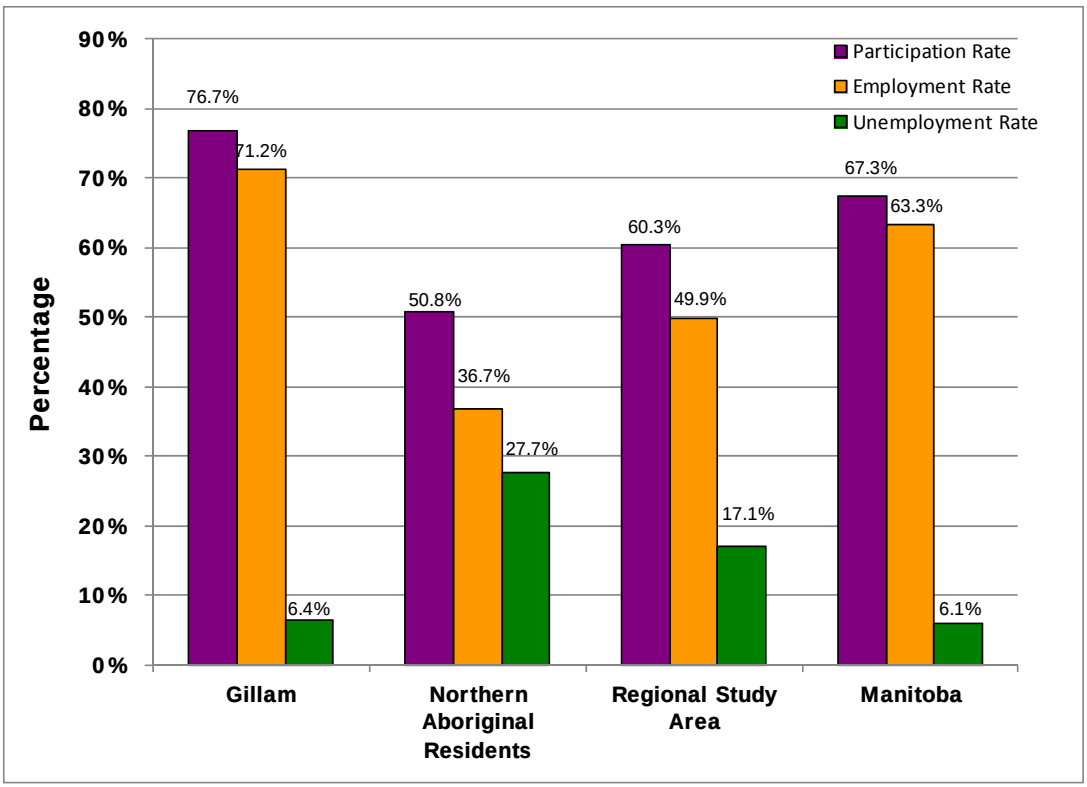
already working, leaving those that may not necessarily be as qualified or interested to fill the remaining jobs (Gillam KPI Program 2009-2010).

As shown in Figure 3-6, the participation rate in Gillam in 2001 was nearly 77%. The participation rate in Gillam exceeded that of the Regional Study Area by over 15 percentage points and that of Manitoba by nearly 10 percentage points (for a more detailed analysis, see Appendix 3A, Table 3A-7).

Findings from the community-based research programs suggest there are two main groups that comprise a part of the potential labour force not currently working in Gillam: (1) the spouses of Manitoba Hydro employees; and (2) FLCN Members residing in Gillam, but not currently employed. The reasons for which spouses of Manitoba Hydro employees are not working tend to be associated with a lack of daycare spaces in the community and a lack of desirable employment prospects. In some instances, these reasons have persuaded families to leave the community to pursue opportunities elsewhere (Gillam KPI Program 2009-2010). In the case of FLCN Members, participation in the labour force is sometimes limited because of a lack of local training opportunities to access local jobs. Many FLCN Members, particularly young families, do not want to leave the Gillam and Fox Lake (Bird) area for education and training due to challenges experienced when living in larger urban centres (*e.g.*, lack of family support, childcare and family responsibilities, culture shock of urban centres and the expense of living off-reserve) (FLCN KPI Program 2009-2010). Because FLCN Members are part of the Gillam community, their Members represent another portion of the available labour force in Gillam.

Like participation rates, employment rates in Gillam exceeded those of the Regional Study Area and the province as a whole in 2001. That year, the overall employment rate in Manitoba was about 63%, while the rate of the Regional Study Area was about 50%. In comparison, the employment rate in Gillam at that time was over 71%, reflecting the affect Manitoba Hydro had on the workforce in the community.

The unemployment rate in Gillam in 2001 also reflected the strong presence of Manitoba Hydro in the community: the unemployment rate in Gillam was 10.7 percentage points lower than that of the Regional Study Area. Also, this rate was 0.3 percentage points higher than the unemployment rate for Manitoba in 2001 (Figure 3-6).



Source: Statistics Canada 2002, 2011a.
Notes:

- Complete data set provided in Appendix 3A (Table 3A-7).
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- Participation rate refers to the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the population 15 years of age and over. The participation rate for Northern Aboriginal residents was calculated by InterGroup Consultants as the weighted average of the Aboriginal Identity Population 15 years and over for Census Divisions 19, 21, 22 and 23 and, for Regional Study Area, the weighted average of the total population 15 years and over for Census Divisions 19, 21, 22 and 23.
- Employment rate refers to the number of persons employed in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the total population 15 years of age and over. The employment rate for Northern Aboriginal residents was calculated by InterGroup Consultants as the weighted average of the Aboriginal Identity Population 15 years and over for Census Divisions 19, 21, 22 and 23 and, for Regional Study Area, the weighted average of the total population 15 years and over for Census Divisions 19, 21, 22 and 23.
- Unemployment rate refers to the unemployed persons, expressed as a percentage of the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001). The unemployment rate for Northern Aboriginal residents was calculated by InterGroup Consultants as the weighted average of the Aboriginal Identity Population 15 years and over for Census Divisions 19, 21, 22 and 23 and, for Regional Study Area, the weighted average of the total population 15 years and over for Census Divisions 19, 21, 22 and 23.

Figure 3-6: Employment, Participation and Unemployment Rates in Gillam and Comparison Populations (2001)

3.3.1.3.2 Education

Education is an important factor influencing the extent to which Project employment opportunities may be filled by the labour force in Gillam. The highest level of education attained for individuals aged 20 years and over for Gillam residents was determined using the 2001 Census of Canada. Data are presented in Table 3-6 (for a more detailed analysis, see Appendix 3A, Table 3A-8). All percentages of populations are based on population aged 20 years and over for Gillam, the Regional Study Area and Manitoba; and 25 years and over for Northern Aboriginal Residents population.

In 2001, approximately 62.8% of the residents of Gillam over age 20 had a high school, trades or post-secondary education certificate or equivalent. Twenty-nine percent of residents in Gillam did not have a high school certificate, compared to 48% of residents of the Regional Study Area and 34% of Manitoba residents without a high school certificate.

As detailed in Appendix 3A, Table 3A-8, over 50% of the population of Gillam has had some post-secondary training or achieved a trade or post-secondary non-university certificate or diploma, with nearly 10% of the population holding a university degree and over 20% holding a university or non-university certificate or diploma. In contrast, less than eight per cent of Regional Study Area residents had university degrees in 2001. Similarly, approximately 12% of residents of Regional Study Area and about 17% of Manitobans held a university or non-university certificate or diploma at that time. However, the approximately 10% of Gillam residents with a university degree was less than the 14% for the Province of Manitoba as a whole.

Approximately 52% of the Gillam population had engaged in some form of post-secondary education. Of those who had post-secondary education, over 29% had attained a trades certificate or diploma and 19% had obtained a university degree.

Despite a highly skilled workforce, in certain sectors of the local economy, skill development and training were noted as issues for employers. Among retail and service providers, employers expressed difficulty in recruiting staff with the necessary skills and experience (Gillam KPI Program 2009-2010).

Manitoba Hydro has begun to bring more trainers to Gillam, rather than have members of the community go to Thompson or elsewhere, to decrease the amount of time that people have to be away from their family and community. This has increased both the number of training opportunities and the success for job applicants (Gillam KPI Program 2009-2010).

Table 3-6: Highest Level of Education in Gillam and Comparison Populations (2001)

Characteristics[1, 2, 3, 4]	Gillam	Comparison Populations		
		Northern Aboriginal Residents[5]	Regional Study Area[6]	Manitoba
Less than high school certificate	29.0%	59.6%	48.2%	34.4%
High school certificate or equivalent	11.0%	5.8%	8.5%	11.4%
Trades certificate or diploma	20.7%	n/a	13.0%	11.7%
Some post-secondary education	n/a	10.4%	10.2%	11.4%
Post-secondary education certificate, diploma, degree, *etc.*[7, 8]	31.1%	24.1%	20.2%	31.0%

Source: Statistics Canada 20022011a.
Notes:
1. Table is based on population aged 20 years and older for Gillam, Regional Study Area and Manitoba populations; and for 25 years and older for Northern Aboriginal Residents populations.
2. Complete data set provided in Appendix 3A (Table 3A-8).
3. Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
4. Columns may not add to 100% due to rounding and/or unavailable data (n/a).
5. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
6. Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
7. For columns "Gillam", "Regional Study Area" and "Manitoba", "Post-secondary education certificate, diploma, degree, *etc.*" is the sum of "Post-secondary non-university certificate or diploma", University certificate or diploma" and "University degree" in the corresponding table in Appendix 3A.
8. For column "Northern Aboriginal Residents", "Post-secondary education certificate, diploma, degree, *etc.*" is the sum of "Trades, college or university certificate or degree (below bachelor's level" and "University degree" in the corresponding table in Appendix 3A.

While more than one-fifth of the Gillam population 20 years of age and older attained a trades certificate or diploma, local employers cite challenges in recruiting certified tradesmen, particularly carpenters (Gillam KPI Program 2009-2010).

According to local school officials, there has been an increase in high school enrolment in Gillam recently, with about 30 new students. The increase was attributed to program changes and improvements, including the introduction of calculus and university-level mathematics courses. In addition, internship programs that allow students to receive credit for on-the-job training related to trades are also popular among new students. These programs were developed to help address the need to retain a local workforce of existing Manitoba Hydro employees' families and other residents of the community, including FLCN Members (Gillam KPI Program 2009-2010).

3.3.1.3.3 Characteristics of the Workforce

Gillam has strong ties to Manitoba Hydro and hydroelectric energy production and has some attributes typical of a single-industry economic base. Table 3-7 and Figure 3-7 present occupations in Gillam in 2001 compared to northern Aboriginal residents, the Regional Study Area and Manitoba as a whole based on the total labour force 15 years and over (for a more detailed analysis, see Appendix 3A, Table 3A-9).

The largest proportion of Gillam's total workforce is employed in the trades, transport and equipment operators and related occupations sector. In contrast, the provincial rate of employment in this occupational sector is less than half the rate found in Gillam. The proportion of Gillam's workforce employed by this sector is about 15 percentage points and 16 percentage points greater than for northern Aboriginal residents and Regional Study Area residents, respectively (Table 3-7). This disparity reflects the extent to which Manitoba Hydro and its contractors are major employers in the community.

The sales and services sector employs the second largest percentage of the workforce compared to the other occupational sectors in Gillam, although this proportion is 5-14 percentage points smaller than in the comparison populations (Table 3-7). To some extent, the smaller percentage of workers in the sales and services sector reflects the fact that many retail services are not available in the town itself. Interviews with members of the Gillam community note the lack diversity and number of services and retailers in the community (including restaurants and clothing stores) as reasons for people to do their shopping in Thompson (Gillam KPI Program 2009-2010).

While the sales and services sector employs a smaller percentage of the workforce in Gillam than in the comparison populations, findings from community-based research suggest that several employers felt that they were experiencing recruitment difficulties due to what they believed to be high salary expectations. Others asserted that community youth required additional motivation to pursue available opportunities (Gillam KPI Program 2009-2010). The lack of available housing for non-Manitoba Hydro employees (*e.g.*, those people that may work in the service industry) may also be contributing to recruitment challenges.

Table 3-7: Labour Force by Occupation Classification in Gillam and Comparison Populations (2001)

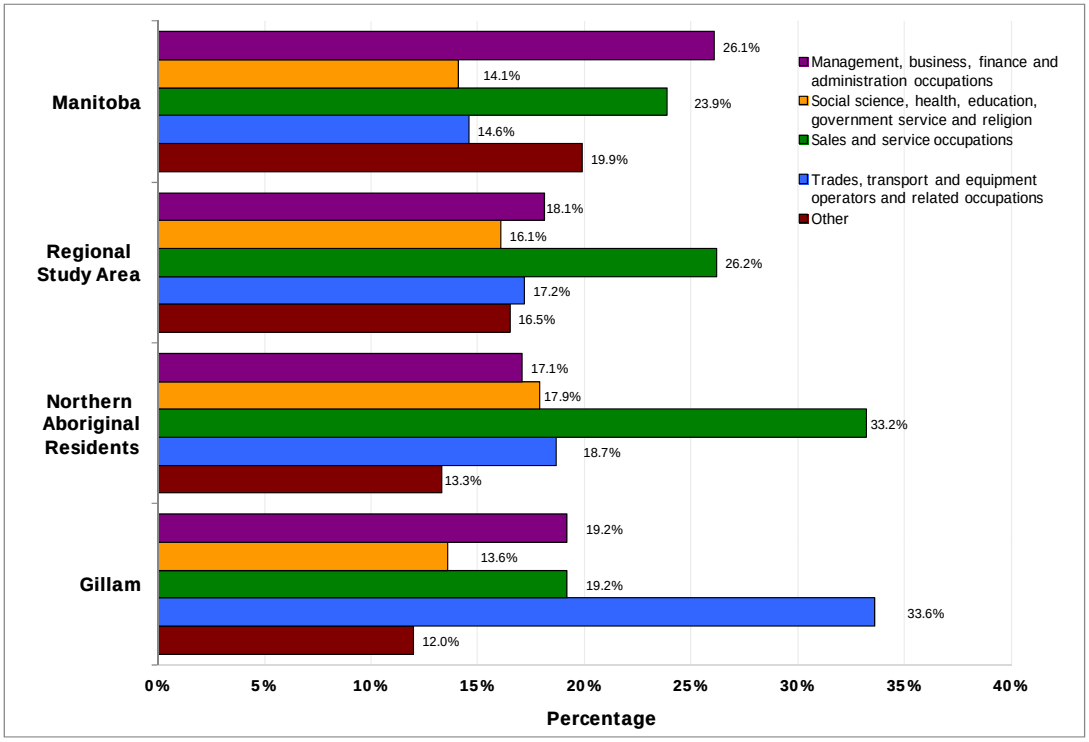
Characteristics[1, 2, 3, 4]	Gillam	Comparison Populations		
		Northern Aboriginal Residents[5]	Regional Study Area[6]	Manitoba
Not applicable[7]	1.6%	n/a	5.8%	1.4%
All occupations[8]	98.4%	n/a	94.1%	98.6%
Management, business, finance and administration occupations[9]	19.2%	17.1%	18.1%	26.1%
Sales and service occupations	19.2%	33.2%	26.2%	23.9%
Social science, health, education, government service and religion[10]	13.6%	17.9%	16.1%	14.1%
Trades, transport and equipment operators and related occupations	33.6%	18.7%	17.2%	14.6%
Other	12.0%	13.3%	16.5%	19.9%

Source: Statistics Canada 2002, 2011a.
Notes:
1. Data is based on total labour force 15 years and over.
2. Complete table provided in Appendix 3A (Table 3A-9).
3. Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
4. Columns may not add to 100% due to rounding and/or unavailable data (n/a).
5. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
6. Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
7. Not available for Northern Aboriginal Resident population.
8. Not available for Northern Aboriginal Resident population.
9. Row "Management, business, finance and administration occupations" is sum of rows "Management occupations" and "Business, finance and administration occupations" in the corresponding table in Appendix 3A.
10. Row "Social science, health, education, government service and religion" is sum of rows "Health occupations" and "Occupations in social science, education, government service and religion" in the corresponding table in Appendix 3A.

The unique nature of the Gillam workforce is especially apparent in the large percentage of the workforce in occupations related to the natural and applied sciences compared to the comparison populations (see Appendix 3A, Table 3A-9). In Gillam, the rate of employment in this sector was 8.8%, more than five times the rate of northern Aboriginal residents (1.6%), more than double the rate of Regional Study Area residents (3.7%), and nearly double the rate of Manitoba residents (4.6%). This occupational category represents a major sector of the Gillam workforce and likely reflects the extent to which Manitoba Hydro is the major employer in the community.

Management, business, finance and administration occupations employed about seven percentage points less of Gillam's workforce than Manitoba's (Table 3-7). Although some Manitoba Hydro jobs in the community encompass management and administrative positions, the bulk of these positions are based out of Winnipeg and other centres. Most Hydro-related employment in Gillam was related to electrical generation, maintenance and skilled trades.

The percentage of Gillam's workforce employed by health occupations is about 1.5 percentage points lower than Manitoba's (see Appendix 3A, Table 3A-9). To some extent, this reflects the position of Gillam relative to Thompson, which is the regional health services centre. While the Burntwood Regional Health Authority provides most health services in Gillam, the existence of major hospital services in Thompson precludes the need for a full range and/or duplicate services in Gillam.



Source: Statistics Canada 2002, 2011a.
Notes:

- Complete table provided in Appendix 3A (Table 3A-9).
- Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- "Management, business, finance and administration occupations" is sum of "Management occupations" and "Business, finance and administration occupations" in the corresponding table in Appendix 3A.
- "Social science, health, education, government service and religion" is sum of "Health occupations" and "Social science, education, government service and religion" in the corresponding table in Appendix 3A.

Figure 3-7: Labour Force by Occupation Classification in Gillam and Comparison

3.3.1.3.4 Skills Pertinent to Project Construction Employment

Gillam currently enjoys low unemployment rates, primarily because of the close association with Manitoba Hydro. There are some FLCN Members who live in Gillam who are eligible for the first order hiring preference provisions and are likely to gain employment on the Project. These residents are already included in the KCNs portion of the analysis and are therefore not included here. Of the remaining

residents, there are few people (not already working for Manitoba Hydro) available for work with the skill sets required who might be attracted to employment on the Project.

3.3.1.4 Thompson

While Thompson's economy is more diverse than that of Gillam, employment levels are heavily influenced by Vale's mining operations, which remain a primary industrial base for the local economy. Other growth is resulting from an emerging cold-weather testing industry, ongoing mineral exploration and a growing role as a regional transportation hub. Thompson is one of the Regional Study Area's main health and education service centres, providing extensive health care services and is the main location for the University College of the North. Thompson also includes major provincial and federal services for the Regional Study Area, providing access to federal and provincial programs. Thompson currently enjoys low unemployment rates, with many employment opportunities available across a wide variety of industries and job categories.

This section presents the employment and training data for Thompson, derived from Statistics Canada 1991, 2001 and 2006 Census data (Statistics Canada 1992, 2002, 2007a). All data have been rounded. For comparison, the Thompson data are discussed in reference to comparison populations — northern Aboriginal residents, the Regional Study Area and Manitoba as a whole. The Regional Study Area is approximated by examining Census Divisions 19, 21, 22 and 23 and these data have been summed and weighted, where necessary. Northern Aboriginal residents are characterized as those residents of Regional Study Area who self-identify as Aboriginal. Regional Study Area and Manitoba labour force characteristics are based on 20% samples.

A community-based KPI program was undertaken in Thompson to obtain first-hand data, where available, and perspectives from those knowledgeable about employment and training. The KPI program took place in 2008, 2009 and 2010. For the most part, the interviews were undertaken with community members.

3.3.1.4.1 Labour Force

The potential labour force in Thompson, defined as the population 15 years and older, experienced a decline between 1991 and 2001 of about 11%, from 10,620 in 1991 to 9,495 in 2001 (see Appendix 3A, Table 3A-10). This was likely due to a reduction in the required labour force employed by Vale over the decade. Since employment in Thompson has been traditionally linked to mining, much of the decrease in the potential labour force should reflect the out-migration of former Vale employees and their families from the community in the mid-1990s. In the period 2001-2006, the potential labour force in the community rose by about three per cent (see Appendix 3A, Table 3A-10). Commitments and activities by Vale, as well as other major projects in and around the city, have continued to increase the potential labour force since 2006.

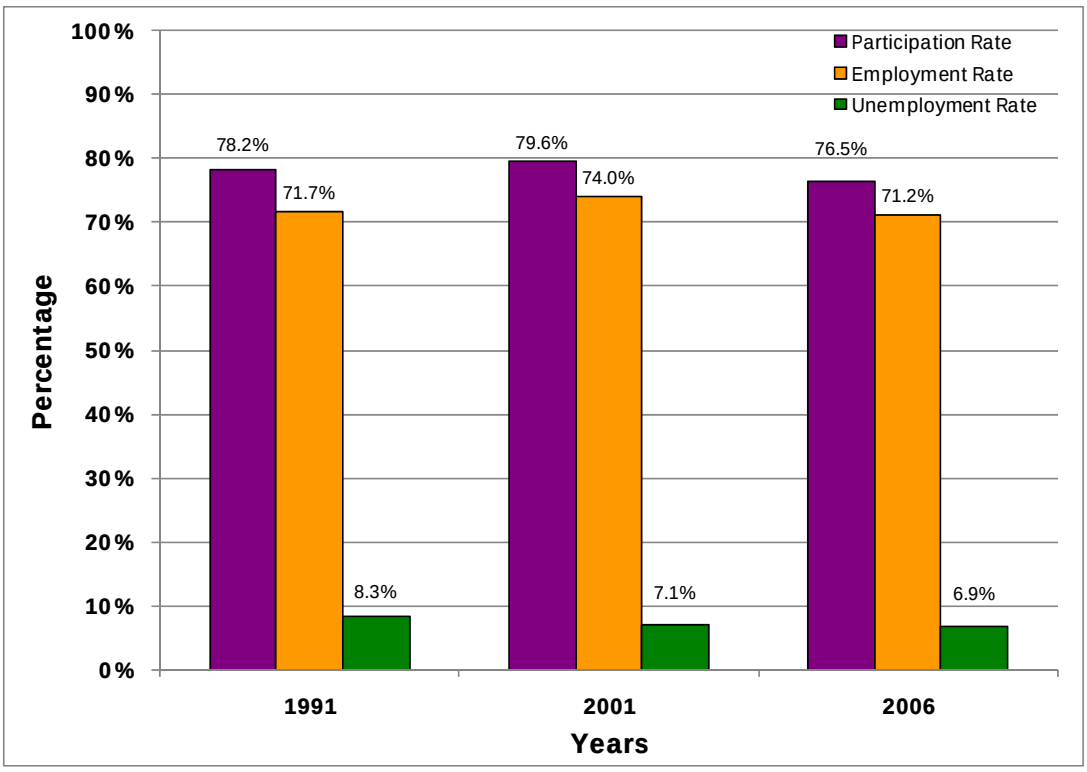
In November 2010, Vale announced that they would be closing the nickel smelter and refinery in Thompson. This may represent a loss of approximately 500 jobs. Vale expects to pursue development of additional mine deposits in the region, thereby off-setting some of the job losses. Depending on the level

and type of job loss, the potential labour force requirements may decline, leading to labour force and population losses.

Although the potential labour force and population of Thompson fell over the period 1991-2001, the participation rate remained relatively stable over this time, increasing by about one percentage point over the period 1991 - 2001, and decreasing by about three percentage points over the period 2001-2006 (Figure 3-8).

Employment rates in Thompson did not vary markedly from 1991, 2001 and 2006 although the number of individuals employed in the community declined by 645 over the period (see Appendix 3A, Table 3A-10). Partially due to a decline in the potential labour force from 1991 to 2001, the employment rate increased by about two percentage points, since fewer individuals remained to compete for employment. The employment rate declined by about three percentage points from 2001 to 2006.

The unemployment rate in Thompson declined about 1.4 percentage points over the period 1991-2006 (Figure 3-8).



Source: Statistics Canada 1992, 2002, 2007a.
Notes:

- Complete table provided in Appendix 3A (Table 3A-10).
- Participation rate refers to the labour force in the week (Sunday to Saturday) prior to Census Day (June 4, 1991; May 15, 2001; May 16, 2006), expressed as a percentage of the population 15 years of age and over.
- Employment rate refers to the number of persons employed in the week (Sunday to Saturday) prior to Census Day (June 4, 1991; May 15, 2001; May 16, 2006), expressed as a percentage of the total population 15 years of age and over.
- 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 (June 4, 1991; May 15, 2001; May 16, 2006).

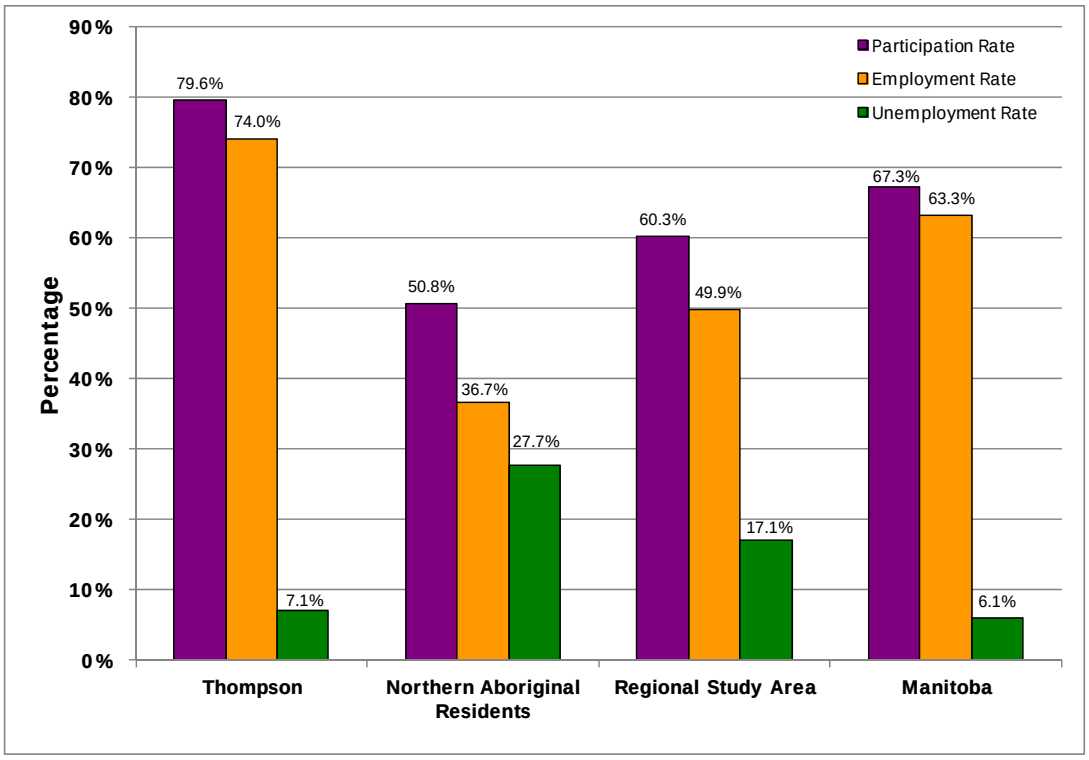
Figure 3-8: Change in Employment, Participation and Unemployment Rates in Thompson (1991, 2001, 2006)

In 2001, the participation rate in Thompson was greater than the rate of the comparison populations (Figure 3-9) about 30 percentage points greater than that of northern Aboriginal residents, nearly 20 percentage points greater than Regional Study Area residents and about 12 percentage points greater than Manitoba residents (for a more detailed analysis, see Appendix 3A, Table 3A-11).

The employment rate in Thompson was also greater than the employment rate in the comparison populations in 2001 (Figure 3-9). Compared to northern Aboriginal residents and Regional Study Area, Thompson's employment rate was about 37 and 24 percentage points greater, respectively. Thompson's employment rate was about 11 percentage points greater than the rate of Manitoba residents.

The unemployment rate in Thompson in 2001, compared to comparison populations, reflected the strong presence of Vale, as well as other associated employers in the community. Thompson's

unemployment rate was one percentage point higher than the rate for Manitoba as a whole in 2001 (Figure 3-9).



Source: Statistics Canada 2002, 2011a.
Notes:

- Complete data set provided in Appendix 3A (Table 3A-11).
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- Participation rate refers to the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the population 15 years of age and over. Employment rate refers to the number of persons employed in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the total population 15 years of age and over.
- Unemployment rate refers to the unemployed persons, expressed as a percentage of the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001).

Figure 3-9: Employment, Participation and Unemployment Rates in Thompson and Comparison Populations (2001)

3.3.1.4.2 Education

Education is an important factor in influencing the extent to which Project employment opportunities may be filled by the labour force in Thompson. Basic education levels for Thompson were determined using the 2001 Census of Canada. In 2001, the Census of Canada determined the highest level of education attained for individuals aged 20 years and over. Data are presented below in Table 3-8 (for a more detailed analysis, see Appendix 3A, Table 3A-12).

In 2001, about two-thirds of the residents of Thompson over age 20 had a high school certificate or higher education, which was only slightly more than for residents of Manitoba as a whole. Thompson had the lowest proportion of residents with less than a high school education out of all of the comparison populations (Table 3-8).

Table 3-8: Highest Level of Education in Thompson and Comparison Populations (2001)

Characteristics[1,2,3,4]	Thompson	Comparison Populations		
		Northern Aboriginal Residents[5]	Regional Study Area[6]	Manitoba
Less than high school certificate	33.6%	59.6%	48.2%	34.4%
High school certificate or equivalent	9.5%	5.8%	8.5%	11.4%
Trades certificate or diploma	15.6%	n/a	13.0%	11.7%
Some post-secondary education	n/a	10.4%	10.2%	11.4%
Post-secondary education certificate, diploma, degree, *etc.*[7,8]	29.7%	24.1%	20.2%	31.0%

Source: Statistics Canada 2002, 2011a.
Notes:
1. Highest level of education is based on population 20 years and over for Thompson, Regional Study Area and Manitoba; and for 25 years and over for Northern Aboriginal Residents populations.
2. Complete data set provided in Appendix 3A (Table 3A-12).
3. Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
4. Columns may not add to 100% due to rounding and/or unavailable data (n/a).
5. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
6. Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
7. For columns "Thompson", "Regional Study Area" and "Manitoba", "Post-secondary education certificate, diploma, degree, *etc.*" is the sum of "Post-secondary non-university certificate or diploma", University certificate or diploma" and "University degree" in the corresponding table in Appendix 3A.
8. For column "Northern Aboriginal Residents", "Post-secondary education certificate, diploma, degree, *etc.*" is the sum of "Trades, college or university certificate or degree (below bachelor's level" and "University degree" in the corresponding table in Appendix 3A.

A greater percentage of Thompson residents had trades certificates or diplomas than Regional Study Area and Manitoba residents, by about 2.5 and four percentage points, respectively. In addition, a greater percentage of Thompson residents had a post-secondary education certificate, diploma, degree or other as compared to northern Aboriginal and Regional Study Area residents, but less than the percentage for

Manitoba as a whole (Table 3-8). For a more detailed breakdown of education, see Appendix 3A, Table 3A-12.

Over 45% of the population of Thompson over 20 years of age had some post-secondary training or achieved a trade or post-secondary non-university certificate or diploma, with over 12% of the population holding a university degree and over, and 15% holding a university or non-university certificate or diploma (Appendix 3A, Table 3A-12). These figures illustrate the high level of education attained by residents of Thompson; in contrast, less than eight per cent of Regional Study Area residents had university degrees in 2001. Similarly, approximately 12% of residents of the Regional Study Area and about 17% of Manitobans held a university or non-university certificate or diploma at that time. The rate of Thompson residents with a university degree at over 12% was comparable to the 14% for the Province of Manitoba as a whole.

Approximately 14% of high school graduates (about 10% of residents over 20 years of age) had not continued their education beyond the high school level in 2001. Of those who had some post-secondary education, over 23% had attained a trades certificate or diploma, nearly 16% of the total population aged 20 and over. This figure exceeds both the 12% of Manitobans and the 13% of residents of the Regional Study Area with a trades certificate or diploma (see Appendix 3A, Table 3A-12).

According to school district officials, the technical vocational, trades certification and apprenticeship programs are among the most popular programs available in Thompson schools. Several programs, including the senior year's apprenticeship and work experience programs, are run collaboratively with Vale and Manitoba Hydro, providing students with valuable experience in a workplace setting. Programs run at R.D. Parker Collegiate in Thompson include auto mechanics, aircraft maintenance engineer, heavy duty mechanics, small engine repair, carpentry, cosmetology, food services certification, as well as computer-aided design and power and diesel mechanics training. In addition, the school is working to introduce Emergency Medical Rescue and Health Care Aide programs, including college accreditation, as well as other programs in collaboration with local employers (Thompson KPI Program 2008-2010).

While the local school district provides a number of opportunities for skills training and development in the community, local unions and employers, such as Vale and Manitoba Hydro, have also been involved in a number of initiatives to improve education levels, especially in trade certification, in the community.

The Thompson campus of the University College of the North, along with locations in The Pas and 12 regional learning centres throughout the Regional Study Area, provide more than 65 degree, diploma and certificate programs. Several interviews were conducted with local educators and other stakeholders in the Thompson area, with many noting that the University College of the North campus required upgrading in order to accommodate the large number of potential students enrolling in courses. The main issues have been a lack of housing for prospective students, as well as a lack of classroom and administrative spaces. Indeed, a new campus in Thompson, including on-campus housing for students, has been under discussion for several years, with a commitment from the Government of Manitoba of $82 million announced in April 2010. The first phase of construction is set to begin in the fall 2010, with new classrooms, laboratories, a new library, a childcare centre with space for 75 children, several ceremonial and meeting spaces; and a 24-unit housing development slated to be built. This construction should increase student capacity at the Thompson campus (Government of Manitoba 2010b). University

College of the North administrators expect that student enrolment will increase to approximately 1,000 within ten years.

Although the workforce in Thompson is relatively well educated, employers in the community continue to have difficulties attracting educated workers. For some employers, basic literacy, numeracy, logic and aptitude testing, as well as high school or General Educational Development certification remain important skill gaps. Employers cite the need for more adult basic education and workplace skills, as well as more complex skill sets, such as trades certification and professional training, in order to fill the positions that they offer. Due to the relatively low unemployment rates in the community, finding qualified staff is a major concern and some employers seek potential workers from outside northern communities, out-of-province and even internationally.

In general, most employers agree that individuals who were born or grew up in the north are more likely to stay in the north and, therefore, northern residents are the preferred source of employees. Companies, such as Vale and Manitoba Hydro, are investing in training programs for local and northern residents, specifically among the Aboriginal population, in order to improve the long-term viability of a skilled northern workforce (Thompson KPI Program 2008-2010).

According to some reports, several employers, including the Burntwood Regional Health Authority and Vale, have been flying in workers for shifts and contract work due to the difficulty of attracting local staff with the necessary qualifications (Thompson KPI Program 2008-2010).

3.3.1.4.3 Characteristics of the Workforce

The economic structure of Thompson, a community with strong ties to the mining sector, as well as the largest service centre in the Regional Study Area, has some unique attributes typical of an important regional centre with a rich resource base. Table 3-9 and Figure 3-10 present the distribution of occupations in Thompson in 2001 compared to northern Aboriginal residents, the Regional Study Area and Manitoba as a whole (for a more detailed analysis, see Appendix 3A, Table 3A-13).

As illustrated by Table 3-9 and Figure 3-10, occupations in the sales and services sector employed the largest percentage of Thompson's workforce (at nearly 25%) compared to other occupations in 2001. This percentage of employment by sales and service occupations was nearly nine percentage points below the northern Aboriginal workforce, about 1.5 percentage points below the Regional Study Area workforce and slightly larger than the Manitoba labour force (about one percentage point). This reflects the fact that Thompson is the major centre for retail and other services in the Regional Study Area. This was confirmed through the community-based research program (2008-2010) during which respondents in a number of communities referred to Thompson as the main shopping and services hub for the Regional Study Area.

The second largest employers in Thompson were those with occupations related to management, business, finance and administration in 2001 (Table 3-9). These occupations employed a slightly greater percentage of Thompson's workforce than either the northern Aboriginal or the Regional Study Area workforces, but about six percentage points less than the workforce of Manitoba as a whole.

In 2001, the third largest employers in Thompson were those having occupations related to social science, health, education, government service and religion (Table 3-9). These occupations employed

about two percentage points more in Thompson as compared to the Manitoba workforce. This reflects the fact that, as the major service centre for the Regional Study Area, Thompson is the location of a number of Provincial and Federal government positions, as well as the University College of the North and Thompson Regional Hospital, among other employers. According to the Manitoba Civil Service Commission, from 2000 to 2008 the Provincial Government employed an average of between 296 and 367 full-time equivalent positions each year[1]. The School District of Mystery Lake reported a total of 448 employees in Thompson in 2008 (Thompson KPI Program 2008-2010). Despite being important to the local economy, the rate of Thompson residents employed in this sector remains slightly lower than the proportion of the populations of the Regional Study Area (about 16%) and for northern Aboriginal residents (18%).

Occupations in trades, transport and equipment operators and related occupations were the fourth largest employers of the Thompson workforce in 2001 (Table 3-9). These occupations employed about 1.5 percentage points less of the Manitoba workforce than the Thompson workforce. The sizable percentage of the workforce employed by these occupations is related to Thompson's strong connections to Vale and other resource-based pursuits, as well as a variety of contractors. According to Vale, the company employed an average of 1,507 individuals each year from 2000 to 2008, with an annual average of 1,101 hourly employees between 2000 and 2007. These numbers were on the rise in recent years, though below the former highs experienced in the early 1980s and early 1990s when the company employed over 2,000 employees annually. The company also reported an average of 232 contractors each year between 2003 and 2007[2] and suggested that, in the next few years, this number could expand to over 1,000 contractors at a time (Thompson KPI Program 2008-2010).

The trucking sector in Thompson, including Gardewine North, has reported increases to freight hauling into Thompson, while large local contractors, such as Smook Brothers, have increased their staff levels and operations (Thompson KPI Program 2008-2010).

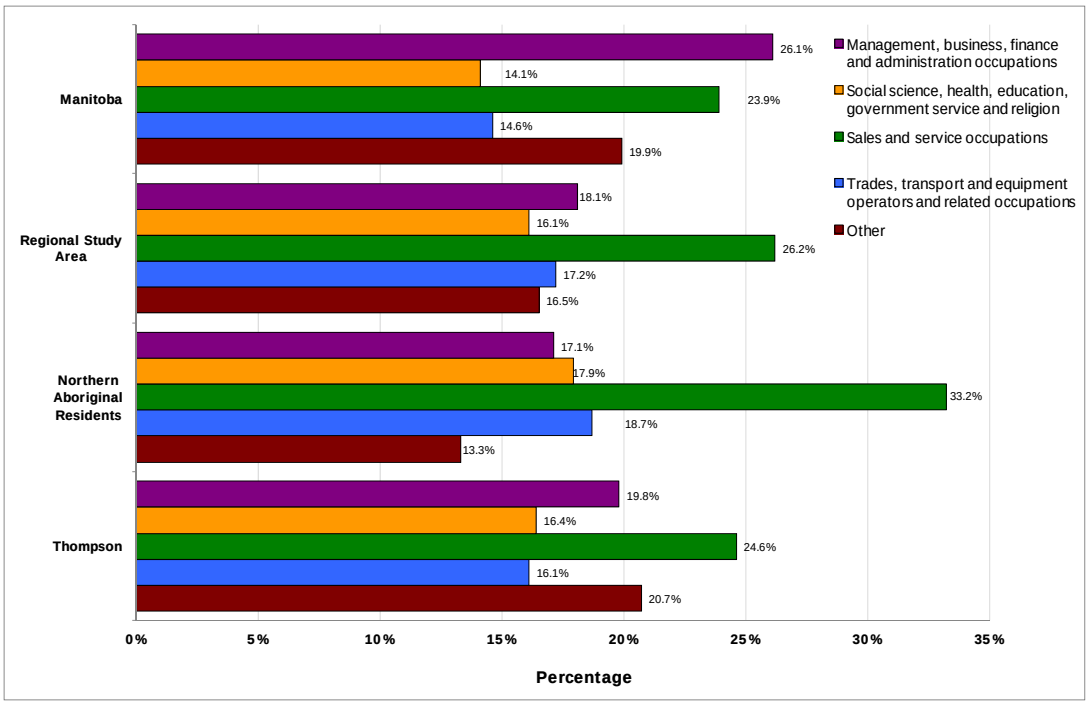
[1] Average number of full-time equivalent positions calculated by InterGroup Consultants based on data provided by the Manitoba Public Service Commission for 2000 to 2008. These numbers are presented in a range due to the seasonal nature of some positions.

[2] Average employed contractors calculated by InterGroup Consultants based on data provided by Vale.

Table 3-9: Labour Force by Occupation Classification in Thompson and Comparison Populations (2001)

Characteristics[1,2,3,4]	Thompson	Comparison Populations		
		Northern Aboriginal Residents[5]	Regional Study Area[6]	Manitoba
Not applicable[7]	2.2%	n/a	5.8%	1.4%
All occupations[8]	97.6%	n/a	94.1%	98.6%
Management, business, finance and administration occupations[9]	19.8%	17.1%	18.1%	26.1%
Sales and service occupations	24.6%	33.2%	26.2%	23.9%
Social science, health, education, government service and religion[10]	16.4%	17.9%	16.1%	14.1%
Trades, transport and equipment operators and related occupations	16.1%	18.7%	17.2%	14.6%
Other	20.7%	13.3%	16.5%	19.9%

Source: Statistics Canada 2002, 2011a.
Notes:
1. Data is based on total labour force 15 years and over.
2. Complete table provided in Appendix 3A (Table 3A-13).
3. Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
4. Columns may not add to 100% due to rounding and/or unavailable data (n/a).
5. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
6. Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
7. Not available for Northern Aboriginal Resident population.
8. Not available for Northern Aboriginal Resident population.
9. Row "Management, business, finance and administration occupations" is sum of rows "Management occupations" and "Business, finance and administration occupations" in the corresponding table in Appendix 3A.
10. Row "Social science, health, education, government service and religion" is sum of rows "Health occupations" and "Occupations in social science, education, government service and religion" in the corresponding table in Appendix 3A.



Source: Statistics Canada 2002, 2011a.
Notes:

- Complete table provided in Appendix 3A (Table 3A-13).
- Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- "Management, business, finance and administration occupations" is sum of "Management occupations" and "Business, finance and administration occupations" in the corresponding table in Appendix 3A.
- "Social science, health, education, government service and religion" is sum of "Health occupations" and "Social science, education, government service and religion" in the corresponding table in Appendix 3A.

Figure 3-10: Labour Force by Occupation Classification in Thompson and Comparison Populations (2001)

In 2007, Vale committed to keeping the Thompson mines operational until at least 2027, as well as investing approximately $750 million in the Thompson operations (Government of Manitoba 2007a; Service Canada 2008). The work completed to date, as well as additional commitments by Vale, has been a major stimulus to the local economy in Thompson. However, the November 2010 announcement to close the refinery and smelter by 2015 may affect the overall labour market in this category in future years.

However, residents suggest that, while the community was traditionally dependent on Vale, in recent years the local economy has been shifting towards a service-based economy with a more diverse base. The city is experiencing a period of economic growth as a result of the following:

- The Wuskwatim Generation Project (construction phase);
- Cold-weather testing;
- Growth in the transportation industry (such as aviation, shipping, road transport and rail); and
- Growth in the health and education sectors.

This has had effects on housing costs and availability, as well as wages across all sectors, including sales and service jobs. For example, wages in restaurants have been raised to between $12 and $14 per hour. This recent economic growth in the local economy has had an effect on the Thompson labour force (Thompson KPI Program 2008-2010).

The category of health occupations is an area in which the proportion of the Thompson workforce (about 5%) is comparable to that of the province as a whole (6%) (see Appendix 3A, Table 3A-13). While the City of Thompson is the major service centre in the Regional Study Area and the location of the regional hospital, due to the large workforce in the city, this sector represents a relatively small proportion of the workforce. In absolute numbers, however, more than 350 individuals were employed in the health sector in 2001, rivalling the total number employed in processing, manufacturing and utilities in the community. According to the Burntwood Regional Health Authority, in 2008 the Burntwood Regional Health Authority employed 519 individuals in Thompson.

3.3.1.4.4 Project Employment

Thompson currently enjoys low unemployment rates, with many employment opportunities available across a wide variety of industries and job categories. A large proportion of this workforce is employed in trades, transport and equipment operations and related occupations in 2001, which are areas that are suitable for Project construction. Actual Project employment on for Thompson residents will depend on the state of the city's economy at the time Project construction is underway.

3.3.2 Business Opportunities – Local Study Area

This section describes current businesses in the Local Study Area, particularly those types of businesses that benefit from participation in Project construction. Businesses owned by any of the KCNs partner First Nations or their Members would be provided the opportunity to negotiate directly to undertake a subset of contracts for construction of the Project (DNCs). In addition, businesses located within the Local Study Area may see opportunities to provide goods and services to contractors. Associated retail/wholesale goods and services, accommodation and food services and the transportation sector could also benefit from the large numbers of people moving to and from the construction site and spending leisure time in local communities.

3.3.2.1 Keeyask Cree Nations

Aboriginal businesses (including those owned by the KCNs communities) are eligible to obtain Project construction contracts through Manitoba Hydro's Northern Procurement Policy. Under this policy First Nation-owned businesses, Aboriginally-owned businesses and/or joint ventures may obtain contracts for work near their communities, or in the broader Regional Study Area.

KCNs businesses that could potentially participate in Keeyask-related contracts include the following:

- Amisk Construction – This joint venture is between CNPLP #2, a Limited Partnership owned by the CNP communities (TCN and WLFN), and Sigfusson Northern Ltd. They indicate capacity to undertake site preparation and camp maintenance, clearing and construction of access roads and reservoir clearing.
- Ininew Limited Partnership – This partnership is based in Winnipeg and provides project management services in civil engineering and architecture, as well as community planning services. Ininew is owned and operated jointly by the Mosakahiken Cree Nation and TCN. The parthernship has been engaged in numerous projects in First Nation communities throughout Manitoba and has participated in environmental site assessments with Manitoba Hydro (Ininew 2010; updated by CNP June 2012).
- TC Building Materials Limited Partnership – This partnership is owned by TCN and is headquartered in Winnipeg. It provides building supplies and constructs buildings, including houses and ready-to-move houses for First Nations and other clients. Services include architecture, drafting and engineering services. Specific projects that TC Building Materials has been engaged in include an addition to the construction camp at the Kelsey generating station, modular housing units in Split Lake and construction of housing and buildings for the RCMP and Manitoba Infrastructure and Transportation.
- War Lake Construction – This company is operated by WLFN and is CORE certified. War Lake Construction has been active in the past few years building a road from Ilford to War Lake and contracting with the Provincial Government to build the winter road.
- Tataskweyak Construction Limited Partnership – This partnership is owned by TCN and is located in Split Lake. It provides services to businesses and government, including road building and maintenance, water and sewer, soil remediation, dyke construction, snow removal and house construction.
- United Cree Construction Joint Venture – This joint venture represents a business arrangement between TCN and the James Bay Cree and is associated with the Cree Construction and Development Company based in Québec. It undertook riprap work for Manitoba Hydro on the shorelines at Split Lake and built the local church.
- ESS-TCS Limited Partnership– This is a joint venture between TCN and ESS (part of Compass Group Canada) that provides camp services. ESS-TCS undertook a contract at the Project site.

- Iron North Limited Partnership– a 100% TCN owned business involved in the purchase and leasing of heavy construction equipment to contractors.
- Keeyask Emergency Medical Services Joint Venture- This is a joint venture between CNPLP # 3, a Limited Partnership owned by the CNP communities (TCN and WLFN), and Criti Care EMS Inc., an emergency medical services provider, formed to provide these services at the Keeyask construction site.
- Keeyask Maintenance Services Joint Venture- This is a joint venture between CNPLP #3, a Limited Partnership owned by the CNP communities (TCN and WLFN) and Newton Mechanical Inc. formed to provide camp maintenance services for Keeyask camps.
- Aboriginal Strategies Limited Partnership (ASI) – This is 80% owned by the TCN Trust and 20% owner by TCN. ASI is a financial management company providing a wide range of professional services; and has the capability of supplying services to Manitoba Hydro and the joint venture companies that are involved in Keeyask DNCs. ASI provides services in the following areas: accounting and financial advice; accountability assessments; on-site training; system analysis and computer installations; business evaluations; First Nation taxation issues and others.
- Northstream Communications Limited Partnership– a TCN-owned internet service provider serving TCN and WLFN. It could potentially provide internet services to Keeyask construction camps.
- Keewatin Railway Company Limited (KRC) – jointly owned by WLFN, TCN, and Mathias Colomb Cree Nation. This railway runs between The Pas and Pukatawagan. KRC provides the full range of track maintenance services, including gauging and ballast, to Manitoba Hydro at Kelsey and the Laurie River generating stations, to the Hudson Bay Railway and to Vale at Thompson. It is available to provide services for the Keeyask and Conawapa projects.
- Tataskweyak Gas Bar – providing local retail gasoline services to TCN and as a supplier to Penner Oil, TGB could provide gasoline and diesel fuel to construction companies and workers.
- FLCN partnership with Sodexo – FLCN has entered a partnership to operate the Mile 326 restaurant (formerly the Aurora Gardens restaurant). This partnership has also been contracted to operate the Conawapa camp.
- FLCN/Smook Contractors – Memorandum of Understanding to form a joint venture for construction activities.
- FLCN/Kleysen Transportation – Memorandum of Understanding to form a joint venture for transportation and materials management.
- FLCN/Multicrete – Memorandum of Understanding form a joint venture for concrete supply and batch plant.
- FLCN/Stefan Homes – Joint venture in relation to construction of buildings.

- FLCN – Has a Memorandum of Understanding with Hartman Construction based in Ashern, Manitoba to bid on contracts related to construction and heavy equipment operation (FLCN KPI Program 2009-2010).
- Fox Lake Contracting – Currently employs eight to ten FLCN Members on a seasonal basis to clear logs and debris along dykes and waterways (FLCN KPI Program 2008-2010).
- YFFN partnership with Sodexo – York Factory First Nation has an existing partnership for camp services at the Kelsey generating station and has used this arrangement as a means of training YFFN Members. YFFN is currently exploring options for taking over management of catering services at the Kelsey Generating Station (YFFN KPI Program 2009-2010).

In addition to the construction-related entities noted above, there are also establishments attached to the KCNs communities that provide accommodations. These hotels have the capacity to cater to visiting consultants and specialists, government employees, contractors and others:

- TCN Kistepinanek Hotel is located in Split Lake and is owned by TCN. It is a 14-unit hotel with a 32-seat restaurant that provides catering services for construction crews carrying out work near the community. This could provide accommodation for Project-related workers if needed.
- TCN ows the Wawatay Inn (a guest housing facility for First Nations patients and families in Thompson).
- WLFN has a two bedroom lodge that can be rented by visitors, and a trailer that can accommodate up to six people. In addition, the former Awasis Learning Centre is available for meeting space and accommodations for up to 15 people. This facility is equipped with a commercial kitchen.
- WLFN has plans to expand the Mooseocoot Convenience Store and Gas Bar to include a motel to accommodate visitors.
- York Landing Hotel is located in York Landing (*Kawechiwasik*) and is owned by YFFN. It provides accommodations and some meal services to construction workers and visiting consultants.

The availability of retail and grocery services varies among the KCNs communities, as in the case of other types of establishments. Split Lake is serviced by a Northern Store and the Tataskweyak Gas Bar, and WLFN recently opened the Mooseocoot Convenience Store and Gas Bar.FLCN has periodically operated the Fox Lake Groceteria located in Fox Lake (Bird). Fox Lake Lumber and Hardware is located in Gillam. YFFN owns and operates the Ripple River Store in York Landing (*Kawechiwasik*).

In terms of business development, the KCNs communities are engaged in the North Central Development Board (two Members from each community) that operates under the umbrella of Aboriginal Business Canada and Western Economic Diversification Canada to assist new entrepreneurs and community corporations with start up. The entrepreneurs may work with Aboriginal Business Canada to build competitive, sustainable businesses, with the provision of financial incentives for those who are eligible (North Central Development 2010).

3.3.2.2 Gillam

The Town of Gillam is economically linked to Manitoba Hydro as the company's key operations and service centre in the Regional Study Area. While the community has close historical ties with FLCN (Gillam is home to FLCN Members in the past and today), as well as the Canadian National Railway/Hudson Bay Railway, Manitoba Hydro's activities in the Local Study Area have had the most profound effects on the town and its residents since the mid-1960s. As the largest employer in the community, the presence of Manitoba Hydro provides a relatively affluent population base to support local businesses and amenities.

Workers in Gillam tend to be permanent staff engaged in plant operation and maintenance, although the population of Gillam has occasionally experienced considerable fluctuations as a result of a mobile, temporary workforce entering the community to develop projects. Many individuals in the community believe that the average person resides in Gillam for approximately five years, with only about 30% of the population in 2008 considered lifetime residents (HTFC 2008). The town's population can therefore be characterized as one that has a degree of stability and some long-time residents, with periodic increases resulting from new construction projects. FLCN Members have long considered Gillam a home community, in addition to Fox Lake (Bird).

Manitoba Hydro is the major landowner in the town and provides company-owned housing to staff at a subsidized rate. The company owns most homes in the community; however, there are some houses owned by FLCN, private individuals and public sector groups such as Frontier School Division, the RCMP and others (see Section 4.3.2.2). There is currently a shortfall of available housing to meet Manitoba Hydro's current needs and those projected for the future, even without the Project. Manitoba Hydro is currently planning to address current and future needs. The lack of private sector housing is a limitation for employers other than Manitoba Hydro, as well as for many FLCN residents.

Due to Gillam's historic and economic ties to Manitoba Hydro development in the Local Study Area, community members have considerable knowledge and experience in the fields of construction and contracting services. Major businesses in this sector include Gardon Construction Ltd. and T and E Zelen Construction, with Gardewine North (based in Winnipeg with a depot in Thompson) providing supplying, shipping and hauling services. Calm Air International Ltd. (based in Thompson) and Gillam Air Services Ltd. provide chartered flights and freight delivery.

Although there is relative affluence among Manitoba Hydro employees in the town, the retail and services sector in Gillam remains limited to only a few stores and restaurants providing basic goods and services. Retailers in the community include the Gillam Co-op grocery store, Fox Lake Lumber and Hardware, as well as the Trapper Shack, which offers souvenirs, liquor, flowers and giftware. Restaurant services are available at the town's two motels, the Mile 326 and the Gillam Motor Inn. According to local residents, the lack of options is related to a number of factors, such as a low unemployment rate, few available homes and difficulty finding dependable and qualified staff. Several business owners remarked that running a business in Gillam is not easy because, "…people don't shop here – they shop in Thompson and Winnipeg." Similarly, local business owners stated that the costs of doing business in Gillam, in terms of wages and transportation, are prohibitive and make prices too high for local

consumers. Nevertheless, residents are optimistic that plans for a new shopping mall, as well as continued growth in the community, will result in broader retail options, particularly clothing (Gillam KPI Program 2008-2010).

One area in which the local business sector remains active is the hospitality industry. The town's two motels report high occupancy rates, even after recent expansion, with close to 100% occupancy most of the time. Motel staff indicated that the majority of their clientele are employees of Manitoba Hydro and the Hudson Bay Railway (Gillam KPI Program 2008-2010).

3.3.2.3 Thompson

The City of Thompson has become a major service centre for the Regional Study Area, with capacity in the construction, transport, hospitality and retail sectors and an expanding variety of related businesses as the local economy continues to diversify.

The local construction and transport industries have extensive experience in the mining sector and increasing experience working on hydroelectric projects in the Regional Study Area. Major capital projects, such as infrastructure programs and construction projects in the community, as well as anticipated long-term investments in mining and mineral exploration by Vale (despite the refinery and smelter shutdown), are attracting other major businesses and resulting in an expanded variety of businesses in Thompson (Thompson KPI Program 2008-2010).

After a decade of business growth and decline, the heavy construction sector is experiencing steady increases in activity, while transportation companies, such as Gardewine North, are expanding their operating capacity to keep up with demand. According to the community-based research program, some skilled workers in the construction and mining sectors are also branching out on their own as contractors or taking on part-time contracts (Thompson KPI Program 2008-2010).

Major trucking companies operating in Thompson at the time of writing included the following:

- Gardewine North;
- Kleysen Group LP;
- Jomac Transport; and
- Matechuk Trucking Ltd.

Major construction and building contractors in Thompson include:

- Smook Bros Ltd.;
- A and B Builders;
- La Furlane Construction;
- Mutschel Brothers;
- Northwest (Thompson) Ltd.;

- Wescan Electrical Company;
- Nor-Man Electrical/Mechanical Construction;
- Buddens Construction;
- JOA Construction Ltd.;
- TerraCrete; and
- Cree Construction and Development Company.

Although the resource sector is still a strong driver of the Thompson economy, recent years have seen diversification in the local business sector. The local economy is no longer tied exclusively to the highs and lows of the mining sector and the success of Vale. Thompson has become a centre for cold-weather vehicle testing, with major automobile manufacturers moving their testing facilities to the city; Thompson has also become a service centre and hub for the Regional Study Area. The transportation sector, including a number of aviation companies with headquarters or major offices in Thompson, is another growing industry in the community. Calm Air International, for example, has plans to expand its cargo facility in Thompson due to increased business in the Regional Study Area and the Arctic. Other major aviation service providers offering charter and freight services include Creeway Aviation, Gavkad Aviation, Missinippi Airways and Perimeter Aviation (Thompson KPI Program 2008-2010).

Economic growth in other sectors of the Thompson economy has resulted in development of the retail, service and hospitality industries. Local hotels, often booked to capacity by out-of-town contractors and companies, have expanded and new hotels have opened in an attempt to meet growing demand. Wages in the restaurant, retail and service sectors have increased as these industries and others face labour shortages, while some businesses have been forced to reduce their hours of operation due to a lack of staff. Housing prices in the city have risen over the last decade; and property values and rent have increased as a few former rental properties have been converted to condominiums and a number of apartment blocks have been renovated. There is also opportunity for capital investment in commercial and retail development in the Thompson market, with high demand for reasonably priced office and retail space. However, available land is a constraining factor. Findings of the community-based research program indicated that many members of the community hope that these developments will encourage local entrepreneurship and attract larger chain retail outlets (Thompson KPI Program 2008-2010).

As noted previously, Vale announced that it would be shutting down the Thompson nickel smelter and refinery by 2015. The anticipated job loss could, in part, be offset by announced increases in Vale mining activity in the Thompson area. The net effect of this development can be expected to include a slowing down of the Thompson economy, with consequent easing of inflationary pressures. Labour and business capacity will no longer be stretched and may in some cases move into a surplus situation. Under these circumstances, the Thompson economy should be better able to absorb the additional demands on businesses and other services arising from construction of the Project.

3.3.3 Income – Local Study Area

Income determines the standard of living (*e.g.*, quantity and quality of goods and services) available to both individuals and communities. Three indicators are provided in this section to better understand the incomes currently available across the Local Study Area. The following indicators were derived from Statistics Canada data sources:

- Average earned income by individuals;
- Average household income, placing individual earned income within the context of total household income; and
- Income sources, showing the distributions among employment, government payments and interest and other investments for each community.

The relationship among those sources is important for placing the employment generated by the Project into context.

3.3.3.1.1 Average Earned Income by Individuals

Average earned income is useful for understanding how much income Aboriginal people earn relative to the total population of Gillam, Thompson and other comparison populations. This helps identify variations in employment earnings within and among communities. Table 3-10 summarizes the average annual earned income by employed workers in these communities. Separate data are not available for northern Aboriginal residents and individual KCNs communities.

Table 3-10: Average Annual Earned Income for Aboriginal People in Gillam, Thompson and Comparison Populations (2001)

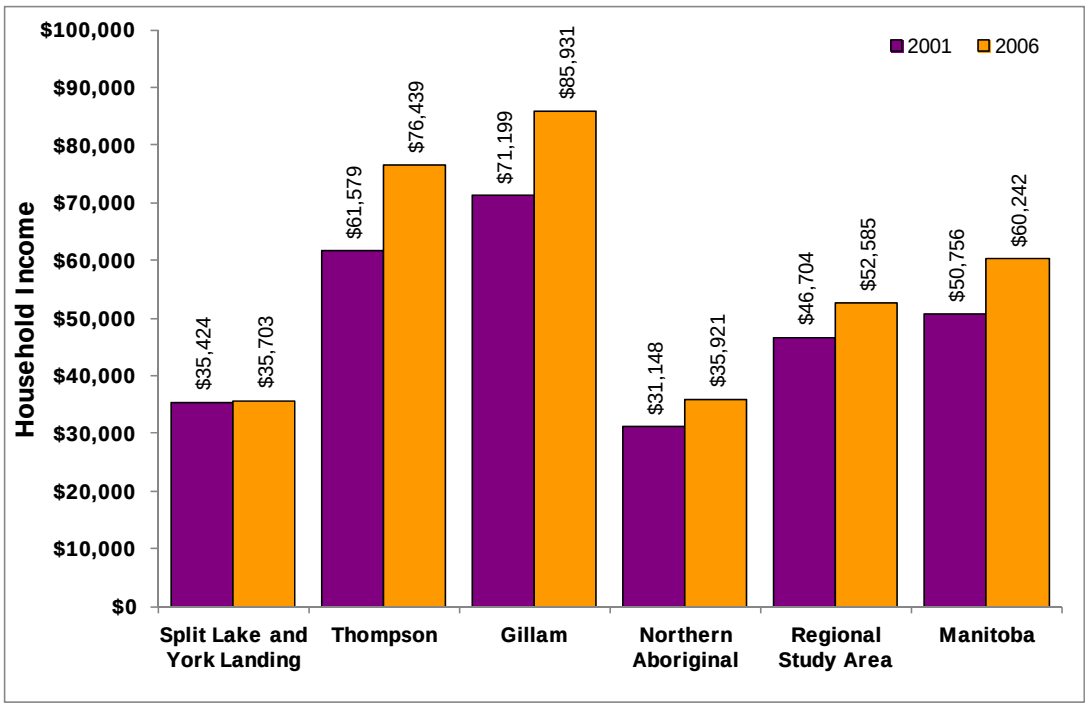
		Average Annual Earnings[1]	
Gillam	Total	$41,174	100%
	Aboriginal Workers	$29,233	71%
Thompson	Total	$33,583	100%
	Aboriginal Workers	$22,690	68%
Regional Study Area[2,3]	Total	$26,364	100%
	Aboriginal Workers	$17,998	68%
Manitoba	Total	$27,178	100%
	Aboriginal Workers	$19,271	71%

Source: Statistics Canada 2002.
Notes:
1. Average annual earning of Aboriginal Workers as a percentage of total workers from each comparison population.
2. Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
3. Based on a weighted average of Census Divisions 19, 21, 22 and 23 weighted by total people with earnings.

Average earned incomes varied from $17,998 - $41,174 in the populations presented in Table 3-10. On average, Aboriginal workers in these populations earned 68% - 71% of the average earnings of all workers. In addition, among these populations, the average Aboriginal annual earnings ranged from $17,998 – $29,223, while the average annual earning for all workers ranged from $26,364 - $41,174. Aboriginal workers in Gillam had the highest average annual earnings, 29% greater than Aboriginal workers in Thompson, 62% greater than Aboriginal workers in the Regional Study Area and 52% greater than Aboriginal workers in Manitoba as a whole.

3.3.3.1.2 Average Household Income

Average household income compares the total income received by households among the Local Study Area's communities. This helps identify variations in income levels among these communities. Figure 3-11 illustrates the average household income by community across the Regional Study Area compared with provincial and national averages.



Source: Statistics Canada 2002, 2007a.
Notes:

- Statistics Canada data are available for York Landing (*Kawechiwasik)* and Split Lake for 2001, and for York Landing (Kawechiwasik) in 2006. Data were not available for WLFN (at Ilford) and FLCN (at Fox Lake (Bird)).
- TCN and YFFN data has been averaged.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area and northern Aboriginal figures based on a weighted average of Census Divisions 19, 21, 22 and 23.

Figure 3-11: Average Household Income (Canadian dollars) by Community and Comparison Populations (2001, 2006)

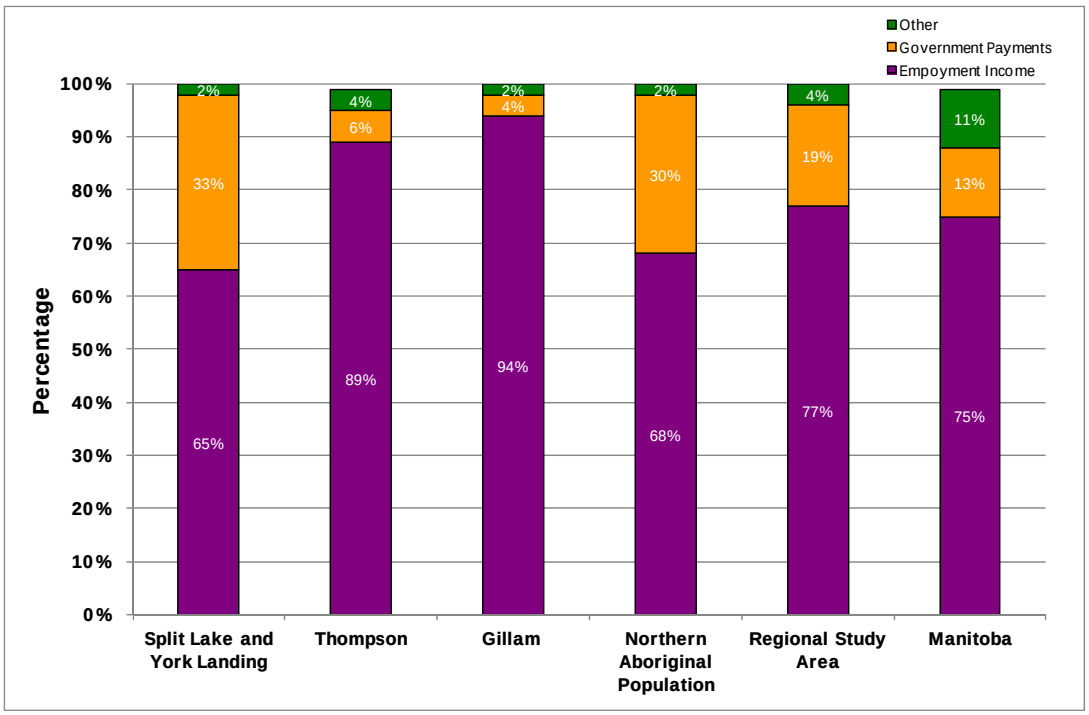
Average household incomes across the Regional Study Area have generally been rising. Between 2001 and 2006, the percentage of Regional Study Area households with incomes above $90,000 rose while the percentage of households with incomes less than $90,000 declined. Overall, average income increased 8% in the Regional Study Area.

While average household income for northern Aboriginal residents was similar to the average household income for Split Lake and York Landing (*Kawechiwasik*) in 2006, northern Aboriginal household income rose faster. From 2001 to 2006, northern Aboriginal household income rose by 15%, while Split Lake and York Landing (*Kawechiwasik*) average household income remained constant.

3.3.3.1.3 Income Sources

Income sources analysis compares the sources of household income among Local Study Area communities. Statistics Canada tracks three general categories, or sources, of income: employment and self-employment income, government payments and interest and other investment income. Of these three sources, most income tends to be generated by employment, followed by government payments, with interest and investment income playing a smaller role in the total earnings of a community. Figure 3-12 presents the average percentage of total income residents of each community or population receives from each income source For a more detailed analysis, see Appendix 3A, Table 3A-14.

In 2001 and 2006, KCNs communities experienced a higher reliance on government payments than the provincial average. Although KCNs data were incomplete, available data for Split Lake and York Landing (*Kawechiwasik*) indicate that the contribution of the sources of household income in KCNs communities remained fairly constant between 2001 and 2006. For a more detailed analysis, see Appendix 3A, Table 3A-14.



Source: Statistics Canada 2002.
Notes:

- Complete table provided in Appendix 3A (Table 3A-14).
- Statistics Canada data are available for York Landing (*Kawechiwasik*) and Split Lake for 2001, and for York Landing (*Kawechiwasik*) in 2006. Data were not available for WLFN (at Ilford) and FLCN (at Fox Lake (Bird)).
- TCN and YFFN has been averaged.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area and northern Aboriginal figures based on a weighted average of Census Divisions 19, 21, 22 and 23.

Figure 3-12: Sources of Income by Local Study Area Communities and Comparison Populations (2001)

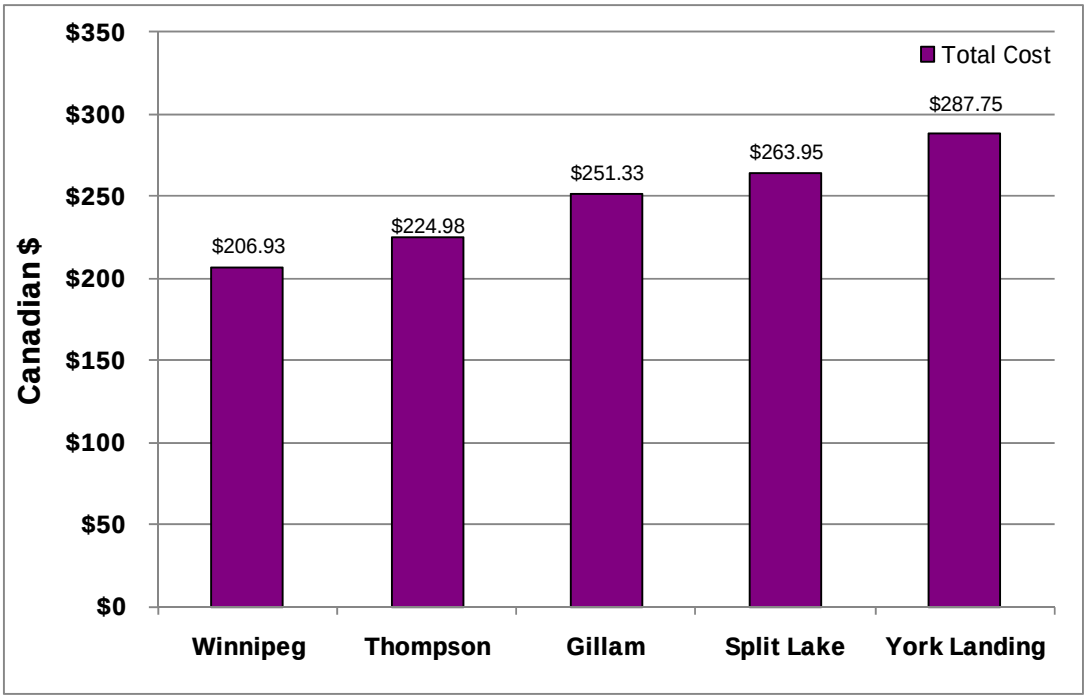
3.3.4 Cost of Living – Local Study Area

High living costs are a function of living in the Regional Study Area, primarily because of the increased cost of transporting goods long distances to small markets.

Three main categories of costs were identified and included in this cost of living analysis: the cost of food and household items, the cost of housing and the cost of transportation. These categories are the most likely to be potentially affected by the Project. (For a more detailed look at cost of living in the Local Study Area, see Appendix 3B).

With respect to the cost of food, Figure 3-13 illustrates the average weekly cost to feed a family of four according to the modified Revised Northern Food Basket survey results (for a more detailed analysis, see Appendix 3B, Table 3B-1). As the Regional Study Area's retail centre, costs are lowest in Thompson, which experiences a 9% premium over Winnipeg. The highest costs in the Local Study Area are found in the smallest, most remote communities without road access, such as York Landing (*Kawechiwasik*), where

residents pay as much as 40% more than in Winnipeg for food and household goods, and approximately 28% more than in Thompson (Table 3-11).



Source: InterGroup Consultants research based on RNFB Survey and Price Selection Procedure 2007.
Notes:
- Complete table provided in Appendix 3B (Table 3B-1).

Figure 3-13: Total Cost of Weekly Revised Northern Food Basket for Family of Four by Community (June-November 2009)

Table 3-11: Comparison of Weekly Revised Northern Food Basket Cost for a Family of Four by Community (June-November 2009)

Baseline Comparison[1]	Winnipeg	Thompson	Gillam	Split Lake	York Landing (*Kawechiwasik*)
Winnipeg Baseline	0%	9%	21%	28%	39%
Thompson Baseline		0%	12%	17%	28%

Source: InterGroup Consultants research based on RNFB Survey and Price Selection Procedure 2007
Notes:
1. Complete table provided in Appendix 3B (Table 3B-1).

With respect to transportation, costs within the Local Study Area are more difficult to quantify. Costs per trip to reach goods, services, employment and other amenities are highest in the most remote locations. Total costs, however, are reduced somewhat in small communities because of the reduced need for daily commutes. This may reduce fuel costs for those people who do not commute regularly on public highways.

Housing costs are generally more affordable in the remote communities than in the regional centres. In the KCNs communities, housing is provided to Members through Aboriginal and Northern Affairs Development Canada and Canadian Mortgage and Housing Corporation (CMHC) programs that are administered by the First Nations, thereby reducing housing-related rental or purchase costs. The exception would be the case of Canadian Mortgage and Housing Corporation homes that are held by the community, with rent being paid by band Members that are living in them[1]. In Gillam, Manitoba Hydro subsidies reduce employee housing costs to a level well below the provincial average. The highest housing costs are found in Thompson, which is currently experiencing a housing shortage with little housing construction on the horizon to absorb the growing demand. This is driving up the price of houses and apartments. It is also leading to some apartment owners converting apartments into condominiums to take advantage of the increased sale prices (Thompson KPI Program 2008-2010). This situation is likely to change given the proposed 2015 shutdown of the Vale's smelter and refinery.

Table 3-12 summarizes the findings of cost differentials among the communities in the Local Study Area, including the results of the Revised Northern Food Basket survey for each community, transportation and housing costs and the Federal Price Index Differential as a comparative measure[2]. As expected, employees in the most remote communities experience the highest Price Index Differential including allowances of 45% to 49% of salary. For further details on cost of living and the calculations discussed here, see Appendix 3B.

[1] There are currently 188 CMHC funded homes at TCN (Split Lake); 29 at FLCN (Fox Lake (Bird)); 20 in WLFN (Ilford); and 18 in YFFN (York Landing (Kawechiwasik)). All KCNs communities are experiencing housing shortages with resultant over-crowding. KCNs community Members have indicated that these programs are not adequate to meet the demand.

[2] See Section 3.2.4 for discussion on Price Index Differential.

Table 3-12: Summary of Costs of Living by Community

Community	Food and Household Items	Transportation	Housing	Federal Price Index Differential[1]
Split Lake (TCN)	28% above Winnipeg	Road / Bus Higher than Thompson	Subsidized by First Nation	20-24%
Ilford (WLFN)	n/a	Ice Road / Rail/ Air Charter Inconvenient	Subsidized by First Nation	30-34%
Fox Lake (Bird) (FLCN)	n/a	Road / Rail Inconvenient	Subsidized by First Nation	n/a
York Landing (*Kawechiwasik*) (YFFN)	39% above Winnipeg	Ice Road / Ferry / Air Expensive in spring and fall as air only option	Subsidized by First Nation	45-49%
Gillam	21% above Winnipeg	Road / Bus / Rail / Air Higher than Thompson	Manitoba Hydro Subsidizes Most Homes	25-29%
Thompson	9% above Winnipeg	Road / Bus / Rail / Air	Comparable to Winnipeg	<15%

Source: InterGroup Consultants research based on Calm Air 2011; Perimeter Aviation 2010; CMHC 2009; Greyhound Canada 2009; Manitoba Hydro 2009; Manitoba Real Estate Association 2009; MIT 2009; National Joint Council 2009; INAC 2007; Thompson Real Estate Board 2009; Town of Gillam 2009; VIA Rail 2009; Winnipeg Real Estate Board 2009.
Notes:
1. Represents the percentage difference (in a range) between prices in each community and those in Winnipeg (*e.g.*, for York Landing (*Kawechiwasik*), prices tend to be 45-49% higher than in Winnipeg).

3.3.4.1 Keeyask Cree Nations

As noted previously, the discussion on cost of living has been organized into sub-sections for food and household items, transportation and housing. Where feasible in the case of the KCNs, community-specific commentary is provided.

3.3.4.1.1 Food and Household Items

Costs for food and household items tend to be high for KCNs residents, compared to Thompson. All four KCNs communities are small markets, with limited purchasing power, and are remotely located. As a result, they experience a 17% to 28% premium for food and household items compared with Thompson, based on the RNFB survey results.

Of the KCNs communities, Split Lake experiences the smallest differentials in food and household costs when compared to Thompson. Split Lake is accessible year-round by road and has the largest population among the KCNs communities. The community hosts a privately operated Northern Store that is part of a larger Northern distribution network operated by the North West Company. The store receives regular

shipments of products including a large portion, but not all, of the food categories identified in the RNFB (2008a). Freight is also shipped to the community by Grey Goose Bus Lines (a subsidiary of Greyhound Canada), as part of the regular bus service and by other companies such as Arctic Beverages and Old Dutch. The presence of this competition helps encourage increased selection and stabilizes prices at a level approximately 17% higher than in Thompson.

The Mooseocoot Convenience Store and Gas Bar have recently opened in the community of Ilford (WLFN). As the most remote KCNs community, Ilford is accessible by ice road during the winter season, or by rail or chartered flight. Rail service costs about $50 per person to Thompson return. In addition, WLFN Members would also need taxi service to and from the airport (about $20 in total) adding about $70 to the bi-weekly grocery bill. Although travel by train allows passengers to bring large quantities of goods with them, making it the most affordable way of shopping for large volumes of groceries, it adds considerably to the cost of food for community Members.

The communities of Fox Lake (Bird) and York Landing (*Kawechiwasik*) both experience higher costs than Split Lake. Fox Lake (Bird) is located 250 km from the regional distribution centre of Thompson and is accessed from a highway that is often in relatively poor condition. In the summer, York Landing (*Kawechiwasik)* is only accessible by ferry and by air. In the winter, the community can be accessed by winter road via Split Lake. Findings from community-based research suggest that Members of YFFN often make use of the greater accessibility of Split Lake by purchasing grocery and other household items there or in Thompson during the summer and winter seasons. The communities of Fox Lake (Bird) and York Landing (*Kawechiwasik*) hosted stores that brought in goods for sale, but these stores both experienced disruptions in service during 2009.

The RNFB survey was conducted at the York Landing (*Kawechiwasik*) store before it closed in October 2009 and results showed that prices were about 28% higher than in Thompson and about 9% higher than in Split Lake. The York Landing (*Kawechiwasik*) store reopened within a few months, in late 2009, under Band management[1]. Nevertheless, Members of YFFN will likely continue to make purchases in Split Lake when seasonal conditions permit. As of April 2010, the store at Fox Lake (Bird) remained closed and FLCN Members living in the community traveled to Gillam to do their shopping. As a result, prices for residents of Fox Lake (Bird) are comparable to those in Gillam, at least for those who travel there for groceries, plus the cost of travel between the communities.

As Aboriginal people with hunting and fishing Treaty rights and with designated **resource management areas** (in the cases of TCN, YFFN and FLCN), most KCNs Members are likely to include at least some **country food** (fish and game, berries, nuts and edible wild plants) in their diet. All country food items are able to replace items on the RNFB. While the premiums outlined in this analysis will still hold generally for each individual product purchased, the total weekly amount paid by people living in remote

[1] It is unclear at the time of writing whether the new Band management of the store in York Landing (Kawechiwasik) will affect the cost and availability of grocery items. For the purposes of this comparison, we assume that the new management has no measureable effect on cost of living.

communities may be offset by the presence of country foods[1]. This trend is likely more pronounced where wildlife food sources are more accessible and the cost of store-bought food is highest.

3.3.4.1.2 Transportation

Transportation to and from KCNs communities is generally difficult and expensive. There are four main modes of transport available in the Local Study Area: air, bus, rail and road. None of the communities are accessible via all four modes of transport, with some communities only experiencing very limited opportunities for outside travel during certain times of the year. Table 3-13 summarizes the available transportation options for the KCNs communities.

Table 3-13: Summary of Transportation Access to Keeyask Cree Nations Communities

Methods	Split Lake	Ilford	Fox Lake (Bird)[1]	York Landing (*Kawechiwasik*)
Rail	No	Yes	Yes	No
Ferry	Yes (to YFFN)	No	No	Yes
Road/Bus	PR 280/Bus	No	PR 290	No
Airport[2]	No	Yes	No	Yes
Winter Road[3]	Yes	Yes	No	Yes

Source: YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2011; Gillam KPI Program 2009-2010; CNP 2010c, 2010f.
Note:
1. FLCN Members living in Gillam have rail, road/bus and air access.
2. There are no scheduled flights to Ilford; however, charter service is available to both Gillam and Thompson.
3. Winter roads connect Split Lake to YFFN at York Landing (*Kawechiwasik*) and WLFN at Ilford.

Travel costs are also closely associated with the cost of food and household items in remote communities. The main cost of transportation for residents of the KCNs communities, particularly those without local stores, is the cost of regular commutes to Thompson or other neighbouring communities for groceries and other supplies not available closer to home.

3.3.4.1.3 Housing

Unlike food and transportation costs, housing costs tend to be very low across all four of the KCNs communities, with little variation among communities. Each KCNs community distributes housing to Members, usually at little or no cost except in the case of CMHC housing where residents may incur costs. In 2007, Manitobans spent on average 25% of their gross household income on shelter, 30% of which was spent on operating and furnishing their homes. Therefore, the ability for KCNs residents to reduce or eliminate these shelter-related costs provides a large benefit in terms of the housing component of their cost of living (with the exception of some living in CMHC housing).

[1] Costs associated with country foods – such as the price of fuel, fishing, hunting and trapping gear – are not considered in this analysis but could add material costs to country food.

3.3.4.2 Gillam

3.3.4.2.1 Food and Household Items

The cost of food and household items tends to be high in Gillam. Revised Northern Food Basket survey data show prices in Gillam to be about 12% higher than in Thompson (see Table 3-11). However, prices in Gillam are lower than those experienced in Split Lake, which is a larger community located closer to Thompson. As a regional centre, Gillam is likely able to keep prices lower than in Split Lake because of increased purchasing power.

3.3.4.2.2 Transportation

Compared to other Regional Study Area communities, Gillam is very accessible, with regular flights from Winnipeg, year-round highway access and regularly scheduled bus and rail service. As a smaller centre, flights to Gillam are generally more expensive than flights to Thompson and are available to fewer destinations than in Thompson. Road access is considered poor along PR 280, which connects Gillam to Split Lake and Thompson, with residents attributing some increased maintenance costs of their vehicles to the condition of this highway. Public transportation in Gillam consists of a local taxi. There is no municipal bus service. Table 3-14 summarizes the transportation options available for Gillam.

Table 3-14: Summary of Transportation Access to Gillam

Community[1]	Air	Bus	Rail	Road	Ferry	Winter Road
Gillam	Scheduled Flights	yes	yes	yes	n/a	n/a

Sources: Calm Air 2009; Greyhound Canada 2009; MIT 2009; Town of Gillam 2009; VIA Rail 2009.
Note:
1. 'n/a' denotes 'not applicable' (*e.g.*, winter roads are not applicable in the case of Fox Lake (Bird) because it is already serviced by an all weather road).

The cost of the regularly scheduled services to various destinations are discussed in more detail in Appendix 3B. Table 3-15 summarizes the number of flights from various communities each week to Gillam. Charter service to Ilford is also available.

Table 3-15: Weekly Flights to Gillam (2009)

	York Landing (*Kawechiwasik*)	Thompson	Churchill	Winnipeg
Calm Air	Charter only	5	6	11

Sources: Calm Air 2009.

3.3.4.2.3 Housing

Costs for housing tend to be low for Gillam residents who are employed by Manitoba Hydro because they are provided with subsidized housing as an incentive to work in this remote northern community. For other residents (including FLCN Members and non-Hydro employees), housing costs are much higher. There are approximately 534 housing units in Gillam, with the majority of these (322) owned by Manitoba Hydro and rented to permanent employees stationed in the town. The remaining units are owned by other organizations, owned privately, or by FLCN that provide them to Members residing in the community. As a result, there is virtually no supply of homes available to meet any changes in demand that may occur for housing in Gillam. This may change in the future with the recent introduction of an Alternative Gillam Housing program by Manitoba Hydro which provides options for Manitoba Hydro's employees based in Gillam to purchase their homes or rent alternative local accommodation.

Manitoba Hydro is expected to build new homes in Gillam in the near future to accommodate the workforce increases anticipated from increased hydroelectric operations along the Nelson River. These homes will be provided exclusively to Manitoba Hydro employees and will not be available on the open market for some time, if at all. There is one apartment block being built for the open market; however, no other housing developments are currently planned for Gillam. Implications of the recent establishment of FLCN's new reserve in Gillam, A Kwis Ki Mahka Reserve, have yet to be determined.

3.3.4.3 Thompson

3.3.4.3.1 Food and Household Items

As the Regional Study Area's largest community and main distribution hub, the cost of food and household items in Thompson tends to be the lowest of all the communities in the Local Study Area. The RNFB analysis indicates that Thompson residents pay a 9% premium for food and household items over Winnipeg. A portion of this increase is attributable to the long distance goods must travel from Winnipeg and other regional distribution points to reach consumers in Thompson. This factor, however, only accounts for some of the price increase.

Rapid development within the community, including previous investments in Vale's mining operations, increases in the number of companies conducting cold weather testing in Thompson and construction of new health care facilities, are among the many projects and trends taking place in Thompson that are increasing demand for labour from all job categories. This increase in labour demand has created a labour shortage, which, in turn, is causing wage inflation in Thompson. Wage inflation provides direct upward pressure on the price of food and household goods. This situation is likely to change given that it is anticipated that Vale's smelter and refinery will close down by 2015. Specifically, a stable or declining economy will not exert the same upwards pressure on the price of food and household goods.

3.3.4.3.2 Housing

Thompson has approximately 4,810 total occupied private dwelling units according to the 2006 census (this includes apartments, single detached, row houses and moveable units). Despite having the largest housing stock in the region, Thompson is currently experiencing a housing shortage.

House prices tend to be highly volatile in Thompson, being closely linked with the price of nickel and related operations at Vale's operations. In 2000, average house prices in Thompson reached a low of $83,762. They peaked in 2008 at a high of $243,391. Prices dropped slightly in 2009, with an average selling price of $204,212 at the end of September 2009. Overall, house prices have more than doubled since 1998 and, in September 2009, were on par with average house prices in Winnipeg.

This volatility tends to deter developers from speculating on new subdivisions. Between 2000 and 2006, 65 housing units were built. In 2007, 26 new units were built, with another 51 units built in 2008. No new units had yet been started as of March 2009. As long as current economic conditions prevail, demand is expected to outpace supply in Thompson (Thompson KPI Program 2008-2010). Additional discussion regarding housing is provided in Section 4.3.2.

While little investment is currently being made to build new housing units, larger private investments are being made to upgrade existing units, particularly to convert existing rental apartments into condominiums for sale. In 2007, the Grey Wolf apartments were converted to condominiums. Another 400 apartment units are currently scheduled for conversion from rental apartments to condominiums, including the Princeton Towers and the Corayana Apartments. Prices for the Princeton Towers units are expected to start at about $164,000 (Service Canada 2009b). The trend toward converting apartments into condominium units is increasing the average cost of housing per person without relieving the increase in housing demand resulting from the current economic activity in the region. This is currently compounding the upward pressure on housing prices (Thompson KPI Program 2008-2010). There is reason to expect that housing prices could stabilize since the announcement regarding the nickel refinery and smelter closure.

3.3.4.3.3 Transportation

Thompson is the most accessible community in the Local Study Area, with regular flights to and from Winnipeg, The Pas, Churchill and other communities. Thompson is also serviced by regularly scheduled passenger bus and rail service. Provincial Trunk Highway (PTH) 6 from Winnipeg to Thompson is built to a relatively higher standard and maintained better than PR 280. Table 3-16 summarizes the transportation options available to Thompson residents.

Table 3-16: Summary of Transportation Access to Thompson

Community[1]	Air	Bus	Rail	Road	Ferry	Winter Road
Thompson	Scheduled Flights	yes	yes	yes	n/a	n/a

Sources: Calm Air 2009; Perimeter Aviation 2010; Greyhound Canada, 2009; MIT 2009; City of Thompson 2009; VIA Rail 2009.
Note:
1. 'n/a' denotes 'not applicable' (*e.g.*, winter roads are not applicable in the case of Fox Lake (Bird) because it is already serviced by an all weather road).

The costs of the regularly scheduled services tend to be highly variable. The costs for each of these services to the various available destinations are discussed in more detail in Appendix 3B. Table 3-17

summarizes the number of flights from various communities each week to Thompson. Charter service to Ilford is also available.

Table 3-17: Weekly Flights to Thompson (2009)

	York Landing (*Kawechiwasik*)	Gillam	Churchill	Winnipeg
Calm Air	Charter only	5	5	35
Perimeter	10	Charter only	Charter only	51

Sources: Calm Air 2009; Perimeter Aviation, 2009.

3.3.5 Regional Study Area – Employment and Training Opportunities

Employment levels across the Regional Study Area remain low for Aboriginal people, both in the CBN region and more broadly across the Regional Study Area. The Aboriginal unemployment rate in the Regional Study Area was 27.3% in 2001. Exact unemployment data are not available for Aboriginal people living in the CBN region, although unemployment rates for Aboriginal people living in Census Divisions 22 and 23, which contain the CBN region, were 28.1% in 2001.

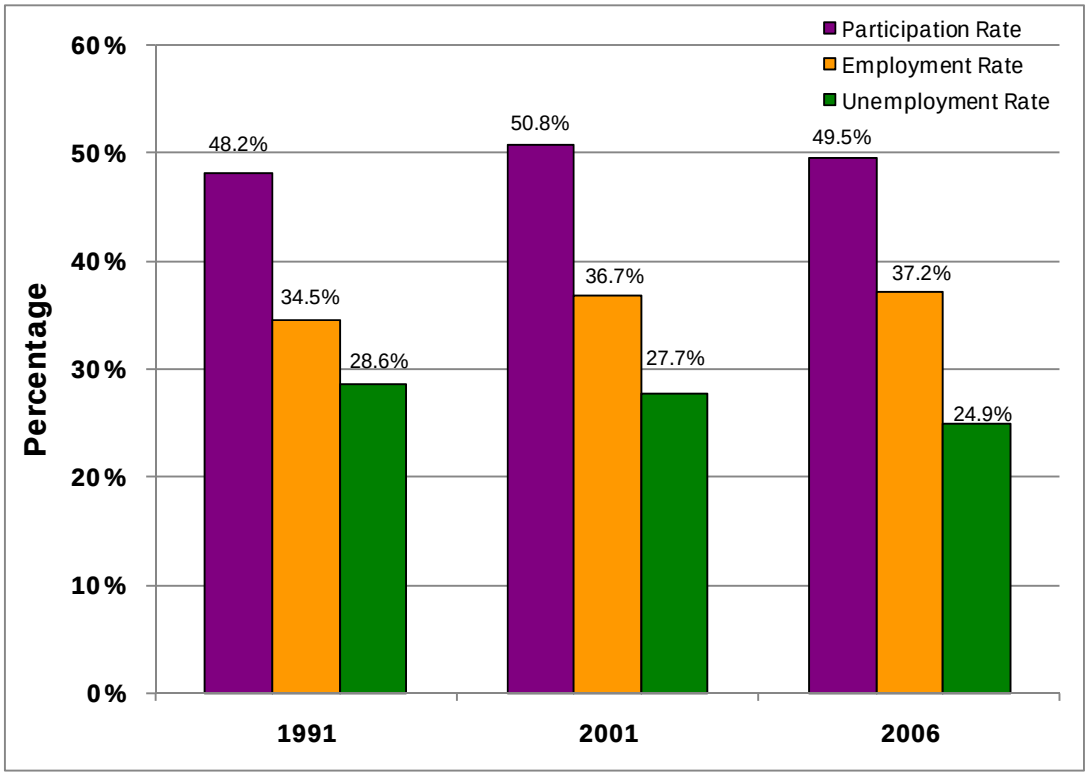
This section presents the employment, training and income data for Northern Aboriginal residents (denoted NA), derived from Statistics Canada 1991, 2001 and 2006 Census data (Statistics Canada 1992, 2002, 2007a).

All data have been rounded. For comparison, the data for northern Aboriginal residents are discussed in reference to the Regional Study Area residents, residents of Manitoba and residents of Canada as a whole. Northern Aboriginal residents are characterized as those residents of the Regional Study Area who self-identify as Aboriginal. The Regional Study Area is made up of Census Divisions 19, 21, 22 and 23 and data have been summed and weighted where necessary. The Regional Study Area, Manitoba and Canada labour force characteristics are based on 20% samples.

3.3.5.1.1 Labour Force

There has been a substantial increase in potential labour force, employment and unemployment among northern Aboriginal residents between 1991 and 2006. The potential labour force, defined as the population 15 years and older, increased by more than 44% from 26,785 in 1991 to 38,640 in 2006 (see Appendix 3A, Table 3A-16). Factors contributing to this increase include having a high proportion of the population in the young age groups, the residual effects of Bill C-51, passed in 1985, as well as a general trend toward greater self-identification by Aboriginal people over this period, during which the Aboriginal population of Canada grew by 45% (Statistics Canada 2008c). The total number of employed individuals increased by about 56%, while the total number of unemployed individuals in the labour force grew by about 29% over the same period.

Figure 3-14 illustrates the changes in the participation, employment and unemployment rates between 1991 and 2006 for northern Aboriginal residents (for a more detailed analysis, see Appendix 3A, Table 3A-16); while Figure 3-15 compares the 2001 rates with those for the Regional Study Area, Manitoba and Canada.



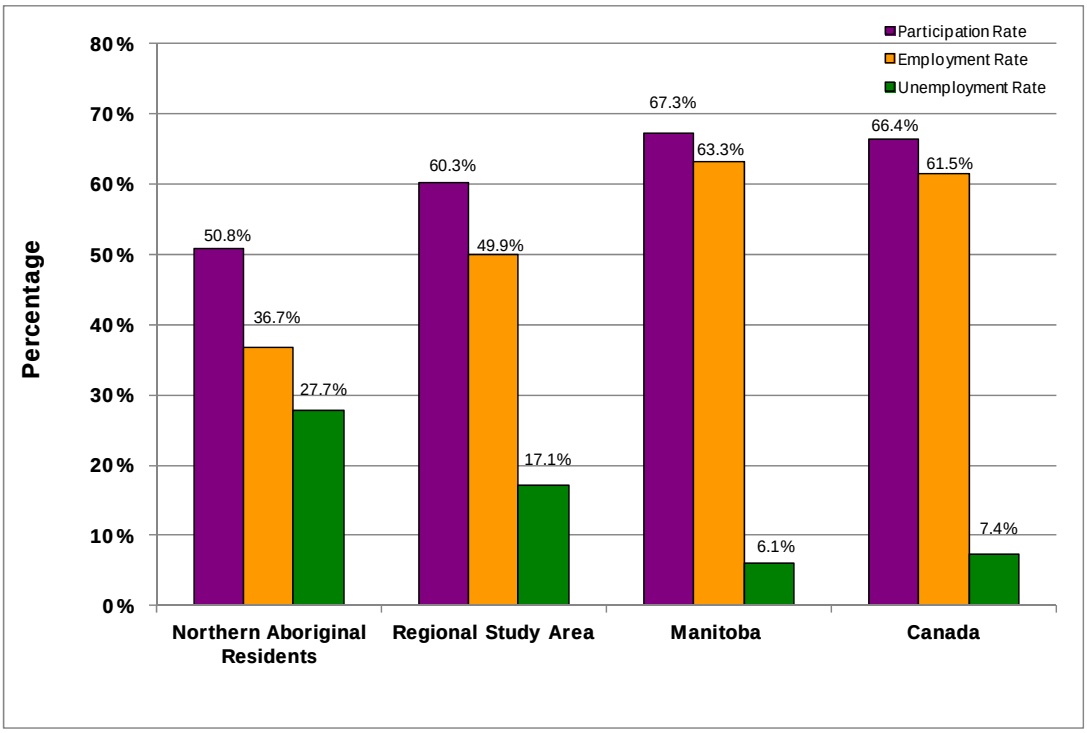
Source: Statistics Canada 2011a, 2011b.
Notes:

- Complete table provided in Appendix 3A (Table 3A-16).
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Participation rate refers to the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the population 15 years of age and over.
- Employment rate refers to the number of persons employed in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the total population 15 years of age and over.
- Unemployment rate refers to the unemployed persons, expressed as a percentage of the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001).

Figure 3-14: Change in Employment, Participation and Unemployment Rates among Northern Aboriginal Residents (1991, 2001, 2006)

Figure 3-14 shows, the participation rate grew slightly by 1.3 percentage points from 1991 to 2006. Over this same period, the employment rate increased nearly three percentage points. Despite an absolute increase in the number of unemployed, the unemployment rate decreased nearly four percentage points (Figure 3-14), indicative of faster growth in employment than labour force size. The net result was 5,000 more people were employed in 2006 than in 1991, while about 1,000 more people were unemployed (see Appendix 3A, Table 3A-16).

As shown in Figure 3-15, the participation rate among northern Aboriginal residents in 2001 was approximately 9-16 percentage points lower than that of the populations of the Regional Study Area, Manitoba and Canada (for a more detailed analysis, see Appendix 3A, Table 3A-17). In addition, the rate of employment among northern Aboriginal residents was about 13-27 percentage points below that of the comparison populations. Correspondingly, the unemployment rate among northern Aboriginal residents exceeded that of Regional Study Area residents by nearly 10 percentage points, Manitoba residents by nearly 22 percentage points and residents of Canada by about 20 percentage points.



Source: Statistics Canada 2011a.
Notes:

- Complete data set provided in Appendix 3A (Table 3A-17).
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- Participation rate refers to the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the population 15 years of age and over.
- Employment rate refers to the number of persons employed in the week (Sunday to Saturday) prior to Census Day (May 15, 2001), expressed as a percentage of the total population 15 years of age and over.
- Unemployment rate refers to the unemployed persons, expressed as a percentage of the labour force in the week (Sunday to Saturday) prior to Census Day (May 15, 2001).

Figure 3-15: Employment, Participation and Unemployment Rates among Northern Aboriginal Residents (and in Comparison Populations) (2001)

3.3.5.1.2 Education

Education is an important factor influencing the extent to which Project employment opportunities may be filled by the northern Aboriginal residents. Basic education levels for northern Aboriginal residents were determined using the 2001 Census of Canada. In 2001, the Census of Canada determined the highest level of education attained for individuals aged 20 years and over, but the data for northern Aboriginal residents represent those aged 25 years and over. As a result, any comparison of this data with data from other populations must be interpreted with caution. Data are presented in Table 3-18 (for a more detailed analysis, see Appendix 3A, Table 3A-18).

Table 3-18: Distribution of Highest Level of Education Attained by Northern Aboriginal Residents (2001)

Characteristics[1,2,3]	Northern Aboriginal Residents[4]	Comparison Populations	
		Regional Study Area[5]	Manitoba
Less than high school certificate	59.6%	48.2%	34.4%
High school certificate or equivalent	5.8%	8.5%	11.4%
Trades certificate or diploma	n/a	13.0%	11.7%
Some post-secondary education	10.4%	10.2%	11.4%
Post-secondary education certificate, diploma, degree, *etc.*[6, 7]	24.1%	20.2%	31.0%

Source: Statistics Canada 2002, 2011a.
Notes:
1. Complete data set provided in Appendix 3A (Table 3A-18).
2. Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
3. Columns may not add to 100% due to rounding and/or unavailable data (n/a).
4. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
5. Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
6. For columns "Thompson", "Regional Study Area" and "Manitoba", "Post-secondary education certificate, diploma, degree, *etc.*" is the sum of "Post-secondary non-university certificate or diploma", University certificate or diploma" and "University degree" in the corresponding table in Appendix 3A.
7. For column "Northern Aboriginal Residents", "Post-secondary education certificate, diploma, degree, *etc.*" is the sum of "Trades, college or university certificate or degree (below bachelor's level" and "University degree" in the corresponding table in Appendix 3A.

The total population of individuals 15 years and over reported for northern Aboriginal residents in 2001, exceeds the total population 25 years and over in the Educational Attainment table (Table 3-18) by nearly 10,000 individuals. This highlights the fact that the northern Aboriginal population is a relatively young group, with approximately 28% of the labour force-aged population between the ages of 15 and 25 years in 2001. The HNTEI and other initiatives are targeted toward the population for this reason.

About 40% of northern Aboriginal residents had a high school certificate, trades or other post-secondary education in 2001, which was about 11 percentage points less than Regional Study Area residents and about 25 percentage points less than Manitoba residents. However, a greater percentage of northern

Aboriginal residents had attained a post-secondary education certificate, diploma, or degree when compared to Regional Study Area residents in 2001, but less than Manitoba as a whole (Table 3-18).

Educational attainment below a high school certificate or equivalent is prevalent in northern Aboriginal communities for a number of reasons; most importantly, a historic lack of access to high school programs in local First Nations communities. In the past, residents of communities that did not offer higher-level secondary education would have to leave their home community for a larger centre in order to complete high school. In some cases, those who left the communities to pursue their education did not return, opting instead to pursue opportunities outside their home community upon completion of their diplomas, degrees or certificates.

In order to address lower educational attainment among northern Aboriginal residents, including the lack of basic skills and education, community-based training programs have been developed. Many of these programs include a life skills component and ongoing support. Still, findings from community-based research suggest that lack of access to academic prerequisites and certain essential courses (such as Grade 12 Physics and Mathematics) in the KCNs communities presents a major systemic challenge to recruitment for northern Aboriginal residents.

While the total rate of post-secondary education among northern Aboriginal residents is lower than those of the Regional Study Area and Manitoba, a slightly higher rate of high school graduates continue on to post-secondary studies than residents of the Regional Study Area or Manitoba. Among northern Aboriginal residents who graduated from high school, over 85% had pursued further education in 2001, compared to 83.6% of Regional Study Area residents and 82.7% of Manitoba residents.

Approximately four percent of the total population of northern Aboriginal residents held a university degree in 2001, compared to eight per cent of Regional Study Area residents and over 14% of residents of Manitoba (see Appendix 3A, Table 3A-18).

CHARACTERISTICS OF THE WORKFORCE

The distribution of occupations in a community is an important indicator of the type of training that individuals need to pursue available opportunities. The economic structure of the Regional Study Area has some unique attributes typical of a region with a rich resource base. Table 3-19 and Figure 3-16 present the distribution of occupations among northern Aboriginal residents in 2001 compared to the Regional Study Area, Manitoba and Canada as a whole (see Appendix 3A, Table 3A-19 for a more detailed breakdown of occupations).

The largest employer of northern Aboriginal residents are businesses in the sales and services sector. The percentage of northern Aboriginal residents employed in the sales and services sector is about seven percentage points greater than that of Regional Study Area residents and about nine percentage points greater than that of Manitoba residents.

The second largest employer of northern Aboriginal residents is businesses that provide trades, transport and equipment operation and related occupations. Compared to northern Aboriginal residents, these occupations include a lower percentage of Regional Study Area and Manitoba residents, by about 1.5 percentage points and three percentage points, respectively. The strength of this sector is related to the

relatively high rate of education in trades and other non-university certificates among northern Aboriginal residents, as well as the connections between the population and resource-based pursuits.

A large proportion of the northern Aboriginal workforce are employed in occupations related to social sciences, health, education, government services and religion. The percentage of the population employed in these sectors is greater for northern Aboriginal residents than residents of the Regional Study Area or Manitoba. This likely reflects the fact that many First Nations in the Regional Study Area are responsible for social services and education on-reserve; as well, many Aboriginal residents are employed in Band, provincial and federal administrative positions in northern communities.

Occupations related to management, business, finance and administration comprised the fourth largest percentage of northern Aboriginal resident employment. Compared to Regional Study Area and Manitoba residents, these occupations included a smaller percentage of the population of northern Aboriginal residents.

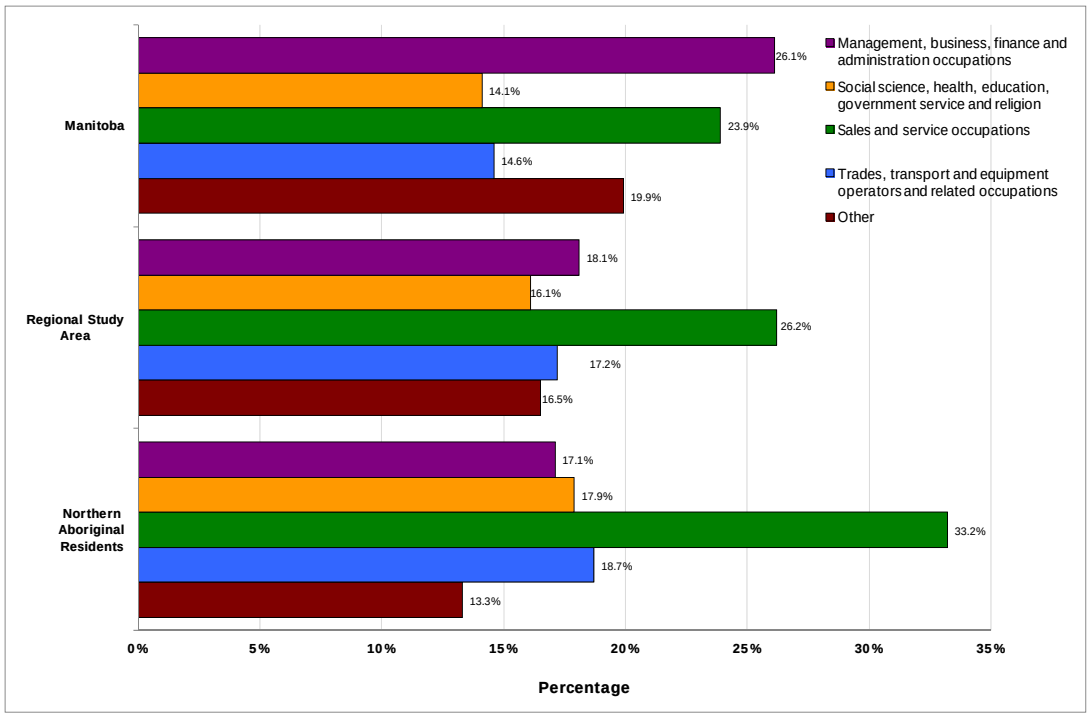
Table 3-19: Distribution of Occupation Classification among Northern Aboriginal Residents (2001)

Characteristics[1,2]	Northern Aboriginal Residents[3]	Comparison Populations	
		Regional Study Area[4]	Manitoba
Not applicable[5]	n/a	5.8%	1.4%
All occupations[6]	n/a	94.1%	98.6%
Management, business, finance and administration[7]	17.1%	18.1%	26.1%
Sales and service	33.2%	26.2%	23.9%
Social science, health, education, government service and religion[8]	17.9%	16.1%	14.1%
Trades, transport and equipment operators and related	18.7%	17.2%	14.6%
Other	13.3%	16.5%	19.9%

Source: Statistics Canada 2002, 2011a.

Notes:

1. Complete table provided in Appendix 3A (Table 3A-19).
2. Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
3. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
5. Not available for Northern Aboriginal Resident population.
6. Not available for Northern Aboriginal Resident population.
7. Row "Management, business, finance and administration occupations" is sum of rows "Management occupations" and "Business, finance and administration occupations" in the corresponding table in Appendix 3A.
8. Row "Social science, health, education, government service and religion" is sum of rows "Health occupations" and "Occupations in social science, education, government service and religion" in the corresponding table in Appendix 3A.



Source: Statistics Canada 2002, 2011a.
Notes:

- Complete table provided in Appendix 3A (Table 3A-19).
- Categories have been organized and rolled-up by InterGroup Consultants for ease of comparison.
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- Not available for Northern Aboriginal Resident population.
- Not available for Northern Aboriginal Resident population.
- "Management, business, finance and administration occupations" is sum of "Management occupations" and "Business, finance and administration occupations" in the corresponding table in Appendix 3A.
- "Social science, health, education, government service and religion" is sum of "Health occupations" and "Occupations in social science, education, government service and religion" in the corresponding table in Appendix 3A.

Figure 3-16: Distribution of Occupation Classification among Northern Aboriginal Residents (2001)

3.3.5.1.3 Project Employment

Between 2001 and the end of 2008, more than 500 northern Aboriginal residents completed courses and programs in construction trades and related occupations, providing a pool of people who might be interested in and at least partially qualified for Keeyask construction opportunities. Until the HNTEI program ended on March 31, 2010, northern Aboriginal residents not belonging to a KCNs community could participate in training through Manitoba Keewatinowi Okimakanak and the Manitoba Metis Federation.

Information and insights gained from the HNTEI were instrumental in developing and refining the employment effects estimation model analysis for this section. From 2001 onward, actual HNTEI data are used to account for all new northern Aboriginal entrants to Project-related trades in the Regional Study Area.

As indicated in the methodology description, the skills inventory for Regional Study Area Aboriginal people was developed using 2001 Statistics Canada data. Therefore, 2001 northern Aboriginal data were scaled to

reflect the proportion of this population comprised of CBN region residents (33%). The model was then used to forecast the estimated projected levels of potentially qualified workers in KCNs communities at the Project start[1]. Since HNTEI training primarily took place within the CBN region, HNTEI trainees are considered northern Aboriginal residents and therefore eligible for first-order hiring preferences on opportunities for TCs[2]. Table 3-20 provides a summary of the results of this modelling by broad Project job categories (for a more detailed analysis, see Appendix 3A, Table 3A-20).

Table 3-20: Employment Model - Northern Aboriginal and Churchill Burntwood Nelson Region Skills by Job Category (2014, 2021)

Skills By Job Category[1]	2014			2021		
	NA HNTEI[2,3]	CBN[4]	NA	NA HNTEII	CBN	NA
Designated Trades (Construction, Transportation and industrial)	101	315	740	101	335	805
Non-Designated Trades (Construction, Transportation and Industrial)	345	550	970	345	565	1,005
Construction Support and Service Trades	149	680	1,675	149	770	1,950
Total	595	1,545	3,385	595	1,670	3,760

Source: Derived from Wuskwatim Keeyask Training Consortium 2009/10 fourth quarter report and other WKTC derived data. Analysis prepared by InterGroup Consultants Inc., 2010.
Notes:
1. Complete data set provided in Appendix 3A (Table 3A-20).
2. 'NA' denotes Northern Aboriginal.
3. 'HNTEI' denotes pre-Project training.
4. 'CBN' denotes Churchill Burntwood Nelson region.
5. Numbers are subject to rounding.

This analysis shows a large portion of the CBN and northern Aboriginal workforce expected to be available for the construction start in 2014 will have received some pre-project training through HNTEI. Since most pre-project training took place within the CBN region, the majority of pre-project trainees will be eligible for CBN hiring preferences. A small number, however, may not fit the criteria set out in Section 13 of the BNA to be eligible for CBN hiring preferences.

There are expected to be 1,545 northern Aboriginal residents in 2014 with skills appropriate to work on the Project. Of these, at least 595 will have received pre-project training through HNTEI. This workforce is expected to grow to 3,760 workers by the end of the construction period in 2021.

[1] While the total CBN workforce is modelled, more certainty can be attributed to the HNTEI data, which represents actual data collected while the HNTEI program was in operation.

[2] There are two requirements to be eligible for first-order hiring preferences: Aboriginal status and residence in the CBN region. There is an exception for KCNs Members. All KCNs Members are eligible for first preference regardless of where they reside in Manitoba.

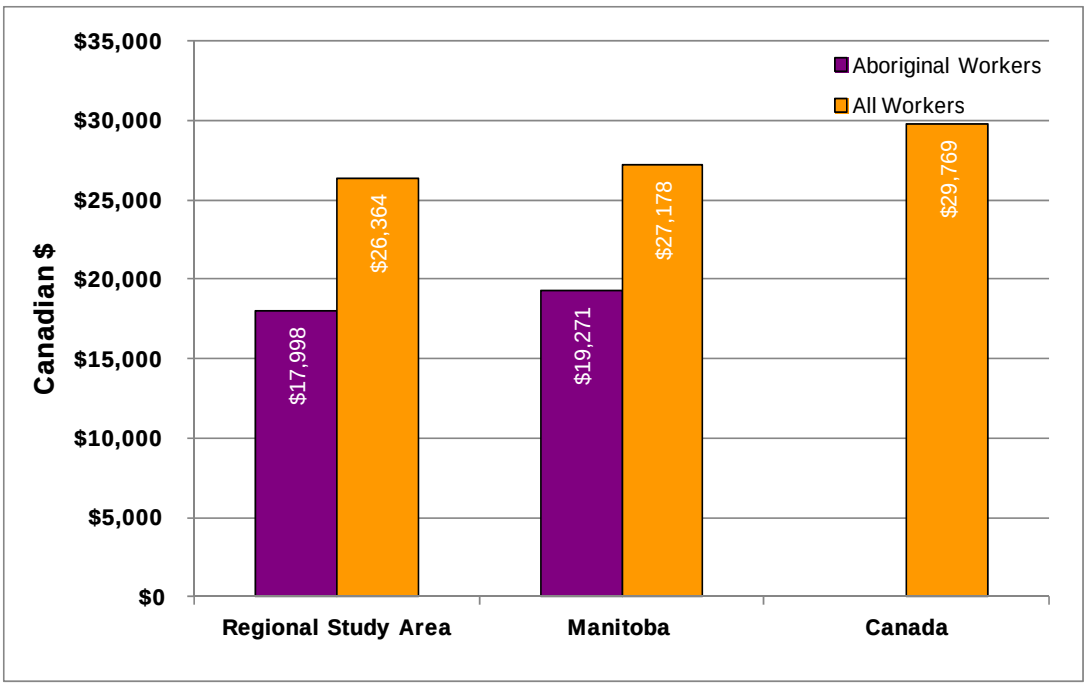
Carpenters account for more than half of anticipated CBN and northern Aboriginal workers in designated trades. Non-designated trades are more evenly distributed among trade categories, with three categories comprising the bulk of the anticipated labour: heavy equipment operators, teamsters and labourers. Almost half of all construction support workers for both CBN and northern Aboriginal groups are anticipated to be in the catering and janitorial category (Appendix 3A, Table 3A-20).

3.3.6 Regional Study Area – Business Opportunities

Project effects are primarily expected in the KCNs communities based on the terms negotiated through the JKDA. Some effects will also be felt in the communities of Gillam and Thompson due to their proximity to the Project area. However, broader implications for northern Aboriginal residents and residents of the Regional Study Area as a whole are not expected in terms of business opportunities.

3.3.7 Regional Study Area – Income

As noted in Figure 3-17, the average income in the Regional Study Area is lower than the provincial and national averages for both the Aboriginal population and the total population of the Regional Study Area.

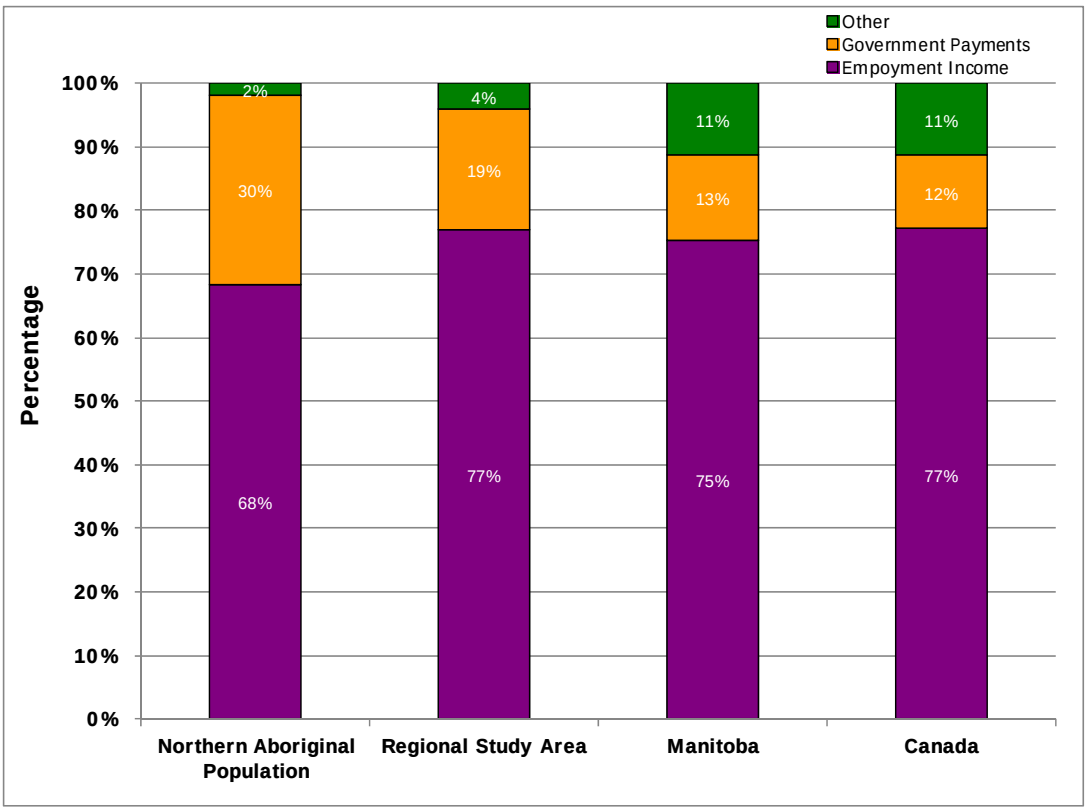


Source: Statistics Canada 2002.
Notes:

- Complete data set provided in Appendix 3A (Table 3A-21).
- The Aboriginal portion of Regional Study Area is the same as Northern Aboriginal residents. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
- For Aboriginal Identity Population, Statistics Canada describes the Aboriginal Identity Population as referring to "those persons who reported identifying with at least one Aboriginal group, that is, North American Indian, Metis or Inuit and/or those who reported being a Treaty Indian or a Registered Indian, as defined by the Indian Act of Canada and/or those who reported they were Members of an Indian band or First Nation" (Statistics Canada 2003).
- Total Population 15 years and over with earnings.
- Percentage of Earnings calculated by InterGroup Consultants comparing Aboriginal Identity Population average earnings to Total Population average earnings, if total population average earnings are considered to be 100%.
- Data not available for average employment earning for total Aboriginal population of Canada.

Figure 3-17: Average Employment Earnings for Aboriginal Populations and Total Populations of Regional Study Area, Manitoba and Canada (2001)

As illustrated in Figure 3-18, in 2001, Northern Aboriginal residents relied on government payments at 2.5 times the national rate and Regional Study Area residents relied on government payments at just under twice the national rate.



Source: Statistics Canada 2002, 2007a.
Notes:
- Complete data set provided in Appendix 3A (Table 3A-22).
- Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
- Regional Study Area defined as Statistics Canada Census Divisions 19, 21, 22 and 23.

Figure 3-18: Sources of Income for Northern Aboriginal, Regional Study Area, Manitoba and Canada (2001)

3.4 ENVIRONMENTAL EFFECTS ASSESSMENT

The Keeyask Generation Project will create employment, business activity and income. As a result of enhancement measures favouring the KCNs, the most pronounced economic effects of the Project will be on Local Study Area communities. These effects will be generated through Project employment, business participation and the KCNs potential participation as equity partners. The Regional Study Area will also benefit mainly through Project employment. This is especially important for northern Manitoba Aboriginal people, whose unemployment levels are considerably higher than Manitoba as a whole. As well, the Project is of sufficient size that it can positively and noticeably affect the Manitoba and Canadian economies through the purchase of materials and equipment, labour supply, payments to the Provincial and Federal governments (*e.g.,* payroll tax, personal income tax, fuel tax and provincial sales tax) and re-spending of employment wages and other Project-related income. In anticipation of these benefits, Manitoba Hydro, along with the Province of Manitoba and Human Resources and Social Development Canada, invested substantial resources primarily in community-based training programs in the Regional Study Area. The training programs aimed to maximize local Aboriginal participation in the employment opportunities available from northern hydroelectric

development. The HNTEI initiative operated between 2002 and 2010. These resources were targeted towards northern Aboriginal people, including those from the following groups: Members of the KCNs in the immediate vicinity of the Project, Members of Nisichawayasihk Cree Nation near the Wuskwatim Generation Project, other First Nation Members served by Manitoba Keewatinowi Okimakinak and Metis people served by the Manitoba Metis Federation.

As noted in Section 1, each of the KCNs negotiated, agreed upon and ratified a JKDA with Manitoba Hydro to govern development of the Project. The JKDA included a number of provisions that affect the economic benefits the KCNs may receive if the Project proceeds:

- Participation as limited partners in the Project; the opportunity to invest in the Project and to receive future returns from that investment;
- Assignment of contracts for a portion of the construction of the Project for possible direct negotiation with Aboriginal-owned companies in the KCNs communities;
- Construction phase employment benefits as set out in the BNA and associated letters; and
- Operation phase employment opportunities throughout the Manitoba Hydro system.

In addition to the Local Study Area, two other areas are relevant to the examination of employment effects of the Project. They are as follows:

- The CBN area includes all communities located within the CBN river system area. These are the communities located on the waterways that were affected by the Churchill River Diversion, which was completed in 1977 (see Section 1, Map 1-2). Qualified Aboriginal residents of these communities will be included in a first hiring preference as outlined in the BNA. The KCNs communities are located within this area and make up approximately 23% of its Aboriginal population. KCNs workers share first order hiring preference on TCs with other workers from this area[1]. On DNCs, qualified Members of the KCNs can be hired directly, bypassing the hierarchy of preferences.
- The Regional Study Area includes all of northern Manitoba as defined in the BNA (see Figure 3-1). In the BNA, qualified Aboriginal residents of the Regional Study Area would be given third hiring preference after qualified Aboriginal residents from CBN communities and members of construction unions living in the Regional Study Area. On DNCs, qualified Aboriginal residents of the Regional Study Area could be hired directly after the pool of qualified and interested KCNs Members has been fully utilized, bypassing the job order hiring system used on TCs.

This section examines potential effects of the Project on the economy of the Local Study Area and the Regional Study Area during the construction and operation phases of the Project including:

- Economic benefits for the KCNs communities in the Local Study Area through construction employment, labour income and business opportunities;
- Potential for changes in cost of living in the Local Study Area;

[1] A small difference for KCNs Members (as compared to other workers) is that they can live anywhere in the province in order to receive preferential hiring.

- The extent to which construction employment and income may also accrue to Aboriginal people in the Regional Study Area as a whole;
- Operation employment benefits and labour income in the Local Study Area and Regional Study Area; and
- Potential revenue for each of the KCNs based on their investment in the Project.

Finally, the section looks at potential effects on the local resource economy as a result of physical and biophysical effects of the Project on the resources used by people in the Local Study Area for commercial or domestic purposes.

Socio-economic pathways of effect on the Economy VECs in the Local and Regional Study Areas include the following (see SE SV Sections 3.4.1 and 3.4.2 for details):

- Construction employment opportunities for qualified Aboriginal workers;
- Construction business opportunities through DNCs for KCNs businesses;
- Operation phase employment opportunities associated with the Project;
- Operation employment opportunities throughout Manitoba Hydro's system associated with JKDA commitments and targets for KCNs Members;
- Equity income for KCNs from their investment as limited partners in the Project (operation phase); and
- Project-related changes to terrestrial and aquatic species used by people for domestic or commercial purposes (construction and operation).

3.4.1 Construction Effects and Mitigation

3.4.1.1 Overview of Key Project Features

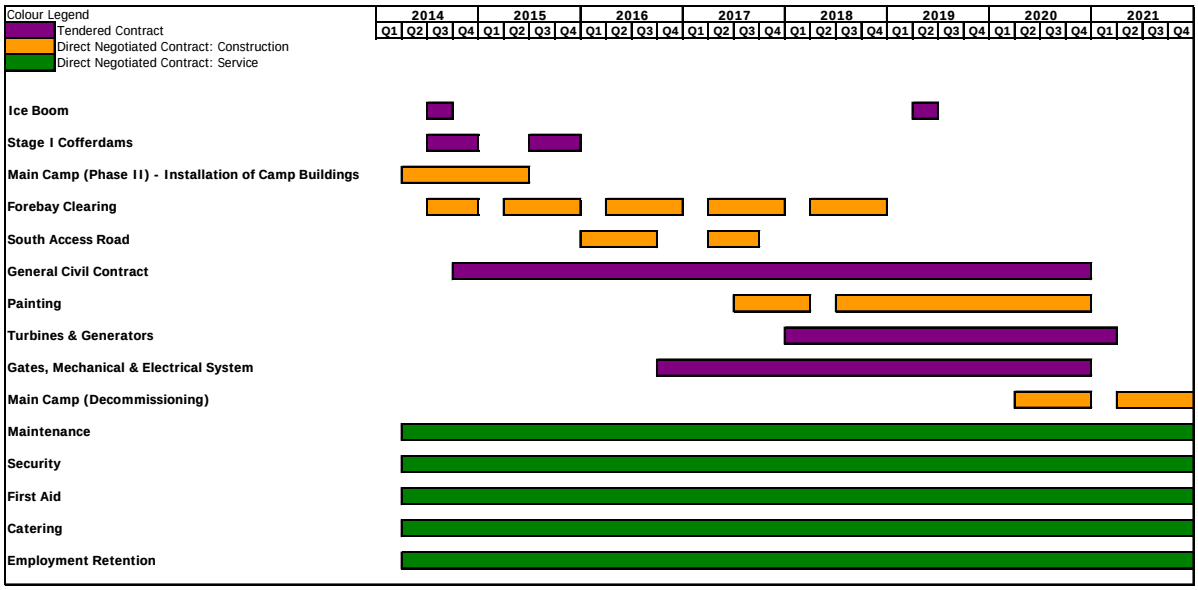
The construction phase of the Project is expected to last over eight years. The first year (2014) would be spent preparing for the general civil contract. General civil contract construction would begin late that summer, with the pouring of concrete for the main structures beginning two years after that. The Nelson River would be closed during the fall of 2017, with initial power occurring at the end of 2019 and final unit online at the end of 2020.

Figure 3-19 outlines the projected timing of the construction work packages. The Ice Boom, Stage I Cofferdam and Phase II Camp Building contracts are projected to commence in 2014. The largest contract, the General Civil Contract (GCC), is projected to begin in 2014. Construction related to gates, mechanical and electrical systems would begin in late 2016; construction related to turbines and generators would begin in early 2018.

For discussion purposes, where appropriate, DNCs are divided into two types - construction versus service contracts. This terminology reflects the JKDA. These will occur throughout the Project schedule. Construction DNCs include main camp construction (to begin in 2014); reservoir clearing and south access

road construction (to begin in 2014); painting (to begin in 2017) and main camp decommissioning (to begin in 2020)[1]. Service DNCs include maintenance, security, first aid, catering and employment retention, and would be in effect throughout the duration of the Project, although employment associated with these contracts would vary according to other Project activities occurring at the same time.

Keeyask Cree Nations Members located anywhere in the Province of Manitoba, Aboriginal residents of the CBN area and Aboriginal residents of the Regional Study Area were targeted for preferential treatment, with the aim of increasing participation by Aboriginal people in Project employment. Special measures and programs toward this end were outlined in the BNA and JKDA (further details are provided in Section 3.4.1.3). These measures are consistent with best practices for achieving local and regional Aboriginal participation in construction employment (InterGroup Consultants 2008). Similar measures were also applied for construction of the Wuskwatim Generation Project between 2006 and 2012.



Source: Derived from data provided by Manitoba Hydro in 2010.
Notes:

- This work would be carried out through construction work packages comprised of DNCs and TCs.
- Construction of the Keeyask Generation Project is estimated to commence June 2014.
- The workforce estimates were provided by Manitoba Hydro on August 31, 2010.
- Tendered Contracts include Ice Boom, Stage I Cofferdams, Turbines, Generators and Gate, Mechanical and Electrical System.
- Direct Negotiated Contracts include Main Camp Buildings, Reservoir Clearing, South Access Road, Painting and Main Camp Decommissioning and the five Service Contracts (Maintenance, Security, First Aid, Catering and Employment Retention).
- Actual timing of work packages could be different from those presented here.

Figure 3-19: Schedule of Construction Phase Work Packages for the Keeyask Generation Project

[1] Actual timing of work packages could be different than those presented here.

3.4.1.2 Construction Employment Opportunities

Employment opportunities represent direct and indirect benefits associated with construction projects, particularly in the vicinity of communities where unemployment is typically high. The intent of this discussion is to characterize potential employment outcomes within the context of training opportunities in the north (for example, the HNTEI). Key considerations include the type of positions available (including required skills and experience) and their duration.

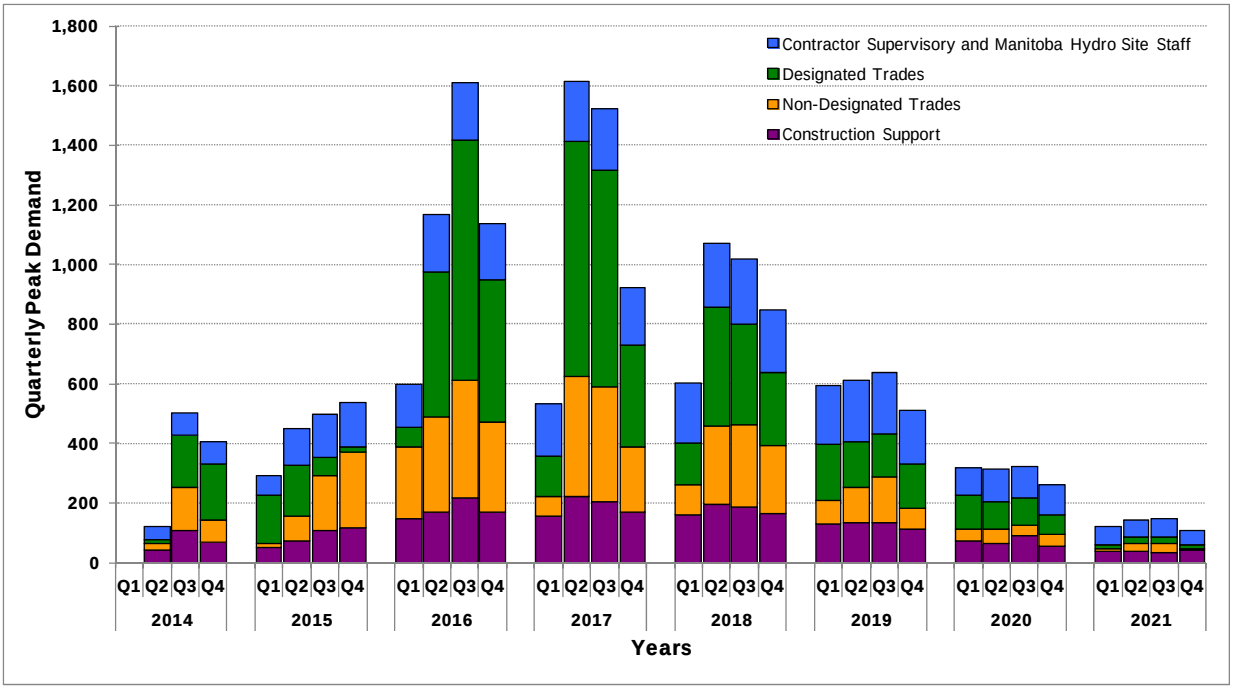
Construction employment opportunities are characterized by estimates of workforce requirements. This section illustrates the estimated workforce requirements overall, as well as by DNCs and TCs. Results are provided on an annual basis and by job category for DNCs and TCs.

Information about workforce requirements is presented in this section as follows:

- Peak quarterly employment, indicative of the number of jobs that would be filled in a given quarter (Figure 3-20); and
- Person-years, indicative of the volume of employment that would be available (Figure 3-21)[1].

Figure 3-20 illustrates quarterly peak workforce requirements during the Project's construction phase divided into four broad occupational categories: construction support including catering, security and administrative staff; non-designated trades including labourers, truck drivers and heavy equipment operators; designated trades consisting of occupations having formal apprenticeship programs including carpenters, electricians, and ironworkers; and contractor supervisory and Manitoba Hydro staff. The workforce estimates presented here are useful primarily as an indication of the size and composition of Project-related employment opportunities. Actual workforce requirements would vary from the estimate presented in the following sections. All employment estimates in this section, including all graphic representations of workforce demand, are based on current labour regulations, Project plans as of spring 2012 and past experience with similar projects. Contractors retained to undertake each contract would develop their own approach to the assignment, which could affect the timing, level and skill mix of workers required to complete the work.

[1] A person-year is a measure of the amount of work that could be available during a specific time period or for a specific type of work. One person-year approximates the amount of work that one worker could complete during twelve months of full-time employment. This would equate to between 2,090 and 2,295 hours per year (rounded, based on regular weekly hours of 40-44 hours/week).



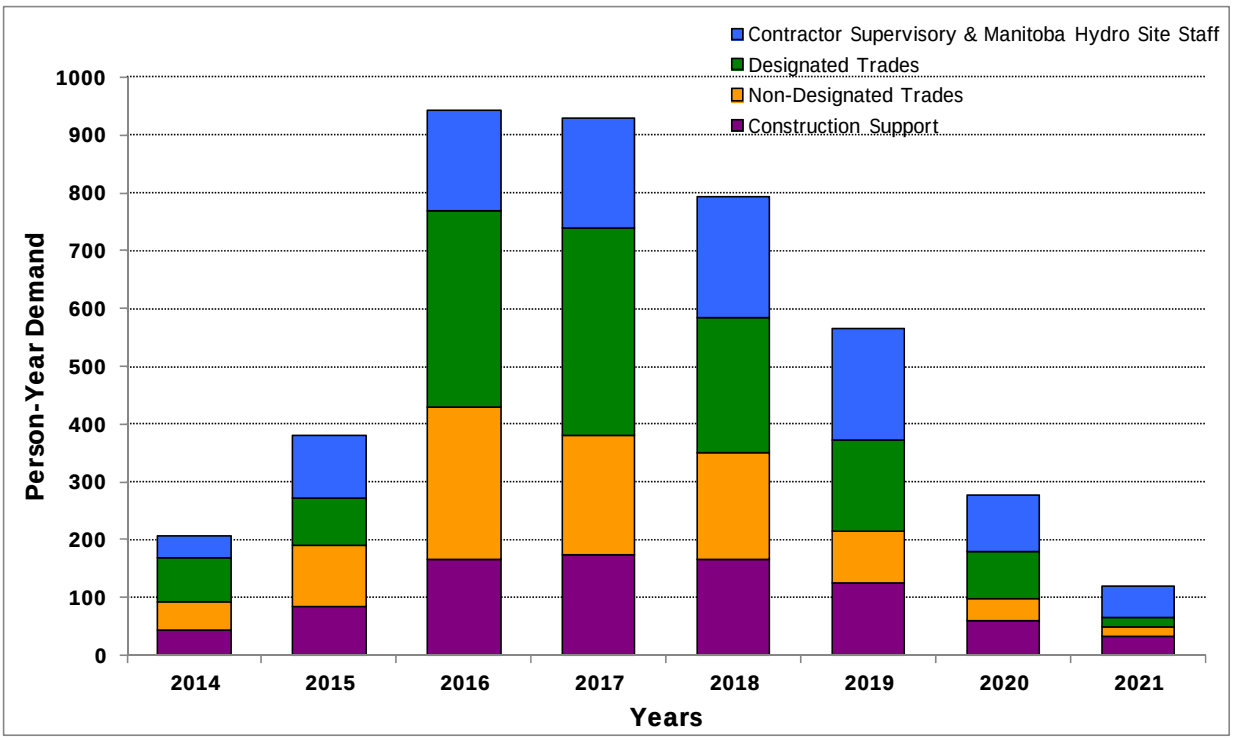
Source: Derived from data provided by Manitoba Hydro in 2010.

Figure 3-20: Construction Phase Estimated Workforce Requirements (Quarterly Peak) for the Keeyask Generation Project

Highlights of Figure 3-20 are as follows:

- Peak quarterly workforce requirements are highest during the Project's middle years, from 2016 to 2018, reaching the highest level in 2016 and 2017;
- The highest quarterly employment is set to occur in Q3 of 2016 and Q2 of 2017 at 1,610 workers; and
- Employment is seasonal. On average, the peak summer workforce during Q2 and Q3 increases in size compared to the previous winter.

Figure 3-21 illustrates construction workforce requirements by year (in person-years of employment).



Source: Derived from data provided by Manitoba Hydro in 2010.

Figure 3-21: Construction Phase Estimated Workforce Requirements (Person-Years) for the Keeyask Generation Project

The person-year employment pattern parallels the quarterly peak employment pattern with more moderate fluctuations.

Table 3-21 illustrates person-year construction workforce requirements by job category. Characteristics of person-year employment are as follows:

- Overall, the Project is expected to generate 4,218 person-years of construction employment;
- Construction support, non-designated trades and designated trades are expected to account for 3,150 person-years, with another 1,068 person-years generated by Manitoba Hydro and key contractor personnel; and
- Higher-skilled occupations (designated trades, contractor supervisory and Manitoba Hydro staff) account for 57% of total employment. Relatively lower skilled occupations (construction support and non-designated trades) make up the remaining 43%.

Table 3-21: Construction Workforce Requirements by Job Category

Job Category	Person-Years	Percent of Total
Construction Support	1,346	32%
Non-Designated Trades	952	23%
Designated Trades	852	20%
Manitoba Hydro and Contractor Supervisory	1,068	25%
TOTAL	**4,218**	**100%**

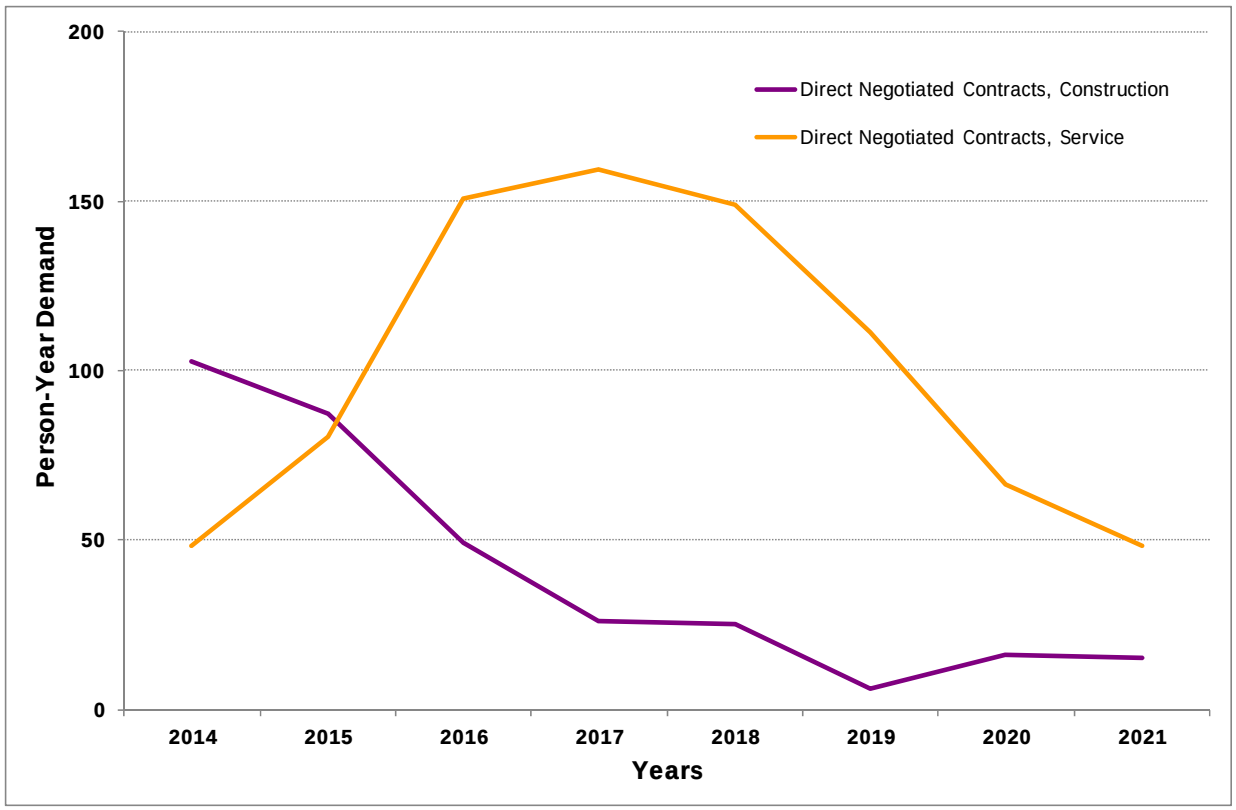
Source: Derived from data provided by Manitoba Hydro in 2010

DNCs are estimated to account for 1,142 person-years (36%) of contract employment, which does not include Manitoba Hydro or contractor supervisory employment. Most of these DNCs would begin in 2014, the first year of the Project and continue until the end of construction.

Figure 3-22 and Figure 3-23 focus solely on DNCs, which can be classified as follows:

- Construction DNCs (main camp; Phase II only): site preparation and development, main camp decommissioning, south access road construction, reservoir clearing, painting and architectural finish; or
- Service DNCs: catering, camp maintenance services, security services, employee retention and support services, and first-aid services.

Figure 3-22 illustrates workforce requirements for DNCs, broken down by construction and service contracts.

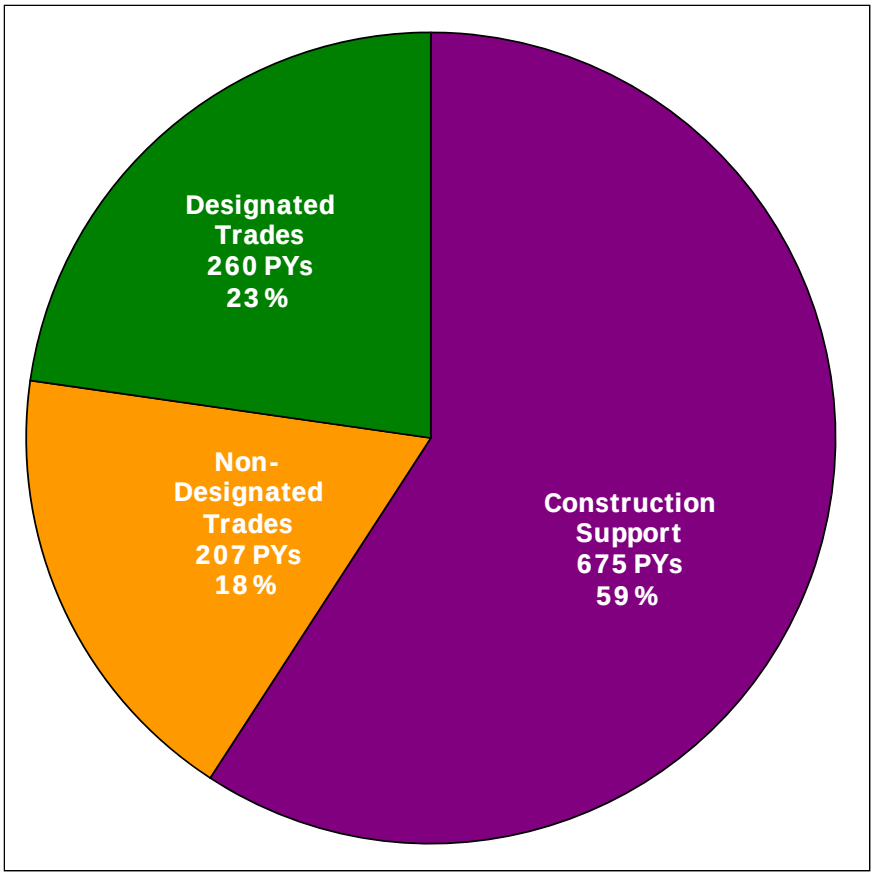


Source: Derived from data provided by Manitoba Hydro in 2010.

Figure 3-22: Construction Phase Estimated Workforce Requirements by Direct Negotiated Contract for the Keeyask Generation Project

Construction DNCs would account for 328 person-years of employment and would peak in 2014 at 103 person-years. DNC construction employment would then decline each year until 2019, when it would rise back to 15 person-years as part of the Project's demobilization activities. Service DNCs would account for 814 person-years of employment and would be active throughout the full duration of the Project. Employment related to DNC service contracts would follow a bell-shaped curve over the course of the Project, closely correlated with overall Project employment levels. Service contract DNCs would peak at 159 person-years of employment in 2017, with employment levels declining to 48 person-years by the end of the Project.

Figure 3-23 provides a summary of anticipated workforce requirements (by person-years) for the DNCs (construction and service contracts combined) by job category.

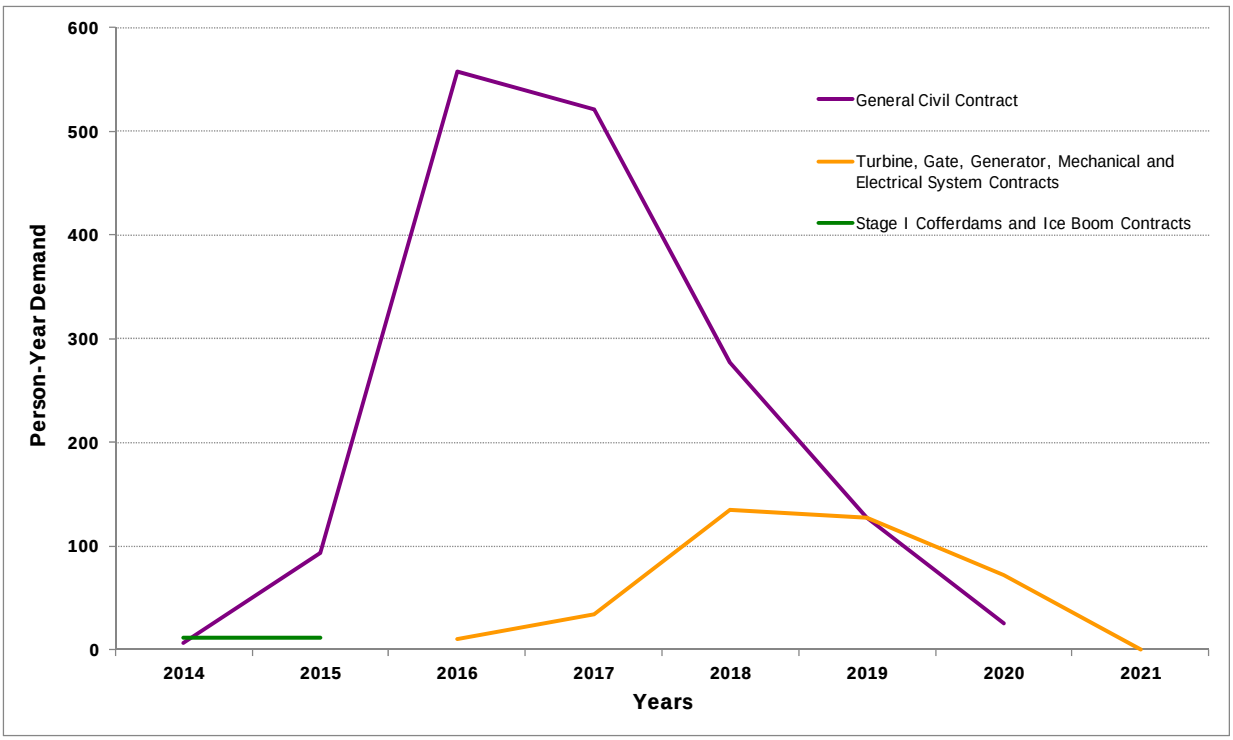


Source: Derived from data provided by Manitoba Hydro in 2010.

Figure 3-23: Construction Phase Estimated Direct Negotiated Contract Workforce Requirements by Job Category (Person-Years) for the Keeyask Generation Project

Construction support positions would account for the majority of the 1,142 person-years of available DNC employment. Designated trades would account for the next largest proportion, followed closely by the non-designated trades.

Tendered Contract workforce requirements would account for the majority of employment opportunities provided by the Project; Figure 3-24 and Figure 3-25 focus on these TCs. Figure 3-24 illustrates projected yearly person-year workforce requirements for the three categories of TCs: general civil contract; turbine-generator, mechanical-electrical and gate components, and Stage I cofferdam and ice boom construction.



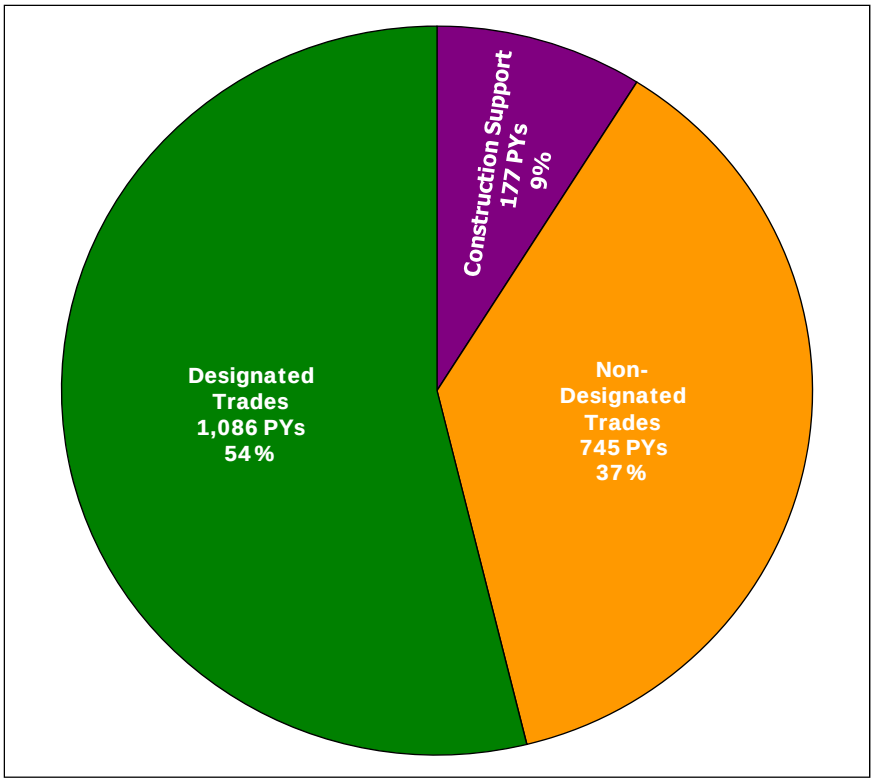
Source: Derived from data provided by Manitoba Hydro in 2010.

Figure 3-24: Construction Phase Estimated Tendered Contracts Workforce Requirements for the Keeyask Generation Project

The TCs would require 2,008 person-years (64%) of contract employment to complete:

- General Civil Contract employment would account for 1,607 person-years. General Civil Contract employment would begin in 2014 and last until 2020. General Civil Contract employment would peak in 2016 at 558 person-years and decline each year after, with 25 person-years of General Civil Contract employment expected in 2020. More than 92% of the person-years of General Civil Contract work would take place between 2016 and 2019, with 67% taking place in 2016 and 2017 alone.
- Most of the remainder (379 person-years) is accounted for by construction of the turbine-generator, mechanical-electrical and gate components of the Project, which would occur during the latter half of the schedule. These contracts would begin in 2016 and peak in 2018 at 135 person-years. Employment related to these contracts would occur through to the end of the Project as each of the final turbines becomes commissioned.
- Work related to Stage I cofferdam and ice boom contracts would create a total of 22 person-years of employment during the first two years of the Project.

Figure 3-25 provides a summary of estimated TC workforce requirements by job category (designated trades, non-designated trades and support positions).



Source: Derived from data provided by Manitoba Hydro in 2010.

Figure 3-25: Construction Phase Estimated Tendered Contract Workforce Requirements by Job Category (Person-Years) for the Keeyask Generation Project

Highlights of Figure 3-25 are as follows:

- Construction support positions would account for a relatively small proportion of the 2,008 person-years of contract TC employment, with designated trades accounting for over half of the person-years and non-designated trades at 37%.
- Compared to the distribution of DNC workforce requirements by job category, TC workforce requirements would show much higher demand for designated trades than for non-designated trades or construction support positions.

3.4.1.2.1 Factors Influencing Distribution of Construction Employment

An employment model was developed to estimate the portion of Project employment opportunities, as described above, that would be taken up by KCNs Members and by Aboriginal workers residing in the CBN area and in the Regional Study Area. In addition to using the workforce requirements, the model incorporated key factors that appear to influence the distribution of employment to these groups: labour supply, hiring preferences and challenges affecting level of local and regional employment. These key factors and the way they were used in the model are presented below. A description of the employment model and these employment challenges are provided in Section 3.2.1.1.

LABOUR SUPPLY

The labour supply portion of the model took the following into account:

- People already in the workforce; and
- Trainees that completed courses or programs of the HNTEI program implemented specifically for the Wuskwatim and Keeyask generation projects.

The employment model was applied to 2001 Statistics Canada occupational data for the Aboriginal workforce in the Regional Study Area, as well as to data regarding the outcome of the HNTEI program. Using these data as a base, the model generated projections of the Aboriginal workforce in the KCNs communities, in communities in the CBN area and in the Regional Study Area during the time period when Project construction would be underway.

HIRING PREFERENCES

The BNA and the JKDA are the two agreements in place that define hiring preferences for the construction phase of the Project. Based on the rules set out in these hiring preferences, the model was designed to undertake a sequence of simulated hiring as follows:

- For DNCs: Qualified KCNs workers were hired first. When the qualified KCNs labour supply ran out, qualified northern Aboriginal workers who were not KCNs Members were hired next; and
- For TCs: Qualified residents living in the CBN area were hired first. The CBN workers included KCNs workers and other CBN workers estimated according to a weighted average of their respective populations. When the CBN labour supply ran out, other qualified northern Aboriginal workers were hired.

OTHER CHALLENGES AFFECTING EMPLOYMENT

Challenges affecting employment were identified through community field research and a review of the Wuskwatim Generation Project experience regarding Aboriginal participation in construction employment. The review identified a number of factors/challenges that may affect the extent to which local and regional Aboriginal workers may be employed on the Project during the construction phase. The most important of these were incorporated into the employment model through the labour supply analysis and include the following:

- The extent to which qualified workers would be attracted to work on Project construction jobs;
- The extent to which local trades people and HNTEI trainees would be considered to have appropriate and sufficient work experience to be treated as qualified; and
- The extent to which potential applicants maintain their status in the job referral system and would therefore be eligible for referral when opportunities become available.

To characterize the effect of these challenges and to reflect uncertainty, low and high assumptions were applied in the employment model. Estimates that resulted in higher levels of KCNs, CBN and northern Aboriginal employment assumed that the influence of all of the challenges were less pronounced. In contrast, low employment estimates assumed that employment challenges were more pronounced. More detail regarding the assumptions made to incorporate employment challenges can be found in Section 3.2.1.1.

3.4.1.2.2 Construction Employment Estimates

Results of the Keeyask construction employment modelling analysis are presented below.

KEEYASK CREE NATIONS EMPLOYMENT EFFECTS

This section presents the estimated extent of participation by KCNs Members in Project construction employment, based on results of the employment supply/demand model. Key effects for discussion include person-years of employment and employment by job category. Analysis is also provided that estimates the percentage of available Project employment filled by qualified KCNs Members, as well as the job categories in which the KCNs estimated labour force would exceed the expected number of opportunities. Finally, estimates are provided for average total KCNs employment (quarterly and by job category).

Table 3-22 and Table 3-23 show the estimated person-years of employment for KCNs Members by job category for both high and low employment estimates. These tables do not include employment related to pre-construction activities or the Keeyask Infrastructure Project.

Table 3-22: Construction Phase Estimated Employment Participation by KCNs Members in the Keeyask Generation Project - High Employment Estimate (Person-Years)

	High Employment Estimate: KCN[1]									
Employment	**Construction Support**		**Non-Designated Trades**		**Designated Trades**		**MH and Supervisory[2]**		**Total**	
	PY	%	PY	%	PY	%	PY	%	PY	%
Total KCNs Participation	325	8%	170	4%	95	2	10	<1%	600	14%
Total Demand	852		952		1,346		1,068		4,218	

Source for the Demand: Derived from data provided by Manitoba Hydro in 2010.
Source for the Participation: Analysis prepared by InterGroup Consultants Ltd.
Notes:
1. Numbers are subject to rounding.
2. Estimated KCNs Participation within the Manitoba Hydro and Supervisory employment category resulted in a value of less than one percent.

Table 3-23: Construction Phase Estimated Employment Participation by KCNs Members in the Keeyask Generation Project - Low Employment Estimate (Person-Years)

Employment	Low Employment Estimate: KCN[1]									
	Construction Support		Non-Designated Trades		Designated Trades		MH and Supervisory[2]		Total	
	PY	%	PY	%	PY	%	PY	%	PY	%
Total KCN Participation	125	3%	45	1%	55	1%	10	<1%	235	6%
Total Demand	852		952		1,346		1,068		4,218	

Source for the Demand: Derived from data provided by Manitoba Hydro in 2010.
Source for the Participation: Analysis prepared by InterGroup Consultants Ltd.
Notes:
1. Numbers are subject to rounding.
2. Estimated KCNs Participation within the Manitoba Hydro and Supervisory employment category resulted in a value of less than one percent.

KCNs workers are projected to account for between 6% in the low employment estimate and 14% in the high employment estimate of the total construction workforce for the Project. This would constitute between 235 and 600 person-years of the 4,218 person-years of total construction employment. The participation percentages are strongly influenced by the relatively small number of qualified KCNs Members who could work on the Project relative to the large number of Project construction jobs that are available. While the percentage of the total appears to be relatively small, the absolute amount of employment is substantial for the KCNs as the Project is expected to involve a large percentage of available workers from the KCNs. The difference between the high and low estimates illustrates the effect that challenges to employment would potentially have on KCNs participation in construction employment. When these effects are assumed to be less prominent, KCNs employment is estimated to be substantially higher than when these challenges are assumed to have more influence.

For both high and low estimates of construction site employment, more than half of KCNs employment is expected to be in construction support occupations, while about one-third is expected to be in non-designated trades at higher estimates and about one-fifth at low estimates. About 18%-28% of KCNs employment is expected to be in designated trades and Manitoba Hydro and contractor supervisory occupations for low and high estimates, respectively.

Implications of these estimates are as follows:

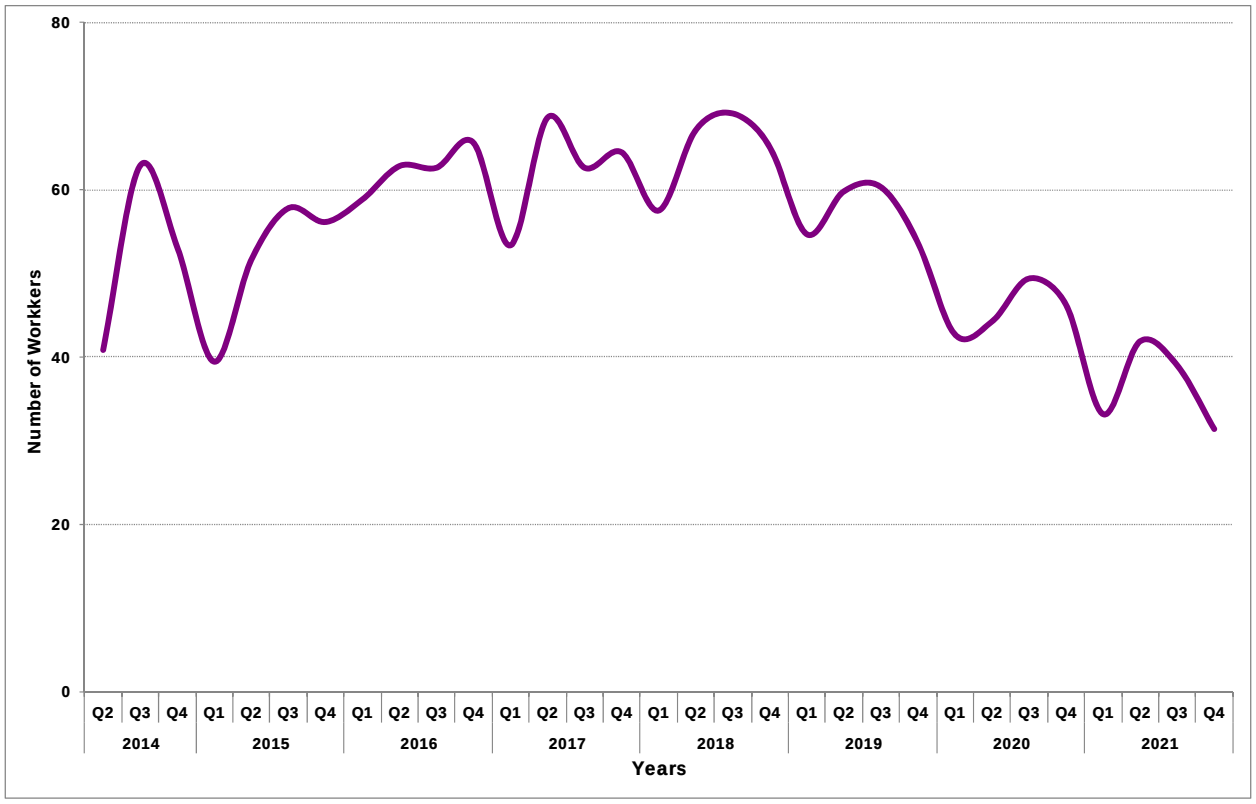
- In small to medium-sized First Nations these levels of employment could contribute noticeably to reducing unemployment levels for their rapidly growing labour force during the construction phase. If these were full-time positions, approximately 30 to 70 KCNs Members would be working throughout the construction phase. However, much of the Keeyask construction work would be seasonal and therefore, a person-year of work would be spread over several individual jobs. Assuming two jobs per person-year, the number of KCNs Members working during a given year would be on average 60 to 140 persons, which would be substantial in these high unemployment settings. This would vary among construction

years, reflecting differences in numbers and skills mix of workers required throughout the construction phase.

- The percentage of KCNs employment is affected by the nature of Project construction. Since the Project consists mainly of building the major civil works and installing mechanical and electrical equipment, the workforce requirements would be heavily oriented towards designated trades, requiring more trained and skilled workers. This would temper the levels of KCNs participation that could occur.

During construction, Project-related employment for KCNs Members will also be generated through on-site representatives, participation in technical and ATK monitoring programs, and community based job referral and partner implementation staff. These jobs will contribute at least 35-40 additional person-years of construction related employment for KCNs Members.

Figure 3-26 illustrates the quarterly peak employment levels of KCNs Members during construction of the Project.



Source: Analysis prepared by InterGroup Consultants Ltd.

Figure 3-26: Construction Phase Estimated Average Total Employment among KCNs Members (Number of Jobs Filled)

This figure illustrates the following:

- Throughout the construction phase from 2014 to 2021, KCNs employment is estimated to vary between 30 and 70 workers.

- Except for seasonal factors, KCNs employment is expected to remain steady. This is largely due to the high proportion of KCNs employment in DNCs most of which extend over the entire construction period. These contracts are expected to provide more stable employment than the TCs and produce higher levels of KCNs employment than comparable TCs.

The JKDA does include an employment target of 630 person-years of construction employment for the KCNs. The target includes their participation in construction of the generation project as well as their participation in Keeyask Infrastructure Project employment opportunities and all pre-construction employment following signing of the JKDA. The target is being measured and tracked by the Project partners through a separate process.

As with all major construction projects, Project-related construction employment levels in local communities will increase and decline and will eventually cease, contributing to a minor boom and bust situation. During the bust, local economic activity will decline and unemployment levels will rise in the Local and Regional study areas. However, this should be moderated in part by the experience gained during construction which will enhance the employability of KCNs Members and northern Aboriginal residents who have worked on the Project.

GILLAM EMPLOYMENT EFFECTS

In Gillam, during the construction phase, employment effects are expected to be generated primarily by direct construction employment and concentrated on FLCN Members living in Gillam. As one of the KCNs, employment effects on FLCN were already included in the KCNs employment analysis.

In addition, there could be a very small increase in employment in the Gillam retail and hospitality service sectors as a result of the spending of construction worker wages from two sources: increased income for FLCN Members who secure Project employment opportunities and expenditures by other construction workers visiting Gillam[1].

THOMPSON EMPLOYMENT EFFECTS

During the construction phase, employment effects in Thompson would primarily result from direct construction employment, in particular from KCNs Members living off-reserve in Thompson who would qualify for preferential hiring on the Project. These employment effects were already included in the KCNs employment estimate.

There could also be a small increase in employment in the retail/wholesale goods and services sector, hospitality services sector and transportation sector as a result of Project-related purchases by Manitoba Hydro and construction contractors; expenditures by KCNs Members who secure Project jobs; and expenditures by construction workers visiting Thompson.

[1] Hospitality services include accommodations, food and beverages services.

3.4.1.2.3 Mitigation/Enhancement

Key measures to enhance participation by KCNs Members and Aboriginal workers from the Regional Study Area in Project construction employment opportunities are already in place through the HNTEI, BNA and JKDA. These include:

- Pre-project training through the HNTEI undertaken between 2001 and 2010 to develop construction skills;
- The extensive use of DNCs and the opportunity for direct hire provisions within these contracts, as well as preferential hiring provisions for TCs and associated Job Referral Service;
- The employee retention and services contract, expected to be implemented by YFFN and FLCN, which includes cross cultural training and on-site counselling services;
- On-site employee liaison workers;
- Funding for the hiring of an Aboriginal union representative by the Allied Hydro Council of Manitoba;
- Establishment of the Advisory Group on Employment that can serve as a forum for KCNs and others to identify and discuss construction employment issues; and
- Community based job referral officers.

While the planned measures are extensive and address key issues affecting KCNs participation in construction jobs, the analysis of factors affecting employment suggests that it would be beneficial to focus additional effort on challenges that can affect worker's availability for construction employment. These challenges include:

- Maintaining a candidate's status in the job referral system;
- Reaching a selected candidate about a specific job opportunity;
- A candidate not accepting job offers; and
- The ability of the candidate to make arrangements to get to the job site.

Consideration should be given to implementing additional availability oriented measures to complement the measures that have already been implemented or are defined in existing agreements. A starting point for this would be reviewing the Wuskwatim Generation Project experience with the respect to the challenges affecting availability and identifying opportunities for addressing some of the challenges. This would be a joint effort involving the KCNs, Manitoba Hydro Project staff, the Job Referral Service, key contractors and other relevant stakeholders.

As with the Wuskwatim Generation Project, a Socio-Economic Monitoring Program (SEMP) to monitor key data will be prepared and implemented (see Chapter 8 of the Response to EIS Guidelines for further details).

3.4.1.3 Business Opportunities – Local Study Area

As in the case of employment, business opportunities represent tangible benefits associated with construction projects. This discussion focuses on the nature of potential Project contracts (*e.g.*, TCs versus DNCs), opportunities for joint ventures between Aboriginal-owned companies and others, as well as entrepreneurial

opportunities that may arise. Indirect business opportunities are also important considerations since the increased employment and business income can provide benefits to businesses such as restaurants and accommodation providers.

During the construction phase, the Project is expected to generate substantial business opportunities across the Regional Study Area. Businesses owned by the KCNs or their Members are being provided with the opportunity to negotiate directly on a group of contracts (the DNCs), which would cover a wide scope of Project construction work. In addition, businesses located within the Local Study Area have the opportunity to provide construction supplies and services to all contractors working on the Project. Particularly in the regional centre of Thompson, the retail/wholesale goods and services sector, the hospitality sector and the transportation sector will benefit from the large numbers of people moving to and from the construction site and spending their days off from work in local communities.

3.4.1.3.1 Keeyask Cree Nations

Article 13 of the JKDA outlines the business opportunities to be made available directly to the KCNs. These opportunities relate primarily to the construction and removal of Project infrastructure components (*e.g.*, access road and camp) and to the provision of services to construction workers at the site during construction (*e.g.*, food services, security services and employee retention).

The JKDA Schedule 13-1 identifies which contracts would be DNCs and indicates the KCNs communities being provided the opportunity to negotiate these contracts directly. The schedule includes both the Keeyask Infrastructure Project and the Keeyask Generation Project. Table 3-24 identifies the DNCs that apply to the Project and which of the KCNs communities have been identified for their implementation (excludes DNCs identified in the JKDA that are part of the Keeyask Infrastructure Project). In order to secure one of the 11 contracts identified in the JKDA available for allocation to the Project, a business is required to be majority owned by a KCNs community or be a Member of the KCNs. Manitoba Hydro will negotiate each contract on an individual basis with prospective businesses to establish contract provisions and a value acceptable to both parties. Several KCNs businesses, especially those with capacity in construction-related activities could potentially benefit through this process. These are identified in Section 3.3.2.1.

Table 3-24: Direct Negotiated Contracts for the Keeyask Generation Project

Code	Service Contracts	KCNs Allocation
SC-1	Catering	FLCN and YFFN
SC-2	Camp Maintenance Services	CNP
SC-3	Security Services	FLCN and YFFN
SC-4	Employee Retention and Support Services	FLCN and YFFN
SC-5	First-Aid Services	CNP
	Construction Contracts	
IC-2	Main Camp (Phase II only) - Site Preparation and Development	CNP
IC-5	Main Camp - Decommissioning	CNP
IC-8	South Access Road Construction	CNP
PS-1	Reservoir Clearing	CNP
PS-2	Painting and Architectural Finish	CNP
PS-5	Rock and Unclassified Excavation	CNP

Source: JKDA, Schedule 13-1 (CNP *et al.* 2009).

In total, 11 work packages as identified in Schedule 13-1 of the JKDA have been allocated to KCNs communities as DNCs. These contracts are expected to generate most, if not all, local direct business income from the Project. These contracts will follow a series of DNCs that were awarded to the KCNs for Keeyask Infrastructure Project. The experience gained in implementing the Keeyask Infrastructure Project contracts is expected to strengthen the KCNs capacity to undertake DNCs for the Keeyask Generation Project.

Manitoba Hydro's most recent hydroelectric development project under construction (Wuskwatim Generation Project) provides useful information on overall business benefits to the local First Nation; and is therefore a good predictor of anticipated Project outcomes. The Wuskwatim Generation Project experience reported by Nisichawayasihk Cree Nation indicates they were able to establish a building supply company to serve the Wuskwatim Generation Project; the supply company subsequently expanded into Saskatchewan. In addition, Nisichawayasihk Cree Nation created joint ventures with road construction, catering and camp maintenance companies, gaining valuable experience negotiating business partnerships and creating jobs and revenue for Nisichawayasihk Cree Nation. "NCN has also created its own environmental monitoring company Aski'Otutoskeo Ltd (AOL) to provide services as a contractor to Manitoba Hydro and other monitoring companies working on the project" (NCN 2011b).

At the time of this analysis, negotiations were ongoing between Manitoba Hydro and KCNs businesses regarding all potentially contracted DNC work. Final contract amounts were yet to be determined.

It is expected that most of the contracts will be carried out by joint ventures made up of a company owned by a KCNs partner and a non-KCNs company that has extensive experience in performing the type of work required by the contract. In all cases, the company owned by the KCNs party will own the largest share of the joint venture. This approach will enable the KCNs partner to maintain control of the contract and receive the

largest share of the profits to be generated. These business opportunities are also expected to generate the following important business benefits:

- The process of negotiating, managing and completing these contracts in a joint venture setting will provide valuable business experience to the KCNs owners and managers selected for the Project.
- The revenues associated with the Project could be used to finance payments for up to nine years on buildings, equipment and capital items that could be used to secure future contracts within the region.
- The relationships developed as part of the joint ventures could be used to pursue additional joint venture contracts on other construction projects.

These enhancements to KCNs-owned businesses could have the following broader benefits for the KCNs communities:

- Increase the capacity of local businesses to expand and pursue future business opportunities within and outside of their home communities, including construction of future hydroelectric projects;
- Increase the role of local businesses in meeting communities' needs in such areas as building and maintaining houses and infrastructure;
- Strengthen the local economy of KCNs communities; and
- Provide continuing construction job opportunities for community residents.

Should these outcomes materialize, the DNCs awarded to KCNs-controlled businesses would yield not only short-term benefits during the construction phase, but would also generate benefits after Project construction is completed. A key factor in achieving these longer-term benefits is the meaningful involvement of KCNs owners in managing the DNCs, rather than relying solely on the non-KCNs joint venture partners for these skills. This could benefit KCNs business capacity through increased revenue and resulting business enhancements (*e.g.*, equipment upgrades). It could also lead to improved credibility of KCNs as viable, capable and progressive business owners, potentially leading to other business opportunities.

Some business opportunities are expected to result from the general increase in economic activity that would take place across the Local Study Area. Some of the employment income earned at the job site would be spent by Members of KCNs communities to support their households. The increased income resulting from the employment opportunities created by the Project could increase the market potential for businesses in KCNs communities, primarily for items such as groceries and other household items. This could contribute to improved viability of retail and consumer service businesses located in these communities. However, it should also be noted that the scope of services in these communities is limited and it is likely that spending of worker wages would also occur at businesses in other locations (*e.g.*, the regional centre of Thompson).

3.4.1.3.2 Gillam

During construction, business opportunities in the Gillam area relate primarily to the potential increase in demand for transportation and hospitality services by workers and other people associated with the Project as they travel to and from the construction work site. There could be some increased demand for construction-related supplies and services, although the current scale of construction-related retail services available in Gillam would likely limit these opportunities.

3.4.1.3.3 Thompson

Thompson could benefit from construction-related purchases. As the regional retail centre with the most well-established supply chains, Thompson is likely to be the source of these kinds of transactions. While the potential for increased demand for construction goods and services is not likely to result in new retail businesses being established in Thompson, there would be a substantial opportunity for existing businesses to increase sales and modify product lines in anticipation of this increased demand. Based on experience with the Wuskwatim Generation Project, the value of these purchases could be in the tens of millions of dollars. Businesses in the transportation, industrial supply and energy supply sectors would likely benefit most.

Business opportunities in the Thompson area could also arise from an increase in demand for transportation and hospitality services by workers and other people associated with the Project as they travel to and from the construction work site. In addition, some non-local construction workers are likely to spend time in Thompson during their days off, increasing business opportunities in these same sectors.

In recent years, the Thompson economy experienced very rapid growth, mainly as a result of major facility expansion and modernization undertaken by Vale. While this growth led to increased sales volumes for many local businesses, it also contributed to labour shortages in the local retail and consumer service sectors making it difficult for businesses to meet customer needs and to take full advantage of available opportunities. This local competition for labour put upward pressure on wages, which in turn led to rising local prices in some sectors, particularly in hospitality, trades and transportation-related sectors. The high demand for skilled trades resulted in labour shortages for many businesses, which led to schedule and cost implications for these businesses.

The anticipated Vale smelter and refinery closure (in 2015) may change the character of Thompson's economy from one of rapid growth with labour shortages to no growth or declining growth with labour surpluses. Local businesses could shift from a position of insufficient capacity to excess capacity. These changes may occur while Project construction is taking place. In this new context, the modest business opportunities flowing from Project expenditures would shift from potentially exacerbating existing labour shortages to being beneficial for the Thompson business community, offsetting some of loss in activity arising from the smelter closure.

Monitoring should be undertaken to determine what influence Project-related expenditures during construction have on the level of business activity and employment in Thompson. This could be done through a survey of relevant Thompson businesses. It is recognized that it will be difficult to isolate Project effects from other factors influencing the Thompson economy; nevertheless, even a limited understanding of these effects would be useful given the varied prospects for this city's economy in the future.

3.4.1.3.4 Mitigation

The DNCs are the most important measures for enhancing KCNs participation in Project business opportunities. Other measures for enhancing local business participation during the construction phase include the following:

- Provide a mechanism to identify entrepreneurial opportunities associated with Project construction; and
- As occurred in the Wuskwatim Generation Project, maintain communication with appropriate organizations on opportunities through Manitoba Hydro's Northern Purchasing Policy.

Monitoring will be undertaken as part of a SEMP, and will include tracking direct purchases, a KPI program in Thompson, Gillam and the KCNs communities to ascertain any indirect business opportunities generated as a result of the Project and KPIs with key participants in managing the DNCs.

3.4.1.4 Income – Local Study Area

New income would be generated in two ways in the Local Study Area during the construction phase of the Project: through wage employment and through business. Employees would be attracted to the Project in anticipation of the opportunity for new, and in some cases higher, income. In turn, once that income is earned, indirect economic activity would occur in nearby communities, particularly in the retail and hospitality sectors through the spending of wage income. These effects would become apparent early in the construction phase and would last until construction is complete.

The following discussion addresses direct employment income and business income. For employment income, gross and net income is estimated for construction employment. Business income, which consists of profits from increased business activity, is presented for the DNCs. Other sources of employment and business income including from local purchases by Manitoba Hydro and contractors and re-spending by Project workers have not been estimated. The following sections are broken down by employment and business income effects, with separate sections provided for effects specific to the KCNs, Gillam and Thompson.

3.4.1.4.1 Keeyask Cree Nations Income Effects

EMPLOYMENT INCOME

Table 3-25 provides a summary of estimated gross employment income by contract type and job category that would accrue to KCNs workers during the construction phase. These estimates are provided for all contracts (DNCs and TCs) and have been presented for two scenarios: high and low which encompass a combination of high and low employment estimates and wage ranges. Methodological details regarding these wage ranges are provided in Section 3.2.3.

Table 3-25: Construction Phase Estimated KCNs Gross Employment Income from the Keeyask Generation Project (in millions of dollars)

	High Wage Range			Low Wage Range		
	All Contracts	DNC	TC	All Contracts	DNC	TC
Construction Support	31.7	27.9	3.8	9.8	9.4	0.4
Non-Designated Trades	17.6	11.8	5.8	3.6	3.0	0.6
Designated Trades	12.3	7.8	4.5	7.6	5.3	2.3
Subtotal	61.6	47.5	14.1	21.0	17.7	3.3
Manitoba Hydro And Contractor Supervisory	0.6			0.6		
Total	62.2			21.6		
Construction Support	51%	45%	6%	47%	45%	2%
Non-Designated Trades	29%	19%	9%	17%	14%	3%
Designated Trades	20%	13%	7%	36%	25%	11%
Total	100%	77%	23%	100%	84%	16%

Sources: Derived from data provided by Manitoba Hydro in 2010 with analysis prepared by InterGroup Consultants Ltd.
Note:

- Numbers do not always add due to rounding. Actual results will vary from estimates provided here.

Keeyask Cree Nations workers are expected to earn between $21 and $62 million working on construction of the Project. Most of this income would be generated from DNCs, even though these contracts only represent about 27% of total Project employment.

The high level of KCNs employment on DNCs illustrates the importance of the DNCs to KCNs employment income. The importance of the DNCs can also be seen by comparing total KCNs income to estimated construction employment income that would accrue to the whole CBN area (see Section 3.4.1.8). Keeyask Cree Nations represents about 23% of the total CBN population, yet it is estimated that KCNs would secure between approximately 50% to 60% of CBN employment and gross employment income. Keeyask Cree Nations and CBN workers would share the same preferences on TCs.

Monitoring would be undertaken to determine the amount of gross labour income accruing to KCNs Members from Project construction employment.

BUSINESS INCOME

While businesses with awarded DNCs would be active during the entire course of the construction phase, profits from these contracts would depend substantially on how well the contractors are able to manage their costs over the length of the contracts. Profits generated and business income created by the DNCs would only be evident after the contracts are completed. If costs are effectively managed, profits in excess of $15 million could be earned on the DNCs, of which more than half could accrue to KCNs businesses, who must

own at least half of the contracted enterprises. This level of profit is based on a target return of 10% of contract earnings.

3.4.1.4.2 Gillam

Gillam would experience some income benefits as a result of the Project. Employment income would accrue primarily to FLCN Members living in Gillam; that income is included in estimates of employment income accruing to KCNs workers as a whole in Table 3-25.

Income benefits would also result from the increased economic activity that is estimated to occur in Gillam during the construction phase of the Project. This would affect both employment and business income for workers and businesses in the transportation, hospitality, retail and construction sectors. This spending is dependent on individual spending preferences of employees, therefore, quantitative estimates of spending in the specific Gillam economy are difficult to determine.

3.4.1.4.3 Thompson

Thompson is expected to experience some income benefits as a result of construction of the Project. Employment income effects would accrue primarily to the city's Aboriginal population many of whom are likely to have some level of hiring preference for Project construction jobs. Income benefits would also result from the increased economic activity that would occur in Thompson as a result of the Project. Income received through Project employment is expected to lead to indirect economic activity in Thompson, particularly in the construction, retail/wholesale goods and service and hospitality sectors. In turn this would affect both employment and business income for workers and businesses in these sectors. As in the case of Gillam, this spending is dependent on the type and location of preferences of individual employees and, therefore, quantitative estimates in the specific Thompson economy are difficult to determine.

3.4.1.4.4 Mitigation

No mitigation or enhancement is required.

3.4.1.5 Cost of Living – Local Study Area

Discussion regarding cost of living is intended to capture issues associated with the higher costs for housing, food and household items and transportation in northern communities. The increased employment and business opportunities associated with large construction projects can potentially affect these costs.

In addition to effects related to direct employment, business and income, construction of the Project is expected to result in indirect expenditures in the Local Study Area. Local construction workers and their families could increase their purchases of retail products, transportation and hospitality services as a result of increased income from the Project. Non-local workers could spend more money on transportation, and hospitality services. Local firms that sell products and services for businesses could also see an increase in sales to contractors. While these expenditures are likely to occur primarily in Thompson, some, particularly retail products and services, may also occur in other Local Study Area communities.

Despite the potential for increased purchases, local spending and construction-related expenditures associated with the Project are unlikely to affect the cost of living in the Local Study Area. Construction-related expenditures are anticipated to be concentrated in Thompson, where the size of the local economy would

likely diffuse the effects of such spending. Spending in the other Local Study Area communities would tend to be focused on locally available goods and services, which are relatively limited.

In general, increased spending in the Local Study Area is estimated to have little effect on the differences in cost of living between these communities and communities in southern Manitoba. In Thompson, a heated economy in recent years created labour and housing shortages. If this continued, additional spending may compound existing local economic pressures. However, the recent announcement that Vale expects to close its Thompson smelter and refinery could noticeably change that situation. In any event, it is difficult to determine quantitatively the extent to which any pressure would be attributable to Project-related spending.

The discussion below is organized by community (KCNs, Gillam and Thompson), with food and household items, transportation and housing considered separately for each.

3.4.1.5.1 Keeyask Cree Nations Communities

Cost of living in KCNs communities could be affected mainly by the spending of residents and their families who work on the Project. They are unlikely to experience an increase in their costs and associated product and service prices as a result of expenditures related to Keeyask construction. Reasons for this include the following:

- While the income of local residents working on Project construction would likely grow considerably, their local purchases are not likely to increase proportionately since they are already purchasing most of what is available locally. Local purchases would continue to be limited by the types of retail and consumer products available in their community.
- For locally available products and services, the capacity of retail and consumer service suppliers is either adequate, or on the verge of expanding.
- Underemployed labour is available for businesses to draw on if they need additional staff to deal with increased sales. Pressure on local wages is moderated when such resources are available.

Although an increase in costs is unlikely, some increased spending power in KCNs communities may prompt some retail and consumer service providers to widen their product or service range in order to capture a larger share of the growing market. If this happens, the range of locally available goods and services could be enhanced.

FOOD AND HOUSEHOLD ITEMS

In Split Lake, the Northern Store, Arctic Beverages, Old Dutch and Grey Goose bus lines provide regular shipments of goods into the community. Increased purchasing power among Split Lake residents could increase sales across all categories, encouraging wider selection while potentially exerting downward pressure on prices. To some extent, however, a lack of local competition and high transportation costs may dampen this pressure.

An increase in employment income and purchasing potential among construction workers and their families will likely lead to increased spending at the Mooseocoot Convenience Store and Gas Bar (opened April 27, 2010) in Ilford. An increase in spending by Ilford residents will also likely occur in Thompson or Gillam. No effect on the cost of food and household items in Ilford is anticipated.

Despite the recent closure of the Groceteria in Fox Lake (Bird), the community expects a new store to open in the near future. The Ripple River Store in York Landing (*Kawechiwasik*) closed in early 2010 and reopened in fall 2010 under management by YFFN. The increased purchasing power anticipated in each community could increase total sales and profitability at these existing/proposed stores and improve the likelihood of success of existing retailers and consumer service outlets.

TRANSPORTATION

Since KCNs communities are located in the vicinity of the Project, KCNs workers are more likely than other workers to travel to and from the construction work site during their days off. This would increase demand for transportation between the site and these communities.

Split Lake is accessible year-round by road. Travel by personal vehicle to the job site or to Thompson for shopping would not result in any increase in transportation costs for TCN Members at Split Lake.

Ilford is accessible by road only when the winter road is in operation. During the remainder of the year, workers would use a combination of bus (from Project site to Thompson or Gillam) and the railway to commute back to their community. Rail transport is likely to have sufficient excess capacity to handle the number of additional passengers travelling between the job site and the community (although schedule can be uncertain). Therefore, the cost of transportation for WLFN/Ilford residents is unlikely to be affected by the increased use of winter road or rail transportation.

Fox Lake (Bird) is accessible year-round by road. Travel by personal vehicle to the job site or to Thompson for shopping and recreation would not result in any transportation cost increases for Fox Lake residents of Fox Lake (Bird) or Gillam. Fox Lake (Bird) is also accessible by rail, where there is adequate capacity for any additional increase. The Project is unlikely to affect the transportation costs of Fox Lake (Bird) residents during the construction phase.

York Landing (*Kawechiwasik*) is accessible by ferry in summer and by winter road for a short period in winter. Travel by road when these options are available is not expected to increase the transportation costs for YFFN Members at York Landing (*Kawechiwasik*). During the remainder of the year, access is only available by air to Thompson. The increased potential for demand for air travel may encourage carriers to increase the number of flights offered to the community and improve service.

HOUSING

Should off-reserve families of KCNs construction workers wish to return to their home communities with KCNs Project workers, they would find housing to be in short supply. However, because housing is largely developed and owned by each First Nation, the constraint tends to be available First Nation housing dollars rather than the financial capacity of individual families. Therefore, the effect of returning population, to the extent that this is expected (see Section 4.4.1.2), is unlikely to elevate housing costs.

3.4.1.5.2 Gillam

Similar limited effects on cost of living would be expected in Gillam, where the majority of any additional construction workers and their families would be FLCN Members. Additional expenditures would also arise from spending of construction workers and their families, and by visiting construction workers and visitors passing through on flights landing in the community.

FOOD AND HOUSEHOLD ITEMS

The community has a basic range of retail and consumer service suppliers who often struggle to achieve stable operations. The expected increase in Project-related spending in Gillam could increase the available selection of products and services, but is unlikely to affect local prices. Planning is underway to develop a new mall in the community that should improve local retail and service capacity. The presence of a more modern facility and increased commercial space should help to temper effects of increased Project-related spending on local retail and service prices (Gillam KPI Program 2009-2010).

Local labour costs are unlikely to contribute to upward pressure on prices because additional workers are available in the Gillam area to handle increased activity in the retail and consumer service sectors (*e.g.*, families of Manitoba Hydro employees and FLCN Members who do not plan to participate in Project construction employment or are not qualified for them).

TRANSPORTATION

Demands for air transportation and all forms of ground transportation are likely to increase. However, since these services are provided by large suppliers, whose prices are determined by broader market considerations, increased demand is unlikely to affect local prices for these services.

HOUSING

During construction, Gillam is unlikely to experience housing-related cost of living effects as a result of the Project. The only Project-related in-migration to Gillam during the construction phase is expected to be by FLCN Members and they are likely to seek access to First Nation housing in the community. Furthermore, most other available rental units in Gillam are controlled by Manitoba Hydro for use by Manitoba Hydro employees. There is little turnover among the remaining units in the town. Therefore, there is little opportunity for price increases even if demand for rental housing grew (Gillam KPI Program 2009-2010).

3.4.1.5.3 Thompson

The situation in Thompson may be different from that of other communities in the Local Study Area. A more detailed discussion regarding various Thompson growth scenarios can be found in Appendix 4C. The city has experienced rapid economic growth in recent years, which has led to labour shortages and associated upward pressure on wages, including demand for lower-skilled workers, as well as housing shortages and sharply rising housing prices and rents. If the Thompson economy continues to grow up to and during the early years of Project construction, added expenditures occurring in Thompson due to the Project, could lead to further labour shortages, forcing labour costs higher and precipitating local price increases.

However, future effects would change if Vale follows through with their announcement and closes down its smelter in Thompson by 2015. The city's economy would be expected to slow down leading to surplus capacity in the local labour markets and in various local business sectors. Under these circumstances, Project-related increases in expenditures in Thompson are unlikely to affect local prices. Surplus labour and business capacity would provide a buffer to inflationary pressures. Project-related effects on inflation are likely to vary over the course of construction in Thompson. However, due to the multiplicity of factors affecting inflation in Thompson, it is not possible to isolate quantitatively the contribution of the Keeyask Generation Project to cost of living.

FOOD AND HOUSEHOLD ITEMS

Thompson is already well-serviced by national retail grocery stores. Short-term increases in the purchasing power of a small portion of residents working on the Project are, therefore, unlikely to affect the price of food and household goods within the community.

Increased economic activity related to the Project caused by workers traveling to Thompson for shopping and entertainment may increase the demand for labour at retail and hospitality establishments. Potential effects on cost of living would depend on the growth scenario that unfolds.

It is expected that if Vale moves forward with its plan to shut down the smelter and refinery during the same timeframe as Project construction, the Thompson economy may grow more slowly or enter a state of decline during the construction phase of the Project. If this were to occur, then any inflationary effect is unlikely to materialize and local labour shortages could be expected to relax.

TRANSPORTATION

As the Regional Study Area's main transportation hub, Thompson would likely experience an increase in volume in all modes of travel. The main increases likely would occur in air travel into the region from the south and bus travel between Thompson and Gillam. This could improve service if carriers respond with increased flights and buses. However, adverse effects on transportation services could result from a decrease in the number of seat sales or other incentives along popular routes; or over-filled planes/buses if carriers do not increase the level of service.

There would be increases in ground traffic approaching Thompson from the south on PTH 6 and PR 391 and PR 280 between Thompson and the Project site. However, the main artery in Thompson (Mystery Lake Road) is capable of handling the scale of Project-related increases. Effects of traffic are discussed in Section 4 and Section 5.

HOUSING

Thompson's recent strong local economy resulted in a housing shortage, driving up the cost of housing units in the city. However, additional pressure is not anticipated in this market as a result of the Project. Few construction workers and their families are expected to move to Thompson for the following reasons:

- There is little advantage for an employee to relocate his or her family to Thompson, since it is too far from the Project site for daily commuting.
- Project construction workers receive free board and room while working on the Project.
- High housing costs and existing shortages in affordable housing in Thompson are likely to be a deterrent to workers who may be considering relocating there.

3.4.1.5.4 Mitigation

No mitigation, enhancement or monitoring is required.

3.4.1.6 Resource Economy – Local Study Area

Further detail regarding effects on resource use in the Local Study Area is provided in the Resource Use section of this supporting volume. Based on this analysis, relevant findings related to various types of resource use have been extracted (*e.g.*, commercial trapping), and these findings are summarized in terms of their effects on income and livelihood in the resource sector of the local economy. The analysis does not include effects on Manitoba Metis Federation and Cross Lake First Nation (Pimicikamak Okimawin). At the time this report was being prepared, Manitoba Hydro was working with the Manitoba Metis Federation and Cross Lake First Nation (Pimicikamak Okimawin) to undertake studies funded by Manitoba Hydro on the effects of the Project related to resource use of their members (see Chapter 3, Section 3.4.1 of the Response to EIS Guidelines). Project effects on the resource economy during the construction will be a result of the following:

- Disturbances to wildlife resources and habitat loss due to noise and construction-related activity in the vicinity of the Project;
- Shifting patterns of resource use through the KCNs AEA Offsetting Programs;
- Improved access from Project-related roads;
- An influx of workers potentially creating additional resource harvesting pressure; and
- Changes in lifestyles of local resource harvesters who choose Project employment.

During construction, domestic resource use, commercial trapping and tourism (commercial lodges and outfitters) will be affected; however, the effects identified are expected to have limited consequences on cash and in-kind income of the affected resource users. Losses of in-kind income from reduced domestic resource use in the immediate vicinity of the Project are expected to be offset by the KCN's AEA Offsetting Programs that provide access to resource harvesting at alternative and unaffected locations; as well as to fish for consumption in communities. No further analysis on domestic resource economy is needed.

3.4.1.6.1 Commercial Resource Economy

COMMERCIAL TRAPPING

During Project construction, effects on the commercial trapping sector of the resource economy would likely result from increased opportunities for participation in the wage economy, construction activity in the immediate vicinity of the Project (issues related to noise and dust, resource user safety and reduction in furbearing mammals) and shifting patterns of resource use due to off-setting programs.

During the construction phase of the Project, access along the north and south access roads will be controlled by security gates. A Construction Access Management Plan will determine who is permitted on the site and will include limitations on use of the roads by construction workers, domestic resource users and other members of the general public. Licensed trappers will likely have unlimited access to their traplines where there are no construction safety-related concerns and they will be able to continue trapping and opportunistic hunting activities as per the Construction Access Management Plan.

The new work site population and activity in the area may be detrimental to trappers' abilities to trap productively, particularly for Traplines 15 and 9, where possible disturbance to traps could occur. Measures

would be in place to mitigate this potential disturbance (including the Construction Access Management Plan and camp rules). Similarly, the increase in noise and dust could cause furbearing animals to move away from the area. The nature and magnitude of effects associated with disturbance caused by Project construction are largely related to individual perceptions of these disturbances, including how far away from traps they are occurring (*e.g.*, from dust and noise related to road traffic). In general, the effect on trapping income from these sources is expected to be minor.

Increases in the wage economy in the Local Study Area during construction may lead to small, short-term decreases in the number of people engaging in commercial trapping to the extent that trappers choose to participate in construction employment opportunities. Alternatively, those engaged in commercial trapping may view Project employment as a means to earn additional income in order to purchase additional and/or better equipment, thereby improving their ability to undertake trapping activities. Project construction work would largely be seasonal in nature, with less activity during the winter months. Trappers from the Local Study Area who would participate in Project employment are unlikely to be employed during the winter months (see Project Description Supporting Volume, Section 3.9.1) when most commercial trapping activity takes place. This would dampen the extent to which trapping activity is reduced due to Project employment. The extent of these effects is dependent on the personal preferences of individuals and the seasonality of employment opportunities with respect to winter trapping activity.

Shifting patterns of resource use could also occur during Project construction. Increased domestic use in offset program areas would increase the frequency with which traplines and cabins are utilized. There may be times when trapline holders are not Members of the community from which offset programs are based, potentially creating conflict among competing resource users (*i.e.,* First Nation, Metis and non-Aboriginal resource harvesters). A substantial effect on trapping is not expected because the highest level of activities related to the AEA Offsetting Programs are in spring and fall instead of winter when trapping activities are at their highest level. Further, within communities, licensed trappers are recognized and respected as stewards of the furbearer resources. Harvest of furbearers without permission of the trapline holder is not expected to occur as part of the offsetting program. Despite these potential challenges, it is important to note that the access programs are fundamental to the integrity of the community and the Cree cultural identity.

COMMERCIAL FISHING

Several aspects of Project construction could potentially affect the viability of commercial fishing including the presence of a large workforce, disturbances from Project construction and increased opportunities to participate in the wage economy. As described below, these effects are related primarily to the viability of the commercial fishing economy through effects on fish populations themselves, as well as associated infrastructure and safety issues. There is also a potential effect related to individuals choosing employment on the Project who might otherwise engage in commercial fishing.

Some Project construction workers may choose to engage in shore-based recreational fishing, thereby contributing to a perception of increased competition for commercial fish resources and concerns over decreased harvest. However, the harvest from this recreational fishing is expected to be of a relatively low level and the commercial resources of these lakes are considered sustainable (see the Resource Use Section of this Supporting Volume).

Disturbances resulting from Project construction may also affect the circumstances of the small-scale Stephens Lake fishery. Construction activities would take place in relatively close proximity: approximately four kilometres from key fishing locations at the inlet to Stephens Lake. Although the nature and magnitude of these effects remain uncertain (*e.g.*, potential for fish to change the areas in which they congregate as a result of changes in flow), there is likely to be an effect on the Stephens Lake fishery as fishers are forced to seek out new areas and are potentially subject to decreased harvests. As in the case of trapping, an increase in the wage economy during construction may cause short-term decreases in the number of individuals interested in engaging in commercial fishing, particularly since a considerable portion of the potential construction jobs overlaps with the commercial fishing season (spring and fall). The level of effect would depend on individual preferences for undertaking these activities. The average annual fishing income is just over $5,000/year, earned over a short period of time (see Resource Use Section); since Project employment wages are considerably higher, one might expect that participation in wage employment may be chosen over commercial fishing. Alternatively, as in the case of commercial trapping, those engaged in commercial fishing may view Project employment as a means to earn additional income to purchase equipment in order to improve their ability to undertake commercial fishing activities. Discussions with TCN fishers suggest that this will not be an issue on Assean Lake or Split Lake where none of them expect to take Project employment. Discussions are underway with the affected fisherman on Stephens Lake to be compensated for losses and damages incurred related to the single-licence fishery.

TOURISM, COMMERCIAL FORESTRY AND MINING

These activities occur mainly outside of the Local Study Area and within the Regional Study Area, as such, they are discussed in Section 3.4.1.11.

Increases in traffic on PR 280 have the potential to affect one outfitter based in Gillam whose operation uses the roadway corridor for bear hunting. Increased traffic and population due to the large workforce may increase the risk of disturbance to bear baits, while also reducing aesthetics for clientele, thereby potentially affecting the viability of the business. Education and communication initiatives would be in place for workers as a means of mitigation, through the relevant Environmental Protection Plan and Monitoring Program.

Concerns have been raised about potential risks to the property and operations of lodges and outfitters located on or near lakes being used as alternate harvesting areas under the TCN Access Program as defined in their AEA. TCN has adopted guidelines and principles for its Members when they are participating in the AEA Access Program. The guidelines and principles include respect for the land and environment including leaving areas clean, respect for others and their property, and conducting selective harvesting including applying traditional and cultural values on all harvesting activities. Implementation of these guideline and principles should largely mitigate potential adverse effects on lodges and outfitters. An exception may be that some customers sense a loss of their "wilderness experience" from meeting participants of the AEA Access Program while they are using a lodge or outfitters services.

During construction there are no Project effects expected on mining; and effects on forestry are expected to be negligible (see Resource Use Section 6.7.4).

3.4.1.6.2 Mitigation

Losses of in-kind income from reduced domestic resource use in the vicinity of the Project are expected to be compensated for by the Offsetting Programs contained in the AEAs that provide access to resource harvesting at alternative and unaffected locations. Trapline 15 domestic resource users are expected to be compensated for any decrease in domestic harvesting through a compensation agreement.

Losses experienced by commercial trappers will be compensated. Provisions exist in the TCN AEA (Members Claims) and FLCN AEA (Citizens Claims) to provide for losses in net revenue and damages to property incurred by commercial trappers on a Registered Trapline. These provisions are expected to address any Project-related losses experienced on the potentially affected traplines, which are Traplines 15, 9, 25 and 7. A five-year, extendable disturbance agreement has been reached with the holder of Trapline 9; an annual agreement with Trapline 15 is expected to be reviewed and renewed as needed on an annual basis; and a compensation agreement is expected to address the minor effects to Traplines 7 and 25 (a TCN community trapline).

Project-related effects during construction are expected to result in closure of the small-scale Stephens Lake fishing business that operates under a special licence to sell fish locally in Gillam and Churchill. Discussions between the operator and Manitoba Hydro are underway at the time of submission.

Implementation of TCN's guidelines and principles for the TCN Access Program should largely mitigate potential effects on lodges and outfitters located at or near alternate harvesting destinations. The guidelines and principles include respect for the land and environment (leaving areas clean and respecting others, including refraining from acts of aggression and disrespect to property). No further mitigation is required.

3.4.1.7 Construction Employment Opportunities – Regional Study Area

This section examines participation by Aboriginal residents of the Regional Study Area as a whole in construction employment opportunities associated with the Project. As was set out in Section 1.3.2, the Regional Study Area is defined according to the BNA. Also considered in this section, is participation by residents of the CBN area, a subset of the Regional Study Area that encompasses communities that have been affected by past hydroelectric development (also defined in Section 1.3.2).

Construction employment participation was estimated for qualified Aboriginal residents in the CBN area (the area designated for first order hiring preference on TCs) and for qualified Aboriginal workers in the Regional Study Area as a whole (the region for third-order hiring preference on all contracts).

The CBN area includes the KCNs communities, so all CBN employment results presented in this section incorporated KCNs employment estimates discussed earlier in this section. Similarly, estimates presented for the Regional Study Area incorporated employment estimates for the CBN area.

Employment estimates are presented in person-years (for high and low estimates) and by job category.

3.4.1.7.1 Churchill-Burntwood-Nelson Employment Effects

Table 3-26 and Table 3-27 present person-years of construction employment estimated to be taken up by qualified Aboriginal residents of the CBN area, by job category, under high and low employment estimates respectively.

Table 3-26: Construction Phase Estimated Participation by the Churchill-Burntwood-Nelson Aboriginal Workforce in the Keeyask Generation Project (Person-Years) – High Employment Estimates

	High Employment Estimates: CBN									
Employment	**Construction Support**		**Non-Designated Trades**		**Designated Trades**		**MH and Supervisory**		**Total**	
Total CBN (including KCNs)	510	12%	420	10%	230	5%	35	1%	1,195	28%
Total Demand	852		952		1,346		1,068		4,218	

Source for the demand: Derived from data provided by Manitoba Hydro in 2010.
Source for the participation: Analysis prepared by InterGroup Consultants Ltd.
Note:
- Numbers are subject to rounding.

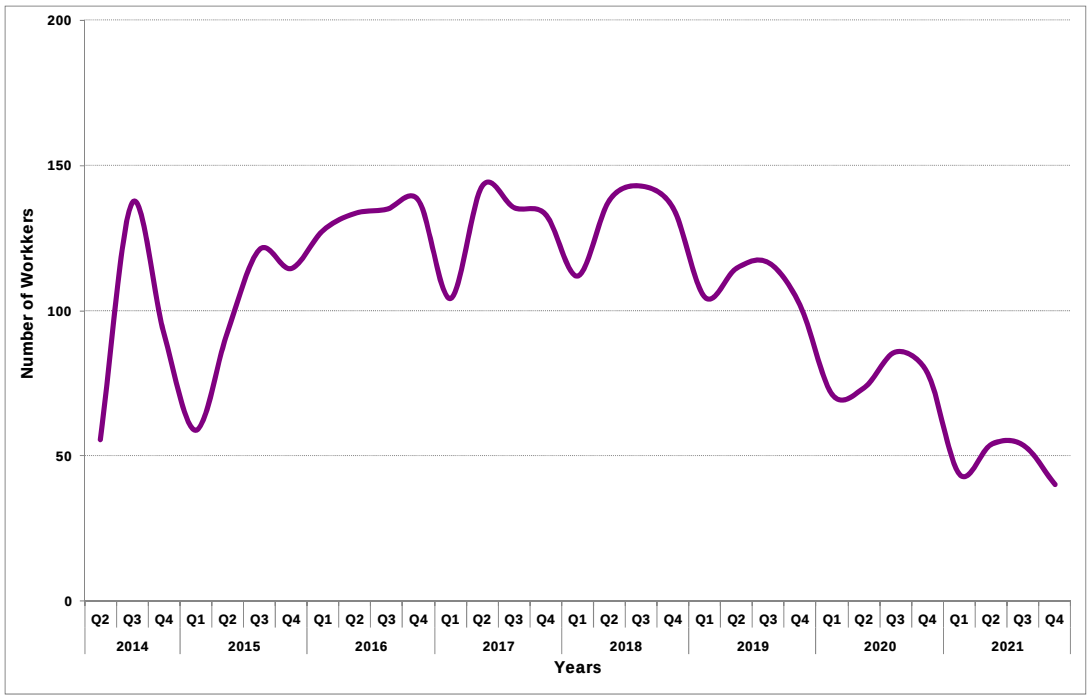
Table 3-27: Construction Phase Estimated Participation by the Churchill-Burntwood-Nelson Aboriginal Workforce in the Keeyask Generation Project (Person-Years) - Low Employment Estimates

	Low Employment Estimates: CBN									
Employment	**Construction Support**		**Non-Designated Trades**		**Designated Trades**		**MH and Supervisory**		**Total**	
	PY	%	PY	%	PY	%	PY	%	PY	%
Total CBN (including KCNs)	160	4%	100	2%	95	2%	35	1%	390	9%
Total Demand	852		952		1,346		1,068		4,218	

Source for the demand: Derived from data provided by Manitoba Hydro in 2010.
Source for the participation: Analysis prepared by InterGroup Consultants Ltd.
Note:
- Numbers are subject to rounding.

Aboriginal workers from the CBN area are predicted to obtain between 390 and 1,195 person-years of employment representing 9% (low estimate) and 28% (high estimate) of Project construction employment opportunities .Approximately two thirds of Aboriginal participants from the CBN area are expected to be employed in construction support and non-designated trades opportunities. Designated trades and Manitoba Hydro and supervisory jobs would account for approximately one-third of this employment.

As shown in Figure 3-27, participation by Aboriginal workers from the CBN area is estimated to vary between about 40 and about 140 workers over most active years of the construction phase.



Source: Analysis prepared by InterGroup Consultants Ltd.

Figure 3-27: Construction Phase Estimated Average Employment of the Churchill-Burntwood-Nelson Aboriginal Workforce

3.4.1.7.2 Regional Study Area Employment Effects

Participation by Aboriginal workers from the Regional Study Area as a whole (including Aboriginal workers from the KCNs and the CBN area) was estimated to range between 13% (low estimate) and 40% (high estimate) of total Project construction employment, representing between 550 and 1,700 person-years of employment (see Table 3-28 and Table 3-29).

Table 3-28: Construction Phase Estimated Employment Participation by the Northern Region Aboriginal Workforce in the Keeyask Generation Project (Person-Years) – High Employment Estimates

High Employment Estimates: Regional Study Area										
Employment	**Construction Support**		**Non-Designated Trades**		**Designated Trades**		**MH and Supervisory**		**Total**	
	PY	%	PY	%	PY	%	PY	%	PY	%
Regional Study Area Aboriginal Workforce (incl. CBN)	750	18%	535	13%	310	7%	105	2%	1,700	40%
Total Demand	852		952		1,346		1,068		4,218	

Source for the Demand: Derived from data provided by Manitoba Hydro in 2010.
Source for the Participation: Analysis prepared by InterGroup Consultants Ltd.
Note:
- Numbers are subject to rounding.

Table 3-29: Construction Phase Estimated Employment Participation by the Northern Region Aboriginal Workforce in the Keeyask Generation Project (Person-Years) - Low Employment Estimates

Low Employment Estimates: Regional Study Area										
Employment	**Construction Support**		**Non-Designated Trades**		**Designated Trades**		**MH and Supervisory**		**Total**	
	PY	%	PY	%	PY	%	PY	%	PY	%
Regional Study Area Aboriginal Workforce (incl. CBN)	225	5%	115	3%	105	2%	105	2%	550	13%
Total Demand	852		952		1,346		1,068		4,218	

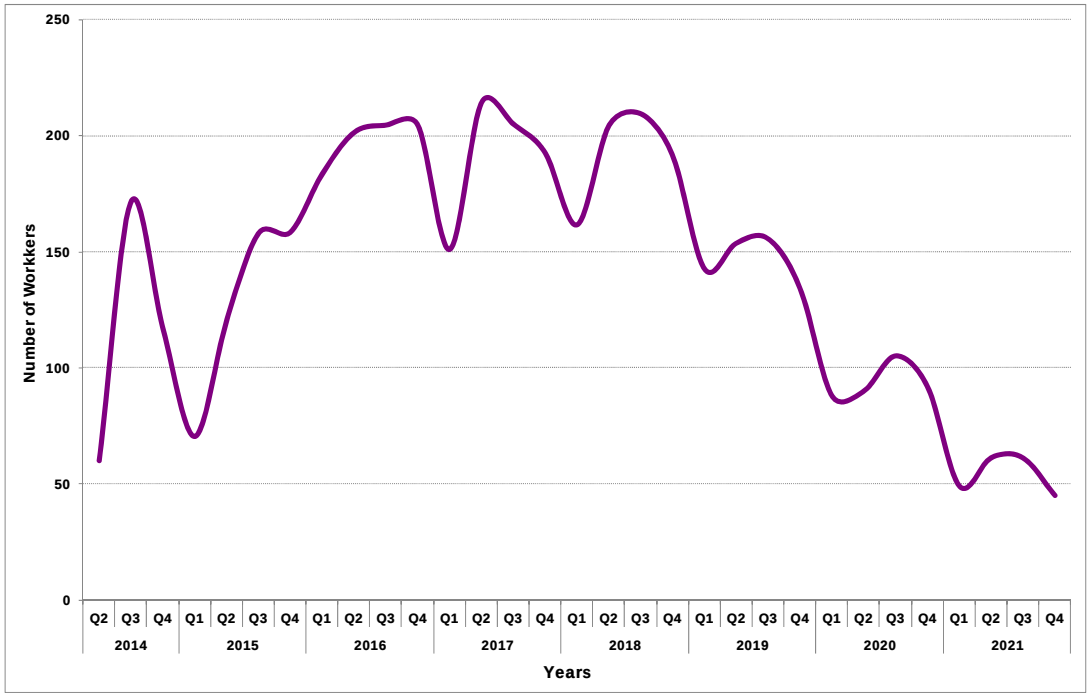
Source for the Demand: Derived from data provided by Manitoba Hydro in 2010.
Source for the Participation: Analysis prepared by InterGroup Consultants Ltd.
Note:
- Numbers are subject to rounding.

These percentages can be compared to that of the Wuskwatim Generation Project, under construction since 2006 and currently nearing completion. Like the Keeyask Generation Project, the Wuskwatim Generation Proejct construction occurred during and following the HNTEI initiative and followed the same preferential hiring provisions for northern Aboriginal workers. The construction phase has consisted of both infrastructure and major works. For a proper comparison of its employment results with the Keeyask Generation Project, only the major works construction can be considered. Construction of Wuskwatim

Generation Project major works resulted in 24% of its workforce being filled by Aboriginal workers from the Regional Study Area. This falls near the middle of the range of the Keeyask Generation Project estimates.

Aboriginal workers from the Regional Study Area (including KCNs and the CBN area) are expected to secure a high percentage of employment in the construction support (up to 88%) and non-designated trades (up to 56%) categories since there are a large number of Aboriginal workers who are qualified for these positions. A smaller proportion of designated trades and Manitoba Hydro and contract supervisory positions are likely to be filled by Aboriginal workers from the northern Region.

Figure 3-28 illustrates projected average quarterly peak employment for Aboriginal residents of the Regional Study Area.



Source: Analysis prepared by InterGroup Consultants Ltd.

Figure 3-28: Construction Phase Average Estimated Employment of the Regional Study Area Aboriginal Workforce in the Keeyask Generation Project

Employment of northern Aboriginal workers is estimated to vary between 45 and 215 workers over the construction phase. Comparing this to the average supply of northern Aboriginal workers, estimates from the employment analysis suggest that, on average, approximately 54% of those who have been identified as ready and qualified to work on the Project could gain employment. This would peak at 83% in the second quarter of 2017.

3.4.1.7.3 Mitigation

Mitigation for Regional Study Area employment includes taking the strategies described above for addressing the availability challenge and applying them to the Regional Study Area as well as tracking Aboriginal Regional Study Area employment as part of the SEMP.

3.4.1.8 Business Opportunities – Regional Study Area

There are no additional anticipated business opportunities related to construction in the Regional Study Area beyond those already discussed for the Local Study Area.

3.4.1.9 Income – Regional Study Area

Project construction will generate income from a number of sources including employment, business opportunities and payment of taxes. KCNs construction income will originate mainly from employment and to a lesser extent from business opportunities; while employment will be the main source of income for Aboriginal residents of the Regional Study Area.

As described earlier in this section, the BNA includes hiring preferences for Aboriginal workers from the CBN area and the Regional Study Area, according to the order set out in BNA Section 12.1.1.3. The following CBN and northern Aboriginal employment income estimates have been developed to illustrate the income effects of these hiring preferences.

All business income accruing to northern Aboriginal businesses is expected to result from DNCs with KCNs businesses. Tendered Contracts are typically not well-suited to the existing construction capacity in the Regional Study Area. Specifically, they usually require a large and very skilled labour force (beyond the capability of companies currently situated in the Regional Study Area). In addition, they typically require specialized equipment and experience that are not currently well developed in the Regional Study Area. Therefore, no Project business income is anticipated to accrue to northern Aboriginal businesses beyond the KCNs communities.

3.4.1.9.1 Employment Income - Churchill-Burntwood-Nelson Area

As a whole, Aboriginal workers from the CBN area, including KCNs Members, are expected to earn between $36 million and $128 million as a result of Project construction employment. Over half of this income is expected to result from DNCs, primarily from construction support employment. The remainder of employment income is expected to come from TCs, primarily through non-designated and designated trades.

In both the low and high employment estimates, more income is generated in the construction support category. Table 3-30 provides a summary of the income analysis results for the CBN area.

Table 3-30: Construction Phase Estimated Gross Employment Income Earned by the Churchill-Burntwood-Nelson Aboriginal Workforce (in millions of dollars)

CBN Region Income	High Employment Estimates			Low Employment Estimates[1]		
	All Contracts	DNC	TC	All Contracts	DNC	TC
Construction Support	51.0	41.2	9.8	12.1	11.7	0.4
Non-Designated Trades	43.8	18.1	25.7	8.4	6.2	2.2
Designated Trades	30.3	14.9	15.4	13.1	8.5	4.6
Subtotal	125.1	74.2	50.9	33.6	26.4	7.2
Manitoba Hydro And Contractor Supervisory	2.7			2.7		
Total	**127.8**			**36.3**		
Construction Support	41%	33%	8%	36%	35%	1%
Non-Designated Trades	35%	14%	21%	25%	18%	7%
Designated Trades	24%	12%	12%	39%	25%	14%
Total	**100%**	**59%**	**41%**	**100%**	**79%**	**21%**

Sources:
Workforce estimates provided by Manitoba Hydro in 2010.
Wage rates derived from BNA (Hydro Projects Management and Allied Hydro Council of Manitoba 2009).
Analysis prepared by InterGroup Consultants Ltd.
Note:
- Numbers do not always add due to rounding. Actual results will vary from estimates provided here.

The estimated effects of the hiring preferences for the CBN area outlined in the BNA for TCs, and the hiring preferences provided to KCNs Members within the CBN area for DNCs, can be seen by comparing total income estimates. The CBN area represents approximately one-third of the total northern Aboriginal population. Churchill-Burntwood-Nelson workers, however, are projected to earn 71%-75% of the total gross employment income anticipated to accrue to northern Aboriginal workers constructing the Project.

3.4.1.9.2 Employment Income – Regional Study Area

Aboriginal workers from the Regional Study Area, including all CBN workers, are estimated to earn between $49 million and $180 million in employment income during the construction phase. On average about 66% of this income is expected to be from employment under DNCs and about 34% from employment under TCs. Direct Negotiated Contract employment in both sets of estimates is expected to be focused in the construction support category, while employment under TCs is expected to be related more to non-designated and designated trades.

Table 3-31 provides a summary of estimated construction employment income for Aboriginal workers in the Regional Study Area as a whole.

Table 3-31: Construction Phase Estimated Gross Employment Income Earned by the Regional Study Area Aboriginal Workforce (in millions of dollars)

Regional Study Area Income	High Employment Estimates			Low Employment Estimates[1]		
	All Contracts	DNC	TC	All Contracts	DNC	TC
Construction Support	75.5	59.7	15.8	16.1	15.2	0.9
Non-Designated Trades	55.4	19.5	35.9	9.8	7.1	2.7
Designated Trades	41.0	16.9	24.1	14.4	8.6	5.8
Subtotal	171.9	96.1	75.8	40.3	30.9	9.4
Manitoba Hydro and Contractor Supervisory	8.2			8.2		
Total	**180.1**			**48.5**		
Construction Support	44%	35%	9%	40%	38%	2%
Non-Designated Trades	32%	11%	21%	24%	18%	7%
Designated Trades	24%	10%	14%	36%	21%	14%
Total	**100%**	**56%**	**44%**	**100%**	**77%**	**23%**

Sources:
Workforce estimates provided by Manitoba Hydro in 2010.
Wage rates derived from BNA (Hydro Projects Management and Allied Hydro Council of Manitoba 2009).
Analysis prepared by InterGroup Consultants Ltd.
Note:
- Numbers do not always add due to rounding. Actual results will vary from estimates provided here.

3.4.1.10 Cost of Living – Regional Study Area

There are no anticipated effects from the Project related to cost of living in the Regional Study Area.

3.4.1.11 Resource Economy – Regional Study Area

During the construction phase, Project effects related to the resource economy in the Regional Study Area are limited to effects on tourism (lodges and outfitters) and forestry within the Split Lake Resource Management Area. Effects are likely to result from shifting patterns of resource use due to the TCN AEA Offsetting Programs.

TOURISM, COMMERCIAL FORESTRY AND MINING

During Project construction, effects on tourism, specifically the lodges and outfitters sector of the resource economy, are likely to result from the increased wage economy (*e.g.*, challenges associated with hiring), presence of a large workforce and increased competition for resources. While construction is occurring, effects from shifting patterns of resource use due to AEA Offsetting Programs could also occur. In addition,

lodge owners and outfitters may experience reduced availability of qualified workers who seek alternate employment in Project construction. Since choices related to employment are at the discretion of the individual, no mitigation measures are recommended.

The TCN AEA Offsetting Programs, which would be occurring at the same time as Project construction, could potentially affect active lodge and outfitting activities within the Split Lake Resource Management Area as a result of shifting patterns of resource use by TCN participants. At times, these Offsetting Program areas are likely to coincide with areas in which lodges and outfitters operate. Effects, if and where experienced, are expected to be most noticeable in fall during moose hunting season and, to a lesser degree, in the spring. Changes in the patterns of resource use leading to reduced aesthetics of hunting and fishing experiences for clientele may reduce lodge operators' and outfitters' ability to attract new or retain current clients. TCN has adopted guidelines and principles for its Members when they are participating in the AEA Offsetting Programs. The guidelines and principles include respect for the land and environment. More specifically, they refer to leaving areas clean, respect for others and their property, and conducting selective harvesting which would consist of a consideration for the application of traditional and cultural values on all harvesting activities. Implementation of these guideline and principles should largely mitigate potential adverse effects on lodges and outfitters. A possible exception may be loss of customers who sense a loss of their 'wilderness experience' from increased activity in the area while they are using a lodge or outfitters services.

Increased competition for fish resources may occur in relation to the TCN Healthy Food Fish Program planned for lakes such as Waskaiowaka and Pelletier (among others) where a lodge business with an outcamp is in operation. The fish harvest sustainability plan is expected to manage this fishery sustainably to support the ongoing operation of the TCN Program. However, net fisheries and commercial sports fisheries are typically incompatible. Reductions in the abundance of large trophy fish would likely be noticeable to the Waskaiowaka and Pelletier lodge clientele if the designated harvest level is achieved from these lakes.

While forested areas will be cleared as part of the Reservoir Clearing Plan and for infrastructure requirements, this will have no immediate effect on the forest industry in Manitoba and will result in a very small reduction (738 ha/0.7%) of the productive forestland under forest management by the Province within Forest Management Unit 86. Loss in standing timber will be compensated for as per Manitoba Conservation's Forest Damage Appraisal and Valuation policy (2002). No further mitigation is required.

3.4.1.12 Economy of Canada and Manitoba

The following summarizes the provincial and national economic effects of the Project. Estimates of the Project's contribution to Gross Domestic Product, Project employment, labour income and government revenues are presented for the seven-year construction phase that begins in 2014. The information presented is based on an economic assessment carried out by Manitoba Hydro which relies heavily on analysis conducted by the Manitoba Bureau of Statistics using its national/provincial Economic Impact Assessment Model[1]. A copy of the economic assessment is presented in Appendix 3C.

Due to the capital intensive nature of hydroelectric projects, much of the provincial and national economic effects stemming from the Project are concentrated in the construction phase. It will be one of the largest

[1] Manitoba Hydro. Keeyask Generation Project: Economic Impact Assessment. Winnipeg, Manitoba. November 2011 (see Appendix 3C of SE SV).

construction projects in Canada when it is being built and the largest construction project undertaken in Manitoba since the Limestone Generating Station was built between 1985 and 1992. Construction of the Project will make a noticeable contribution to Manitoba's economy and be a prominent source of provincial economic activity.

The Project's estimated $2.2 billion in construction expenditures (in 2010 dollars without interest and escalation) is expected to generate the following provincial and national economic effects (in 2010 dollars):

- **Gross Domestic Product:** Spending on products, services and labour will contribute over $1.8 billion dollars to Canada's GDP from 2014 to 2021. Approximately 42% of this amount (about $755 million), will accrue in Manitoba, with the remaining $1 billion accruing in the rest of Canada.
- **Project Employment and Labour Income:** Construction of the Project will generate almost 21,600 person-years of direct, indirect and induced employment, and approximately $1.3 billion in labour income. This includes on-site construction jobs in northern Manitoba (2,460 person-years), off-site manufacturing, fabricating and transportation jobs in southern Manitoba and the rest of Canada as well as retail and service jobs resulting from expenditure of wages and salaries by project workers. A large share of the jobs and labour income will be in Manitoba, with nearly 8,370 person-years of employment (38%). The rest of Canada will benefit from over 13,000 person-years of added employment centered in the manufacturing and fabricating sectors.
- **Government Revenues:** Construction of the Project will generate sales, income and property tax revenues for the Federal, Provincial and local governments. Provincial governments will receive an estimated $328 million, nearly $182 million of which will flow to the Government of Manitoba. Local governments will receive an additional $60 million, with $25 million flowing to local governments in Manitoba. Over $362 million of Federal Government revenues will be generated. The Federal and Provincial governments will also benefit from reductions in social assistance and employment insurance payments where jobs are filled by people who would otherwise be unemployed. The magnitude of these savings has not been estimated.

No mitigation is required to derive these benefits. No additional monitoring is warranted.

3.4.1.13 Construction Monitoring

As noted in Chapter 8 of the Response to EIS Guidelines document, monitoring of socio-economic effects will be organized into a coordinated SEMP whose details will be developed after the Project has been filed. It will be part of a larger strategy to identify where the proposed approaches to conducting the Project and mitigating its effects may have to be adjusted in order to address observed Projects effects that do not align with what had been predicted. In relation to the economy, monitoring of construction effects is proposed for selected VECs.

3.4.1.13.1 Employment

Monitoring will be undertaken to determine the overall employment and training outcomes of Project construction with particular emphasis on Aboriginal and northern resident employment incomes. During construction, the following information will be tracked for Aboriginal, non-Aboriginal, CBN region, Northern Region and, Manitoba employees.

- Total construction opportunities available including the amount (*e.g.*, total person-years);
- Occupational classification of available opportunities; and
- Number of hires and total number of employees.

Both on-site construction employment and direct Project-related community based employment (*e.g.*, for community based job referral employment), would be covered.

Data will also be collected regularly on:

- Trainee status by on-site contractors and Manitoba Hydro, including information on trainee participation in HNTEI pre-Project training, trainee designation and apprenticeship level at the point of hire, at the point of separation and at any point during employment when reclassification occurs; and
- Factors associated with availability of workers and job qualification in a manner similar to construction of the Wuskwatim Generation Project.

If concerns with respect to employment are raised, they will be reviewed by the Advisory Group on Employment and if required internally by the Partnership, to determine whether and what form of adaptive management measures are appropriate.

3.4.1.13.2 Business Opportunities

Monitoring will occur to track business outcomes of Project construction, with a particular focus on KCN, Aboriginal and northern business participation. Monitoring will also attempt to understand any indirect business opportunities generated as a result of Project-related expenditures in Gillam, Thompson and the KCNs communities. This will be accomplished by tracking direct purchases made by the Partnership, in addition to undertaking a key person interview program in Thompson, Gillam and each of the KCNs communities at the peak of the General Civil Contract to ascertain any indirect business opportunities generated as a result of the Project.

Monitoring will also try to understand the role of KCNs businesses in implementing the DNCs and how the DNCs contribute to building KCNs business capacity. Monitoring will include a key person interview program with the main participants involved in managing the DNCs. Further to this, it will identify non-Keeyask contracts secured by joint ventures that perform DNC contracts.

3.4.1.13.3 Income

Monitoring will determine the levels of employment income generated by Project construction, and will include KCNs and CBN region employees. Monitoring will estimate the total labour income generated by the Project based on the total person-years of employment generated and applicable wage rates from the BNA. Labour income will be broken down by KCNs, CBN region, Aboriginal, non-Aboriginal, and northern Manitoban employees.

3.4.2 Operation Effects and Mitigation

Economic benefits of the operation phase to the Regional Study Area would be concentrated in the Local Study Area and would flow mainly from three sources:

- Manitoba Hydro operation employment opportunities based in Gillam – 46 operating jobs are expected to be created as a result of the Project;
- Operation employment opportunities with Manitoba Hydro created by commitments in the JKDA: the JKDA established 20-year targets for employment by Manitoba Hydro of KCNs Members across Manitoba Hydro's entire system, not just for the Keeyask Generation Project; and
- Revenue earned by the KCNs partner communities through their equity ownership in the Project.

Direct business benefits are expected to be small.

3.4.2.1 Employment Opportunities – Local Study Area

The effects of operation phase employment and training opportunities within the Local Study Area are presented separately for KCNs, Gillam and Thompson.

3.4.2.1.1 Keeyask Cree Nations

KCNs Members are expected to benefit from job opportunities that flow from Section 12.7.1 of the JKDA. This section established a 20-year target for the employment of KCNs Members in Manitoba Hydro operation and maintenance jobs. Within this 20-year timeframe, Manitoba Hydro and KCNs intend to work together, through a working group on operation jobs, to develop strategies to achieve this goal and to review and adjust these targets. The working group would make use of Manitoba Hydro employment forecasts and known KCNs labour supply data to undertake this review. Target employment levels established in the JKDA are 100 TCN Members, 10 WLFN Members, 36 YFFN Members and 36 FLCN Members by 2029. The target level of employment for all four KCNs communities is 182 jobs. These levels of employment in long-term, well-paying jobs would generate substantial benefits for each First Nation: specifically, by providing valuable full-time employment opportunities for their rapidly growing labour force, and contributing noticeably to lowering their unemployment levels.

Some of the positions filled pursuant to the JKDA operation employment provisions could include Project operation jobs.

3.4.2.1.2 Gillam

Table 3-32 identifies the Project employment positions anticipated to be required for the operation phase. These 46 full-time, high-paying positions would be based in Gillam. None are expected to be based in other Local Study Area communities. Project operation jobs would increase the current complement of full-time Manitoba Hydro employees in the community by about 13%, adding noticeably to Gillam's economic base. These jobs would be filled through Manitoba Hydro's standard hiring procedures. Most of the workers required to fill these operating positions are expected to come from outside of Gillam, since most of the qualified residents in Gillam are already employed by Manitoba Hydro. Some of the operation jobs may also be filled by KCNs Members. Qualified TCN Members living in Split Lake and FLCN Members living in

Gillam and Fox Lake (Bird) and are the most likely KCNs Members to fill Project operation jobs due to their close proximity to where the jobs are to be based.

Table 3-32: Estimated Operation and Maintenance Staff Requirements for the Keeyask Generation Project

Keeyask Site Staff	**37**
Power Supply Worker Journeyman (Electrical)	9
Power Supply Worker Journeyman (Mechanical)	9
Senior Power Supply Worker (Electrical)	1
Senior Power Supply Worker (Mechanical)	1
Maintenance Planner	1
Administrative Rep	1
Utility Workers	3
Senior Utility Worker	1
Storekeepers	1
Welder	1
Manager	1
Electrical/Operating Supervisor	1
Mechanical/Operating Supervisor	1
Power Supply Worker Trainees	6
Gillam Support Staff	**9**
Gillam Services Tradesperson (carpenter/plumber, etc)	2
Technical Services Engineers (Electrical and Mechanical)	2
Other, such as equivalent for Safety Officer, Human Resource, Admin, Finance, IT, protection/Telecontrol	5
TOTAL	**46**

Source: Data provided by Manitoba Hydro in 2009.

FLCN and Manitoba Hydro staff based in Gillam are working together to develop strategies and plans for increasing the participation of FLCN Members in Manitoba Hydro jobs based in Gillam which includes the Project and other work with Manitoba Hydro located in the vicinity of Gillam (FLCN KPI Program 2009-2010). Particular attention is being directed at assisting youth in Gillam, including FLCN members, who are currently in the school system to participate in Manitoba Hydro opportunities.

The addition of Project workers and their families would increase the population of Gillam and add to the requirement for retail and public sector services. This could create a small number of additional part-time and full-time jobs in these sectors.

3.4.2.1.3 Thompson

No direct employment effects on Thompson are expected as a result of Project operation. The increased population of Gillam would likely access the retail and hospitality services available in Thompson. Although the overall resulting economic effects are expected to be small, the effect on job creation in Thompson would be even smaller.

3.4.2.1.4 Mitigation

No mitigation measures are required.

3.4.2.2 Business Opportunities – Local Study Area

Three main business opportunities would result from the operation phase of the Project:

- Local participation by KCNs communities in the ownership of the Keeyask Project;
- Participation in contracts required to maintain the Project site (*e.g.,* snow clearing); and
- Increased business activity in Gillam where the Project's operation workforce would be based.

3.4.2.2.1 Keeyask Cree Nations

The KCNs, with Manitoba Hydro, have established a limited partnership that is responsible for planning, design, ownership, construction, operation and maintenance of the Project. Each of the KCNs partners will receive ongoing income relative to their equity investment in the Project and according to the terms of the JKDA.

JKDA Section 14.2.2 Permitted Uses states that "distributions referred to in subsection 14.2.1 may be used by a Keeyask Cree Nation for a variety of purposes including business and employment development" (CNP *et al.* 2009). This indicates that some of the income generated by the investment in the Project could be used by each of the KCNs to facilitate development of new business capacity and opportunities for their Members. Beyond this general indication, however, the direction and scale of new business opportunities are not known at this time. For each of the KCNs, future business plans will depend upon the amount of equity income available, as well as the intentions and circumstances of each KCNs and their Members. Ongoing purchases of goods and materials for Project operation and maintenance will likely result in modest opportunities for KCNs businesses, *e.g.* snow clearing contracts.

3.4.2.2.2 Gillam

During the operation phase, business opportunities in Gillam will result from the added population growth in the community, spurred by Project operation workers and their families being located in Gillam. An estimated 46 workers will be required by Manitoba Hydro to operate the facility, adding about 13% to the existing 350 Manitoba Hydro employees currently working in Gillam. With the addition of workers' families, as well as the indirect employment resulting from the Project, Gillam's population could increase by 120 to 150 people. This would represent an increase to the community's population of about 10%. Population projections for Gillam are found in Section 4.2.1.3 for the operation phase.

This increased population may enlarge the market for existing retail and consumer services in Gillam, enhancing their viability and purchasing power and possibly leading to a wider selection of products being made available to Gillam residents. The increased business activity in the operation phase may help to

counter-balance the boom-bust nature of development projects by extending business activity beyond the construction phase.

Ongoing purchases of goods and materials for Project operation and maintenance will likely result in modest opportunities for KCNs and Gillam businesses, *e.g.* snow clearing contracts.

3.4.2.2.3 Thompson

During the operation phase, following the decline in activity due to completion of Project construction, Thompson is likely to experience some increased business activity as a result of new Project operation employment in Gillam and employment and equity income flowing to the KCNs communities. At this juncture, it is not known how new income in the KCNs communities would be utilized or distributed. However, KCNs communities have described the importance of Thompson businesses and services to their Members. If the new, Project-related population in Gillam and past experiences of the KCNs communities follows existing trends, extra income could be spent in Thompson for entertainment, groceries, household goods and other items. While not quantifiable, the overall effect on Thompson businesses from this increased spending is expected to be small relative to the overall Thompson economy.

Ongoing purchases of goods and materials for Project operation and maintenance will likely result in modest opportunities for KCNs, Thompson and Gillam businesses, *e.g.* snow clearing contracts.

3.4.2.2.4 Mitigation

No mitigation or enhancement is required.

3.4.2.3 Income – Local Study Area

Two main income effects are expected to result from the Project in the Local Study Area during the operation phase; they are as follows:

- Income to KCNs Members from Manitoba Hydro and Keeyask operation jobs; and
- Income to each of the KCNs from Project profits accruing to the KCNs based on their investment in the Project.

A discussion about these effects is provided for the KCNs, Gillam and Thompson.

3.4.2.3.1 Keeyask Cree Nations Income

EMPLOYMENT INCOME

The operation jobs filled by KCNs Members through Section 12.7.1 of the JKDA would generate substantial employment income for these Members. These jobs would occur throughout Manitoba Hydro's operations, including operation of the Project. Table 3-33 provides a summary of the 20-year employment targets for each of the KCNs communities (as outlined in Section 12.7.1 of the JKDA) and the potential gross income that could be realized when these targets are reached. Income from Project operation jobs is included in these amounts.

Table 3-33: Estimated Annual Gross Income for Keeyask Cree Nations Members When 20-Year Operation Employment Targets Are Achieved (Million $)

KCNs Community	Manitoba Hydro 20-year Employment Target	Potential Annual Gross Income [1,2]	Potential Annual Net Income [1,2]
TCN	100 positions	10.8	7.4
WLFN	10 positions	1.1	.7
FLCN	36 positions	3.9	2.6
YFFN	36 positions	3.9	2.6

Source: JKDA, Section 12.7.1 (CNP *et al.* 2009)
Note:
1. Actual results will vary from estimates provided here.
2. Expected gross salary per position is provided by Manitoba Hydro, 2011 and assumed to be $108,157 per year in 2010 dollars. Net Income is calculated based on Canada Revenue Agency's Payroll Deductions Table effective July 1, 2011 for Manitoba.

INVESTMENT INCOME

Under the JKDA, KCNs communities have the option of acquiring up to 25% equity in the Project. Of this total, the CNP has the opportunity to acquire up to 15% equity in the Project, while FLCN and YFFN each have the opportunity to acquire up to 5%.

Each of the KCNs communities would eventually receive income based on their investment in the Project. Dividends will begin to accrue after the Project becomes operational and produces revenues. KCNs communities can choose to invest in the Project in one of two ways: 1) a common equity option, which requires a higher level of investment and generates a proportionate share of distributions from the Project based on Partnership financial performance, or 2) a preferred equity option. The latter option involves a lower investment and a guaranteed return on investment. In the long-term, annual dividends could provide substantial long-term, sustainable income for the community.

The distribution of annual Project dividends is expected to increase the amount of discretionary income the KCNs have to address economic, infrastructure and social needs. This may contribute to improve socio-economic circumstances for the KCNs. Section 14.2.2 of the JKDA indicates that distributions may be used by a KCNs community for the following purposes:

- Resource rehabilitation and development measures to support increased viability for traditional and commercial resource pursuits and other resource harvesting;
- Initiatives to support its Aboriginal or treaty rights;
- Cultural support and social development initiatives;
- Business and employment development undertakings;
- Local community infrastructure and housing development;
- The construction of capital projects, including related infrastructure, as well as the operation and maintenance of any capital projects, including related infrastructure; and

- Technical and legal services related to its business and other affairs.

3.4.2.3.2 Gillam

Project income effects during the operation phase will be primarily related to the employment increases identified in Section 3.4.2.1. Project employment during the operation phase will be year round. While employment will occur both at the Keeyask work site and in Gillam, all new employees related to the operation phase would be expected to live in Gillam. Table 3-34 identifies potential annual net and gross income from Project operating jobs based in Gillam. Gross income for Gillam-based employees employed during the Keeyask operation phase is expected to be in the order of $5 million gross and $3.4 million net of income taxes. As well, some indirect income would to be generated as a result of expenditure of the KCNs investment income and local spending of income from operations jobs.

Table 3-34: Increase in Annual Gross and Net Employment Income in Gillam during Operation

	Net Income	Gross Income[1,2]
Income	$3,383,985	$4,975,218

Analysis by InterGroup Consultants Ltd.
Notes:
1. Actual results will vary from estimates provided here.
2. Expected gross salary per position is provided by Manitoba Hydro, 2011 and assumed to be $108,157 per year in 2010 dollars. Net Income is calculated based on Canada Revenue Agency's Payroll Deductions Table effective July 1, 2011 for Manitoba.

3.4.2.3.3 Thompson

Some indirect income would be generated in Thompson as a result of the increased KCNs equity income and the increased employment income expected in Gillam. This equity and employment income could result in additional employment and business income, primarily at retail businesses in Thompson. Estimates regarding this income could not be determined for this analysis.

3.4.2.3.4 Mitigation

No mitigation or enhancement is required.

3.4.2.4 Cost of Living – Local Study Area

There are two potential sources of effect during the operation phase of the Project. First, the Project will increase the number of people required for Manitoba Hydro's northern operations. This will increase employment income in Gillam, with a corresponding increase in related economic activity. Second, Manitoba Hydro has committed to hiring targets for KCNs residents, as outlined in the JKDA. As noted above, this commitment to operation job targets for the KCNs applies across Manitoba Hydro's entire operational area and is not limited to the Project.

3.4.2.4.1 Keeyask Cree Nations

Since Manitoba Hydro's hiring targets apply across Manitoba Hydro's entire operations, no effect on the cost of living in KCNs communities is expected. Keeyask Cree Nations workers who participate in these operation jobs could return a small amount of their employment income to family members living in KCNs

communities, but it is unlikely that there would be enough increased income to create any tangible effect on cost of living.

3.4.2.4.2 Gillam

Project operation is expected to increase long-term employment in Gillam.

The related potential for local spending of employee income may improve the selection of food and household items available in the community and, due to the sustained nature of these jobs, could result in expansion of existing businesses or new business creation. The planned new mall could be in place by the time Project operation begins, providing added capacity to accommodate the increase in local spending from operation workers. Nevertheless, local prices are unlikely to be pressured downward due to limited competition.

Local labour costs may contribute to upward pressure on prices. However, additional available workers in the Gillam area would likely be able to handle increases in activity in the retail and consumer service sectors, especially among the families of Manitoba Hydro employees and FLCN Members.

Housing costs are not expected to be affected by the Project. Manitoba Hydro is expected to build new homes in Gillam in anticipation of operation employment increases. These homes would be available to new Project employees at the same subsidized rates as other Manitoba Hydro homes in Gillam.

3.4.2.4.3 Thompson

No Project-related cost of living effects are anticipated in Thompson during the operation phase. Related spending in Thompson due to an increase in Gillam employment is not expected to be large enough to affect the local economy. Keeyask Cree Nations employment income resulting from Project-related employment targets is expected to occur across the Province and is expected to have little effect on the Thompson economy.

3.4.2.4.4 Mitigation

No mitigation or enhancement is required.

3.4.2.5 Resource Economy – Local Study Area

Project effects on the resource economy during the operation phase could result from the following: (identified in the Resource Use Section of the SE SV):

- Loss of habitat and access due to raising of water levels and the creation of the reservoir;
- Shifting patterns of resource use through the KCNs AEA Offsetting Programs;
- Increased mercury levels in fish;
- Changes in access due to operation of the north and south access roads; and
- Income generated by KCNs investment in the Project.

Similar to the construction phase, the effects during the operation phase identified are expected to have limited consequences on cash and in-kind income and livelihood related to all resources use sectors.

With regard to the income generated by KCNs ownership participation, it is reasonable to anticipate that some portion of this income may be directed to promoting and protecting traditional resource harvesting activities, thereby enhancing their importance in the local economy and contributing to community self-sufficiency. If investments were used to enhance traditional and commercial resource harvesting, positive effects on the resource economy likely would result. Project effects through increased investment income could therefore bring about positive and long-term change in the resource economy in general. However, anticipating how this income could be distributed across various activities cannot be predicted.

Effects on commercial forestry are expected to be negligible; and the effects on mining are expected to be positive due to increased access for future exploration.

3.4.2.5.1 Commercial Resource Economy

COMMERCIAL TRAPPING

During Project operation, effects on the commercial trapping sector of the resource economy would likely result from loss of terrestrial and aquatic habitat and increased access.

Several aspects of Project operation, primarily related to terrestrial and aquatic habitat change, could potentially have an effect on the viability of commercial trapping in the local area. This includes the nature and magnitude of flooding, as well as road access.

In the case of Trapline 15, approximately 4.5% (or 42 km^2) of the total area of 950 km^2 will be flooded. This will increase to just over 5% due to reservoir expansion over 30 years. Trapline 9 will not be affected by flooding, but will contain about 12 km of the new south access road. Trapline 7 is expected to experience just over 1% cent flooding (or just under two km^2). Trapline 25 is expected to experience flooding to less than 1% of its land. During operation, the north and south access roads are expected to form part of the provincial highway system. Increased traffic associated with the highway could potentially lead to wildlife disturbance on Traplines 15 and 9.

To mitigate adverse effects, Manitoba Hydro expects to have Trapline agreements in place for all affected Traplines including 7, 9 and 15. Minor effects to Trapline 25, a TCN community line, will be treated differently (see Resource Use section of the SE SV).

Increased road access may also contribute to the economic viability of Traplines 15 and 9 by providing safe and cost-effective access to areas that were previously not accessible (*e.g.*, portion of Trapline 15 south of the Nelson River, western half of Trapline 9). This improved accessibility would be expected to increase productivity on these two traplines, thus having the potential to increase the resource economy related to commercial trapping.

COMMERCIAL FISHING

The primary Project effect on commercial fishing, as a result of the operation phase, will be the increased mercury concentrations post-impoundment.

Although there is no existing commercial fishery on Gull Lake, increased levels of mercury will preclude the opportunity for any such fishery to be established for approximately 30 years post-impoundment, due to an increase in the levels of mercury in fish.

In Stephens Lake (the location of a small-scale, single licence fishery with authorization for local sale of fish), the mean standardized mercury level for pickerel (the primary target species of the fishery) is expected to increase to just under 0.5 ppm, which corresponds to the upper limit set by Health Canada for retail fish sales. Since the sale of pickerel from Stephens Lake is typically directed towards local retailers and consumers (rather than through the Freshwater Fish Marketing Corporation), standard testing by the Canadian Food Inspection Agency for mercury is not likely to take place (see Resource Use Section).

As discussed under construction phase mitigation, the Stephens Lake fishery is expected to be discontinued by agreement with the operator.

TOURISM, COMMERICAL FORESTRY AND MINING

Potential Project effects during the operation phase on tourism (lodges and outfitters) are mainly covered under the Regional Study Area, Section 3.4.1.11. For businesses based in Gillam, access will be improved (travel time from Thompson will be reduced) as a result of re-routing of PR 280 along the south access road, across the generating station and along the north access road, potentially leading to an increased client base. However, since most clients tend to be from the United States, these effects are not expected to be substantial.

Project-specific residual effects on forestry resources are negligible. Where timber is salvaged and utilized, positive environmental and economic effects are anticipated (see Resource Use Section).

Project operation effects on mining activities in the Local Study Area are expected to be positive (due to improved access). The access roads could potentially result in increased mineral exploration activity in the Local Study Area (see Resource Use Section).

3.4.2.5.2 Mitigation

No mitigation is proposed.

3.4.2.6 Resource Economy – Regional Study Area

Project operations are not expected to create noticeable effects on the resource economy outside of the Local Study Area. TCN's AEA Access Program is being implemented using TCN's principles and guidelines for users of the Access Program. This should limit long-term, Project operation effects on lodges and outfitters. No further mitigation is required.

3.4.2.7 Economy of Canada and Manitoba

Similar estimates are also provided for a typical operation phase year, which would begin in 2019.

The Keeyask Generating Station has a design life of at least 60 years. Operating and maintenance activities will be quite similar from year to year except for those few years when repair or rehabilitation needs to be carried out. A typical year's expenditure will be about $5.7 million including water rental accruing each year to the Manitoba Government. This accounts for nearly 90% of this amount. These expenditures will generate the following annual economic effects (in 2010 dollars) when the Project is operating in a typical manner.

- **Gross Domestic Product:** Operation of the Project will generate an estimated $6.9 million of Gross Domestic Product in Manitoba, and just over $0.7 million in the rest of Canada. The high concentration

in Manitoba is due to the high proportion of total expenditures accounted for by water rentals paid to the Manitoba Government.

- **Project Employment and Labour Income:** Only a relatively small number of people will be required to operate and maintain the generating station. About 91 person-years of direct, indirect and induced employment will be generated in a typical year of Project operation, 76 of which will occur in Manitoba and 15 of which will occur in the Rest of Canada. Labour income will amount to $6 million in Manitoba and $0.4 million in the Rest of Canada.
- **Government Revenues:** Government revenues will largely be concentrated in Manitoba where the Provincial Government will receive almost $29.4 million each year, comprised largely of water rentals. Federal revenues will be approximately $1.2 annually.

These benefits will be generated in the absence of any further mitigation. No additional monitoring is warranted.

3.4.2.8 Operation Monitoring

No monitoring is proposed.

3.4.3 Summary of Residual Project Effects

3.4.3.1 Summary of Construction Effects

Table 3-35 provides a summary of expected Project construction effects, high-level mitigation and monitoring identified to address those effects, assessment characteristics used (magnitude, geographic extent and duration) and the residual effects (after mitigation) pertaining to the Socio-Economic Local and Regional study areas (where applicable).

Table 3-35: Construction Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
EMPLOYMENT (Keeyask Cree Nations, Gillam, Thompson, CBN, Northern Aboriginal)			
Project includes substantial increased employment throughout construction phase, particularly through DNCs for the KCNs	No mitigation required as best practices in place through BNA and JKDA Enhancements include strategies to enhance participation of northern Aboriginal workers to work on construction jobs, particularly availability-oriented measures Monitoring of employment hires and job type and trainee status for Aboriginal, non-Aboriginal, northern, Manitoba and CBN region as part of SEMP	Increased employment	Direction: Positive Magnitude: Moderate Geographic Extent: Medium Duration: Short-term

Table 3-35: Construction Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
BUSINESS OPPORTUNITIES (Keeyask Cree Nations)			
Increased business opportunities and community capacity	None required Opportunities for KCNs involvement through DNCs in place Monitoring to track outcomes, expenditures, and role of DNCs	Increased business opportunities and community capacity	Direction: Positive Magnitude: Moderate Geographic Extent: Medium Duration: Short-term
Increased business revenue	None required	Increased business revenue, capital	Direction: Positive Magnitude: Moderate Geographic Extent: Medium Duration: Short-term
Expansion of business network	None required	Expansion of business network	Direction: Positive Magnitude: Moderate Geographic Extent: Medium Duration: Short-term

Table 3-35: Construction Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
BUSINESS OPPORTUNITIES (Gillam)			
Increased business opportunities	None required Enhancement includes the maintenance of communication with organizations on opportunities through Manitoba Hydro's Northern Purchasing Policy Monitoring of Project-related expenditures in Gillam through KPI program and business survey	Increased business opportunities for new and existing local businesses	Direction: Positive Magnitude: Small to Moderate Geographic Extent: Medium Duration: Short-term
BUSINESS OPPORTUNITIES (Thompson)			
Increased business opportunities	Maintain communication with organizations in City of Thompson on opportunities through Manitoba Hydro's Northern Purchasing Policy	Increased opportunities and revenue for existing local businesses	Direction: Positive Magnitude: Small to Moderate Geographic Extent: Medium Duration: Short-term

Table 3-35: Construction Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
INCOME (Keeyask Cree Nations)			
Increased employment income	None required Monitoring of labour income generated as part of SEMP	Increased employment income	Direction: Positive Magnitude: Moderate to Large Geographic Extent: Medium Duration: Short-term
Increased business income	None required KPIs with key participants in managing the DNCs	Increased capacity of local business	Direction: Positive Magnitude: Moderate to Large Geographic Extent: Medium Duration: Short-term
INCOME (Gillam, Thompson)			
Increased employment income	None required Monitoring of labour income generated as part of SEMP	Increased employment income	Direction: Positive Magnitude: Small to Moderate Geographic Extent: Small to Medium Duration: Short-term
Increased business income	None required	Increased business income	Direction: Positive Magnitude: Small to Moderate Geographic Extent: Small to Medium Duration: Short-term

Table 3-35: Construction Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
INCOME (Regional Study Area)			
Increased employment income	None required Monitoring of labour income generated as part of SEMP (breakdown labour income by KCNs, CBN region, Aboriginal, non-Aboriginal, northern and Manitoban)	Increased employment income	Direction: Positive Magnitude: Small to Moderate Geographic Extent: Large Duration: Short-term
COST OF LIVING (Keeyask Cree Nations, Gillam, Thompson)			
Little tangible effect that can be attributed to the Project	None required	Little tangible effect	Direction: Neutral
RESOURCE ECONOMY – Commercial Trapping			
Decreased harvest and associated income	Settlements with trappers for loss of income No monitoring intended	No net effect	Direction: Neutral
RESOURCE ECONOMY – Commercial Fishing			
Decreased harvest and associated income	Settlement with business for closure of fishing business No monitoring intended	No net effect	Direction: Neutral

Table 3-35: Construction Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
RESOURCE ECONOMY – Tourism, Commercial Forestry and Mining			
Potential disturbance of certain lodges and outfitters	Implementation of TCN's guidelines and principles for their Access Program Fish Harvest Sustainability Plan	Disturbance of certain lodges and outfitters	Direction: Neutral
Loss of forestland for Project infrastructure	Compensation will be provided	Negligible loss	Direction: Negligible
No effects on commercial mining	None required	No effect	No effect
ECONOMY OF CANADA AND MANITOBA			
Increased level of economic activity	None required	Increased employment, employment income, GDP and government revenues	Direction: Positive Magnitude: Moderate Geographic Extent: Large (*i.e.,* Manitoba and Canada) Duration: Short-term

Notes:
Direction: Positive, Neutral , Adverse
Magnitude: Small, Moderate, Large
Geographic Extent: Small, Medium, Large
Duration: Short-term, Medium-term, Long-term

In summary, residual effects of the Project after mitigation on employment, opportunities in the construction phase are expected to be positive due to increased employment opportunities, medium to large in geographic extent, of short-term duration and of moderate magnitude. KCNs workers are projected to account for between 6% and 14% of the total construction workforce. The full extent will depend on the uptake of employment opportunities. Monitoring will be undertaken to track employment opportunities, trainee status, factors associated with employment challenges and other information.

Residual effects of the Project after mitigation on business opportunities are also expected to be positive, small to moderate in magnitude, medium in geographic extent and short-term. This is due to increased business opportunities (including KCNs DNCs) and resulting enhanced community capacity, business revenue and business networks. Monitoring will track business opportunities, DNC involvement, expenditures and other information.

Residual effects of the Project after mitigation on income are expected to be positive, small to large (depending on the group) in magnitude, small to medium in geographic extent, and short-term. This would result from increases in employment and business income. Monitoring of labour income generated will take place.

Residual effects of the Project after mitigation on cost of living are expected to be neutral for the KCNs, Gillam and Thompson.

Residual effects of the Project after mitigation on commercial trapping are expected to be neutral after taking into consideration compensation to trappers. The Stephens Lake fishery is expected to be closed by agreement with the operator, including compensation provided to the business. Residual effects of the Project after mitigation on tourism (lodges and outfitters specifically) are expected to be neutral. Residual effects on commercial forestry are expected to be negligible; and there are no expected residual effects on mining.

3.4.3.2 Summary of Operation Effects

Table 3-36 provides a summary of expected Project operation effects, high-level mitigation and monitoring identified to address those effects, assessment characteristics used (*e.g.*, magnitude, geographic extent and duration) and the residual effects (after mitigation) pertaining to the socio-economic Local and Regional Study Areas (where applicable).

Table 3-36: Operation Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
TRAINING AND EMPLOYMENT (Keeyask Cree Nations)			
Increased employment opportunities – both Project operation jobs and system-wide opportunities	None required JKDA targets for Manitoba Hydro operations employment for KCNs. Monitoring through the SEMP	Increased employment	Direction: Positive Magnitude: Moderate Geographic Extent: Medium to Large Duration: Long-term
TRAINING AND EMPLOYMENT (Gillam, Thompson)			
Increased employment opportunities	None required	Increased employment	Direction: Positive Magnitude: Moderate Geographic Extent: Medium Duration: Long-term
BUSINESS OPPORTUNITIES (Keeyask Cree Nations)			
Increased opportunities for KCNs businesses (*e.g.,* snow clearing)	None required Monitoring through the SEMP	Increased opportunities for KCNs businesses Increased community capacity to start and manage businesses	Direction: Positive Magnitude: Small to Moderate Geographic Extent: Medium Duration: Long-term

Table 3-36: Operation Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
BUSINESS OPPORTUNITIES (Gillam)			
Increased business opportunities	None required	Increased business opportunities, with wider selection of goods and services, increase in variety of businesses	Direction: Positive Magnitude: Small to Moderate Geographic Extent: Small Duration: Long-term
INCOME (Keeyask Cree Nations)			
Increased employment income through long-term employment opportunities	None required Monitoring through SEMP	Increased employment income	Direction: Positive Magnitude: Moderate to Large Geographic Extent: Medium to Large Duration: Long-term
INCOME (Gillam, Thompson)			
Increased employment income	None required	Potential for increased local spending	Direction: Positive Magnitude: Small to Moderate Geographic Extent: Small to Medium Duration: Long-term
COST OF LIVING			
No effect	None required	No effect	No effect

Table 3-36: Operation Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
RESOURCE ECONOMY – Commercial Trapping and Fishing			
Commercial resource use loss	Settlements with resource users No monitoring intended	No residual effect	Direction: Neutral
RESOURCE ECONOMY – Tourism, Commercial Forestry and Mining			
Potential disturbance of certain lodges and outfitters	Implementation of TCN's guidelines and principles for AEA Access Program participants	Disturbance of certain lodges and outfitters	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Long-term
Improved access for mineral exploration via the new access roads	None required	Improved access	Direction: Positive Magnitude: Small Geographic Extent: Medium Duration: Long-term
Permanent loss of forestland (negligible)	Compensation for loss of standing timber	Loss in forestland	Direction: Negligible

Table 3-36: Operation Effects on Economy

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
ECONOMY OF CANADA AND MANITOBA			
Increased level of economic activity	None required	Increased employment, employment income, GDP and government revenues	Direction: Positive Magnitude: Small Geographic Extent: Large (*i.e.,* Manitoba and Canada) Duration: Long-term

Notes:
Direction: Positive, Neutral , Adverse
Magnitude: Small, Moderate, Large
Geographic Extent: Small, Medium, Large
Duration: Short-term, Medium-term, Long-term

In summary, residual effects of the Project (during operation) after mitigation on employment opportunities are expected to be positive, moderate in duration, small to large in geographic extent (due to system-wide employment opportunities for the KCNs) and long-term. Provisions in the JKDA provide for the opportunity for KCNs Members employment in 182 operation positions across Manitoba Hydro's system. The Project is expected to require 46 full-time, well-paying operation positions based in Gillam.

Residual effects of the Project after mitigation on business opportunities (for KCNs, Gillam and Thompson) are expected to be positive, small to moderate in magnitude, small to medium in geographic extent and long-term. These residual effects include increased business opportunities and community capacity to develop, manage and potentially expand businesses. In Thompson, residual effects are likely to be very small, resulting from re-spending of employment income within the City.

Income effects would result from KCNs Members participating in Manitoba Hydro system-wide jobs and Keeyask operation jobs. KCNs communities will also receive income based on their investment in the Project. As such, likely residual effects of Project operation on KCNs income are expected to be positive, medium to large in geographic extent (due to system-wide employment opportunities), of long-term duration and moderate to large in magnitude. Residual effects related to income in Gillam and Thompson are expected to be positive, small to medium in geographic extent, long-term and small to moderate in magnitude.

There are no anticipated residual effects of the Project on cost of living in the KCNs communities, Gillam, Thompson and the rest of the Regional Study Area.

Effects on resource economy during the operation phase are expected to have limited consequences on cash and in-kind income and livelihood related to all resource use sectors. Therefore, the likely residual effects are expected to be neutral (domestic and commercial resource use losses are to be compensated); residual effects on tourism are expected to be adverse; those on commercial forestry are expected to be negligible; and there are positive residual effects on mining due to improved access. In the adverse effects on tourism, these effects are expected to be small in magnitude, medium in geographic extent, and of long-term duration.

APPENDIX 3A
SUPPLEMENTARY DATA TABLES

KEEYASK
Hydropower Limited Partnership

LIST OF TABLES

Page

3A.0 INTRODUCTION

This appendix serves as a repository for more comprehensive data sets than those presented in Section 3. These tables include the complete dataset for tables that may have been abridged within the main volume, or in some cases have been presented as summary charts. Key topics (for KCNs, Northern Region, Thompson and Gillam) include:

- Labour force;
- Employment, participation and unemployment;
- Education;
- Employment skills by job category;
- Occupational classification;
- Income; and
- Cost of living.

Table 3A-1: Labour Force in KCNs Communities (1991, 2001, 2006)

Characteristics[1]	KCNs Members[2]		WLFN and YFFN
	1991	2001	2006[3]
Potential Labour Force (15 years and older)[4]	1,040	1,445	350
Active Labour Force – Employed[5]	290	515	180
Active Labour Force – Unemployed[5]	185	340	30
Not in the Labour Force[6]	570	600	135
Participation Rate[7]	46.2%	58.8%	61.4%
Employment Rate[7]	27.9%	35.6%	51.4%
Unemployment Rate[7]	38.5%	40.0%	14.0%

Source: Statistics Canada 1992, 2002, 2007a.
Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. KCNs includes Members of TCN, WLFN, FLCN and YFFN. Statistics Canada refers to these communities as Split Lake, Ilford, Fox Lake 2 and York Landing, respectively.
3. Figures exclude TCN and FLCN. Data have been suppressed by Statistics Canada.
4. Potential labour force defined as all individuals 15 years of age and older.
5. Employed Active Labour Force and the Unemployed Active Labour Force calculated by InterGroup Consultants based on Statistics Canada employment and unemployment rates.
6. 'Not in the Labour Force' calculated by InterGroup Consultants based on Statistics Canada data as the difference between the total KCNs population 15 years and over and the combined number of employed and unemployed individuals in the Active Labour Force.
7. The participation rate and employment rate are expressed as a percentage of the total population 15 years of age and over; the unemployment rate is expressed as a percentage of the total active labour force. Each is based on individual data for the week (Sunday to Sunday) prior to Census Day. Each is calculated as a weighted average of the populations of TCN, WLFN, FLCN and YFFN (or in the case of 2006, a weighted average of WLFN and YFFN).

Table 3A-2: Employment, Participation and Unemployment Rates in KCNs Communities and Comparison Populations (2001)

Characteristics[1]	KCNs Members[2]	Comparison Populations		
		Northern Aboriginal Residents[3]	Northern Region[4]	Manitoba
Potential Labour Force (15 years and older)[5]	1,445	33,990	54,945	869,315
Active Labour Force – Employed[6]	515	12,475	27,445	549,990
Active Labour Force – Unemployed[6]	340	4,785	5,665	35,430
Not in the Labour Force[7]	600	16,730	21,825	283,895
Participation Rate[8]	58.8%	50.8%	60.3%	67.3%
Employment Rate[8]	35.6%	36.7%	49.9%	63.3%
Unemployment Rate[8]	40.0%	27.7%	17.1%	6.1%

Source: Statistics Canada 2002.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. KCNs includes Members of TCN, WLFN, FLCN and YFFN. Statistics Canada refers to these communities as Split Lake, Ilford, Fox Lake 2 and York Landing, respectively.
3. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
4. The Northern Region is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
5. Potential labour force defined as all individuals 15 years of age and older.
6. Employed Active Labour Force and the Unemployed active labour force for the KCNs, Northern Region and Northern Aboriginal residents calculated by InterGroup Consultants based on Statistics Canada employment and unemployment rates.
7. 'Not in the Labour Force' calculated by InterGroup Consultants based on Statistics Canada: for KCNs, Northern Aboriginal residents and the Northern Region, calculated as the difference between each population and the combined number of employed and unemployed individuals in the Active Labour Force.
8. The participation rate and employment rate are expressed as a percentage of the total population 15 years of age and over; the unemployment rate is expressed as a percentage of the total active labour force. Each is based on individual data for the week (Sunday to Sunday) prior to Census Day. Each is calculated as a weighted average of the populations of TCN, WLFN, FLCN and YFFN.

Table 3A-3: Highest Level of Education in KCNs Communities and Comparison Populations (2001)

Characteristics[1,2]	KCNs Members[3]	Comparison Populations		
		Northern Aboriginal Residents[4,5]	Northern Region[6]	Manitoba
Population 20 years and over[7]	1,260	24,335	47,555	789,615
Less than high school certificate[8]	760 (60.3%)	14,500 (59.6%)	22,910 (48.2%)	271,895 (34.4%)
High school certificate or equivalent[9]	85 (6.7%)	1,420 (5.8%)	4,045 (8.5%)	89,725 (11.4%)
Trades certificate or diploma	100 (7.9%)	n/a	6,160 (13.0%)	92,545 (11.7%)
Post secondary non-university certificate or diploma[10]	90 (7.1%)	n/a	5,240 (11.0%)	112,870 (14.3%)
University certificate or diploma[11]	20 (1.6%)	n/a	665 (1.4%)	19,270 (2.4%)
Some post-secondary education[12]	145 (11.5%)	2,530 (10.4%)	4,840 (10.2%)	90,160 (11.4%)
Trades, college or university certificate or degree (below bachelor's level)	n/a	4,980 (20.5%)	n/a	n/a
University degree[13]	55 (4.4%)	885 (3.6%)	3,715 (7.8%)	113,150 (14.3%)

Source: Statistics Canada 2002.
Notes:

1. Highest Level of Educational Attainment is based on 20% sample data. All Statistics Canada data are subject to a random rounding procedure.
2. 'Highest Level of Education Attained' refers to the highest certificate, diploma or degree that an individual has completed based primarily on time spent 'in-class'. For high school graduates, a university education is considered to be a higher level of education than a college diploma, while a college education is considered to be a higher level education than a trade. Although some trades requirements may take as long or longer to complete than a college or university program, the majority of time acquiring trade certification may be on-the-job training, as opposed to being in a classroom.
3. KCNs Members includes Members of TCN, WLFN, FLCN and YFFN. Statistics Canada refers to these communities as Split Lake, Ilford, Fox Lake 2 and York Landing, respectively.
4. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
5. Data source for Northern Aboriginal residents is Statistics Canada website, 2001 Census of Canada Aboriginal Population Profiles. The organization of education data on Statistics Canada website differs from other sources, with

categories of educational attainment difficult to compare to the original categories. For this reason, the data have been maintained in website categories to reduce errors.

6. The Northern Region is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
7. Northern Aboriginal residents' population is provided for 25 years and over, while comparison populations use 20 years and over.
8. The 2001 data set used the education categories "Grades 9-13 without secondary certificate" and "Less than grade 9". Data for these education categories have been placed under "Less than high school certificate".
9. The 2001 data set used the education category "Grades 9-13 with high school graduation certificate". Data for this education category have been placed under "High school certificate or equivalent".
10. The 2001 data set used the education category "College – with certificate or diploma". Data for this education category have been placed under "Postsecondary non-university certificate or diploma".
11. The 2001 data set used the education category "University - with certificate or diploma". Data for this education category have been placed under "University certificate or diploma".
12. The 2001 data set used the education categories "College – without certificate or diploma" and "University – without certificate or diploma". Data for these education categories have been placed under "Some post-secondary".
13. The 2001 data set used the education category "University - with bachelor's degree or higher". Data for this education category have been placed under "University degree".

Table 3A-4: Labour Force by Occupation Classification in KCNs Communities (2001)

Characteristics[1]	KCNs[2]	Comparison Populations		
		Northern Aboriginal Residents[3]	Northern Region[4]	Manitoba
Total labour force 15 years and over	845	15,435	33,120	585,420
Not applicable[5]	195 (23.1%)	n/a	1,935 (5.8%)	8,075 (1.4%)
All occupations[6]	645 (76.3%)	n/a	31,180 (94.1%)	577,345 (98.6%)
Management occupations	50 (5.9%)	1,060 (6.9%)	2,395 (7.2%)	50,850 (8.7%)
Business, finance and administration occupations	60 (7.1%)	1,570 (10.2%)	3,600 (10.9%)	101,940 (17.4%)
Natural and applied sciences and related occupations	10 (1.2%)	240 (1.6%)	1,210 (3.6%)	26,695 (4.6%)
Health occupations	25 (3.0%)	540 (3.5%)	1,380 (4.2%)	36,690 (6.3%)
Social science, education, government service and religion	140 (16.6%)	2,230 (14.4%)	3,940 (11.9%)	45,890 (8%)
Art, culture, recreation and sport	0	180 (1.2%)	380 (1.1%)	12,165 (2.1%)
Sales and service occupations	195 (23.1%)	5,120 (33.2%)	8,685 (26.2%)	139,940 (23.9%)
Trades, transport and equipment operators and related occupations	140 (16.6%)	2,880 (18.7%)	5,710 (17.2%)	85,640 (14.6%)
Occupations unique to primary industry	10 (1.2%)	1,140 (7.4%)	2,615 (7.9%)	40,580 (6.9%)
Occupations unique to processing, manufacturing and utilities	20 (2.4%)	475 (3.1%)	1,270 (3.8%)	36,945 (6.3%)

Source: Statistics Canada 2002.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. KCNs includes Members of TCN, WLFN, FLCN and YFFN. Statistics Canada refers to these communities as Split Lake, Ilford, Fox Lake 2 and York Landing, respectively.
3. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
4. The Northern Region is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
5. Not available for Northern Aboriginal Resident population.
6. Not available for Northern Aboriginal Resident population.

Table 3A-5: Employment Model Skills by Job Category in KCNs (2014, 2021)

Skills By Job Category[1]	2014 (Construction Start)		2021 (Construction End)	
	KCNs Labour Supply Resulting From HNTEI[1]	KCNs Total Labour Supply[2]	KCNs Labour Supply Resulting From HNTEI[1]	KCNs Total Labour Supply[2]
DESIGNATED TRADES (CONSTRUCTION, TRANSPORTATION AND INDUSTRIAL)	31	83	31	87
Crane Operator	2	2	2	2
Mechanic		7	-	7
Carpenter	20	45	20	44
Millwright (Industrial Mechanic)	4	6	4	6
Iron Worker (excluding Reinforcing Workers)	1	1	1	1
Electrician	3	9	3	11
Lineman	-	5	-	6
Plumber	1	8	1	10
Welder	-	-	-	-
NON-DESIGNATED TRADES (CONSTRUCTION, TRANSPORTATION AND INDUSTRIAL)	116	165	116	169
Trade Helpers and Construction Labours	23	39	23	41
Driller / Blaster	-	1	-	1
Heavy Equipment Operator (excluding Crane Operators)	50	63	50	63
Teamster	34	53	34	55
Serviceman (including Oilers, Warehouseman)	9	9	9	9
CONSTRUCTION SUPPORT AND SERVICE TRADES	95	231	95	253

Table 3A-5: Employment Model Skills by Job Category in KCNs (2014, 2021)

Skills By Job Category[1]	2014 (Construction Start)		2021 (Construction End)	
	KCNs Labour Supply Resulting From HNTEI[1]	KCNs Total Labour Supply[2]	KCNs Labour Supply Resulting From HNTEI[1]	KCNs Total Labour Supply[2]
Technical (Surveyors and Drafting)	10	22	10	28
Clerical (Clerks and Typists)	48	65	48	66
Catering and Janitorial	6	63	6	75
Security	31	65	31	68
First Aid[3]	-	5	-	5
Employee Retention Support[3]	-	11	-	11
TOTAL	242	479	242	509

Source: Derived from Wuskwatim Keeyask Training Consortium 2009/10 fourth quarter report. Analysis prepared by InterGroup Consultants Inc., 2010.

Notes:

1. Table includes a portion (5%) of apprentices that have achieved less than Level 1 apprenticeship. Table includes graduates that have undertaken training through the HNTEI in occupational classifications that align with Keeyask workforce estimates as of August 2010.
2. A factor of 80% was applied to off-reserve KCNs residents. This means that 80% of off-reserve KCNs residents were assumed to be either living in the region in communities such as Thompson and Gillam or would be returning from southern Manitoba to take advantage of employment opportunities. This skills inventory identifies the estimated maximum number of KCNs Members available to work on the Project and includes people who are already employed, may not have the proper qualifications required by hydro projects and who may not be available to secure employment opportunities when they arise. These and other factors are taken into account during the scenario analysis portion of the employment modeling.
3. No information is available for the First Aid and Employee Retention Support categories. The data provided here is based on an assumption that all workforce demand in these categories will be filled by KCNs supply.

Table 3A-6: Change in Employment, Participation and Unemployment Rates in Gillam (1991, 2001, 2006)

Characteristics[1]	Gillam		
	1991	2001	2006
Potential Labour Force (15 years and older)[2]	1,325	815	855
Active Labour Force – Employed	930	580	605
Active Labour Force – Unemployed	115	40	55
Not in the Labour Force	285	195	190
Participation Rate[3]	78.5%	76.7%	77.8%
Employment Rate[3]	70.2%	71.2%	70.8%
Unemployment Rate[3]	11.1%	6.4%	8.3%

Source: Statistics Canada 1992, 2002, 2007a.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. Potential labour force defined as all individuals 15 years of age and older.
3. The participation rate, employment rate and unemployment rate refer to the labour force, number of persons employed and number of persons unemployed (respectively) during the week (Sunday to Sunday) prior to Census Day. The participation rate and employment rate are expressed as a percentage of the total population 15 years of age and over; the unemployment rate is expressed as a percentage of the total active labour force.

Table 3A-7: Employment, Participation and Unemployment Rates in Gillam and Comparison Populations (2001)

Characteristics[1]	Gillam	Comparison Populations		
		Northern Aboriginal Residents[2]	Northern Region[3]	Manitoba
Potential Labour Force (15 years and older)[4]	815	33,990	54,945	869,315
Active Labour Force – Employed[5]	580	12,475	27,445	549,990
Active Labour Force – Unemployed[5]	40	4,785	5,665	35,430
Not in the Labour Force[6]	195	16,730	21,825	283,895
Participation Rate[7]	76.7%	50.8%	60.3%	67.3%
Employment Rate[7]	71.2%	36.7%	49.9%	63.3%
Unemployment Rate[7]	6.4%	27.7%	17.1%	6.1%

Source: Statistics Canada 2002.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
3. The Northern Region is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Potential labour force defined as all individuals 15 years of age and older.
5. Employed Active Labour Force and the Unemployed Active Labour Force for Gillam and comparison populations calculated by InterGroup Consultants based on Statistics Canada employment and unemployment rates.
6. 'Not in the Labour Force' calculated by InterGroup Consultants based on Statistics Canada: for Gillam and comparison populations, calculated as the difference between each population and the combined number of employed and unemployed individuals in the Active Labour Force.
7. The participation rate and employment rate are expressed as a percentage of the total population 15 years of age and over; the unemployment rate is expressed as a percentage of the total active labour force. Each is based on individual data for the week (Sunday to Sunday) prior to Census Day. Each is calculated as a weighted average of the population.

Table 3A-8: Highest Level of Education in Gillam and Comparison Populations (2001)

Characteristics[1,2]	Gillam	Comparison Populations		
		Northern Aboriginal Residents[3,4]	Northern Region[5]	Manitoba
Population 20 years and over[6]	725	24,335	47,555	789,615
Less than high school certificate[7]	210 (29.0%)	14,500 (59.6%)	22,910 (48.2%)	271,895 (34.4%)
High school certificate or equivalent[8]	80 (11.0%)	1,420 (5.8%)	4,045 (8.5%)	89,725 (11.4%)
Trades certificate or diploma	150 (20.7%)	n/a	6,160 (13.0%)	92,545 (11.7%)
Post secondary non-university certificate or diploma[9]	140 (19.3%)	n/a	5,240 (11.0%)	112,870 (14.3%)
University certificate or diploma[10]	15 (2.1%)	n/a	665 (1.4%)	19,270 (2.4%)
Some post-secondary	n/a	2,530 (10.4%)	4,840 (10.2%)	90,160 (11.4%)
Trades, college or university certificate or degree (below bachelor's level)	n/a	4,980 (20.5%)	n/a	n/a
University degree[11]	70 (9.7%)	885 (3.6%)	3,715 (7.8%)	113,150 (14.3%)

Source: Statistics Canada 2002.

Notes:

1. Highest Level of Educational Attainment is based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. 'Highest Level of Education Attained' refers to the highest certificate, diploma or degree that an individual has completed based primarily on time spent 'in-class'. For high school graduates, a university education is considered to be a higher level of education than a college diploma, while a college education is considered to be a higher level education than a trade. Although some trades requirements may take as long or longer to complete than a college or university program, the majority of time acquiring trade certification may be on-the-job training, as opposed to being in a classroom.
3. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Data source for Northern Aboriginal residents is Statistics Canada website, 2001 Census of Canada Aboriginal Population Profiles. The organization of education data on Statistics Canada website differs from other sources, with categories of educational attainment difficult to compare to the original categories. For this reason, the data have been maintained in website categories to reduce errors.
5. The Northern Region is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
6. Northern Aboriginal residents' population is provided for 25 years and over, while comparison populations use 20 years and over.
7. The 2001 data set used the education categories "Grades 9-13 without secondary certificate" and "Less than rade 9". Data for these education categories have been placed under "Less than high school certificate".
8. The 2001 data set used the education category "Grades 9-13 with high school graduation certificate". Data for this

education category have been placed under “High school certificate or equivalent”.

9. The 2001 data set used the education category “College – with certificate or diploma”. Data for this education category have been placed under “Postsecondary non-university certificate or diploma”.
10. The 2001 data set used the education category “University - with certificate or diploma”. Data for this education category have been placed under “University certificate or diploma”.
11. The 2001 data set used the education category “University - with bachelor’s degree or higher”. Data for this education category have been placed under “University degree”.

Table 3A-9: Labour Force by Occupation Classification in Gillam and Comparison Populations (2001)

Characteristics[1]	Gillam	Comparison Populations		
		Northern Aboriginal Residents[2]	Northern Region[3]	Manitoba
Total labour force 15 years and over	625	15,435	33,120	585,420
Not applicable[4]	10 (1.6%)	n/a	1,935 (5.8%)	8,075 (1.4%)
All occupations[5]	615 (98.4%)	n/a	31,180 (94.1%)	577,345 (98.6%)
Management occupations	45 (7.2%)	1,060 (6.9%)	2,395 (7.2%)	50,850 (8.7%)
Business, finance and administration occupations	75 (12.0%)	1,570 (10.2%)	3,600 (10.9%)	101,940 (17.4%)
Natural and applied sciences and related occupations	55 (8.8%)	240 (1.6%)	1,210 (3.7%)	26,695 (4.6%)
Health occupations	30 (4.8%)	540 (3.5%)	1,380 (4.2%)	36,690 (6.3%)
Occupations in social science, education, government service and religion	55 (8.8%)	2,230 (14.4%)	3,940 (11.9%)	45,890 (7.8%)
Occupations in art, culture, recreation and sport	0 (0.0%)	180 (1.2%)	380 (1.1%)	12,165 (2.1%)
Sales and service occupations	120 (19.2%)	5,120 (33.2%)	8,685 (26.2%)	139,940 (23.9%)
Trades, transport and equipment operators and related occupations	210 (33.6%)	2,880 (18.7%)	5,710 (17.2%)	85,640 (14.6%)
Occupations unique to primary industry	10 (1.6%)	1,140 (7.4%)	2,615 (7.9%)	40,580 (6.9%)
Occupations unique to processing, manufacturing and utilities	10 (1.6%)	475 (3.1%)	1,270 (3.8%)	36,945 (6.3%)

Source: Statistics Canada 2002.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
3. The Northern Region is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Not available for Northern Aboriginal Resident population.
5. Not available for Northern Aboriginal Resident population.

Table 3A-10: Change in Employment, Participation and Unemployment Rates in Thompson (1991, 2001, 2006)

Characteristics[1]	Thompson		
	1991	2001	2006
Potential Labour Force (15 years and older)[2]	10,620	9,495	9,790
Active Labour Force – Employed	7,615	7,030	6,970
Active Labour Force – Unemployed	690	535	520
Not in the Labour Force	2,320	1,940	2,300
Participation Rate[3]	78.2%	79.6%	76.5%
Employment Rate[3]	71.7%	74.0%	71.2%
Unemployment Rate[3]	8.3%	7.1%	6.9%

Source: Statistics Canada 1992, 2002, 2007a.
Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. Potential labour force defined as all individuals 15 years of age and older.
3. The participation rate, employment rate and unemployment rate refer to the labour force, number of persons employed, and number of persons unemployed (respectively) in the week (Sunday to Sunday) prior to Census Day. The participation rate and employment rate are expressed as a percentage of the total population 15 years of age and over; the unemployment rate is expressed as a percentage of the total active labour force.

Table 3A-11: Employment, Participation and Unemployment Rates in Thompson and Comparison Populations (2001)

Characteristics[1]	Thompson	Comparison Populations		
		Northern Aboriginal Residents[2]	Northern Region[3]	Manitoba
Potential Labour Force (15 years and older)[4]	9,495	33,990	54,945	869,315
Active Labour Force – Employed[5]	7,030	12,475	27,445	549,990
Active Labour Force – Unemployed[5]	535	4,785	5,665	35,430
Not in the Labour Force[6]	1,940	16,730	21,825	283,895
Participation Rate[7]	79.6%	50.8%	60.3%	67.3%
Employment Rate[7]	74.0%	36.7%	49.9%	63.3%
Unemployment Rate[7]	7.1%	27.7%	17.1%	6.1%

Source: Statistics Canada 2002.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
3. The Northern Region is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Potential labour force defined as all individuals 15 years of age and older.
5. Employed Active Labour Force and Unemployed Active Labour Force for Thompson and comparison populations are calculated by InterGroup Consultants based on Statistics Canada employment and unemployment rates.
6. 'Not in the Labour Force' calculated by InterGroup Consultants based on Statistics Canada data. For Thompson and comparison populations, calculated as the difference between each population and the combined number of employed and unemployed individuals in the Active Labour Force.
7. The participation rate, employment rate and unemployment rate refer to the labour force, number of persons employed, and number of persons unemployed (respectively) in the week (Sunday to Sunday) prior to Census Day. The participation rate and employment rate are expressed as a percentage of the total population 15 years of age and over; the unemployment rate is expressed as a percentage of the total active labour force.

Table 3A-12: Highest Level of Education in Thompson and Comparison Populations (2001)

Characteristics[1,2]	Thompson	Comparison Populations		
		Northern Aboriginal Residents[3,4]	Northern Region[5]	Manitoba
Population 20 years and over[6]	8,385	24,335	47,555	789,615
Less than high school certificate[7]	2,815 (33.6%)	14,500 (59.6%)	22,910 (48.2%)	271,895 (34.4%)
High school certificate or equivalent[8]	800 (9.5%)	1,420 (5.8%)	4,045 (8.5%)	89,725 (11.4%)
Trades certificate or diploma	1,305 (15.6%)	n/a	6,160 (13.0%)	92,545 (11.7%)
Post secondary non-university certificate or diploma[9]	1,275 (15.2%)	n/a	5,240 (11.0%)	112,870 (14.3%)
University certificate or diploma[10]	155 (1.8%)	n/a	665 (1.4%)	19,270 (2.4%)
Some post-secondary	n/a	2,530 (10.4%)	4,840 (10.2%)	90,160 (11.4%)
Trades, college or university certificate or degree (below bachelor's level)	n/a	4,980 (20.5%)	n/a	n/a
University degree[11]	1,065 (12.7%)	885 (3.6%)	3,715 (7.8%)	113,150 (14.3%)

Source: Statistics Canada 2002.

Notes:

1. Highest Level of Educational Attainment is based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. 'Highest Level of Education Attained' refers to the highest certificate, diploma or degree that an individual has completed based primarily on time spent 'in-class'. For high school graduates, a university education is considered to be a higher level of education than a college diploma, while a college education is considered to be a higher level education than a trade. Although some trades requirements may take as long or longer to complete than a college or university program, the majority of time acquiring trade certification may be on-the-job training, as opposed to being in a classroom.
3. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Data source for Northern Aboriginal residents is Statistics Canada website, 2001 Census of Canada Aboriginal Population Profiles. The organization of education data on Statistics Canada website differs from other sources, with

categories of educational attainment difficult to compare to the original categories. For this reason, the data have been maintained in website categories to reduce errors.

5. The Northern Region is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
6. Northern Aboriginal residents' population is provided for 25 years and over, while comparison populations use 20 years and over.
7. The 2001 data set used the education categories "Grades 9-13 without secondary certificate" and "Less than grade 9". Data for these education categories have been placed under "Less than high school certificate".
8. The 2001 data set used the education category "Grades 9-13 with high school graduation certificate". Data for this education category have been placed under "High school certificate or equivalent".
9. The 2001 data set used the education category "College – with certificate or diploma". Data for this education category have been placed under "Postsecondary non-university certificate or diploma".
10. The 2001 data set used the education category "University - with certificate or diploma". Data for this education category have been placed under "University certificate or diploma".
11. The 2001 data set used the education category "University - with bachelor's degree or higher". Data for this education category have been placed under "University degree".

Table 3A-13: Labour Force by Occupation Classification in Thompson and Comparison Populations (2001)

Characteristics[1]	Thompson	Comparison Populations		
		Northern Aboriginal Residents[2]	Northern Region[3]	Manitoba
Total labour force 15 years and over	7,565	15,435	33,120	585,420
Not applicable[4]	170 (2.2%)	n/a	1,935 (5.8%)	8,075 (1.4%)
All occupations[5]	7,385 (97.6%)	n/a	31,180 (94.1%)	577,345 (98.6%)
Management occupations	465 (6.1%)	1,060 (6.9%)	2,395 (7.2%)	50,850 (8.7%)
Business, finance and administration occupations	1,040 (13.7%)	1,570 (10.2%)	3,600 (10.9%)	101,940 (17.4%)
Natural and applied sciences and related occupations	480 (6.3%)	240 (1.6%)	1,210 (3.7%)	26,695 (4.6%)
Health occupations	355 (4.7%)	540 (3.5%)	1,380 (4.2%)	36,690 (6.3%)
Occupations in social science, education, government service and religion	885 (11.7%)	2,230 (14.4%)	3,940 (11.9%)	45,890 (7.8%)
Occupations in art, culture, recreation and sport	95 (1.3%)	180 (1.2%)	380 (1.1%)	12,165 (2.1%)
Sales and service occupations	1,860 (24.6%)	5,120 (33.2%)	8,685 (26.2%)	139,940 (23.9%)
Trades, transport and equipment operators and related occupations	1,215 (16.1%)	2,880 (18.7%)	5,710 (17.2%)	85,640 (14.6%)
Occupations unique to primary industry	630 (8.3%)	1,140 (7.4%)	2,615 (7.9%)	40,580 (6.9%)
Occupations unique to processing, manufacturing and utilities	365 (4.8%)	475 (3.1%)	1,270 (3.8%)	36,945 (6.3%)

Source: Statistics Canada 2002.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
3. The Northern Region is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Not available for Northern Aboriginal Resident population.
5. Not available for Northern Aboriginal Resident population.

Table 3A-14: Sources of Income by Local Study Area Communities and Comparison Populations (2001, 2006)

2001	KCNs [1]	Thompson	Gillam	Northern Aboriginal Population [2]	Northern Region [2]	MB
Employment Income	65%	89%	94%	68%	77%	75%
Government Payments	33%	6%	4%	30%	19%	13%
Other	2%	4%	2%	2%	4%	11%
2006						
Employment Income	76%	88%	94%	69%	77%	78%
Government Payments	24%	8%	6%	29%	20%	11%
Other	0%	4%	1%	2%	4%	11%

Source: Statistics Canada 2002, 2007a.

Notes:

1. 2001 Census data based on Split Lake and York Landing data. 2006 Census data based on York Landing data. York Landing data remained relatively constant during this period. Change from 2001 to 2006 results from loss of Split Lake data.
2. The Northern Region and northern Aboriginal figures based on weighted average of Census Divisions 19, 21, 22 and 23 weighted by total people with earnings.

Table 3A-15: Weekly Revised Northern Food Basket (RNFB) Food Costs for Family of Four by Community (June-November 2009)[1, 2]

Food Categories[3]	Winnipeg[4]	Thompson[5]	Gillam[6]	Split Lake[7]	York Landing[8, 9]
Dairy Products	$40.58	$37.45	$48.20	$53.11	$65.85
Eggs	$1.92	$1.76	$1.60	$1.76	$2.80
Meat, Poultry & Fish	$58.18	$63.38	$67.40	$75.24	$75.78
Meat Preparations & Alternatives	$5.98	$7.73	$6.02	$6.97	$6.71
Grain Products[10]	$20.08	$18.54	$22.77	$21.56	$28.49
Citrus Fruit[11]	$10.56	$9.50	$8.49	$12.01	$13.68
Other Fruit	$24.83	$33.83	$41.09	$41.19	$31.84
Potatoes	$6.68	$11.58	$9.84	$10.95	$17.35
Other Vegetables	$29.07	$32.28	$36.19	$32.89	$33.93
Fats & Oils	$8.00	$7.84	$8.41	$6.89	$9.33
Sugar	$1.05	$1.08	$1.32	$1.38	$1.98
TOTAL	$206.93	$224.98	$251.33	$263.95	$287.75
Winnipeg Baseline	*0%*	*9%*	*21%*	*28%*	*39%*
Thompson Baseline		*0%*	*12%*	*17%*	*28%*

Source: InterGroup Consultants research based on RNFB Survey and Price Selection Procedure 2007 (RNFB 2008a, 2008b).

Notes:

1. Food prices were collected and calculated based on standard scalars provided by the RNFB Price Selection Procedures. These calculated prices have been weighted to reflect nutritional needs and food buying preferences in northern communities, resulting in standard RNFB prices. The weekly prices indicated have been multiplied to meet the needs of a family of four in the listed Keeyask communities.
2. Split Lake data was collected on November 4, 2009. Winnipeg data was collected November 19, with a follow-up visit on November 22, 2009. Gillam data was collected on June 18 and 19, 2009. York Landing data was collected on June 25 and 26, with a follow-up visit on September 15, 2009. Thompson data was collected on September 16 and 17.
3. The eleven food categories of the RNFB are comprised of 67 food items, organized based on food group.
4. Winnipeg data collected in one mid-sized store, Family Foods at 1881 Portage Avenue.
5. Thompson data was collected in two stores: the Thompson Safeway and the Thompson Extra Foods.
6. Gillam data was collected in one store, the Gillam Co-op.
7. Split Lake data was collected at the Northern Store.
8. York Factory data was collected at the Ripple River Store on two separate occasions. After data collection was undertaken, the store closed for business but re-opened a few months later under Band management.
9. The price calculations for York Landing are missing a number of key products in several of the eleven food categories, including Dairy Products, Meat Preparations and Alternatives, Grain Products, Citrus Fruit, Other Fruit and Other Vegetable categories.
10. Grain products include Pilot Biscuits, a food item only available in Split Lake and as such, not included in the RNFB price analysis for the Local Study Area.
11. Citrus fruit includes tomato juice and other tomato-based products, as well as apple juices. Raw tomatoes and apples are included in the price calculations for Other Vegetables and Other Fruit, respectively.

Table 3A-16: Change in Employment, Participation and Unemployment Rates among Northern Aboriginal Residents (1991, 2001, 2006)

Characteristics[1]	Northern Aboriginal Residents[2]		
	1991	2001	2006
Potential Labour Force (15 years and older)[3]	26,785	33,990	38,640
Active Labour Force – Employed[4]	9,235	12,475	14,365
Active Labour Force – Unemployed[4]	3,690	4,785	4,770
Not in the Labour Force[5]	13,870	16,730	19,505
Participation Rate[6]	48.2%	50.8%	49.5%
Employment Rate[6]	34.5%	36.7%	37.2%
Unemployment Rate[6]	28.6%	27.7%	24.9%

Source: Statistics Canada 2002, 2007a.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
3. Potential labour force defined as all individuals 15 years of age and older.
4. Employed Active Labour Force and the Unemployed Active Labour Force for the Northern Aboriginal residents calculated by InterGroup Consultants based on Statistics Canada employment and unemployment rates.
5. 'Not in the Labour Force' calculated by InterGroup Consultants based on Statistics Canada data. For Northern Aboriginal residents, calculated as the difference between the total Aboriginal Identity Population 15 years and over and the combined number of employed and unemployed individuals in the Active Labour Force.
6. The participation rate, employment rate and unemployment rate refer to the labour force, number of persons employed, and number of persons unemployed (respectively) in the week (Sunday to Sunday) prior to Census Day. The participation rate and employment rate are expressed as a percentage of the total population 15 years of age and over; the unemployment rate is expressed as a percentage of the total active labour force.

Table 3A-17: Employment, Participation and Unemployment Rates among Northern Aboriginal Residents (2001)

Characteristics[1]	Northern Aboriginal Residents[2]	Comparison Populations		
		Regional Study Area[3]	Manitoba	Canada
Potential Labour Force (15 years and older)[4]	33,990	54,945	869,315	23,901,360
Active Labour Force – Employed[5]	12,475	27,445	549,990	14,695,135
Active Labour Force – Unemployed[5]	4,785	5,665	35,430	1,175,935
Not in the Labour Force[6]	16,730	21,825	283,895	8,029,290
Participation Rate[7]	50.8%	60.3%	67.3%	66.4%
Employment Rate[7]	36.7%	49.9%	63.3%	61.5%
Unemployment Rate[7]	27.7%	17.1%	6.1%	7.4%

Source: Statistics Canada 2002.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
3. The Regional Study Area is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Potential labour force defined as all individuals 15 years of age and older.
5. Employed Active Labour Force and the Unemployed Active labour force for Northern Aboriginal residents calculated by InterGroup Consultants based on Statistics Canada employment and unemployment rates.
6. 'Not in the Labour Force' calculated by InterGroup Consultants based on Statistics Canada: for Northern Aboriginal residents and comparison populations, calculated as the difference between each population and the combined number of employed and unemployed individuals in the Active Labour Force.
7. The participation rate, employment rate and unemployment rate refer to the labour force, number of persons employed, and number of persons unemployed (respectively) in the week (Sunday to Sunday) prior to Census Day. The participation rate and employment rate are expressed as a percentage of the total population 15 years of age and over; the unemployment rate is expressed as a percentage of the total active labour force.

Table 3A-18: Distribution of Highest Level of Education Attained by Northern Aboriginal Residents (2001)

Characteristics[1,2]	Northern Aboriginal Residents[3,4]	Comparison Populations	
		Regional Study Area[5]	Manitoba
Population 20 years and over[6]	24,335	47,555	789,615
Less than high school certificate[7]	14,500 (59.6%)	22,910 (48.2%)	271,895 (34.4%)
High school certificate or equivalent[8]	1,420 (5.8%)	4,045 (8.5%)	89,725 (11.4%)
Trades certificate or diploma	n/a	6,160 (13.0%)	92,545 (11.7%)
Post secondary non-university certificate or diploma[9]	n/a	5,240 (11.0%)	112,870 (14.3%)
University certificate or diploma[10]	n/a	665 (1.4%)	19,270 (2.4%)
Some post-secondary	2,530 (10.4%)	4,840 (10.2%)	90,160 (11.4%)
Trades, college or university certificate or degree (below bachelor's level)	4,980 (20.5%)	n/a	n/a
University degree[11]	885 (3.6%)	3,715 (7.8%)	113,150 (14.3%)

Source: Statistics Canada 2002.

Notes:

1. Highest Level of Educational Attainment is based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.
2. 'Highest Level of Education Attained' refers to the highest certificate, diploma or degree that an individual has completed based primarily on time spent 'in-class'. For high school graduates, a university education is considered to be a higher level of education than a college diploma, while a college education is considered to be a higher level education than a trade. Although some trades requirements may take as long or longer to complete than a college or university program, the majority of time acquiring trade certification may be on-the-job training, as opposed to being in a classroom.
3. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Data source for Northern Aboriginal residents is Statistics Canada website, 2001 Census of Canada Aboriginal Population Profiles. The organization of education data on Statistics Canada website differs from other sources, with categories of educational attainment difficult to compare to the original categories. For this reason, the data have been maintained in website categories to reduce errors.
5. The 2001 data set used the education categories "Grades 9-13 without secondary certificate" and "Less than grade 9". Data for these education categories have been placed under "Less than high school certificate".
6. The 2001 data set used the education category "Grades 9-13 with high school graduation certificate". Data for this education category have been placed under "High school certificate or equivalent".

7. The 2001 data set used the education category “College – with certificate or diploma”. Data for this education category have been placed under “Postsecondary non-university certificate or diploma”.
8. The 2001 data set used the education category “University - with certificate or diploma”. Data for this education category have been placed under “University certificate or diploma”.
9. The 2001 data set used the education category “University - with bachelor’s degree or higher”. Data for this education category have been placed under “University degree”.

Table 3A-19: Economic Structure and Distribution of Occupation Classification among Northern Aboriginal Residents (2001)

Characteristics[1]	Northern Aboriginal Residents[2]	Comparison Populations	
		Regional Study Area[3]	Manitoba
Total labour force 15 years and over	15,435	33,120	585,420
Not applicable[4]	n/a	1,935 (5.8%)	8,075 (1.4%)
All occupations[5]	n/a	31,180 (94.1%)	577,345 (98.6%)
Management occupations	1,060 (6.9%)	2,395 (7.2%)	50,850 (8.7%)
Business, finance and administration occupations	1,570 (10.2%)	3,600 (10.9%)	101,940 (17.4%)
Natural and applied sciences and related occupations	240 (1.6%)	1,210 (3.7%)	26,695 (4.6%)
Health occupations	540 (3.5%)	1,380 (4.2%)	36,690 (6.3%)
Social science, education, government service and religion	2,230 (14.4%)	3,940 (11.9%)	45,890 (7.8%)
Art, culture, recreation and sport	180 (1.2%)	380 (1.1%)	12,165 (2.1%)
Sales and service occupations	5,120 (33.2%)	8,685 (26.2%)	139,940 (23.9%)
Trades, transport and equipment operators and related occupations	2,880 (18.7%)	5,710 (17.2%)	85,640 (14.6%)
Occupations unique to primary industry	1,140 (7.4%)	2,615 (7.9%)	40,580 (6.9%)
Occupations unique to processing, manufacturing and utilities	475 (3.1%)	1,270 (3.8%)	36,945 (6.3%)

Source: Statistics Canada 2002.

Notes:

1. Labour Force Characteristics are based on 20% sample data. Statistics Canada data are subject to a random rounding procedure.

2. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
3. The Regional Study Area is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Not available for Northern Aboriginal Resident population.
5. Not available for Northern Aboriginal Resident population.

Table 3A-20: Employment Model Northern Aboriginal and Churchill-Burntwood-Nelson Skills by Job Category (2014, 2021)

Skills by Project Job Category	2014			2021		
	NA HNTEI[1]	CBN[2]	NA[2]	NA HNTEI[1]	CBN[2]	NA[2]
DESIGNATED TRADES (Construction, Transportation And Industrial)	101	315	740	101	335	804
Crane Operator	2	2	2	2	2	2
Mechanic	0	28	83	0	31	93
Carpenter	73	179	388	73	175	378
Millwright (Industrial Mechanic)	4	14	34	4	11	26
Iron Worker (excluding Reinforcing Workers)	1	1	1	1	1	1
Electrician	14	38	86	14	46	110
Lineman	-	17	52	-	25	76
Plumber	5	34	92	5	42	116
Welders	2	2	2	2	2	2
NON-DESIGNATED TRADES (Construction, Transportation and Industrial)	345	552	970	345	565	1,005
Trade Helpers and Construction Labours	53	119	252	53	125	269
Driller / Blaster	-	3	10	-	3	10
Heavy Equipment Operator (excluding Crane Operators)	185	242	358	185	242	354
Teamster	98	179	341	98	186	363
Serviceman (including Oilers, Warehouseman)	9	9	9	9	9	9

Table 3A-21: Employment Model Northern Aboriginal and Churchill-Burntwood-Nelson Skills by Job Category (2014, 2021)

CONSTRUCTION SUPPORT AND SERVICE TRADES	149	681	1,676	149	771	1,949
Technical (Surveyors and Drafting)	10	60	157	10	87	241
Clerical (Clerks and Typists)	67	138	278	67	141	288
Catering and Janitorial	29	270	748	29	316	884
Security	43	183	463	43	197	506
First Aid[2]	-	5	5	-	5	5
Employee Retention Support	-	25	25	-	25	25
TOTAL	595	1,548	3,386	595	1,671	3,758

Source: Derived from Wuskwatim Keeyask Training Consortium 2009/10 fourth quarter report. Analysis prepared by InterGroup Consultants Inc. 2010.

Notes:

1. "NA" denotes Northern Aboriginal. Table includes a portion (5%) of apprentices that have achieved less than Level 1 apprenticeship. Table includes graduates that have undertaken training through the HNTEI in occupational classifications that align with Keeyask workforce estimates as of August 2010.
2. This skills inventory identifies the estimated maximum number of aboriginal people available to work on the Project and includes people who are already employed, may not have the proper qualifications required by hydro projects and who may not be available to secure employment opportunities when they arise. These and other factors are taken into account during the scenario analysis portion of the employment modeling.
   No information is available for the First Aid and Employee Retention Support categories. The data provided here is based on an assumption that all workforce demand in these categories will be filled by Northern Aboriginal supply.

Table 3A-22: Employment Earnings for Aboriginal Population and Total Populations of Northern Manitoba, Manitoba and Canada (2001)

	Northern Region[1,2]		Manitoba		Canada
	Aboriginal[3]	Total	Aboriginal	Total	Total
Population[4]	17,900	34,745	58,285	609,575	23,901,360
% of Population	52%	100%	10%	100%	100%
Average Earnings[5]	$17,998	$26,364	$19,271	$27,178	$29,769
% of Earnings[6]	68%	100%	71%	100%	100%

Source: Statistics Canada 2002.

Notes:

1. The Aboriginal portion of northern Manitoba is the same as Northern Aboriginal residents. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
2. The Regional Study Area is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
3. For Aboriginal Identity Population. Statistics Canada describes the Aboriginal Identity Population as referring to "those persons who reported identifying with at least one Aboriginal group, that is, North American Indian, Metis or Inuit and/or those who reported being a Treaty Indian or a Registered Indian, as defined by the Indian Act of Canada and/or those who reported they were Members of an Indian band or First Nation" (Statistics Canada, 2001 Census Dictionary).
4. Total Population 15 years and over with earnings.
5. Average employment earnings.
6. Percentage of Earnings calculated by InterGroup Consultants comparing Aboriginal Identity Population average earnings to Total Population average earnings, if total population average earnings are considered to be 100%.

Table 3A-23: Sources of Income for Northern Aboriginal, Northern Manitoba, Manitoba and Canada (2001, 2006)

2001[1,2]	**Northern Aboriginal**[3,4]	**Regional Study Area**[5,6]	**Manitoba**	**Canada**
Employment Income	68.4%	76.9%	75.3%	77.1%
Government Payments	29.8%	19.0%	13.4%	11.6%
Other Income	1.8%	4.1%	11.3%	11.3%
2006[7]				
Employment Income	68.8%	75.3%	75.2%	76.2%
Government Payments	28.9%	20.0%	12.5%	11.1%
Other Income	2.3%	4.7%	12.3%	12.7%

Source: Statistics Canada 2002, 2007a.

Notes:

1. 'Sources of Income' calculated based on 20% sample data.
2. Statistics Canada refers to 'sources of income of a population group or a geographic area' as "the relative share of each income source or group of sources, expressed as a percentage of the aggregate total income of that group or area". Three groups of sources are used to determine total income: employment income, including wages, salaries and income from farm and non-farm self-employment; government transfer payments, including all transfers or payments received from any level of government and recorded as a separate income source; and other income, including investment income, retirement pension income and other money income. Percentages may not add to 100% due to rounding.
3. Northern Aboriginal residents defined as Aboriginal Identity Population in Statistics Canada Census Divisions 19, 21, 22 and 23.
4. Calculated by InterGroup Consultants as the simple averages of Employment Income, Government Payments and Other Income for the Aboriginal Identity Population of Statistics Canada Census Divisions 19, 21, 22 and 23.
5. The Regional Study Area is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
6. Calculated by InterGroup Consultants as the simple average of Employment Income, Government Payments and Other Income.
7. For the 2006 census, taxable benefits, research grants and royalties were counted as part of 'Wages and salaries' and included in the 'Employment income' category. In previous years, research grants and royalties were included in the 'Other income' category, while taxable benefits and allowances were formerly excluded as a source of income. Regular payments to motor vehicle accident victims from provincial or territorial governments formerly included as 'Other income from government sources', were excluded for the first time in the 2006 census.

APPENDIX 3B

COST OF LIVING IN KEEYASK COMMUNITIES TECHNICAL REPORT

KEEYASK
Hydropower Limited Partnership

LIST OF TABLES

Page

3B.0 COST OF LIVING IN KEEYASK COMMUNITIES TECHNICAL REPORT

3B.1 INTRODUCTION

This memo provides a technical summary of the projected effects of the Keeyask Generation Project on the cost of living in the Local Study Area. It summarizes the methodologies used to analyze the cost of living in northern communities, applies these methodologies across the Local Study Area, discusses where the Project may affect the cost of living and compares these results with the results of a similar tool used by the federal government.

The Local Study Area includes the regional centres of Thompson and Gillam and the four First Nation partner communities, also known as the Keeyask Cree Nations (KCNs) communities of Split Lake (TCN), York Landing (YFFN), Fox Lake (Bird) (FLCN) and Ilford (WLFN).

The results of this study indicate that costs of living are not likely to rise because of the Project. High living costs are simply a reality of living in northern Manitoba, primarily because of the small communities that exist here. During construction of the Project, the increased purchasing power created by Project employment may have some beneficial cost of living effects by encouraging better service across the Local Study Area, especially in KCNs communities. Thompson is the one community where there may be a potential for adverse cost of living effects. The strong economy in Thompson has created labour and housing shortages that may be affected by the Project, although any effects that occur would be small and short-lived.

3B.2 METHODLOGIES OVERVIEW

This analysis focuses on the three main living costs most likely to be affected during the construction and operation phases of the Project:

- Food and household items;
- Transportation within the Local Study Area; and
- Housing.

According to Statistics Canada, in 2007 Manitobans spent an average of 14.9% of total household expenditures on food and household items (not including tobacco and alcohol), 24.7% on housing and 15.3% on transportation. These costs make up more than 50% of household spending and make up the bulk of a household's non-discretionary spending (Statistics Canada 2008a, 2008b).

Of these three costs, the cost of food and other household items is generally the indicator most closely scrutinized because of its strong correlation with social and economic effects in related communities. The Consumer Price Index (CPI) is the most common tool used in Canada to measure variations in the cost of food and household items. The CPI, however, is designed to track cost differentials among large

homogenous populations in urban centres and is not well suited to assessing the cost of living for smaller populations living in the unique conditions experienced in northern Canada (for more information on the CPI and CPI methodology, see Statistics Canada 1996; Bank of Canada 2009).

The Revised Northern Food Basket (RNFB) was developed in 2007 by Indian and Northern Affairs Canada, under the auspices of their Northern Food Mail Program, as a way to monitor the cost of a thrifty food basket in both isolated northern communities and southern supply centres. The RNFB compares the combined food costs of a basket of groceries in Canada's northern communities with major centres such as Winnipeg. It consists of 67 items that reflect a balanced approach to Canada's Food Guide, including the Aboriginal Food Guide released in April 2007, and takes into account current food consumption patterns in northern communities. In this way, the RNFB overcomes some of the limitations associated with the CPI, particularly those related to food preferences and nutritional needs (INAC 2007; RNFB 2008a; RNFB 2008b).

From a nutritional point of view, the RNFB has been designed to meet the energy requirements of people whose activity level is within the "low-active" range – the minimum level of activity recommended for good health – with an added 5% to compensate for the additional energy needs associated with the colder climate of northern communities (INAC 2007; RNFB 2008b).

In addition to the nutritional guidelines used to develop the survey, the RNFB reflects average prices for each of the products in the basket rather than the lowest prices available in a community. In this way, the price data represents what consumers would typically pay to purchase the basket of goods. The RNFB also provides a uniform procedure for analysing comparative data between communities and a standard unit of measurement that can be manipulated to reflect weekly food costs for individuals or families, allowing for factors such as household composition, age, gender, pregnancy and lactation (for more information on the RNFB program, methodology and survey, see INAC 2007; RNFB 2008a; RNFB 2008b).

There are currently no formal tools similar to the RNFB available for assessing the costs of transportation and housing. Instead, a direct sampling approach has been used to gather as much available pricing information as possible. This information is then provided within a regional context to provide a more qualitative analysis than is used for the food and household items analysis.

Once each of the three main living costs has been analyzed the results are compared with the Price Index Differential (PID) cost of living measure used by the Treasury Board of Canada Secretariat and the National Joint Council for four Project Study Area communities, including Gillam, Ilford, Split Lake and York Factory. This comparison provides additional depth to the analysis and shows how cost results can be affected by different approaches to cost of living.

3B.3 FOOD AND HOUSEHOLD ITEMS

3B.3.1 REVISED NORTHERN FOOD BASKET SURVEY – SAMPLING METHODS AND RESULTS

RNFB price data was collected between June and November 2009 in four of the six communities in the Local Study Area – Thompson, York Landing, Split Lake and Gillam – as well as comparative data collected in Winnipeg in late November.

Unlike the Consumer Price Index, which focuses on changes to the price of select products, the RNFB focuses on differences between the weekly cost of food and household items for a family in a northern community compared to its southern counterpart. For this survey, data was calculated and analyzed to meet the needs of a family of four – a man and woman between the ages of 31 and 50 and a boy and girl between the ages of nine and 13. While weekly costs will vary for households with different compositions, this provides a relevant baseline for comparison among communities.

The data presented in this analysis is subject to a number of limitations. These include the long timeframe over which data was collected, the sizes of stores sampled in each community, as well as data collection by several consultants rather than one individual as prescribed by the RNFB guidelines. Nevertheless, the data is the most current and detailed available for comparing the cost of food and household items across the Local Study Area, and is useful as a representative approximation of consumer costs. Results are not intended to provide definitive results or to be comparable to other RNFB survey results.

3B.3.1.1 Summary of RNFB Results for Food Categories by Community

The RNFB data is presented in (Table 3B-1).

Table 3B-1: Weekly RNFB Food Prices for a Family of Four by Community - June to November 2009[1,2]

Food Categories[3]	Winnipeg[4]	Thompson[5]	Gillam[6]	Split Lake[7]	York Landing[8, 9]
Dairy Products	$40.58	$37.45	$48.20	$53.11	$65.85
Eggs	$1.92	$1.76	$1.60	$1.76	$2.80
Meat, Poultry & Fish	$58.18	$63.38	$67.40	$75.24	$75.78
Meat Preparations & Alternatives	$5.98	$7.73	$6.02	$6.97	$6.71
Grain Products[10]	$20.08	$18.54	$22.77	$21.56	$28.49
Citrus Fruit[11]	$10.56	$9.50	$8.49	$12.01	$13.68
Other Fruit	$24.83	$33.83	$41.09	$41.19	$31.84
Potatoes	$6.68	$11.58	$9.84	$10.95	$17.35
Other Vegetables	$29.07	$32.28	$36.19	$32.89	$33.93
Fats & Oils	$8.00	$7.84	$8.41	$6.89	$9.33
Sugar	$1.05	$1.08	$1.32	$1.38	$1.98
TOTAL	**$206.93**	**$224.98**	**$251.33**	**$263.95**	**$287.75**
Winnipeg Baseline	*0%*	*9%*	*21%*	*28%*	*39%*
Thompson Baseline		*0%*	*12%*	*17%*	*28%*

Source: InterGroup Consultants research based on RNFB Survey and Price Selection Procedure 2008a, 2008b.
Notes:

1. Food prices were collected and calculated based on standard scalars provided by the RNFB Price Selection Procedures. These calculated prices have been weighted to reflect nutritional needs and food buying preferences in northern communities, resulting in standard RNFB prices. The weekly prices indicated have been multiplied to meet the needs of a family of four in the listed Keeyask communities.
2. Split Lake data was collected on November 4, 2009. Winnipeg data was collected November 19, with a follow-up visit on November 22, 2009. Gillam data was collected on June 18 and 19, 2009. York Landing data was collected on June 25 and 26, with a follow-up visit on September 15, 2009. Thompson data was collected on September 16 and 17.
3. The eleven food categories of the RNFB are comprised of 67 food items, organized based on food group.
4. Winnipeg data collected in one mid-sized store, Family Foods at 1881 Portage Avenue.
5. Thompson data was collected in two stores: the Thompson Safeway and the Thompson Extra Foods.
6. Gillam data was collected in one store, the Gillam Co-op.
7. Split Lake data was collected at the Northern Store.
8. York Factory data was collected at the Ripple River Store on two separate occasions. After data collection was undertaken, the store closed for business but re-opened a few months later under Band management.
9. The price calculations for York Landing are missing a number of key products in several of the eleven food categories, including Dairy Products, Meat Preparations and Alternatives, Grain Products, Citrus Fruit, Other Fruit and Other Vegetable categories.
10. Grain products include Pilot Biscuits, a food item only available in Split Lake and as such, not included in the RNFB price analysis for the Local Study Area.
11. Citrus fruit includes tomato juice and other tomato-based products, as well as apple juices. Raw tomatoes and apples are included in the price calculations for Other Vegetables and Other Fruit, respectively.

3B.3.1.2 Ilford

With about 150 permanent residents, Ilford (War Lake) is one of the smallest communities in the Local Study Area. Ilford does not have a grocery store and no RNFB data was collected in the community.

3B.3.1.3 Fox Lake (Bird)

With about 150 permanent residents, Fox Lake (Bird) is one of the smallest communities in the Local Study Area. Goods in Fox Lake (Bird) were primarily available at the community's only grocery store, the Groceteria, until it closed for business on August 28, 2009 due to lack of supplies. This small shop offered staple items such as bread, milk, eggs, sugar, flour, vegetables, lard and toilet paper, as well as canned and frozen foods, pizza, bacon, chicken, chips, pop and candy. There are plans to build a new store in the community. Residents of Bird currently travel 50 km each way to Gillam for groceries (FLCN KPI Program 2009-2011). No RNFB data was collected at the store before it closed.

3B.3.1.4 York Landing

Prices were collected in York Landing at the Ripple River Store before its operations were suspended in October 2009. Subsequently, in late 2009, the store reopened under Band management[1]. With about 420 permanent residents, York Landing is the third smallest community in the Local Study Area. The data collected at the Ripple River Store provide an example of how prices are affected by the size and accessibility of a regional market.

The RNFB survey was conducted on two separate occasions in York Landing; nevertheless, many of the items in the survey were not available during either of the data collection periods. In fact, of the 67 items for which RNFB survey data was calculated, 14 items[2] and their RNFB-approved substitutions were completely unavailable, with more than six alternatives used to complete the price comparisons. The combination of higher prices and less selection causes some residents of York Landing to travel to Thompson or Split Lake to do their regular shopping (YFFN KPI Program 2009-2010). On at least one occasion, community Members even chartered a plane to bring in groceries and other items from outside the community (YFFN KPI Program 2009-2010).

Prior to disruption of service, the Ripple River Store was dependent on deliveries from Winnipeg by semi trailer, entering the community by ferry during the summer months and by ice road in winter. As a privately owned business, the costs associated with transporting products into the community were largely borne by consumers, often resulting in higher retail prices. During winter freeze up and spring thaw, the community is only accessible by air, which increases the shipping cost of groceries (YFFN KPI Program 2009-2010).

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[1] It is unclear whether the new Band management of the Ripper River store will affect the cost and availability of grocery items. For the purposes of this comparison, we assume that the new management has no measureable effect on cost of living.

[2] Not including calculation for Pilot Biscuits, as this item was only in Split Lake.

The prices calculated for York Landing are approximately 28% higher than prices for similar items in Thompson and 39% higher than prices in Winnipeg. The suspension of operations at the Ripple River Store and the closure of the Groceteria in Fox Lake (Bird) also illustrate the volatility of supplying items in remote communities.

3B.3.1.5 Split Lake

The prices gathered from Split Lake illustrate the comparative costs of supplying more isolated communities in the Local Study Area to those of larger markets. With less than 1,500 residents, the community of Split Lake (TCN) is the largest of the KCNs partner communities, but is located more than 100 km from Thompson.

Food price data was collected in Split Lake on November 4, 2009, at the Northern Store, part of a chain of food and sundry stores located across northern Canada and owned by the North West Company. The Northern Store in Split Lake receives supply shipments by truck twice each week, on Tuesdays and Fridays. Deliveries include fresh perishable fruit and vegetables, as well as dairy and meat products. Grey Goose Bus Lines and other companies, including Arctic Beverages and Old Dutch, also provide the community with freight and dry good deliveries on a daily basis[1]. The last delivery of perishable food to the Northern Store was on November 3, 2009, the day before the RNFB survey was conducted, resulting in relatively high stock levels for completion of the food price survey (CNP 2010a).

Nevertheless, several items in the RNFB survey guide were not available in the community during the period of data collection, including T-bone steak, frozen apple and orange juice, frozen carrots and broccoli and canned carrots. Prices for similar items were substituted as per RNFB survey guidelines; however, this sometimes resulted in differences of as much as several dollars. In most cases, the price difference between items was negligible, especially for non-perishable items such as frozen or canned fruit and vegetables.

In general, the RNFB prices in Split Lake are higher than those encountered in Gillam, but lower than in York Landing. The increased costs relative to Gillam are consistent with the community's more remote location and smaller market size. The improved prices relative to York Landing are consistent with the improved supply chain provided by the North West Company as part of a larger regional distribution network and the community's larger market size.

The comparison between Split Lake and York Landing is particularly interesting because the two communities are located across the lake from each other. All road access to York Landing goes through Split Lake. Residents of York Landing travel the 25 km distance to Split Lake by ferry in summer and by ice road in winter. Prices, therefore, are generally lower in Split Lake than in York Landing and many residents of York Landing cross the lake on a regular basis to do their shopping in Split Lake.

While prices in Split Lake were 17% more than prices in Thompson and 28% more than those in Winnipeg, they were about 5% less than prices across the lake in York Landing.

[1] According to the Keewatin Tribal Council website (2009).

3B.3.1.6 Gillam

The prices gathered in Gillam indicate the cost of supplying a smaller market with strong purchasing power that still enjoys good regular access by truck, bus, rail and air. With about 1,200 permanent residents, Gillam is among the larger markets in the Local Study Area, only slightly smaller than the largest First Nation partner community at Split Lake.

The Gillam Co-op is the primary source of groceries in the community. As a co-op store, a portion of its profits are returned to community members each year according to the amount of money each customer spends. In this way, profits remain in the community either through store re-investment or in the hands of co-op members. The co-op ownership structure also removes the incentive to raise prices too much, which might otherwise occur because of the lack of competition. Prices in Gillam are generally in the mid-range between Thompson and York Landing.

Prices in Gillam are also lower than prices in Split Lake despite being a smaller community. This price differential is likely because Gillam is accessible by more modes of transportation and community members have more purchasing power as a result of the community's close relationship with Manitoba Hydro. Both Gillam and Split Lake are accessible by road and have regularly scheduled bus service. Gillam, however, is also located on a rail line and features an airport with regularly scheduled flights. Manitoba Hydro is the town's primary employer, providing high-paying, secure jobs with strong benefits. The town's close relationship with Manitoba Hydro may also provide some additional supply chain benefits. Manitoba Hydro takes an active role in the operation of the town and is more likely to intervene so that basic household goods are available at reasonable prices.

Despite these factors, there is still a feeling among some Gillam residents that prices may be higher at the co-op than they need to be. For instance, one long-term resident stated that people tend to buy only what is necessary due to what they considered "the marked up prices" in the community (Gillam KPI Program 2009-2010).

Prices in Gillam are 12% more than in Thompson and 21% more than in Winnipeg. At the same time, prices in Gillam are 5% less than prices in Split Lake despite being a smaller market.

3B.3.1.7 Thompson

As a regional retail centre, Thompson offers the largest market in the Local Study Area. It is serviced by multiple large, national retail grocery chains with strong, active supply chains to provincial distribution centres such as Winnipeg. Data was collected in two grocery stores – Safeway and Extra Foods – both of which form part of large chains operating across Canada.

While prices in Thompson are influenced by its northern location and long distance from Winnipeg, they are also influenced by an additional factor not experienced to the same degree in other Local Study Area communities. The strong economy in Thompson is creating a labour shortage, causing wage inflation. Higher wages, in turn, push up the price of retail goods. Despite this additional factor, Thompson still features the lowest overall prices in the study region with a 9% premium over Winnipeg prices.

3B.3.1.8 Winnipeg

The Winnipeg data was collected at one medium-sized chain store, Family Foods, in late November 2009[1]. As expected, RNFB price calculations for Winnipeg were the lowest of all communities for which data was collected.

Some individual food categories, however, had higher costs in Winnipeg than in Thompson. These included dairy products, eggs, grain products, citrus fruit and fats and oils. In the cases of eggs and citrus fruit, Winnipeg prices were also higher than the Gillam prices. The higher prices among these categories may be related in part to the smaller size of the store and chain relative to those surveyed in Thompson. Peak seasons for produce may also be a factor – the lower citrus prices in June and July may reflect fruit that is closer to peak season and therefore more affordable.

3B.3.1.9 Variations of RNFB Essential Food Prices

Although the overall RNFB prices accurately reflect expected cost of living increases that occur in each community as a result of their size and accessibility, individual prices do not always follow accordingly. This is most apparent in the RNFB prices gathered in the First Nation communities.

In York Landing, prices are much higher than in Thompson and Winnipeg, especially for perishable items such as milk, yogurt and fresh carrots. Similarly, some canned and boxed products with a long shelf life, such as macaroni and cheese, apple juice and canned tomatoes, are much more expensive in York Landing than in Thompson and Winnipeg. Compared to other isolated communities, York Landing had the lowest prices for both apples and lean ground beef. York Landing also provided the lowest price for canola oil at 75% the cost in Winnipeg. In general, canola oil prices are less expensive in the smaller, more remote markets.

In Split Lake, prices generally follow the 17% premium over Thompson prices. Some products, however, including milk, lean ground beef and canned salmon are almost double the prices recorded in Thompson. Bananas were priced almost four times higher than in Thompson. At the same time, eggs, canola oil, canned corn, margarine, potatoes and apple juice were all less expensive in Split Lake than in Thompson.

3B.3.1.10 Cost of Non-Essential Foods

The RNFB survey also collects data on non-essential foods. While these items do not form part of the RNFB analysis for a number of reasons, most notably their nutritional content, they do form part of residents' regular consumption, especially where convenience items are among the few regularly stocked food products.

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[1]In Southern cities, RNFB procedure has been to collect data in only store for comparison to the data collected in all stores in northern communities. While RNFB documents on price selection suggest that collecting data from multiple stores in southern communities would be preferable in future, there is no indication that this procedure has been adopted and, as such InterGroup Consultants chose to follow the typical RNFB methodological guidelines. For further information, see RNFB 2008a.

While high prices for specialty items, such as infant formula and infant cereal, affect only a segment of the population, the difference in prices noted between communities would affect the cost of living for many households with children. These high prices can induce secondary effects on Valued Environmental Components such as community health if these high costs result in products being watered down to last longer or replaced with less expensive substitutes of lower nutritional value (see Boult 2004, for implications of nutritional deficiencies and prevalence of junk food in Northern Canada).

Another item that is sometimes necessary in isolated communities is bottled water, especially where potable water contamination prevents local water consumption or forces residents to boil their regular water supply. Although water prices per litre appear relatively low across the Local Study Area, prices in York Landing are twice those recorded in Gillam.

3B.3.1.11 Cost of Non-Food Household Items

The RNFB survey collects price data for some non-food household items and toiletries. Again, these products do not form a part of the RNFB analysis; however, the standard sizes and brands sought by the RNFB allow their prices to be compared directly between the communities.

The non-food product information collected includes items that are common to most households – toilet paper, facial tissue, toothpaste, and laundry detergent – as well as specialized items including feminine hygiene products and diapers. Prices are similar in Winnipeg and Thompson, with the total cost of these items in Winnipeg slightly higher than in Thompson. Several items, including toothpaste, toilet paper and facial tissues are also similar among the communities, while other items, including diapers and feminine hygiene products, provide more variation. In Split Lake, for example, prices for these seven items exceed Thompson and Winnipeg prices by about 77%, due mainly to the large price differences between diapers, feminine hygiene products and laundry detergent.

3B.3.2 EFFECTS ASSESSMENT: FOOD AND HOUSEHOLD ITEMS

The RNFB analysis shows that prices for food and household items vary between locations due to the costs of transporting goods to that location, the amount of overhead included in each product at each location and, in the case of Thompson, the availability and cost of labour in the community. Prices can also be affected by ownership structure and the nature of local competition, which may limit the amount a vendor can increase the selling price of a product. Spoilage and replacement costs also increase the price of perishable food items, particularly in remote communities with small populations, while non-perishable food prices tend to remain more constant across communities.

The following four main drivers appear to determine the cost of food and household items in communities within the Local Study Area:

- Remoteness (transportation);
- Size of market (overhead per product);

- Purchasing power of market (overhead per product); and
- Competition for labour (cost of labour).

In general, the Project will not affect the first two variables across the Local Study Area to any noticeable degree. No infrastructure is planned for any community that will affect accessibility and the size of any single market is not expected to change substantially as a result of the Project.

The purchasing power of residents across the Local Study Area, however, is likely to be affected by the Project through increased employment and business income. During the construction phase, the expected increase in employment and business income will likely result in increased disposable income for family Members living within the KCNs communities and in Gillam. Some of this purchasing power will be spent within local communities with the remainder likely to be spent in Thompson. Increases in spending could affect the cost of food and household items in two ways: 1) if current supply chains remain intact and there are no corresponding increases in supply, prices could increase as demand increases; 2) alternately, where supply chains are able to react, the cost of living could be reduced as stores are able to rely on more consistent and stable demand.

The Project will also result in increased levels of business activity. Since most Project supplies will be ordered from large-scale distributors located outside the Local Study Area, local business activity resulting from the Project will most likely be for small-scale equipment, tools and related gear, as well as for hospitality services at restaurants, hotels and taverns. The effect of this increase in business activity will therefore be felt primarily in Thompson. This may have a small, related effect on labour costs, which may put some upward pressure on the price of food and household items.

An increase in demand for labour is unlikely to directly affect the cost of food and household items because the labour pool for hydroelectric construction work is substantially different from the retail labour pool. Indirectly, the increased level of business activity within the Local Study Area, particularly in Thompson, may require businesses to offer higher wages to attract labour. This may translate into slightly higher costs for food and household items.

During the operations phase, the main effect of the Project will be felt in Gillam, which is expected to experience a population increase. Since these are longer-term jobs, the increased purchasing power the new jobs will bring to the community should help to stabilize demand and provide a more lucrative market for vendors. The result could be a slight reduction in prices or an increased selection of items for purchase.

One factor not accounted for in the RNFB analysis is the effect of country foods (fish and game, berries, nuts, and edible wild plants) on the total amount spent on food and household items by Local Study Area residents. Country food items are able to replace items in the RNFB survey document. Therefore, while the premiums outlined in this analysis will hold for each individual product purchased (subject to variation, as described) the total weekly amount paid by people living in remote communities will be offset to some degree by the presence of country foods in their diet. This effect is likely to be most pronounced in remote communities where food prices are most expensive and access to wildlife and other resources is most abundant.

Families of workers may experience a moderate cost of living increase because of a reduction of country foods in their diet, as time that was previously spent hunting and fishing may now be spent on the job site. However, this is not expected to affect the cost of individual items in the stores but rather, is consistent with a more general trend observed among indigenous peoples where economic development has resulted in decreases in traditional harvesting activities (Buell and Ajunnginiq Centre 2006).

There is also the possibility of an increase in the cost of living for other community residents if the presence of the Project affects the abundance of or access to country foods. In areas where traditional resource use is common, increased traffic, the creation of access roads and flooding effects of the Project may add stress to local ecosystems, potentially affecting resource harvesting and increasing local dependence on purchased foods. The Adverse Effects Agreements for the KCNs provide mitigation measures to address the anticipated effects on both communities. Mitigation measures include providing transportation and equipment to access other resource areas not currently in use. These measures are important because a traditional diet is generally considered to be the healthiest alternative for indigenous peoples (Myers *et al.* 2004).

3B.4 TRANSPORTATION

The Project will require a large workforce during the construction phase. While resources have been used to train a large local workforce, many workers will also be travelling from outside the Local Study Area to work on the Project. This will increase demand for local transportation to and from communities in the Local Study Area as well as within northern Manitoba in general. Increased demand may affect the cost of transportation for local residents, thereby increasing their cost of living. This section will examine the potential for transportation-related cost of living effects in more detail.

3B.4.1 AVAILABLE MODES OF TRANSPORTATION

Statistics Canada reports that 15.3% of total expenditures by Manitobans in 2007 were for transportation (Statistics Canada 2008a; Statistics Canada 2008b). Transportation to and between the Local Study Area communities generally consists of bus, rail and air service. (Table 3B-2) provides a summary of transportation options across the Local Study Area.

Table 3B-2: Summary of Transportation Access to Local Study Area Communities

Community[1,2]	Air	Bus	Rail	Road	Ferry	Winter Road
Ilford	Charter Only	n/a	●	None	None	●
Fox Lake (Bird)	None	None	●	●	n/a	n/a
York Landing	Scheduled Flights to Thompson	n/a	None	None	●	●
Split Lake	None	●	None	●	n/a	n/a

Source: Calm Air 2009; Perimeter Aviation 2010; Greyhound Canada 2009; MIT 2009; VIA Rail 2009.
Notes:
1. '●' denotes presence of that mode of transportation.
2. 'n/a' denotes 'not applicable' (*e.g.*, winter roads are not applicable in the case of Fox Lake (Bird) because it is already serviced by an all weather road).

3B.4.1.1 Air Service

Scheduled air travel in Local Study Area communities is provided by two regional airlines, Perimeter Aviation and Calm Air International. Calm Air offers scheduled flights between the communities of Thompson, Gillam, Churchill and Winnipeg. Flight prices range from $205 to $615 each way for the Winnipeg-Thompson run, and from $205 to $360 each way for the Gillam-Thompson route, plus applicable taxes and fees (Calm Air 2009).

Perimeter regularly services Thompson, York Landing and Winnipeg, with flight prices ranging from $105 each way between York Landing and Thompson to $335 each way between Winnipeg and Thompson, plus applicable taxes and fees (Perimeter Aviation 2010).

(Table 3B-3) and (Table 3B-4) show the number flights in and out of each community on a weekly basis. While many routes have several departures daily, making scheduled flight reasonably convenient for local residents, the price associated with flying between communities makes this form of transportation expensive to use on a regular basis. Several local residents referred to the high cost of airfare, expressing a desire for less expensive options. However, recent increases in the number of flights between communities have improved the price of airfare generally (Gillam KPI Program 2009-2010). In addition to scheduled flights between communities, charter flights are also available through Perimeter, Calm Air and Missinippi Airways (Thompson Airport 2009).

Table 3B-3: Weekly Calm Air Flights between Local Study Area Communities, 2009

Departures	Arrivals			
	Gillam	Churchill	Thompson	Winnipeg
Gillam	--	6	5	11
Churchill	6	--	5	18
Thompson	5	5	--	35
Winnipeg	14	18	35	--

Source: Calm Air 2009.

Table 3B-4: Weekly Perimeter Flights between Local Study Area Communities, 2009

Departures	Arrivals		
	York Landing	Thompson	Winnipeg
York Landing	--	10	--
Thompson	10	--	51
Winnipeg	--	51	--

Source: Perimeter Aviation 2010.
Notes:
- Thompson-Winnipeg route via Oxford House.

3B.4.1.2 Bus Service

Bus service in the Local Study Area is provided by Grey Goose Bus Lines, a subsidiary of Greyhound, servicing the communities of Thompson, Gillam, Split Lake and Winnipeg, as well as stopping at Long Spruce Junction where Provincial Roads 280 and 290 (PR280 and PR290) meet (Greyhound 2009). Bus service between Winnipeg and Thompson costs as much as the least expensive airfares offered between the cities, ranging from $210 to $235 each way, for a trip lasting over 18 hours (Greyhound 2009). In other Local Study Area communities, the price of bus service makes it a more accessible choice for local residents. Fares between Gillam and Thompson range from $90 to $100 each way for a four-hour trip, less than half the price of flights between the communities (Greyhound 2009). Similarly, bus fares from Split Lake to Thompson, an hour-and-a-half trip, range from $45 to $50 each way (Greyhound 2009). Nevertheless, the cost of bus fares between KCNs communities remains high, especially if required on a regular basis or for larger groups. In addition, when weather conditions make travel on the northern highways and roads difficult, inter-town bus service may not be a viable transportation option.

In mid-2009, Greyhound indicated that the company was considering stopping inter-town service throughout the province. Greyhound and the Province of Manitoba came to an agreement in late October 2009, which will see the company continuing to operate in the short term, with additional short-term support pledged in March 2010 (Government of Manitoba 2010a). However, it is important to note

the possibility that bus service could end or be reduced within the Local Study Area, eliminating an important mode of transportation between communities.

3B.4.1.3 Rail Service

Passenger rail service is provided by VIA Rail between Thompson, Ilford, Gillam, Fox Lake (Bird) and Churchill. Rail service is relatively inexpensive, even compared to bus travel, with round trip tickets ranging from $40 to $72 between communities and approximately $230 between Winnipeg and Thompson (VIA Rail 2009). Travel times, however, are somewhat longer than comparable bus trips. For example, the trip from Gillam to Thompson is more than six hours by train versus four hours by bus. Service is also much less frequent, with departures and arrivals only twice a week in each community. However, train passengers are allowed up to two pieces of carry-on baggage and three pieces of checked baggage for free, after which a small service fee applies (VIA Rail 2009). WLFN respondents noted that VIA Rail is inconsistent in keeping trains on schedule (CNP 2010f).

For local residents expecting to shop in one of the larger regional centres, passenger rail service is more economical and more practical for carrying parcels. With stops in Ilford and Bird, the train is also a more accessible option than other means of transportation for residents of those KCNs communities. Rail freight service is also provided up to three times each week along the Hudson Bay Railway from The Pas to Thompson, Ilford and Gillam.

3B.4.1.4 Roads and Highways

The Local Study Area is accessible by highway from the south along Provincial Trunk Highway 6 (PTH 6) from The Pas to Thompson. From Thompson, the communities of Split Lake and Gillam are accessible by PR280. York Landing is accessible by ferry, at no cost, across Split Lake during the summer months. Fox Lake (Bird) is accessible along PR290, which connects with PR280 near the bridge north of Gillam.

As a Provincial Trunk Highway, PTH6 is built to a relatively high standard and maintained well compared to other northern highways. Alternately, as Provincial Roads, the transportation connections between Thompson and Gillam, and beyond to Fox Lake (Bird), are generally rough and difficult to travel.

In winter, ice roads are constructed over frozen lakes, rivers and muskeg to provide temporary access to Ilford and York Landing. Ice roads can open as early as November, although are more often open only for a short period in late winter. During the 2008-2009 season, Manitoba's winter road system did not officially open until February 2, 2009, closing at the end of March after about seven weeks of operation (Service Canada 2009a). During that period, 2,500 shipments of staple items, such as fuel, groceries, construction materials and general freight were delivered to northern communities via the winter road system (Service Canada 2009a). Although travel is sometimes slow on the ice, the direct access provided

by winter roads is often more convenient and affordable than other modes of transportation such as air and rail[1].

In 2008-2009, the ferry between Split Lake and York Landing transported 8,286 passengers and 3,495 vehicles. Peak volumes since 1979 occurred the previous year, in 2007-2008, with 9,544 passengers and 3,607 vehicles (Manitoba Infrastructure and Transportation 2009). On average, the ferry has been operating at one-third capacity in recent years. No information is available on how often passengers are turned away during individual trips that reach capacity. (Table 3B-5) shows the average usage of the York Landing-Split Lake ferry in 2008.

Table 3B-5: Ferry Capacity York Landing to Split Lake in 2008

	Passengers	Vehicles
Capacity per trip	40	16
2007/08 average per trip	14.2	5.4
2007/08 average	35.5%	33.5%

Source: InterGroup Consultants based on MIT 2009.

The cost of transportation in the Local Study Area tends to include higher maintenance costs than urban centres to the south, where roads are better maintained. The colder northern climate is generally harder on vehicles. For people living outside Thompson, travel on the highway from Thompson to Gillam and on to Fox Lake (Bird) along icy roads is also very hard on vehicles. As one long-term resident remarked, the cost of replacing shocks on his van each year led him to purchase a new truck (Gillam KPI Program 2009-2010).

3B.4.1.5 Public Transportation

Public transportation throughout the Local Study Area has been discussed in previous sections. Within the community of Gillam, public transportation is provided by private taxi. In Thompson, public transportation is available both by taxi and by bus. The City of Thompson operates a single bus route across the city. Buses run every half hour from 7:30 am to 6:10 pm Monday to Thursday, from 7:30 am to 9:10 pm on Fridays and 11:00 am to 6:10 pm on Saturdays. There is no service on Sundays. Bus fare is $1.85 for adults, with monthly bus passes available at a cost of $68.40 (City of Thompson 2011). By comparison, in Winnipeg, bus fare is $2.40 for adults, with monthly bus passes available at a cost of $75.35 (City of Winnipeg 2011).

[1] The 2009-2010 season was even shorter than the previous year, with the full system officially opening on February 12, 2010 and closing on March 15, 2010 after a quick thaw (Government of Manitoba 2010b). Within a few weeks of the abrupt closure of winter roads, on March 30, 2010, the Province of Manitoba announced major infrastructure funding to construct several all-weather access roads in Northern Manitoba (Government of Manitoba 2010c).

3B.4.2 EFFECTS ASSESSMENT: TRANSPORTATION

There are four main effects of the Project on transportation:

1. Many workers are expected to be recruited from outside the Local Study Area. The Project will increase traffic on flights to Thompson and Gillam and on bus routes between the two communities.
2. Some workers will likely want to go into town on days off. The Project will increase bus and road traffic between the job site and the two regional centres at Gillam and Thompson.
3. A large number of KCNs workers are expected to be employed at the site. The Project will increase traffic between the KCNs communities and the job site.
4. KCNs employment is expected to increase family incomes among KCNs residents, which may increase the ability of KCNs residents to purchase items in Thompson. The Project is therefore expected to increase traffic between KCNs communities and Thompson.

Thompson and Gillam are the only communities with regularly scheduled flights to locations outside the Local Study Area. Since Thompson is more than 700 km north of Winnipeg, workers travelling to and from the Local Study Area are expected to fly into one of these destinations. Flights to Thompson are generally less expensive than flights to Gillam but require the additional time and expense of bus travel to Gillam before continuing to the job site.

Increased demand for bus and air travel has the potential to create either a positive or an adverse effect on transportation costs. The increase in demand may encourage carriers to increase prices for existing seats or increase capacity, thereby reducing costs through economies of scale. For example, recent increases to the number of flights between some northern communities have decreased flight prices according to some residents (Gillam KPI Program 2009-2010).

KCNs workers are more likely than other workers to travel to and from the site during their days off. This will increase demand for transportation between the site and these communities. The following analysis outlines the potential effects of workers travelling to the job site and additional visits by family members to Thompson.

Split Lake is accessible year-round by road. Travel by personal vehicle to the job site or Thompson will not result in any increase in transportation costs for other Split Lake residents.

Split Lake also receives regular bus service. As a large community that is expected to experience a high level of employment on the Project, there is a potential for workers to use the bus to travel to Gillam before being transported by Manitoba Hydro to the job site. Because of the limited number of seats generally offered through bus transport, there is potential for either a positive or an adverse effect on transportation costs for other residents of Split Lake as the increase in demand may encourage the carrier to increase prices for existing seats or to increase capacity, thereby reducing costs through economies of scale.

Fox Lake (Bird) is accessible year-round by road. Travel by personal vehicle to the job site or to Thompson for shopping and recreation will not result in any transportation cost increases for other

residents of Bird. Bird is also accessible by rail although general abundance of capacity on rail transport indicates that this is not expected to increase the cost of living for residents of Bird.

York Landing is accessible by road and ferry through the summer months, and while the ice road is in operation. Travel by road when this option is available is not expected to increase the transportation costs for other residents of York Landing. Workers, however, may wish to return to their community or need to leave quickly to work at the site during other periods. Other family members may also wish to travel to Thompson for shopping. In this case, residents will need to fly to Thompson with workers then proceed by bus or air to Gillam. Because of the limited number of seats generally offered through air transport and the small number of flights to York Landing, there is a potential for either a positive or an adverse effect on transportation costs for other York Landing residents. The increase in demand may also encourage the carrier to increase prices for existing seats or increase capacity, thereby reducing costs through economies of scale. The increased use of bus transport is not expected to be enough to affect the cost of transportation for other residents.

Ilford is also accessible when the ice road is in operation. During the remainder of the year, workers will need to use the railway to commute back to their community. Rail transport generally has sufficient excess capacity to handle the additional passengers that may use this mode of transport. Neither the increased road nor rail transportation is expected to increase the cost of transportation for other Ilford residents.

There is also a more general potential for the Project to affect the transportation costs of all northern Manitobans. Manitoba Public Insurance (MPI) annual vehicle licensing fees are consistent across the Local Study Area, so there is no variation among communities for licensing costs. However, MPI does vary premiums by region across the province, so any changes in claim rates resulting from the Project would have the potential to affect future premiums. This is unlikely to occur due to mitigation measures already planned for the Project, such as the on-site camp that limits the need for workers to commute to work, and the drug and alcohol policy that is designed to limit the opportunities for workers to drive in the region while impaired.

3B.5 HOUSING

The Project is expected to attract large numbers of workers to the Local Study Area. Some of these workers may be KCNs Members who will reside temporarily in their home First Nation on days off and between contracts. Some Aboriginal and non-Aboriginal workers may also bring family members who will establish permanent residences for the duration of each worker's contract. The increased business activity in the Local Study Area related to the Project may also attract other people and their families to capitalize on indirect employment and business opportunities. Therefore, the Project has the potential to affect the cost of living in both Aboriginal and non-Aboriginal communities across the Local Study Area as a result of increased demand for housing. This section will examine the potential for housing-related cost of living effects in more detail.

Housing costs accounted for about 24.7% of Manitobans' cost of living in 2007 (Statistics Canada 2008a; Statistics Canada 2008b). Housing in the Local Study Area falls into five broad and sometimes

overlapping, categories, including band-owned and subsidized homes; company-owned and subsidized homes; rental units; privately-owned homes; and public housing.

3B.5.1 HOUSING IN KCNs COMMUNITIES

Band-owned housing is available in First Nation communities and in some other communities in the Local Study Area. On most reserves, band-owned housing is offered at little or no cost, substantially reducing shelter costs for residents. This subsidy has an effect on cost of living for First Nation residents. For instance, the loss of this subsidy often contributes to the financial challenges of First Nations Members who choose to live in other communities (YFFN KPI Program 2009-2010).

In 2006, Fox Lake (Bird) registered 40 dwellings and Split Lake registered 370 dwellings. The community of Ilford registered 35 dwellings. In August 2009, Indian Northern Affairs Canada (INAC) and the Canada Mortgage and Housing Corporation (CMHC) announced plans to invest millions of dollars over the next two years in First Nation communities across the country. In Manitoba, 47 First Nations, including FLCN (Fox Lake (Bird), WLFN (Ilford) and TCN (Split Lake), will share in $13.9 million in funding from INAC to help service lots, construct new high-density multi-unit dwellings and undertake renovations to support the conversion of band-owned housing to private ownership (Government of Canada 2009). In addition to this direct First Nation funding, CMHC will receive $125 million to be used for the creation of new on-reserve housing, as well as $125 million for the renovation and repair of existing federally assisted on-reserve social housing (Government of Canada 2009).

3B.5.2 HOUSING IN GILLAM

Gillam has approximately 435 dwellings, according to 2006 census data. Ninety of these dwellings[1] are owned by their occupants and the remaining 345 rented. Some rentals are owned by FLCN although the majority are owned by Manitoba Hydro, which rents them to employees at subsidized rates as part of their compensation and benefits packages. All permanent employees of Manitoba Hydro are eligible for the corporate housing subsidy when stationed in Gillam, though they pay tax on the difference between the rent they pay and the fair market rent for the property. With several types of corporate housing available, subsidies provided by the company vary by position.

Bi-weekly rates range from $42.90 for apartments to $71.60 for "Basic plus 2" units. Employees with a garage are compensated with an additional $4.12 bi-weekly and all employees receiving subsidies are eligible for $1.03 bi-weekly for each major appliance in their home (including washer, dryer, fridge and stove). According to Manitoba Hydro, most employees residing in Gillam receive the "Basic plus 2" subsidy, with additional compensation for four appliances and a garage, for a total of $79.84 on a bi-weekly basis (Gillam KPI Program 2009-2010).

In addition, all Gillam employees receive a northern allowance, with various payment rates dependent on family status. For employees living with their dependents in Manitoba Hydro-subsidized corporate

[1] Census data for 2006 is incomplete for Fox Lake and Split Lake.

housing, the northern allowance provides an additional $181.01 bi-weekly (Manitoba Hydro, *pers. comm.* 2009). Manitoba Hydro employees living in Gillam expressed their satisfaction with the subsidized housing and lack of home repair and maintenance costs, citing improved quality of life and greater flexibility when it comes to their costs of living (Gillam KPI Program 2009-2010).

3B.5.3 HOUSING IN THOMPSON

According to the 2006 census, Thompson had approximately 4,810 housing units: 2,470 single-detached, semi-detached and attached houses, 420 row houses, 1,465 apartments and 465 moveable dwellings, such as trailers (Statistics Canada 2007). More recently, in February 2010, the Canada Post Corporation in the City of Thompson reported 3,509 single detached houses, town-houses, duplexes and mobile home units and 1,700 apartments in Thompson (Canada Post Corporation 2010). Despite having the largest stock in the Local Study Area, Thompson is currently experiencing a housing shortage. In the last few years, rental and affordable housing has become more difficult to find, former apartment complexes have been converted to condominiums and rents have increased.

Census data indicates 65 housing units were built between 2000 and 2006 (Statistics Canada 2002; Statistics Canada 2007a). Service Canada data indicates 26 new units were built in 2007 (Service Canada 2009b). CMHC data reveals that 51 units were built in 2008, although no new units had yet been started as of March 2009 (CMHC 2009; Service Canada 2009b). A multi-family student housing project for the University College of the North campus is expected to begin within the next few years (Service Canada 2009c). The City of Thompson is also working with WinCan Properties Ltd. to build up to 110 new homes in the Burntwood South subdivision by the end of 2011 (Service Canada 2009d). The agreement to begin the first phase of 19 homes was made in June 2008, however construction was postponed until summer 2010 (Service Canada 2009d).

While little investment has been made to build new housing units, larger investments are being made to upgrade existing units, particularly to convert existing rental apartments into condominiums for sale. In 2007, the Grey Wolf apartments were converted to condominiums (Service Canada 2009b) and an additional 400 apartment units are currently scheduled for conversion from rental apartments to condominiums, including the Princeton Towers and the Corayana Apartments (Service Canada 2009b). Prices for these units are expected to start at about $164,000 (Service Canada 2009b). As a result of these conversions, apartment vacancy rates continue to decline. Table 3B-6 illustrates the number of vacant apartments in Thompson compared to Winnipeg and Manitoba as at April 2009.

Table 3B-6: Apartment Units Vacant by Bedroom Type, April 2009

Number of Private Apartment Units Vacant and Universe In April 2009 by Bedroom Type										
Centre	Bachelor		1 Bedroom		2 Bedroom		3 Bedroom		TOTAL	
	Vacant	Total	Vacant	Total	Vacant	Total	Vacant	Total	Vacant	Total
Thompson	**[1]	50	0	497	2	825	0	27	3	1,399
Winnipeg	24	4,747	256	26,631	175	21,012	27	1,515	482	53,906
Manitoba[2]	25	4,929	268	28,664	182	24,374	28	1,631	503	59,598

Source: CMHC 2009.
Notes:
1. Data suppressed to protect confidentiality or data is not statistically reliable.
2. Manitoba data only includes centres with 10,000 residents or more.

As vacancy rates in the city have decreased, rental prices have increased. Table 3B-7 presents average apartment rental prices in Thompson compared to rent in Winnipeg and Manitoba for April 2008 and 2009. While rental prices in Thompson remain lower than the provincial average, except in the case of bachelor apartment rents, average prices rose nearly 9% between 2008 and 2009 versus an increase of less than 3.5% in Winnipeg and an increase of 3.75% in the province as a whole. According to the Residential Tenancy Act, owners of apartment facilities are given exemption from rent controls if they undertake major renovations to the property. As a result, many landlords have substantially increased rents following improvements. With the additional anticipated condominium conversions, monthly rental rates are likely to continue to increase and vacancy rates will probably remain low.

Table 3B-7: Apartment Average Rent by Bedroom Type, April 2008 and April 2009

Private Apartment Average Rent by Bedroom Type										
Centre	Bachelor		1 Bedroom		2 Bedroom		3 Bedroom		TOTAL	
	Apr-08	Apr-09	Apr-08	Apr-09	Apr-08	Apr-09	Apr-08	Apr-09	Apr-08	Apr-09
Thompson	$452	$474	$531	$577	$590	$639	$662	$688	$562	$611
Winnipeg	$453	$455	$492	$616	$746	$774	$906	$920	$648	$670
Manitoba[1]	$450	$453	$586	$610	$726	$757	$879	$905	$640	$664

Source: CMHC 2009.
Note:
1. Manitoba data only includes centres with 10,000 residents or more.

While the total number of housing units in Thompson has remained relatively constant over the last decade, increase in rental prices and trends toward converting low-cost apartments into condominiums is causing the housing-related cost of living in Thompson to rise quickly.

3B.5.4 EFFECTS ASSESSMENT – HOUSING

There are two main ways the Project could affect housing prices in the Local Study Area during the construction phase:

- Workers returning to the Local Study Area who require a residence away from the job site during days off and between contracts; and
- Workers who bring their families with them to the Local Study Area who require permanent residences for their families while they are living and working at the job site.

In the KCNs communities, the presence of subsidized housing currently limits the opportunity for an influx of workers to affect house-related costs of living. The current stock of housing is finite and the ability of workers and their families to take up residence in the communities during the construction phase of the Project will be limited by their ability to negotiate with the band council or existing residents who may have space in their homes.

Nearby Nisichawayasihk Cree Nation (Nelson House) has recently begun to charge rents for band housing (CBC News 2009). If KCNs communities adopt this approach, there could be more opportunity for the Project to affect the cost of living for other band residents.

Thompson is currently too expensive to be an attractive place for workers to secure a permanent residence to stay at between contracts. It would likely be more convenient for workers to travel to Winnipeg, or to their home if they live outside the Local Study Area, while waiting for work opportunities.

Workers may choose to move their families to Thompson while they are working at the job site to make it easier to spend time together during days off. While the total number of workers expected to do this is likely to be small as is their impact on the Thompson housing market. If Vale's plans to shut down their Thompson smelter and refinery proceeds, some housing is likely to become available in Thompson as workers affected by the closure leave to work elsewhere.

Gillam is unlikely to experience housing-related costs of living effects as a result of the Project. Most available rental units are controlled by Manitoba Hydro which only rents them to employees and there is little turnover among the remaining units in town. Therefore, there is virtually no supply to satisfy any increase in demand that results from the Project.

During the operations phase, Gillam is likely to experience a population increase. Manitoba Hydro is already preparing to build new rental units to accommodate the new staff and families that are expected to work at the facility.

3B.6 COMPARISON OF RESULTS TO PRICE INDEX DIFFERENTIAL

The Price Index Differential (PID) is calculated by the Treasury Board of Canada Secretariat and the National Joint Council as part of the Isolated Post Allowance (IPA) for four of the six communities within the Local Study Area: Gillam, Ilford, Split Lake and York Landing. Federal employees living and working in northern Manitoba communities are eligible for this allowance, should the cost of living in the community exceed the cost of living in Winnipeg by 15% or more. The PID index includes prices for the community of Ilford, which was not surveyed for the RNFB price calculations. However, the IPA index does not include the cost of housing or rent in any of the affected communities. In addition, Thompson is not included on the list, indicating that the cost of living in this community has not reached the 15% threshold according to PID calculations. Similarly, the PID has not been calculated specifically for Fox Lake (Bird), which is likely due to its proximity to the town of Gillam.

The PID index calculates price differentials using Winnipeg as a baseline – set at a value of 100 – with classification ranges corresponding to price increases by percentage over this baseline for a variety of goods and services. Products incorporated into the PID calculation include grocery items, household supplies and operations, household or tenant insurance premiums, transportation expenses, personal care supplies and services, pharmaceutical products (excluding prescription medications), entertainment supplies, rental of cable or satellite services, reading materials and tobacco and alcohol products. In total, approximately 250 items are used to calculate the PID[1] (National Joint Council 2009).

In general, the PID supports the findings of the RNFB survey. According to the PID, the cost of living in Split Lake is more than 20% higher than the cost of living in Winnipeg, followed by Gillam at 25%. The cost of living in Ilford is 30% more than in Winnipeg, and at York Landing the cost of living is 45% greater than in Winnipeg. PID indices are presented for each community in (Table 3B-8).

[1] For more information on the calculation of the PID and related federal indexes, see the Isolated Posts and Government Housing Directive documents hosted on the National Joint Council website 2010.

Table 3B-8: PID Index for Local Study Area Communities Effective August 2009

Location	Living Cost Differential[1]	Price Index Differential[2]
Split Lake[3]	2	120-124
Gillam	3	125-129
Ilford	4	130-134
York Landing	7	145-149

Source: National Joint Council 2009.
Notes:
1. The Living Cost Differential may be authorized at certain posts where abnormally high prices prevail. The LCD allowance becomes effective when the price of goods and services, as measured by Statistics Canada, reaches an index level of 115 or higher in relation to an index of 100 at the point of comparison. There are 16 LCD levels, reflecting 5-point ranges. Costs associated with shelter, clothing, furniture and vehicle purchases are not taken into consideration.
2. The Price Index Differentials are the actual 5-point ranges referred to by the LCD classification. The PID is measured in relation to a community of comparison, in the case of the Keeyask region this community of comparison is Winnipeg, which is given a comparative index of 100.
3. Split Lake is considered a Special Location, with federal employees paid a combined rate equal to the Living Cost Differential and the Fuel and Utilities Differential (which is paid at isolated posts where employees are required to pay for fuel and/or utility consumption directly to the supplier or indirectly through a portion of their rent).

There are some notable differences between the PID calculations and the results of the RNFB survey. The PID indicates that Gillam experiences a higher cost of living increase than Split Lake, despite Gillam's better access to transportation and greater purchasing power. The PID also applies a higher cost of living to York Landing than the RNFB results would suggest.

Although the PID index rates are slightly higher than the RNFB calculations and differ slightly for the communities of Gillam and York Landing, the differences are relatively small. Considering the much broader basket of goods included in the PID index, the large number of missing items from the York Landing RNFB survey, as well as the different time periods during which the RNFB surveys were undertaken, some differences were likely. Overall, both measurements serve to provide some perspective on the findings of the other.

3B.7 COST OF LIVING SUMMARY

There are three main drivers affecting the cost of living across the Local Study Area: the cost of food and household items, the cost of transportation and the cost of housing. In Manitoba, these three costs make up more than 50% of the total amount spent by families (Statistics Canada 2008a; Statistics Canada 2008b).

Within the Local Study Area, the results of the RNFB and other collected data indicate that the cost of food and household items are directly affected by the accessibility of a community. Residents of the most remote communities pay almost 40% more than people in Winnipeg and nearly 30% more than those living in Thompson for basic household goods. These costs are mitigated to some extent by the increased prevalence of country foods in remote communities.

Transportation costs are more difficult to quantify, although it is clear that transportation costs are higher for people living in remote communities. However, the small size of the community may reduce transportation costs such as fuel and annual licensing fees for those people who do not commute from their home community to other locations on a regular basis.

Housing costs are generally more affordable in the remote communities than in the regional centres. In the KCNs communities, most on-reserve housing is subsidized by the Federal Government, which reduces housing-related rental or purchase costs. The exception would be the case of Canadian Mortgage and Housing Corporation (CMHC) homes that are held by the community, with rent paid by the individuals living in them[1]. In Gillam, Manitoba Hydro subsidies reduce employee housing costs to a level well below the provincial average. Housing costs for non-Manitoba Hydro employees remain much more expensive. The highest housing costs are found in Thompson, which is currently experiencing a housing shortage with little housing construction on the horizon to absorb the growing demand. This is driving up the price of houses and apartments. It is also leading some apartment owners to convert apartments into condominiums in order to take advantage of the increased sale prices (Thompson KPI Program 2008-2010). This situation is likely to change given the announcement in November 2010 that Vale expects to close the nickel refinery and smelter by 2015.

Table 3B-9 provides a summary of the findings of this study alongside the federal PID indices.

[1] There are currently 188 CMHC funded homes at TCN (Split Lake); 29 at FLCN (Bird); 20 at WLFN (Ilford); and 18 at YFFN (York Landing) (FLCN KPI Program 2009-2011; CNP 2010c; CNP 2010f; YFFN KPI Program 2009-2010).

Table 3B-9: Cost of Living and Potential Effects Summary Table 2009

	Food & Household Items (RNFB)	Transportation	Housing	Price Index Differential (PID)
Thompson	9% above Winnipeg	Road / Bus / Rail / Air	Comparable to Winnipeg	<15%
Potential for effect	*Potential for Small, Short-Term Increase*	*No Effect, or Small Decrease Cost of Bus & Air*	*Potential for Small, Short-Term Increase*	
Gillam	12% above Thompson 21% above Winnipeg	Road / Bus / Rail / Air Higher than Thompson	Manitoba Hydro Subsidizes Most Homes	25-29%
Potential for effect	*No Effect, or Small Decrease to Costs*	*No Effect, or Small Decrease Cost of Bus & Air*	*No Effect*	
Split Lake (TCN)	17% above Thompson 28% above Winnipeg	Road / Bus Higher than Thompson	Subsidized by First Nation	20-24%
Potential for effect	*No Effect, or Small Decrease to Costs*	*No Effect, or Small Decrease Cost of Bus*	*No Effect*	
York Landing (YFFN)	28% above Thompson 39% above Winnipeg	Ice Road / Ferry / Air Expensive in spring & fall	Subsidized by First Nation	45-49%
Potential for effect	*No Effect, or Small Decrease to Costs*	*No Effect, or Small Decrease Cost of Air*	*No Effect*	
Fox Lake/Bird (FLCN)	n/a	Road / Rail Inconvenient but affordable	Subsidized by First Nation	n/a
Potential for effect	*No Effect, or Small Decrease to Costs*	*No Effect*	*No Effect*	

Table 3B-9: Cost of Living and Potential Effects Summary Table 2009

	Food & Household Items (RNFB)	Transportation	Housing	Price Index Differential (PID)
Ilford (WLFN)	n/a	Ice Road / Rail/ Air Charter Inconvenient but affordable	Subsidized by First Nation	30-34%
Potential for effect	*No Effect*	*No Effect*	*No Effect*	

APPENDIX 3C

ECONOMIC IMPACT ASSESSMENT

KEEYASK
Hydropower Limited Partnership

Keeyask Generation Project

Economic Impact Assessment

Economic Analysis Department

November 2011

Table of Contents

List of Tables

List of Figures

1. Executive Summary

For the purpose of this economic impact assessment, all costs and assumptions associated with the Keeyask Infrastructure Project (KIP) are not included. The Keeyask generation project is a proposed 695-megawatt (MW) hydroelectric generating station at Gull Rapids on the lower Nelson River, immediately upstream of Stephens Lake in northern Manitoba. The project will take approximately eight years to construct. The project consists of principal structures and supporting infrastructure. The principal structures consist of a powerhouse complex, spillway, dams, and dykes. Supporting infrastructure consists of temporary facilities required to construct the principal structures and permanent facilities required to construct and operate the project. Temporary infrastructure consists of roads, borrow sources, a camp and work areas, cofferdams, an ice boom and boat docking and launching facilities.

Three new transmission lines, each approximately 38 km in length, will be required to transmit power from Keeyask to the Radisson Converter Station, where the power will enter Manitoba Hydro's integrated power system.

The Keeyask project includes:

- A 695-megawatt (MW) generating station. The capital cost is estimated to be $2,162 million (in 2010 dollars) to build. The annual operating and maintenance costs are estimated to be $5.7 million (in 2010 dollars).
- Three new transmission lines, each approximately 38 km in length. The capital costs are estimated to be $65.7 million (in 2010 dollars). The annual operating and maintenance costs are estimated to be approximately $122,000 (in 2010 dollars).
- A switching station with capital cost estimated to be $57.2 million (in 2010 dollars). The annual operating and maintenance costs are estimated to be $91,800 (in 2010 dollars).

The economic impact analysis does not include costs associated with the infrastructure project (KIP), sunk costs, interest and escalation during construction, costs associated with pre-project planning, design, and training, costs associated with environmental studies, any potential local development payments, and contingency costs.

The major economic benefit of the project is from construction. In total, the entire project construction expenditure is expected to contribute to **Manitoba** as follows:

- **9,170 person-years of direct and indirect employment,**
- **$653.8 million in labour income,**
- **$822.7 million in GDP,**
- **$422.6 million in tax revenue.**

Operating and maintaining the project is expected to contribute, on average, annually to **Manitoba** as follows:

- **77 person-years of direct and indirect employment,**
- **$6.2 million in labour income,**
- **$7.1 million in GDP,**
- **$31.5 million in tax revenue.**

In total, the entire project construction expenditure is expected to contribute to **all of Canada** as follows:

- **22,920 person-years of direct and indirect employment,**
- **$1,390.8 million in labour income,**
- **$1,901.6 million in GDP,**
- **$788.3 million in tax revenue.**

In total, operating and maintaining the project is expected to contribute, on average, annually to **all of Canada** as follows:

- **93 person-years of direct and indirect employment,**
- **$6.7 million in labour income,**
- **$7.8 million in GDP,**
- **$31.8 million in tax revenue.**

2. Introduction

The purpose of this document is to present the results of an economic impact analysis of the proposed Keeyask generating station and associated transmission infrastructure. The Keeyask project includes:

- A 695-megawatt (MW) hydroelectric generating station on the lower Nelson River, immediately upstream of Stephens Lake in Northern Manitoba. The capital cost is estimated to be $2,162 million (in 2010 dollars) to build. The annual operating and maintenance costs are estimated to be $5.7 million (in 2010 dollars).
- Three new transmission lines, each approximately 38 km in length. The capital costs are estimated to be $65.7 million (in 2010 dollars). The annual operating and maintenance costs are estimated to be approximately $122,000 (in 2010 dollars).
- A switching station with capital cost estimated to be $57.2 million (in 2010 dollars). The annual operating and maintenance costs are estimated to be approximately $91,800 (in 2010 dollars).

The economic impact analysis does not include sunk costs, interest, and escalation during construction, costs associated with pre-project planning, design, and training, costs associated with environmental studies, any potential local development payments, and contingency costs.

The economic impact analysis provides an estimate of the total employment impacts of the project on the economies of Manitoba and the rest of Canada. It also estimates the total Gross Domestic Product, tax revenue impacts, and labour income. It indicates not only the potential impacts generated directly by the project, but also the potential spin-off effects generated as a result of purchases on domestic goods and services and the local recirculation of increased income.

The economic impacts for the construction phase represent the estimated impacts for the entire construction period. The economic impacts for the operational phase are expressed on an annual basis.

Economic impacts have been calculated separately for construction and operational phases of the project. The analysis is based on construction, and operation and maintenance cost estimates available as of 2010. The construction and operating and maintenance cost estimates for the Keeyask generating station and associated transmission lines and switching station facilities may change as a result of further enhancements to the design. This may lead to changes in the economic impacts presented in this report.

While economic impact analysis can be a useful component in decision making, it does have some limitations. Economic impact analysis differs from socio-economic benefit-cost analysis in that it is a gross, rather than net, measure of benefits and it only considers the impact of project expenditures. It does not consider the opportunity cost of labour and capital in the project nor does it consider the revenue generated by the project. By itself, it cannot measure the profitability of the project. Thus, the results of this study should be treated as general estimates and never as absolutes.

3. Methodology

Assessing economic impacts of the construction and subsequent operation of the Keeyask project involves estimating (1) direct expenditures that would be made by entities within Manitoba or Canada, and (2) the secondary impacts that would be expected to result from these direct expenditures. The economic modelling framework used for estimating these economic impacts is the Manitoba Bureau of Statistics' Input-Output model. The model is based on statistical information about the flow of goods and services among various sectors of Manitoba's economy. In effect, it allows one to trace the demands placed on one industry resulting from increased activity in another. Thus the model provides estimates of direct, indirect, and induced impacts of the proposed Keeyask project on the economy of Manitoba or Canada. In summary, economic impact analysis refers to three different types of impacts:

- **Direct**. These are the impacts of the initial project expenditures.
- **Indirect.** These are the impacts that are created through increased sales for suppliers to the direct activity. For example, direct expenditures on transmission line towers will create an indirect increase in spending on transportation fuel and transportation repair services.
- **Induced**. These are impacts that are created by additional income and profits earned by workers and company owners associated with the project directly or indirectly. This additional income leads to more spending on food, housing, entertainment, transportation, and all of the other expenses that make up a typical household budget.

In determining the economic impact, there are two major purchasing categories considered: local purchases and non-local purchases. Non-local purchases represent a leakage or loss to a local economy.

The results of economic impact analysis are reported with the following data:

- **Employment.** This is a straightforward measure of the number of person-years of employment (full-time job equivalents) that are generated by the project, including direct employment, indirect employment with suppliers to the main project, and induced employment that is associated with the extra spending by households.
- **Labour Income.** This is the additional income earned by workers as a result of the project.
- **Gross Domestic Product (GDP).** Also referred to as "value-added," GDP represents the additional value of production that is generated by the project after removing the cost of intermediate inputs. For the purpose of this analysis, GDP at market price is reported. GDP at market price is a measure of the total value of goods and services produced in the economy.
- **Tax Revenue.** Tax revenue is calculated for all three levels of government – federal, provincial, and local.

Key economic impacts resulting from the Keeyask project are presented in the sections that follow. The construction phase impacts indicate the cumulative employment, labour income, GDP, and tax revenue impacts generated over the entire construction period. The operation and maintenance phase impacts indicate the annual impacts generated for a typical year of operation when the project is at full production.

4. Potential Economic Impacts on Manitoba

4.1 Construction Phase

Total expenditures during the construction phase are estimated to be $2,285 million. Of the total, $999.3 million is estimated to be spent outside the province. The majority, $1,285.8 million, is estimated to be spent within the province and is estimated to yield the impacts set out in Table 1 and Figure 1.

Table 1

Economic Impact on Manitoba – Construction Phase[1], [2]

	Construction Phase			
	Generating Station	**Transmission Line**	**Switching Station**	**Total**
Employment (person-years)[3]				
Project Direct[4]	2,460[5]	45	60	2,565
Other Direct[6]	2,280	240	55	2,575
Indirect and Induced[7]	3,640	295	105	4,040
Total Employment (person-years)	**8,370**	**580**	**220**	**9,170**
Labour Income ($ millions)[8]	**$604.5**	**$31.6**	**$17.7**	**$653.8**
GDP ($ millions)[9]	**$755.6**	**$42.4**	**$24.7**	**$822.7**
Tax Revenues ($ millions)[10]				
Provincial	$182.3	$ 6.6	$ 5.2	$194.1
Local	$ 25.4	$ 1.5	$ 0.7	$ 27.6
Federal	$187.9	$ 7.6	$ 5.4	$200.9
Total Tax Revenue ($ millions)	**$395.5**	**$15.7**	**$11.4**	**$422.6**

Note 1: Figures may not add to total, due to rounding.

Note 2: In 2010 dollars.

Note 3: Employment impacts are in "person-years." A person-year is defined as one person being fully employed for one year.

Note 4: On-site direct employment of Manitoba Hydro (including incremental Manitoba Hydro off-site employees) and contractor employees which is directly generated by the project.

Note 5: Total on-site direct employment of contractor and Manitoba Hydro employees is estimated to be 4,218 person-years. Off-site incremental employment of Manitoba Hydro employees is estimated to be 259 person-years.

Note 6: Employment of suppliers to support the main project and other jobs created by additional spending by households.

Note 7: Indirect employment refers to the employment of people who supply raw materials, equipment, or services to the initial direct suppliers to the project.

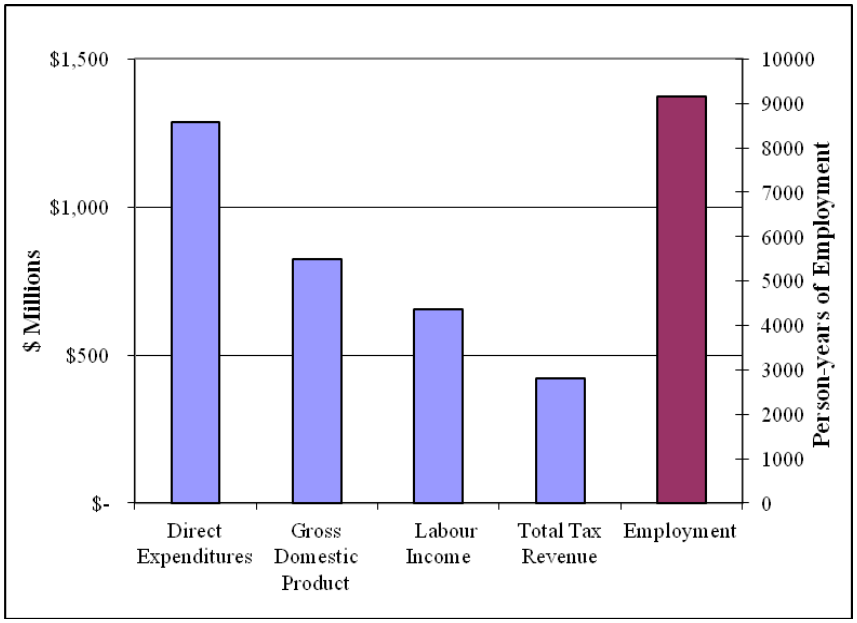
Note 8: Labour income is the sum of wages, supplementary labour income, and net income of unincorporated business. Any or all of these may be present in the direct expenditures and resultant direct, indirect, and induced impacts.

Note 9: GDP at market price is the total value of goods and services produced in Manitoba's economy.

Note 10: Tax revenue estimates are based on 2009-10 Manitoba Budget and 2006 income tax data adjusted to 2010 rates.

Figure 1

Economic Impact on Manitoba – Construction Phase



4.1.1 Employment

Total provincial employment impacts from the construction phase of the Keeyask generating station and associated transmission infrastructure are estimated at 9,170 person-years. This represents about 0.2% of the total number of full time employees in Manitoba's construction industry in 2010. For every $1 million direct capital expenditure in Manitoba, the Keeyask project is expected to generate 7.1 person-years of employment.

4.1.2 Labour Income

The total provincial labour income impacts from the construction phase of the Keeyask generating station and associated transmission infrastructure are estimated at $653.8 million. This represents about 0.4% of total labour income of full time employees in Manitoba's construction industry in 2010. For every $1 million direct capital expenditure in Manitoba, labour income impact in the province is estimated at $0.5 million for the Keeyask project.

4.1.3 Gross Domestic Product

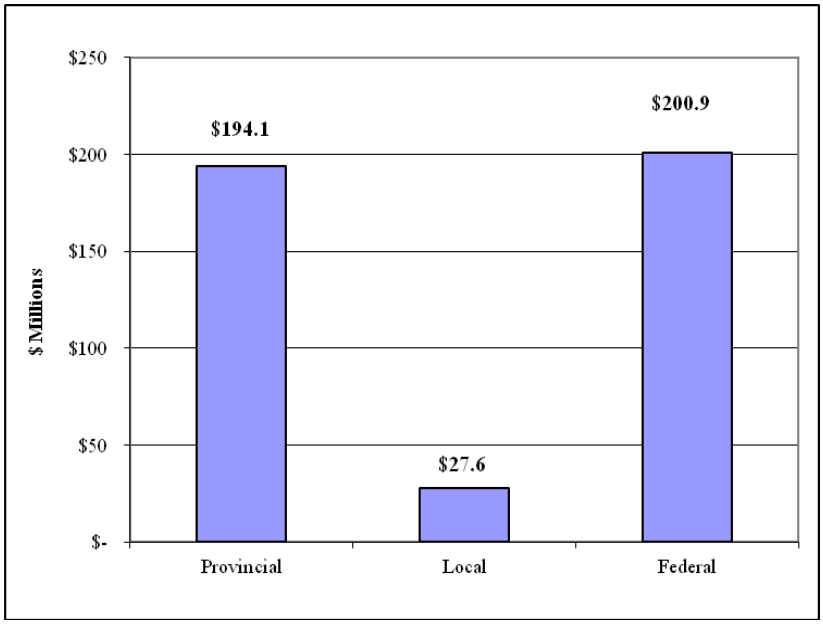
Total provincial impacts due to GDP at market prices from the construction phase of the Keeyask generating station and associated transmission infrastructure are estimated at $822.7 million. For every $1 million direct capital expenditure in Manitoba, the GDP impact in the province is estimated at $0.6 million for the Keeyask project.

4.1.4 Tax Revenue

Provincial, local, and federal tax revenues generated in Manitoba are estimated at $422.6 million from the construction of the Keeyask generating station and associated transmission facilities. As shown in Figure 2, this is comprised of $194.1 million in provincial, $27.6 million in local, and $200.9 million in federal taxes. For every $1 million direct capital expenditure in Manitoba, the tax revenue impacts are estimated at $0.15 million at the provincial, $0.02 million at the local, and $0.16 million at the federal levels for the Keeyask project.

Figure 2

Tax Revenue – Construction Phase



4.2 Operational Phase

Average annual expenditures during the operational phase are estimated at $5.9 million.* Approximately ninety-nine per cent (99%) of the total annual expenditures are assumed to be direct expenditures in Manitoba. Table 2 and Figure 3 provide the detailed economic impacts.

Table 2

Economic Impact on Manitoba – Operational Phase(1), (2)

	Operations – Per Year			
	Generating Station	**Transmission Line**	**Switching Station**	**Total**
Employment (person-years)(3)				
Project Direct(4)	46	0.7	0.5	47.2
Other Direct(5)	0	0.1	0.1	0.2
Indirect and Induced(6)	30	0.4	0.4	30.8
Total Employment (person-years)	**76**	**1.2**	**1.0**	**78.2**
Labour Income ($ 000s)(7)	**$6,000**	**$85.3**	**$73.7**	**$6,159.0**
GDP ($ 000s)(8)	**$6,900**	**$101.6**	**$85.3**	**$7,086.9**
Tax Revenues ($ 000s)(9)				
Provincial(10)	$29,410	$448.5	$301.4	$30,159.6
Local	$ 230	$ 3.4	$ 2.9	$ 236.3
Federal	$ 1,110	$ 16.8	$ 14.2	$ 1,141.0
Total Tax Revenue ($ 000s)	**$30,750**	**$468.7**	**$318.5**	**$31,536.9**

Note 1: Figures may not add to total, due to rounding.

Note 2: In 2010 dollars.

Note 3: Employment impacts are in "person-years." A person-year is defined as one person being fully employed for one year.

Note 4: On-site direct employment at the plant and in Gillam which is directly generated by the project.

Note 5: Employment of suppliers to support the main project and other jobs created by additional spending by households.

Note 6: Indirect employment refers to the employment of people who supply raw materials, equipment, or services to the initial direct suppliers to the project.

Note 7: Labour income is the sum of wages, supplementary labour income, and net income of unincorporated business. Any or all of these may be present in the direct expenditures and resultant direct, indirect, and induced impacts.

Note 8: GDP at market price is the total value of goods and services produced in Manitoba's economy.

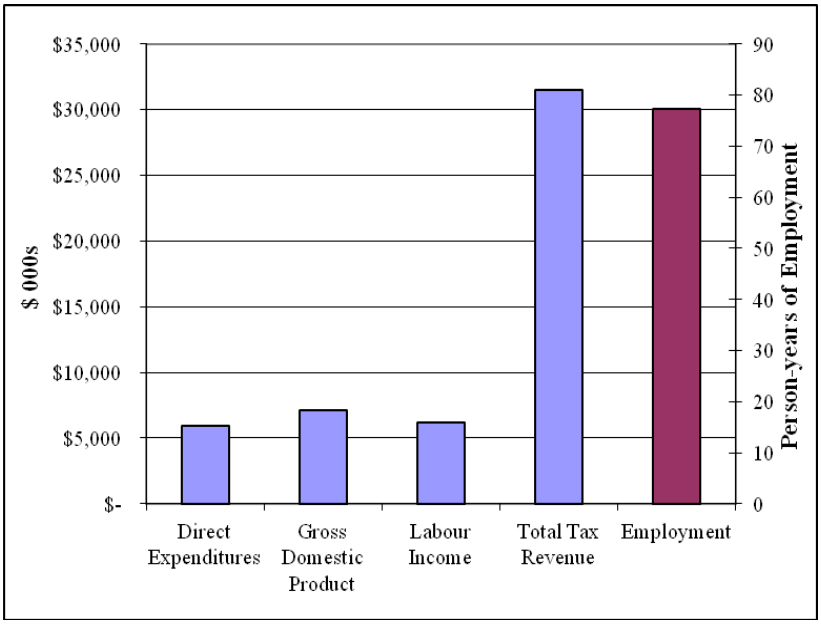
Note 9: Tax revenue estimates are based on 2009-10 Manitoba Budget and 2006 income tax data adjusted to 2010 rates.

Note 10: Estimates associated with annual corporation capital tax revenue and annual water rental payments are included in the provincial tax revenues.

*Annual expenditure estimates are based on average costs over the past four years at Kettle and Long Spruce.

Figure 3

Economic Impact on Manitoba – Operational Phase



4.3 Summary of Manitoba Economic Impacts

Table 3 provides the overall impacts of the Keeyask project in Manitoba.

Table 3

Manitoba Economic Impacts of the Keeyask Project[1, 2]

	Generating Station		Transmission Lines		Switching Station		Total	
	Const. (total)	**O&M (per year)**	**Const. (total)**	**O&M (per year)**	**Const. (total)**	**O&M (per year)**	**Const. (total)**	**O&M (per year)**
Employment (person-years)[3]								
Project Direct[4]	2,460[5]	46[6]	45	0.7	60	0.5	2,565	47.2
Other Direct[7]	2,280	0	240	0.1	55	0.1	2,575	0.2
Indirect and Induced[8]	3,640	30	295	0.4	105	0.4	4,040	30.8
Total Employment (person-years)	**8,370**	**76**	**580**	**1.2**	**220**	**1.0**	**9,170**	**78.2**
Labour Income ($ 000s)[9]	**$604,500**	**$6,000**	**$31,600**	**$85.3**	**$17,700**	**$73.7**	**$653,800**	**$6,159.0**
GDP ($ 000s)[10]	**$755,600**	**$6,900**	**$42,400**	**$101.6**	**$24,700**	**$85.3**	**$822,700**	**$7,086.9**
Tax Revenues ($ 000s)[11								
Provincial[12]	$182,300	$29,410	$ 6,600	$448.5	$ 5,200	$301.4	$194,100	$30,159.6
Local	$ 25,400	$ 230	$ 1,500	$ 3.4	$ 700	$ 2.9	$ 27,600	$ 236.3
Federal	$187,900	$ 1,110	$ 7,600	$ 16.8	$ 5,400	$ 14.2	$200,900	$ 1,141.0
Total Tax Revenue ($ 000s)	**$395,500**	**$30,750**	**$15,700**	**$468.7**	**$11,400**	**$318.5**	**$422,600**	**$31,536.9**

Note 1: Figures may not add to total, due to rounding.

Note 2: In 2010 dollars.

Note 3: Employment impacts are in "person-years." A person-year is defined as one person being fully employed for one year.

Note 4: On-site direct employment of Manitoba Hydro (including incremental Manitoba Hydro off-site employees) and contractor employees which is directly generated by the project.

Note 5: Total on-site direct employment of contractor and Manitoba Hydro employees is estimated to be 4,218 person-years. Off-site incremental employment of Manitoba Hydro employees is estimated to be 259 person-years.

Note 6: On-site direct employment at the plant and in Gillam which is directly generated by the project.

Note 7: Employment of suppliers to support the main project and other jobs created by additional spending by households.

Note 8: Indirect employment refers to the employment of people who supply raw materials, equipment, or services to the initial direct suppliers to the project.

Note 9: Labour income is the sum of wages, supplementary labour income, and net income of unincorporated business. Any or all of these may be present in the direct expenditures and resultant direct, indirect, and induced impacts.

Note 10: GDP at market price is the total value of goods and services produced in Manitoba's economy.

Note 11: Tax revenue estimates are based on 2009-10 Manitoba Budget and 2006 income tax data adjusted to 2010 rates.

Note 12: Estimates associated with annual corporation capital tax revenue and annual water rental payments are included in the provincial tax revenues.

5. Potential Economic Impacts to Rest of Canada

5.1 Construction Phase

During the construction phase $752.1 million is estimated to be spent in the Rest of Canada, outside Manitoba, and is estimated to yield the impacts set out in Table 4 and Figure 4.

Table 4

Economic Impact on Rest of Canada – Construction Phase[1], [2]

	Construction Phase			
	Generating Station	Transmission Line	Switching Station	Total
Employment (person-years)[3]				
Project Direct[4]	**2,010**	**0**	**0**	**2,010**
Other Direct[5]	**3,120**	**95**	**50**	**3,265**
Indirect and Induced[6]	**8,100**	**245**	**130**	**8,475**
Total Employment (person-years)	**13,230**	**340**	**180**	**13,750**
Labour Income ($ millions)[7]	**$717.6**	**$12.3**	**$7.0**	**$736.9**
GDP ($ millions)[8]	**$1,046.7**	**$19.4**	**$12.8**	**$1,078.9**
Tax Revenues ($ millions)[9]				
Provincial	**$145.6**	**$2.5**	**$1.6**	**$149.7**
Local	**$ 34.9**	**$0.6**	**$0.4**	**$ 35.9**
Federal	**$175.0**	**$3.0**	**$2.0**	**$180.0**
Total Tax Revenue ($ millions)	**$ 355.5**	**$6.1**	**$4.0**	**$365.6**

Note 1: Figures may not add to total, due to rounding.

Note 2: In 2010 dollars.

Note 3: Employment impacts are in "person-years." A person-year is defined as one person being fully employed for one year.

Note 4: Direct employment related to direct suppliers (i.e., contractors) from outside Manitoba.

Note 5: Employment of suppliers to support the main project and other jobs created by additional spending by households.

Note 6: Indirect employment refers to the employment of people who supply raw materials, equipment, or services to the initial direct suppliers to the project.

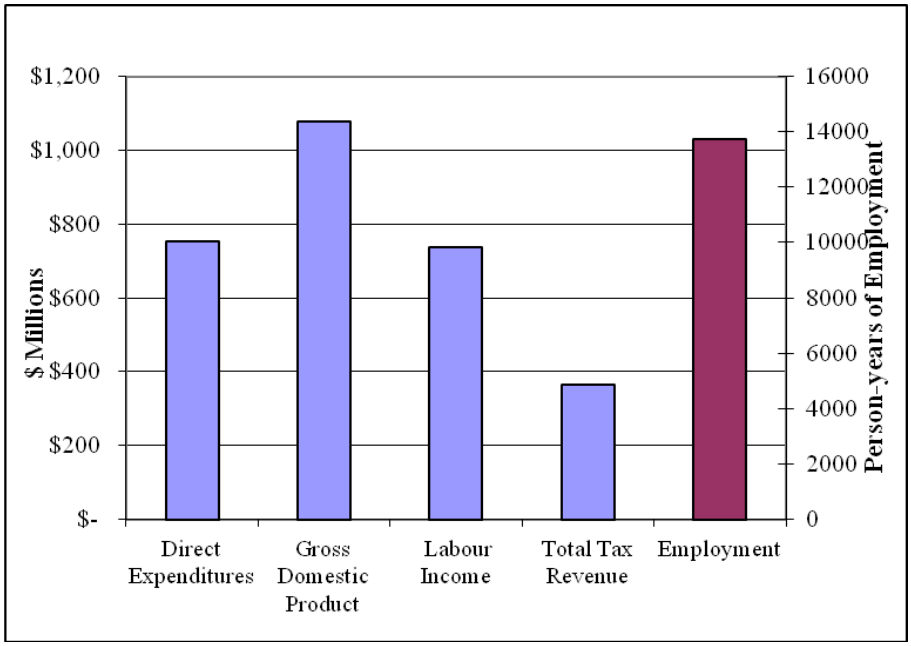
Note 7: Labour income is the sum of wages, supplementary labour income, and net income of unincorporated business. Any or all of these may be present in the direct expenditures and resultant direct, indirect, and induced impacts.

Note 8: GDP at market price is the total value of goods and services produced in Manitoba's economy.

Note 9: Tax revenue estimates are based on 2009-10 Manitoba Budget and 2006 income tax data adjusted to 2010 rates.

Figure 4

Economic Impact on Rest of Canada – Construction Phase



5.2 Operational Phase

During the operations and maintenance phase, annual average expenditures of $2,500 are estimated to be spent in the Rest of Canada, outside Manitoba, and are estimated to yield the impacts set out in Table 5 and Figure 5.

Table 5

Economic Impact on Rest of Canada – Operational Phase[1], [2]

	Operations – Per Year			
	Generating Station	**Transmission Line**	**Switching Station**	**Total**
Employment (person-years)[3]				
Project Direct[4]	0	0.0	0	0.0
Other Direct[5]	0	0.0	0	0.0
Indirect and Induced[6]	15	0.2	0.2	15.0
Total Employment (person-years)	**15**	**0.3**	**0.2**	**15.5**
Labour Income ($ 000s)[7]	**$400**	**$8.7**	**$4.4**	**$413.1**
GDP ($ 000s)[8]	**$700**	**$18.0**	**$8.2**	**$726.2**
Tax Revenues ($ 000s)[9]				
Provincial	$100.0	$2.4	$1.1	$103.5
Local	$ 20.0	$0.6	$0.3	$ 20.9
Federal	$120.0	$2.8	$1.3	$124.1
Total Tax Revenue ($ 000s)	**$250.0**	**$5.7**	**$2.7**	**$258.4**

Note 1: Figures may not add to total, due to rounding.

Note 2: In 2010 dollars.

Note 3: Employment impacts are in "person-years." A person-year is defined as one person being fully employed for one year.

Note 4: Direct employment related to direct suppliers (i.e., contractors) from outside Manitoba.

Note 5: Employment of suppliers to support the main project and other jobs created by additional spending by households.

Note 6: Indirect employment refers to the employment of people who supply raw materials, equipment, or services to the initial direct suppliers to the project.

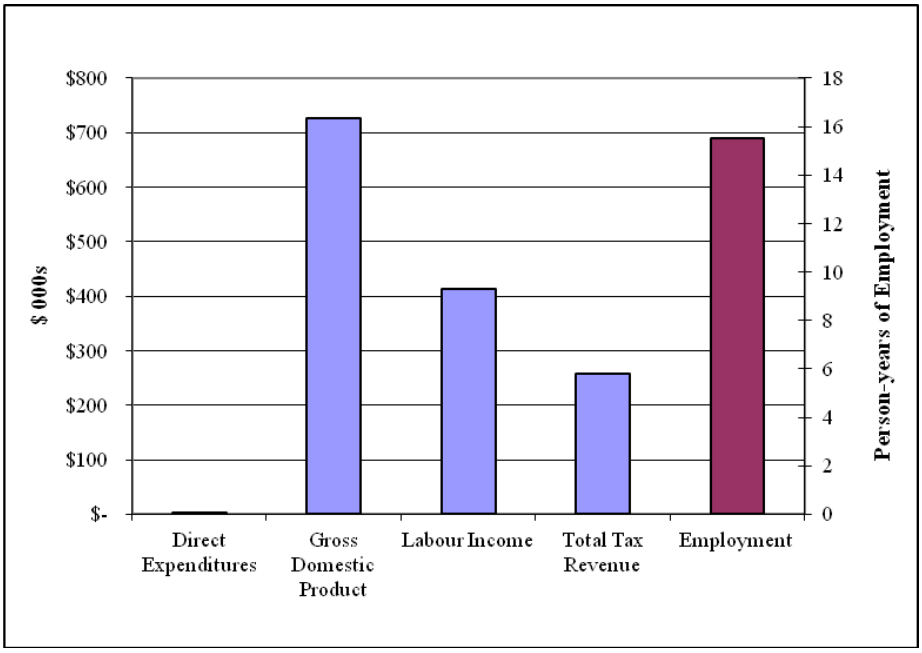
Note 7: Labour income is the sum of wages, supplementary labour income, and net income of unincorporated business. Any or all of these may be present in the direct expenditures and resultant direct, indirect, and induced impacts.

Note 8: GDP at market price is the total value of goods and services produced in Manitoba's economy.

Note 9: Tax revenue estimates are based on 2009-10 Manitoba Budget and 2006 income tax data adjusted to 2010 rates.

Figure 5

Economic Impact on Rest of Canada – Operational Phase



5.3 Summary of Economic Impacts to the Rest of Canada

Table 6 provides the overall impacts of the Keeyask project to the Rest of Canada.

Table 6

Rest of Canada Economic Impacts of the Keeyask Project[1], [2]

	Generating Station		Transmission Lines		Switching Station		Total	
	Const. (total)	**O&M (total)**	**Const. (total)**	**O&M (total)**	**Const. (per year)**	**O&M (total)**	**Const. (per year)**	**O&M (total)**
Employment (person-years)[3]								
Project Direct[4]	2,010	0	0	0.0	0	0	2,010	0.0
Other Direct[5]	3,120	0	95	0.0	50	0	3,265	0.0
Indirect and Induced[6]	8,100	15	245	0.2	130	0.2	8,475	15.0
Total Employment (person-years)	**13,230**	**15**	**340**	**0.3**	**180**	**0.2**	**13,750**	**15.5**
Labour Income ($ 000s)[7]	**$717,600**	**$400**	**$12,300**	**$8.7**	**$7,000**	**$4.4**	**$736,900**	**$413.1**
GDP ($ 000s)[8]	**$1,046,700**	**$700**	**$19,400**	**$18.0**	**$12,800**	**$8.2**	**$1,078.900**	**$726.2**
Tax Revenues ($ 000s)[9]								
Provincial	$145,600	$100	$2,500	$2.4	$1,600	$1.1	$149,700	$103.5
Local	$ 34,900	$ 20	$ 600	$0.6	$ 400	$0.3	$ 35,900	$ 20.9
Federal	$175,000	$120	$3,000	$2.8	$2,000	$1.3	$180,000	$124.1
Total Tax Revenue ($ 000s)	**$355,500**	**$250**	**$6,100**	**$5.7**	**$4,000**	**$2.7**	**$365,600**	**$258.4**

Note 1: Figures may not add to total, due to rounding.

Note 2: In 2010 dollars.

Note 3: Employment impacts are in "person-years." A person-year is defined as one person being fully employed for one year.

Note 4: Direct employment related to direct suppliers (i.e., contractors) from outside Manitoba.

Note 5: Employment of suppliers to support the main project and other jobs created by additional spending by households.

Note 6: Indirect employment refers to the employment of people who supply raw materials, equipment, or services to the initial direct suppliers to the project.

Note 7: Labour income is the sum of wages, supplementary labour income, and net income of unincorporated business. Any or all of these may be present in the direct expenditures and resultant direct, indirect, and induced impacts.

Note 8: GDP at market price is the total value of goods and services produced in Manitoba's economy.

Note 9: Tax revenue estimates are based on 2009-10 Manitoba Budget and 2006 income tax data adjusted to 2010 rates.

6. Potential Economic Impacts to All of Canada

6.1 Construction Phase

During the construction phase, the project is expected to contribute to all of Canada as provided in Table 7 and Figure 6.

Table 7

Economic Impact on all of Canada – Construction Phase[1], [2]

	Construction Phase			
	Generating Station	**Transmission Line**	**Switching Station**	**Total**
Employment (person-years)[3]				
Project Direct[4]	4,480[5]	45	60	4,585
Other Direct[6]	5,390	335	105	5,830
Indirect and Induced[7]	11,730	540	235	12,505
Total Employment (person-years)	**21,600**	**920**	**400**	**22,920**
Labour Income ($ millions)[8]	**$1,322.1**	**$44.0**	**$24.7**	**$1,390.8**
GDP ($ millions)[9]	**$1,802.3**	**$61.8**	**$37.5**	**$1,901.6**
Tax Revenues ($ millions)[10]				
Provincial	$327.9	$ 9.1	$ 6.8	$343.8
Local	$ 60.3	$ 2.1	$ 1.1	$ 63.5
Federal	$362.9	$10.6	$ 7.4	$380.9
Total Tax Revenue ($ millions)	**$751.1**	**$21.8**	**$15.4**	**$788.3**

Note 1: Figures may not add to total, due to rounding.

Note 2: In 2010 dollars.

Note 3: Employment impacts are in "person-years." A person-year is defined as one person being fully employed for one year.

Note 4: On-site direct employment of Manitoba Hydro and contractor employees. Direct employment related to direct suppliers (i.e., contractors) from outside Manitoba.

Note 5: Total on-site direct employment of contractor and Manitoba Hydro employees is estimated to be 4,218 person-years. Off-site incremental employment of Manitoba Hydro employees is estimated to be 259 person-years.

Note 6: Employment of suppliers to support the main project and other jobs created by additional spending by households.

Note 7: Indirect employment refers to the employment of people who supply raw materials, equipment, or services to the initial direct suppliers to the project.

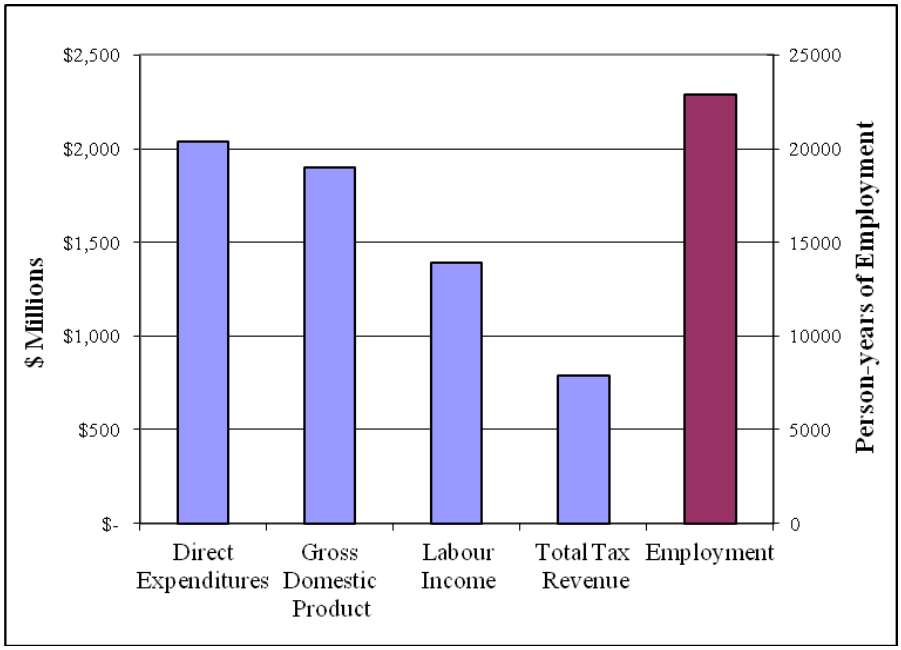
Note 8: Labour income is the sum of wages, supplementary labour income, and net income of unincorporated business. Any or all of these may be present in the direct expenditures and resultant direct, indirect, and induced impacts.

Note 9: GDP at market price is the total value of goods and services produced in Manitoba's economy.

Note 10: Tax revenue estimates are based on 2009-10 Manitoba Budget and 2006 income tax data adjusted to 2010 rates.

Figure 6

Economic Impact on all of Canada – Construction Phase



6.2 Operational Phase

During the operations and maintenance phase, the entire project is expected to contribute annually to Canada as provided in Table 8 and Figure 7.

Table 8

Economic Impact on all of Canada – Operational Phase[1], [2]

	Operations – Per Year			
	Generating Station	**Transmission Line**	**Switching Station**	**Total**
Employment (person-years)[3]				
Project Direct[4]	46	0.7	0.5	47.2
Other Direct[5]	0	0.1	0.1	0.2
Indirect and Induced[6]	45	0.7	0.5	46.2
Total Employment (person-years)	**91**	**1.5**	**1.1**	**93.6**
Labour Income ($ 000s)[7]	**$6,500**	**$94.0**	**$78.1**	**$6,672.1**
GDP ($ 000s)[8]	**$7,600**	**$119.6**	**$93.5**	**$7,813.1**
Tax Revenues ($ 000s)[9]				
Provincial	$29,510	$450.9	$302.5	$30,263.1
Local	$ 250	$ 4.0	$ 3.1	$ 257.1
Federal	$ 1,230	$ 19.6	$ 15.5	$ 1,265.1
Total Tax Revenue ($ 000s)	**$31,000**	**$474.4**	**$321.2**	**$31,795.3**

Note 1: Figures may not add to total, due to rounding.

Note 2: In 2010 dollars.

Note 3: Employment impacts are in "person-years." A person-year is defined as one person being fully employed for one year.

Note 4: On-site direct employment at the plant and in Gillam which is directly generated by the project.

Note 5: Employment of suppliers to support the main project and other jobs created by additional spending by households.

Note 6: Indirect employment refers to the employment of people who supply raw materials, equipment, or services to the initial direct suppliers to the project.

Note 7: Labour income is the sum of wages, supplementary labour income, and net income of unincorporated business. Any or all of these may be present in the direct expenditures and resultant direct, indirect, and induced impacts.

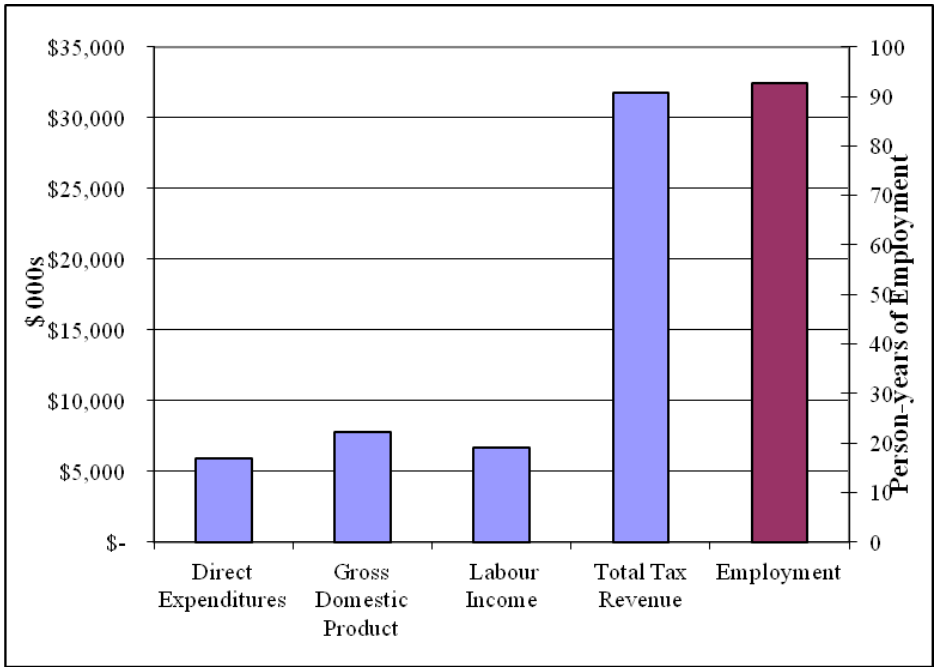
Note 8: GDP at market price is the total value of goods and services produced in Manitoba's economy.

Note 9: Tax revenue estimates are based on 2009-10 Manitoba Budget and 2006 income tax data adjusted to 2010 rates.

Note 10: Estimates associated with annual corporation capital tax revenue and annual water rental payments are included in the provincial tax revenues.

Figure 7

Economic Impact on all of Canada – Operational Phase



6.3 Summary of Economic Impacts to All of Canada

Table 9 provides the overall impacts of the Keeyask project in all of Canada.

Table 9

Canada Economic Impacts of the Keeyask Project[1, 2]

	Generating Station		Transmission Lines		Switching Station		Total	
	Const. (total)	**O&M (per year)**	**Const. (total)**	**O&M (per year)**	**Const. (total)**	**O&M (per year)**	**Const. (total)**	**O&M (per year)**
Employment (person-years)[3]								
Project Direct[4]	4,480[5]	46[6]	45	0.7	60	0.5	4,585	47.2
Other Direct[7]	5,390	0	335	0.1	105	0.1	5,830	0.2
Indirect and Induced[8]	11,730	45	540	0.7	235	0.5	12,505	46.2
Total Employment (person-years)	**21,600**	**91**	**920**	**1.5**	**400**	**1.1**	**22,920**	**93.6**
Labour Income ($ 000s)[9]	**$1,322,100**	**$6,500**	**$44,000**	**$94.0**	**$24,700**	**$78.1**	**$1,390,800**	**$6,672.1**
GDP ($ 000s)[10]	**$1,802,300**	**$7,600**	**$61,800**	**$119.6**	**$37,500**	**$93.5**	**$1,901,600**	**$7,813.1**
Tax Revenues ($ 000s)[11]								
Provincial[12]	$327,900	$29,510	$ 9,100	$450.9	$ 6,800	$302.5	$343,800	$30,263.1
Local	$ 60,300	$ 250	$ 2,100	$ 4.0	$ 1,100	$ 3.1	$ 63,500	$ 257.1
Federal	$362,900	$ 1,230	$10,600	$ 19.6	$ 7,400	$ 15.5	$380,900	$ 1,265.1
Total Tax Revenue ($ 000s)	**$751,100**	**$31,000**	**$21,800**	**$474.4**	**$15,400**	**$321.2**	**$788,300**	**$31,795.3**

Note 1: Figures may not add to total, due to rounding.

Note 2: In 2010 dollars.

Note 3: Employment impacts are in "person-years." A person-year is defined as one person being fully employed for one year.

Note 4: On-site direct employment of Manitoba Hydro (including incremental Manitoba Hydro off-site employees) and contractor employees which is directly generated by the project.

Note 5: Total on-site direct employment of contractor and Manitoba Hydro employees is estimated to be 4,218 person-years. Off-site incremental employment of Manitoba Hydro employees is estimated to be 259 person-years.

Note 6: On-site direct employment at the plant and in Gillam which is directly generated by the project.

Note 7: Employment of suppliers to support the main project and other jobs created by additional spending by households.

Note 8: Indirect employment refers to the employment of people who supply raw materials, equipment, or services to the initial direct suppliers to the project.

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Note 10: GDP at market price is the total value of goods and services produced in Manitoba's economy.

Note 11: Tax revenue estimates are based on 2009-10 Manitoba Budget and 2006 income tax data adjusted to 2010 rates.

Note 12: Estimates associated with annual corporation capital tax revenue and annual water rental payments are included in the provincial tax revenues.

SECTION 4

POPULATION, INFRASTRUCTURE AND SERVICES

KEEYASK
Hydropower Limited Partnership

TABLE OF CONTENTS

APPENDICES

APPENDIX 4A Population Projections

APPENDIX 4B Population Data

APPENDIX 4C Thompson Scenarios

LIST OF TABLES

Page

LIST OF FIGURES

Page

LIST OF MAPS

Page

4.0 POPULATION, INFRASTRUCTURE AND SERVICES

4.1 INTRODUCTION

This section examines the effects of the Project on the population, infrastructure and services of communities in the Socio-Economic Local Study Area, as well as effects on population and transportation infrastructure in the Socio-Economic Regional Study Area. Similar to Section 3, Economy, valued environmental components (VECs) were identified within the broad categories of population, infrastructure and services. This section responds to Sections 8.3 (Existing Environment) and 9 (Environmental Effects Assessment) of the Final EIS Guidelines for the Project, as issued by the Canadian Environmental Assessment Agency in March 2012 (CEAA 2012).

A wide range of essential human needs are fulfilled by infrastructure and services in communities in the Local Study Area. For purposes of this socio-economic impact assessment (SEIA), infrastructure is considered to include the following: housing; public infrastructure (such as potable water treatment facilities, waste handling facilities, roads, airports, rail, electricity and communications); public facilities (such as schools, health centres, recreation facilities, government offices); and public services (such as education, health care, recreation, day care, social services and other government services).

In many communities in the Regional Study Area, and particularly in First Nation and Northern Affairs communities, limited financial resources often hamper the provision of infrastructure and services. In many cases, this is coupled with rapid population growth. Over the past several decades, higher fertility rates together with improvements in life expectancy have caused the Aboriginal population to grow more rapidly than the overall Canadian population. This trend is expected to continue for some time into the future (CMHC 2007; INAC 2009).

Governments are involved in providing housing, infrastructure, public facilities and services for residents of most First Nation reserves and, to varying degrees, draw on public funds at the local, provincial and national levels. One of the most basic of necessities that many First Nation communities struggle with is the provision of adequate housing (International Housing Coalition 2006; CHMC 2008). This struggle was substantiated through the community-based fieldwork research with the Keeyask Cree Nations (KCNs) communities. Although housing is a priority recognized as important to human health and social well-being, demand frequently exceeds the available supply of quality homes and many community residents and families live in crowded conditions. As a result, there is limited capacity in most communities to handle population growth, including the ability to accommodate community Members who may wish to return to their home reserve after living elsewhere. The effects associated with crowding in the KCNs communities are discussed in Section 5, Personal, Family and Community Life.

Public consultation and engagement, as well as community-based research in the KCNs communities, Gillam and Thompson were important sources of information in describing the existing environment as well as the assessment of Project-related effects on population, infrastructure and services. In addition to

the sources noted above, and as noted in Section 1, the study team reviewed a number of recent Environmental Impact Statements (EIS) and project-specific regulatory guidelines for other projects in Canada including the Wuskwatim Generation Project. This contributed to identification of best practices in relation to assessment of effects on VECs related to population, infrastructure and services.

This section is divided into the following three main sub-sections:

- Approach and Methodology (Section 4.2);
- Environmental Setting (Section 4.3); and
- Project Effects, Mitigation/Enhancement and Monitoring (Section 4.4).

The environmental setting and Project effects, mitigation/enhancement and monitoring sections discuss VECs as relevant to the Local Study Area and the Regional Study Area. The VECs associated with population, infrastructure and services are the following:

- Housing (including temporary accommodations);
- Infrastructure (including water supply, wastewater management, landfill and recycling facilities, and utilities);
- Facilities and Services (including education, health and social services, childcare, emergency and police services, and community recreation);
- Land (including Indian Reserve parcels, Treaty Land Entitlement (TLE) parcels and lands selected as part of the Northern Flood Agreement (NFA)); and
- Transportation (including roads, highways, internal and ice roads, railway, airport, bus, and ferry infrastructure and services).

The effect that construction and operation of the Project may have on infrastructure and services in communities in the Local Study Area would largely depend on changes to population. As such, population itself is not considered a VEC but a supporting key topic. An understanding of projected future population is useful in planning for future demands on infrastructure, facilities and services. This includes projections both of future population without the Project and, in addition, population change that may result from the Project. The most important factors affecting population growth or decline are births, deaths and migration (INAC 2007). Of these factors, migration is hardest to predict because adults and their families migrate from one community to another for many reasons, including a search for job and business opportunities, better housing conditions, access to better education and health care, and family, personal and other reasons (CNP KPI Program 2009-2010; FLCN KPI Program 2009-2011; and YFFN KPI Program 2009-2010). The Project is not anticipated to affect in-migration to the Regional Study Area as a whole, but it does have the potential to affect in-migration to the Local Study Area as a result of the draw of substantive construction phase employment, business opportunities and operation phase employment. In-migration, particularly by those with limited financial resources, could generate additional demand for housing, facilities and services and, depending on current capacity, could have implications for public finances.

Population projections for the existing environment for the KCNs communities in the Local Study Area were developed using a cohort-component-based approach. Section 4.2.1.2 and Appendix 4A describe the approach and methodology used to model and project natural population growth for the KCNs communities without the Project. Projections for the Town of Gillam were estimated based on Manitoba Hydro staffing forecasts beyond the Project. For the City of Thompson, population growth is described based on known and potential drivers of change, which were used to develop three population growth scenarios based on high, low and suppressed economic growth.

Communities in the Local Study Area, particularly Tataskweyak Cree Nation (TCN), Fox Lake Cree Nation (FLCN) and Gillam, are likely to experience the majority of Project-related in-migration and associated effects on infrastructure and services as a result of the following:

- Their proximity to the Project site;
- The Direct Negotiated Contracts (DNCs) with the KCNs during the construction phase (which would allow KCNs contractors and businesses to directly hire qualified workers – see Section 3.4.1);
- The availability of KCNs Members who have successfully completed Pre-Project Training (PPT);
- The operational headquarters for the Project being located in Gillam; and
- The Project revenue stream that would eventually accompany KCNs investment in the Project.

Section 4.2 below describes the approach and methodology used to estimate population change associated with the Project. Section 4.3 describes the current state of infrastructure, facilities and services within the communities, as well as the availability of housing and land in terms of their capacity to accommodate population growth associated with the Project. Section 4.4 describes Project effects during both the construction and operation phases, including recommended mitigation/enhancement, monitoring and follow-up.

4.2 APPROACH AND METHODOLOGY

This section describes the approach and methodology used to assess the effects of the Project on the VECs and supporting topic examined under population, infrastructure and services. The methodologies used varied among VECs and between the construction and operation phases. The analysis considered the drivers of change within the Local Study Area, including the projected and planned changes within communities, both with and without the Project. For example, changes to population considered both natural growth and decline as well as estimates of population change as a result of Project construction and operation. The approaches and methods selected to assess Project-related changes were built on pathways of effect that connect relevant features of the Project to the socio-economic environment in which the Project would occur.

As Vanclay (2002) notes, the key social effects of a proposed project are likely to vary from project to project and from community to community. The process of community-based research supported Vanclay's observation, as each of the KCNs and stakeholders in Gillam and Thompson described the factors that shape life in their respective communities and their issues and concerns related to Project

development. Community-based key person interviews (KPIs) and theme-based workshops helped to understand the existing situations in communities including past influences. In the case of the KCNs communities, the study team worked with a local community coordinator and (when available) community researchers to help in the planning and conducting of KPIs, and the coordination of workshops. For Gillam and Thompson, members of the study team conducted the community-based research through KPIs with a variety of key informants. Follow-up telephone interviews were used to fill any identified data gaps.

The process of engaging with the Local Study Area communities was important in the analysis of population, infrastructure and services and for the assessment of effects of the Project. The assessment of effects considered the Project-related drivers of change and focused largely on changes to population. However, the assessment also considered effects stemming from community participation in Project activities and each community's relative proximity to the Project. While accounting for natural growth and decline, estimates of Project-related population change were calculated and the implications of the new population on community infrastructure and services were examined. The short-term influx of construction workers visiting communities was also examined. If community infrastructure, a public facility or service already operates at or near capacity, additional strain from an increase in population or short-term influxes of workers may have an adverse effect. However, population growth may not have any adverse effects if the infrastructure, facilities and services in the community have unused capacity.

A review of planning and other documents related to infrastructure and services within the Local Study Area supplemented the community-based research. Census data from Statistics Canada were used to help characterize the environmental setting, in particular the current population and certain housing characteristics.

4.2.1 Population

Population changes have implications for infrastructure and services within a community. Population projections can be used as a planning tool to enable communities to understand and adjust to potential future conditions. As such, population projections for the communities within the Local Study Area were conducted in order to understand population growth both with and without the Project.

4.2.1.1 Current Population

The first step in projecting population was to establish the current population. Given the range of approaches used by government agencies to determine past and current populations, triangulation among multiple data sources was employed to cross-check population estimates. Among the sources considered were the following:

- Statistics Canada: 2006 Census of Canada (2007a) and 2006 Census of Canada Aboriginal Population Profiles (2008c);
- Aboriginal Affairs and Northern Development Canada (AANDC)(formerly INAC): First Nation Population Profiles;
- Health Canada: First Nations and Inuit Health Branch Population Totals Reports;

- Manitoba Health: Population Reports;
- Other relevant historic information found in reports, websites and other available publications; and
- Community-based KPI programs.

For information from databases, 2006 was considered as the baseline year to complement the 2006 Census of Canada, which is the most recent census year. The exception to this is for population projections using AANDC data, whereby 2008 is used as the most recent data available at the time of estimating projections. Historical population data was also presented back to 1991 in order to illustrate any trends in how communities' populations have changed since the early 1990s. Where available, information on the historic population of communities before 1991 was also provided. The age and gender breakdown of communities was described through population pyramids, which illustrate the overall composition of the population.

4.2.1.2 Keeyask Cree Nations: Projected Population

After establishing the current population, the next step was to estimate the projected future population for each of the Local Study Area communities independent of the Project. Given the unique characteristics of each of the communities, methods were devised to reflect factors that shape the population in each community (these methods are described in the following sections).

The current population structure of the KCNs communities would play an important role in determining population levels for this group of First Nations in the near future. Under these circumstances, a demographically based approach was used for projecting population growth. KCNs population projections were developed using a cohort-component-based approach. Projections were also developed for each of the KCNs community. Low, medium and high population projections were modelled and the medium projection is presented in this section. Low and high projections are contained in Appendix 4A.

Under this approach, each component of population change is factored into the projection as expressed in the demographic equation below.

$$Population_{t+1} = Population_{t} + (Birth - Death) + Net\ Migration$$

Where:

- $Population_{t+1}$ is population at time "t+1";
- $Population_{t}$ is population at time "t";
- *Birth* is number of births between time "t" and "t+1";
- *Death* is number of deaths between time "t" and "t+1"; and
- *Net Migration* is the number of people moving into the community between time "t" and "t+1" less the number of people moving out of the community in the same period of time.

The model projects population growth for the KCNs communities for a 15-year timeframe, with 2008[1] acting as the base year for projections through to 2023. This period encompasses the construction phase and the early years of the operation phase of the Project. High, medium and low growth scenarios considered fertility rates, mortality rates and net migration. The medium growth scenario used the following assumptions:

- Fertility:
  - Women between the ages of 15-49 would be giving birth;
  - Age specific fertility rates were applied;
  - 105:100 sex ratio[2] (boys to girls born); and
  - Annual moderate decline (-0.84%) fertility coefficient.
- Mortality:
  - Age specific mortality ratios (*e.g.*, a ratio for each age) that reflect a gradual improvement to life expectancy;
  - All people in the specific age group are subject to mortality; and
  - The model assumes the same mortality rate for people 85 years of age and older.
- Net Migration:
  - 0.5% net migration applied to the on-reserve population;
  - The number of net migrants on-reserve is subtracted from the off-reserve population at each age level and by sex;
  - In the model, migration effects are not applied to age cohorts over 60 years of age[3]; and
  - Migration effects do not apply to newborn babies since their migration effects are captured by their mother.

Population projections should be interpreted with some caution and it is unlikely that the exact population predicted would result.

[1] As noted previously, 2008 was used for the KCNs projections as this is the year of most recent data available from Aboriginal Affairs and Northern Development Canada.
[2] Sex ratio: the ratio of males to females in a given population, expressed as the number of males per 100 females. Per Statistics Canada, the sex ratio for Canada for 0-14 year age group equals 105:100.
[3] It is recognized that out-migration could occur for health related reasons since on-reserve facilities and services are often inadequate for certain chronic diseases. However, given the small size of the over 60 age cohort, out-migration numbers are likely too small to make a statistical difference in the model.

4.2.1.3 Gillam: Projected Population

The population of Gillam today continues to be primarily linked to the availability of employment with Manitoba Hydro and associated available housing. The current housing stock in Gillam (described in detail in Section 4.3.2.2) limits the overall ability of the community to grow according to a natural increase, as estimated with traditional population projection models. Upon retirement, most Manitoba Hydro employees migrate out of the community because they no longer qualify for Manitoba Hydro housing; this affects the overall structure of the population. In addition, the Manitoba Hydro workforce in Gillam experiences regular turnover, so that, while the total population of the community remains fairly stable, the actual people resident in the community are in flux. As such, cohort component population models such as the one applied to the KCNs communities do not apply to Gillam. An approach based on the connection between population and the number of Manitoba Hydro employees in the community was more appropriate.

In addition to Manitoba Hydro employees, Gillam is home to FLCN Members who reside both on- and off-reserve. As current estimates of the size of this population are uncertain, projections could not be developed for this portion of the population. It is likely that overall population trends for FLCN Members residing in Gillam would be similar to that of the general FLCN population.

Over the next five to ten years, Manitoba Hydro's northern operations based in Gillam are planning for growth. This is due in part to the addition of the Wuskwatim Generating Station, which requires technical support positions based in Gillam. Increases in employment are also anticipated related to work at the Kettle, Long Spruce and Limestone generating stations. These positions are based in Gillam, with employees commuting to their respective work sites on a daily basis. The proposed Keewatinoow Converter Station (as part of the Bipole III Transmission Project) and the potential Conawapa Generation Project (a future project within Manitoba Hydro's ten-year planning horizon) could also add to the Manitoba Hydro operations workforce in Gillam in the future. Growth in Manitoba Hydro's northern technical services department and in Gillam Services is expected in relation to current and planned growth within Manitoba Hydro's system.

4.2.1.4 Thompson: Projected Population

Scenarios were developed to examine the potential future population of Thompson prior to and during the development of the Project. This approach was adopted because the cohort-component approach based on birth rates and mortality rates was unlikely to produce meaningful results for the following reasons:

- Thompson's population has fluctuated with the cyclicality of the mining industry;
- More recently, the economy has started to diversify resulting in additional economic drivers for the community. While the Vale operations continue to be the prime economic driver of Thompson's economy and population, this role currently is not as great as it has been in the past; and

- In-migration and out-migration of workers, students and others from outlying northern communities and the south, appear to have as great an effect, if not a greater effect, on the overall population than birth and mortality rates.

As described in Section 3.3, the Thompson economy has been strongly linked to the mining sector throughout most of its history. Over the last fifteen years, the economy has started to diversify, although mining still ranks as the top economic activity. With the increase in government services, post-secondary education (particularly University College of the North) and health care services and facilities, the population of Thompson has also started to diversify with a wider range of factors affecting population change.

Using an analysis of the known and potential drivers of change, two scenarios for the future of Thompson's economy were produced (more complete analysis is attached in Appendix 4C). The two economic scenarios examined were as follows:

- A low growth scenario which maintains growth in the community but at a noticeably lower rate than occurred from 2007 to 2010; and
- A suppressed economy scenario similar to stable and sometimes negative growth experienced from 1981 to 2006 (see Section 4.3.1.4 for further details).

4.2.1.5 Project-Related Population Changes

The final step in understanding population effects in the Local Study Area relates to Project construction (Section 4.4.1.1) and Project operation (Section 4.4.2.1), since both may result in population change in the area. The effects on population are considerably different between the Project phases. During the construction phase, employment opportunities are short-term in nature and workers are expected to be accommodated by the Project construction camps. While construction workers would be likely to visit communities in the Local Study Area during their term working on the Project, these would largely be short-term visits to communities during leisure time as opposed to relocation to communities to establish residences. The factors that were considered in arriving at this conclusion included:

- The lack of available housing in communities;
- The work rotation schedule;
- The nature of hiring preferences for KCNs Members; and
- The potential for out-migration associated with Project employment.

Uncertainties in predicting construction-related population effects resulting from Project construction arise primarily from the difficulty in estimating migration behaviour. While there is potential for individuals to relocate to a community in the Local Study Area to better access employment opportunities, the decision by an individual and/or family to move ultimately involves an array of factors, of which economic opportunities are but one element.

Operation phase employment would result in the creation of permanent jobs that would be located in Gillam. These employment estimates include the number of positions required to operate and support

the Project, (some of which may be filled locally), and the potential for other professional positions to be created in response to the overall growth of the Gillam community.

Changes to the population resulting from the Project would be expected only to occur within the Local Study Area communities. Beyond the communities in the Local Study Area, communities in the Regional Study Area would be unlikely to see material population changes resulting from the Project. As such, these effects are not carried through to the assessment.

4.2.2 Housing, Infrastructure and Services

Effects on housing, infrastructure and services were considered by following the pathway of effects associated with Project activities. The analysis considered the drivers of change within the Local Study Area, including the characteristics of the environmental setting and planned changes within communities, both with and without the Project. The existing conditions in the Local Study Area communities were determined through community-based KPI programs, along with document and website searches. A key component of the KPI programs included collecting information about current conditions and available capacity of housing, infrastructure and services today. Trends and plans that are in place for the future without the Project were also considered where information was available.

The effects assessment looked at predicted Project effects on housing, infrastructure and services in the Local Study Area during both the construction and operation phases based on key drivers as outlined below.

4.2.2.1 Construction Phase

During construction, the key driver of change related to housing (including temporary accommodations) in Local Study Area communities would be demand created by the population seeking or engaging in Project employment. During construction, Project workers, including Manitoba Hydro employees, would be housed in construction camps near the Project site, although communities in the Local Study Area may experience some population change as result of activities related to the Project. Construction workers may also choose to visit communities within the Local Study Area during their time off, resulting in potential short-term effects on housing and/or temporary accommodations. The effects on housing and temporary accommodations were examined based on information obtained through KPIs and predicted population growth.

Changes affecting infrastructure and services in the Local Study Area communities were anticipated to include the following:

- Changes in population resulting from the Project;
- Employment and associated increased income related to the Project;
- Proximity to the Project;
- Access to transportation;
- Type of time off (evening off vs. day off vs. end of shift rotation); and

- The availability of leisure-time activities at the construction camps and within the communities including bars, liquor vendors, hotels, restaurants, shopping and recreation.

Potential Project effects on transportation infrastructure and services in the Local Study Area were also examined due to the potential pathway of effect from an increased use of rail, air and road networks related to the transport of people, equipment and material to the Project site.

The extent to which these sources of effect would be felt in any given community may vary; changes could be negligible in some cases or well within the capacity of the infrastructure or service. In other cases, adverse effects were identified and these effects and mitigation measures are discussed in greater detail. The effects on infrastructure and services in the Local Study Area (including transportation) were examined based on information obtained through KPIs.

Effects on the Regional Study Area focused on the transportation pathway of effect due to predicted increased use of Provincial Trunk Highway (PTH) 6 for transportation of equipment, materials and personnel to the Project site; and increased use of northern road networks by potential northern Manitoba construction workers driving to the site.

4.2.2.2 Operation Phase

Effects on housing in the Local Study Area during the operation phase would be driven primarily by increases in the population as a result of the Project's operation phase employment opportunities. Project operation staff would be housed in Gillam; hence, it is anticipated this would be the community to incur a measurable effect on housing[1].

The capacity of infrastructure and services in Gillam (*e.g.*, housing, education facilities, day care, health services, recreation facilities and services, and emergency services) to accommodate a growth in new population were examined and compared to potential in-migration for operation jobs.

Assessing the effects of an increased population on infrastructure and services in Gillam consisted of two primary steps:

- Estimating potential Project-related population change in Gillam, including the structure of the population where possible (*e.g.*, age and family structure); and
- Examining the implications of providing infrastructure and services for an expanded population that may include an increased FLCN population residing in Gillam.

Project effects for the operation phase were examined based on information obtained through KPIs (Gillam and FLCN) and workshops with FLCN; particularly focused on known capacity concerns of both FLCN and Gillam.

[1] Operation phase job targets for the KCNs communities are Manitoba Hydro system-wide and are not tied specifically to Gillam or Project operations.

Operation effects on housing, infrastructure and services in Thompson and the Regional Study Area are expected to be minimal in comparison to those in Gillam. As such, limited analysis on Thompson and the Regional Study Area was undertaken.

The next section describes the present population, as well as the state of housing, infrastructure, facilities and services available in the KCNs communities, the Town of Gillam and the City of Thompson. The Regional Study Area is described in terms of population and transportation infrastructure.

4.3 ENVIRONMENTAL SETTING

The population size and scope of infrastructure and services vary among the six communities in the Local Study Area. This section discusses the existing population, infrastructure and services in communities in the Local Study Area (including land), as well as the population and transportation infrastructure in the Regional Study Area. The infrastructure and services discussed in this section include the following: housing; public infrastructure (*e.g.*, potable water treatment facilities, waste handling facilities, roads, airports, rail, electricity and communications); public facilities (*e.g.*, schools, health centres and recreation facilities); and public services (such as education, health care, recreation, day care, social and other government services).

Each of the KCNs provides housing, infrastructure and a variety of facilities and services to Members living on-reserve. Federal and Provincial governments are also involved in providing direct service (*e.g.*, health care) and funding (*e.g.*, for housing). In Gillam, Manitoba Hydro provides housing for its employees and contributes to a range of facilities and services in the Town; FLCN also has a role to play in serving its Members in Gillam. In the regional centre of Thompson, public facilities and services are provided by the municipality, school division, regional health authority, Provincial government and Federal Government. Market housing makes up the vast majority of the available supply; some public housing is also present.

The present state of housing, infrastructure and services is examined from the perspective of their capacity to handle a potential increase in population associated with the Project. If the population in a community does increase as a result of people returning home, this could strain housing, infrastructure and services. For example, if a community already lacks suitable housing or a particular piece of infrastructure is already at or beyond its capacity, the community will not have the capacity to absorb further population growth if people choose to return to their home community for work on the Project.

Some communities in the Local Study Area, such as Thompson and Gillam, offer a broad range of facilities and services to their population. The City of Thompson is the regional centre for northern Manitoba and the Town of Gillam is largely a resource-based town serving the needs of Manitoba Hydro as a base of operations for its northern hydroelectric system, as well as being the historical and present day home for many FLCN Members. All the KCNs community Members access facilities and services in Thompson, and some make use of facilities and services in Gillam. Gillam includes a new FLCN urban reserve called A Kwis Ki Mahka (approved in 2009).

Four First Nation communities found in the Local Study Area are as follows (see Map 1-1 Socio-Economic Local Study Area).

Tataskweyak Cree Nation

Members of TCN live on-reserve in the community of Split Lake, as well as off-reserve in Thompson, Winnipeg and other locations. Split Lake is accessible year-round from Provincial Road (PR) 280. The community is located on the shores of Split Lake and is the largest First Nation community in the Local Study Area. Chief and Council are responsible for delivery of services and programs on-reserve. TCN exercises its traditional rights, interests and pursuits mainly in the Split Lake Resource Management Area (SLRMA) and appoints Members to the Split Lake Resource Management Board. The SLRMA was established under the 1992 Northern Flood Implementation Agreement and the resource management board includes both community and provincial appointees.

War Lake First Nation

Members of WLFN live on-reserve at the Mooseocoot 1 Indian Reserve adjacent to the community of Ilford. A number of their Members live on adjacent Crown land that is planned to be transferred as Reserve land (CNP 2010f). Some band Members also live in Thompson, Winnipeg and other locations. Ilford is accessible year-round by a Canadian National Railway railway and in the winter via the winter road to York Landing (*Kawechiwasik*) and Split Lake. WLFN is responsible for delivering social services to its Members living in the community. For its pursuit of traditional activities, WLFN Members make use of the southern part of the SLRMA.

Fox Lake Cree Nation

Members of FLCN live on the Fox Lake (Bird) Reserve 51 km north of Gillam, on the A Kwis Ki Mahka Reserve and in other areas in Gillam. FLCN also has off-reserve Members living in Thompson, Winnipeg and other locations. Fox Lake (Bird) is accessible year-round via Provincial Road (PR) 290. FLCN Members rely on the Town of Gillam to support many of their key infrastructure and service needs. The FLCN Resource Management Area (RMA) is located adjacent to the SLRMA (outside of the Local Study Area) in the Regional Study Area. FLCN exercise their traditional rights, interests and pursuits primarily in this area.

York Factory First Nation

Members of YFFN live on-reserve in the community of York Landing (*Kawechiwasik*) on Split Lake at the juncture of the Aiken River, and off-reserve in Churchill, Thompson, Winnipeg and other locations. York Landing (*Kawechiwasik*) is accessible in summer by ferry to Split Lake, which is accessible by all-weather road. Similar to WLFN, York Landing (*Kawechiwasik*) is accessible in winter via a winter road. York Landing (*Kawechiwasik*)'s only access for up to 16 weeks during annual fall freeze-up and spring break-up is by air and is weather dependent. Infrastructure and services at York Landing (*Kawechiwasik*) are managed by the First Nation government. YFFN Members have a small RMA surrounding the community on Split Lake and a much larger RMA on the Hudson Bay coast where they primarily exercise their traditional rights, interests and pursuits.

Analysis of present and future population without the Project helps to understand future capacity with respect to housing, infrastructure, health care, education and a variety of other community facilities and services. The following sections characterize the current and projected future populations for the KCNs

communities, Gillam and Thompson. The sections also examine the available and projected capacity of the land base, housing, facilities, infrastructure and services available to serve those populations. To begin, Section 4.3.1 describes the current population in the Local Study Area, including the KCNs communities, the Town of Gillam and the City of Thompson.

4.3.1 Population / Migration – Local Study Area

In the Local Study Area, a range of factors influence the size and composition of the current population and the way that the population is projected to change in the future. Projected population without the Project is discussed in Section 4.3.1.2 for the KCNs, Section 4.3.1.3 for Gillam and Section 4.3.1.4 for Thompson. In many KCNs communities, the overall availability of housing is often a limiting factor in determining the total on-reserve population. In contrast, economic growth scenarios in Thompson and changes in Manitoba Hydro's workforce in Gillam are the most important factors influencing population in those two communities. As such, different approaches were taken to reflect the current circumstances and the major factors influencing the future population of each of the KCNs communities, Gillam and Thompson.

The first step in each of the approaches consisted of establishing the current population, for which a process of triangulation using multiple data sources was employed. For the purposes of the SEIA, 2006 was considered as the baseline year in order to complement data available from the 2006 Census of Canada, which is the most recent census year that provides a full range of data for the communities in the Local Study Area at the time of the EIS preparation. Other literature or data sources support the historic, current and projected populations where available, including data collected through the community-based KPI programs. Additional tables pertaining to population can be found in Appendix 4B.

In the following sections, the approaches to determining population projections are described in relation to each community.

4.3.1.1 Keeyask Cree Nations Existing Population

As summarized in Table 4-1, the KCNs' Member population in 2006 both on- and off-reserve was approximately 5,350 (INAC 2006a, 2006b, 2006c, 2006d). About 43% of the KCNs population lived off-reserve, with a large proportion of these individuals residing in other communities in northern Manitoba, such as Thompson, Gillam and Churchill. TCN, the largest of the KCNs communities, had a total population of approximately 3,000, while WLFN was the smallest with an approximate total population of 235. YFFN's approximate population was 1,060, while that of FLCN was 1,010. Each of the KCNs' respective populations is discussed in further detail below and in Appendix 4B.

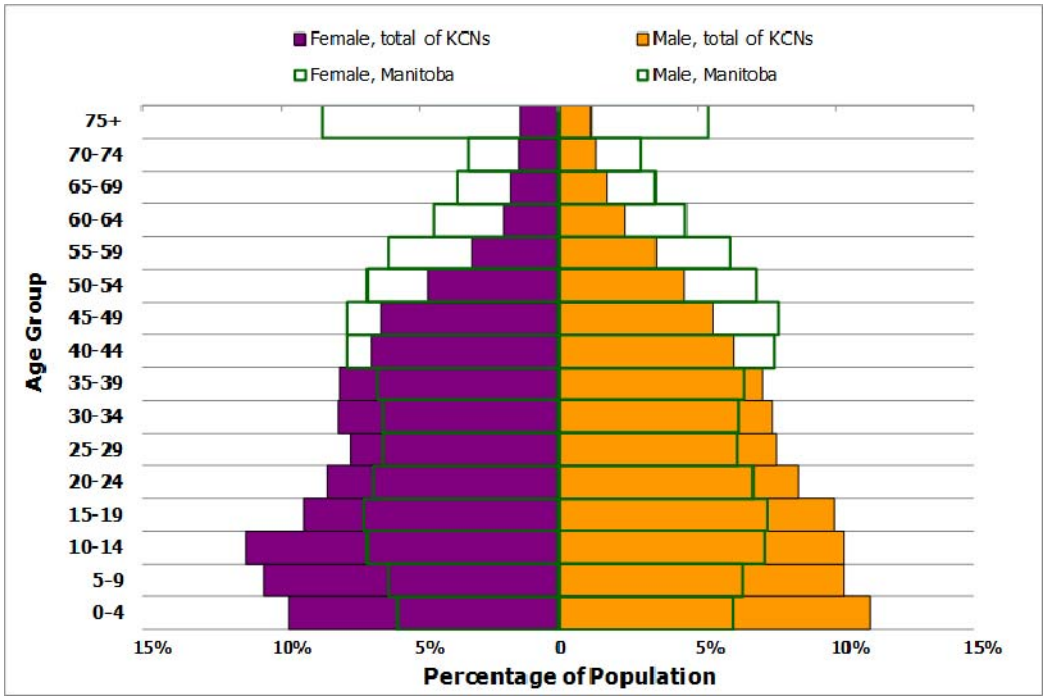
Table 4-1: Keeyask Cree Nations Population (2006)

Source	Location of Population Covered	2006 Population
Statistics Canada[1,2,3,4]	KCNs Communities	2,454
Indian and Northern Affairs Canada[5,6,7]	Entire First Nations	5,346
	On-Reserve and Crown Land	3,019
	Off-Reserve	2,327
Health Canada[8,9,10]	Entire First Nations	5,258
	On-Reserve and Crown Land	3,006
	Off-Reserve	2,252

Sources: Statistics Canada 2007a, 2008; INAC 2006a, 2006b, 2006c, 2006d; Health Canada 2006.
Notes:
1. Statistics Canada refers to the KCNs communities as Split Lake 171, Ilford, York Landing, and Bird/Fox Lake 2, respectively.
2. Statistics Canada data represent the population during the Census of Canada on May 16, 2006.
3. Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
4. Statistics Canada population total calculated by InterGroup Consultants.
5. INAC refers to the KCNs communities as Tataskweyak Cree Nation, War Lake First Nation, York Factory First Nation, and Fox Lake Cree Nation, respectively.
6. INAC data represent the population as of December 31, 2006.
7. INAC population totals calculated by InterGroup Consultants.
8. Health Canada refers to the KCNs communities as Tataskweyak (Split Lake), War Lake, York Factory, and Fox Lake, respectively.
9. Health Canada data represent the population as of June 2006.
10. Health Canada population totals calculated by InterGroup Consultants.

The KCNs' population is young (a large proportion of the overall population is under 25 years old), and reflects the overall trend in the Aboriginal population of growth at rates as high as four times greater than the non-Aboriginal population in Canada (CMHC 2008; Steffler, 2008). This will likely be influenced by recent amendments to the *Indian Act* (the Act) in accordance to the British Columbia Court of Appeal McIvor decision of 2009. The amendment to the Act will provide status to children who lost their status as a result of their grandmother marrying a non-Indian (INAC 2010).

Figure 4-1 demonstrates how the 2006 KCNs population was structured differently than the population of the Province of Manitoba as a whole. While Manitoba's age structure was fairly evenly distributed with slight increases in the 40-50 year old categories, over 41% of the KCNs' population were in age categories under the age of 20. This pattern of population distribution indicates that the Aboriginal population will continue to grow at well above the rate of the provincial population for the foreseeable future. It is also indicative of a sizeable rate of growth in the number of young people who will be entering the labour force and looking for jobs in the near future.



Sources: Manitoba Health 2006; INAC 2006a, 2006b, 2006c, 2006d.
Notes:
- INAC refers to the communities as Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.
- The data are based on a 2006 base year.
- INAC data represent the population as of December 31, 2006.
- Manitoba Health data represent the population as of June 1, 2006.
- 75+ population range of KCNs refers to age groups 75-79, 80-84 and 85 years or older in INAC data.

Figure 4-1: Age and Gender Population Distribution of Keeyask Cree Nations (On- and Off-Reserve) versus Manitoba Population (2006)

4.3.1.1.1 Cree Nation Partners

TATASKWEYAK CREE NATION

The TCN people have lived for centuries in their ancestral homeland in northern Manitoba, with the north shore of Split Lake at the heart of their "homeland ecosystem" where many families of TCN ancestry gathered for thousands of years (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a; CNP 2010c). TCN's traditional homeland is relatively consistent with, but not confined to, the Split Lake RMA and Registered Trapline (RTL) block (CNP 2010c). TCN, unlike their coastal ancestors, integrated into the European fur trade more slowly, and in 1886, more than 200 years after the Hudson Bay post at York Factory opened, a post was erected at Split Lake followed by a permanent church built by the Anglican missionaries in 1906.

In the early 1900s, TCN had a population of approximately 250 Members residing at Split Lake and Recluse Lake, with TCN Members also using seasonal out-camps at Assean, Waskaiowaka and Billard Lakes to the north and Atkinson Lake to the southeast. In the early half of the twentieth century, the out-

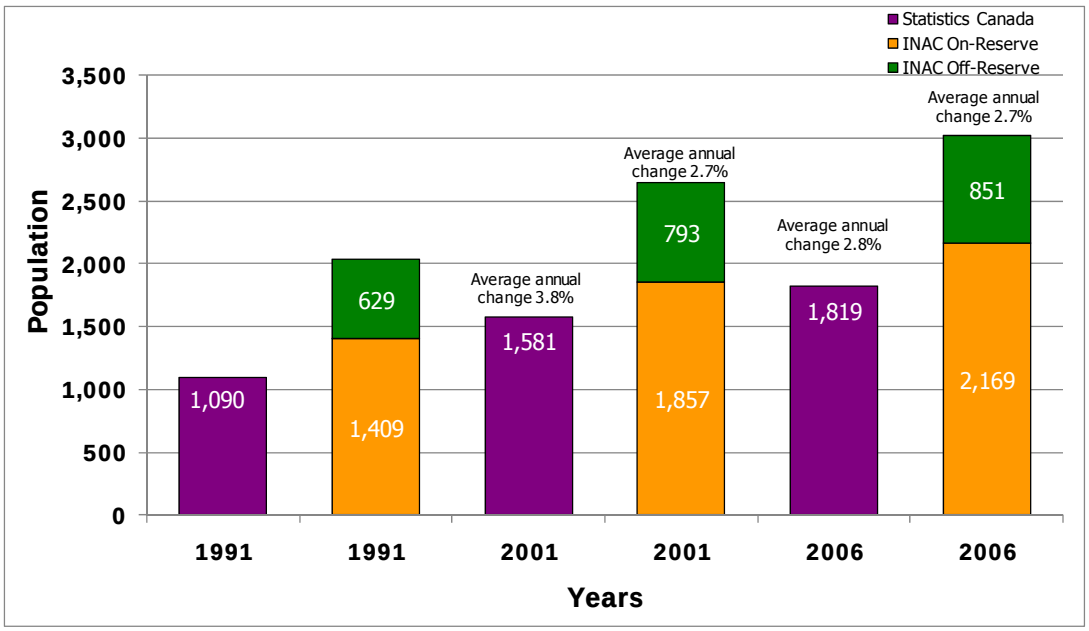
camps were slowly abandoned as the community came to settle in Split Lake. By the late 1960s, the population had grown to 370 people, and by the 1970s, the population had grown to close to 800 people (Split Lake Cree – Manitoba Hydro Joint Study Group, 1996a). As Table 4-2 demonstrates, TCN had a population of approximately 3,000 people in 2006, with approximately 72% of the population living on-reserve and on Crown Land.

Table 4-2: Tataskweyak Cree Nation Population (2006)

Source	Location of Population Covered	2006 Population
Statistics Canada[1,2,3]	Community of Split Lake	1,819
Indian and Northern Affairs Canada[4,5]	Entire First Nation	3,020
	On-Reserve and Crown Land	2,169
	Off-Reserve	851
Health Canada[6,7]	Entire First Nation	2,969
	On-Reserve and Crown Land	2,131
	Off-Reserve	838

Sources: Statistics Canada 2007a, 2008c; INAC 2006a; Health Canada 2006.
Notes:
1. Statistics Canada refers to TCN as Split Lake 171.
2. Statistics Canada data represent the population during the Census of Canada on May 16, 2006.
3. Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
4. INAC refers to TCN as Tataskweyak Cree Nation.
5. INAC data represent the population as of December 31, 2006.
6. Health Canada data represent the population as of June 2006.
7. Health Canada refers to TCN as Tataskweyak (Split Lake).

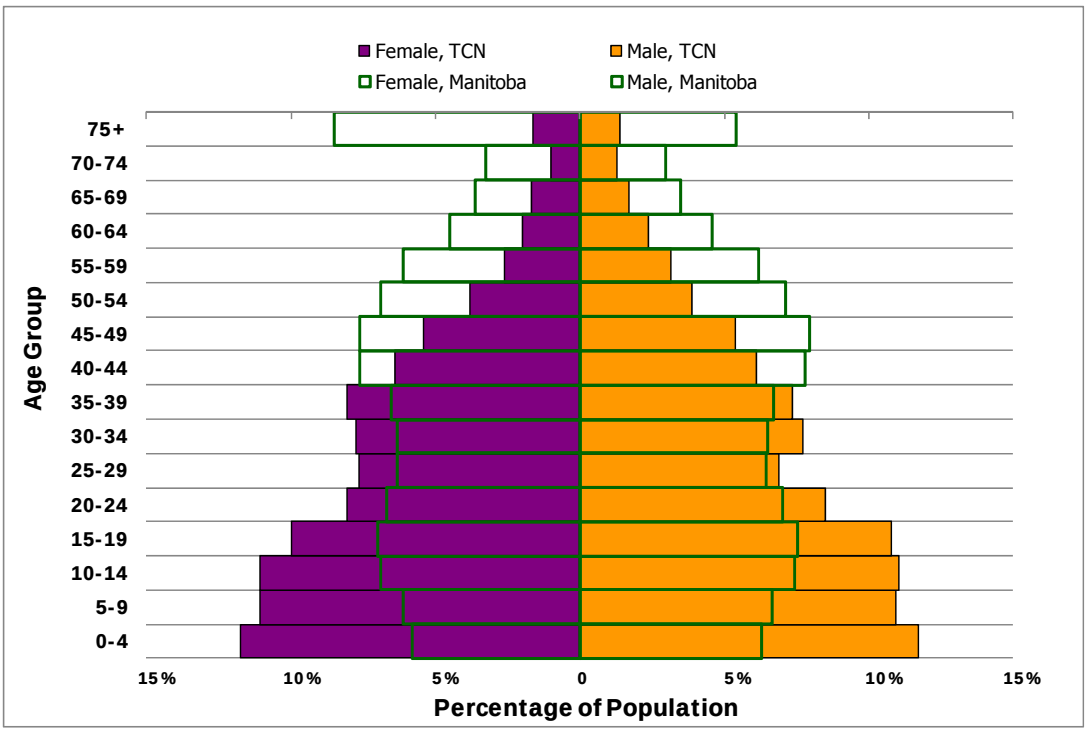
Figure 4-2 demonstrates that TCN's population continues to grow both on- and off-reserve, with the on-reserve population growing at a slightly higher average annual rate compared to the off-reserve population. Similar to other First Nations in northern Manitoba, over 44% of the 2006 population of TCN was under the age of 20 years old (see Figure 4-3).



Sources: Statistics Canada 1992, 2002, 2007a; INAC 1991a, 2001a, 2006a.
Notes:

- Statistics Canada refers to TCN as Members living on Split Lake Reserve 171.
- Statistics Canada data represent the population during the Census of Canada on June 4, 1991, May 15, 2001 and May 16, 2006.
- Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
- Average annual population change was calculated by InterGroup Consultants based on Statistics Canada data.
- INAC refers to TCN as Tataskweyak Cree Nation.
- INAC data represent the population as of December 31, 1991, 2001 and 2006.
- Average annual population change was calculated by InterGroup Consultants based on INAC data.

Figure 4-2: Change in Tataskweyak Cree Nation Population (1991, 2001, 2006)



Sources: Manitoba Health 2006; INAC 2006a.
Notes:
- INAC refers to Split Lake as Tataskweyak Cree Nation.
- INAC data represent the population as of December 31, 2006.
- Manitoba Health data represent the population as of June 1, 2006.
- 75+ population range of TCN refers to age groups 75-79, 80-84 and 85 years or older in INAC data.

Figure 4-3: Age and Gender Population Distribution of Tataskweyak Cree Nation versus Manitoba (2006)

TCN's current population, as per May 2012 AANDC data is 3,508 Members, with 2,216 (63.2%) living on-reserve (primarily at Split Lake), and 1,292 living off-reserve (including on other First Nation reserves and Crown land) (AANDC 2012).

WAR LAKE FIRST NATION

WLFN has had a timeless presence on the lands of the Hudson Bay Lowlands and northeastern Manitoba. WLFN was formed as a separate band in 1980 establishing their Reserve at the community of Ilford on the Hudson Bay Railway Line. Most Members who joined the WLFN were TCN Members living in and around the Ilford area. From 1917 until the late 1970s, Ilford was a booming economic and supply point and Hudson Bay Railway service centre until the economic collapse in the 1980s when Thompson became the Hub of the North. The reserve lands in Ilford were acquired as part of the community's TLE selection in 1992. As such, the historical population of WLFN was also closely linked

to the community of Ilford[1]. Table 4-3 demonstrates that the 2006 population of WLFN was approximately 230 people, with over 46% living off-reserve.

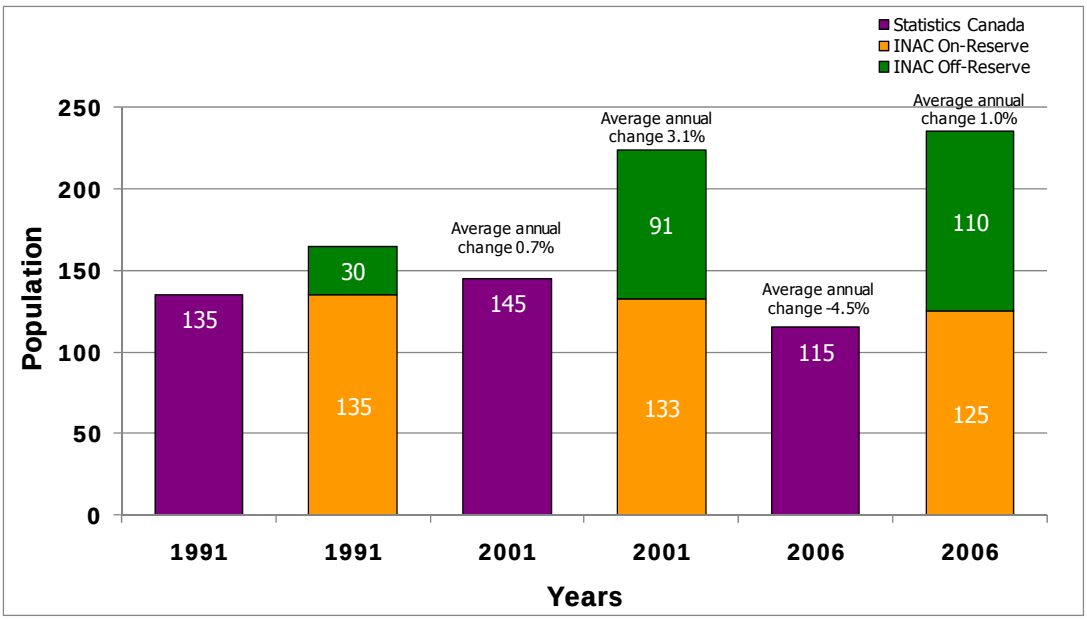
Table 4-3: War Lake First Nation Population (2006)

Source	Location of Population Covered	2006 Population
Statistics Canada[1,2,3]	Community of Ilford	115
Indian and Northern Affairs Canada[4,5]	Entire First Nation	235
	On-Reserve and Crown Land	125
	Off-Reserve	110
Health Canada[6,7]	Entire First Nation	231
	On-Reserve and Crown Land	124
	Off-Reserve	107

Sources: Statistics Canada 2007a; INAC 2006b; Health Canada 2006.
Notes:
1. Statistics Canada refers to WLFN as Ilford.
2. Statistics Canada data represent the population during the Census of Canada on May 16, 2006.
3. Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
4. INAC refers to WLFN as War Lake First Nation.
5. INAC data represent the population as of December 31, 2006.
6. Health Canada refers to WLFN as War Lake.
7. Health Canada data represent the population as of June 2006.

Figure 4-4 shows that the community of Ilford and WLFN's on-reserve population have gradually decreased (between -1.2% and -4.5% annually), while the off-reserve population continues to grow. Similar to other First Nations in northern Manitoba, almost 40% of the 2006 WLFN population was under the age of 20 years old (see Figure 4-5).

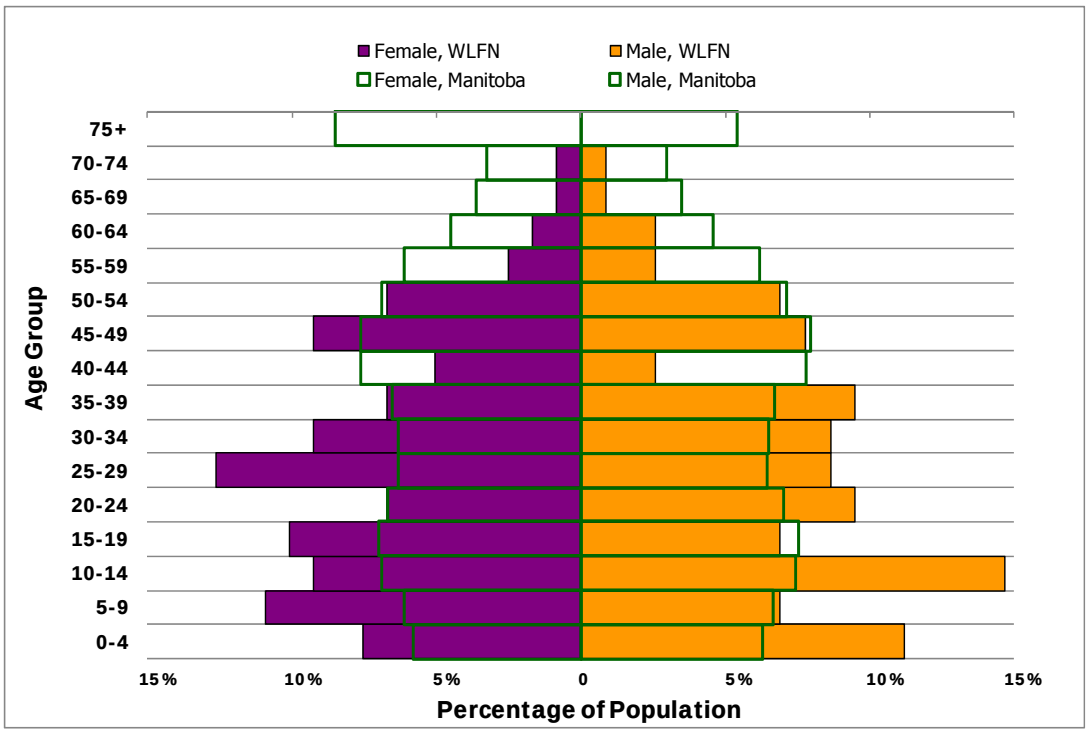
[1] Statistics Canada does not distinguish the population of WLFN, rather it designates Ilford as an "Indian Settlement".



Sources: Statistics Canada 1992, 2002, 2007a; INAC 199b, 2001b, 2006b.
Notes:

- Statistics Canada refers to WLFN as Ilford.
- Statistics Canada data represent the population during the Census of Canada on June 4, 1991, May 15, 2001 and May 16, 2006.
- Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
- Average annual population change was calculated by InterGroup Consultants based on Statistics Canada data.
- INAC refers to WLFN as War Lake First Nation.
- INAC data represent the population as of December 31, 1991, 2001 and 2006.
- Average annual population change was calculated by InterGroup Consultants based on INAC data.

Figure 4-4: Change in War Lake First Nation Population (1991, 2001, 2006)



Source: Manitoba Health 2006, INAC 2006b.
Notes:
- INAC refers to War Lake as War Lake First Nation.
- INAC data represent the population as of December 31, 2006.
- Manitoba Health data represent the population as of June 1, 2006.
- 75+ population range of WLFN refers to age groups 75-79, 80-84 and 85 years or older in INAC data.

Figure 4-5: Age and Gender Population Distribution of War Lake First Nation versus Manitoba (2006)

Based on May 2012 AANDC data, WLFN had a total population of 284, with 94 (33%) Members living on-reserve (primarily at Ilford) and 190 living off-reserve (including on other First Nation reserves and on Crown land). There are approximately 29 Members living on Crown land (likely in Ilford) (AANDC 2012). Population information from the community supports the overall trend of a steady decline in Members living on-reserve and growth in the number of Members living off-reserve. Off-reserve Members live primarily in Thompson and Winnipeg, with a small number in Gillam and other northern Manitoba communities. Out-migration from the community occurs primarily by young adult Members seeking training and education opportunities that are not available within the community (CNP 2010f).

4.3.1.1.2 Fox Lake Cree Nation

The area traditionally inhabited by FLCN was considerable and centered on the Nelson River system and its tributaries. Before the railway to Churchill was completed, Gillam had earned the Cree name *Kaquayskimukkakh* or 'the place where trains turned around'. With the closure of York Factory, many FLCN families settled in Gillam and other encampments in proximity to the rail line, which offered convenient access from the coast to other northern communities inland (FLCN 2009a Draft).

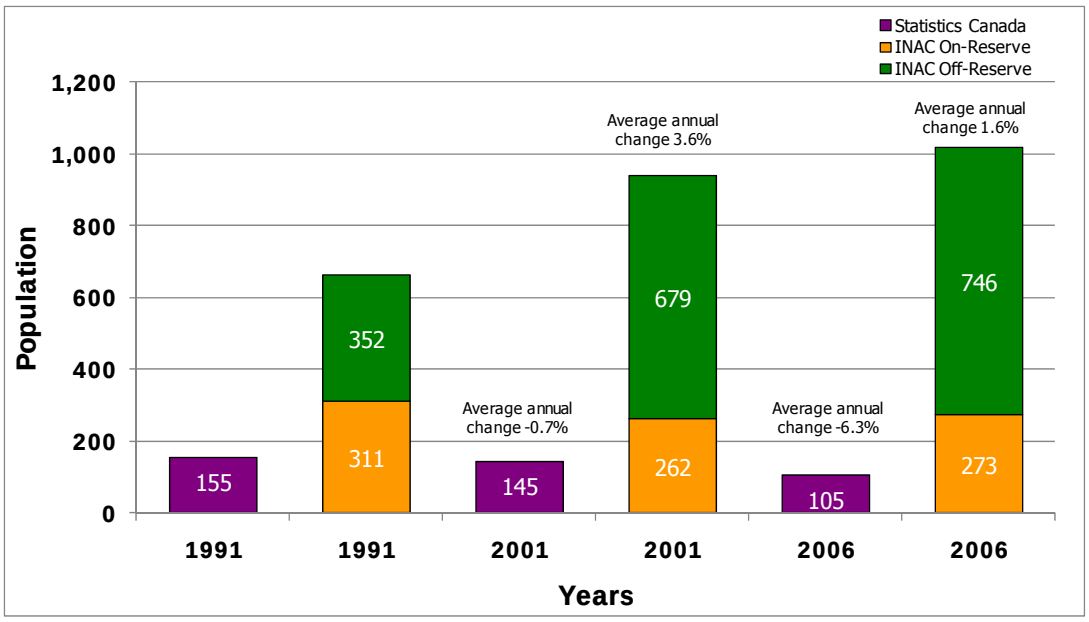
As noted in Section 2.2.3.2, adhesions to membership between the 1970s and 1990s have resulted in meaningful increases to FLCN's population. For example, the population more than doubled between 1985 and 1995 (from 399 to 815 Members), of which two-thirds resulted from adhesions. "This re-claiming of membership can most fairly be seen as an assertion of natural affinity and closest kinship to the Fox Lake First Nation" (FLCN 1997).

As Table 4-4 demonstrates, FLCN's population was approximately 1,020 people in 2006, with just over 270 living on-reserve or on Crown land at Fox Lake (Bird), and over 73% of the community living off-reserve (INAC 2006c). Members living off-reserve were located in communities across Manitoba (FLCN KPI Program 2009-2011). Figure 4-6 indicates that population growth rates off-reserve were higher than those on-reserve, which may in part be due to the lack of on-reserve housing restricting growth, and the choice of some Members to live in Gillam. Similar to other First Nations in northern Manitoba, over 36% of the 2006 FLCN population was under the age of 20 years old (see Figure 4-7).

Table 4-4: Fox Lake Cree Nation Population (2006)

Source	Location of Population Covered	2006 Population
Statistics Canada[1,2,3]	Community of Bird	105
Indian and Northern Affairs Canada[4,5]	Entire First Nation	1,019
	On-Reserve and Crown Land	273
	Off-Reserve	746
Health Canada[6,7]	Entire First Nation	1,005
	On-Reserve and Crown Land	271
	Off-Reserve	734

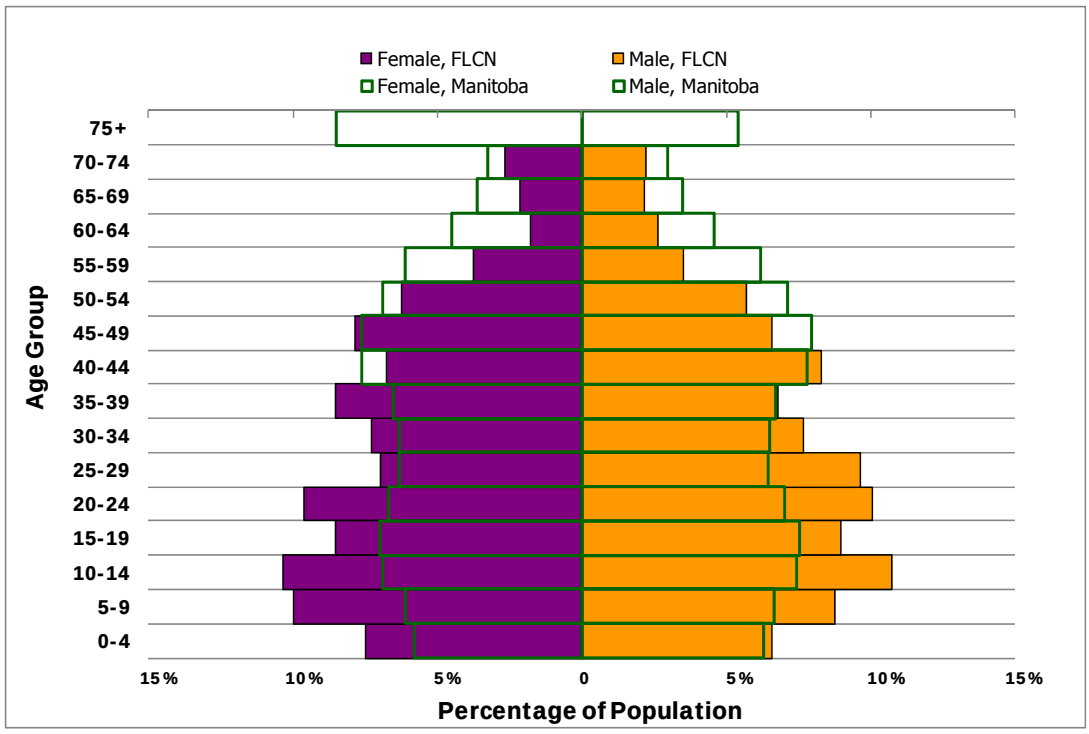
Sources Statistics Canada 2007a; INAC 2006c; Health Canada 2006.
Notes:
1. Statistics Canada refers to FLCN as Bird/Fox Lake 2.
2. Statistics Canada data represent the population during the Census of Canada on May 16, 2006.
3. Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
4. INAC refers to FLCN as Fox Lake Cree Nation.
5. INAC data represent the population as of December 31, 2006.
6. Health Canada refers to FLCN as Fox Lake.
7. Health Canada data represent the population as of June 2006.



Sources: Statistics Canada 1992, 2002, 2007a; INAC 1991c, 2001c, 2006c.
Notes:

- Statistics Canada refers to FLCN as Bird/Fox Lake 2.
- Statistics Canada data represent the population during the Census of Canada on June 4, 1991, May 15, 2001 and May 16, 2006.
- Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
- INAC refers to FLCN as Fox Lake Cree Nation.
- INAC data represent the population as of December 31, 1991, 2001 and 2006.
- Average annual population change was calculated by InterGroup Consultants based on INAC data.

Figure 4-6: Change in Fox Lake Cree Nation Population (1991, 2001, 2006)



Source: Manitoba Health 2006; INAC 2006c.
Notes:
- INAC refers to FLCN as Fox Lake First Nation.
- INAC data provided by INAC.
- INAC data represent the population as of December 31, 2006.
- Manitoba Health data represent the population as of June 1, 2006.
- FLCN population breakout by gender for age group 65-69 was prorated based on total population gender breakout.
- 70-74 population range of FLCN includes age groups 75-79, 80-84 and 85 years or older in INAC data.

Figure 4-7: Age and Gender Population Distribution of Fox Lake Cree Nation versus Manitoba (2006)

According to May 2012 AANDC data, FLCN currently has 1,115 Members, with 138 (12.4%) living on their own reserve and 977 Members living off-reserve (including Members located at other First Nation reserves and on own or non-Band Crown land) (AANDC 2012). FLCN indicated that approximately 265 Members were reported to live in Gillam in 2009 (FLCN KPI Program 2009-2011).

4.3.1.1.3 York Factory First Nation

The YFFN Cree have lived with, travelled along and relied on the waters of northern Manitoba since time immemorial. The homeland of YFFN lies along the Hudson Bay coast, where their settlements once stretched from Ontario to Churchill, and inland to Shamattawa and Gillam. The Hudson Bay post at York Factory opened in 1684 as the central hub in the North American fur trade. York Factory also became a social and economic centre for the Cree, who provided provisions to the fort and became middle-men in the region's fur trade. When the post closed in 1957, YFFN Members were relocated nearly 200 km from their homeland to a small site on the south-east shore of Split Lake, which is now

known as York Landing (*Kawechiwasik*). The community of York Landing (*Kawechiwasik*) received reserve status in 1989 (KTC 2008; YFFN 2010).

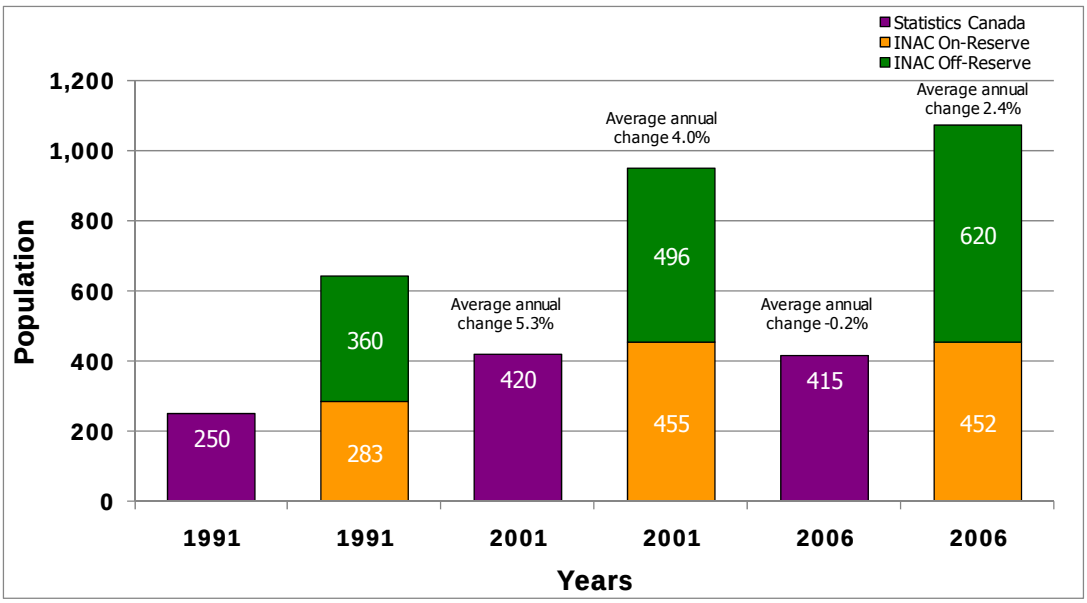
As Table 4-5 demonstrates, the population of YFFN was approximately 1,070 in 2006, with about 450 living on-reserve at York Landing (INAC 2006d). Currently, and in the past, YFFN has a high proportion (approximately 56%) of Members living off-reserve, with the off-reserve Members living primarily in the communities of Thompson, Churchill, Winnipeg, Split Lake and elsewhere (YFFN KPI Program 2009-2010).

Table 4-5: York Factory First Nation Population (2006)

Source	Location of Population Covered	2006 Population
Statistics Canada[1,2,3]	Community of York Landing (*Kawechiwasik*)	415
Indian and Northern Affairs Canada[4,5]	Entire First Nation	1,072
	On-Reserve and Crown Land	452
	Off-Reserve	620
Health Canada[6,7]	Entire First Nation	1,053
	On-Reserve and Crown Land	480
	Off-Reserve	573

Sources: Statistics Canada 2007a; INAC 2006d; Health Canada 2006.
Notes:
1. Statistics Canada refers to YFFN as York Landing.
2. Statistics Canada data represent the population during the Census of Canada on May 16, 2006.
3. Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
4. INAC refers to YFFN as York Factory First Nation.
5. INAC data represent the population as of December 31, 2006.
6. Health Canada refers to YFFN as York Factory.
7. Health Canada data represent the population as of June 2006.

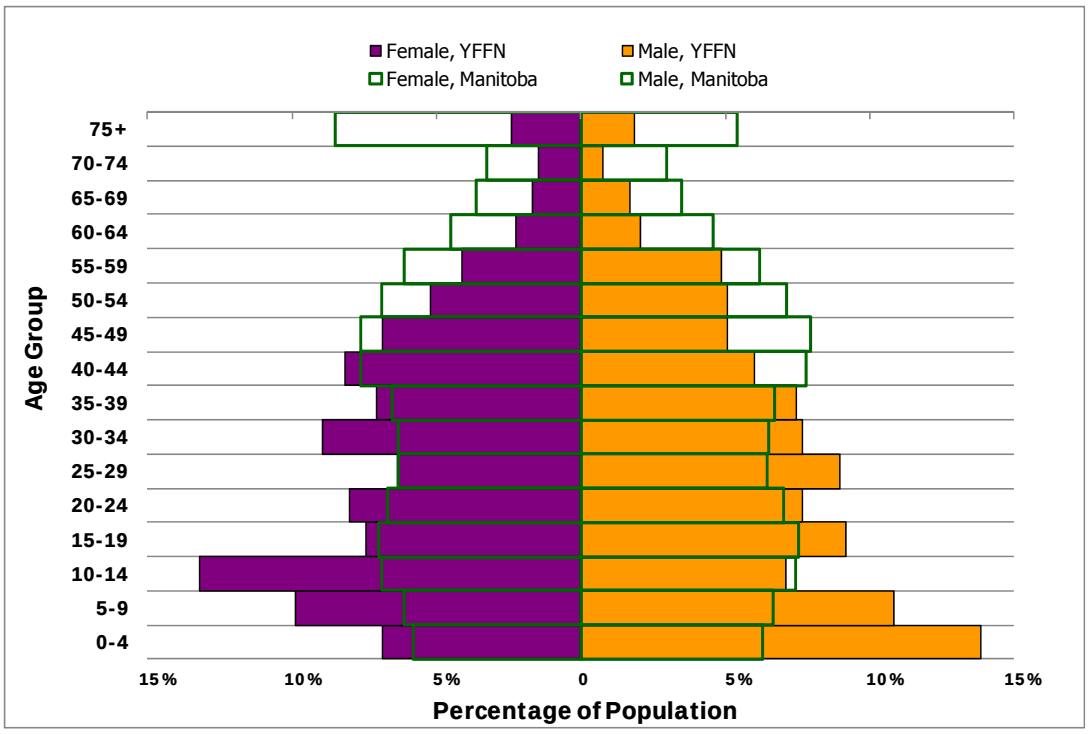
Figure 4-8 demonstrates that the overall population of YFFN has grown steadily since 1991, with a very slight decline in the on-reserve population between 2001 and 2006. Similar to other First Nations in northern Manitoba, almost 40% of the population is under the age of 20 years old (see Figure 4-9).



Sources: Statistics Canada 1992, 2002, 2007a; INAC 1991d, 2001d and 2006d.
Notes:

- Statistics Canada refers to YFFN as York Landing.
- Statistics Canada data represent the population during the Census of Canada on June 4, 1991, May 15, 2001 and May 16, 2006.
- Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
- INAC refers to YFFN as York Factory First Nation.
- INAC data represent the population as of December 31, 1991, 2001 and 2006.
- Average annual population change was calculated by InterGroup Consultants based on INAC data.

Figure 4-8: Change in York Factory First Nation Population (1991, 2001, 2006)



Source: Manitoba Health 2006, INAC2006d.
Notes:
- INAC refers to YFFN as York Factory First Nation.
- INAC data represent the population as of December 31, 2006.
- Manitoba Health data represent the population as of June 1, 2006.
- 75+ population range of YFFN refers to age groups 75-79, 80-84 and 85 years or older in INAC data.

Figure 4-9: Age and Gender Population Distribution of York Factory First Nation versus Manitoba (2006)

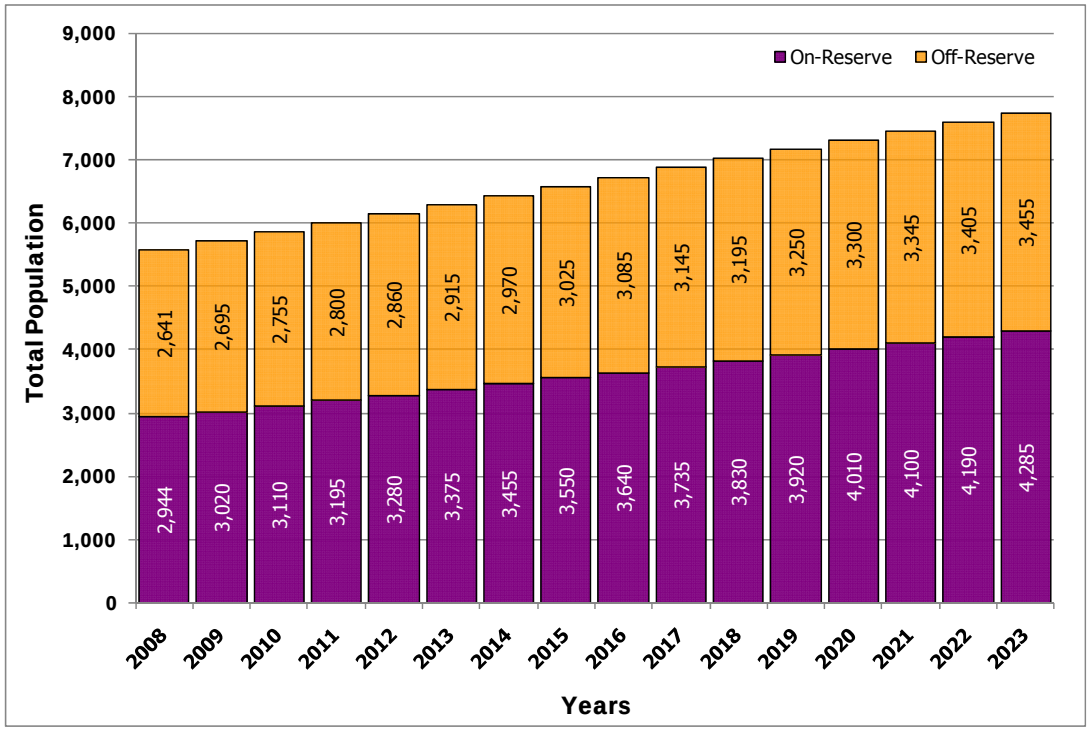
AANDC's May 2012 population data show 796 YFFN Members living off-reserve (including on other First Nation reserves and Crown land) and 400 Members (33.4%) living on-reserve at York Landing (*Kawechiwasik*), for a total population of 1,196 (AANDC 2012). Membership information collected through the KPI program indicates that a sizeable number of off-reserve Members live in Thompson, Churchill and Winnipeg (YFFN KPI Program 2009-2010).

The population in York Landing (*Kawechiwasik*) exhibits mobility, with families moving in and out of the community on a fairly regular basis. Residents primarily leave the community to access education, training and employment opportunities as well as health services. People often return to the community due to the higher costs associated with living off-reserve, as well as a sense that it is easier to raise a family in their home community (YFFN KPI Program 2009-2010).

4.3.1.2 Keeyask Cree Nations Projected Population

Population projections were developed for the KCNs up to 2023 to correspond with the period during which Project construction and the early years of normal operation would occur. For purposes of examining the existing environment, these projections estimate future population in the absence of

Project-related population effects. Figure 4-10 depicts the projected population from 2008 to 2023 for the medium-growth scenario for the KCNs. Under a medium-growth scenario[1], the population would increase by approximately 39% over 15 years, or 2.6% annually. The average annual growth rate on-reserve would be 3% and the average annual growth rate off-reserves would be 2.2%.



Source: Analysis prepared by InterGroup Consultants based on INAC First Nations Population Profiles 2008.
Notes:

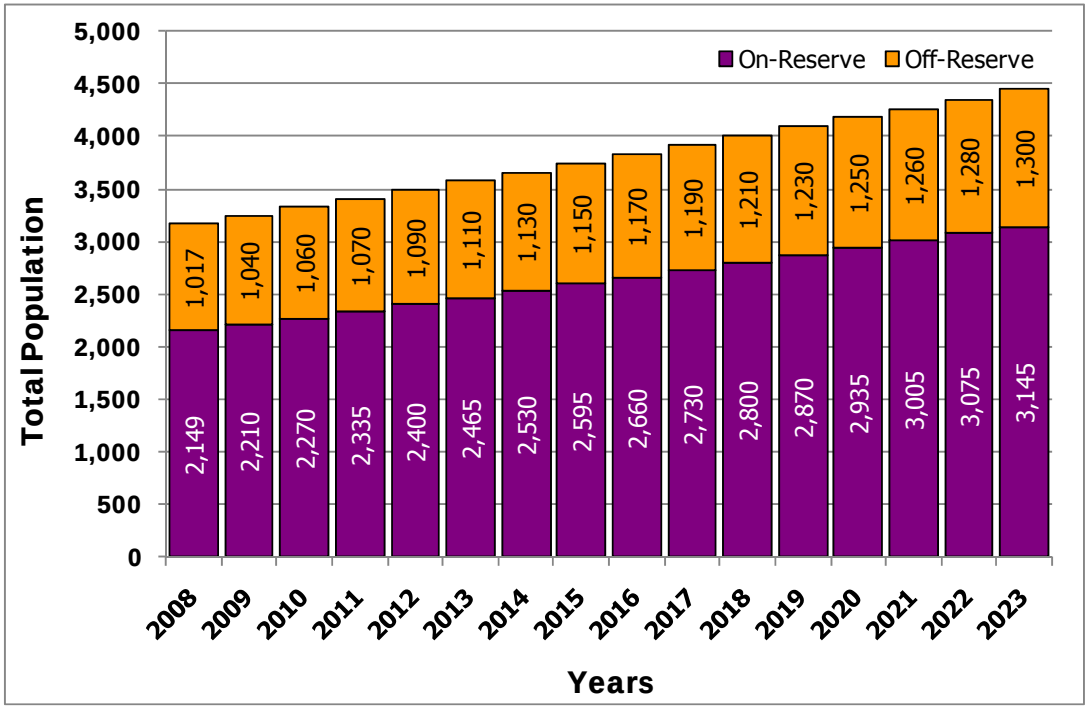
- KCNs data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data for TCN, WLFN and YFFN are provided by the First Nations and Inuit Health Branch of Health Canada.
- INAC data for FLCN are provided by INAC from the Indian Registry System. Please see the notes for Figure 4-13.
- The figure above summarizes population projections for TCN, WLFN, YFFN and FLCN.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- For the Projection, InterGroup used fertility and mortality ratios derived from The Registered Indian Demography Population, Household and Family Projections, 2004-2029 (INAC 2009c).
- The population projection model rounds the calculated totals from the component equation; this figure shows a total of the rounded numbers in Figures 4.3-11, 4.3-12, 4.3-13 and 4.3-14 which have been rounded to the nearest five.

Figure 4-10: Keeyask Cree Nations Population Projection (2008-2023 Medium Growth Scenario)

Population projections for TCN, WLFN, FLCN and YFFN are presented in Figure 4-11, Figure 4-12, Figure 4-13 and Figure 4-14, respectively.

[1] Population projections were completed for low-, medium- and high-growth scenarios. The assumptions used for a medium-growth scenario are presented in Section 4.2.1.2, while the assumptions and results of low- and high-growth scenarios are in Appendix 4A.

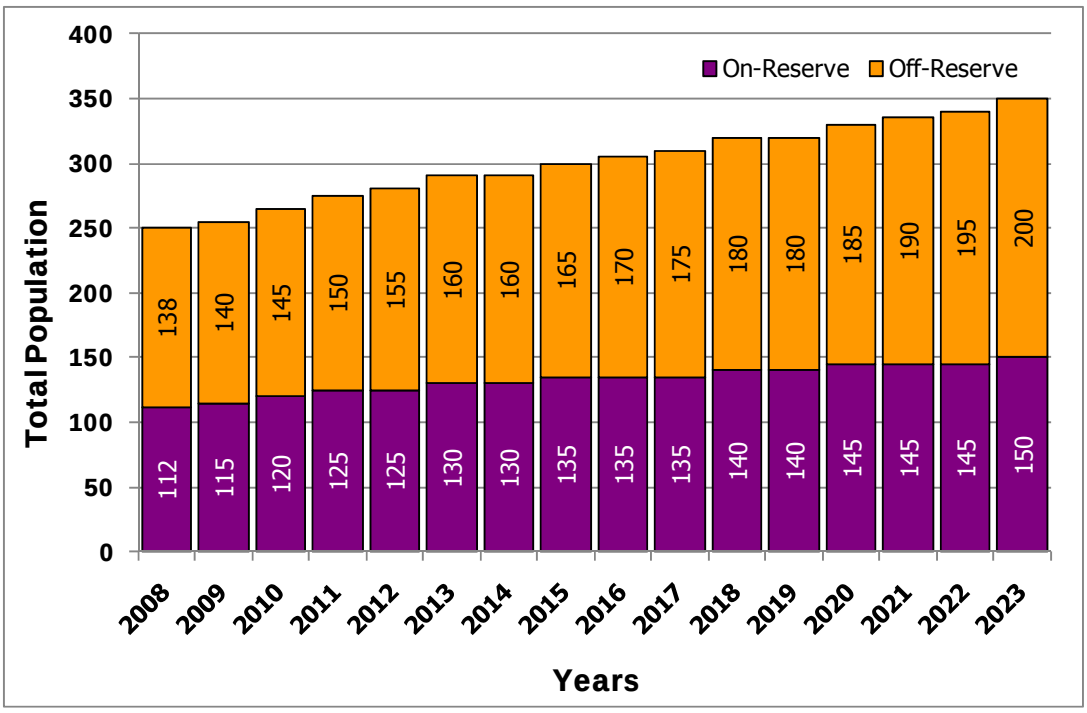
Based on a medium-growth scenario projection, TCN's on-reserve growth is expected to outpace growth in its off-reserve population, at an average annual rate of 2.6% compared to 1.7%. In contrast, WLFN's off-reserve population is expected to grow at an average annual rate of 2.5%, compared to on-reserve growth of 2.0% annually. FLCN's off-reserve population is expected to grow 2.3% annually, while its on-reserve population is anticipated to grow by almost 2.9% annually. YFFN's on-reserve population is expected to grow at an annual rate of 2.6% compared to 1.7% for its off-reserve population.



Source: Analysis prepared by InterGroup Consultants based on INAC First Nations Population Profiles 2008.
Notes:

- TCN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by the First Nations and Inuit Health Branch of Health Canada.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- For the Projection, InterGroup used fertility and mortality ratios derived from The Registered Indian Demography Population, Household and Family Projections, 2004-2029 (INAC 2009c).
- The population projection model rounds the calculated totals from the component equation to the nearest five.

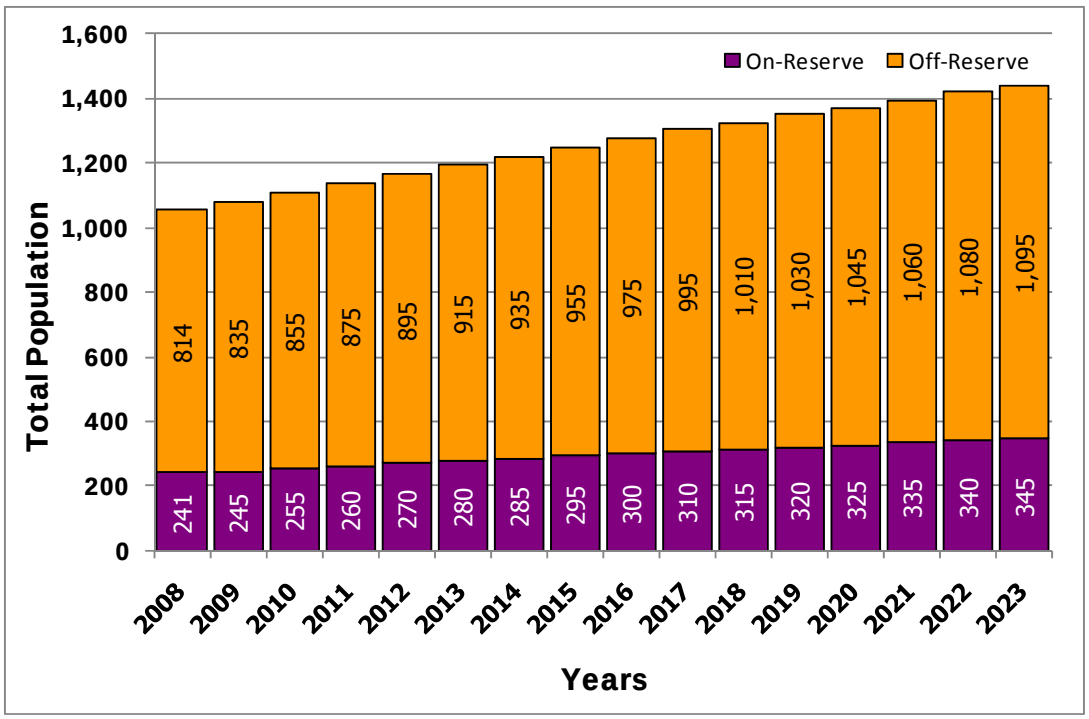
Figure 4-11: Tataskweyak Cree Nation Population Projection (2008-2023 Medium Growth Scenario)



Source: Analysis prepared by InterGroup Consultants based on INAC First Nations Population Profiles 2008.
Notes:

- WLFN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by the First Nations and Inuit Health Branch of Health Canada.
- For the Projection, InterGroup used fertility and mortality ratios derived from The Registered Indian Demography Population, Household and Family Projections, 2004-2029 (INAC 2009c).
- The population projection model rounds the calculated totals from the component equation to the nearest five.

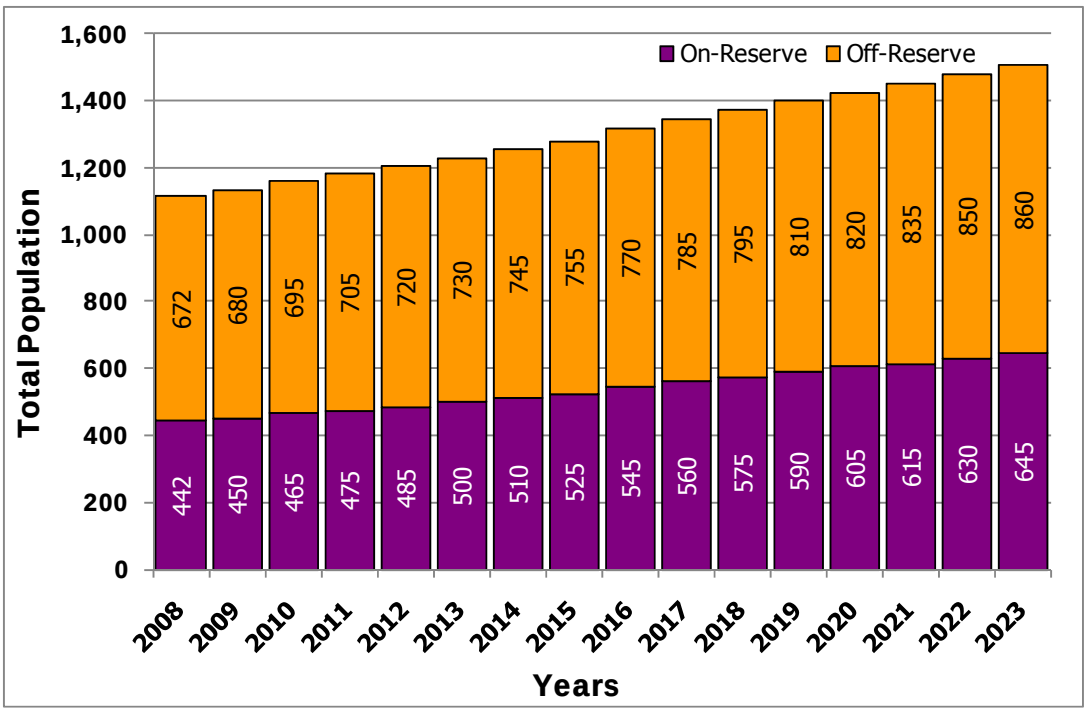
Figure 4-12: War Lake First Nation Population Projection (2008-2023 Medium Growth Scenario)



Source: Analysis prepared by InterGroup Consultants based on INAC First Nations Population Profiles 2008 and Manitoba Health Fox Lake Cree Nations Population data 2008.
Notes:

- FLCN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by INAC from Indian Registry System.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- INAC data "On-Reserve" population breakout by gender for all age groups, except 10-14 and 15-19, was prorated based on total "On-Reserve" population (excluding age groups 10-14 and 15-19) gender breakout.
- INAC data "On-Reserve" population for age groups above 60 assume Manitoba Health FLCN Population data for the same age groups. Population data for age groups above 75 corrected to make reconcile to total population.
- Total population gender breakout for age groups above 65 was prorated based on total population gender breakout.
- Off-Reserve population numbers are derived as follows: Total population minus "On-Reserve" (note 4 above) population.
- For the Projection, InterGroup used fertility and mortality ratios derived from The Registered Indian Demography Population, Household and Family Projections, 2004-2029 (INAC 2009c).
- The population projection model rounds the calculated totals from the component equation to the nearest five.

Figure 4-13: Fox Lake Cree Nation Population Projection (2008-2023 Medium Growth Scenario)



Source: Analysis prepared by InterGroup Consultants based on INAC First Nations Population Profiles 2008.
Notes:

- YFFN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by the First Nations and Inuit Health Branch of Health Canada.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- The population projection model rounds the calculated totals from the component equation to the nearest five.

Figure 4-14: York Factory First Nation Population Projection (2008-2023 Medium Growth Scenario)

The estimated total growth for each of the KCNs communities between 2008 and 2023 is summarized in Table 4-6.

During 2016, the year that would correspond to the peak of construction, it is estimated that TCN would have a total population about 3,830, WLFN would have a population of 305, FLCN would have a population of 1,275 and YFFN would have a population of 1,315. A sizeable portion of each of these populations in 2016 would be a part of the labour force as described in Table 4-7.

Table 4-6: Total Projected Population Estimates for the Keeyask Cree Nations (2008, 2016, 2023 Medium Growth Scenario)

	2008			2016 (Peak Construction Year)			2023		
	On-Reserve	Off-Reserve	Total	On-Reserve	Off-Reserve	Total	On-Reserve	Off-Reserve	Total
TCN	2,149	1,017	3,166	2,660	1,170	3,830	3,145	1,300	4,445
WLFN	112	138	250	135	170	305	150	200	350
FLCN	241	814	1055	300	975	1,275	345	1095	1,440
YFFN	442	672	1,114	545	770	1,315	645	860	1,505
KCNs	2,944	2,641	5,585	3,640	3,085	6,725	4,285	3,455	7,740

Source: Analysis prepared by InterGroup Consultants based on INAC First Nations Population Profiles 2008. INAC data for TCN, WLFN and YFFN are provided by the First Nations and Inuit Health Branch of Health Canada. INAC data for FLCN are provided by INAC from the Indian Registry System.
Note:
- See the notes to Figures 4.3-11, 4.3-12, 4.3-13 and 4.3-14 for population projections for each TCN, WLFN, YFFN and FLCN.

Table 4-7: Proportion of the Population Estimated to be in the Labour Force (2008, 2016, 2023 Medium Growth Scenario)

	2008	2016	2023
TCN	62.2%	62.0%	61.3%
WLFN	69.6%	64.6%	61.4%
FLCN	69.6%	64.2%	60.5%
YFFN	64.5%	65.8%	61.0%
KCNs	64.4%	63.2%	61.1%

Source: Analysis prepared by InterGroup Consultants based on INAC First Nations Population Profiles 2008.
Notes:
- KCNs labour force is calculated based on total population of TCN, WLFN, YFFN and FLCN for the years shown and represents those in the age category of 15-64.
- KCNs, as well as TCN, WLFN, YFFN and FLCN population numbers are subject to rounding.
- INAC data for TCN, WLFN and YFFN are provided by the First Nations and Inuit Health Branch of Health Canada. INAC data for FLCN are provided by INAC from the Indian Registry System.
- See the notes to Figures 4.3-11, 4.3-12, 4.3-13 and 4.3-14 for population projections for each TCN, WLFN, YFFN and FLCN.

4.3.1.3 Gillam

Although the people of FLCN historically occupied the territory surrounding Gillam as part of their seasonal round of resource use, the first settlement in the area began in 1912-1913 at Mile 330 of the railway. A population of approximately 350 people settled in this area, consisting largely of railway workers and their families, along with some Members of YFFN (whose Members became part of FLCN in subsequent years; see Section 2.2.3.2 for further details on FLCN history). Construction of the railway

over Kettle Rapids was interrupted by World War I, and the railway was not completed until 1929. "The present Town of Gillam at Mile 326 began after the railway gangs moved on from Mile 330. The Fox Lake people settled on the hill "south switch"[of the railway] and the Split Lake peoples settled on the north side of the tracks"(Town of Gillam 2010).

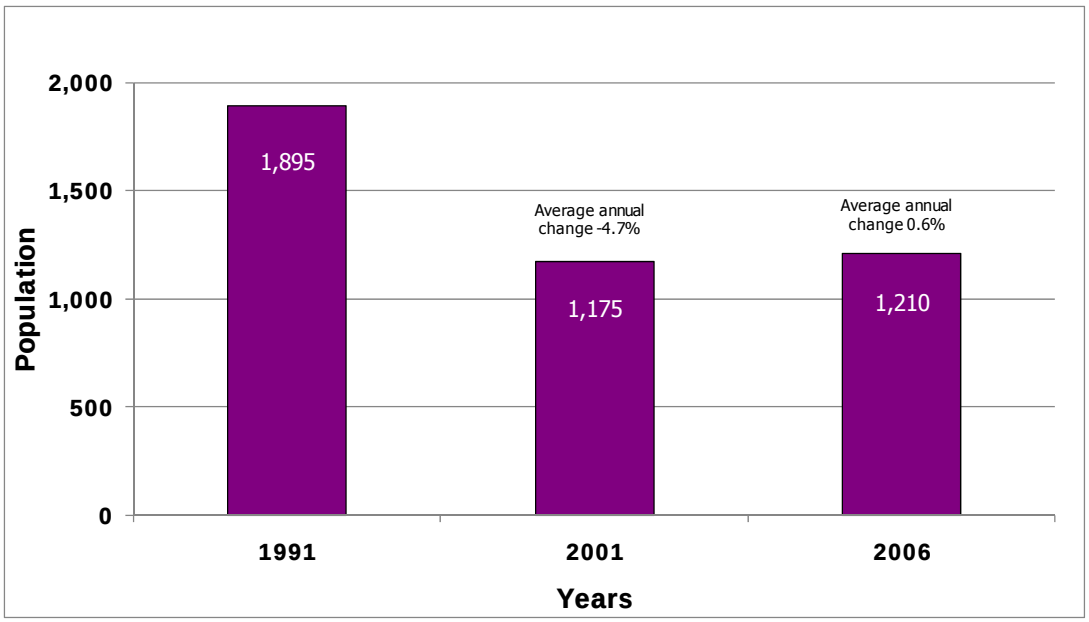
Since the 1960s, the population of the Gillam area has been closely linked to the development of Manitoba Hydro's generation and transmission facilities. For example, between 1966 and 1979[1], during the period of construction of the Kettle and Long Spruce Generating Stations, a population boom occurred, with an estimated peak of 3,000 at the start of the Kettle Generating Station construction (Town of Gillam 2010). The population increased over 400% during the Census years of 1966 and 1971, an additional 48% between 1971 and 1976, and almost 50% between 1976 and 1981 (HTFC 2009).

4.3.1.3.1 Current Population

In 2006, the population of Gillam was approximately 1,200, of which 580 self-identified as Aboriginal (Statistics Canada 2007a). As shown in Figure 4-15 the population of Gillam declined noticeably in the 1990s as Manitoba Hydro employment in the community fell. Since 2001, the population has slowly increased (by about 0.6% per year), in conjunction with rising Manitoba Hydro employment. The growth in the community's Aboriginal population[2] was also a factor in the increase.

[1] Construction of the Kettle Generating Station occurred between 1966 and 1973. Construction of the Long Spruce Generating Station occurred between 1971 and 1979.

[2] Forty-five percent of Gillam's population self-identified as Aboriginal in the 2006 Census. According to Statistics Canada, this included identifying as North American Indian, Metis or Inuit, and/or those who reported being a Treaty Indian or a Registered Indian, as defined by the Indian Act of Canada, and/or those who reported they were members of an Indian Band or First Nation (Statistics Canada 2007a).



Sources: Statistics Canada 1992, 2002, 2007a.
Notes:
- 1991, 2001 and 2006 population data consist of 100% of the census population.
- Statistics Canada data represent the population during the Census of Canada on June 4, 1991, May 15, 2001 and May 16, 2006.
- Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
- Average annual population change was calculated by InterGroup Consultants based on Statistics Canada 1991, 2001 and 2006 data.

Figure 4-15: Change in Gillam Population (1991, 2001, 2006)

The age structure of the Gillam population (see Table 4-8) had characteristics closer to the Regional Study Area than the province as a whole in 2006. The median age of the Gillam Aboriginal population was 23 years, compared to 26 years for the Regional Study Area and 39 years for the province. The overall Gillam population was fairly young, with about 35% under the age of 20; about 46% of the Aboriginal portion of the population was under the age of 20.

What is most notable about Gillam's population is the overall lack of an older generation. Only about 2% of the total and Aboriginal populations were over the age of 65, which was lower than the Regional Study Area (about 6%) and the province as a whole (about 17%). This could have resulted because most Manitoba Hydro employees retired to other communities since housing is no longer provided once employment ends (Gillam KPI Program 2009-2010), and because many FLCN Elders preferred to live in Fox Lake (Bird) (FLCN KPI Program, 2009-2011).

Table 4-8: Age Distribution of the Gillam Population and Comparison Populations (2006)

	Gillam (Total)	Gillam Aboriginal Population	Comparison Populations	
			Northern Manitoba[4]	Manitoba
Total Population[1,2,3]	1,210	580	84,600	1,148,400
0-4 Years – # and %	105	50	8,615	68,100
	8.7%	8.6%	10.2%	5.9%
5-19 Years – # and %[5]	315	220	26,045	157,075
	26.0%	37.9%	30.8%	13.7%
20-64 Years – # and %[6]	770	295	45,165	761,350
	63.6%	50.9%	53.4%	66.3%
65 years and over –# and %[7]	25	10	4,750	198,710
	2.1%	1.7%	5.6%	17.3%
Median age[8]	29	23	26	39

Source: Statistics Canada 2007a; Statistics Canada 2011b.
Notes:
1. 2006 population data consist of 100% of the census population.
2. Statistics Canada data represent the population during the Census of Canada on May 16, 2006.
3. Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
4. Northern Manitoba region defined by Statistics Canada as census divisions 19, 21, 22 and 23.
5. Age category 5-19 years calculated by InterGroup Consultants as the total of Statistics Canada age categories 5-9, 10-14, and 15-19 years.
6. Age category 20-64 years calculated by InterGroup Consultants as the total of Statistics Canada age categories 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64.
7. Age category 65 years and over calculated by InterGroup Consultants as the total of Statistics Canada age categories 65-69, 70-74, 75-79, 80-84, and 85 years or older.
8. Median ages were calculated by InterGroup Consultants; assumes equal distribution of population within age groups.

4.3.1.3.2 Projected Population

The population of Gillam today and in the near-term continues to be linked primarily to the availability of employment with Manitoba Hydro and associated housing. The current housing stock in Gillam (described in detail in Section 4.3.2.2) limits community growth. While the total population of the community remains fairly stable, regular turnover among Manitoba Hydro staff moving in and out of the community means that there is flux in the local population. The regular turnover among staff occurs for various reasons, including access to other employment opportunities with Manitoba Hydro elsewhere in the province, or in order to provide family members and/or their children with further education and employment opportunities. Upon retirement, most Manitoba Hydro employees relocate to other communities since they no longer qualify for Manitoba Hydro housing; this affects the structure of the

population (Gillam KPI Program 2009-2010)[1]. For these reasons, the cohort component population model could not be applied to project the future population of the Town of Gillam. Instead, an approach based on the relationship between population and the number of Manitoba Hydro employees in the community was used.

Over the next five to 10 years, Gillam is forecasted to almost double, to between 2,300 and 2,800 people assuming Manitoba Hydro projects move forward (Dillon Consulting 2012). This forecast includes growth associated with operation staff of the Keeyask Generation Project (further discussion provided in Section 4.4.2), Bipole III Transmission Project/Keewatinoow Converter Station and the potential Conawapa Generation Project. It is assumed this also includes other Manitoba Hydro related staff growth, retail and services growth, and FLCN population growth (all of which may include families). The cumulative effects of population growth are described in Chapter 7 of the Response to EIS Guidelines document.

As noted in Section 4.2.1, it is likely that overall population trends for FLCN Members residing in Gillam would be similar to that of the general FLCN population. Therefore, a growth rate between 2.3% and 2.9%[2] of FLCN Members living in Gillam may be expected. It is anticipated that some of the FLCN Members living in Gillam may fill some of the operation jobs associated with the Project.

4.3.1.4 Thompson

The Thompson population was examined using data from the Burntwood Regional Health Authority (BRHA) and Statistics Canada and through the KPI program.

4.3.1.4.1 Current Population

Thompson's early history is tied to mineral development in the Thompson region. In 1956, after 10 years of exploration, the International Nickel Company (INCO Ltd.) discovered a world class nickel ore body at Cook Lake in the Thompson area. This discovery led INCO Ltd. to make a long-term commitment to the area. An agreement was signed between INCO Ltd. and the Manitoba Government to develop a town site for 8,000 people. During the winter of 1957 and 1958 development of the town site occurred rapidly, with the bank, school, store and hospital being located temporarily in houses until more permanent structures were completed (Fraser 1985). The nickel plant (mill, smelter and refinery) and mine site were developed on Cook Lake, and the town site was established a few kilometres away on the Burntwood River (Buckingham 1988).

The City of Thompson was incorporated in 1967 with INCO Ltd turning over infrastructure a year prior. The town site was administered as a Local Government District (Manitoba Hydro and NCN 2003) and an administrator was jointly appointed by INCO Ltd. and the Province of Manitoba (Taunton 1978). In June of 1970, Thompson was incorporated as a City of 20,000 residents, governed by an elected Mayor and Council (Thompson Unlimited 2007).

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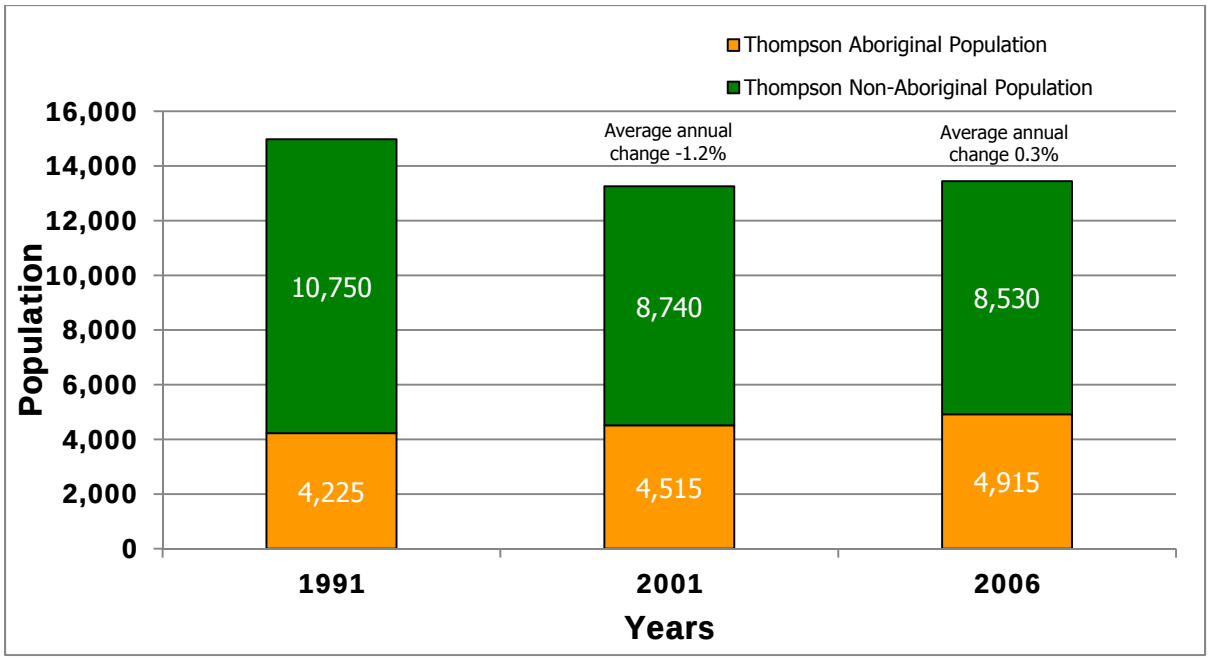
[1] This situation may change in the future with the newly implemented Alternative Gillam Housing program which provides options for employees to purchase their homes, and therefore remain in the community.
[2] FLCN growth of 2.3% refers to off-reserve projected growth and 2.9% refers to on-reserve projected growth.

During the 1970s, population levels in Thompson increased annually. This trend of consistent growth, which periodically included large annual increases, ended in the mid-1970s. Subsequently, population levels entered a period of decline until about 1981 (Manitoba Hydro and NCN 2003). Since the early 1980s, the population of Thompson has fluctuated from just under 14,000 to just over 15,000 people (Manitoba Health, 1981 to 2008). Statistics Canada recorded the population of Thompson as low as 13,445 in the 2006 census (Statistics Canada 2007a). Within the community, people have indicated that the population in the fourth quarter of 2008 and into 2009 was estimated to be about 18,000 people (Thompson KPI Program 2008-2010). Some community residents felt that the population could grow to 20,000-22,000 people in the next 10 years as a result of increased employment opportunities related to Thompson's role as a service centre (*e.g.*, jobs outside of the mining sector), in addition to increased numbers of Aboriginal people establishing residence in the community (discussed below). An increase in population would place additional stresses on existing infrastructure and services and would require the development of additional serviceable land (Thompson KPI Program 2008-2010).

Figure 4-16 highlights the growth and decline of the Thompson population using data obtained from the Census of Canada. From 1991 to 2001, a decline in the total population was observed, however this was followed by a positive growth rate from 2001 to 2006.

The Aboriginal portion of the Thompson population has experienced similar fluctuations over time, following trends in the total population. In recent years, growth in Thompson's Aboriginal population has been more rapid than in the total population. In 1991, the total Aboriginal population of Thompson was about 4,200 individuals, representing 28% of the total community. By 2006, this had increased to about 4,900 individuals, representing 37% of the overall population. The number of Aboriginal individuals increased between 1991 and 2006 while the overall population decreased. Local residents estimated that the actual Aboriginal portion of the total Thompson population is in the range of 45 to 50%. The in-migration of Aboriginal people to the community has been attributed to various reasons, including better opportunities for individuals and families than in their home communities (*e.g.*, education, training, employment and better access to health facilities and services), and that Thompson acts as an administrative centre for various Aboriginal organizations. (Thompson KPI Program 2008-2010).



Sources: Statistics Canada 1992, 2002, 2007a, 2011a, 2011b.
Notes:

- 1991, 2001 and 2006 population data consist of 100% of the census population.
- Statistics Canada data represent the population during the Census of Canada on June 4, 1991, May 15, 2001 and May 16, 2006.
- Average annual population change was calculated by InterGroup Consultants based on Statistics Canada data.
- Statistics Canada data are subject to random rounding procedure.

Figure 4-16: Change in Thompson Population (1991, 2001, 2006)

Table 4-9 describes the age distribution of both the Aboriginal and non-Aboriginal population of Thompson. The median age of 29 years for the population of Thompson was lower than the median age of 39 years for the Manitoba population. The median age of the Thompson Aboriginal population was younger at 21 years. There were also a larger proportion of school-aged children in Thompson and among the Thompson Aboriginal population compared to the Province of Manitoba as a whole. Approximately half of the youth population (0 to 19 years of age) in Thompson was of Aboriginal descent and about half of the Aboriginal population (49%) was in this age range. The proportion of the population over the age of 65 was quite small for Thompson (3%) as a whole and for the Thompson Aboriginal population (2 %), compared to the Regional Study Area (6%) and Manitoba (17%).

Table 4-9: Age Distribution of the Total Thompson and Thompson Aboriginal Population and Comparison Populations (2006)

	Thompson	Thompson Aboriginal	Comparison Populations	
			Northern Manitoba[4]	Manitoba
Total Population[1,2,3]	13,445	4,915	84,600	1,148,400
0-4 Years – # and %	1,140 (8.5%)	605 (12.3%)	8,615 (10.2%)	68,100 (5.9%)
5-19 Years – # and %[5]	3,630 (27%)	1,815 (36.9%)	26,045 (30.8%)	157,075 (13.7%)
20-64 Years – # and %[6]	8,245 (61.3%)	2,390 (48.6%)	45,165 (53.4%)	761,350 (66.3%)
65 years and over – # and %[7]	415 (3.1%)	105 (2.1%)	4,750 (5.6%)	198,710 (17.3%)
Median age[8]	29	21	26	39

Source: Statistics Canada 2007a, 2011b.
Notes:
1. 2006 population data consist of 100% of the census population.
2. Statistics Canada data represent the population during the Census of Canada on May 16, 2006.
3. Statistics Canada data are subject to random rounding procedure; population totals and individual cells are rounded.
4. Northern Manitoba region defined by Statistics Canada as census divisions 19, 21, 22 and 23.
5. Age category 5-19 years calculated by InterGroup Consultants as the total of Statistics Canada age categories 5-9, 10-14, and 15-19 years.
6. Age category 20-64 years calculated by InterGroup Consultants as the total of Statistics Canada age categories 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64.
7. Age category 65 years and over calculated by InterGroup Consultants as the total of Statistics Canada age categories 65-69, 70-74, 75-79, 80-84, and 85 years or older.
8. Median ages were calculated by InterGroup Consultants; assumes equal distribution of population within age groups.

4.3.1.4.2 Projected Population

Scenarios were developed to examine the potential future population of Thompson between 2008 and 2023, including the period during which construction and initial operation of the Project would occur. The scenario approach has been adopted because the cohort-component approach, which calculates natural increase based on birth rates and mortality rates, is unlikely to produce meaningful results for the following reasons:

- Thompson's population has fluctuated with the economic growth and decline cycles of the mining industry.
- More recently, the economy has begun to diversify, resulting in additional economic drivers for the community. While the Vale (formerly Vale-Inco and INCO) operations continue to be the prime

economic driver of the Thompson economy and its population, Vale's role is not as great as it has been in the past, particularly with their intended closure of their smelter and refinery.

- In-migration and out-migration of workers, students and other people from/to the south and outlying northern communities and their families appears to have an equal or greater effect on the overall population than the birth rate and mortality rate.

The Thompson economy has been strongly linked to the mining sector throughout most of its history. Over the last 15 years, the economy has begun to diversify, with mining still ranked as the top economic activity. With the increase in government services, post-secondary education and health care services and facilities, Thompson has begun to take on more of a regional centre role. This changing role has meant that population change is affected by a wider range of factors than simply mining development.

Using an analysis of the known and potential drivers of change, two scenarios for the future of Thompson's economy were produced (more complete analysis is attached in Appendix 4C). The two economic scenarios examined include:

- A low growth scenario which maintains growth in the community but at a noticeably lower rate than occurred from 2007 to 2010; and
- A suppressed economy scenario similar to stable and sometimes negative growth experienced from 1981 to 2006.

Population projections were estimated for the City of Thompson for each economic scenario (see Table 4-10). These projections are informed by past and recent population levels that Thompson has experienced under different economic circumstances:

- From 1981 to 2006, while the community was in a stable to slightly negative economic growth situation, Thompson's population remained steady at between 14,000 and 15,000 people.
- In late 2008, after two years of high growth, the Thompson population was estimated to be 17,000 to 18,000 people, with much of the increase from 2006 consisting of people who were living for short durations in the city, working on construction and upgrading projects.

Table 4-10: Scenario-Based Population Projections for Thompson to 2023

Low Growth Scenario	Suppressed Economy Scenario
14,000 to 17,000	11,000 to 14,000

Source: InterGroup Consultants.

4.3.2 Housing – Local Study Area

This section describes existing housing, including temporary accommodations, in the Local Study Area communities. Where available, data on housing types, overall housing conditions and whether communities face a shortage of housing are provided.

Housing is one of the most basic necessities of life, yet the availability of adequate and affordable housing for First Nations residents is an ongoing concern in northern reserve communities in Canada. In general,

the rapidly growing population and limited availability of on-reserve housing are driving the need for more housing in many areas, including the KCNs communities.

Over the past several decades, high fertility rates and moderate improvements in life expectancy have caused the Aboriginal population to experience higher rates of growth compared to the overall Canadian population; this is a trend that is expected to continue for some time into the future with or without the Project (CMHC 2007; Steffler 2008).

Overcrowding and difficult conditions in which to construct and maintain housing (*e.g.*, harsh northern climate in remote locations) make housing a challenge to provide to residents (CMHC 2008). Many First Nations people who wish to remain in their home communities are placed on housing waiting lists. While waiting for housing, families either share accommodations with existing family members on-reserve or leave their home communities in order to find housing elsewhere. Some who leave do not return to their home reserve despite the desire to do so (*e.g.*, some KCNs Members continue to live in Thompson due to housing shortages in their home communities (Thompson KPI Program 2008-2010)).

Gillam and Thompson housing needs are identified as issues in the following sections as both communities face a shortage of housing units to accommodate the existing demand.

4.3.2.1 Keeyask Cree Nations Housing

4.3.2.1.1 Cree Nation Partners

TATASKWEYAK CREE NATION

According to TCN's fieldwork research program, there are 368 single-family dwelling units in nine housing subdivisions in Split Lake. Of these dwellings, 183 are INAC Capital Housing units, 126 are Canada Mortgage and Housing Corporation (CMHC) subsidized units owned by TCN and rented out to community Members and 59 are CMHC Section 10 units owned by the occupants. Over 2009 and 2010, 10 new homes were built, made up of four duplexes and two single-family units. Despite these new homes, the housing wait list has increased (CNP 2010c). In 2011, two triplex housing units were completed (CNP *pers. comm.* 2011).

Two hundred seventy-two houses have a piped water supply and the rest of the 95 houses are serviced by cisterns or tanks. Two hundred fifty-seven houses have access to piped sewer services, while 110 homes have sewage holding tanks and one home has a pit privy. The majority of homes are heated by electric furnaces and baseboard heaters (CNP 2010c).

Limited housing availability, leading to overcrowding and poor housing quality is a concern in Split Lake. On average, six people live in each three-bedroom home, with as many as 12 to 15 people living in some homes. Extended families typically live together in overcrowded homes, which affects housing quality since overcrowded homes tend to deteriorate more quickly. As of June 2010, there were more than 200 TCN Members on the waiting list for a home, with Members waiting two years on average to acquire a home. In 2005, it was estimated that 502 new housing units would be required by 2035 to meet community demand. In terms of housing quality, 58 houses have been condemned, 137 houses require major repairs, 122 houses require moderate repairs, and 48 houses require minor repairs. Repairs range

from minor problems with plumbing, baseboard heaters and flooring to major problems with mould and ventilation (CNP 2010c).

There is concern in the community that the demand for housing will increase with the development of the Project, but that there will be no financial means of meeting that demand (CNP 2010c).

According to 2006 Census data, between 2001 and 2006 the total number of private dwellings on-reserve at Split Lake increased from 355 to 370 homes. Of those private dwellings, 250 were single-detached housing units, 10 were row-housing units and 110 were moveable dwellings (trailers). In 2001, it was estimated that 89% of the housing was First Nation-owned. Almost 21% of the homes in the community were constructed approximately 20 years or more prior to 2001 and just over one half of the housing in the community was described as needing major repairs[1] (Statistics Canada 2007a).

The census data showed an increase in the average number of people residing in private dwellings from 4.5 in 2001 to 4.9 in 2006 (Statistics Canada 2007a). This was substantially higher than the national average in Canada, which was 2.6 in 2006. More detailed data related to the number of occupied private dwellings and a number of other household statistics were suppressed for the 2006 census year.

Temporary Accommodation

The Kistepinanik Hotel is a modern hotel located within the community of Split Lake and owned by the First Nation. The 14-unit hotel opened in 2003 and has a full-service, 32-seat restaurant. The hotel is used by those visiting the community and the restaurant has the ability to provide take-out lunches for residents and crews working nearby (TCN 2008). The hotel includes Video Lottery Terminals operated by TCN's Gaming Commission. The hotel is staffed with a full-time manager and front desk clerk and part-time kitchen and housekeeping staff (CNP 2010c).

WAR LAKE FIRST NATION

According to the 2006 Census, there were a total of 35 occupied private dwellings in Ilford. These were all single-detached homes (Statistics Canada 2007a). More recent data indicates there are approximately 20 on-reserve single-family homes, all of which are CMHC units owned by the First Nation and rented out to WLFN Members, in addition to 10 occupied houses and five abandoned houses on non-reserve land in Ilford (CNP 2010f).

The federal Rural Native Housing Program funds 10 of the occupied houses in Ilford. The Canadian Mortgage and Housing Corporation owns and manages the houses for this program for off-reserve Members and Metis residents. Under the CMHC-INAC First Nation On-Reserve Housing Program, there are plans to complete four new houses. WLFN also has plans to purchase two four-bedroom trailer units. Many of the off-reserve houses in Ilford have been condemned (CNP 2010f).

According to Statistics Canada, the average number of people residing in private dwellings decreased from 3.4 in 2001 to 3.3 in 2006 (higher than the Canadian average of 2.6 persons per dwelling in 2006).

[1] Major repairs "refer to the repair of defective plumbing or electrical wiring, structural repairs to walls, floors or ceilings, *etc.*," (Statistics Canada 2006).

The 2006 Census showed that the number of private dwellings that had six or more residents decreased from 25% in 2001 to just over 14% in 2006 (Statistics Canada 2002, 2007a). Currently, however, the community has indicated that overcrowding has become a serious concern, with approximately six people per three-bedroom house. The Mooseocoot Housing Authority assesses applications according to family size, age distribution, income and health considerations, and then makes recommendations to the Chief and Council. Families often wait one to two years or longer to upgrade their housing, and demand for available or new housing is greater than the supply. At the time of writing, there are six to ten families on the waiting list to receive First Nation-housing (CNP 2010f).

The quality of WLFN housing in Ilford is a concern, with approximately 50% of houses requiring repair. Major problems include mould and malfunctioning windows and doors. All housing units have running water and indoor plumbing, and the majority have electric furnaces (CNP 2010f).

A lack of reserve land is a factor impeding new housing development. The community believes that the transfer of Crown land at Ilford through the TLE process is important to addressing their need for more housing, and in 2007, the Mooseocoot Housing Authority was activated to begin land transfer discussions with the Government of Manitoba, Manitoba Keewatinowi Okimahkanak and the Government of Canada. The 2008 War Lake Long Term Development Strategy also identified the need to further develop the housing policy first recommended in 2005. It is believed that the demand for housing in the community would increase with the development of the proposed Project (CNP 2010f).

Temporary Accommodation

There is no housing designated for visitors or temporary workers other than one First Nation-owned trailer. The WLFN Northern Lights Place of Learning Centre, offers two to three rooms for rent, there is a two bedroom lodge at the Moosecoot Gar Bar and some out-of-town visitors may also use the Laliberty Memorial Centre during the Winter Carnival or Indian Days celebrations (CNP 2010f).

4.3.2.1.2 Fox Lake Cree Nation

FLCN Members live on-reserve at Fox Lake (Bird), on-reserve at the A Kwis Ki Mahka Reserve in Gillam and also off-reserve in Gillam, Thompson, Winnipeg and other centres. According to the 2006 Census, there were 40 occupied private dwellings, either detached or semi-detached, in the reserve community of Fox Lake (Bird). The 2006 Census indicates that on average there were 2.6 people per household (Statistics Canada 2007a). This number should be interpreted with caution, however, as the previous Census indicated an average household size of 3.6 people per household (Statistics Canada 2002), and the community-based research program suggested an average of four persons per household in Fox Lake (Bird) and three persons per household in Gillam. In 2009, data supplied by FLCN noted there were 265 Members living within the Town of Gillam (including the Trailer Court and the new urban reserve) (FLCN KPI Program 2009-2011).

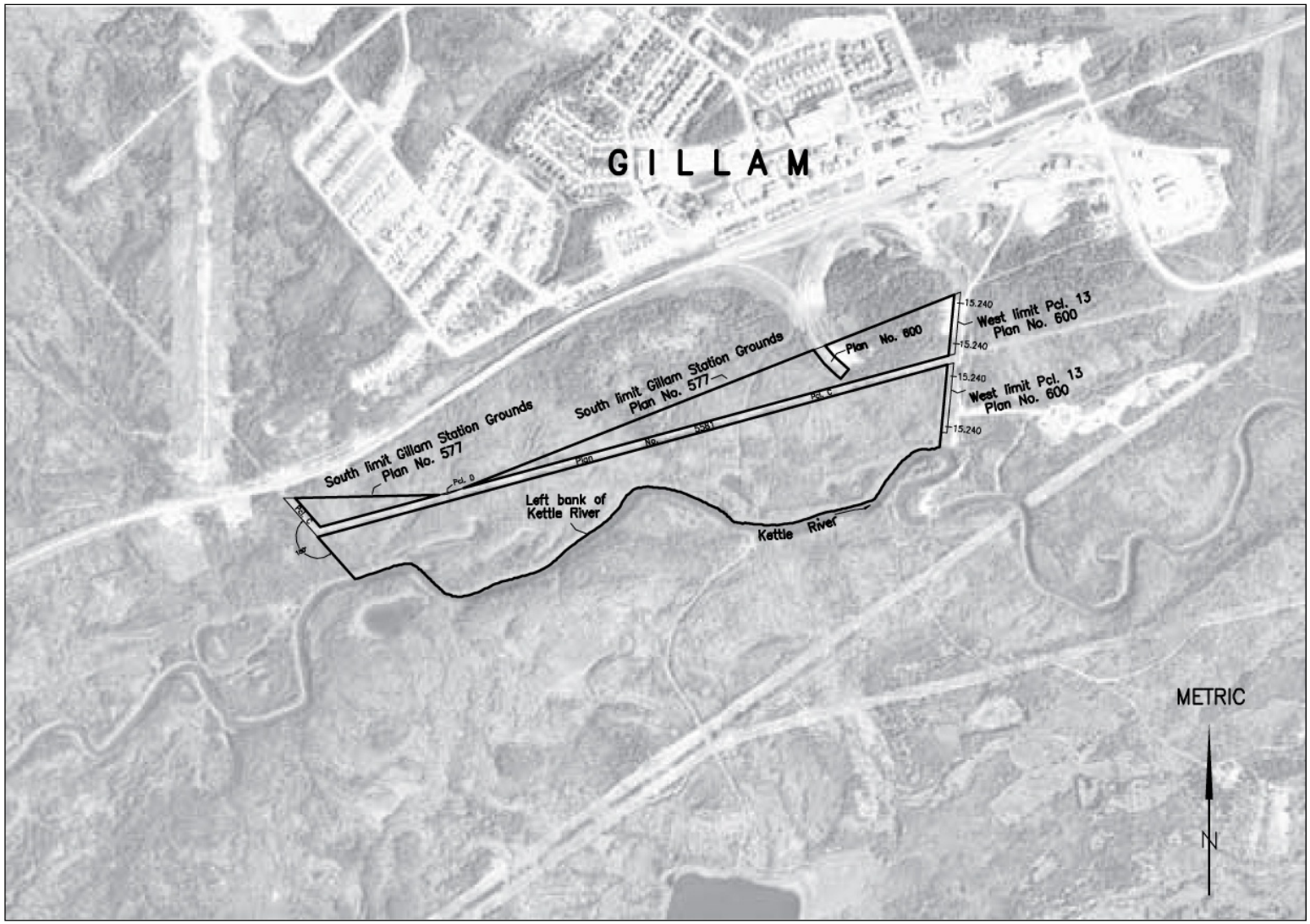
A FLCN housing committee allocates First Nation-owned homes to Members based on priority needs. However, like many First Nation communities in Manitoba, there is a shortage of housing in Fox Lake (Bird) (FLCN KPI Program 2009-2011). The quality of housing at Fox Lake (Bird) is generally considered to range from good to poor. Poor air circulation is believed to be a primary factor

contributing to the presence of mould in some of the housing units (HTFC 2008; FLCN KPI Program 2009-2011). Many FLCN homes are older with the exception of a six-unit modern Elder's complex in Gillam (HTFC 2008).

Many units have multiple families living in them, and over the last 5-10 years the number of FLCN Members waiting for housing has substantially increased. At the time of writing, there were 86 people on the combined housing waiting list for both Fox Lake (Bird) and Gillam, and demand for housing is expected to exceed supply into the foreseeable future (FLCN KPI Program 2009-2011).

On September 9, 2009, the Government of Canada transferred 1.29 ha of land in Gillam in the area known as Kettle Crescent to FLCN to create the A Kwis Ki Mahka Reserve. In 2010, FLCN had 27 First Nation-owned housing units on Kettle Crescent and approximately 12 units on Hudson Bay Railway-owned land. Many FLCN Members also reside in the Gillam Trailer Court. There is limited land available for housing expansion on Kettle Crescent; however, the First Nation plans to purchase 25 trailers for their Members in Gillam. These homes could be placed on empty lots or replace older trailers located in the Gillam Trailer Court (FLCN KPI Program 2009-2011).

Along the Kettle River to the south of the town, FLCN has requested the transfer of 80 acres of land, called the Kettle River Site (see Figure 4-17), from INAC to FLCN for the purposes of reserve land, as a partial fulfillment of their outstanding TLE selections (FLCN, *et al.* 2004). FLCN is also interested in housing ownership related to units in the Gillam Trailer Court noted above, as well as Crown land within the Town boundaries, such as the Limestone Construction Camp and Sundance sites (Grahame McLeod and Associates 2007). A report on the setting aside of lands for FLCN reserve land in Gillam recommended that FLCN prepare a comprehensive proposal on FLCN land requirements in and around Gillam (Grahame McLeod and Associates 2007). No decisions have been made by INAC on additional transfer of Crown land (beyond the A Kwis Ki Mahka Reserve).



Source: FLCN *et al.* 2004. Cropped by InterGroup.

Figure 4-17: Kettle River Site

FLCN also faces challenges in adding to the housing stock at Fox Lake (Bird). Approximately half of the 98 acres of Fox Lake reserve land at Fox Lake (Bird) is presently used for housing or other purposes. Although FLCN wishes to build more housing units in the community with a focus on three- to four-bedroom units and one- to two-bedroom duplexes, the land available is not suitable for housing due to the high water table and poor soil conditions. There is no unused land suitable for housing in the community (FLCN 1997; FLCN KPI Program 2009-2011).

4.3.2.1.3 York Factory First Nation

According to the 2006 Census, the reserve community of York Landing (*Kawechiwasik*) had 115 occupied private dwellings. Of the 115 dwellings, 95 homes were single-detached housing units and the remaining 20 were trailer units (Statistics Canada 2007a). A new sixplex housing unit started in the fall of 2009 is almost complete, with water and sewer connections being finalized. Two families have moved in (YFFN KPI Program 2009-2010).

The majority of housing in the community is First Nation-owned, although recently 18 CMHC housing units were built through a CMHC financing program for houses on reserve land. This approach allows the First Nation administration to pay for the home using a mortgage-like payment system (YFFN KPI Program 2009-2010).

The community housing authority is responsible for the allocation of housing in the community based on priority needs as determined through an application process. The housing authority acts under the direction of the Chief and Council. Larger families are given priority when housing becomes available, but it can take from six months to a year to receive housing in York Landing (*Kawechiwasik*). In recent years, demand for housing has increased and there is an expectation that this trend will continue (YFFN KPI Program 2009-2010).

According to Statistics Canada census data, although the total number of homes in the community increased slightly between 2001 and 2006, the number of households with six or more people living in them remained the same. Community Members indicated that, due to the lack of housing in the community, overcrowding within existing homes is an issue, with multiple families (as many as 12 to 14 people) often residing in the same home. In 2009, the waiting list for housing at York Landing (*Kawechiwasik*) included approximately 60 community Members. The waiting list has seen increases in people waiting for homes over the past three years (YFFN KPI Program 2009-2010).

Housing conditions in York Landing (*Kawechiwasik*) are variable, although many of the homes in the community are older and in need of repair work. The 2006 Census indicated that just over 39% of housing was in need of major repairs, 34% was in need of minor repairs and 27% was in need of regular maintenance. Maintenance of the homes is the responsibility of the YFFN Housing Repairs and Maintenance Program; however, financial constraints on the program affect the level of service. Nevertheless, the YFFN leadership was able to improve the conditions in some homes by accessing funding through the federal Residential Rehabilitation Assistance Program. The funding was put toward renovation and mould remediation in some of the on-reserve homes. Some of the community Members indicated that mould and crowding in some homes were negatively affecting overall wellness of community Members (YFFN KPI Program 2009-2010).

YFFN faces a number of constraints when developing additional on-reserve housing in York Landing (*Kawechiwasik*), including limited seasonal access and the cost of transporting building materials to the community (YFFN Future Development 2010). As with the maintenance of existing homes, financial constraints limit the ability of the First Nation to provide new homes for its Members. There are also limitations in terms of the development of serviceable land for expansion of the community. There are two possible locations near the community that could be used for future housing development. One location is an island directly south of York Landing (*Kawechiwasik*) that would require existing infrastructure to be expanded and an access causeway to be built. A second location is on the south bank across the Aiken River. In order to access the site, a bridge would need to be built and the land cleared. According to the results of the KPI Program, this land is presently covered by forest and it is estimated that it would take approximately five years for soil moisture and permafrost to disappear and for the ground to settle enough to become suitable for construction (YFFN KPI Program 2009-2010).

Most off-reserve YFFN Members reside in Thompson, Churchill, Winnipeg, Split Lake and elsewhere. No housing support is provided to these YFFN Members unless they are out of the community for education or training purposes (YFFN KPI Program 2009-2010).

Temporary Accommodation

The Evergreen Inn is a YFFN-owned hotel that has been in operation for the past ten years. The hotel has seven rooms with two beds per room, potentially accommodating up to 14 guests. Meals are provided for the guests including a self-serve breakfast and a prepared lunch and dinner. The hotel is used by construction workers, consultants and other visiting workers in the community. The hotel employs one full-time staff and two part-time staff when needed. The hotel was at or near capacity throughout 2009 and 2010 (YFFN KPI Program 2009-2010).

4.3.2.2 Gillam

According to the 2006 Census, Gillam had a total of 435 occupied private dwellings of which approximately 74% were rental units. However, a recent study determined that there were approximately 534 housing units in the Town of Gillam (see Table 4-11), with the majority of homes owned by Manitoba Hydro and rented to employees stationed in the town. Manitoba Hydro homes accounted for approximately 322 units that ranged in size (from 600 to 1,650 square feet) and type (apartment, trailer, townhouse and single family dwellings). The majority of Manitoba Hydro and other institutional units were single-family and duplex homes. Only 37 units were apartments (HTFC 2008). Improvements are being made to many units, including the addition of screened porches, plumbed basements and attached garages; Manitoba Hydro homes are considered more desirable than other homes in Gillam (FLCN KPI Program 2009-2011).

Manitoba Hydro employees are eligible for a corporate housing subsidy as part of their compensation/benefit package (HTFC 2008), although there is a waiting list. Housing units are being built to match the expanding needs of Manitoba Hydro in the region and in order to accommodate growth. Manitoba Hydro has plans to build a minimum of 200 houses in Gillam over the next 10 years for staff employed as a result of upcoming projects in the region (Gillam KPI Program 2009-2010). Gillam's new Development Plan recommends developing a multi-stakeholder affordable housing strategy

for non-Hydro employees to access a range of housing and living options (Dillon Consulting 2012). Manitoba Hydro recently established an alternative housing program, which will help to address home ownership in Gillam, by providing employees with options to purchase their home or to rent accommodation (Manitoba Hydro, *pers. comm.* 2012).

Gillam Services is responsible for maintaining corporate housing and other corporate facilities in the community (Gillam KPI Program 2009-2010).

Table 4-11: Housing Ownership in Gillam

Owner	Number of Units
Manitoba Hydro	322*
Trailer Court	123
FLCN (units on Kettle Crescent and on Hudson Bay Railway land)	36
Frontier School Division	14
Town of Gillam	10
Her Majesty the Queen (HMQ), Canada (RCMP)	10
Private	8
Manitoba Housing Authority	7
Manitoba Telecom Services (MTS)	3
Canadian Mortgage and Housing Corporation (CMHC)	1
Total	534

Source: HTFC 2008.
Note:
*Includes 13 units in the Trailer Court.

In addition to Manitoba Hydro, other organizations that own homes in Gillam identified in Table 4-11 include the Frontier School Division, Town of Gillam, Her Majesty the Queen (HMQ) Canada (RCMP), Manitoba Housing Authority, MTS, Canada Mortgage and Housing Corporation (CMHC) and a few private individuals. Most privately owned housing in the town is in the Gillam Trailer Park and along the rail line. This housing consists of factory built homes and trailers of varying quality and condition. Home ownership in Gillam is restricted by the limited availability of serviced land and high development costs owing to remoteness and soil conditions that require the construction of costly foundations. As a result, trailer homes on surface foundations are the most available and affordable home ownership options in Gillam (HTFC 2008). Manitoba Hydro has recently established an alternative housing program that is designed to help alleviate some of the pressure on housing in the community (Manitoba Hydro, *pers. comm.* 2012).

Temporary Accommodation

Temporary accommodations can be found at the Aurora Gardens Motel (21 original rooms and 14 recently added rooms) and the Gillam Motor Inn (36 rooms), two long-standing businesses in Gillam. In

addition to accommodations, the Aurora Gardens restaurant, Mile 326, (operated by a FLCN/Sodexo partnership) provides buffet-style meals and recently began catering services. The Gillam Motor Inn has a restaurant, a lounge (Lucky's Tavern) and vendor. Throughout the year, both businesses often have no vacancies and the expectation is that this situation will continue into the foreseeable future. Both businesses note that the recruitment and retention of staff is currently challenging, and is expected to remain so into the future (Gillam KPI Program 2009-2010). In 2010, Manitoba Hydro purchased modular units to accommodate up to 60 people. This facility, to be operated as a FLCN/Sodexo partnership, has been targeted to house workers on the Kettle Generating Station upgrade (*i.e.*, stator replacement) and for future capacity in Gillam, including use by workers on future Gillam-area Manitoba Hydro projects.

4.3.2.3 Thompson

The estimated number of housing units in the City of Thompson varies according to source. The Manitoba Provincial Assessment Office indicated that, as of October 1, 2008, there were 3,150 individual housing units in Thompson, including single-detached housing, duplexes, townhouses, row housing and mobile home units and 2,223 apartment units (Thompson KPI Program 2008-2010). In February 2010, the City of Thompson Post Office reported that there were 3,509 single-detached houses, townhouses, duplexes and mobile-home units and 1,700 apartments in Thompson (Thompson KPI Program 2008-2010). The 2006 Statistics Canada Census data indicated that there were 3,355 single-detached houses, row houses, detached duplexes, other single attached houses and movable dwellings and 1,465 apartment units (Statistics Canada 2007a).

In mid-2008, Thompson experienced a period of peak economic growth. At that time, it was estimated that the city needed approximately 750 new housing starts to keep up with demand (Service Canada 2009). The lack of available housing caused some market price inflation and resulted in an increase in housing values. As in other areas of Manitoba, housing prices saw a subsequent increase of 6% in 2009 (CMHC 2009).

To address the very low vacancy rate for rental accommodation (see Table 4-12 below), Vale secured housing for their new hires and temporary workers by signing long-term leases at relatively high rates. Similarly, a number of businesses and service providers in Thompson have acquired apartment blocks to ensure that they will have housing available for their own employees and short-term workers (Thompson KPI Program 2008-2010).

Table 4-12: Rental Property Vacancy Rate in Thompson (2000 – 2009)

Thompson Data	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Apartment Vacancy Rate (%)	18.4	10.6	4.78	2.42	2.6	1.63	0.98	2.4	0.2	0.2	0.3	0.5

Sources: Thompson KPI Program 2008-2010, CMHC 2009; CMHC 2011.

Owners of apartment facilities are given an exemption to rent controls in the *Residential Tenancy Act* (Manitoba) if they undertake a major renovation. As a result, several landlords in Thompson undertook major renovations to their properties and substantially increased their rent. This has affected 499 units in the last few years (Thompson KPI Program 2008-2010). There was also a move to convert some rental units into condominiums, for example, both Princeton Towers and Corayana apartments were targeting conversions; however, poor sales has slowed or eliminated this strategy. In October 2009, Thompson had a total of 1,623 units available for rent; by spring 2011 the number of units had dropped to 1,327 (CMHC 2009, 2011).

These renovations and price increases resulted in a major decrease in the number of affordably priced rental units and an increase in the number of high-end rental units and condominiums in the Thompson market. The demographics of the tenants were also changing. Smaller families with higher incomes were moving into these recently renovated units, displacing as many as 96 families (including some 219 school-age children) who moved from the community. This resulted in the school division experiencing decreased enrolment for the 2008-2009 school year, which had implications for the budget and staffing levels for the 2009-2010 school year (Thompson KPI Program 2008-2010).

The following planned housing projects in Thompson would begin to address some of the affordable housing needs in the city (Thompson KPI Program 2008-2010):

- Twenty-four units for student housing at University College of the North, including housing for larger family units (now approved);
- Twenty family housing units by Manitoba Housing and Renewal Corporation; and
- A 16 unit project involving the Urban Aboriginal Strategy.

In the last few years there have been some individual houses built; however, few are affordable to those with middle to low incomes. There is also no retirement housing, and this has been identified as a growing need. Overall, there is currently a shortage of housing units to accommodate the existing population and this will likely continue into the near future.

Temporary Accommodation

Thompson has several temporary accommodation options available for visitors. Table 4-13 lists temporary accommodation in the nine hotels, three apartment style rental suites and one bed-and-breakfast facility that were available in Thompson in 2011 and indicates that there were a total of 553 rooms available.

Table 4-13: Accommodation in Thompson (2011)

Name of Accommodations	Number of Rooms
Hotels	
Lakeview Inn	60
Days Inn	60
Mystery Lake Motor Hotel	99
Burntwood Hotel	76
Thompson Inn	35
Meridian Motel	42
Interior Inn	54
Northern Inn and Steak House	22
Suburban Extended Stay Hotel	70
Apartment Style Suites for Short-term Rent	
Friuli Apartments and Suites13	13
Home-style Suites	9
Polar Suites	6
Bed and Breakfast	
Northern Lights Bed and Breakfast	7
Total Rooms	553

Source: Thompson KPI Program 2008-2010.

Thompson hotels have been very heavily booked over the last few years with contract workers and temporary workers staying in hotels. The majority of these workers have been in Thompson to work on capital projects at Vale and other construction projects in the community. There were also a number of workers for the Wuskwatim Generation Project staying in Thompson in the early stage of construction; however, this decreased once the main camp was completed. During the winter months, the companies that conduct cold weather testing in the area also take up large blocks of hotel rooms (Thompson KPI Program 2008-2010). More recently, the BRHA has also been using short-term accommodation space (Thompson KPI Program 2008-2010). In response to demand, the new Extended Stay Hotel was constructed in 2010, and opened in May of 2011; and several apartment-style suites have been built focusing on people staying for a week or a month.

4.3.3 Infrastructure and Services – Local Study Area

Infrastructure and services available to people living in the Local Study Area are critical to meeting a wide range of human needs. In addition to housing discussed above, these needs include provision of public infrastructure (potable water, waste handling, electricity, roads and other needs) and public facilities and services to provide education, health care, recreation, social services and other government services. In many northern communities, particularly in northern First Nation communities, provision of infrastructure and services is often hampered by limited financial resources coupled with, in many cases, rapid population growth and demand for services.

This section examines the status of infrastructure and services in communities in the Local Study Area that would be likely to experience the majority of any Project-related migration and associated effects on infrastructure and services. Other Project-related change, *e.g.*, possible investment in infrastructure and services by the KCNs communities with revenue generated from their investment in the Project, could also occur in the Local Study Area. The section looks at the capacity of existing infrastructure and services to accommodate possible Project-related population change and the associated demand for service. To the extent known, future plans for infrastructure and services without the Project are also discussed.

4.3.3.1 Keeyask Cree Nations Infrastructure and Services

4.3.3.1.1 Cree Nation Partners

TATASKWEYAK CREE NATION

Water and Sewer Services

The majority of the community of Split Lake has a water and sewer system. By 1992, water and sewer services were available to about 65% of the community (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a). The water treatment plant was built in 1987, expanded in 2002 in anticipation of the development of a new 14-unit motel, community training facilities, proposed community complex and proposed personal care home, and then extended for greater capacity in 2005. Recently, the Government of Canada announced funding to support upgrades to the existing water and sewage facilities through the First Nations Water and Wastewater Action Plan (CNP 2010c). Upgrades in 2010 were planned for the water treatment plant and the sewage lagoon. The sewage lagoon upgrade is to service the entire Split Lake community and a projected 20 year growth. In spring of 2011, construction of the sewer project was ongoing and is expected to be completed in 2012. The project includes the installation of four thousand metres of piping and construction of a truck dump station (CNP *pers. comm.* 2011*)*. Tataskweyak Construction Limited Partnership operates as the public works department to deliver infrastructure services related to water and sewer landfill, housing repairs, and internal roads maintenance to the community (CNP 2010c). It is equipped with a sewage truck, grader and tractor.

Community Members expressed concern about high turbidity and declining or worsening of the community's drinking water quality. This has led to many Members choosing to either boil their water or purchase bottled water (CNP 2010c).

Utilities

Split Lake receives electrical service from Manitoba Hydro via landline from Kelsey Generating Station to a substation approximately 3 km from the community. MTS provides individual line service and digital switching with toll-free calling to Gillam and War Lake. Until recently, the community had no cell phone coverage. Today, Split Lake has 1X Digital Coverage from MTS. The community has satellite television with 80% of the homes subscribing to Bell Satellite TV, Shaw or Star Choice systems. Radio stations include CBC, CHTM (Thompson), NCI Radio and a local volunteer radio service CJKD. TCN owns Northstream Communications Ltd. Partnership, which has provided high-speed internet service to all TCN facilities and 60 homes since 2007. Internet residential installation costs and monthly fees are higher than those for urban centres like Thompson (CNP 2010c).

Fire and Ambulance

In Split Lake, there is a volunteer fire crew of approximately 10 Members, headed by the Fire Chief and a Deputy Chief cross-trained as paramedics. The fire hall is equipped with a fire truck, water truck and ambulance. The community Health Centre has a full-time dispatcher/security guard who is responsible for informing the volunteer fire/ambulance crew of medical emergencies requiring ambulance transportation. Medi-Vac services are provided through the Thompson Airport. Community fire hydrants are limited to those areas of Split Lake serviced with piped water (CNP 2010c).

Policing

The community of Split Lake has two full-time special constables who have received special training and provincial accreditation; two additional full-time constables who have not completed the specialized training and 7-10 part-time, untrained constables. A new three-cell Band Constable station including dispatch office, waiting room and offices has been in operation since early 2011; however, some equipment upgrades are required (CNP *pers. comm.* 2011). Constables patrol the community by car, and are responsible for taking emergency calls.

The RCMP from Thompson travel to the community for investigative work on a weekly basis. A TCN Member is in charge of the restorative justice program in the community; however, no other RCMP programs are delivered in the community (CNP 2010c; CNP *pers. comm.* 2011).

Key person interviews indicated that there is an overall concern for violence and crime in Split Lake. There has been a noticeable increase in vandalism, youth crime and physical violence. Some community Members suggested that better funded recreation programs could help reduce youth crime (CNP 2010c).

Education

In September 1991, the Chief Sam Cooke Mahmuwee Education Centre was opened, which provided K-8 education services at the time. In 1994, six classrooms were added to the Centre to accommodate high

school students. The school has a maximum capacity of 500 students, and in 2010 served 652 students. Overcrowded classrooms and general lack of space due to the increased number of students has been an issue for the school. The music room was recently converted into an additional classroom to better accommodate the overload of students (CNP 2010c).

The Education Centre is divided into elementary, middle and high schools, each headed by a separate principal. In addition to the principals, there are over 30 full-time certified teachers and 20 full-time teaching assistants, as well as a support staff of over 15 including resource coordinators, guidance counsellors and Elders (CNP 2010c).

In 2010, the school gym suffered considerable damage in a fire. Prior to the fire, the gym was available to the community for recreational, conference and public health needs. Recreational activities included tai chi, bingo, league volleyball, and square dancing. The gym has also been used to host the Keewatin Tribal Council Chiefs Assembly conference, as well as other community gatherings, such as the annual Grade 12 graduation ceremony. Public health activities held in the gym include retinal screening and the recent H1N1 mass vaccinations (CNP 2010c). The fire aggravated lack of space and community access issues related to the use of the school for both education and community programming. The length of time for repairs resulted in the closure of the school between April 2010 and November 2010, which resulted in students missing school for a considerable time as there is little alternative space. Eventually, the high school students were housed at the TCN Regional Training Centre and the elementary students were transferred to multiple locations including the Band office, the Keeyask office, the youth centre, the church, the day care centre and the TCN Arena (CNP *pers. comm.* 2011).

The Tataskweyak Education Authority is the responsible agency for delivering the K-12 education to the community. The Authority has a full-time staff of four, including a director, to deliver community education services. The Education Authority follows the provincial curriculum, and has developed culturally sensitive and protective outreach programs for children and youth. Other responsibilities of the Education Authority include finance administration, home school programming for families, off-reserve high school placements, and coordinating post-secondary education needs for community Members (CNP 2010c).

Split Lake also has The University College of the North Regional Centre located about 5 km outside of the community. The Centre acts as a liaison between the University College of the North, enrolled students and on-reserve Members seeking post-secondary training. In 2010, there were 16 TCN Members enrolled in the Recreation Leadership Program and five Members enrolled in the Facilities Technician Program. Staffed by local and visiting instructors, the Centre offers various construction and trades training programs. The Centre is being managed by a full-time regional coordinator. At the time of writing, funding was being sought to continue post-secondary training (CNP 2010c; CNP *pers. comm.* 2012).

Childcare

The Tataskweyak Cree Nation Headstart/Day Care Centre was opened in 1997 and is funded by the Health Canada Headstart On-Reserve Program. The director and six full-time employees are responsible for caring for approximately 30 children, of which less than 10 are infants. Services include basic health

care, meals and early childhood education activities, including reading and writing exercises. At the time of writing, the Day care Centre was operating at capacity, and could not accept more children or hire additional staff due to funding constraints. There were 16 infants on the waiting list. Day care equipment was also in need of upgrading (CNP 2010c). Currently, limited available childcare affects those families that may wish to pursue local employment opportunities.

Health and Social Services

It should be noted that in terms of healthcare services, the 1964 Memorandum of Agreement between the Department of National Health and Welfare (federal) and the Manitoba Department of Health (provincial) stipulated the shared provision of health care services by these two levels of government to select northern Manitoba communities, including fiscal responsibility for transportation of staff and patients between health centres. Split Lake is covered by the federal government in terms of "clinical and public health services in the field" (Memorandum of Agreement 1964).

The community has a 15-unit elderly person home that currently houses 16 Elders. Five full-time shift workers provide 24-hour caretaking, meals and maintenance services. There is an additional unit at the home for a staff member. At the time of writing, the home was at capacity and required upgrades (CNP 2010c).

The John Wavey Health Centre opened in February 2009 as a replacement for the former nursing station. The Health Centre has a dedicated unit for emergency patients, a pharmacy, a kitchen, accommodations, a small meeting room and facilities used for visiting health professionals, public health education and health promotion. The facility is operated through Health Canada's First Nations and Inuit Health Branch and has more than 12 staff, including a director, five full-time public health nurses, support staff, and a full-time dispatcher for coordinating Medi-Vac and ambulance transportation. A new nurses residence was recently completed to house portions of the staff (CNP 2010c; CNP *pers. comm.* 2011).

In general, residents are concerned with the community's capacity to deal with increasing diabetes rates and has "stated there was a desperate need for more health facilities and space for workshops to promote healthy lifestyles to combat this trend, in addition to a long-term plan for in-community dialysis and diabetes treatment" (CNP 2010c). The rate of incidence of diabetes and other current health issues are discussed further in the Section 5.3.2, Community Health.

Funded through a contribution agreement with Health Canada, TCN provides a number of health services to its Members, including Brighter Futures Initiative, Canadian Pre-Natal Nutritional Program, Fetal Alcohol Syndrome/Fetal Alcohol Effects Initiative, Aboriginal Diabetes Initiative, Building Healthy Communities, National Native Addictions Drug and Alcohol Program (NNADAP) and Home Care Services (CNP 2010c).

Community and family well-being is promoted through a number of public education and awareness programs, including Youth Healthy Living Education and Awareness, Smoking Cessation Program, Fetal Alcohol Syndrome/Fetal Alcohol Effects Initiative, Health Food Coupon Program, Breast Feeding Education, Aboriginal Mental Health, Aboriginal Youth Suicide, Violence Against Women and Domestic Violence Education and Awareness and Counselling for Residential School Experiences. The community hall and youth centre provide a space for program delivery which usually take the form of workshops or

meetings. Alternatively, programs are also provided through one-on-one monitoring and counselling. A mental health therapist visits TCN once a month to provide support, and Building Healthy Communities and NNADAP workers provide referrals to external therapists and addictions programs. The community's whole health team monitors levels of drug and alcohol abuse, domestic violence and self-injury behaviour (CNP 2010c).

Three Community Health Representatives provide assistance to community Members in coordinating appointments with First Nations and Inuit Health Branch nurses and public health service outside the community, delivering home and community care services and also assist in the delivery of public education and awareness programs. Vans designated for medical travel transport Members to appointments with specialists in neighbouring regional centres such as Thompson (CNP 2010c).

The Community Health Representative home care services provide support concerning infant care, nutritional awareness, physical activities and diabetes control programs as well as other Health Canada initiatives. First Nations and Inuit Health Branch's public health team works in conjunction with the Community Health Representatives to deliver primary and emergency care in Split Lake, including a weekly diabetes clinic (CNP 2010c).

Community Members have expressed concern that Split Lake needs between two and three additional NNADAP workers (at the time of writing Split Lake had one NNADAP worker) to deal with community substance abuse, as well as a substance abuse treatment program located in the community. Community facilities and services are described as "inadequate and greatly underfunded", with upwards of 60% of Members traveling to Thompson and 40% to Winnipeg to obtain treatment for diabetes and to access primary care services, such as dentistry and midwifery. Staff retention, especially First Nations and Inuit Health Branch public health nurses, is a concern, as is coordination between the various health agencies and programs (CNP 2010c).

Social Services

Two full-time social development workers and one membership clerk, who work and report to Chief and Council, are responsible for the delivery of income assistance services such as income assistance, employment and disability insurance, and Indian registry and Treaty payments. To achieve the long-term goal of full employment of the on-reserve workforce, TCN is working with a Thompson-based independent economic development advisor (CNP 2010c).

Split Lake's social services also include the Awasis Child and Family Services Agency which has been operating in the community since 1990. A Unit supervisor and eight full-time workers follow the mandate of the Government of Manitoba for the delivery of family protection services, which includes foster care, while working within the rules and framework of established by Tataskweyak Cree Nation. Community Members expressed concern over increasing substance abuse resulting in more Awasis interventions and placement of children in foster care. Coordination between Awasis, NNADAP and other social services was identified as being very important (CNP 2010c).

TCN has also recently developed community outreach programs. One of these, the Troy Lake Summer Day Camp Program, has operated each summer since 2006 and focuses on empowering youth and strengthening community cohesion through traditional pursuits. This program has been funded by

Manitoba Hydro; however, continued funding is not guaranteed. Approximately 100 children and youth aged 7-14 participate annually over a four- to six-week period (CNP 2010c).

Multi-year funding for the Tataskweyak Cree Nation Ooskahtisuk Club Project was recently approved by Public Safety Canada. The project is designed to reduce substance abuse and anti-social behaviours among children/youth and is expected to encourage community cohesion by strengthening intergenerational exchanges between Elders, parents and children/youth; teaching skills and appreciation for traditional pursuits; and promoting a strong understanding of cultural history and tradition (CNP 2010c).

The community also receives social, spiritual and emotional support through the St. John Baptist parish, including such programs as the Diocese of Keewatin Cross-Cultural Canoe Experience and Bible Camp (CNP 2010c).

Recreation

The Tataskweyak Trust Secretariat is responsible for administering cultural and recreational programs and institutions, including the Youth Centre and TMC Arena which was funded by the Tataskweyak Trust Secretariat. Built in 2005, the Youth Centre was established as a space to host sports and cultural activities for youth; however, the facility is currently vacant and requires major repairs to its flooring. At the time of writing, the Youth Centre had not been fully staffed for two years, and programming responsibilities rested with the one full-time recreation director. The director is assisted by a 10-member recreation committee to plan, develop and administer recreational programming in Split Lake. TCN would like to have two full-time and two part-time staff involved in recreational programming. The following major events are planned by the recreation committee: Winter Festival, Indian Treaty Days and Troy Lake Summer Day Camp (CNP 2010c).

The TMC Arena, built in the mid-1990s, is a multi-purpose facility that houses a hockey rink and skate-sharpening services, an equipment shop, a floor hockey and fitness area, indoor volleyball courts, video lottery terminals and a canteen. The arena is used for training workshops and also has an outdoor baseball diamond for use in the summer months. Operation and maintenance of the arena are provided by the Tataskweyak Trust, which is also responsible for the delivery of community youth activity programs (*e.g.*, sports tournaments). The arena is staffed with a full-time manager, two full-time maintenance workers, part-time security personnel, and a seasonal ice maintenance crew. A hockey league with over 400 participants is run by the recreation director and arena manager. The recreation director is also responsible for running the volleyball league and roller blade events in the summer months, when the arena is converted to summer time use (CNP 2010c).

Some community Members suggested that better funded recreation programs could help reduce poor behaviour among youth, and improve general community health through physical activity, cultural strengthening and better lifestyle choices. One suggestion was to initiate a canoe club; other suggestions included improved access to traditional pursuits (CNP 2010c).

The Tataskweyak Education Authority provides extra-curricular activities for children and youth, including a square dance club, after-school sports (such as badminton, basketball and cross-country skiing), and other programs, including art, music, woodworking and scholastic competitions in math and

science. High school intramural sports include volleyball, basketball, soccer and track and field. Programs available to adults include weight loss and tai chi (CNP 2010c).

Offset Programs identified in TCN's Adverse Effects Agreement (AEA), which encourage greater outdoor physical activity through traditional pursuits in the bush, are managed by the Tataskweyak Future Development Program (CNP 2010c).

The TCN Gaming Commission owns and manages the video lottery terminals located in the arena and the hotel. Video lottery terminal revenues are retained for community improvements. The Gaming Commission, with a full-time staff of six, is also responsible for organizing bingo nights and community events, such as the annual fishing derby on Split Lake (CNP 2010c).

Other Services

The Band office was constructed in 1990. The office was recently upgraded and houses many of TCN's government services and public service employees. Community programs, institutions and processes including culture and recreation, home care, commercial and domestic resource use, housing construction and renovation and the TMC Arena are administered through the Band Office (CNP 2010c).

TCN's Band hall is the hub of the community, housing Membership meetings, cultural festivals and other informational sessions. The radio station is also operating out of this facility (CNP 2010c).

Construction is set to begin on the Keeyask Centre, an 8,000 square foot building which will provide facilities for the administration of the Offsetting Programs, such as the Healthy Food Fish Program and the Spring and Fall Access Programs (described further in Section 4.4.1.3). The project will be funded through the Keeyask AEA (TCN 2011).

The St. John the Baptist Anglican Church opened in 2009 after the original Church burnt down in 2006. Six ordained priests and eight lay readers serve the community and report to the Diocese of Keewatin. The church now features a new organ and piano for the TCN Junior Church Choir and an active Women's Auxiliary Group provides many community services (CNP 2010c).

WAR LAKE FIRST NATION

As indicated in Section 2, Historical Context, WLFN and the Ilford Community have been closely linked for many years. Services are shared between the Ilford Community and the WLFN reserve, with responsibilities for delivery and maintenance either jointly shared (as is the case for the roads) or managed by one group for the benefit of both (as is the case for the water and sewage treatment plant).

Water and Sewer Services

The fresh water source for the Town of Ilford is Moosenose Lake. Water is pumped from the lake, chlorinated and delivered to two standpipes for use by community residents. The water treatment plant was built in the early 1990s to serve approximately 25 households and all public facilities in the community. The water system is prone to issues, particularly in the winter when intake freezing at Moosenose Lake and air locked lines can occur (CNP 2010f).

Sewage is disinfected using a UV light system at a community sewage plant that was installed in 1994. This system was intended to serve 25 families with some capacity for growth.

In March 2009, the Government of Canada announced funding for upgrades to the existing water and sewage treatment plants to address the community's current and future needs (Government of Canada n.d.). Construction has since been completed in 2011 and the plant is being operated according to INAC's standards. Currently, the Ilford Community's public works department operates the plant, employing WLFN Members as the plant operator (full-time) and technician (part-time). Responsibility for water and sewer services is expected to be transferred to WLFN (CNP 2010f). Plans are also in place for a new sewage lagoon; however, no funding has been allocated at time of writing (CNP *pers. comm.* 2011).

Landfill

A new landfill site was selected in 2008, approximately 8 km from Ilford. The new site has over ten separate garbage deposit areas, each handling approximately 20 tonnes of garbage. The old site continues to be used for scrap metal. Garbage pick-up is twice weekly. At the time of writing, there was no recycling program, although WLFN has expressed an interest in having one (CNP 2010f).

Utilities

Manitoba Hydro provides electricity to Ilford and WLFN, serviced through Gillam. MTS provides individual line service and digital switching, with toll-free calling to Gillam and Split Lake. High-speed internet was recently provided by Northstream Communications, a TCN-owned business, to all WLFN facilities and about 80% of the homes. Costs for this service are considerably higher than for Manitoba's urban businesses and residences in major centres (CNP 2010f).

Since reception improvements were made out of Thompson in 2003, radio reception in the community includes CBC Radio 1 and 2, CHTM out of Thompson and NCI Radio. Most Members (about 80% of homes) rely on satellite television, with most subscribing to Bell Satellite TV, Shaw or Star Choice systems (CNP 2010f).

Fire and Ambulance

The community relies on the Ilford Community Council, which is responsible for fire-fighting. Ilford has a fire hall and volunteer fire-fighting staff. Fire-fighting capability includes a well-equipped pumper truck from the community fire hall and portable forestry equipment for grass and brush fires. Medi-Vac services are available through the Ilford airport and are coordinated by the Ilford Community Health Centre (CNP 2010f).

Policing

A community-based Band constable works closely with the RCMP Gillam Detachment. The Band constable is responsible for routine patrols and takes occasional emergency calls (primarily domestic disturbances). WLFN previously employed two Band constables and at the time of writing, were investigating funding programs to restore the additional position. The RCMP detachment provides once-

a-month visits and is on-call for emergencies. It often takes two hours to respond to an emergency call. The RCMP provides some youth focused initiatives through the Julie Lindal Public School, however the community is not involved in any of the RCMP's Crime Prevention, Restorative Justice and Alternative Justice Programs (CNP 2010f; CNP *pers. comm.* 2011).

Education

The Mooseocoot Education Authority manages and administers education for WLFN Members on-reserve attending Julie Lindal Public School. The nursery to grade eight school is located in Ilford and falls under the jurisdiction of the Frontier School Division. The school is staffed by a principal, one teacher and three support staff and is equipped with four classrooms that can each accommodate 15 students, a library, a gymnasium and a playground. The school uses mixed grade classes by subject for grades one to eight and serves approximately 25 students annually. There were 25 children enrolled in the 2009/2010 school year (CNP 2010f). Students must leave the community to attend high school and often go to communities such as Thompson or Gillam. The school has sufficient capacity to accommodate population growth. WLFN Members expressed interest in having a high school program located in the community (CNP 2010f).

The War Lake First Nation Band Office is also equipped with a boardroom with computers that is available for adult education programs (CNP 2010f).

Childcare

The WLFN Day Care Centre was re-opened in 2009 in response to an increase in the number of WLFN Members undergoing training or working outside the community and is operating at capacity. The Day Care Centre is funded through the Aboriginal Human Resources Development Agreement and operates through the Band office. The Day Care Centre employs two full-time childcare workers and one part-time assistant and can care for up to five children at a time (infant to toddler) (CNP 2010f).

Health and Social Services

As previously noted, the 1964 Memorandum of Agreement between the Department of National Health and Welfare (federal) and the Manitoba Department of Health (provincial) stipulated the shared provision of health care services by these two levels of government to select northern Manitoba communities (including fiscal responsibility for transportation of staff and patients between health centres). Iflord (and therefore WLFN Members residing at Ilford) is covered by the province in terms of "clinical and public health services in the field" (Memorandum of Agreement 1964).

The 275 m² Ilford Community Health Centre was opened in November 2007. The facility includes two patient examination rooms, sleeping accommodations for visiting physicians and health providers, secure supply storage areas and wheelchair access. The facility is run by the BRHA and funded by the Province with primary medical care provided by a public health nurse. The public health nurse is responsible for providing blood work and attending to IV lines as required, as well as administering medications and mental health referrals. A physician is scheduled to visit the community once every three weeks, although the schedule can vary due to weather conditions and transportation challenges. The community has

noticed an improvement in basic, primary and emergency health care since the opening of the new health centre (CNP 2010f).

The First Nation provides a number of health services funded under a contribution agreement with First Nations and Inuit Health Branch and coordinated by the WLFN health director who is supported by three Community Health Representatives. Programs offered through the Health Centre include the Brighter Futures Initiative, Building Healthy Communities, Canadian Pre-natal Nutrition Program, NNADAP and the Home and Community Care Services, which focuses on caring for Elders. Counselling services are also provided, although the community recently stopped having a mental health worker from Gillam come to visit. Efforts are underway to start a mental health healing circle. The NNADAP worker provides counselling for drug and alcohol use, residential school victim support and victims of spousal abuse. There is a safe-house for women experiencing domestic violence (CNP 2010f).

Social Services

A social development worker and an education and training coordinator deliver social services under the direction of the Band Chief and Council. Primary responsibilities include social income assistance, employment assistance, disability assistance, Indian registry and Treaty payments, job search services, training placement and educational upgrade coordination. The First Nation also provides specific community outreach programs, such as the Healing to Build Family and Community Project, a multi-year program that ended March 31, 2010, which had been funded by the Aboriginal Healing Foundation (CNP 2010f).

The Northern Lights Place of Learning Centre, opened in 1997, was previously owned and operated by the Awasis Child and Family Services Agency. The facility features a training room, breakout session rooms, a dining room and overnight accommodations. WLFN has recently taken over operation of the building, to be used as a fitness facility and as lodging for contractors and guests. The community can now accommodate approximately 25 guests: six at the trailer, 15 at the Learning Centre, and four at the Lodge (CNP 2010f; CNP *pers. comm.* 2011).

Recreation

The community's Laliberty Memorial Centre was built in 2008 as a multi-purpose, 278.7 m² community hall that is used for community meetings and feasts, weddings, funerals, indoor sports and other recreation activities. The Centre is equipped with a large kitchen. The Mooseocoot Education Authority is involved with planning youth-focused recreational activities and events. Most activities and events take place in either the school gym or the Laliberty Memorial Centre (CNP 2010f).

Recreational programming is the responsibility of a five-member committee that reports to Chief and Council. Youth-focused recreational programs and associated infrastructure are key concerns for WLFN. There is a ballpark (outdoor baseball diamond); however, the portable ice rink installed previously had to be dismantled due to maintenance problems. The Recreation Committee is currently pursuing funding for an arena/ice rink and a youth drop-in centre to address the need for more youth-oriented facilities. The Mooseocoot Education Authority is also involved in youth-focused recreational activities and events (CNP 2010f).

WLFN holds annual community events including a winter carnival, Indian Days Summer Festival and a pike fishing derby, the latter being a community fundraising event for adults and children. Approximately 70 fishermen participate annually. The Summer Festival is focused on youth and is generally well attended by community families for such activities as foot and canoe races, arm and leg wrestling, archery and square dancing. Other sports and cultural activities are held at the school, including badminton, floor hockey, trap setting, archery and fiddling (CNP 2010f).

Other Services

In April 2010, WLFN opened an on-reserve convenience store and gas bar facility called the Mooseocoot Convenience Store and Gas Bar that offers groceries, confectionery items, fast foods, gas and diesel fuel. The facility also houses Video lottery terminals, a coffee area, game tables, and a one-bedroom on-site house that is planned to be a part of a future motel complex (CNP 2010f).

4.3.3.1.2 Fox Lake Cree Nation

The following information on infrastructure and services relates to FLCN's on-reserve community at Fox Lake (Bird). Information related to infrastructure and services accessed by FLCN Members living in either Fox Lake (Bird) or Gillam has been included under Section 4.3.3.2 on Gillam. As a part of their AEA, FLCN intends to address some of its immediate infrastructure needs in both locations (Neepin *pers. comm.* 2011).

Water and Sewer Services

The on-reserve community at Fox Lake (Bird) obtains its water from the Nelson River and since 2006, a water treatment plant has been treating the community's drinking water. The plant filters and chemically treats the water and has the ability to supply clean drinking water for up to 500 people. Overall, the water treatment system is in good working order and, based on INAC and Health Canada estimates of FLCN population living on-reserve or on Crown land at Fox Lake (Bird) at approximately 270 people, the system has the ability to accommodate growth in the population (FLCN KPI Program 2009-2011).

All homes and buildings in the community are serviced by a sewer line and a mechanical aeration system is used to treat wastewater. No sewage lagoon or sludge bed is available in the community, so all heavy sludge is transported to Gillam. Upgraded in 2004, the sewage treatment system in Fox Lake (Bird) can serve approximately 60 homes and is operating at capacity; therefore, it cannot accommodate an increase in population. The existing system requires a major upgrade to adequately serve the community. At the time of writing, a proposal for an upgrade of the system was being prepared (FLCN KPI Program 2009-2011).

Landfill

Garbage pick-up in the community of Fox Lake (Bird) occurs three times per week. The existing landfill, located approximately 2 km from the community, is already operating at capacity and the community has plans underway for a new landfill site within the next five to ten years (FLCN KPI Program 2009-2011).

Utilities

Manitoba Hydro provides electricity and Manitoba Telecom Services provides telephone service to the on-reserve community of Fox Lake (Bird). Residential internet access is via no-charge dial-in service.

Fire and Ambulance

In the past, a volunteer Fire Department operated in the community of Fox Lake (Bird). However, due to a shortage of funding, inadequate equipment and an apparent lack of interest, the program has been inactive for several years. Fire and ambulance services are currently provided by the Town of Gillam (FLCN KPI Program 2009-2011).

Policing

The community of Fox Lake (Bird) has one Band constable for community policing. The Band constable reports to the Chief and Council and is responsible for alcohol, drug and curfew enforcement, and keeping the peace. The community also relies on the Gillam RCMP detachment, which is called upon for more serious matters. It was noted that there is a positive working relationship between the Band constable and the Gillam RCMP detachment (FLCN KPI Program 2009-2011).

FLCN has identified a need for additional support staff, particularly a female Band officer who can search female suspects. FLCN has also indicated that additional funding and staff are needed for the Band constable to adequately provide services to the existing population. Any growth in the population would place additional stress on community policing efforts (FLCN KPI Program 2009-2011).

Education

The Fox Lake School in Fox Lake (Bird) opened in September 2005, replacing the portable classrooms previously used. The 1,468 m^2 kindergarten to grade eight school has three classrooms, a computer room, a library, a kitchen, and a full-size gymnasium, as well as 432 m^2 of living space for teachers. At present, the school has 10 full-time staff including eight educators and two administrative staff. Recruiting and retaining teaching staff remains a key challenge, primarily due to salaries and housing. At the time of writing, 29 students were enrolled in the school; however, the school had capacity for another 30 students. Some families choose to send their children to the Gillam School rather than the Fox Lake School in Fox Lake (Bird). After grade eight, students must attend school elsewhere, with the majority of students attending school in Gillam. Students are bussed into Gillam on a daily basis to attend the Gillam School (FLCN KPI Program 2009-2011).

There is a home school coordinator who acts as a liaison among the students, parents and school and provides services and resources for special needs students. The coordinator also makes home visits and coordinates a number of other school-related functions. In fall 2009, the home school coordinator was responsible for 120 students attending school in both Fox Lake (Bird) and Gillam (FLCN KPI Program 2009-2011).

Childcare

A day care program associated with the Adult Education Program at the Fox Lake School was provided for one year (2007-2008); however, the day care program was unable to continue due to a lack of funding. The First Nation is currently discussing options to provide day care services in both Fox Lake (Bird) and Gillam and is seeking a qualified early childhood educator (FLCN KPI Program 2009-2011). Any population growth would exacerbate the shortage of childcare services in Fox Lake.

Health and Social Services

As previously noted, that in terms of healthcare services, the 1964 Memorandum of Agreement between the Department of National Health and Welfare (federal) and the Manitoba Department of Health (provincial) stipulated the shared provision of health care services by these two levels of government to select northern Manitoba communities (including fiscal responsibility for transportation of staff and patients between health centres). Fox Lake (Bird) and Gillam are covered by the province in terms of "clinical and public health services in the field" (Memorandum of Agreement 1964). Further information as it relates to FLCN concerns regarding this arrangement are provided in Section 5.3.2, Community Health.

Fox Lake (Bird) does not have a full nursing station but does have a community health centre. The health centre is over 20 years old; during the community-based research program, staff noted that plans for a new nursing station are part of FLCN's 20-year capital development plan. However, FLCN indicated frustration in dealing with the various levels of government that are responsible for funding infrastructure, health services and programming in the community as delays and lack of progress are common issues.

FLCN Members use the Gillam Hospital when in need of primary health care. It was noted that having FLCN Members in Fox Lake (Bird) use their local community health services instead of traveling to Gillam was also a challenge. This is because the health centre can only provide some basic services including access information, transportation for medical appointments, and provision of a home care nurse for clients with a Community Health Representative worker. At the heath centre, a community health program is in place that focuses on health education and outreach. In addition, a nurse provides wound care, changes bandages, helps people with their medication and does checkups (FLCN KPI Program 2009-2011).

Health services provided through the program include the NNADAP, Building Healthy Communities and Brighter Futures programs. The NNADAP program is in need of additional supports to help manage the caseload and there are plans to expand in the near future. The community health program also provides services associated with other aspects of community health, mental health, medical transportation (for Members requiring help getting to Gillam for medical reasons), diabetes and pre-natal classes, support for Fetal Alcohol Syndrome, home care and others.

Recruitment and retention of nursing staff is a challenge for the community health program at Fox Lake (Bird) and, as of spring 2011, the program was operating with one nurse on a two-weeks in/two-weeks

out rotation. The community is hoping that one of their own Members will pursue education in the health field to fill the gap in the long-term.

The Gillam office of the Awasis Agency of northern Manitoba provides child and family services to FLCN Members living in Fox Lake (Bird) as well as Gillam. As noted in Section 4.3.3.2, Awasis provides education, prevention and crisis response/protection relating to family issues in the community, as well as foster care for children in need. Awasis also works with other programs such as NNADAP, Brighter Futures, Building Healthy Communities, the RCMP and the school. For further details on Awasis and other health and social services available to FLCN Members living in Fox Lake (Bird) and/or Gillam, please see Section 4.3.3.2.

Other than the identified need of a nursing station, community Members would like to have an independent living facility built for Elders with a nurse on staff. Elders don't want to move to Gillam, but there is no assisted living in Fox Lake (Bird). Fox Lake (Bird) is where their family is; however, some Elders need to have access to 24-hour care while living independently (FLCN KPI Program 2009-2011).

It has been noted that outdoor pursuits, including fishing, boating, canoeing, snowmobiling, hunting and swimming are enjoyed by youth and other Members of the community. While there are currently no dedicated recreation facilities at Fox Lake (Bird), the school is often used throughout the year for community activities. For example, Treaty Days, sports nights and community feasts have been held at the school in past years, along with non-school meetings. The drop-in centre is no longer able to be used as a facility for youth to get together. Youth in the community have expressed a need for more facilities and recreational opportunities and activities at Fox Lake (Bird.) This was echoed during the community-based research program where it was noted that a facility for kids' recreation would go a long way to improving overall health in the community (FLCN KPI Program 2009-2011). Recently, FLCN has held a spring Goose Camp for the past five years and in 2011 a Moose Camp of one week was held (FLCN KPI Program 2009-2011).

FLCN Members attend various events and activities in Gillam, including bingo nights. Gillam's Recreation Centre and the Nelson River Aquatic Centre are also utilized by some Members, including the youth drop-in centre, although concerns have been raised regarding barriers to their involvement (for example, user fees, the need and cost for the hour's one-way travel from Fox Lake (Bird) to Gillam, and in the case of the drop-in centre, irregular hours) (FLCN KPI Program 2009-2011).

4.3.3.1.3 York Factory First Nation

WATER AND SEWER SERVICES

The community draws its potable water from the channel on Split Lake where the Aiken and Nelson rivers meet. The water is then treated in a chemical water treatment system that was built in 1997 and piped throughout the community to each home and to other buildings. A second source of potable water treated by a reverse osmosis system is available through faucets located at the water treatment plant where individuals can fill their own containers with water. This alternate source of water is preferred for drinking and cooking (YFFN KPI Program 2009-2010).

The current water treatment system has four underground reservoirs that can hold 600,000 litres of water. The existing water treatment system is complex, complicated by seasonal shifts in the mixing point of water from Slit Lake and the Aiken River. Some of the electrical components and system piping need upgrading. At the time of writing, there were plans to expand the physical size of the water treatment plant to accommodate larger tanks, although there was still capacity for an additional 15 to 25 housing units (YFFN KPI Program 2009-2010).

Despite the use of the water treatment system, water quality is a major ongoing concern in the community. Individuals have strong concerns about the odour, taste, colour and health effects of the water, as well as the frequent boil water advisories (YFFN 2010). There are also concerns about skin rashes and itchy skin believed to be caused by the water supply. The same types of concerns are noted by individuals who swim near the community (YFFN KPI Program 2009-2010).

To handle sewage disposal, the community uses a lagoon system, built in 1998, with a series of lift-stations and pumps. The lift-stations are operated manually, since the electrical system related to the lift-stations requires repair. Two sewage pumper trucks are used in the community to move the sewage from the lift-stations to the sewage lagoon. Samples from the sewage lagoon are sent to Environment Canada for testing in order to determine when the processed fluid can be discharged into the lake (YFFN KPI Program 2009-2010). The sewage lagoon has been able to accommodate growth in the community to date and is expected to be able to handle modest future growth. Some concerns were expressed that the primary cell is inadequate to accommodate additional community growth. However, expansion of the primary cell could give the community an additional 20 years of service (YFFN KPI Program 2009-2010).

LANDFILL

The landfill site is located 2 km west of the community. There is garbage pickup every second day (three times per week). At the time of writing, the capacity of the landfill was exceeded and could not meet existing community needs. In addition, the current site does not meet existing guidelines because it is too close to the community, the lake and the airport. Discussions with INAC have been ongoing about building a new landfill site, but no location had been determined at the time of writing[1] (YFFN KPI Program 2009-2010).

There is no recycling program in the community. A recycling program was implemented in the past, but was discontinued due to storage concerns and the high cost of transporting material to market (YFFN KPI Program 2009-2010).

UTILITIES

Manitoba Telecom Services provides single and party line telephone access, as well as no-charge dial-in internet service. Wireless internet is available in public community buildings, including the Future

[1] Information provided through a key person interview suggested that a potential location for the next landfill site would be between York Landing (Kawechiwasik) and Ilford if the communities are connected by an all-weather road sometime in the future (YFFN KPI Program 2009-2010).

Development office, the school, arena and Band Office. Manitoba Telecom Services also provides other special communication services if required (YFFN Future Development 2010).

York Landing (*Kawechiwasik*) has a local satellite TV system that services the community. The system consists of 12 channels, one being a community channel. The community channel is used for local communication of events and other special services offered by the community. Many households also have Global satellite TV. The local radio station, CHYL 93.5 FM, has a broadcast range of 10 to 15 miles, but is not currently operating. The Canadian Broadcasting Corporation (CBC) broadcasts from Winnipeg on local channel 10, via a microwave tower located 14 miles east of the community (YFFN KPI Program 2009-2010).

FIRE AND AMBULANCE

YFFN has a fire hall, fire truck and associated equipment. There is a volunteer firefighter crew with trained Members in the community[1].

Funding was previously made available through the Kitche-Waskahigan Trust, but within the last three years, funding for a fire fighting program was not available. The department is described as severely underfunded and much of the equipment is in need of repair or replacement (YFFN KPI Program 2009-2010).

No ambulance service is provided in York Landing (*Kawechiwasik*). In the case that emergency medical attention is required, patients are flown by Medi-Vac to Thompson or Winnipeg (YFFN KPI Program 2009-2010).

POLICING

The Band Constable program has six constables providing services in York Landing (*Kawechiwasik*), with two or three on duty at all times. The RCMP has a small facility in York Landing (*Kawechiwasik*) that is used when officers are visiting the community. The facility has two holding cells (YFFN KPI Program 2009-2010).

EDUCATION

The nursery to grade eight George Saunders Memorial School had 115 students registered in the fall of 2009. The school has five classroom teachers, one physical education/computer teacher, one resource teacher, one principal, one home school coordinator, eight teacher assistants, two custodians, one facility technician and one bus driver; all employees work full-time. Students leave the community for high school, with many going to Thompson or Cranberry Portage (YFFN KPI Program 2009-2010).

It is felt that the school is close to capacity with the current student population. There is need for additional space for a science lab and more space for a larger computer lab (YFFN KPI Program 2009-2010). The school is also used for large community events such as funerals and large-group

[1] Information provided through key person interviews suggested there were six to ten trained firefighters in the community.

meetings. In the winter of 2009/2010, the school was closed for a prolonged period due to flooding; however, it is now back in full operation (YFFN KPI Program 2009-2010; YFFN *pers. comm.* 2011).

The Learning Institute provided adult education upgrading and post-secondary training in York Landing (*Kawechiwasik*). This program was funded by the Hydro Northern Training and Employment Initiative until March 31, 2010 when the funding ended (YFFN KPI Program 2009-2010). Currently, the Learning Institute continues to coordinate training under Band funding (YFFN *pers. comm.* 2011*)*. The facilities include two video-conferencing rooms, three classrooms, one computer lab and a number of offices. When the building has required maintenance, students in the training programs have been used to make repairs in order to give them hands-on skill development opportunities (YFFN KPI Program 2009-2010). Due to a fire at the Band office, the Learning Institute is currently also used as the Band administration office (YFFN *pers. comm.* 2011*)*.

CHILDCARE

YFFN operates a childcare program through YFFN Childcare Inc., which shares a building with the Awasis Agency of Northern Manitoba. The day care looks after children aged six months to seven years and has 27 spaces for the Head Start Program and five spaces for children aged six months to one year who require day care services. All of the spaces are typically filled and, in the last two years, the numbers have increased slightly. At present, there is a waiting list and, for those children who are not able to get into the day care, the only alternative is for family members to look after them. At the time of writing, there were five early childcare workers on staff, however, not all had Early Childhood Education training. In the past, it has been a challenge to maintain an appropriate worker-to-child ratio and it has sometimes been difficult to find people qualified to work at the day care. The cost of the day care is also prohibitive for some families (YFFN KPI Program 2009-2010; YFFN Future Development 2010).

HEALTH AND SOCIAL SERVICES

As previously noted, the 1964 Memorandum of Agreement between the Department of National Health and Welfare (federal) and the Manitoba Department of Health (provincial) stipulated the shared provision of health care services by these two levels of government to select northern Manitoba communities (including fiscal responsibility for transportation of staff and patients between health centres). York Landing (*Kawechiwasik*) is covered by the federal government in terms of "clinical and public health services in the field" (Memorandum of Agreement 1964).

York Landing (*Kawechiwasik*)'s new nursing station opened in late 2009, with greater space to provide medical services to the community. Due to the small population and isolated location of York Landing (*Kawechiwasik*), the limited health services available include a nurse-in-charge and one other registered nurse in residence at the facility. Doctors, dentists and mental health workers visit the community one or two times per month for three to four days at a time.

Thompson is one centre that YFFN Members have a heavy reliance on in terms of health and social services. For illnesses of a more urgent nature, community Members are flown by Medi-Vac to either Thompson or Winnipeg. A paid ticket on Greyhound Bus Lines (11.5 hours one-way) is provided for non-urgent appointments requiring travel to Winnipeg, including specialized procedures and

appointments. Community Members have expressed concern regarding the overall limited nature of health services within their community, as well as with challenges with accessing services outside of the community, particularly Thompson. These issues are related to lodging, transportation to and from appointments, escorts for the elderly, the need for pregnant women to travel to Thompson to give birth and translation services, particularly for the Elders (YFFN KPI Program 2009-2010; YFFN *pers. comm.* 2011*)*.

Concerns expressed by community Members noted that the quality of care varied among health care providers who visit the community. Delays in treatment between a nursing station visit and the resulting appointment with a specialist were noted, and a concern was expressed that this meant people could become sicker during the waiting period (YFFN KPI Program 2009-2010).

YFFN has a Community Health Representative who works with the staff at the York Landing Nursing Station. The community also has a number of health-related programs delivered in York Landing (*Kawechiwasik*), including the NNADAP, Brighter Futures Initiative, Tuberculosis Program, residential school counselling, sexual abuse support and an optometrist who visits the school; however, these programs are not consistently funded and/or operational (YFFN KPI Program 2009-2010). Awasis Agency of Northern Manitoba has an office in York Landing (*Kawechiwasik*), sharing the building that houses the YFFN Childcare Inc. Program.

The Band office deals with requests for other services, such as bringing in people to offer cultural/traditional healing and spirituality programs. Funding for health-related facilities and services are provided by First Nation and Inuit Health, a department of Health Canada (YFFN KPI Program 2009-2010).

RECREATION

There are limited recreation services and facilities in the community. The *(Kawechiwasik)* Mochikikamik Arena, completed in August 1998, has a regulation indoor hockey rink. The arena, complete with a concession stand, provides recreation year round since it can also be used for indoor functions in the summer. The arena has artificial ice and a zamboni for ice maintenance. In 2009, six video lottery terminal machines were installed in the lobby area (YFFN KPI Program 2009-2010).

Recreation facilities at the school include a gymnasium, baseball diamond, basketball court, playground equipment and a quarter-mile oval track. Outdoor recreation equipment in the community is managed and supervised by the recreation coordinator who also provides programming for young people; however, the position was vacant in the fall of 2009. In the past, the community has also offered recreation programming that included taking youth to Thompson to use the swimming pool. In the past, families would use the local beaches for swimming and family get-togethers; however, due to fluctuating water levels and shoreline erosion, community Members noted their concern over the loss of community beaches, particularly Sandy Beach on the west side of the community. This activity is no longer available (YFFN KPI Program 2009-2010; YFFN 2010). A more detailed discussion is noted in the YFFN Evaluation Report *Kipekiskwaywinan*.

Considerable concern was expressed by both youth and adults about the lack of recreational opportunities for young people, contributing to a number of youth-related issues in the community (YFFN KPI Program 2009-2010).

OTHER SERVICES

The YFFN Band office was lost to fire in January 2011; it was the primary office facility for all YFFN administrative functions. As noted above, the administration office has been transferred to the York Factory Learning Institute. Additional planning and Manitoba Hydro-related negotiations are managed through the Future Development office in a separate facility (YFFN KPI Program 2009-2010; YFFN *pers. comm.* 2011).

4.3.3.2 Gillam

The Town of Gillam is the location of Manitoba Hydro's northern operations. The Town is located in FLCN's traditional territory and is the home to many Members of FLCN. FLCN Members live both on the A Kwis Ki Mahka Reserve and on other lands within Gillam's boundaries. Facilities and services provided to the residents of the Town of Gillam also apply to FLCN Members, some of which are covered under the Municipal Services Agreement discussed below. Where differences in services occur, or concerns have been identified by FLCN, they are highlighted in this section; otherwise, this section references Gillam infrastructure and services for the sake of readability.

As noted in Section 2, FLCN has a long history of living in the environs of Gillam. In the early 1900s, FLCN Members lived in this area during the construction of the Hudson Bay Railway. In the mid-1960s, construction began on the Kettle Generation Project, the first of three major hydroelectric projects in the vicinity of the community. As Manitoba Hydro's operations and presence expanded, the town expanded and grew to its current size and scale. Manitoba Hydro is also the major landowner in the community and provides funding for most housing (with the exception of FLCN housing) and major infrastructure and facilities.

Over the course of the next 10 to 25 years, even in the absence of the Project, Gillam is expected to experience the next wave of growth as Manitoba Hydro plans a series of proposed developments, including the Bipole III Transmission Project (including the Keewatinoow Converter Station) and the potential Conawapa Generation Project. These projects will have an effect on the infrastructure and services of the town, which will require advance planning and design to accommodate such growth.

In February 2007, FLCN and Manitoba Hydro signed a Joint Statement on Harmonized Gillam Development (HGD) recognizing that both FLCN and Manitoba Hydro are major stakeholders in the development of Gillam; FLCN because the Gillam area is the ancestral homeland of the First Nation, and Manitoba Hydro due to its ongoing development activities in the area. The parties agreed on a collaborative approach to Gillam planning and development that respects the goals and objectives of FLCN, Manitoba Hydro, the Town of Gillam and, where applicable, Manitoba. The Joint Statement notes that "the Harmonized Gillam Development must focus on building a community where all residents live, work, play and prosper together, where there is a mutual use and enjoyment of community

facilities and services and where residents respect and support the interests and ambitions of their neighbours" (Joint Statement on Harmonized Gillam Development 2007).

The Joint Statement identified three key features of the harmonization process:

- A clarification and sharing of the long-term goals and objectives of Fox Lake Cree Nation, Manitoba Hydro, the Town of Gillam and, where applicable, Manitoba in the Gillam area;
- Identification of challenges and issues that have arisen in the past and with future developments, and of opportunities to implement planning and development activities that provide for mutual gain; and
- A regular process of interaction to discuss issues of mutual interest (Joint Statement on HGD 2007).

As part of the HGD process, the Town of Gillam, Manitoba Hydro, FLCN and, where applicable, the provincial government are working together to ensure that community growth could take place in a manner that satisfies the needs of all parties. As part of the HGD process, Hilderman Thomas Frank Cram (HTFC) were contracted to assist the parties in the development of a land use and allocation strategy for land in the Town of Gillam. A draft Land Use Requirements and Availability Study was released in December 2008 (HTFC 2008).

WATER AND SEWER SERVICES

The primary source of water for the Town of Gillam is Stephens Lake and the secondary source is the Kettle River. The town has a treated-water reservoir with a capacity of 1,409,287 L (310,000 imperial gallons), which can supply the town for an estimated eight hours. The water treatment plant "is designed to treat raw water for the removal of colour, odour, taste, turbidity, micro-organisms, and other impurities to provide a high quality effluent for potable and domestic use" (Town of Gillam 2008). Upgrades are planned to bring the system up to provincial standards with respect to the issue of turbidity (Town of Gillam 2008).

New pumps and controls were installed at the Stephens Lake pumping station in 1997 and new controls were installed in the Kettle River pumping station. One Kettle River pump was replaced in 2007 and there are plans to replace the second one in 2010 (Town of Gillam 2009).

All infrastructure in the Town of Gillam has piped water and all lines are said to be in relatively good condition, including water lines in the Trailer Court where many FLCN Members reside, which were replaced in 1996/1997 (HTFC 2008; Gillam KPI Program 2009-2010). In the event of a fire, where a great volume of water is needed, there is a stand-by 120 horsepower fire pump in the water treatment plant. The water treatment plant has the capacity to serve between 3,000 and 3,500 residents, almost three times the 2006 population of Gillam of 1,210[1] residents (Town of Gillam 2008).

The existing wastewater treatment facility was constructed approximately 10 years ago and has a capacity to service approximately 2,500 residents. Most of the sewer lines in the Town of Gillam are in reasonable condition, but the majority of those in the Gillam Trailer Court are in poor condition and require

[1] Gillam population is from Statistics Canada (2007a).

replacement (HTFC 2008; Gillam KPI Program 2009-2010). The wastewater treatment facility is presently able to accommodate roughly a doubling in community growth from a current population of 1,210 to the facility's capacity of 2,500.

LANDFILL AND RECYCLING

A landfill site is located just outside of the community. Weekly curb-side pick-up is provided by the Town of Gillam, with larger items picked up on call. Curb-side pickup is also offered for recycling and the town has a sorting depot from where, after sorting, all recyclables are shipped to the Thompson Recycling Centre[1]. It is estimated that the landfill has approximately 20-25 years before it reaches capacity and can, therefore, accommodate the existing population and any expected growth in the community into the near future; the Town is also planning to change the way materials are accepted at the landfill to divert more items and encourage recycling (HTFC 2008; Gillam KPI Program 2009-2010).

FIRE AND AMBULANCE

Gillam fire and ambulance service provides fire protection and emergency medical services to the town, the surrounding area and the community of Fox Lake (Bird). Currently, there are 20 volunteer firefighters, including a chief and deputy chief, with crews receiving mutual aid from the Manitoba Hydro stations nearby when required (Gillam KPI Program 2009-2010). Members are trained as National Fire Protection Association standard level one firefighters and emergency medical responders are accredited through the Manitoba Emergency Services College. The department has one pumper and two ambulances; however, staff retention has been a concern. It is felt that the community has adequate emergency services and could accommodate a growth in the population (details on level of growth were unavailable) (Gillam KPI Program 2009-2010).

POLICING SERVICES

The RCMP has a detachment located in Gillam, consisting of six constables and one administrative assistant. The majority of the service calls occur within Gillam, but a few times a month the RCMP provides assistance with calls outside of the community in places such as Fox Lake (Bird) and Ilford (Gillam KPI Program 2009-2010; FLCN KPI Program2009-2011).

The detachment currently has two holding cells and one other holding area with no bed. The detachment is adequately staffed to provide services to the existing population. The RCMP is anticipating discussions with Manitoba Hydro concerning a new, stand-alone detachment to deal with holding areas, as well as health and safety issues anticipated with increased development in the area and the potential need for increased staff (Gillam KPI Program 2009-2010).

The RCMP has been involved in, and initiated, a variety of programming and activities in the community:

[1] It was noted that effective in 2010, the provincial regulations regarding landfills will change. These new regulations include a charge per ton of waste delivered which may encourage more recycling in the community and may divert some material from the landfill.

- Kids Are the Responsibility of Everyone (KARE): Formerly known as Youth at Risk. According to the Gillam KPI Program (2009-2010), one RCMP member manages the program and sits on the board. The group raises money and collects used sports equipment. This enables KARE to sponsor children in organized community activities when financial needs arise.
- School liaison: Three members of the detachment are assigned to the school (Gillam KPI Program 2009-2010). The program helps to build rapport and trust and provides mentoring. There is an officer at the school once or twice a week. One of the junior officers is tasked specifically with female youth aggression in partnership with the school.
- Drug Abuse Resistance Education (DARE) Program: DARE is a collaborative program in which local law enforcement and local schools join together to educate students about the personal and social consequences of substance abuse. The DARE interactive lessons include a strong message of abstinence, as well as lessons about learning assertiveness, managing stress, reducing violence, combating media influences, making decisions about risky behaviours, having positive role models and building self-esteem. The detachment has one trained DARE officer who is actively involved in implementing and teaching this curriculum to grade six classes at the Gillam School (Gillam KPI Program 2009-2010).
- Drop-in centre: RCMP members are involved in community recreation and play hockey against community youth once a week, most of the year (Gillam KPI Program 2009-2010).
- Community and youth corrections: There is one full-time probation officer who travels in from Thompson on a monthly basis (Gillam KPI Program 2009-2010).

EDUCATION

The nursery to grade 12 Gillam School was built approximately 40 years ago and is part of the Frontier School Division.

There has been an increase in high school enrolment over the last few years and, as of June 2009, there were 335 students enrolled with an additional 50 adult education students. Increases in high school enrolment were attributed in large part to changes and improvements in the programs, including the introduction of university math, as well as the Senior Years Apprenticeship Program that allows students to get credit for on-the-job training related to trades. A student mentoring program has also been established, where students are mentored by teachers to help them with their studies.

The school has expanded as needed and, approximately eight years ago, a library wing was added. A recent addition has included $80,000 - $100,000 of upgrades to the playground, including a new track and soccer pitch. The school is currently operating at capacity and, based on trends over the last five to ten years, there is an expectation that enrolment will increase further. The school could accommodate approximately 400 students if there was a fairly even distribution of students across grades (Gillam KPI Program 2009-2010; Manitoba Hydro *pers. comm.* 2012). Discussions have taken place regarding the school's capacity and the town is exploring whether to expand the current infrastructure, construct a new school at the same site, or construct a new school at a different site. A feasibility study to determine the best approach, which included discussions with Manitoba Hydro, FLCN, the Town of Gillam and the

Gillam School Administration and Committee, is expected to be completed in 2012 (Manitoba Hydro, *per. comm.* 2012). The Frontier School Division's capital plan does include increasing the school capacity in Gillam. (Gillam KPI Program 2009-2010).

The school has approximately 54 staff members, of which 32 are teachers. One full-time, certified counsellor is on staff (Gillam KPI Program 2009-2010).

After hours, the school is open for the community's volleyball team (North Stars), arts club and boxing and archery clubs (Gillam KPI Program 2009-2010).

CHILDCARE

The Gillam Pre-School Co-op Daycare has been in operation for the last seven years. It offers preschool services for three-year olds that run two days per week from October to June. The facility offers full-time day care for children aged two to twelve. The day care is licensed for 40 children (25 pre-school and 15 school-aged), but typically only accepts between 30 and 35 children due to a lack of space and staffing challenges. There are currently two full-time positions and seven part-time staff; however, there are challenges recruiting and retaining staff that have childcare-related training. Demand for this service is high and already at capacity and, at the time of writing, there were 60 children on the waiting list (HTFC 2008; Gillam KPI Program 2009-2010). There are no alternatives to the day care run at the school and it was reported to be difficult to find dependable babysitters (Gillam KPI Program 2009-2010). In 2011/2012, a new childcare centre was under construction with capacity for 75 children (including one year olds); this facility is expected to be completed in the summer of 2012 (Manitoba Hydro, *pers. comm.* 2012).

HEALTH SERVICES

Gillam Hospital is owned and operated by the BRHA and is the primary health centre in the community. The hospital operates the medical clinic and local retail pharmacy and provides a variety of health, mental health and homecare services (HTFC 2008; Gillam KPI Program 2009-2010). It is a ten-bed facility of which three beds are designated for long-term care, two for paediatrics and one for observation (with flexibility in apportioning as required). There are a sufficient number of beds to handle the current volume of patients. (Gillam KPI Program 2009-2010). The hospital has an emergency department and x-ray department, which are capable of handling non-critical patients. When critical care is required, patients are flown to either Thompson or Winnipeg. The hospital employs 32 full-time employees, including one physician (it previously had two) and 10 nurses (HTFC 2008; Gillam KPI Program 2009-2010). There are emergency services with an ambulance and attending physician available 24 hours per day. A public health nurse is employed at Gillam Hospital, along with a full-time mental health worker. An urgent care clinic is currently operated in Gillam Hospital from Monday through Friday. This is not a walk-in clinic and requires appointment bookings between 1:30 and 4:00 in the afternoon (Gillam KPI Program 2009-2010).

As part of their staff benefits package, Manitoba Hydro pays the cost of travel for health service providers since it is more cost-effective to bring the specialists to the community than to pay for Manitoba Hydro employees to travel south to access treatment. A massage therapist is brought into the

community every two weeks and uses space provided by the hospital; the same is done for chiropractic services (Gillam KPI Program 2009-2010). Similarly, Manitoba Hydro brings an optometrist to the community twice per year, a physiotherapist once per month and Assiniboine Dental Services twice in spring and twice in fall. The Burntwood Regional Health Authority (BRHA) provides a dietician and some occupational and physiotherapy programming. The hospital also uses an interactive health service to access health services, doctors and specialists outside of the community through a system called Tele-Health. Home-care is offered through part-time workers coordinated out of Thompson (Gillam KPI Program 2009-2010).

The Burntwood Regional Health Authority (BRHA) is responsible for providing housing to doctors, nurses and x-ray technician staff, but a lack of housing has made it difficult to recruit medical staff to Gillam (HTFC 2008).

In the future, the hospital staff may be expanded to include a second physician or nurse practitioner, and a walk-in clinic (Gillam KPI Program 2009-2010).

SOCIAL SERVICES

The Awasis Agency of Northern Manitoba "is committed to working towards the vision of healthy communities that promote and nurture the physical, emotional, mental and spiritual growth, development and well being of First Nations Children and Families" (Awasis Agency of Northern Manitoba 2009). The agency is responsible for child and family services protection work in the community. They provide education and crisis response relating to family issues in the community and work with NNADAP, Brighter Futures, Building Healthy Communities, the RCMP and the school. The Gillam office services the population of both Gillam and Fox Lake (Bird). The Awasis Agency currently has four full-time employees who undertake the following:

- Work with local foster homes in the community to provide foster parents with support;
- Work with local families in crisis and provide family support; and
- Work with children in care and their families by providing protection services, case management, case planning, support and counselling services.

COMMUNITY RECREATION

Recreation facilities in the community include the Gillam Recreation Centre and the Nelson River Aquatic Centre.

The Gillam Recreation Centre is a multi-use facility that includes an arena, curling rink, meeting room space, gymnasium, weight room, library and bowling alley. A variety of activities and programming in the community take place at the Centre, including seasonal youth dances, aerobics, tae kwon do, hockey, figure skating, badminton, youth drop-in centre, adult slow pitch and others. Many of the programs have fees associated with participation (Gillam KPI Program 2009-2010). As noted in the FLCN section on recreation (Section 4.3.3.1), this has often created a barrier for FLCN Members to access the facilities (FLCN KPI Program 2009-2011). Although lacking an organized team that is part of a league, hockey is

by far the most popular activity at the facility. Shinny hockey and unorganized noon hour hockey are very popular. Although the Recreation Centre is generally under-used, the popularity of hockey means that the Centre is more heavily used in winter than summer, when people generally take to the outdoors and do not use the facilities. Office and fitness/weight room space appear to be inadequate to meet current or future needs. The facility and associated programming is likely able to accommodate an increase in the population as the facility is currently not used to capacity, with the exception of the fitness/weight room (Gillam KPI Program 2009-2010)[1].

The Nelson River Aquatic Centre opened in 2005 with a swimming pool for adults and children, as well as a water slide. A variety of programs are offered at the pool, such as swim fit, Aquasize and parent and toddler swimming lessons.

Other recreational facilities in the town include parks and playgrounds, a driving range, baseball diamonds, soccer fields, a beach and boat launch (Gillam KPI Program 2009-2010).

OTHER SERVICES

Telephone and internet service in the community are provided by MTS. Manitoba Hydro provides electricity to the community.

MUNICIPAL SERVICE AGREEMENT

The Town of Gillam and FLCN signed a Municipal Service Agreement in 2001. Under this agreement, services to be provided by the Town of Gillam to FLCN Members living on designated lots identified in Schedule A as land to be set aside in the future as "Reserve Land" included the following:

- Fire suppression;
- Road Maintenance and snow clearing; and
- Recreation facility, library and all other public facility access at standard fees for admission rates.

FLCN agreed to pay the town a fee amount outlined in the Agreement under Schedule B.

In addition, the agreement outlined how normal direct services would be supplied by the town and paid for by FLCN. Those direct services that the town would normally provide to residents for a direct charge or user fee include the supply of water, the disposal of sewage, ambulance services, the removal of garbage, land drainage and recreation levies. Charges for direct services are billed to the First Nation twice per year, in April and October (The Town of Gillam and FLCN 2001).

[1] Details on capacity to accommodate population growth were not available.

4.3.3.3 Thompson

Water and Sewer Services

The Burntwood River supplies fresh water to Thompson's water treatment plant. Vale owns and operates the water treatment plant and provides the water for free to the City of Thompson. The city is responsible for supplying the residents with drinking water by means of a piped water distribution system. An agreement between the City of Thompson and Manitoba Hydro was established pertaining to the effects of the Churchill River Diversion on the City of Thompson (City of Thompson 1976).

In 2007, the City of Thompson commissioned a study of the water and sewer infrastructure with the goal of implementing a water metering system. It was determined that the water distribution system was in an advanced state of deterioration. Since 1993, the city has been dealing with 75 to 145 water main breaks per year, but has not implemented an annual water main or sewer replacement program to reduce these system breaks (CH2MHILL 2008). Given the state of the current system, the capacity for additional residential and commercial growth is limited (Thompson KPI Program 2008-2010).

The current sewage collection and treatment system has excess capacity and can accommodate an increase in the population, although the extent of increase was not identified. The system has a high level of inflow and infiltration from either groundwater or storm water entering the system due to the deteriorating state of the water and waste distribution and collection system (CH2MHILL 2008). With the waste water treatment plant currently providing only primary treatment, this will require upgrading to a secondary treatment system when the infrastructure is renewed in order to provide an appropriate level of treatment for the existing population (CH2MHILL 2008).

Landfill and Recycling

The waste disposal site is owned and operated by the Local Government District of Mystery Lake and is located approximately 5 km south of the City of Thompson. In 2009, the city upgraded equipment to accommodate an automated collection system and collection is once per week.

A study commissioned in 2008 has helped the Local Government District extend the life of the current waste disposal grounds for an additional 31 years by implementing a vertical cell approach. A new location has been identified adjacent to the existing site. The landfill can accommodate an increase in the population (Thompson KPI Program 2008-2010).

The Thompson Recycling Centre provides the City of Thompson with residential and commercial recycling services. The Thompson Recycling Centre offers free curb-side pickup with or without a blue box, has several recycling drop-off containers throughout the city and has no requirements to sort materials. This service has been intermittent due to difficulties with staffing and existing facilities (Thompson KPI Program 2008-2010).

Fire and Ambulance

The Thompson Fire Department is located at city hall and consists of one chief, one deputy chief, 24 full-time firefighters trained in Emergency Medical Services and fire services, five dispatchers and 19

auxiliary firefighters. The department responds to calls in Thompson and the surrounding area (Thompson KPI Program 2008-2010). The City of Thompson does not have a 911 emergency call system; rather, emergency calls are made to a local number (Thompson KPI Program 2008-2010).

For the purposes of fire protection, the city has a main and hydrant system. The fire department utilizes a variety of equipment, including four support/utility trucks, a medical attack vehicle ambulance, a 100-foot aerial ladder pumper truck, two additional pumper trucks, three ambulance units, a zodiac boat, floatation suits and water rescue equipment and two snowmobiles with rescue sleds (Thompson KPI Program 2008-2010; City of Thompson 2008). The fire hall has limited space for future staff expansions and equipment acquisitions (Thompson KPI Program 2008-2010).

Police Services

The Thompson RCMP detachment is the largest in Manitoba, consisting of City and Rural units, a Community Policing Unit and General Investigation Section. The City Unit currently has 39 members, including one inspector, one administrative Non-Commissioned Officer staff/sergeant, one Operations Non-Commissioned Officer sergeant, five corporals, and 31 constables. The unit is divided into four watches of one corporal and six or seven regular members each. The General Investigation Section plainclothes watch consists of one corporal and three constables. The Rural Unit consists of one corporal and five constables and they are responsible for the communities of Split Lake, York Landing (*Kawechiwasik*), Tadoule Lake, Pikwitonei and Thicket Portage (RCMP 2009; Thompson KPI Program 2008-2010).

The current RCMP facility, built in 1998, includes three holding cells without bunks and eleven cells that can each hold two or more individuals. While the infrastructure is sufficient to accommodate the existing population, staffing at the Thompson RCMP detachment is based on the local population. However, the city has a large transient population that increases the detachment's case load per member significantly, and sources indicate that the non-resident policing costs are a significant portion of policing costs and caseloads per member in the community. As such, the detachment has one of the highest criminal caseloads per member of any detachment in Canada (Thompson KPI Program 2008-2010). Additional growth and/or transient population likely would put additional strain on the services provided by the RCMP in Thompson.

Education

There are six elementary[1] schools and one high school in the School District of Mystery Lake. Each elementary school offers classes for students in kindergarten to grade eight. In September 2009, a new francophone elementary school, École Communautaire de Thompson, opened within the Burntwood School. The Wapanohk Community School is a Cree bilingual school. As of September 30, 2009, there were 2,980 students registered in classes from K-12 in the School District of Mystery Lake (Thompson KPI Program 2008-2010).

[1] Burntwood School, Deerwood School, Wapanohk Community School, Juniper School, Riverside School and Westside School.

R. D. Parker Collegiate serves 1,100 high school students from Thompson and outlying areas. Along with traditional academic courses and French Immersion, the collegiate offers a variety of electives. It also offers vocational and apprenticeship training in trades, such as carpentry, power mechanics, heavy-duty equipment mechanics and aircraft maintenance engineer training. Other job training includes food services, cosmetology, small engine repair, electronics, First Aid/CPR and emergency medical responder training and many others.

All schools have well maintained infrastructure and provide sufficient space for current programming. R. D. Parker Collegiate has been working with community partners to develop space for their vocational programming (Thompson KPI Program 2008-2010).

Overall, the student base has fluctuated over the years, with a marginal decline in enrolment/student base in the last few years. The student base fluctuation is expected to continue into the foreseeable future. All schools are expected to have enough capacity to accommodate some additional growth in the population. One challenge the community faces is accommodating children with special needs. Since Thompson is a major centre in the north, people often move to Thompson so their children can have better quality education/care. This is putting a strain on those individuals and infrastructure that provide services for children with special needs. Thompson's high schools (along with other communities such as Cranberry Portage) are also used by First Nation communities that do not have high school facilities. YFFN for example, sends their youth outside York Landing (*Kawechiwasik*) for grades 9-12 (Thompson KPI Program 2008-2010; YFFN KPI Program 2009-2010).

Adult, Post-Secondary Education in Thompson

Organizations offering adult education programs in the City of Thompson include the following:

- University of Manitoba, Northern Social Work Program;
- Brandon University Northern Teacher Education Program;
- University College of the North (Thompson KPI Program 2008-2010); and
- The Ma Mow We Tak Friendship Centre, which provides adult basic education programming (Ma-Mow-We-Tak 2009).

Over the last few years, much of the post-secondary education has been consolidated within the University College of the North. Currently, the University College of the North uses facilities in a series of buildings on Princeton Road to serve approximately 400 students. About 40% of students are from outside of the community of Thompson and many move to Thompson with families. Thompson's lack of affordable housing and shortage of childcare spaces are affecting the growth of the University College of the North programming and student participation from outlying communities (Thompson KPI Program 2008-2010).

In April 2010, the Manitoba Government announced that it is investing $82 million to build the new 84,000-square-foot Thompson campus of the University College of the North, with construction to start in the fall of 2010. The new campus will be 19,000 square feet larger than the original campus and will include facilities such as housing for students, and a childcare facility (Government of Manitoba 2010b).

Childcare

The City has a chronic shortage of day care spaces and the shortage likely will continue into the foreseeable future (Prentice 2007; Thompson KPI Program 2008-2010). In 2007, there were 337 day care spots providing childcare in a variety of forms including group day care, family day care, nursery school, pre-school and school-age childcare (Prentice 2007). Some services are provided by eight licensed family day care homes, each caring for a small number of children. The shortage of childcare was exacerbated in 2004 when the YWCA closed their childcare program, and when the Juniper Pre-School closed in 2006. There are few trained early childhood educators in the community, but efforts are underway to improve childcare opportunities. Vale and North Central Development both have committees actively looking for ways to add more day care spaces in the city.

The lack of childcare spaces in Thompson has been identified as "hurting the local economy" by restricting care-giving family members from entering the labour force (Thompson KPI Program 2008-2010). In 2006, the existing childcare facilities in Thompson contributed over $2,000,000 to the local economy. Further growth in this sector would result in more direct and indirect employment (Prentice 2007).

Health and Social Services

The provision of healthcare services in Thompson falls under the authority of two levels of government. The BRHA is the provincial authority in charge of healthcare for non-First Nation members, while most First Nations health concerns fall under the jurisdiction of the federally operated First Nations and Inuit Health Branch. Jurisdictional concerns are an ongoing issue in the BRHA (BRHA 2008) as more than 72% of residents in the BRHA are of Aboriginal descent. The BRHA works closely with its First Nation neighbours on many health-related concerns and has strong partnerships with Aboriginal organizations, such as Manitoba Keewatinowi Okimakanak Inc. and the Keewatin Tribal Council and has opened dialogues with many of the First Nations in the Regional Study Area (BRHA 2008).

The Thompson General Hospital is designated as the regional hospital and is the largest in the BRHA. Services provided at the Thompson General Hospital include medical, surgical, paediatric, maternal, psychiatric, operating theatres, an endoscope suite, a laboratory, a state of the art emergency department, a special care unit, mammography, ultrasound, occupational therapy, physiotherapy, respiratory therapy, radiology and CT scanning and dialysis and chemotherapy through Cancer Care Manitoba. The Northern Consultation Clinic, also situated in the Thompson General Hospital, provides specialist services in obstetrics, gynaecology, paediatrics, internal medicine, anaesthesia, surgery, psychiatry and otolaryngology (Thompson Guide 2009). As a regional hospital, the Thompson General Hospital provides health care services that are used widely by KCNs community Members.

The hospital has 74 beds, including a ten-bed Mental Health Unit and a three-bed Special Care Unit (BRHA 2009a). In February 2008, the Acquired Brain Injury Residence, a five-bed facility servicing patients 18 to 64 years of age, was opened at the Thompson General Hospital (BRHA 2008), and, in 2009, the capacity of the dialysis unit was expanded from 16 to 40 patients (BRHA 2009a).

The number of available beds in the hospital fluctuates and is dependent on staff and funding levels. Staff shortages among nurses, doctors, specialists, or technicians can have an impact on the number of beds that the hospital can keep open for patient use (Thompson KPI Program 2008-2010).

The Burntwood Community Health Resource Centre is the main health centre in Thompson and provides community health services to Thompson residents. The Burntwood Community Health Resource Centre provides a primary medical clinic and services, as well as health promotion, education, community outreach and illness prevention programs. The facility houses a resource library, a breastfeeding room, a traditional healing room and offers clinical care by a variety of health care professionals. The Burntwood Community Health Resource Centre typically has 11 family physicians and a specialist clinic and employs general practitioners, midwives, nurse practitioners, community health nurses, a health promotion coordinator, a family counsellor, Aboriginal liaison workers, a dietician and foot care workers (Thompson Guide 2009).

Overall, there is a shortage of health services in the community, especially services such as clinics and walk-ins, forcing people to use the hospital emergency room for minor health problems. Compounding this problem, there are not enough family doctors and other health care professionals and support workers in the community (BRHA 2008). Similarly, nursing shortages have had an effect on local healthcare. According to the BRHA, the situation has been improving in recent years: in 2008, the staff turnover rate in Thompson was around 15% compared to over 30% in 2001 (Thompson KPI Program 2008-2010). However, recruitment and retention of medical staff is a greater problem than the infrastructure, and any growth in the population would put additional strain on medical services in the community. KCNs Members also rely on the health services provided in Thompson as not all communities have a full range of services located within their community. Growth in population and/or increased use by KCNs Members would put added strain on health and social services in Thompson.

The Northern Spirit Manor, a personal care home located on the Thompson General Hospital campus, opened in January 2007 and provides long-term care to 35 residents. The home was the first of its kind operated by the BRHA and allows Elders and seniors to remain in the region while receiving care in their later years (BRHA 2007; Thompson Unlimited 2007).

Additional medical services offered in the City of Thompson include the following:

- Two private medical clinics;
- Four dental centres and a denture clinic (City of Thompson 2010b);
- Visiting ophthalmologists and optometrists and six resident opticians (City of Thompson 2010b);
- Two chiropractors, one massage therapist and one physiotherapist (City of Thompson 2010b); and
- Four retail pharmacies (City of Thompson 2010b; Thompson KPI Program 2008-2010).

The Addictions Foundation of Manitoba offers a range of prevention and awareness programs related to the use of drugs and alcohol, gambling and other addictive behaviours that can have a negative effect on individuals, families and society (Thompson KPI Program 2008-2010). A total of 1,140 clients participated in addictions programs in Thompson in 2008 (Government of Manitoba 2009a). The

Addictions Foundation of Manitoba opened a new facility in Thompson in June 2009 that offers short- and long-term residential treatment programs and provides community-based day programs (AFM 2009; Government of Manitoba 2009a). The programming includes health assessment, counselling, prevention, education and regional administration, as well as treatment programs for clients at home and in the residential program at the facility (Government of Manitoba 2009a; Thompson KPI Program 2008-2010). The Addictions Foundation of Manitoba have worked with some workers from the Wuskwatim construction site.

Social Services

The delivery of social services and mental health programming by the Province of Manitoba was restructured in 2003. This resulted in several agencies providing the programming that used to fall under the umbrella of Child and Family Services. These services are now provided by the following:

- Awasis Agency of Northern Manitoba;
- Manitoba Family Services and Housing;
- Nisichawayasihk Cree Nation Child and Family Services; and
- BRHA.

The purpose of having multiple agencies is to allow clients to choose the agency that would meet their particular needs. Now that several agencies provide similar services, there is a perception among some that services may be more difficult to obtain (Thompson KPI Program 2008-2010).

There is a wide range of not-for-profit and charitable organizations delivering programming in Thompson including a non-profit, 24-hour emergency homeless shelter called the Nanatowiho Wikamik Homeless Shelter. The facility has spaces for 24 people and offers public bathrooms, daily breakfast and supper, clothing, showers, assistance with personal hygiene and transportation services to and from medical appointments and to the airport, bus and train station (Thompson Guide 2009).

Recreation

Recreation services for Thompson are primarily provided by the City of Thompson Recreation, Parks and Culture Department. A wide range of volunteer and non-profit organizations also provide recreation and cultural programming year-round (Thompson KPI Program 2008-2010).

The Regional Community Recreation Centre and the Norplex Pool are the primary indoor recreation facilities operated by the City of Thompson. The Norplex Pool includes a 25 metre, six-lane pool with a shallow area for recreational water activities. The Regional Community Recreation Centre includes two arenas (C. A. Nesbitt and Gorden Beardy arenas), three racquetball/volleyball courts, an indoor walking/running track, a multi-purpose room, two meeting rooms with a variety of equipment and the City of Thompson Recreation Services offices. On the grounds of the Regional Community Recreation Centre, there is a 400 m running track, two hardball baseball diamonds, three tennis courts, one full-size and two mini soccer fields, the Thompson Zoo and an indoor shooting range in the Wildlife Building (Thompson KPI Program 2008-2010).

There are a variety of other recreation facilities in the city, including parks, ice rinks, playgrounds, baseball and soccer fields, tennis and basketball courts, golf courses and ski trails. There are also a number of commercial recreation and fitness facilities in Thompson offering bowling, movies, dance classes, fitness facilities and martial arts training (Thompson KPI Program 2008-2010).

Overall, there is a wide range of recreation opportunities in the city and outlying areas with enough capacity that they can accommodate population growth.

Other Services

Manitoba Hydro offers electricity services to all households and other facilities in Thompson, the Local Government District of Mystery Lake and in cottage areas to the south of Thompson.

Propane gas is provided by Stittco Utilities in Thompson. The company operates a limited underground pipeline system in Thompson and sells propane in a wide range of container sizes for commercial, industrial and remote domestic use (Stittco Energy Ltd. 2010).

Telecommunications services are provided by MTS including landline telephone, cell phone and internet service to Thompson and Paint Lake. Uninterrupted cell phone service along PTH 6 between Thompson and Winnipeg is available (MTS 2010). Digistar Internet Services also provides internet services to Thompson residents and other locations (City of Thompson 2010b).

4.3.4 Land – Local Study Area

Map 1-1 shows the location of First Nation communities and KCNs reserve parcels in the Local Study Area. Resource Management Areas for the KCNs communities are shown on Map 1-1 in the Resource Use Section and an explanation of these areas is included in the Resource Use Section 1.1.3.

4.3.4.1 Keeyask Cree Nations - Land

4.3.4.1.1 Cree Nation Partners

TATASKWEYAK CREE NATION

Indian Reserve Parcels

TCN reserve lands are approximately 19,055 ha and located entirely in the Province of Manitoba (CNP 2010c). TCN historically made use of a large territory in a seasonal round of traditional resource use activities, including in areas along Split Lake and down the Nelson River 240 km northeast to York Factory at the Hudson Bay coast and upstream along the Burntwood River to Tasitnigup Falls at Wareham Lake. TCN's traditional territory around the Assean River and Split Lake were part of the Hudson Bay fur trade corridor, which led to a more permanent community of Cree in the region. TCN signed their Adhesion to Treaty 5 in 1908 and original reserve lands around Split Lake were chosen and surveyed in 1913 (CNP 2010c). This land was subsequently legally recognized as reserve land by the Government of Canada in 1959. There are three original reserve parcels comprised of Split Lake 171 (14,468.30 ha), which is the main reserve and where the majority of community Members reside, Split

Lake 171A (2,990.70 ha), which is across the Nelson River channel from the community, and Split Lake 171B (135.60 ha) located at the south end of Split Lake near York Landing (*Kawechiwasik*).

TCN's Comprehensive Implementation Agreement (1992) was signed by the Government of Canada, the Government of Manitoba and Manitoba Hydro with TCN. The Agreement gives a practical application to provisions set forth in the Northern Flood Agreement and gives TCN additional rights relative to future development within the SLRMA. The Agreement increased the amount of reserve land by several times, creating additional reserve land at Assean Lake (12,420.61 ha) and Waskaiowaka Lake (2,048.11 ha), as shown in Map 1-1. The community also acquired permit/fee simple lands comprised of 38 parcels on 22 lakes (approximately 1135 ha).

Split Lake Resource Management Area

The SLRMA falls within the traditional territory of TCN and was formally recognized in the 1992 Agreement. The RMA covers more than 43,000 km² (TCN 2010c).

WAR LAKE FIRST NATION

Indian Reserve Parcels

As noted in Section 2, WLFN's early history is tied to TCN. In 1980, Cree Members of TCN living in and around War Lake and Ilford formally became recognized as War Lake First Nation at Ilford. WLFN originally shared the use of the SLRMA and has since gained some reserve parcels of land under the TLE within their traditional ase area.

WLFN has three reserve parcels. Mooseocoot 1 is 6.80 ha and located adjacent to Ilford (CNP 2010d). Mooseocoot 2 and Mooseocoot 3 were converted to Reserve parcels in September 2008. Mooseocoot 2 is 142.40 ha and Mooseocoot 3 is 52.00 ha (CNP 2010f).

Treaty Land Entitlement

Treaty Land Entitlement (TLE) refers to federal obligations to provide sufficient amounts of reserve land under Treaty agreements. Nineteen First Nations with validated TLE claims signed the TLE Framework Agreement with the governments of Canada and Manitoba in 1997. According to their Adhesion to Treaty 5, WLFN has a TLE of 2,896 ha of land. Approximately 2,730 ha have already been selected and approximately 166 ha remain to be selected (CNP 2010f).

The Mooseocoot Housing Authority began land transfer discussions in 2007 through the TLE process with the governments of Canada and Manitoba, Manitoba Keewatinook Ininew Okimakanak, Inc. and the Ilford Community Council. Eventually all of the community of Ilford is targeted to be turned over to WLFN since they have selected these parcels of land through the TLE process. Many Members of WLFN live on Crown land in Ilford and many land use issues, such as housing expansion and economic growth, cannot be resolved until the land transfer process is complete (CNP 2010f).

Traditional Use Area

WLFN does not have a RMA recognized under their 2005 Past Adverse Effects Agreement with Manitoba Hydro. The traditional use area of WLFN falls within the SLRMA (CNP 2010f). WLFN has a representative on the SLRMA Board who makes recommendations on the allocation of land and resources within the SLRMA.

4.3.4.1.2 Fox Lake Cree Nation

Indian Reserve Parcels

Like other KCNs, Members of FLCN are people with deep ancestral ties to the land and waterways of the Hudson Bay region that date back thousands of years. Family ancestral regions linked to FLCN extend from the coast of the Hudson Bay to the interior.

Between the decades of the 1910 Treaty and York Factory's closure in the late 1950's, several groups of Cree gradually moved their seasonal patterns of camping away from the coast at York Factory to other regions, including Gillam and Fox Lake. As early as 1944, those who maintained their seasonal pattern of camping between Fox Lake and Gillam began to be referred to as the Fox Lake Band, and in 1947 Fox Lake First Nation (now known as FLCN) was formalized, but remained without reserve land for almost four decades. In 1985, the Fox Lake No. 2 reserve community of Bird (now known as Fox Lake) was created on 39.5 ha of land at the mouth of the Limestone River, northeast of the Town of Gillam.

On September 9, 2009, a 1.29 ha parcel of land in the Town of Gillam, formerly known as Kettle Crescent, was established as the A Kwis Ki Mahka Indian Reserve in partial fulfillment of their outstanding TLE. In anticipation of the establishment of the reserve in Gillam, a Municipal Services Agreement was negotiated in 2001 between the First Nation and the town for the provision of municipal services. The agreement noted that the new reserve parcel would fall within the purview of FLCN, including responsibility and costs associated with infrastructure located on the reserve (*e.g.*, housing and sewage and water pipe connections). FLCN and the Town of Gillam are undertaking further discussions regarding the Municipal Services Agreement to address any issues not contained in the agreement (FLCN KPI Program 2009-2011).

FLCN's 2004 Impact Settlement Agreement with Manitoba Hydro and the Government of Manitoba also provided for Manitoba to transfer a number of land selections to FLCN (totalling 2,169.1 ha); as noted above, the Kettle Crescent site has already been set aside as reserve land. The Kettle River Site of 32.4 ha (see Section 4.3.2.1) was the location of many FLCN homes prior to the formation of the Local Government District of Gillam. The Kettle River Site was purchased by INAC to be set apart as a reserve for FLCN in partial fulfillment of FLCN's outstanding TLE. The site includes an additional 2 ha to be transferred "for the benefit of Fox Lake, subject to a Project Easement" although the land has not yet received reserve status (FLCN 2004; HTFC 2008).

In addition to the reserves at Fox Lake (Bird) and in Gillam, FLCN has two additional reserves located at Fox Lake (Fox Lake No. 1) and Armstrong Lake (Fox Lake West No. 3). The 561.7 ha reserve at Fox Lake is located about 35 km south of Gillam. Although FLCN derive their name from Fox Lake and the area has long been used and occupied by FLCN Members, for a number of decades it was also known as

Atkinson Lake. This reserve has no road access and no permanent residents (FLCN 1997). The Armstrong Lake reserve contains 1,138.80 ha of land and is located about 190 km southwest of Gillam on the Hudson Bay Railway Line. The site was not historically, and is not now, used or occupied by FLCN (FLCN 1997). FLCN is currently in the process of examining the potential of the parcel of land.

In addition to the above, the FLCN 2004 Settlement Agreement also provided for a study to be undertaken on the establishment of a reserve in the Gillam Trailer Court. The Gillam Trailer Court Committee was formed with representatives from FLCN, the Town of Gillam, Manitoba Hydro, and the Government of Manitoba. It was agreed that FLCN was responsible for sharing findings and engaging with the Government of Canada for any needed support to move forward once the proposal and recommendations were clear. The Committee released a report on the major issues and recommendations in early 2007 called The Report on the Issues Related to the Setting Apart of the Gillam Trailer Court as a "Reserve" within the Meaning of the Indian Act for the Use and Benefit of the Fox Lake Cree Nation (Graham McLeod and Associates 2007). One of the key challenges identified in the report was addressing the differing perspectives of the major stakeholders, which include the Town of Gillam, FLCN, Manitoba Hydro, and the governments of Manitoba and Canada).

The key recommendation from the Gillam Trailer Court report was that FLCN was to prepare a detailed formal proposal to negotiate a separate agreement (apart from their 2004 Settlement Agreement with Manitoba Hydro) that would outline how the interests of each party would be addressed. In 2007, FLCN, Manitoba Hydro, the Town of Gillam and the Government of Manitoba joined together in the HGD process. In late 2008, the Gillam Land Use Requirements and Availability Study assessed and documented the land use and planning needs of each party in the Town of Gillam. It was observed that both Manitoba Hydro and FLCN have interest in the Gillam Trailer Court as valuable residential land. At this time, the settlement of the Gillam Trailer Court as FLCN reserve land is still unresolved; however, discussions are ongoing through the HGD process (FLCN KPI Program 2009-2011).

Treaty Land Entitlement

FLCN has not executed its agreement regarding 10,680 ha of land owed to them under the TLE Framework Agreement stemming from their Adhesion to Treaty 5 and the Manitoba Natural Resources Transfer Agreement (FLCN 1997; INAC 2009e).

Fox Lake Resource Management Area

Under the 2004 Settlement Agreement, the 802,600 ha Fox Lake RMA was established within the FLCN traditional territory to address the land use and community issues of FLCN Members that were not properly dealt with during the development of hydro dams in their traditional territory (see Resource Use Map 1-1). Fox Lake's RMA lies northeast of the SLRMA and southwest of the York Factory RMA at the Hudson Bay coast.

Other Lands

Under the FLCN 2004 Settlement Agreement, there are three other parcels of land to be transferred in fee simple to the FLCN Land Corporation:

- The Angling Lake Site, which has been surveyed and is currently in the process of being registered at the Land Titles Office under the Band's Land Corporation name;
- The Sundance Site, which has been surveyed and is currently in the process of being registered at the Land Titles Office under the Band's Land Corporation name; and
- The Limestone Construction Camp, which is still needed by Manitoba Hydro. Action is expected when Manitoba Hydro no longer requires the site for the potential Conawapa Generation Project.

4.3.4.1.3 York Factory First Nation

Indian Reserve Parcels

York Factory First Nation, as part of the lowland Cree of the Hudson Bay area of northern Manitoba, historically made use of a large territory in a seasonal round of traditional resource use activities, including in areas along the Hudson Bay coastline from Churchill to York Factory and Fort Severn, and inland to Shamattawa, Gillam and Big Trout Lake, Ontario. Following establishment of the Hudson Bay trading post at York Factory in the late 1600s, the Cree who continued to camp and make more permanent residence at York Factory became well established as Homeguard Cree and instrumental in the fur trade. With the closure of the York Factory post in 1957, YFFN Members were relocated approximately 200 km away to York Landing on the southern end of Split Lake.

YFFN has one reserve parcel of 967.4 ha at York Landing (*Kawechiwasik*). The reserve is located 120 km northeast of Thompson, where the Aiken River meets Split Lake (INAC 2008).

Treaty Land Entitlement

Under the TLE Framework Agreement, YFFN is entitled to 11,805.9 ha of Crown land (INAC 2009). The First Nation has been considering some selections of land at the coast in their traditional territory, but the process is not yet complete and YFFN has not yet executed its TLE agreement.

York Factory Resource Management Area

The York Factory RMA was established under their 1995 Comprehensive Implementation Agreement. The land is along 60 km of the Hudson Bay coastline, the Hayes River and in the environs of York Factory National Historic Site (based on YFFN's traditional land use of this area). YFFN's RMA was reduced from their original Registered Trapline Section of the 1940s when the community was relocated to York Landing (YFFN 2010). After relocation, YFFN was also given Trapline 13 (originally part of the SLRMA) as a local community trapline and part of their RMA. Community concerns regarding their RMA and information related to their traditional lands use for harvesting, travel and settlements are found in YFFN's Evaluation Report *Kipekiskwaywinan.* YFFN has indicated that Trapline 13 is "small, crowded and insufficient to support our people, even though it is still being used today" (YFFN 2010).

Other Lands

The community has identified Compensation and Fee Simple lands related to their 1995 Comprehensive Implementation Agreement with Manitoba Hydro, and the Governments of Manitoba and Canada. The

process is ongoing and land has been selected; however, as of the winter of 2012, an agreement had not been finalized (YFFN KPI Program 2009-2010).

4.3.4.2 Gillam

Gillam is located on the Hudson Bay Railway Line between Thompson and Churchill (see Map 1-1). Land in the town is mostly owned by the Town of Gillam and Manitoba Hydro, although other parcels of land are owned by the Provincial Crown, FLCN and the Hudson Bay Railway (Omnitrax) and other private interests (Dillon Consulting 2011). Based on a range of population growth scenarios, it was determined that there is adequate land available for residential and commercial development in and around the community for the next 5 to 20 years (HTFC 2008), although privately owned land within and near Gillam is limited. There is limited availability of land for sale in Gillam due to constraints, including the reservation of certain lands for residential development by Manitoba Hydro (HTFC 2008).

4.3.4.3 Thompson

The City of Thompson (see Map 1-1) has a limited amount of land available for commercial and residential development. The city is exploring the development of commercial and residential property north of the Burntwood River and the expansion of the city boundaries in several locations to accommodate future growth.

Urban Reserve

On February 2, 2005, the Thompson City Council approved Nisichawayasihk Cree Nation's plan for an Urban Reserve. Nisichawayasihk Cree Nation met the requirements of the City of Thompson, completed a service and access agreement with Manitoba Hydro, obtained an agreement from Vale and met all provincial requirements to obtain urban reserve status. Nisichawayasihk Cree Nation owns the Mystery Lake Hotel and adjacent lands (NCN n.d.) and would like to develop additional business and commercial facilities on these lands (NCN 2008).

4.3.5 Transportation Infrastructure – Local Study Area

The main access route to the Project site would be via the north access road, which is being constructed under the Keeyask Infrastructure Project, in advance of the Keeyask Generation Project. The north access road would be a two-lane all-weather gravel road starting at kilometre 174 on PR 280, approximately 185 km east-northeast from Thompson, and extending approximately 25 km east to the north shore of Gull Rapids. Table 4-14 shows the travel distances between communities and the Project within the Local Study Area and Map 4-1 shows the travel distances by section within the Local Study Area.

Table 4-14: Travel Distances in the Local Study Area

Road Segment	Length/Distance (km)
Thompson to Split Lake junction	135.4
Split Lake Access Road (approximate length)	5
Thompson to Split Lake community	140.4
Thompson to Keeyask junction (NAR)	182.7
Split Lake junction to Keeyask junction	47.3
Thompson to PR 290 junction	269.5
PR 290 junction to Bird	23.2
Thompson to Bird (via PR 280 and PR 290)	292.7
PR 290 junction to Gillam	29.8
Gillam to Bird	53
Thompson to Gillam (via PR 280)	299.3

Sources: Dillon Consulting 2001; Thompson KPI Program 2008-2010; Gillam KPI Program 2009-2010.

The north access road is under construction; it will maintain existing drainage patterns and will conform to current Manitoba Infrastructure and Transportation Geometric Design Criteria for Secondary Arterial Roadways (Manitoba Transportation and Government Services 1998). A fully developed by-pass intersection is also being built at the intersection of PR 280 and the proposed road to ensure the safety of local road users. Additional facilities associated with the access road will include a security gatehouse, communication tower, clear-span bridge and signage (Keeyask Hydropower Limited Partnership 2009).

The two principal roads in the Local Study Area that will be used during the construction of the Project are PR 391 and PR 280. PR 391 connects the City of Thompson with PR 280 (distance: 12 km), which in turn is used to access the communities of Split Lake, Fox Lake (Bird), Gillam and, by winter road, York Landing (*Kawechiwasik*) and Ilford. The distance from Thompson to the Split Lake access road and the Keeyask north access road is 135 km and 183 km, respectively. The distance from Split Lake to the Town of Gillam, is approximately 164 km.

As noted above, PR 280 connects Thompson to Gillam and PR 290, as well as several other communities. It is a two-lane, undivided, gravel roadway and is designated as a secondary arterial by Manitoba Infrastructure and Transportation (MIT). PR 280 is built on rolling terrain with roadway widths of about 10 m between PR 391 and Split Lake, and 7 m between Split Lake and the north access road junction. Between the PR 290 intersection and Gillam, the roadway is a combination of paved and gravel surfaces. The condition of PR 280 is described by many users as in poor condition and hard on vehicles. YFFN Community Members who regularly use PR 280 have noted the need for frequent windshield repair/replacement (YFFN KPI Program 2009-2010).

In 2003, a safety analysis of PR 280 and the potential impact of additional Project-related traffic was undertaken (Dillon Consulting 2003). The study indicated that the road did not meet current MIT standards for alignment and cross-section guidelines and the safety improvements should be undertaken prior to construction of the Project.

Upgrades to PR 280 between Thompson and Gillam have been initiated by Manitoba Infrastructure and Transportation (MIT) as part of its 2012 infrastructure projects. In conjunction with Manitoba Hydro, MIT identified 45 locations between PR 391 and the north access road (km 177) that required improvements. The upgrades have been divided into two major components: 1) crushing and stockpiling road aggregates and rock cuts, and 2) re-grading, re-aligning, and re-surfacing. The first component of upgrades between Thompson and Gillam have been completed by MIT and the contract for the second component was awarded in 2012. The upgrades are intended to meet a standard that will improve safety and accommodate increased traffic. The upgrades include widening and curve shaving (Government of Manitoba 2010a).

4.3.5.1 Keeyask Cree Nations

Most roads within the KCNs communities are gravel and in poor condition due to underlying muskeg, and the roads experience slumping and drainage issues. The roads can become rutted when wet and dusty when dry.

Some of the communities in the Local Study Area are remote and difficult to access depending upon the season and weather conditions.

Table 4-15 below shows the various ways by which the KCNs communities can be accessed.

Table 4-15: Methods of Accessing Keeyask Cree Nations Reserve Communities

	Split Lake	Ilford	York Landing *(Kawechiwasik)*	Fox Lake (Bird)[1]
Rail	No	Yes	No	Yes
Ferry	Yes (to York Landing)	No	Yes (via Split Lake)	No
Road/Bus	PR 280/Bus	No	No	PR 290
Airport	No	Yes	Yes	No
Winter Road[2]	Yes	Yes	Yes	No

Source: YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2011, Gillam KPI Program 2009-2010; CNP 2010c, CNP 2010f.
Note:

1. FLCN Members living in Gillam have rail, road/bus and air access.
2. Winter roads connect Split Lake to York Factory First Nation at York Landing (*Kawechiwasik*) and War Lake First Nation at Ilford.

4.3.5.1.1 Cree Nation Partners

TATASKWEYAK CREE NATION

Split Lake is located approximately 140 km northeast of the City of Thompson along PR 391 and PR 280, including the 5 km community access road from PR 280 (see). Year round delivery of materials and services is available via PR 280 and Grey Goose Bus Lines and other companies provide the community with freight and goods on a daily basis. Greyhound provides daily bus service from Split Lake to Thompson (Greyhound 2009).

A winter road that is 32 km long connects Split Lake to York Landing *(Kawechiwasik)* and extends another 32 km from York Landing *(Kawechiwasik)* to Ilford. Contracted by MIT, YFFN constructs and maintains the 32 km stretch of the winter road between Split Lake and York Landing *(Kawechiwasik)*. TCN Members use the road to travel to and from York Landing *(Kawechiwasik)* and Ilford. The winter road is typically open from mid-January to late March. TCN Members have noticed that the winter road season appears to be getting shorter. Between 2004 and 2010, the number of days that the road was open varied from 44 days to 64 days, with an average of 57 days. During that same period, on average, northern winter roads in Manitoba were open between 54 and 74 days, with an average of 65 days (CNP 2010c).

Provincial Road 280 is a mostly gravel road that extends about 136 km from Split Lake to Thompson; the last 9 km of road into Thompson is asphalt. Residents have complained that maintenance problems with PR 280 have caused damage to school buses and personal vehicles (CNP 2010c).

The ferry has been owned and operated by MIT, Northern Airports and Marine Branch since 1977. Split Lake has two ferry landing sites, which are in operation from about the 1st of June to the end of October. However, permanent ferry landing structures are required, since existing ferry tie-up cribs were not meant to be permanent. Ferry landing site maintenance is currently handled through contract by Tataskweyak Construction Limited Partnership. TCN ferry operation staff handle minor repairs, while two professionals from Selkirk do major vessel maintenance and repairs (CNP 2010c).

In-season, the ferry runs twice daily except for Tuesdays, which is a general maintenance day. The 20-mile trip between Split Lake and York Landing *(Kawechiwasik)* takes about two hours, with the ferry typically operating around half-capacity. The maximum capacity of the ferry is 15 vehicles, 40 passengers and one super B (tractor/trailer train). Housing materials, food, fuel and heavy machinery are brought to York Landing *(Kawechiwasik)* via the ferry freight service. Service is rarely cancelled; however, approximately twice a year service will be cancelled due to weather-related events (CNP 2010c).

WAR LAKE FIRST NATION

With no permanent road access to the community of Ilford (see Table 4-14), rail service is heavily relied upon for travel and for freight: approximately 60% of all supplies are shipped by rail to Ilford. Via Rail provides passenger rail service three times per week to Churchill, Thompson and Winnipeg, and Omnitrax provides car load freight service up to three times per week out of The Pas. Passenger rates are reasonable, but the service is unreliable, particularly in the summer months. Both Gardewine North and Motorways also provide freight transportation service to Ilford by Hudson Bay Railway or by the winter road network (CNP 2010f).

Air transportation is available through the Ilford Airport, which has been operated by MIT, Northern Airports and Marine Operations since 1974. About 3 km from the community is a 914 m crushed-rock runway with remote-controlled lighting operated by MIT. There are plans to extend the runway by 300 m, which would permit larger aircraft to land, making larger freight loads possible. Currently, the largest aircraft the airport can accommodate is the turbo prop Fairchild Metro, which seats 10 to 12 passengers. There is no scheduled passenger service; however, chartered flights and Medi-Vac services are available. Air traffic is mainly influenced by Manitoba Hydro activities, with less than 5% of all supplies coming into the community arriving by air (CNP 2010f).

A winter road connects Ilford to York Landing *(Kawechiwasik)*, and extends across Split Lake to PR 280. Contracted by MIT, WLFN (CORR certified) constructs and maintains the stretch of the road between Ilford and York Landing. This portion of the winter road network has a shorter operating season due to a number of stream crossings that influence road/ice conditions (Dillon Consulting 2001). The shorter operating season creates challenges for residents of Ilford who rely on the winter road to travel to York Landing *(Kawechiwasik)* and Split Lake. In addition, approximately 35% of supplies are delivered to the community by winter road (CNP 2010f). The winter road is typically open from mid-January to late March. Between 2004 and 2010, the number of days that the road was open varied from 44 days to 64

days, with an average of 57 days, compared to an average 65 days for northern Manitoba winter roads noted above. WLFN also has wanted to have an all-weather road connecting Ilford to York Landing *(Kawechiwasik)* (CNP 2010f).

WLFN and Ilford Community Council jointly maintain the roads within the community. The Airport Road is approximately 1.5 km long and the main street (Railway Road) is approximately 3 km long. Both roads are gravel and lit by streetlights. There are currently plans to build 8 km of new road to the new landfill (CNP 2010f).

4.3.5.1.2 Fox Lake Cree Nation

The community of Fox Lake (Bird) is accessible by all-weather Provincial Road 290 (see Table 4-14). A number of FLCN shuttle buses run between Fox Lake (Bird) and Gillam. The shuttles provide transportation for community Members to attend medical appointments, school and for work and training opportunities. A shuttle bus also provides services for Fox Lake (Bird) residents who wish to purchase groceries in Gillam. The grocery shuttle operates on Monday, Tuesday, Friday and Saturday. FLCN Members living in Gillam have access to the same transportation network described under Section 4.3.5.2 below (FLCN KPI Program 2009-2011).

4.3.5.1.3 York Factory First Nation

As noted in Table 4-15 above, accessing the community of York Landing *(Kawechiwasik)* is possible by ferry, winter road and by air. Map 1-1 shows the location of York Landing relative to other communities in the Local Study Area. Generally, YFFN Members are concerned over not having all-weather road access to the community, resulting in feelings of isolation (especially during freeze-up and break-up of the lake). Community Members rely on the ferry, winter road and air travel for basic necessities such as groceries, country food harvesting, visiting family and friends and traveling to Thompson for social, economic and health related activities (YFFN 2010; YFFN KPI Program 2009-2010).

Manitoba Infrastructure and Transportation's Northern Airports and Marine Operations is responsible for the operation of the ferry, the M. V. Joe Keeper. The ferry operates between Split Lake and York Landing *(Kawechiwasik),* beginning in the spring when the ice on Split Lake breaks up and continuing until the end of October just prior to freeze-up. During the spring thaw, and at other times of the year, debris and floating logs present obstacles to the navigation of the ferry. Manitoba Infrastructure and Transportation hires a community Member to move debris closer to shore where it is less likely to be affected by wind and river currents (YFFN KPI Program 2009-2010).

The ferry transports people, vehicles, construction materials, fuel and heavy construction equipment. The ferry takes two hours to travel between York Landing *(Kawechiwasik)* and Split Lake. It has two scheduled trips per day, except on Tuesdays when it has a prolonged stop at Split Lake for weekly general maintenance. The schedule of the ferry is modified occasionally to accommodate special events, such as large funerals. Occasionally in October, as the days grow shorter, the ferry's service is often reduced to one trip per day since it cannot operate at night (YFFN KPI Program 2009-2010).

The M.V. Joe Keeper can accommodate 15 to 16 vehicles and 40 passengers and has four crew members. Over the years, vehicle traffic on the ferry has been increasing; however, on an average trip, the ferry

carries six to seven vehicles and 39 people. The ferry operates on a first-come, first-served basis and if it reaches capacity, YFFN residents trying to get home may have to stay overnight in Split Lake with family or friends. In 2009, the M. V. Joe Keeper had been in service for 32 years. Ferry workers expect that a replacement ferry will be put into service sometime within the next five years (YFFN KPI Program 2009-2010).

Greyhound provides daily bus service from Split Lake to Thompson for those who take the ferry from York Landing *(Kawechiwasik)*. Returning by bus requires an overnight stay in Split Lake (Greyhound 2009; YFFN KPI 2009-2010).

A 32 km winter road connects York Landing to PR 280 by way of two access points: 1) an access point located 3 km east of the Split Lake Access Road; and 2) another access point directly into Split Lake at the bay near the TCN gas bar. The winter road is typically in use from mid-January to mid-April, depending on weather conditions. As with all winter roads, safety is an issue. YFFN Members have noted increased risks in using the winter road due to slush ice and thin spots along the road (YFFN 2010). Drivers of large vehicles have reportedly found it difficult to negotiate the steep topography at selected locations, and occasionally heavy equipment is required for assistance (Dillon Consulting 2001). The winter road is considered too narrow in places (YFFN KPI Program 2009-2010) and winter water/ice level fluctuations (on Split Lake) of up to 0.6 m can make access at the transition of ice road to land a challenge (Dillon Consulting 2001). Details related to travel safety are included in Section 5.3.5.

When the winter road system to Ilford is in operation, YFFN residents can take advantage of rail service at Ilford (YFFN KPI Program 2009-2010). However, the on-land portion of the winter road system between York Landing (*Kawechiwasik*) and Ilford has a shorter operating season than other portions due to a number of stream crossings that affect road/ice conditions (Dillon Consulting 2001).

YFFN has been gradually acquiring the equipment and staff needed to manage and maintain local roads within the community and for a number of years they have been exploring options for an all-season permanent road to the community. However, at the time of writing, no plans or funding were in place to develop the project (YFFN KPI Program 2009-2010).

An airport is located on the northern edge of York Landing *(Kawechiwasik)* and has been in operation since 1972. Eight years ago, the airstrip was extended by 213.4 m to accommodate larger airplanes. It is now 1,065.3 m long and can accommodate a variety of small- and medium-sized aircraft (YFFN KPI Program 2009-2010).

Air transport companies providing services to the airport in York Landing *(Kawechiwasik)* include Gillam Air Service and Missinippi Airways/ Missinippi Air-Care. Perimeter Aviation also provides air transport and has seven scheduled flights between Thompson and York Landing each week.

The airport experiences more traffic during spring break-up and in the late fall when ice road and ferry access is unavailable. Mail, groceries for the store and medical supplies are transported into the community each month via aircraft. (YFFN KPI Program 2009-2010).

4.3.5.2 Gillam

Gillam is accessible by all-weather gravel road from Thompson via PR 391 and PR 280 (see Table 4-14). The total distance from Thompson to Gillam is approximately 300 km. The condition of the roads within the community varies, but a recent Province of Manitoba budget allocated funds to improve roadways in the community (Gillam KPI Program 2009-2010).

Grey Goose Bus Line provides passenger service to and from Gillam once daily (Gillam 2009). Freight and trucking services to the community are provided by Gardewine and Reimer; and Gillam Taxi provides services within the town.

A rail line and station grounds are found on the south side of the town. VIA Rail provides service to Gillam three times weekly (Gillam 2009). The Town and FLCN have partnered to consider redevelopment of the train station, and planning is in the early stages. The facility would ideally be designed as a multi-function building and include office and meeting spaces as well as room for a museum (Gillam KPI Program 2009-2010).

The airport is found on the north side of the town. The runway surface is gravel and 1,524 m in length (Gillam KPI Program 2009-2010). Calm Air International provides daily regularly scheduled air service to Gillam from Thompson. Direct flights between Winnipeg and Gillam are available on weekdays and Sunday (Calm Air 2009).

4.3.5.3 Thompson

Thompson is accessible from the south by PTH 6 and is shown on Map 4 -1. Within the city limits PTH 6 turns into a four-lane divided street called Mystery Lake Road. This is the primary thoroughfare in the city and it follows the natural contour of the Burntwood River. Mystery Lake Road was widened and resurfaced by MIT through Thompson to the Thompson Airport in 2006. As part of the ongoing strategic resurfacing program, MIT has been upgrading PTH 6 for several years and has invested nearly $45 million since 1999. In the next five years, there will be an additional investment of approximately $68 million, including $10.2 million for bridges (Thompson KPI Program 2008-2010; MIT 2009).

Within the city, approximately 75% of the streets are in need of resurfacing. This work is linked to the overall need for infrastructure renewal since the main water and sewer lines under the streets in many locations also require upgrading. Roads in Thompson are presently being repaired on an as-needed basis, although Mystery Lake Road and the infrastructure beneath it have already been renewed as part of the Province's Highway Renewal Plan (Thompson KPI Program 2008-2010).

Thompson is also served by the Hudson Bay Railway, which is owned and operated by Omnitrax with a network that connects with Canadian National Railway in The Pas. According to Hudson Bay Railway, the tracks are in good condition in the industrial area and there have been a number of upgrades along the Hudson Bay Railway line in 2010 including surfacing, tie installation and general equipment repairs. The main track between Gillam and Wabowden was upgraded with 3,120 feet of rail replacement in 2010 (Community Futures North Central Development 2011).

The Thompson Regional Airport and terminal are owned and maintained by the Thompson Regional Airport Authority and are situated in the Local Government District of Mystery Lake, approximately 5 km northwest of the city. The Thompson airport has daily scheduled service offered by Calm Air International and Perimeter Airlines, and by chartered flights from several other carriers. Calm Air International is based out of Thompson and has scheduled service to several locations in Manitoba and Nunavut. The Thompson airport is also the base for Custom Helicopters, Manitoba Government Air (air ambulance), the RCMP Air Division and various private contractors.

To accommodate increased numbers of users at the airport, the Thompson Regional Airport Authority completed the construction of a new sewage lagoon in 2007, and there are plans to develop a new terminal on the north side of the airport by late 2012. This is part of an overall ten-year development plan that would see the majority of the public infrastructure move to the north side of the airport, along with the development of additional cargo handling and commercial space along the access road (Thompson KPI Program 2008-2010).

There is also a floatplane base on the Burntwood River east of the PR 391 bridge across the Burntwood River. Venture Air flies out of the floatplane base and has one charter aircraft at the airport (LGD of Mystery Lake 2005; City of Thompson 2008;Thompson KPI Program 2008-2010).

Overall, the existing airport and associated services can accommodate the existing air traffic, and it is expected that, with the expansion of the airport in the near future, the airport will be able to accommodate additional growth in air traffic. Calm Air has implemented additional flights from Winnipeg to Thompson to meet increasing demand (Thompson KPI Program 2008-2010).

Thompson has an extensive west and east bus route. The bus service runs regularly every half-hour and is provided by Grey Goose Bus Lines (City of Thompson 2011). Daily Grey Goose bus service also links Thompson to Winnipeg and other destinations. The Grey Goose buses have a 54-person seating capacity and, at the time of writing, there were no capacity issues with the bus service.

4.3.6 Regional Study Area – Population

Table 4-16 indicates that the population of the Regional Study Area is approximately 84,600 in 2006. The table also shows annual average changes in population between Census years ranging from -0.17% to 1.65%. The overall annual average increase is 0.67% between 1991 and 2006. A large proportion (approximately 72%) of the Regional Study Area population is Aboriginal (see Table 4-17), which includes those who identified themselves in the Census as being North American Indian, Metis, Inuit, and/or those who reported being a Treaty Indian or a Registered Indian as defined by the Indian Act of Canada, and/or those who reported they were Members of an Indian Band or First Nation.

Table 4-16: Regional Study Area Total Population and Average Annual Population Change (1991, 1996, 2001 and 2006)

	Northern Manitoba[1,2]			
	1991	**1996**	**2001**	**2006**
Total Population[3]	76,590	83,135	82,435	84,600
Average Annual Population Change[4] (%)	n/a	1.65%	-0.17%	0.5%

Source: Statistics Canada 1992, 1997, 2002, 2007a.
Notes:
1. 1991, 1996, 2001 and 2006 population data consists of 100% of the census population.
2. Northern Manitoba is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
3. Total Population calculated by InterGroup Consultants. Data are subject to Statistics Canada random rounding procedure; population totals are rounded.
4. Average Annual Population Change calculated by InterGroup Consultants as total population change since the previous census, divided by the number of years. Average Annual Population Change for 1996 is measured from 1991, 2001 is measured from 1996 and for 2006, from 2001.

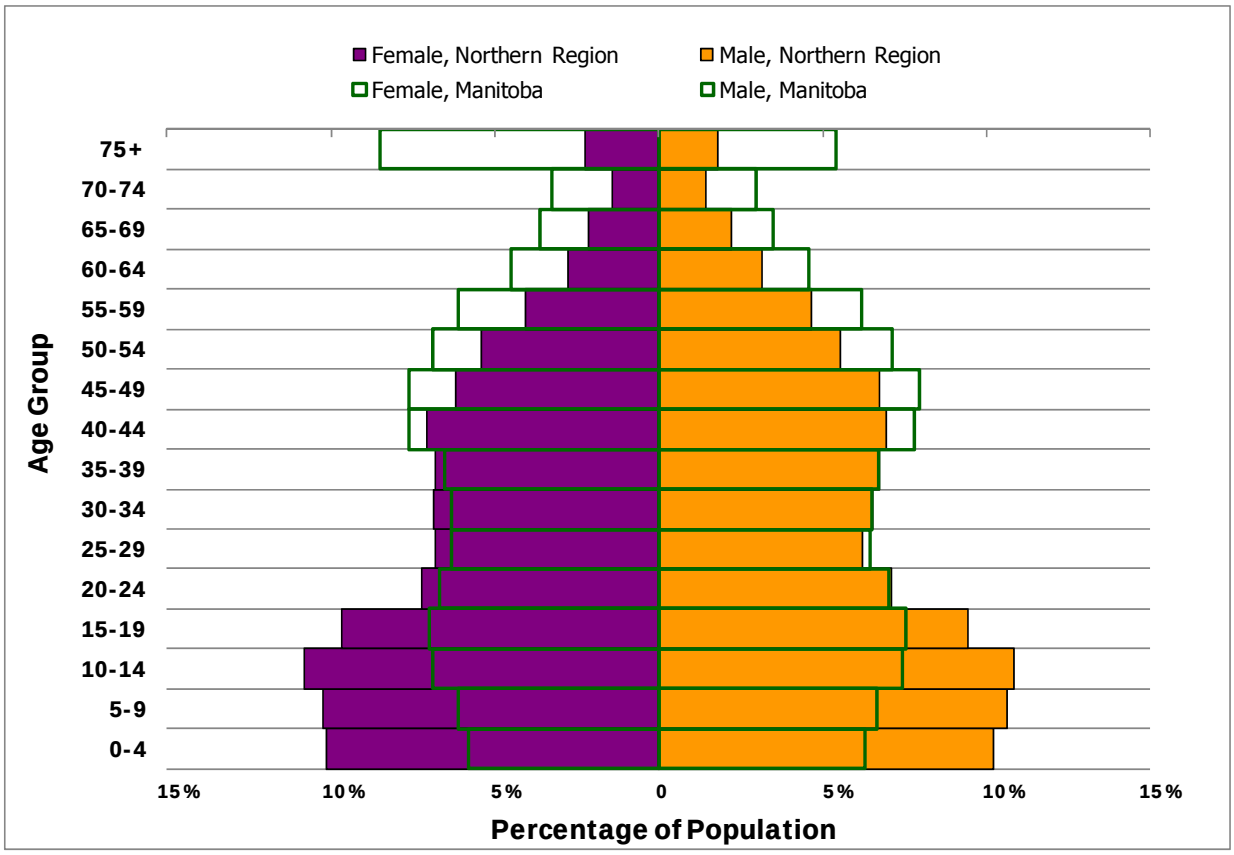
Table 4-17: Total Population of Regional Study Area by Aboriginal Identity (2001 and 2006)

	Northern Manitoba[1,2]	
	2001	**2006**
Total Population[3]	82,435	84,600
Total Aboriginal Identity Population[4]	55,985	61,045
Aboriginal Identity Population[5] (%)	67.9%	72.2%

Source: Statistics Canada 2002, 2007a, 2011a, 2011b.
Notes:
1. 2001 and 2006 population data consists of 100% of the census population.
2. Northern Manitoba is defined as Statistics Canada Census Divisions 19, 21, 22 and 23.
3. Total Population calculated by InterGroup Consultants. Data are subject to Statistics Canada random rounding procedure; population totals are rounded.
4. Statistics Canada refers to the composition of 'Aboriginal Identity Population' as "those persons who reported identifying with at least one Aboriginal group, that is, North American Indian, Metis, or Inuit, and/or those who reported being a Treaty Indian or a Registered Indian, as defined by the Indian Act of Canada, and/or those who reported they were Members of an Indian Band or First Nation". Total Aboriginal Identity Population calculated by InterGroup Consultants as the total population of Statistics Canada Census Divisions 19, 21, 22 and 23 claiming Aboriginal Identity.
5. Percentage of total population with Aboriginal Identity calculated by InterGroup Consultants.

Figure 4-18 demonstrates how the population of the Regional Study Area is relatively young. While Manitoba's age structure is fairly evenly distributed, with slight increases in the 40-49 year old age groups, over 40% of the Regional Study Area's population was in age groups under the age of 20. This pattern of population distribution indicates that the Aboriginal population will continue growing at well above the

rate of the provincial population into the foreseeable future. The Aboriginal population distribution is also indicative of future growth in the labour force as young Aboriginal people being looking for jobs.



Source: Manitoba Health 2006; Statistics Canada 2007a.
Note:
- Statistics Canada refers to Northern Manitoba as Census Divisions 19, 21, 22 and 23.

Figure 4-18: Age Distribution for the Regional Study Area versus Manitoba (2006)

4.3.7 Regional Study Area – Transportation Infrastructure

Northern Manitoba is sparsely populated, and the distances between communities are often quite large. Some communities are isolated and able to access southern parts of the province only by air travel or via the winter road system. Thompson is connected to southern parts of the province via PTH 6. The total distance between Thompson and Winnipeg is 756 km. Provincial Trunk Highway 6 is a paved, two-lane highway, classified as a year-round route with a maximum gross vehicle weight of 62.5 tonnes. Provincial Trunk Highway 6 becomes PR 391 at the south end of the City of Thompson and exits the northwest part of the city.

According to Manitoba's Highway Renewal Plan, the Government of Manitoba has a five-year plan to invest in and renew the existing transportation infrastructure to protect and sustain vital economic lines of commerce (Government of Manitoba 2010a).

4.4 ENVIRONMENTAL EFFECTS ASSESSMENT

The construction and operation phases of the Project would each have different effects on population, infrastructure and services (including land). The pathways to effects on population, infrastructure and services include:

- Additional demand for infrastructure and services by new population (construction and operation);
- Expansion of the Town of Gillam in response to operation phase employment and requirements for other future in-vicinity Manitoba Hydro projects;
- Construction of the south access road and operation of PR 280 along the north access road, across the generating station and along the south access road to Gillam (construction and operation); and
- Transportation of equipment, materials and workers to and from the construction site (construction).

The various factors that would encourage or deter migration are described in detail in Sections 4.4.1 and 4.4.2 for the construction and operation effects, respectively, and implications of increased demand on infrastructure and services by an increase in population are also addressed. With respect to the movement of goods and services, anticipated changes to traffic patterns and travel safety are discussed in Sections 5.4.1.5 and 5.4.2.5 while the implications for infrastructure and services are described in Sections 4.4.1.5 and 4.4.2.5.

Uncertainties associated with the analysis of changes in population pertain primarily to the difficulty in estimating migration behaviour. The decision by an individual and/or family to move to a location involves an array of factors that are difficult to predict with accuracy. Furthermore, it is difficult to ascertain whether in- or out-migration would occur solely as a result of the Project or due to other factors (either acting alone or in combination with the Project).

Additional demand for services may arise from non-resident, camp-based workers visiting Gillam or Thompson during their leisure time. To the extent that these visits result in social issues (see Section 5.3.4) there could be greater demand for social services.

Project effects during the construction phase on transportation infrastructure and services in the Local Study Area are described in Section 4.4.1.5 and in the Regional Study Area in Section 4.4.1.7; and Project effects during the operation phase are discussed in Section 4.4.2.5. Most of these effects are linked to the movement of goods, equipment and people to the Project site during the construction phase, and potential incorporation of the north and south access roads into the provincially managed PR 280.

4.4.1 Construction Effects and Mitigation

4.4.1.1 Population – Local Study Area

This section describes the anticipated effects of the Project due to people moving to communities as a result of employment in the construction workforce and the short-term influx of non-resident, camp-based workers visiting communities during their time off.

4.4.1.1.1 Keeyask Cree Nations

In-migration of workers and their families to the KCNs communities has the potential to affect housing, infrastructure and services in communities, particularly where existing amenities and services are at capacity. However, the Project is not expected to result in notable changes to population in the KCNs communities. Net in-migration associated with Project construction is expected to be quite small, although the KCNs have expressed the concern that any in-migration would stress services that are already at capacity. There are several reasons why net in-migration is expected to be quite low; they are as follows:

- There is a lengthy waiting list for on-reserve housing in all of the KCNs communities. This may deter KCNs families from moving to the communities specifically to work on the Project.
- Construction workers are provided with free accommodation and meals at the construction camp(s) while employed on the Project. This makes it less expensive to live at the construction camp than in a nearby community.
- The work rotation schedule (*e.g.*, 10-12 hour days) and distance from the Project site to the communities would deter workers from travelling to and from work on a daily basis. This is particularly true for WLFN and YFFN communities, which do not have all-weather road access to and from their communities (thereby making a daily commute infeasible).
- The work rotation schedule is expected to include approximately one week off between rotations, providing sufficient time for workers to travel to more distant home locations during their time off. This would reduce the incentive to relocate closer to the Project.
- KCNs Members would qualify for Project hiring preferences regardless of their home address (*e.g.*, there would be no need to live in the reserve community in the Local Study Area to receive the best access to construction jobs)[1]. It should be noted that some concern has been expressed by some KCNs community Members that this opportunity for hiring regardless of home address should be better publicized to off-reserve Members (CNP *pers. comm.* 2012).
- Some out-migration may occur by community residents in the Local Study Area who secure construction employment and improve their financial status. With increased financial capacity, some workers and their families may chose to move from their home communities to larger centres that offer better and more diverse housing and services (*e.g.*, education, specialized medical care); or they may move for other reasons. If this occurs, the number of out-migrants would likely be small; however, those involved could be important contributors to community capacity. Out-migration would offset some of the potential in-migration.

[1] The July 2009 Letter of Agreement No. 23 to the BNA, Article 12 notes that "all candidates who are members of a KCN, are residents of Manitoba, and are registered with the Province of Manitoba (as the job placement and referral agency for the Project) shall be deemed to be Northern Aboriginals residing within the Churchill/Burntwood/Nelson River Area as described in Article 12.1.1.3(a) [of the BNA] and thus eligible for first preference hiring" (Manitoba Hydro and Allied Hydro Council 2009).

During pre-project planning for construction of the Wuskwatim Generation Project, Nisichawayasihk Cree Nation Members expressed some concern that large numbers of Members would return to the community to access construction jobs. While the employment preference permitted hiring of Nisichawayasihk Cree Nation Members from off-reserve locations in southern Manitoba, it was felt that those living on-reserve would have an advantage in being close to Nisichawayasihk Cree Nation businesses awarded DNCs based on-reserve when hiring was undertaken. Despite these concerns, the community saw very limited in-migration directly attributable to the Wuskwatim Generation Project, while some out-migration occurred when Members secured employment and relocated to larger centres (Thompson KPI Program 2009-2010).

The above factors suggest low levels of Project-induced net in-migration to KCNs communities and any resulting effects on housing, infrastructure and services in these communities may occur. The following is the estimated net in-migration to each of the KCNs communities during Project construction, taking into account the size of the community, its proximity or access to the Project and other factors identified above:

- TCN at Split Lake: 0-15 people;
- WLFN at Ilford: 0-3 people;
- YFFN at York Landing (*Kawechiwasik*): 0-3 people; and
- FLCN in Gillam and/or Fox Lake (Bird)[1]: 0-10 people.

It should be noted that YFFN Members have speculated that some Members may relocate closer to the Project for work. For example, Members living in Winnipeg may consider a move to Thompson or Gillam; and some people from York Landing (*Kawechiwasik*) may consider a move to Gillam to enable family members to work at Keeyask and continue to have their families nearby (YFFN Future Development 2010).

SHORT-TERM INFLUX OF WORKERS

Some KCNs Members living off-reserve and working on the Project are likely to take the opportunity to visit family and friends in the Local Study Area during their leisure time. Such visits are likely to be for short periods of time (*e.g.*, possibly for the week between rotations). FLCN has expressed substantial concern about the influx of non-local construction workers into Gillam, which is discussed in more detail in Section 5 3.4. Similar concerns have also been raised by TCN about visits by non-local construction workers to Split Lake.

[1] Housing constraints in Fox Lake (Bird) would impede net in-migration, while housing in Gillam may offer some opportunities for FLCN members to return to the community, although housing in Gillam is also near capacity.

4.4.1.1.2 Gillam

Gillam is not expected to see any substantial population growth as a result of Project-related construction. This is due to several factors, including the following:

- Housing for workers would be provided at the construction camp(s);
- The work rotation schedule (*e.g.,* 10-12 hour days) and distance from the site to Gillam would deter members from commuting on a daily basis;
- The work rotation schedule is expected to include approximately one week off between rotations, allowing sufficient time for workers to return to their home communities or larger centres during their time off; and
- Housing in Gillam is currently at capacity, and new housing planned by Manitoba Hydro and other employers is designed to meet specific housing needs unrelated to Project construction.

Small increases in population may occur if FLCN Members decide to return to the community (see Section 4.4.1.1).

SHORT-TERM INFLUX OF WORKERS

Gillam is expected to experience some short-term influx of workers related to the Project. This could include non-local senior Manitoba Hydro employees and contractors who may require local accommodation if space is not available at the construction site. It also could include construction workers in transit to and from the construction site and or visiting the town during their leisure hours. It is difficult to accurately estimate how many workers would arrive at any one time in Gillam. Factors that may affect the total number of people likely to visit the town include:

- The work rotation schedule (*e.g.,* 10-12 hour days);
- Distance from the construction camps to Gillam (work sites and work camps would be located on both the north and south sides of the Nelson River):
    - The main construction camp on the north side of the Nelson River is approximately 140 km to Gillam. The north side camp has a capacity of 2,000 workers; and
    - The location of the south side construction camp will be finalized with the contractor. The locations under consideration are near the Butnau Dam or somewhere in closer proximity to the town. The south side camp has a capacity of 100 workers.
- Available transportation;
- Location of worker's permanent residence; and
- Desired services and amenities (*e.g.*, restaurant meals and visits to taverns).

Given the range of factors that could affect a worker's decision to travel to Gillam during leisure hours, it is difficult to predict with any accuracy how many people may visit Gillam in a given time period. What can be assumed is the following:

- The level of worker influx into Gillam is more likely to increase with the number of workers living in the construction camp(s). This suggests that the highest levels would occur during seasonal peaks (Q2 and Q3) and overall yearly peaks (*i.e.,* Years 3 and 4) during the construction period. Workers could visit during the day, in the evening, or during their week off. Workers at the north side camp are more likely to choose Thompson, and possibly Split Lake over other destinations in the Local Study Area.
- Workers from the construction camp on the south side of the Nelson River (between 75-100 people; the location of the camp has not yet been determined) are more likely to select Gillam over other destinations in the Local Study Area.
- Given the small size of the community, even a small number of construction workers coming into Gillam or Split Lake would be noticeable.

FLCN Members residing in Gillam are particularly sensitive to an influx of non-local workers due to their history with past hydroelectric developments (this is discussed in greater detail in Section 5.3.4). TCN has voiced similar concerns regarding non-local construction workers coming into Split Lake.

4.4.1.1.3 Thompson

Thompson is not expected to see any material population change as a result of Project construction. Due to a lack of affordable housing, including a lack of affordable rental accommodations, and the fact that there is substantial time off in between work rotations, workers would likely travel to their home community when they are not working as opposed to staying in Thompson. As such, no measurable Project-related change in the population of Thompson is expected.

SHORT-TERM INFLUX OF WORKERS

Thompson is expected to experience some short-term influx of workers visiting the city during their leisure hours. Similar to Gillam, there is a range of factors that may affect the total number of construction workers who may visit the city, including the following:

- The work rotation schedule (*e.g.,* 10-12 hour days);
- Distance from the construction camps to Thompson (approximately 208 km from the camp on the north side of the Nelson River to Thompson and approximately 100 km further from the south side of the Nelson River);
- Available transportation;
- Location of worker's permanent residence; and
- Desired services and amenities for leisure time (*e.g.*, restaurant meals and visits to taverns).

Given the range of factors that could affect a worker's decision to travel to Thompson during leisure hours, it is difficult to predict with accuracy how many people may visit in a given time period. What can be assumed is the following:

- Short-term visits to Thompson are more likely to occur when construction activity is at its peak. This includes both seasonal peaks (Q2 and Q3) and overall yearly peaks (*e.g.*, Years 3 and 4) during the construction period. Workers could visit during the day, in the evening, or during their week off.
- Construction workers during their week off may select Thompson over other communities in the Local Study Area due to the greater range of services and amenities available.

Given the size of the community, an influx of workers is less likely to be noticed than in smaller communities. However, YFFN has noted a concern about effects associated with any in-migration on KCNs Members living in Thompson. This is discussed more fully in Section 5.3.4.

4.4.1.1.4 Mitigation

No mitigation is proposed to address potential population change in the Local Study Area. Given the difficulty of accurately estimating the precise levels of in- and out-migration, it is recommended that monitoring of population change in KCNs communities be included as part of an overall socio-economic monitoring program (see Section 4.4.2.8).

The only population change in Gillam is anticipated to be limited to the short-term influx of non-local workers seeking temporary accommodation or services mainly during their leisure hours. Mitigation measures described in Section 5.4.1.4 would help to minimize the overall volume of people travelling to Gillam. Since Thompson is a larger urban centre (compared to Gillam), it is assumed an influx of workers will be handled by the community. Section 4.4.3 describes the summary of residual Project effects on population in both the construction and operation phases.

4.4.1.2 Housing – Local Study Area

4.4.1.2.1 Keeyask Cree Nations

As discussed in Section 4.4.1.1, it is expected that few KCNs community Members would move back to their respective communities as a result of Project construction. This is due in part to the overall lack of available housing in communities. In addition, KCNs Members are not required to live in their home communities to be eligible for preferential hiring on the Project. The estimated in-migration to each KCNs community during Project construction as noted in Section 4.4.1.1, is expected to be low (0-15 people; an upper range of three is expected in the smaller communities)[1]. With limited new Project-related population, it is expected that there would be little new demand for housing in each of the KCNs communities as a result of the Project. It is also expected that existing capacity issues would remain largely unchanged.

[1] Housing constraints in Fox Lake (Bird) would impede net in-migration, while housing in Gillam may offer opportunities for FLCN Members to return to the community, although housing in Gillam is also near capacity.

It is also possible that construction employment income from the Project may allow community Members to move to larger centres. This could alleviate, to a small degree, some of the existing demand for housing and reduce the number of Members on waiting lists. As a result of construction of the Wuskwatim Generation Project, the rate of population change in Nelson House due to in-migration has been indistinguishable from normal population trends (Wuskwatim Power Limited Partnership 2009). This is in contrast to the net in-migration that was anticipated to occur based on Members' estimates of migration behaviour (Manitoba Hydro and NCN 2003). This underscores the uncertainty surrounding migration behaviour.

There is also potential for KCNs Members working on the Project, whose permanent residence is outside the Local Study Area, to return to their home communities in the Local Study Area between work rotations to visit family and friends. Although some communities offer accommodations for visitors, this may have a short-term, but minor effect on crowding in a few of the homes in the KCNs communities, in particular for TCN in Split Lake and for FLCN in both Gillam and Fox Lake (Bird), since these locations are accessible via all-weather road (unlike WLFN and YFFN with limited, winter-road access).

4.4.1.2.2 Gillam

During construction of the Project, it is expected that Gillam would experience limited in- or out-migration. A small number of returning FLCN Members to Gillam or Fox Lake (Bird) (estimated at 0-10 people as per Section 4.4.1.1) could add to the housing demand, which is currently at capacity for FLCN Members in Gillam and Fox Lake (Bird).

There could be increased demand for temporary accommodation in Gillam; sources of this demand could include Manitoba Hydro senior employees and contractors unable to access short-term accommodation at the construction site, as was the experience at the Wuskwatim construction site (Thompson KPI Program, 2009-2010). There could also be demand for temporary accommodation by construction workers who travel to Gillam during leisure hours and/or days off to access services and amenities or by workers travelling to and from the construction camps at rotation turnover. The demand would be greatest during construction activities on the south side of the Nelson River due to the close proximity of Gillam to the south construction camp[1]. Hotels in Gillam already experience low vacancy rates, and an increase in demand for temporary accommodation by those associated with the Project could place added pressure on hotels and other hospitality services. Manitoba Hydro is installing accommodations for up to 60 individuals at a construction camp for the Kettle Generating Station upgrade in order to relieve additional pressure on hotels and hospitality services in Gillam during the construction phase of the upgrade (between 2010 and 2017). These temporary accommodations, completed in December 2010, would be available for future Manitoba Hydro projects as well as future capacity in Gillam.

[1] At the time of writing, the location of the south side construction camp was not yet determined; however, one option was in the immediate vicinity of the town. If the camp is located within or immediately next to Gillam, it is anticipated there would be reduced demand on short-term accommodation.

4.4.1.2.3 Thompson

Thompson is not expected to see any new material Project-related demand for rental or purchased housing during the construction phase because net population change in Thompson is not anticipated to occur during the construction phase (see Section 4.3.1.4). Thompson is too expensive to be an attractive place for workers to secure a permanent residence to stay at between contracts. While some workers may choose to move their families to Thompson while they are working at the job site, the total number is expected to be quite small as is their impact on the Thompson housing market. If Vale's plans to shut down their Thompson smelter and refinery proceeds as proposed, some housing is likely to become available as workers affected by the closure leave the community to work elsewhere.

However, it is expected that Thompson would experience an increase in demand for temporary accommodations, generated by non-local construction workers accessing amenities and services or staying in the community when arriving or departing the region. At present, hotels and other temporary accommodations in the city experience low vacancy rates throughout the year. Recent extended stay facilities have helped to reduce the overall strain on accommodations as people coming for stays of one week to one month have other options. It is expected the market will respond to increased demand if plans for the Super 8/Best Western are completed in the near future; otherwise, shortages in temporary accommodations could occur.

4.4.1.2.4 Mitigation

Given the difficulty in estimating migration behaviour accurately and, therefore, the precise level of in and out-migration, by extension there is also uncertainty in predicting new demand for housing. No mitigation is proposed. As part of a socio-economic monitoring program (SEMP) the increased demand for housing in the KCNs communities would be investigated through a one-time set of KPIs with representatives of the KCNs Housing Authorities. Population changes would also be monitored (see Section 4.4.1.8).

In addition to potential FLCN Members returning to Gillam, potential effects on housing in Gillam are anticipated to be related to people seeking short-term accommodation. Manitoba Hydro, the Town of Gillam and FLCN are involved in a long-term Gillam Land Use Planning process that is anticipated to address future community growth, including housing and commercial development. Population changes in Gillam will be monitored during Project construction.

In both Gillam and Thompson, it is anticipated that the market would respond to an increased demand for temporary accommodation; therefore, no mitigation or monitoring is required.

4.4.1.3 Infrastructure and Services – Local Study Area

Effects on infrastructure and services stem from the following main sources:

- Changes in population resulting from the Project;
- Employment on the Project;
- Proximity to the Project; and

- An increased need for social services resulting from changes in lifestyle (see Section 5.4.1.2) (described in greater detail below).

The extent to which these sources of change affect any given community would vary; in many instances, the anticipated change would be negligible or would be accommodated within the capacity of existing facilities and services. Where more substantive effects are anticipated, effects and mitigation measures are discussed in greater detail.

4.4.1.3.1 Keeyask Cree Nations

As noted previously, the estimates for increases in population for the KCNs as a result of the Project range between 0-3 people in the smaller communities and 0-15 people in the larger communities. While these are relatively small changes in each community's population, they could put a strain on services whose capacity limits are being approached or have already been exceeded as discussed in further detail below and in Section 5.3.4.

Increased disposable income and the potential for increased spending and availability of alcohol and drugs is a key concern (FLCN KPI Program 2009-2011; CNP 2010b). Lack of alternative expenditure opportunities in Gillam and the KCNs communities may contribute to these spending choices, particularly in combination with an influx of non-local workers. A "work hard/play hard" mentality has been documented elsewhere in development projects (Vanclay 2002) and the root causes of such behaviour are further explored in Section 5.3.4. This may increase demand on social services that are already at capacity in the KCNs communities including addictions-related services (*e.g.*, NNADAP), policing and other social services (*e.g.*, Awasis, Brighter Futures). The causes for needing additional services, as well as potential mitigation measures, are discussed further in Section 5.4.1 and 5.4.2. The potential for associated violence or public safety issues is discussed in detail in Section 5.4.1.4.

Parents who could be involved in Project employment and find themselves spending extended periods of time away from home may require additional family support in terms of counselling, family support services and accessible, affordable childcare. If a family member is away for long periods of time, the remaining parent or extended family is often faced with greater responsibilities in managing the household. Factors that may affect the level of stress experienced by Members remaining in the community and their overall ability to cope are dependent on the stage of a family's lifecycle, the number and ages of dependent children, the quality of communication and cohesion within the family, the proximity of any extended family (*e.g.*, aunts, uncles, grandparents), the duration of the worker's absence and the partner's work status (Taylor and Simmonds 2009;).

Day care options are particularly important to enable women to access Project jobs and can be an obstacle to a worker's ability or willingness to apply for and/or stay on the job. Day care and childcare options are limited in the KCNs communities, with the exception of FLCN in Fox Lake (Bird) where there is no day care. TCN's, WLFN's and YFFN's facilities are already operating at capacity. The communities may experience an increased demand for childcare options during the construction phase as individuals with families assess whether or not to pursue Project employment. This is an entrepreneurial opportunity available to the KCNs communities. Communities have also expressed concern that the Project could draw skilled individuals away from local jobs in the community (*e.g.*, social services,

construction, government) to work at the Project's construction camp. If this occurs, it could limit the ability of community-based service providers to attract qualified employees; however, it may also offer an opportunity for additional people to get engaged in the local workforce.

KCNs ADVERSE EFFECTS AGREEMENTS – INFRASTRUCTURE AND SERVICES

Each of the KCNs signed an AEA with Manitoba Hydro to address known or foreseeable adverse effects on the First Nation, as described in Section 1.2.1. These agreements have the potential to create new infrastructure and services; they are summarized in Table 4-18.

Table 4-18: New Infrastructure and Services Described in Adverse Effects Agreements of the Keeyask Cree Nations

Offset Program	New Infrastructure	New Services
Tataskweyak Cree Nation		
Keeyask Centre	√	√
Access, Land Stewardship, Healthy Food Fish and Traditional Foods Programs	√	√
Traditional Lifestyle, Traditional Knowledge Learning, Cree Language and Museum and Oral Histories Programs		√
War Lake First Nation		
Fish Distribution Centre	√	
Improved Access and Community Fish Program	√	√
Traditional Learning/Lifestyle, Cree Language and Museum and Oral Histories Program		√
Fox Lake Cree Nation		
Gathering Centre	√	√
Youth Wilderness Traditions, Cree Language, Gravesite Restoration and Alternative Resource Use Programs		√
Crisis Centre and Wellness Counselling Programs; Alternative Justice Lateral Violence and "Where do we go from here" Program	√ (in Gathering Centre)	√
York Factory First Nation		
Cultural Sustainability Program	√	√
Resource Access and Use and Environmental Stewardship Programs		√

4.4.1.3.2 Gillam

Gillam is the urban centre in closest proximity to construction activities and is especially close to activities associated with the south access road, south dykes and the associated construction camp on the south side of the Nelson River. As such, Gillam and FLCN Members who reside in Gillam (and Fox Lake (Bird)) are likely to experience effects on infrastructure and services associated with short-term influxes of workers.

It is difficult to predict the exact effect the short-term influx of people may have on a community, since the total number of visitors at any one time is unknown. Among the potential effects of short-term influxes of workers are the following:

- Increased pressure on emergency services; and
- Increased pressure on community facilities and services.

Many of the social services are funded on a per capita basis by various provincial and federal funding programs. While these funding formulae may be appropriate for addressing typical community needs, it is possible that additional, short-term funding arrangements may be required to address incremental requirements for infrastructure and services arising from Project construction.

EMERGENCY SERVICES

Increased pressure on emergency services could result from a short-term influx of workers, as well as the potential need to provide support to the south access road construction camp. Workers based at the main construction camp on the north side of the Nelson River over the entire construction period would range from a low quarterly peak of just over 100 people to upwards of 1,600 people at the peak of construction in years three and four. During 22 consecutive quarters between years two and seven, more than 300 workers would be living in the main construction camp. At the south side construction camp, there will be approximately 100 people in camp including contractors, service personnel (*e.g.*, catering, security), and Manitoba Hydro staff.

One example of potential pressure on services would be that workers (particularly at the south side camp) may chose to access health services in Gillam when on-site health services cannot address medical needs. It is expected that such visits would be infrequent and could be accommodated by existing services. Both construction camps would be equipped with ambulances and associated medical staff, so emergency care would be available at both sites. At the main camp (on the north side) there will be 24 hour/7days per week emergency medical and ambulance services as required under the *Emergency Medical Response and Stretcher Transport Act* and the Land Emergency Medical Response System Regulation. It is anticipated that two accredited Primary Care Paramedics will be on duty at all times and one Advanced Care Paramedic shift supervisor during the day shift. Services include addressing emergency situations at any location throughout the site, management of health monitoring clinics and provision of immediate medical treatment and preparing patients for extraction (if required). Major medical emergencies may require that patients be transported to Gillam, Thompson or Winnipeg by Medi-Vac. Again, the likelihood and frequency of such events is expected to be minimal and to be accommodated by existing services.

Additional demands could arise for RCMP services. This may include the need to respond to calls at the construction camp (although it is expected that on-site security services would deal with the majority of incidents) and to respond to calls related to the influx of non-local workers into the Gillam area and to a lesser degree, possibly in Split Lake. While the Thompson and Gillam RCMP detachments have adequate personnel to meet the needs of the existing population, the increase in visitors and the potential for inappropriate behaviour may place strain on the detachments' current capacities (see Section 5.3.4 for greater detail on RCMP, Band constables and public safety). There will be a need for continued communication by the Partnership with the RCMP regarding the Project, including construction schedule and anticipated timing of the peak workforce.

COMMUNITY FACILITIES AND SERVICES

During construction of the south access road and dykes starting in Year Two and continuing through Year Six (primarily during the summer months), there may be potential for construction workers to access community facilities and services in Gillam. The location of the south construction camp is yet to be determined (likely by the Project contractor), with possible locations near the Butnau Dam or somewhere in closer proximity to Gillam. In addition, the south side construction camp would be considerably smaller (approximately 100 people) as compared to the main construction camp (with a peak of 1,600 workers) and would lack amenities such as a recreation facility and a lounge.

Although it is anticipated that most community facilities and services could accommodate the sporadic needs of a short-term influx of construction workers, there may be increased demands on social services to support residents of the community. Based on experiences with past projects, there is the potential that additional social services could be necessary to support local residents who partake in a "work hard/play hard" lifestyle that can accompany major construction projects (FLCN KPI Program 2009-2011) (see Section 5.3.4 for further detail). The services that may need to increase their capacity include Awasis and NNADAP, which are discussed in further detail in Section 5.4.1.4.

Support to families may also be necessary if family members are successful in gaining construction employment. If a family member is away for long periods of time, the remaining parent or extended family member may be faced with greater responsibilities in managing the household. Several stakeholders noted the lack of accessible and affordable childcare and day care options in the community, as well as accessible and affordable programming for youth (Gillam KPI Program 2009-2010; FLCN KPI Program 2009-2011). The Gillam childcare facility has responded to increased demand and is building a new facility with expanded capacity (Manitoba Hydro, *pers. comm.* 2012). Parents who are involved in Project employment may need additional counselling and family support services both of which will be available at the Project site through the employee retention and support services contract.

A short-term influx of workers may also place pressure on accommodation (see Section 4.4.1.2) and hospitality services, which are already limited in terms of options and hours, and experience challenges in hiring and retaining qualified staff. Although this may create stress for existing hotel, restaurant and bar owners, there is also potential for business owners and other entrepreneurs to benefit from the influx of new clients.

4.4.1.3.3 Thompson

Effects on infrastructure and services in Thompson are likely to occur primarily during the Project construction phase. Thompson is the regional centre and transportation hub of central northern Manitoba and is the closest large centre to the Project. It is anticipated that Thompson would experience short-term influxes of workers seeking amenities and services during their leisure time. Given the relative size of the community, it is anticipated that such effects would be less pronounced than in Gillam. However, YFFN has noted a concern about effects associated with any in-migration on KCNs Members living in Thompson (this is discussed more fully in Section 5.3.4). YFFN, as well as other KCNs communities have a heavy reliance on the health and social services and commercial infrastructure of Thompson. Construction workers using these services will affect others' ability to access the services, causing a burden to Members living in Thompson (YFFN *pers. comm.* 2011).

EMERGENCY SERVICES

A short-term influx of construction workers has the potential to affect emergency services, including the RCMP, whose services may be required should incidents involving construction workers occur. Based on previous experiences, there is potential for issues associated with drinking and fighting in local establishments and bars involving construction workers (Thompson KPI Program 2008-2010). There will be a need for continued communication by the Partnership with the RCMP regarding the Project, including construction schedule and anticipated timing of the peak workforce, to enable the RCMP to assess their capacity needs accordingly.

COMMUNITY FACILITIES AND SERVICES

Short-term influx of workers into the community may also place pressure on accommodation and hospitality services, some of which already experience challenges in hiring and retaining qualified staff. Although this may create stress for existing hotel, restaurant and bar owners, there is also potential for business owners and other entrepreneurs to benefit from the influx of new clients.

4.4.1.3.4 Mitigation

KEEYASK CREE NATIONS

Although difficult to accurately estimate the precise changes affecting infrastructure and services in the KCNs communities, suggested mitigation measures include the following:

- Ongoing communication between Manitoba Hydro and local service providers (*e.g.,* NNADAP) to allow for effective and timely planning of service delivery;
- Through the FLCN AEA, increase youth recreation programming (*e.g.,* FLCN's Youth Wilderness Traditions Program);
- Increasing accessible and affordable daycare options (this is an entrepreneurial opportunity available to the KCNs communities); and
- Available counseling services at the site for KCNs workers and their families, if needed.

In addition to the above, there will be no hiring at the Project site; this may deter workers from returning to the Local Study Area in hopes of acquiring employment on the Project.

GILLAM AND THOMPSON

Sharing of information with the emergency services in Gillam and Thompson regarding the timing and nature of construction activities and extent of any potential need for their services would be conducted. As noted in Section 4.3.3, the RCMP have recognized there may be the need to increase local capacity, particularly during peak construction years and overlap with other in-vicinity projects.

Mitigation measures in Gillam and Thompson include:

- The Partnership will continue to keep the RCMP informed about the Project, including construction schedule and anticipated timing of the peak workforce (Gillam and Thompson); and
- Through the FLCN AEA, increase youth recreation programming (*e.g.*, FLCN's Youth Wilderness Traditions Program) (Gillam).

The Proponent is committed to keeping relevant government and community organizations informed about Project plans on a timely basis to enable these groups to undertake effective planning. In Gillam, the Gillam Land Use Planning process currently underway is a forum for addressing demands on infrastructure and services.

Monitoring of Project effects will be part of a socio-economic monitoring program (see Section 4.4.1.8).

4.4.1.4 Land – Local Study Area

As detailed in Chapter 4 of the Response to EIS Guidlines, the Project site is located on provincial Crown land, which would be purchased by the Partnership prior to the start of construction. The Project will require approximately 12,229 ha of land during the construction phase, and 12,769 ha of land during the operation phase for both permanent and temporary facilities, including the construction worksite, work camps, principal structures, dykes, roads, borrow areas and for the land required for creation of the new reservoir (see Table 4-2 in Chapter 4 of the Response to EIS Guidelines).

4.4.1.4.1 Keeyask Cree Nations

The Project would not affect any reserve land within the KCNs communities or any TLE selections identified by the KCNs. However, it is expected to have effects on lands within areas used and accessed by the KCNs communities as the Project lands are within their traditional territories and specifically within the SLRMA. The Resource Use Section of this SV discusses the effects that the Project would have on people's perceptions of land and water in the area.

4.4.1.4.2 Gillam

Manitoba Hydro, the Town of Gillam and FLCN are engaged in the ongoing Gillam Land Use Planning process to examine the future needs of the community including the need for new serviceable land. As an initial step the Gillam Land Use Requirements and Availability Study (HTFC 2008) provided an identification of land use program requirements and values of all stakeholders, the existing conditions,

estimates of future land requirements and land tenure options for consideration by the stakeholders. This study was followed by the drafting of a new community development plan (Dillon Consulting 2012). The long-range planning of Gillam will consider requirements associated with operation workforces for the Project and other future Manitoba Hydro projects served by Manitoba Hydro's Gillam operations base.

During the construction phase, changes to land in the Town of Gillam would relate primarily to the potential reconfiguration of transportation routes to improve efficiency and safety, which is discussed in Section 4.4.1.5.

4.4.1.4.3 Thompson

Project effects on land or land use in the City of Thompson relate to the transportation of equipment and materials through the city and storage of materials at an off-loading site. If materials and equipment are shipped by rail, they would be off-loaded in Thompson at the rail yards and transferred to trucks for shipment to site, requiring a parcel of land for storage. As noted in Section 4.3.5.3, there is sufficient capacity at the existing rail yard for off-loading and short-term storage of freight prior to hauling to site. The use of existing rail yard for off-loading does not require either the purchase of land by Manitoba Hydro or any zoning amendments.

4.4.1.4.4 Mitigation

As demonstrated in the discussion above, the Project is expected to have no effects on land owned by the KCNs communities in the Local Study Area; therefore no mitigation or monitoring is required. Use of the Project area by KCNs Members has been addressed through each of their respective AEAs; therefore no additional mitigation or monitoring is required.

In the case of Gillam, potential effects on land relate to any need for transportation-related changes on travel routes in Gillam. The land use planning process in Gillam will need to consider potential changes to transportation infrastructure and associated land requirements during the construction of the south access road. It is anticipated that this planning process will incorporate transportation needs; therefore, no mitigation or monitoring is required.

4.4.1.5 Transportation Infrastructure – Local Study Area

Project effects on transportation infrastructure and services in the Local Study Area would include increased use of rail, air and road networks related to the transport of people, equipment and materials to the Project site. Each of these is addressed below.

PR 391 and PR 280 will have the capacity for increased traffic flow before the construction phase begins. Upgrades to PR 280 between Thompson and Gillam have been initiated by MIT as part of its 2012 infrastructure projects. In conjunction with Manitoba Hydro, MIT identified 45 locations between PR 391 and the Keeyask north access road (at km 177) that required improvements. The upgrades have been divided into two major components: 1) crushing and stockpiling road aggregates and rock cuts, and 2) re-grading, re-aligning and re-surfacing. The upgrades include widening and curve shaving. The first phase of upgrades to PR 280 between Thompson and Gillam has been completed by MIT and the contract for re-grading, re-aligning, and re-surfacing was awarded in 2012. By the time Project construction begins, the upgrades are intended to meet a standard that will improve safety and

accommodate increased traffic (Government of Manitoba 2010a). However, community Members have noted concerns that there will be increased damage to vehicles (*e.g.*, windshield damage) and increased collisions due to an increase in traffic associated with the Project (see Section 5.4.1.5 and 5.4.2.5 for further detail). Manitoba Hydro is managing the upgrading project in partnership with MIT. Costs and workload will be shared between Manitoba Hydro and MIT, and MIT will continue to own and maintain the roadway as their asset following completion of the upgrades.

As a component of the Keeyask Infrastructure Project, and prior to the start of the Project, the two-lane all-weather gravel Keeyask north access road will be constructed starting at kilometre 174 on PR 280, approximately 185 km east-northeast of Thompson, and extending approximately 25 km east to the north shore of Gull Rapids (Keeyask Hydropower Limited Partnership 2009). Issues related to travel safety to and from the Project site and Thompson are considered in Sections 5.4.1.5 and 5.4.2.5.

Construction of the south access road will create new transportation infrastructure that will be used during construction activities on the south side of the Nelson River. The south access road starts at the Butnau Dam and continues to the south side of the generating station. The route was selected through a process that involved representatives from the KCNs, Manitoba Hydro, and MIT. During the construction phase, the north and south access roads will be private roads owned and operated by the Partnership. In addition to the construction of the south access road, the existing Butnau road will require upgrading (this is being undertaken by Manitoba Hydro separately).

A Construction Access Management Plan is being developed by Manitoba Hydro and the KCNs to manage access to the Project site via the north and south access roads during the construction phase of the Project. This will include plans related to security gates, security patrols, and conditions for the use of the roads during the construction phase.

4.4.1.5.1 Keeyask Cree Nations

There are no anticipated effects on transportation infrastructure in the KCNs communities as a result of Project construction. The north and south access roads fall within the SLRMA, within an area currently accessed by KCNs Members for resource harvesting.

The Construction Access Management Plan being developed by Manitoba Hydro and the KCNs is intended to retain, to the extent feasible, existing access for KCNs resource users to areas that they previously used for resource harvesting.

4.4.1.5.2 Gillam

Project effects on transportation infrastructure and services in Gillam would include:

- Increased vehicular traffic from construction workers and contractors visiting Gillam to access services;
- Increased truck travel and wear on the road networks related to construction of the south access road and dykes;
- Potential for increased air travel to Gillam by construction workers and contractors who fly to Gillam (rather than Thompson) en route to the Project site; and

- Increased use of the railway and siding for a small portion of equipment shipped up to site. An increase in rail traffic will also result in increased truck traffic between Gillam and the Project site at certain times.

The effects of increased traffic related to wear on the road networks from construction workers in the community are expected to be accommodated by the existing infrastructure and services managed by Manitoba Hydro and the Town of Gillam (Gillam KPI Program 2009-2010).

The railway running through Gillam has not experienced capacity issues in the past. Special trains have been put into service, as required, for freight such as turbines and other large items in the past; and it is anticipated this will continue in the future. It has been forecasted that the Project would have a positive effect on rail business (Gillam KPI Program 2009-2010).

4.4.1.5.3 Thompson

Project effects on transportation services in Thompson include the following:

- Increased use of rail for shipment of equipment and materials to Thompson;
- Increased use of the provincial highway network for shipment of equipment and materials into and out of Thompson;
- Increased use of the city road network in Thompson;
- Use of the Thompson rail siding as an off-loading facility for equipment and materials; and
- Increased use of air and bus travel services for construction workers traveling to the Project site.

The rail siding in Thompson has enough capacity to accommodate the addition of Project-related material off-loads (Thompson KPI Program 2008-2010). As indicated in Section 4.3.5.3, the airport has capacity for expanded air service, and it is anticipated that local air carriers would increase services in response to any potential increase in demand (Thompson KPI Program 2009-2010).

Thompson's road network will be used by truck traffic hauling equipment and materials to the Project site. The City of Thompson only completes street repair work on a priority basis due to the aging infrastructure below the streets. As noted in Section 4.3.5.3, resurfacing of city roads is already required in many areas (*e.g.*, Mystery Lake Road, the main artery through the city has been resurfaced by the Government of Manitoba). Roads connecting the rail yard and other supply routes to Mystery Lake Road may require some additional maintenance due to the potential for increased traffic flow; although no known arrangements have been made with the city (Thompson KPI Program 2008-2010).

4.4.1.5.4 Mitigation

Existing transportation networks (including rail and air) and plans for upgrading infrastructure and services would be able to accommodate the changes associated with Project construction. Provincial Trunk Highways and Provincial Roads are monitored and maintained by MIT and the City of Thompson does the same for roads that fall under its jurisdiction. No further mitigation or monitoring is required.

4.4.1.6 Population – Regional Study Area

Construction of the Project is not expected to result in material effects on the Regional Study Area's population for the following reasons:

- Population increases in the Local Study Area communities, where in-migration would be most likely, is expected to be small; and
- In communities outside the Local Study Area there is expected to be little, if any, increase in job-related in-migration since the northern Aboriginal hiring preferences outlined in the BNA cover large areas. The first hiring preference would include Aboriginal people in communities in the Churchill-Burntwood-Nelson area and the second and third hiring preferences would include people in the Regional Study Area as a whole. Therefore, it would not be necessary for a candidate to move close to the Project to be considered for construction employment. Any migration to the Regional Study Area as a whole is expected to be limited.

No mitigation or monitoring is required.

4.4.1.7 Transportation Infrastructure – Regional Study Area

Project effects on transportation infrastructure and services in the Regional Study Area include the following:

- Increased use of PTH 6 for trucking of equipment, materials and people from southern Manitoba to Thompson;
- Increased use of road networks for northern Manitoba construction workers to drive personal vehicles to the Project site; and
- Sources of effect noted previously in Section 4.4.1.5 (*e.g.*, increased use of rail, air and road networks related to the transport of people, equipment and materials).

MIT is responsible for the maintenance and any necessary upgrades to the provincial highway system. It is anticipated that regular maintenance and the planned improvements to PR 280, noted in Section 4.4.1.5, would be sufficient to handle the increased travel by road associated with the Project during the construction phase. No mitigation or monitoring is required.

As noted in Sections 4.3.5.3 and 4.4.1.5, the airport has the capacity to expand its air service; it is anticipated that local carriers would increase services according to any potential increase in demand (Thompson KPI Program 2008-2010).

No mitigation or monitoring is required.

4.4.1.8 Construction Monitoring

As noted in Chapter 8 of the Response to EIS Guidelines Document, monitoring of socio-economic effects will be organized into a coordinated Socio-Economic Monitoring Program (SEMP) whose details will be developed after the Project has been filed. It will be part of the overarching monitoring program

for the Project, which is being designed to measure whether Project outcomes are as predicted. In cases where Project effects differ from what is expected, adaptive management measures will be considered where appropriate. In relation to infrastructure and services, monitoring of construction effects is proposed for selected VECs and supporting topics.

Population

Given the difficulty of accurately estimating the precise levels of in and out-migration, monitoring will confirm the extent of Project-induced changes in population in the KCNs communities and Gillam. If notable Project related in-migration is identified and is greater than predicted, the Partnership would evaluate how to address the situation. This would include KPIs to understand the influence of the Project on population.

Housing

Given the difficulty in estimating migration behaviour accurately and, therefore, the precise level of in- and out-migration, by extension there is also uncertainty in predicting new demand for housing. For the KCNs communities, monitoring will consist of the aforementioned activities associated with tracking population change, in addition to a one-time set of KPIs with the communities' housing authorities to determine any Project effects on housing. In Gillam, the demand for housing is considered a part of the Gillam Land Use Planning process in place and will consider the outcomes of population monitoring.

Infrastructure and Services

The SEMP will include monitoring to confirm the EA prediction for minimal effect on KCNs infrastructure and services due to the Project. Monitoring will include conducting a one-time set of KPIs with contractors and service providers in KCNs communities to determine whether there are any effects of the Project on infrastructure and provision of services.

Further to this, monitoring would try to understand whether the influx of non-local construction workers place demand on local infrastructure and services in Gillam. This will be coordinated with Manitoba Hydro, the Town of Gillam and FLCN.

4.4.2 Operation Effects and Mitigation

Operation effects on population of the Local Study Area are expected to result from Project-related operation phase employment opportunities (direct and indirect). New operation positions will be located in the Town of Gillam, the only location where a measurable change in population is anticipated. Increased demand for infrastructure and services would result from this growth in population.

4.4.2.1 Population / Migration – Local Study Area

The Project is expected to create 46 operation phase jobs that will be based in Gillam. Of these positions, 37 will be required on-site at the generating station facility, with workers based in Gillam and expected to travel back and forth to the site, and nine positions in technical services will also be based in Gillam. The following sections identify potential effects of the operation phase on population and migration in each of the KCNs communities, in Gillam and in Thompson.

4.4.2.1.1 Keeyask Cree Nations

The operation phase of the Project is expected to have no substantial effects on in- or out-migration or the overall size of the populations at Split Lake, York Landing *(Kawechiwasik)* and Ilford for the following reasons:

- Operation job targets for the KCNs identified in the JKDA are system-wide and do not necessarily apply directly to the Project (see Section 3.4.2);
- Keeyask operation phase jobs will be based in Gillam. KCNs Members would not need to be located in their home communities to be eligible for Project-related operation phase employment; and
- Should TCN, YFFN or WLFN Members qualify and be hired for operation phase jobs associated with the Project, Manitoba Hydro would offer subsidized housing in Gillam, making it more financially attractive to live in Gillam rather than in their home community. This may cause some community Members to move to Gillam from their home communities (*e.g.*, Split Lake, York Landing *(Kawechiwasik)* and Ilford), although the expectation is these numbers would be small, for the reasons noted above.

The exception to this could be the FLCN community residing in Gillam and in Fox Lake (Bird) who are more likely to experience some population changes resulting from the operation phase of the Project. Factors that may affect FLCN population growth in Gillam as a result of the Project include the following:

- Schedule 12-8 of the JKDA presents a framework to enhance participation in operation jobs. Although the location of these jobs is not specified, given that Gillam is the centre of Manitoba Hydro's northern operations and that FLCN has a reserve in Gillam, there is potential that some FLCN Members currently living in other locations may wish to relocate to Gillam to access these long-term operation jobs should housing be available.
- For FLCN Members wishing to return to the Local Study Area for employment reasons, Gillam offers more services and amenities than the community in Fox Lake (Bird), making it a more attractive location for some Members. For Project employees, this would include availability of Manitoba Hydro housing. For those in some types of new indirect service or public sector jobs, this would not be the case.
- The new urban reserve in Gillam may allow for improvements to existing housing and limited additional housing to be created for FLCN Members in the community. FLCN's long-term plans to pursue additional reserve land in and around Gillam may also serve this purpose.
- While the reserve community of Fox Lake (Bird) is within commuting distance of operation jobs in Gillam, the limited housing capacity is likely to deter return migration.

4.4.2.1.2 Gillam

Project effects on population and migration in Gillam will depend on whether the operation staff are hired from within the community or are relocated to the community from elsewhere.

Estimating population increases in Gillam as a result of Project operation considers several factors. First, there is potential for some jobs to be filled locally, meaning that these workers would not add to the population in Gillam. Second, some of the positions would be filled by people from outside of the community, resulting in population growth. Third, a small number of additional professional jobs may be created as a result of the new population. Based on these considerations and using an average family size of three people (Statistics Canada 2007a), it is estimated that 120 to 150 people would be added to the population of Gillam as a result of Project operation. It is anticipated that the age structure of the Gillam population would remain consistent with current trends, *e.g.*, being a relatively young population with a higher proportion of people under the age of 20 as compared to the remainder of the province (Statistics Canada 2007a). This new population would be a part of the overall projected population growth of 2,300-2,800 people, assuming other Manitoba Hydro projects move forward (Dillon Consulting 2012). The cumulative effects of population growth are described in Chapter 7 of the Response to EIS Guidelines document.

The added population associated with operation phase workers and their families is likely to create additional demand for facilities and services in Gillam. This could result in the creation of additional commercial and public sector jobs. Positions created in the retail and personal services sectors could be filled in part locally and would not result in new population. Professional positions in the school and hospital would likely need to be filled by outsiders, which would lead to further increases in population. These were factored into the above estimate.

4.4.2.1.3 Thompson

No change in the population of the City of Thompson is expected as a result of operation of the Project since operation phase jobs are located in the Town of Gillam. Therefore, no mitigation is required.

4.4.2.1.4 Mitigation

Population increases are anticipated in Gillam as a result of Project operation. Mitigation measures related to how this increase in population can be accommodated by infrastructure and services is discussed in the following sections. As part of the SEMP, population change will be monitored in Gillam to enable service providers and the Gillam Land Use Planning process to plan and respond to the anticipated changes. Many of these services are funded on a per capita basis by various provincial and federal funding programs; the per capita funding arrangements will need to reflect any increase in population growth associated with the operation phase of the Project. Further input into the management of community infrastructure and services and adjustment of future plans will be considered in the Gillam Land Use Planning activities already underway.

4.4.2.2 Housing – Local Study Area

Project operation effects on housing stem from increases in population as described in Section 4.4.2.1 above. It is anticipated that population effects would be felt within the Town of Gillam, and as such, this is where housing would be most affected.

4.4.2.2.1 Keeyask Cree Nations

There would be little effect on housing due to Project operation in Split Lake, York Landing (*Kawechiwasik*) and Ilford, since there are no substantial population changes anticipated in these communities as a result of the operation of the Project (see Section 4.4.2.1). Some FLCN Members may return to Gillam or, to a lesser extent, to Fox Lake (Bird) in order to access operation phase jobs, although the number of such Members cannot be predicted with accuracy. While the community at Fox Lake (Bird) has limited capacity to accommodate any additional housing needs (thus deterring in-migration), FLCN Members hired as operation staff will be provided housing in Gillam by Manitoba Hydro. For other FLCN Members who wish to return to Gillam to access indirect jobs, there may be an opportunity for them to access housing in Gillam, particularly with FLCN's recent establishment of an urban reserve in Gillam and ongoing efforts to establish more reserve land in the community.

4.4.2.2.2 Gillam

The estimated increase in population in Gillam from Project operation phase staff, their families and additional professional workers and their families could range between 120 and 150 people. Housing for operation phase workers would be provided by Manitoba Hydro. Upgrades to existing housing and planning new development in order to meet the needs of Manitoba Hydro's current workforce is already underway. Future housing development is likely to continue in a similar pattern to current development, which includes refurbishment of existing housing, development of single family dwellings and development of multi-family dwellings, such as duplexes and fourplexes.

Ongoing planning for additional housing to meet the needs of the future workforce is currently underway and involves Manitoba Hydro in coordination with the Town of Gillam and FLCN, who also have interests in developing additional housing in Gillam, particularly if additional reserve lands are acquired (FLCN KPI Program 2009-2011). As a result of the Gillam Land Use Planning process, as well as the HGD process[1], it is anticipated that Manitoba Hydro will be able to pursue the development of additional residential units on a timely basis and in a way that does not conflict with FLCN's interests. FLCN's interests are also recognized by the Town of Gillam and have been acknowledged in planning processes (Gillam KPI Program 2009-2010; Dillon Consulting 2012). FLCN's long-term housing interests include the addition of trailers and the potential development of a small apartment complex in Gillam (FLCN KPI Program 2009-2011).

4.4.2.2.3 Thompson

Operation job targets for the KCNs identified in the JKDA are system-wide and do not apply directly to the Project. The operation phase of the Project will not result in any population change in Thompson since jobs will be based in Gillam. As such, there are no anticipated effects on housing in Thompson as a result of the operation of the Project.

[1] The HGD process is an existing forum for the Town, FLCN and Manitoba Hydro to discuss issues of concern as the community moves forward in its community planning and long-term development.

4.4.2.2.4 Mitigation

The Town of Gillam has drafted an updated community development plan in relation to the need for new housing and associated infrastructure (Dillon Consulting 2012). As population growth drives changes to housing requirements, it will be necessary for continued dialogue among Manitoba Hydro, FLCN and the Town of Gillam. As part of the SEMP, a monitoring program would be established with Gillam and FLCN to track population changes to help those responsible plan for any increased demand for housing. Monitoring is described in Section 4.4.2.8 below.

4.4.2.3 Infrastructure and Services – Local Study Area

Project operation effects on infrastructure and services in the Local Study Area would stem from two main sources: the physical presence and operation of the Project and the anticipated population changes resulting from operation phase employment.

4.4.2.3.1 Keeyask Cree Nations

Operation of the Project is not anticipated to result in substantial changes to the populations of the KCNs communities and, as such, there are little to no anticipated effects on infrastructure and services. The exception to this is for FLCN Members residing in Gillam or who access services in Gillam, which is discussed further below.

The operation of the Project is not predicted to affect the water level on Clark Lake or Split Lake during open water conditions; and may affect peak winter water levels of Split Lake by 0.2 m under low-flow conditions (see PE SV); however, KCNs community Members have expressed scepticism regarding this prediction, particularly Members of TCN and YFFN who reside along the shores of Split Lake. TCN and YFFN community Members have expressed concern that operation of the Project may result in winter water fluctuations on Split Lake, which could further exacerbate challenges associated with ferry infrastructure and the reliability of the winter road.

Anchor ice formation, ice that forms on the river bottom and restricts flow at the outlet, at both the Clark Lake and the Split Lake outlets causes increased water levels on the lakes during winter under current conditions. Analysis of the surface water and ice regimes (see PE SV) concluded that, with the Project, ice processes in the reach between the outlets of Clark Lake and Split Lake that result in winter water-level increases are expected to remain largely unchanged from existing conditions. There is a possibility for the Project to cause increased water levels upstream of Clarke Lake relative to the existing environment, but only during low-flow conditions that occur once every 20 years on average (*e.g.*, 5th percentile flow). The amount of water level increase that might be caused by the Project during winter low-flow conditions would depend upon how much anchor ice is present at the outlet of Clark Lake. As more anchor ice forms at the outlet, the effect of the Project decreases. The potential effect of the Project on Split Lake water levels would be well within the range of winter water levels that have been experienced since LWR and CRD began operation, resulting in water level conditions that have been and could be experienced in the existing environment.

FOX LAKE CREE NATION

Numerous services are shared by FLCN with the Town of Gillam, which is anticipated to experience growth in the range of 120-150 people as a result of new operation phase employment. Infrastructure and services already dealing with capacity challenges may be placed under additional stress as a result of the growth of the community. Among the facilities and services shared by FLCN and residents of Gillam are the Gillam Hospital and associated services (emergency room, medical clinic, diagnostics services, retail pharmacy, home care, various health and mental health related services and programs), social services (Awasis), day care (available only in Gillam), the Gillam School (K-12 education, with grade 9-12 only available in Gillam and not in the community of Fox Lake (Bird), Gillam Recreation Centre and Nelson River Aquatic Centre, and emergency services (police, fire, ambulance). Since these are shared services, effects are discussed in the Gillam section below.

4.4.2.3.2 Gillam

The Town of Gillam has evolved from a community established to serve the Bay Line railway, to a community shaped by Manitoba Hydro development, and is currently working to become a community that recognizes the interests of all stakeholders, including FLCN, Manitoba Hydro and the Town (see Section 2 for greater detail on the historical development of the town). The HGD process has promoted community dialogue and cooperation amongst stakeholders. The Joint Statement signed by all parties acknowledged development "must focus on building a community where all residents live, work, play and prosper together, where there is mutual use and enjoyment of community facilities and services and where residents support the interests and ambitions of their neighbours" (Joint Statement 2007). The Town of Gillam has also updated its Development Plan to guide development of the community over the next 20 years. The new plan's vision for the future sees Gillam as being "a safe, family orientated, close-knit community where residents and visitors enjoy a vibrant historic full service town, unique natural beauty, and outdoor adventure" (Dillon Consulting 2012).

Community renewal in Gillam would occur within the broader context of changes resulting from development activities in the surrounding region, although the following section identifies the specific anticipated changes resulting from the Project. Infrastructure and services already experiencing capacity challenges may be placed under additional stress as a result of growth associated with operation of the Project. In some instances, infrastructure and services would be able to accommodate growth; however, in other instances, some infrastructure and services may need to be bolstered; these are discussed below.

WATER AND WASTE MANAGEMENT

Water-related facilities and services (water and waste water) for the Town of Gillam have the capacity to handle the Project-related increase in population since both were designed to meet the needs of a population of 3,000-3,500 (HTFC 2008). The town's landfill can likely accommodate current levels of waste disposal for another 20 years, although programs are being implemented to divert more waste through recycling. This may extend its capacity (Gillam KPI Program 2009-2010). It is likely that a new landfill or expansions to the existing landfill would be required to accommodate the community's long-term anticipated growth.

EMERGENCY SERVICES

Emergency services such as fire and ambulance are unlikely to face capacity challenges resulting from the increased population, since Manitoba Hydro often provides support to these services through staffing and equipment at existing generating stations (Gillam KPI Program 2009-2010).

Similarly, the RCMP is adequately staffed to provide services to the existing population. If Gillam experiences any material growth resulting in an increased demand for services from the RCMP a bigger detachment station and additional officers may be required; the RCMP plans on having discussions with Manitoba Hydro once firm employment estimates and Project plans are in place (Gillam KPI Program 2009-2010).

COMMUNITY FACILITIES AND SERVICES

At present the Gillam Hospital and services adequately meet the needs of the population, although recruiting and retaining qualified professionals is challenging. Manitoba Hydro subsidizes services that a remote community might otherwise not have on a regular basis, such as massage therapy, physiotherapy, and eye and dental care. It is expected that additional staff may be required to accommodate changes associated with an increased population (*e.g.*, an additional physician may be required). However, between current plans to hire additional staff, existing hiring practices that attempt to cross-train individuals to enhance local capacity and financial support from Manitoba Hydro to bring in specialists (*e.g.*, massage therapists), the level of service currently provided can likely be maintained with new Project-related population. It is anticipated that the main issue associated with population growth would be timely response with physician coverage (*e.g.*, successfully recruiting an additional physician to avoid potential future shortages as the population of the community grows). The present hospital facility can accommodate a modest increase in population, however office space is limited and the hospital is looking at some redevelopment in order to provide more functional space, potentially including a walk-in clinic (Gillam KPI Program 2009-2010).

The Gillam School is currently operating close to capacity and, based on trends over the last five to ten years, it is expected that enrolment would increase even without the Project. Of the 120-150 people projected to move into the community, 40-50 would be school-aged children. Depending on distribution of the school-aged children, these additional students will likely result in the school being at over-capacity levels. As noted in Section 4.3.3.2, Manitoba Hydro along with the Frontier School Division is examining the feasibility of expanding the current infrastructure or building a new facility (Gillam KPI Program 2009-2010).

Although there is already a shortage of childcare options in the community, the Gillam childcare facility has responded to increased demand and is building a new facility with expanded capacity that should be completed in 2012 (Manitoba Hydro, *pers. comm.* May 2012).

Awasis is the provider of social services in the community. Although the agency has sufficient human resources to address community needs, as well as the potential to expand the number of staff required to meet increased demand, there is a lack of programming space available. NNADAP and Mental Health workers share office space in Gillam, which results in some lack of privacy for clients accessing services.

If adequate space can be found or created to meet the needs of the Project-related population, Awasis is likely to be able to accommodate the community's increase in population.

While many of the aforementioned facilities and services are funded on a per capita basis, it is important to note that Manitoba Hydro supports and subsidizes service delivery in the community and would continue to do so. Subsidized services include massage therapy, chiropractic services, optometry, physiotherapy and dental services (Gillam KPI Program 2009-2010).

4.4.2.3.3 Thompson

Project-related effects on infrastructure, facilities and services in Thompson during the operation phase would be negligible due to no substantial population change.

4.4.2.4 Land – Local Study Area

As noted in Section 4.4.1.4 the Partnership would purchase the Crown land required for all aspects of the Project from the Province of Manitoba.

4.4.2.4.1 Keeyask Cree Nations

The Project is expected to have no effect on the KCNs land since it is not located on any reserve land, fee-simple land or TLE selections. However, it is expected to have effects on lands within areas used and accessed by the KCNs communities since the Project lands are within their traditional territories and specifically within the SLRMA. Further discussion on the implications of the Project on land that is used and accessed by the KCNs can be found in the Resource Use Section of this Supporting Volume.

4.4.2.4.2 Gillam

While no land is required to directly accommodate Project infrastructure in Gillam during the operation phase, there would be a need for additional land to support housing and commercial developments in relation to population growth associated with operation staff required for the Project. There are approximately 350 acres of land suitable for development near the community and an additional 130 acres near Stephens Lake. This is more than adequate to meet the estimated 154 acres necessary to accommodate a 100% growth in population (HTFC 2009), which would be far more than required for the Project-related population change of 120 to 150 people. The ongoing Gillam Land Use Planning process will address the need for these increased demands.

The Town of Gillam is reviewing its existing Development Plan By-Law No. 258 (adopted in 1985) in order to create a new by-law that conforms with *The Planning Act* (Manitoba) and considers new provincial land use policies. The new Development Plan by-law would provide a framework to guide the development of the community over the next 20 years and help the municipality to effectively plan for increases in population and associated infrastructure requirements.

4.4.2.4.3 Thompson

There would be no substantial population change in the City of Thompson as a result of the operation of the Project. No changes to infrastructure would result from the Project. As such, the Project would have no effect on land in the City.

4.4.2.4.4 Mitigation

The existing land use planning process in Gillam would address the needs for additional land in the Town of Gillam and as such, no further mitigation or monitoring is required. The KCNs' AEAs address use of Project required lands that are in the traditional territories of the KCNs; therefore, no mitigation or monitoring is required.

4.4.2.5 Transportation Infrastructure – Local Study Area

Once the Project is commissioned MIT will re-route PR 280 to include the north access road, the generating station facility over the Nelson River and the south access road to Gillam. This will create a shorter route between the Project site and Gillam. The road will be transferred from a private road, owned and operated by the Partnership to the provincial road system. At the same time, MIT plans to abandon the northeastern section of PR 280. FLCN has expressed concern that community Members living in Fox Lake (Bird) will face increased travel distances to reach Thompson if the northern portion of PR 280 (around Stephens Lake) is decommissioned.

The operation of the Project is not expected to affect the water level on Clark Lake or Split Lake during open water conditions; and may affect peak winter water levels of Split Lake by 0.2 m (9 in) under low-flow conditions (see PE SV). However, YFFN have expressed scepticism with these calculations and are concerned that future water fluctuations on Split Lake may affect ferry service and landing sites, as well as the winter road on Split Lake.

4.4.2.6 Population – Regional Study Area

Population changes resulting from the Project are only predicted in the Town of Gillam. As such, no population changes are expected in the Regional Study Area as a result of Project operation.

4.4.2.7 Transportation Infrastructure – Regional Study Area

There are no anticipated changes to PTH 6 as a result of the operation of the Project.

4.4.2.8 Operation Monitoring

As noted in Chapter 8 of the Response to EIS Guidelines, monitoring of socio-economic effects will be organized into a coordinated SEMP whose details will be developed after the Project has been filed. It will be part of the overarching monitoring program for the Project, which is being designed to measure Project outcomes and to determine whether they match EIS predictions. In cases where Project effects differ from what is expected, adaptive management measures will be considered where appropriate. In relation to infrastructure and services, monitoring of operation effects is proposed for selected VECs and supporting topics.

POPULATION

Population growth is anticipated in Gillam in response to operation employment, which would increase the demand for housing, infrastructure and services. Monitoring, using readily available statistical sources

such as Statistics Canada, would track the increase in population in Gillam, although it would be difficult to pinpoint whether this is directly attributable to Project operation employment. Monitoring of population data will enable service providers and community planning processes to plan and respond to anticipated change.

HOUSING

An increase in population would result in increased demands for housing in Gillam. The demand for housing is already being considered as a part of the Gillam Land Use Planning process. Tracking changes in population will provide an indication of the implications for housing.

INFRASTRUCTURE AND SERVICES

An increase in population would result in increased demands on infrastructure and services in Gillam. Manitoba Hydro will assess the demand on infrastructure and services to feed into the ongoing Gillam Land Use Planning process.

TRANSPORTATION INFRASTRUCTURE

TCN and YFFN have expressed the concern that future water fluctuations from operation of the generating station may affect ferry service (*e.g.*, landing sites) and the winter road on Split Lake. As part of Project operation, Manitoba Hydro will monitor water levels at Split Lake and inform TCN and YFFN of the results. In conjunction with MIT, TCN, WLFN and YFFN will continue to monitor the reliability and safety of ferry landing sites and the winter road across Split Lake.

4.4.3 Summary of Residual Project Effects

This section summarizes residual effects of the Project (after mitigation) on socio-economic VECs related to infrastructure and services for both the construction and operation phases. Population is not a VEC, rather a supporting topic that is the driver of change related to potential increased demand for infrastructure and services; as such, residual effects assessment is not undertaken.

4.4.3.1 Summary of Construction Effects

Table 4-19 provides a summary of expected Project construction effects, high-level mitigation and monitoring identified to address those effects, assessment characteristics used (magnitude, geographic extent and duration) and the residual effects (after mitigation) pertaining to the socio-economic Local and Regional Study Areas (where applicable).

Table 4-19: Construction Effects on Infrastructure and Services

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
HOUSING			
Little effect on housing in KCNs communities in the Local Study Area	Conduct a one-time set of KPIs with representatives of the housing authorities to confirm prediction of minimal demand for housing in KCNs communities Monitor population changes in Gillam	Very limited net in-migration and new demand for housing	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Short-term
KCNs workers may choose to visit friends or family on days off while working at the construction site, which may cause short-term crowding for these families	None required	Short-term crowding	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Short-term
Increased demand for temporary accommodation for construction workers visiting Gillam and Thompson	None required	Ongoing demand for temporary accommodation	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Short-term

Table 4-19: Construction Effects on Infrastructure and Services

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
INFRASTRUCTURE AND SERVICES			
Keeyask Cree Nations			
Pressure on infrastructure and services in KCNs communities	Conduct a one-time set of KPIs with contractors and service providers in the KCNs communities Ongoing communication with local service providers to allow for effective and timely planning of service delivery Improved daycare options (entrepreneurial opportunity)	Very limited effect	Direction: Adverse Magnitude: Small - Moderate Geographic Extent: Medium Duration: Short-term
Gillam (including FLCN)			
Potential increased pressure on emergency services in Gillam Potential increased pressure on RCMP and social services due to influx of non-local construction workers to Gillam	Gillam Land Use Planning process underway Keep RCMP informed of Project workforce and schedule Ongoing communication with the Town, service	Very limited effect	Direction: Adverse Magnitude: Small Geographic Extent: Small Duration: Short-term

Table 4-19: Construction Effects on Infrastructure and Services

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
	providers and FLCN on Project activities and schedules Through FLCN AEA, increased youth programming Socio-economic monitoring program		
Pressure on accommodation and hospitality services which could also benefit from increased business opportunities	None required	Same as effect	Direction: Adverse Magnitude: Small Geographic Extent: Small Duration: Short-term
Thompson			
Potential increased pressure on RCMP and social services due to influx of non-local construction workers to Thompson	Keep RCMP informed of Project workforce and schedule	Same as effect	Direction: Adverse Magnitude: Small Geographic Extent: Small Duration: Short-term
LAND			
Effects on Crown land at the Project construction site	None required; Crown land will be transferred to Manitoba Hydro after construction	No effect	Direction: Neutral
Limited effects on land in Gillam	None required	Limited effect	Direction: Neutral

Table 4-19: Construction Effects on Infrastructure and Services

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
TRANSPORTATION INFRASTRUCTURE (Local Study Area)			
Increased use of air, bus and rail services as project-related personnel, equipment and materials travel to and from the construction site	None required	Same as effect	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Short-term
Increased traffic on PR 391 and PR 280	None required; upgrades occurring prior to start of construction Track statistics collected by MIT on traffic-related incidents and complaints on PR 280	Same as effect	Direction: -Adverse Magnitude: Small Geographic Extent: Medium Duration: Short-term
Increased pressure on existing road networks in Gillam in relation to the south access road and dyke construction	None required	Same as effect	Direction: Adverse Magnitude: Small Geographic Extent: Small Duration: Short-term
Use of Thompson rail siding for off-loading facility	None required; facility able to handle the use	Same as effect	Direction: Adverse Magnitude: Small Geographic Extent: Small Duration: Short-term

Table 4-19: Construction Effects on Infrastructure and Services

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
TRANSPORTATION INFRASTRUCTURE (Regional Study Area)			
Increased use of PTH 6 and other road networks across the region	None required; roads able to handle increased usage	Same as effect	Direction: Adverse Magnitude: Small Geographic Extent: Large Duration: Short-term

Notes:
Direction: Positive, Neutral, Adverse
Magnitude: Small, Moderate, Large
Geographic Extent: Small, Medium, Large
Duration: Short-term, Medium-term, Long-term

In summary, residual effects of the Project after mitigation on KCNs housing are expected to be adverse (due to very limited net in-migration potentially causing new demand for housing, and short-term effects on crowding), and of small magnitude for the duration of the construction phase. As part of the SEMP, monitoring of population change and associated demand for housing in KCNs communities will be undertaken to confirm the predicted limited effect.

Residual effects on housing in Gillam and Thompson are focused on temporary accommodations related to visiting construction workers during times outside of work. Effects on housing are expected to be adverse, of small magnitude and for the duration of the construction phase.

Effects after mitigation on KCNs/Gillam/Thompson infrastructure and services are expected to be adverse, small to moderate in magnitude and short-term (throughout the construction phase). The Partnership will continue to keep the RCMP informed of Project workforce estimates and construction schedule (*e.g.*, peak seasonal periods) in order for the RCMP to respond to a potential increased demand appropriately. Similarly, ongoing communication will take place between Manitoba Hydro and local service providers to allow for effective and timely planning of service delivery. Through the FLCN AEA, increased youth programming *(e.g.,* the FLCN Youth Wilderness Traditional Program) will be beneficial in helping keep youth occupied at times when non-local construction workers are likely to be in Gillam. Increased accessible and affordable day care options is an entrepreneurial opportunity available to the KCNs communities; this should provide individuals with families additional childcare options when considering whether or not to apply for work on the Project. There are no effects on KCNs reserve or TLE land due to the Project, although the Project is located within the traditional territories of the KCNs and mainly in the SLRMA, who use these areas for traditional pursuits. There will be neutral effects on land in the Gillam/Thompson area for transportation-related needs during the construction phase. Crown land needed for the Project will be transferred to Manitoba Hydro upon completion of construction. There are no further residual effects or need for monitoring.

Transportation infrastructure within the Local and Regional study areas will have adverse, short-term Project effects of small magnitude during construction. This residual effect is due to the movement of equipment, materials and personnel to the Project site. It is anticipated that existing infrastructure will be able to handle the increased pressure. In the case of PR 280, upgrades to the road will have been completed prior to construction to address the additional traffic volume associated with the Project.

4.4.3.2 Summary of Operation Effects

Table 4-20 provides a summary of expected Project operation effects, high-level mitigation and monitoring identified to address those effects, assessment characteristics used (magnitude, geographic extent and duration) and the residual effects (after mitigation) pertaining to the Socio-Economic Local and Regional study areas (where applicable).

Table 4-20: Operation Effects on Infrastructure and Services

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
HOUSING (Gillam and FLCN)			
Increased demand for housing for operation staff Increased demand to meet overall community growth	The Gillam Land Use Planning process already in place is undertaking planning for the community Monitor population changes in Gillam	Continued planning of new housing through the Gillam Land Use Planning process	Direction: Neutral
INFRASTRUCTURE AND SERVICES (Gillam and FLCN)			
Increased demand for infrastructure and services in Gillam	Assess demand for infrastructure and services to feed into the Gillam Land Use Planning process already in place	Same as effect	Direction: Adverse Magnitude: Small Geographic Extent: Small Duration: Long-term
LAND (Gillam)			
Community growth would require land to develop additional housing and infrastructure in Gillam	The Gillam Land Use Planning process already in place is undertaking planning for the community	No effect	Direction: Neutral

Table 4-20: Operation Effects on Infrastructure and Services

Potential Socio-Economic Effect	Mitigation Measures, Monitoring and Follow-up	Residual Socio-Economic Effect	Assessment Characteristics
TRANSPORTATION INFRASTRUCTURE (Local Study Area)			
No anticipated effect TCN and YFFN perceive that water fluctuations from operation of the generating station may affect ferry service (*e.g.*, landing sites) and the winter road on Split Lake	Monitor water levels, at Split Lake and inform TCN and YFFN Monitoring of ferry landing sites and winter road will continue to be done by MIT	No anticipated effect	No effect

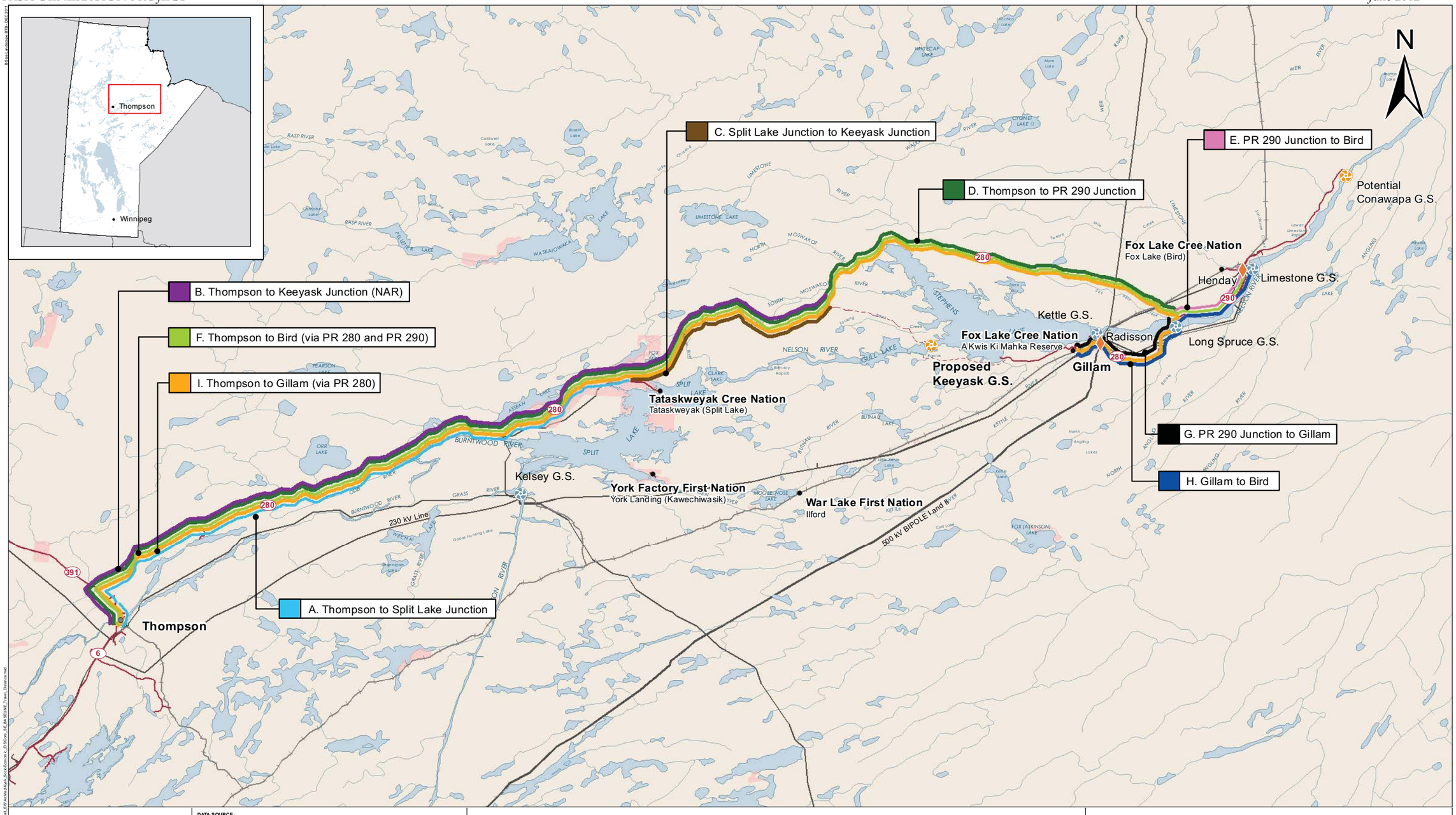
Notes:
Direction: Positive, Neutral , Adverse
Magnitude: Small, Moderate, Large
Geographic Extent: Small, Medium, Large
Duration: Short-term, Medium-term, Long-term

During the operation phase, there will be little effect on housing in Split Lake, York Landing (*Kawechiwasik*) and Ilford. Residual Project effects on housing in Gillam (including FLCN) are expected to be neutral since Manitoba Hydro provides housing for staff employed in operation jobs. Beyond operation staff, it is predicted that Gillam will experience an increase in population, thereby needing housing. The Gillam Land Use Planning process already in place is undertaking planning for the community with the Town, FLCN and Manitoba Hydro.

Residual effects on infrastructure and services during the operation phase are limited to Gillam (including FLCN) to meet the growing population demand. The residual effects are expected to be adverse, small in magnitude and long-term. The Gillam Land Use Planning process already in place will help to identify and address the community's long-term infrastructure needs.

There are no residual effects on KCNs reserve, fee simple or TLE land during the operation phase. Residual effects on land in Gillam are expected to be neutral since Gillam is in the process of preparing for future changes by updating their development plan. The Gillam Land Use Planning process already in place will help to address any future changes to land in the town. There are no residual effects on land in Thompson during the operation phase.

During the operation phase, there are no expected residual effects on transportation infrastructure in the Local or Regional study areas. However, TCN and YFFN have expressed scepticism over long-term effects on open water and ice conditions on Split Lake which has the potential to adversely affect ferry service in the summer and the ice road in the winter. The Partnership will monitor water levels on Split Lake. Manitoba Hydro, as operator of the Project, has committed that open water levels on Split Lake will not be affected by operation of the Keeyask Generation Project - this is a fundamental feature of the Project agreed to in the JKDA. Water levels on Split Lake will continue to be monitored annually by Manitoba Hydro and monitoring information will be provided to the communities. Ferry landing sites and the winter road on Split Lake will continue to be monitored annually by MIT and the communities.



DATA SOURCE:
Manitoba Hydro, NTS, Stantec Consulting Ltd.

CREATED BY:
Stantec Consulting Ltd.

COORDINATE SYSTEM:	DATE CREATED:	REVISION DATE:
UTM NAD 1983 Z15N	16-DEC-10	18-MAY-12
0 8.5 17 Kilometres / 0 7 14 Miles	VERSION NO: 1.0	QA/QC: GS/YYY/MWZ

Legend

Road Segment	Distance (km)	Road Segment	Distance (km)
A Thompson to Split Lake Junction	135.4	G PR 290 Junction to Gillam	29.8
B Thompson to Keeyask Junction (NAR)	182.7	H Gillam to Bird	53.0
C Split Lake Junction to Keeyask Junction	47.3	I Thompson to Gillam (via PR 280)	299.3
D Thompson to PR 290 Junction	269.5		
E PR 290 Junction to Bird	23.2		
F Thompson to Bird (via PR 280 and PR 290)	292.7		

Travel Distances in Local Study Area

Map 4-1

APPENDIX 4A

POPULATION PROJECTIONS

KEEYASK

Hydropower Limited Partnership

LIST OF FIGURES

4A.0 POPULATION PROJECTIONS – KEEYASK CREE NATIONS

4A.1 METHODOLOGY

The population projection model used for the Project is a cohort-component based approach. Each component of population change is factored into the projection as expressed in the demographic equation below.

Population $_{t+1}$ = Population $_{t}$ + (Birth – Death) + Net Migration

Where:

- *Population$_{t+1}$* is population at time "t+1";
- *Population$_{t}$* is population at time "t";
- *Birth* is number of births between time "t" and "t+1";
- *Death* is number of deaths between time "t" and "t+1"; and
- *Net Migration* is number of people moving into the community between time "t" and "t+1" less number of people moving out of the community in the same period of time.

Key points:

- The model projects population growth for the KCNs communities for a 15-year time-frame.
- The base year for the population projection is 2008 through to and including 2023.
- Three population projection scenarios (High, Medium and Low) were produced for each KCNs community.
- The model rounds calculations resulting from the component equation to the nearest integer.

The following provides information on the assumptions and key points of the components of population change that influence the projections.

Fertility

Fertility rates were informed by INAC's The Registered Indian Demography - Population, Household and Family Projections, 2004-2029 (2009).

- An Age-Specific Fertility Rate (ASFR) for each age was used instead of the Total Fertility Rate (TFR) to produce more accurate fertility projections in each age cohort for women during their reproductive years.
- The model assumes women between the ages of 15-49 will be giving birth.

- The model assumes a 105:100 sex ratio (boys to girls born) which is a standard assumption if data are unavailable for births by sex.
- All variables in the model will be held constant (*e.g.,* rates of change) except for fertility rates that will be the driving factor for the different population growth scenarios.
- Three population projection scenarios will be produced using low, medium and high fertility coefficients annually:
  - Slow decline: 0.32%;
  - Moderate decline: 0.84%;
  - Rapid decline: 1.47%; and
  - Overall fertility assumption: A moderate long-term decline in fertility (applicable to the medium growth scenario) that will continue to converge to the rate for the general Canadian population which currently fluctuates around 1.5 births per female.

Mortality

- Age-Specific Survival was informed by INAC's The Registered Indian Demography - Population, Household and Family Projections, 2004-2029 (2009).
- All people in the specific age group are subject to mortality (e.g., 0 to 85+ year of age X Age-Specific Survival Ratio).
- The model assumes the same mortality rate for people 85 years of age and older.

Net Migration

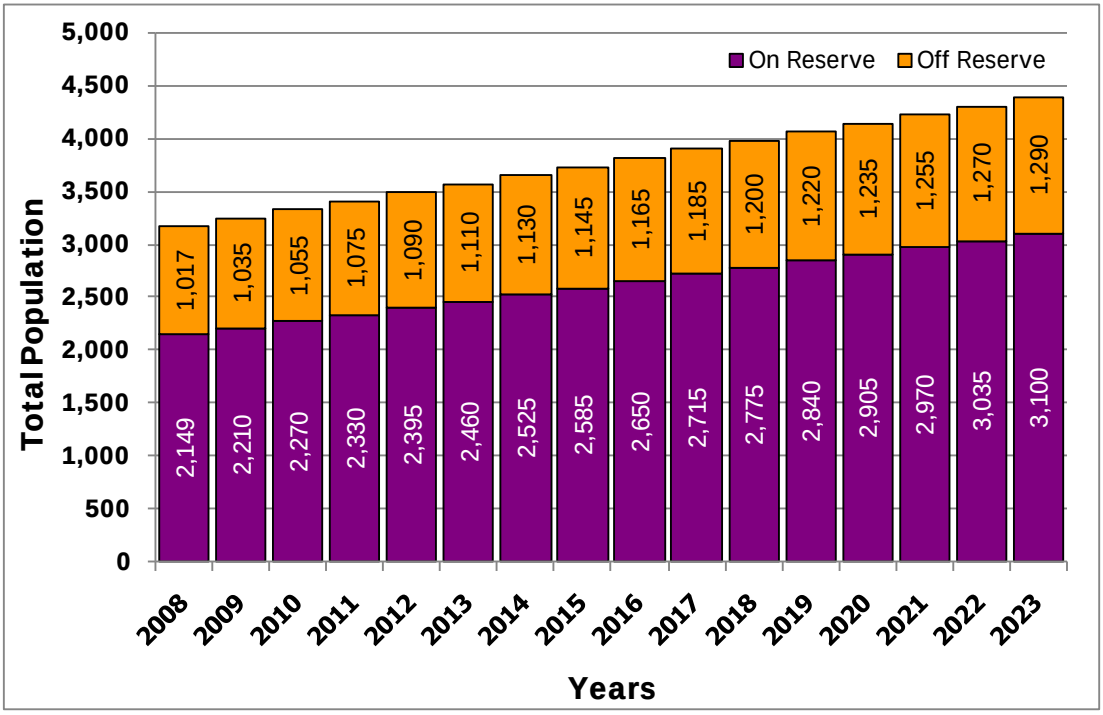
- Assumption that 0.5% net migration is applied to the on-reserve population; the number of net migrants to on-reserve is then subtracted from the off-reserve population at each age level and by sex.
- The overall trend is that people are moving back to their respective reserves, especially the younger generations (*pers. comm.*, Stewart Clatworthy, Dec 19, 2009).
- Assumes migration effects do not apply to people age 60 and older or to newborn babies as their migration effects are the same as their mothers[1].

[1] It is assumed that most people age 60 and older will not move for employment reasons; and that the small number of people who might relocate for medical or family reasons will not affect the results.

4A.1.1 POPULATION PROJECTION RESULTS

The medium-growth scenarios from the population projection model are described in Section 4 of the document. The high and low growth scenarios for each of TCN, WLFN, and YFFN are presented below.

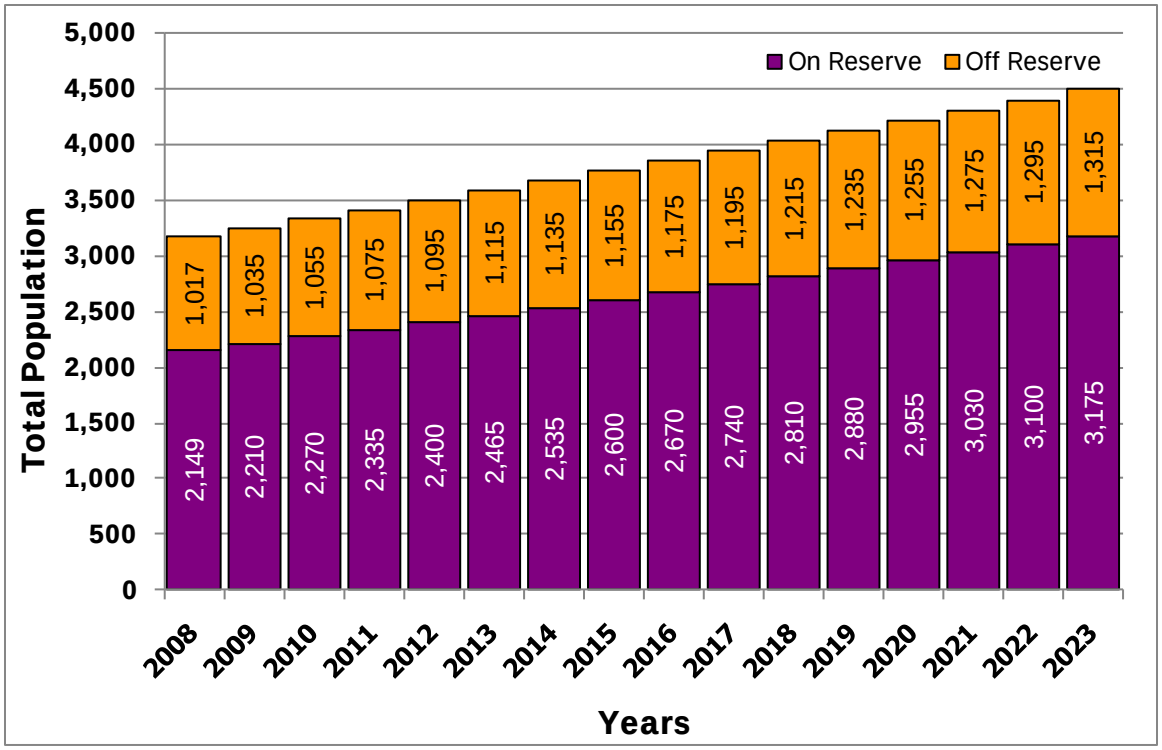
4A.1.1.1 TATASKWEYAK CREE NATION



Source: Analysis prepared by InterGroup Consultants based on Indian and Northern Affairs Canada (INAC) First Nations Population Profiles 2008.
Notes:

- TCN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by the First Nations and Inuit Health Branch (FNIHB) of Health Canada.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- For the Projections, InterGroup used fertility and mortality ratios derived from INAC "The Registered Indian Demography - Population, Household and Family Projections, 2004-2029."
- The population projection calculated totals for each year are rounded to the nearest five.

Figure 4A-1: Tataskweyak Cree Nation Population Projections On- and Off-Reserve (2008-2013 Low-growth Scenario)



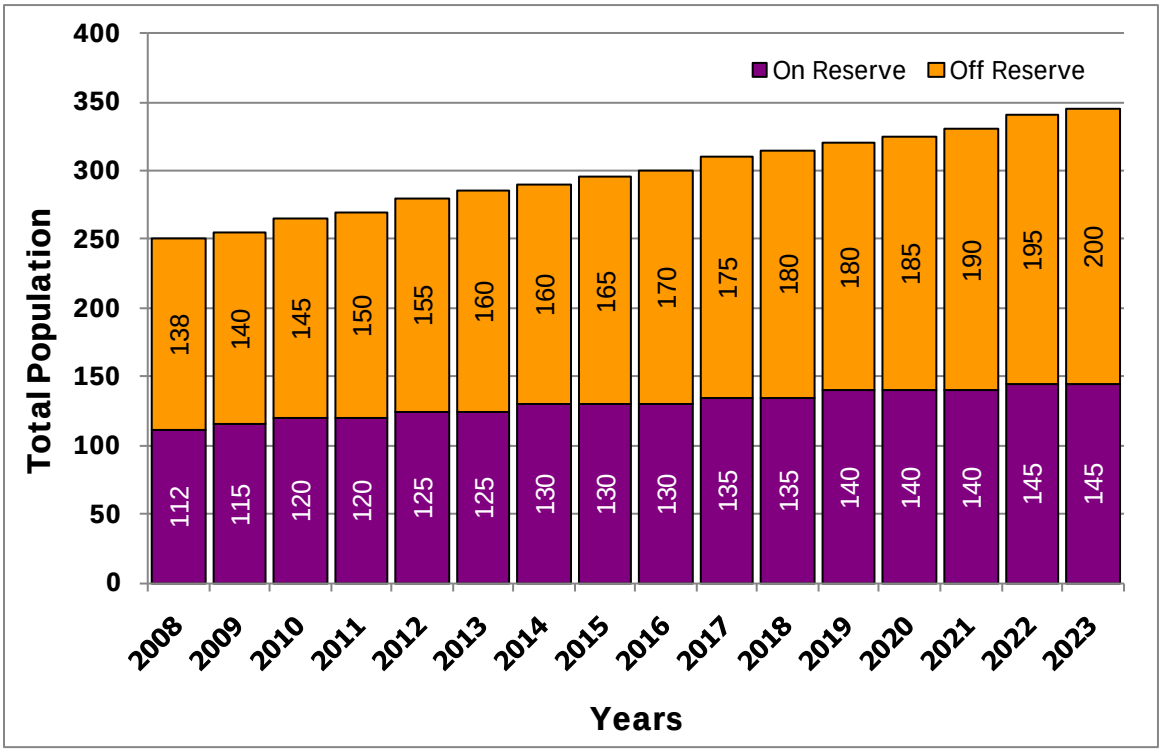
Source: Analysis prepared by InterGroup Consultants based on Indian and Northern Affairs Canada (INAC) First Nations Population Profiles 2008.

Notes:

- TCN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by the First Nations and Inuit Health Branch (FNIHB) of Health Canada.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- For the Projections, InterGroup used fertility and mortality ratios derived from INAC "The Registered Indian Demography - Population, Household and Family Projections, 2004-2029."
- The population projection calculated totals for each year are rounded to the nearest five.

Figure 4A-2: Tataskweyak Cree Nation Population Projections On- and Off-Reserve (2008-2013 High-growth Scenario)

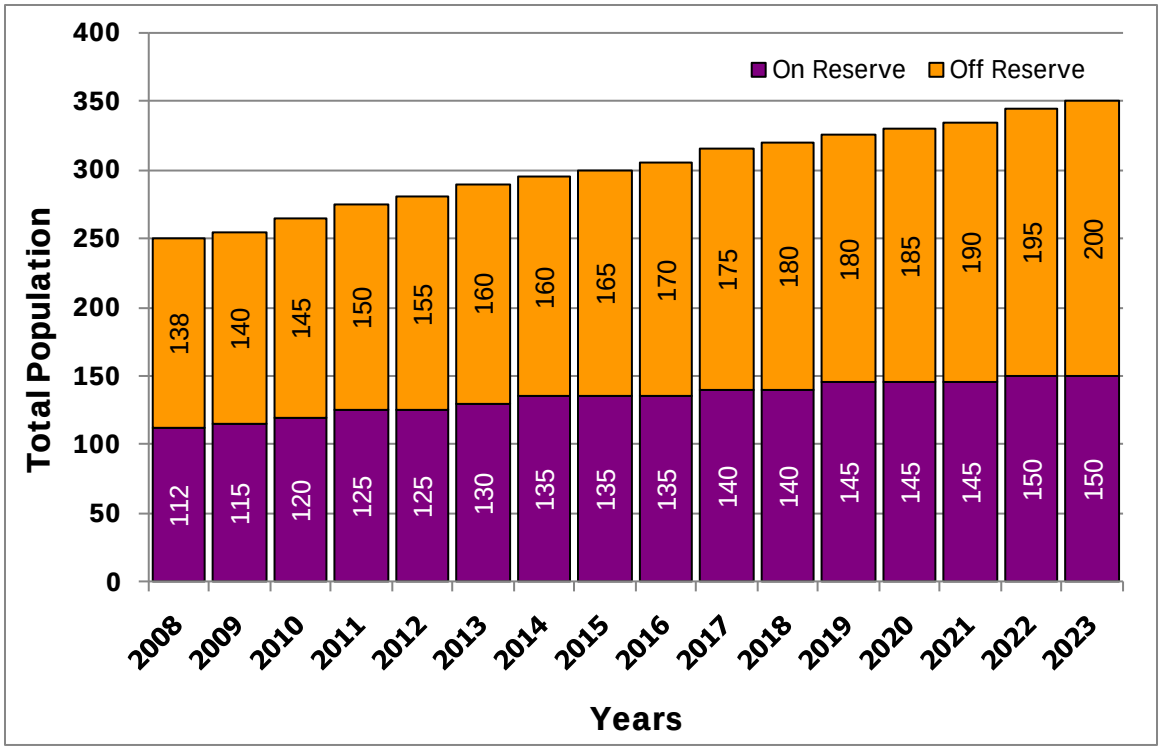
4A.1.1.2 WAR LAKE FIRST NATION



Source: Analysis prepared by InterGroup Consultants based on Indian and Northern Affairs Canada (INAC) First Nations Population Profiles 2008.
Notes:

- WLFN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by the First Nations and Inuit Health Branch (FNIHB) of Health Canada.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- For the Projections, InterGroup used fertility and mortality ratios derived from INAC "The Registered Indian Demography - Population, Household and Family Projections, 2004-2029."
- The population projection calculated totals for each year are rounded to the nearest five.

Figure 4A-3: War Lake First Nation Population Projections On- and Off-Reserve (2008-2023 Low-growth Scenario)



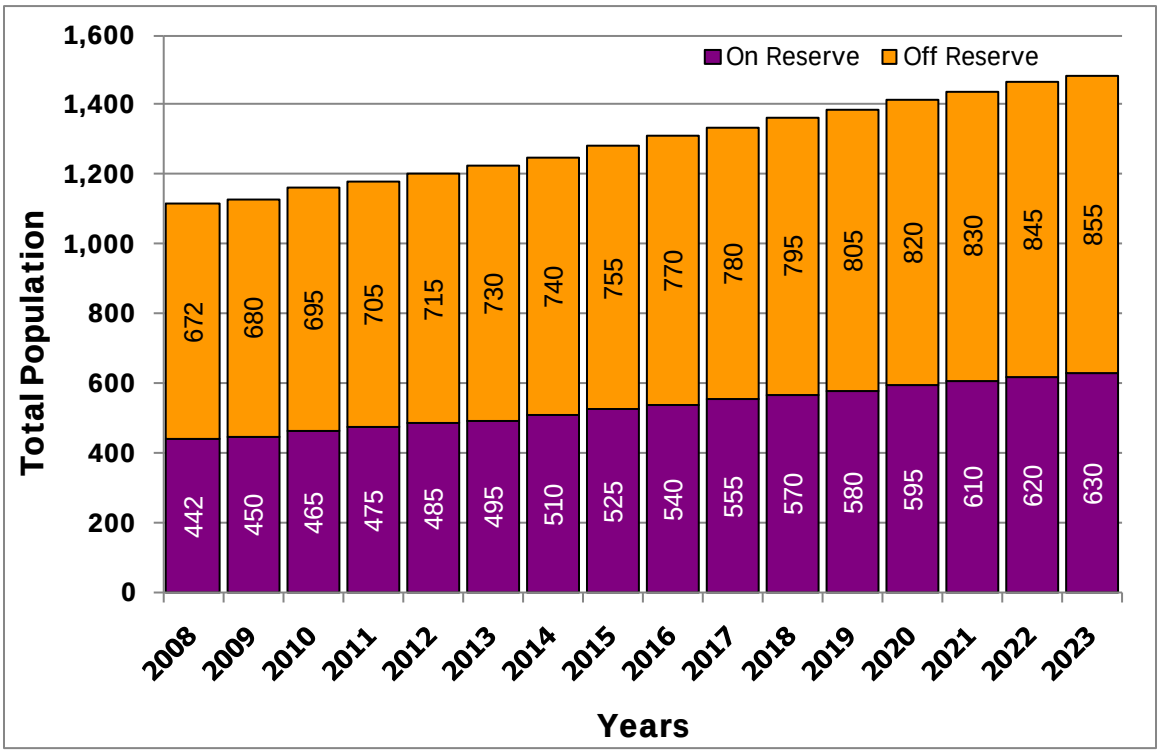
Source: Analysis prepared by InterGroup Consultants based on Indian and Northern Affairs Canada (INAC) First Nations Population Profiles 2008.

Notes:

- WLFN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by the First Nations and Inuit Health Branch (FNIHB) of Health Canada.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- For the Projections, InterGroup used fertility and mortality ratios derived from INAC "The Registered Indian Demography - Population, Household and Family Projections, 2004-2029."
- The population projection calculated totals for each year are rounded to the nearest five.

Figure 4A-4: War Lake First Nation Population Projections On- and Off-Reserve (2008-2023 High-growth Scenario)

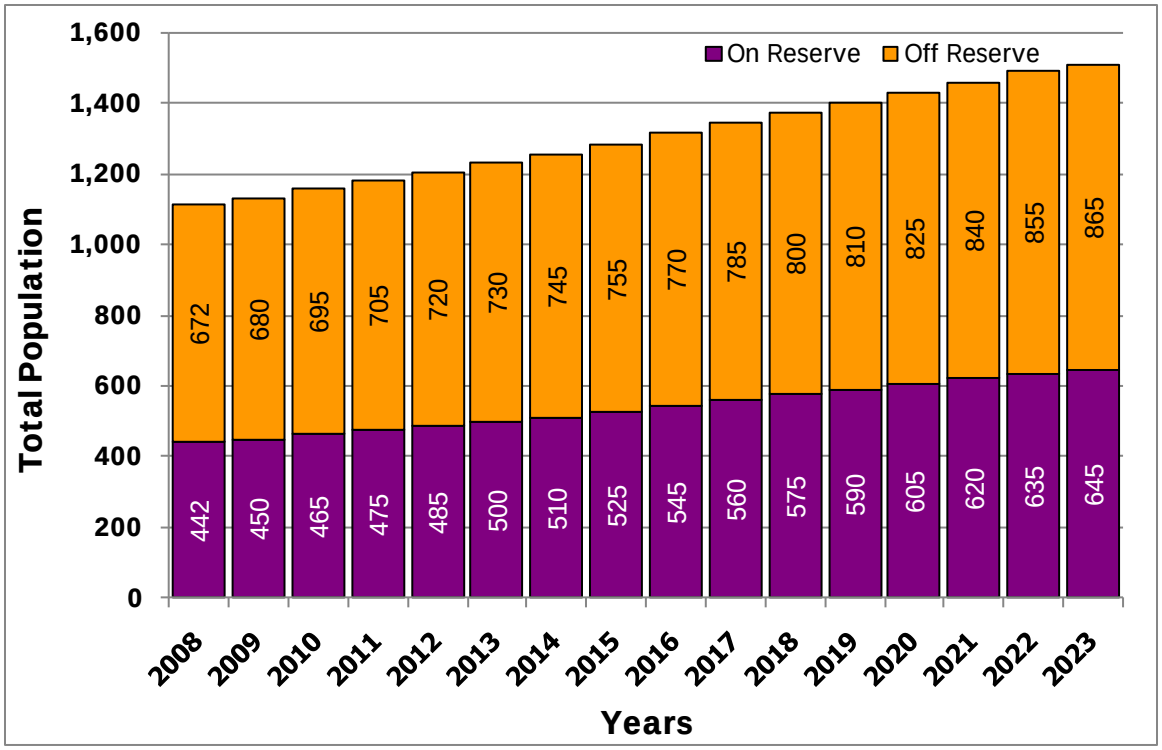
4A.1.1.3 YORK FACTORY FIRST NATION



Source: Analysis prepared by InterGroup Consultants based on Indian and Northern Affairs Canada (INAC) First Nations Population Profiles 2008.
Notes:

- YFFN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by the First Nations and Inuit Health Branch (FNIHB) of Health Canada.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- For the Projections, InterGroup used fertility and mortality ratios derived from INAC "The Registered Indian Demography - Population, Household and Family Projections, 2004-2029."
- The population projection calculated totals for each year are rounded to the nearest five.

Figure 4A-5: York Factory First Nation Population Projections On- and Off-Reserve (2008-2023 Low-growth Scenario)



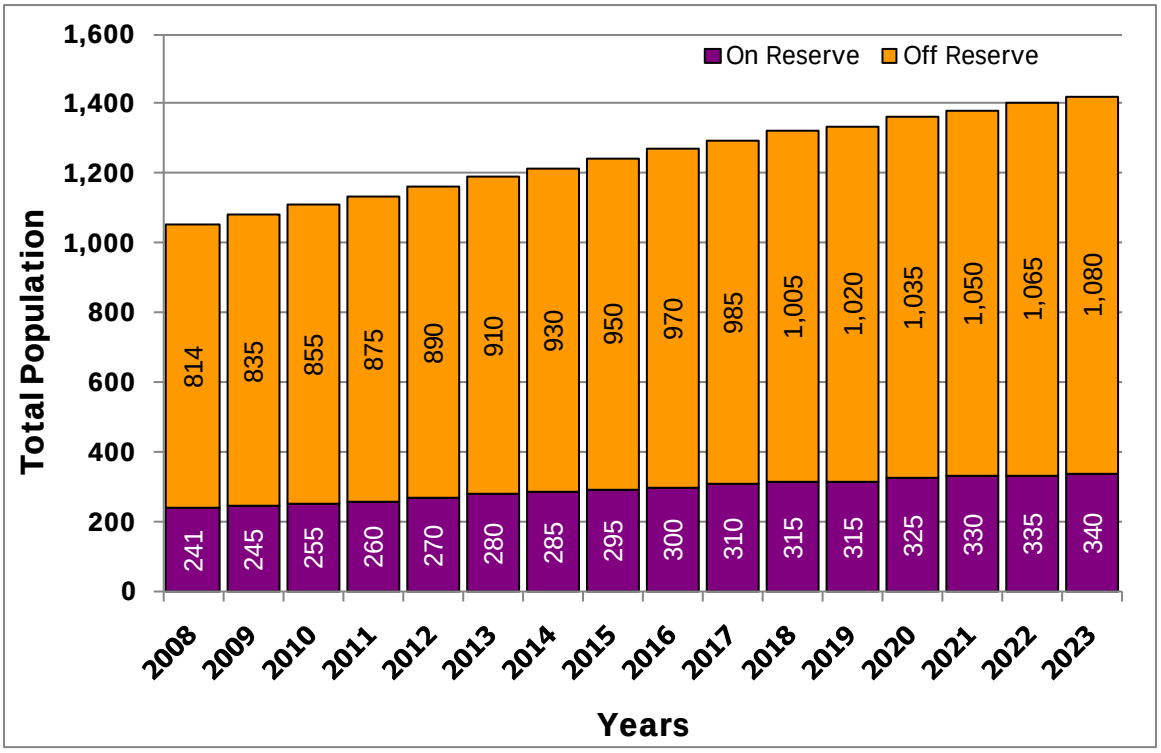
Source: Analysis prepared by InterGroup Consultants based on Indian and Northern Affairs Canada (INAC) First Nations Population Profiles 2008.

Notes:

- YFFN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by the First Nations and Inuit Health Branch (FNIHB) of Health Canada.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- For the Projections, InterGroup used fertility and mortality ratios derived from INAC "The Registered Indian Demography - Population, Household and Family Projections, 2004-2029."
- The population projection calculated totals for each year are rounded to the nearest five.

Figure 4A-6: York Factory First Nation Population Projections On- and Off-Reserve (2008-2023 High-growth Scenario)

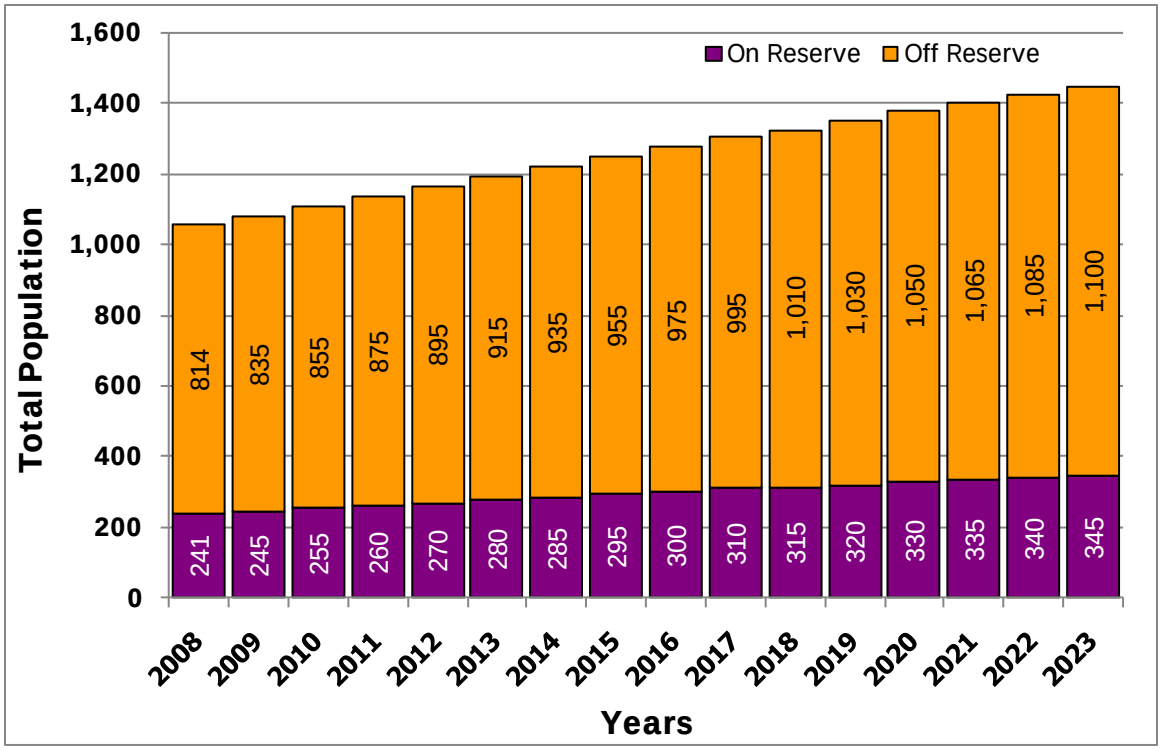
4A.1.1.4 FOX LAKE CREE NATION



Source: Analysis prepared by InterGroup Consultants based on Indian and Northern Affairs (INAC) Indian Register Data for Fox Lake, 2008 and Manitoba Health Fox Lake Cree Nations Population data, 2008.
Notes:

- FLCN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by INAC from Indian Registry System.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- INAC data "On-Reserve" population breakout by gender for all age groups, except 10-14 and 15-19, was prorated based on total "On-Reserve" population (excluding age groups 10-14 and 15-19) gender breakout.
- INAC data "On-Reserve" population for age groups above 60 assume Manitoba Health FLCN Population data for the same age groups. Population data for age groups above 75 corrected to make reconcile to total population.
- Total population gender breakout for age groups above 65 was prorated based on total population gender breakout.
- Off-Reserve population numbers are derived as follows: Total population minus "On-Reserve" (note 4 above) population.
- For the Projections, InterGroup used fertility and mortality ratios derived from INAC "The Registered Indian Demography - Population, Household and Family Projections, 2004-2029."
- The population projection model rounds the calculated totals from the component equation to the nearest five.

Figure 4A-7: Fox Lake Cree Nation Population Projections On- and Off-Reserve (2008-2023 Low-growth Scenario)



Source: Analysis prepared by InterGroup Consultants based on Indian and Northern Affairs (INAC) Indian Register Data for Fox Lake, 2008 and Manitoba Health Fox Lake Cree Nations Population data, 2008.
Notes:

- FLCN data are based on INAC data with a base year of 2008.
- INAC total population as of December 31, 2008.
- INAC data provided by INAC from Indian Registry System.
- "On-Reserve" includes individuals living on Crown Land, on other Reserves, and on other lands affiliated with First Nations operating under Self-Government Agreements.
- INAC data "On-Reserve" population breakout by gender for all age groups, except 10-14 and 15-19, was prorated based on total "On-Reserve" population (excluding age groups 10-14 and 15-19) gender breakout.
- INAC data "On-Reserve" population for age groups above 60 assume Manitoba Health FLCN Population data for the same age groups. Population data for age groups above 75 corrected to make reconcile to total population.
- Total population gender breakout for age groups above 65 was prorated based on total population gender breakout.
- Off-Reserve population numbers are derived as follows: Total population minus "On-Reserve" (note 4 above) population.
- For the Projections, InterGroup used fertility and mortality ratios derived from INAC "The Registered Indian Demography - Population, Household and Family Projections, 2004-2029."
- The population projection model rounds the calculated totals from the component equation to the nearest five.

Figure 4A-8: Fox Lake Cree Nation Population Projections On- and Off-Reserve (2008-2023 High-growth Scenario)

APPENDIX 4B
POPULATION DATA TABLES

KEEYASK
Hydropower Limited Partnership

LIST OF TABLES

4B.0 POPULATION DATA TABLES

4B.1 CURRENT POPULATION – KEEYASK CREE NATIONS

4B.1.1 Tataskweyak Cree Nation Current Population

Table 4B-1: Tataskweyak Cree Nation[1] On- and Off-Reserve Population (1991, 2001, 2006)

	1991	2001	2006
On-Reserve and Crown Land Population	1,409	1,857	2,169
% of Total[2]	69%	70%	72%
Off-Reserve Population	629	793	851
% of Total[3]	31%	30%	28%
Total First Nation Population	2,038	2,650	3,020

Source: INAC 1991a, 2001a, 2006a.
Notes:

1. NAC refers to TCN as Tataskweyak Cree Nation.
2. Percentage of population On-Reserve and Crown Land calculated by InterGroup Consultants.
3. Percentage of population Off-Reserve calculated by InterGroup Consultants.

Table 4B-2: Tataskweyak Cree Nation[1] Proportion of Population by Specific Age Ranges (1991, 2001, 2006)

Population	1991	2001	2006
On-Reserve and Crown Land			
Total	1,409	1,857	2,169
0-4 Years	209	226	294
% of Total[2]	15%	12%	14%
5-19 Years[3]	490	658	759
% of Total[2]	35%	35%	35%
20-64 Years[4]	660	904	1,031
% of Total[2]	47%	49%	48%
65 years and over[5]	50	69	85
% of Total[2]	4%	4%	4%
Off-Reserve Population			
Total	629	793	851
0-4 Years	43	52	60
% of Total[6]	7%	7%	7%
5-19 Years[3]	206	226	220
% of Total[6]	33%	28%	26%
20-64 Years[4]	347	467	525
% of Total[6]	55%	59%	62%
65 years and over[5]	33	48	46
% of Total[6]	5%	6%	5%

Source: INAC 1991a, 2001a, 2006a.
Notes:

1. INAC refers to TCN as Tataskweyak Cree Nation.
2. Percentage of age categories On-Reserve and Crown Land calculated by InterGroup Consultants.
3. Age category 5-19 years calculated by InterGroup Consultants as the total of INAC age categories 5-9, 10-14, and 15-19 years.
4. Age category 20-64 years calculated by InterGroup Consultants as the total of INAC age categories 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64.
5. Age category 65 years and over calculated by InterGroup Consultants as the total of INAC age categories 65-69, 70-74, 75-79, 80-84, and 85 years or older.
6. Percentage of age categories Off-Reserve calculated by InterGroup Consultants.

4B.1.2 War Lake First Nation Current Population

Table 4B-3: War Lake First Nation[1] On- and Off-Reserve Population (1991, 2001, 2006)

	1991	2001	2006
On-Reserve and Crown Land Population	135	133	125
% of Total[2]	82%	59%	53%
Off-Reserve Population	30	91	110
% of Total[3]	18%	41%	47%
Total First Nation Population	165	224	235

Source: INAC 1991b, 2001b, 2006b.
Notes:

1. INAC refers to WLFN as War Lake First Nation.
2. Percentage of population On-Reserve and Crown Land calculated by InterGroup Consultants.
3. Percentage of population Off-Reserve calculated by InterGroup Consultants.

Table 4B-4: War Lake First Nation[1] Proportion of Population by Age Specific Ranges (1991, 2001, 2006)

	1991	2001	2006
On-Reserve and Crown Land Population			
Total	135	133	125
0-4 Years	9	11	14
% of Total[2]	7%	8%	11%
5-19 Years[3]	43	36	32
% of Total[2]	32%	27%	26%
20-64 Years[4]	67	81	75
% of Total[2]	50%	61%	60%
65 years and over[5]	16	5	4
% of Total[2]	12%	4%	3%
Off-Reserve Population			
Total	30	91	110
0-4 Years	4	7	8
% of Total[6]	13%	8%	7%
5-19 Years[3]	10	31	37
% of Total[6]	33%	34%	34%
20-64 Years[4]	16	48	65
% of Total[6]	53%	53%	59%
65 years and over[5]	0	5	0
% of Total[6]	0%	5%	0%

Source: INAC 1991b, 2001b, 2006b.
Notes:

1. INAC refers to WLFN as War Lake First Nation.
2. Percentage of age categories On-Reserve and Crown Land calculated by InterGroup Consultants.
3. Age category 5-19 years calculated by InterGroup Consultants as the total of INAC age categories 5-9, 10-14, and 15-19 years.
4. Age category 20-64 years calculated by InterGroup Consultants as the total of INAC age categories 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64.
5. Age category 65 years and over calculated by InterGroup Consultants as the total of INAC age categories 65-69, 70-74, 75-79, 80-84, and 85 years or older.
6. Percentage of age categories Off-Reserve calculated by InterGroup Consultants.

4B.1.3 Fox Lake Cree Nation Current Population

Table 4B-5: Fox Lake Cree Nation[1] On- and Off-Reserve Population (1991, 2001, 2006)

	1991	2001	2006
On-Reserve and Crown Land Population	311	262	273
% of Total[2]	47%	28%	27%
Off-Reserve Population	352	679	746
% of Total[3]	53%	72%	73%
Total First Nation Population	663	941	1019

Source: INAC 1991c, 2001c, 2006c.
Notes:

1. INAC refers to FLCN as Fox Lake Cree Nation.
2. Percentage of population On-Reserve and Crown Land calculated by InterGroup Consultants.
3. Percentage of population Off-Reserve calculated by InterGroup Consultants.

Table 4B-6: Fox Lake Cree Nation[1] Proportion of Population by Specific Age Ranges (1991, 2001, 2006)

	1991	2001	2006
On-Reserve and Crown Land Population			
Total	311	262	273
0-4 Years	20	26	16
% of Total[2]	6.4%	9.9%	5.9%
5-19 Years[3]	100	89	95
% of Total[2]	32.2%	34.0%	34.8%
20-64 Years[4]	*	*	*
% of Total			
65 years and over[4]	*	*	*
% of Total			
Off-Reserve Population			
Total	352	679	746
0-4 Years	26	47	56
% of Total[5]	7.4%	6.9%	7.5%
5-19 Years[3]	99	206	197
% of Total[5]	28.1%	30.3%	26.4%
20-64 Years	*	*	*
% of Total			
65 years and over[4]	*	*	*
% of Total			

Source: INAC 1991c, 2001c, 2006c.
Notes:

1. INAC refers to FLCN as Fox Lake Cree Nation.
2. Percentage of age categories On-Reserve and Crown Land calculated by InterGroup Consultants.
3. Age category 5-19 years calculated by InterGroup Consultants as the total of INAC age categories 5-9, 10-14 and 15-19 years.
4. Data for age categories 20-64 years and 65 years and over are not available.
5. Percentage of age categories Off-Reserve calculated by InterGroup Consultants.

4B.1.4 York Factory First Nation Current Population

Table 4B-7: York Factory First Nation[1] On- and Off-Reserve Population (1991, 2002, 2006)

	1991	2001	2006
On-Reserve and Crown Land Population	283	455	452
% of Total[2]	44%	48%	42%
Off-Reserve Population	360	496	620
% of Total[3]	56%	52%	58%
Total First Nation Population	643	951	1072

Source: INAC 1991d, 2001d, 2006d.
Notes:

1. INAC refers to YFFN as York Factory First Nation.
2. Percentage of population On-Reserve and Crown Land calculated by InterGroup Consultants.
3. Percentage of population Off-Reserve calculated by InterGroup Consultants.

Table 4B-8: York Factory First Nation[1] Proportion of Population by Specific Age Ranges (1991, 2001, 2006)

	1991	2001	2006
On-Reserve and Crown Land Population			
Total	283	455	452
0-4 Years	33	54	53
% of Total[2]	12%	12%	12%
5-19 Years[3]	94	151	145
% of Total[2]	33%	33%	32%
20-64 Years[4]	140	232	236
% of Total[2]	49%	51%	52%
65 years and over[5]	16	18	18
% of Total[2]	6%	4%	4%
Off-Reserve Population			
Total	360	496	620
0-4 Years	27	48	58
% of Total[6]	8%	10%	9%
5-19 Years[3]	110	127	164
% of Total[6]	31%	26%	26%
20-64 Years[4]	201	296	363
% of Total[6]	56%	60%	59%
65 years and over[5]	22	25	35
% of Total[6]	6%	5%	6%

Source: INAC 199d1, 2001d, 2006d.
Notes:

1. INAC refers to YFFN as York Factory First Nation.
2. Percentage of age categories On-Reserve and Crown Land calculated by InterGroup Consultants.
3. Age category 5-19 years calculated by InterGroup Consultants as the total of INAC age categories 5-9, 10-14, and 15-19 years.
4. Age category 20-64 years calculated by InterGroup Consultants as the total of INAC age categories 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64.
5. Age category 65 years and over calculated by InterGroup Consultants as the total of INAC age categories 65-69, 70-74, 75-79, 80-84, and 85 years or older.
6. Percentage of age categories Off-Reserve calculated by InterGroup Consultants.

APPENDIX 4C

THOMPSON SCENARIOS

KEEYASK

Hydropower Limited Partnership

LIST OF TABLES

LIST OF FIGURES

4C.0 THOMPSON SCENARIOS

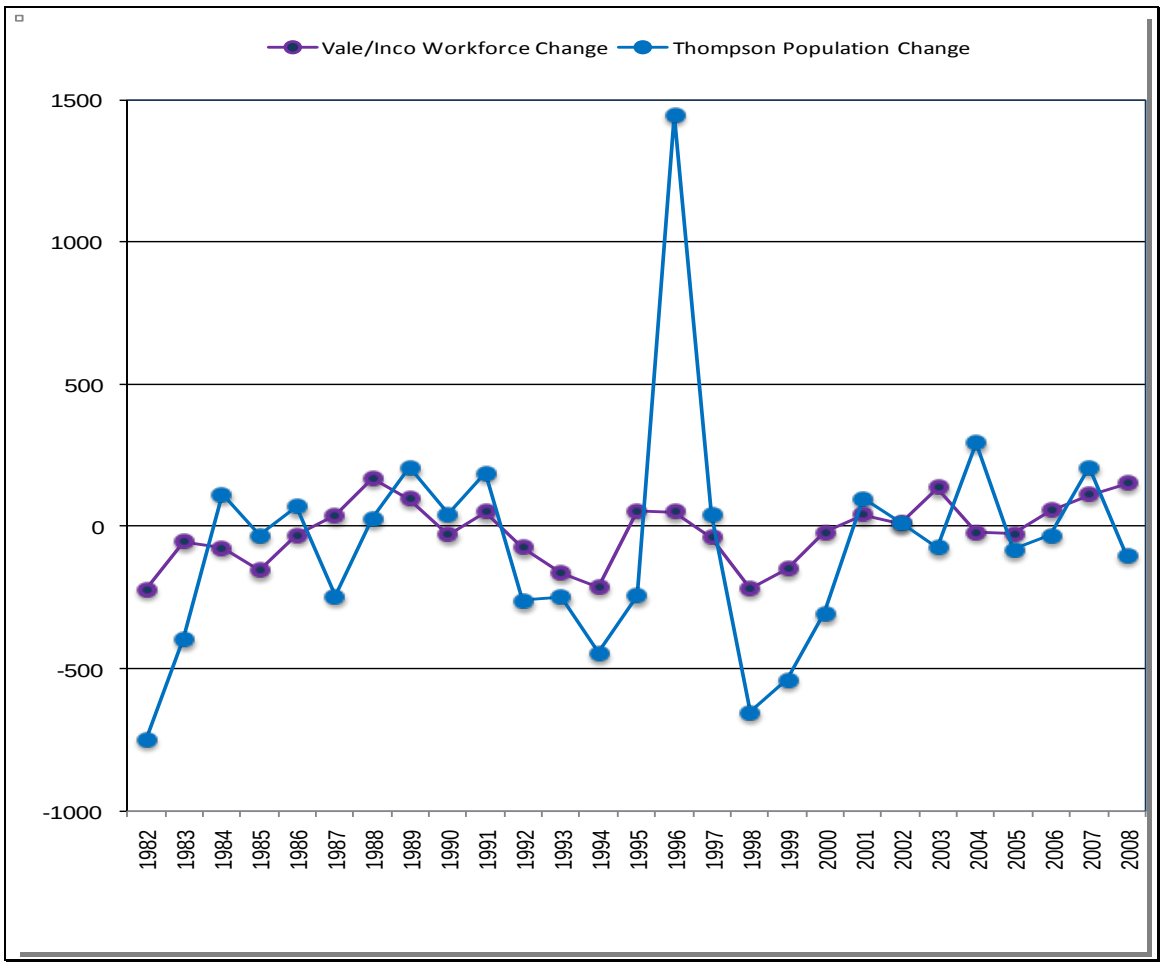
4C.1 BACKGROUND

Thompson has experienced a prolonged period of growth based on a diversity of drivers influencing the economy, population, infrastructure and services, and quality of life. However, with the recent downturn in the global economy and the associated impacts that were observed in Thompson and elsewhere in the world, it is clear that economic drivers can be severely altered in a very short period of time, making it difficult to anticipate what will happen to Thompson's economy over the next ten years.

The Thompson economy is very closely tied to Vale's[1] mining, milling, smelting and refinery operations in the City. Therefore, it is important to understand the situation with Vale in Thompson in order to gain an appreciation for the potential impacts that the Keeyask Generation Project (the Project) construction may or may not have on the community.

Figure 4C-1 relates the change in employment levels at Vale to the overall observed change in total population for Thompson. As can be seen, with the exception of a few years, the overall trends for the Vale workforce and the Thompson population are very similar. In most years that Vale has reduced its workforce, a concurrent decline in population numbers was observed.

[1] Vale is the current owner of the mines, mill, smelter and refinery operation in Thompson. The mine and related facilities were built, then owned and operated by the International Nickel Company (INCO) from 1961 to 2007 when the operations were sold to Vale Inco from Brazil. Vale is used to represent the company ownership in the data presented, even though INCO was the long-term owner and operator of the facilities until 2007.



Sources:
Vale (formerly Inco) employment statistics were received from Vale, Thompson Operations, February 24, 2009 and taken from Manitoba Hydro and NCN Wuskwatim EIS, 2003. Manitoba Health, Annual Statistics (2001-2008).
Notes:

- The chart above represents the change in total numbers observed between years for both Vale (formerly Inco, from 1982 to 2006) employment and the Thompson population. It does not represent the total number of employees at Vale or the total number of people living in Thompson at any given point. For example, between 1982 and 1983 the total Thompson population declined by 342. This decline is represented by the point on the chart for that period.
- Manitoba Health population data are collected and presented by postal code or location of residence.

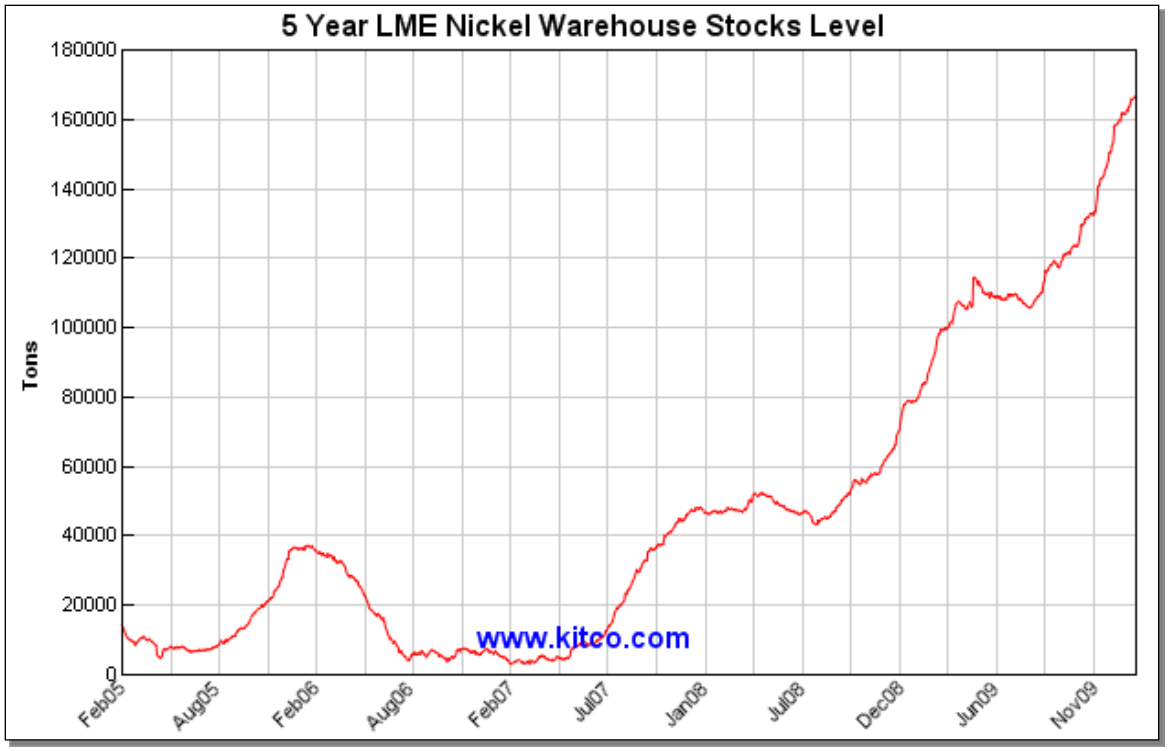
Figure 4C-1: Comparison of Changes in Vale Employment Levels and Changes in the Thompson Population Over the Previous Year: 1982 to 2008

The recent economic downturn brought about a substantive reduction in the price of nickel on world markets. The decline began in the second quarter of 2007 (Figure 4C-2), preceding the major market decline by approximately 15 months.

Source: InfoMine 2010.

Figure 4C-2: Spot Nickel Prices from February 11, 1995 to February 10, 2010

Around that time, the London Metals Exchange inventory of nickel started to increase and has grown steadily since (Figure 4C-3). The result was a large inventory of available nickel on the world markets and a corresponding drop in demand as growth slowed in China, Russia and other countries that have a large or growing industrial base.

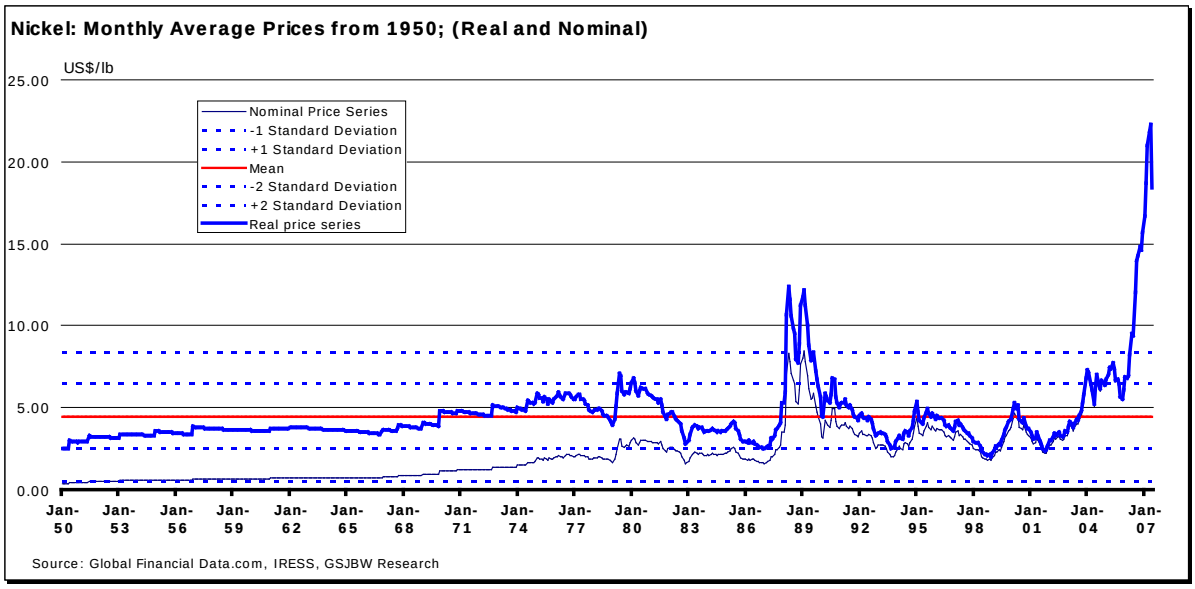


Source: Kitco Metal Exchange 2010.

Figure 4C-3: Metals Exchange Nickel Stocks 1995 to February 2010

Between 2008 and 2010, the London Metals Exchange (LME) inventory of nickel continued to increase. Historically, when inventories increase, the price of the commodity typically decreases. However, in the second quarter of 2009, the nickel price increased while LME inventories increased. Prices appear to have stabilized around the $8.00/pound price since the third quarter of 2009. The high inventory and stable price is a fundamental disconnect from typical market trends (Wright 2010). This results in greater uncertainty for the future of nickel markets.

Figure 4C-4 illustrates the high degree of volatility in nickel prices beginning in the late 1970s. Given the volatility and recent global economic conditions, it is difficult to predict how this will affect Vale in Thompson. Figure 4C-4 shows that there is an overall long-term trend toward nominally higher prices. Over the last 30 years, this has included sharp price increases and decreases. The result is a mean value below $5.00/pound. This appears to support the idea of a relatively low nickel price in the future, possibly in the $6.00/pound range.



Source: Gray 2009.

Figure 4C-4: Nickel Prices (January 1950 to January 2007)

Along with the gradual trend of increasing prices, one must consider the role of exploration. With the recent economic downturn, exploration for new nickel reserves decreased. This could potentially affect the long-term viability of existing mines and the potential development of new mines. However, in the case of Vale, there is sufficient enough knowledge regarding existing reserves that the company may be able to rely upon it in the short to medium-term. The combination of known reserves, the historical trend toward nominal increases in nickel prices and very low nickel production costs in Thompson suggests that Vale's operation in Thompson is well placed to recover if international industrial demand for nickel, particularly in China, increases (Gray 2009).

In a show of confidence in long-term nickel markets, Vale engaged in a wide range of expansion and construction activities for its smelter, refinery and mining operations that started in 2008. Among these activities, Vale completed deepening of the D-1 mine to access greater ore reserves (Vale Inco 2008). At the time, other proposed projects included new open pit mines, re-opening of the Pipe Lake mine, the potential construction of an acid plant, and replacement of furnaces to meet 2015 regulatory environmental guidelines.

When the 2015 regulatory guidelines were established, the nature and cost of these upgrades were acknowledged to likely require an increase in production to help keep costs lower (Minerals and Metals Division *et al.* 2002). In 2008, Vale targeted a 36% boost in production (Service Canada 2008).

Overall, Vale is the main driver of economic growth in the Thompson economy. In a November 17, 2010 press release Vale announced that they plan to phase out the smelting and refining facilities at the Thompson operation by 2015 (Government of Manitoba 2010g). At the same time, Vale announced its intent to pursue development at its Thompson 1-D and Pipe-Kipper deposits in Manitoba, with a

potential $1 billion investment in the 1-D Project as the company recasts itself as a mining and milling operation (Vale 2010).

Considering the recent uncertainty in the global and local economies, two scenarios over two timeframes will be examined for the Thompson economy; a low growth, and suppressed economy scenario (see Table 4C-1 below). The first timeframe, 2010-2014, is the lead up time to the construction of the Project and the second timeframe, 2014-2021, is the projected timeframe for the construction of the Project. An earlier version of this appendix included a high growth scenario; however, with the Vale announcement to shut down the refinery and smelter in Thompson, this scenario is no longer considered to be relevant.

4C.2 THOMPSON ECONOMY AND POPULATION SCENARIOS

In this Appendix, Thompson's economy is examined in a series of tables. The first two tables examine the short-term (Table 4C-1: 2010-2014) and medium-term (Table 4C-2: 2014-2021) overlapping with the Project economic drivers of the local economy. The final table provides population estimate ranges for each scenario.

Vale's November 2010 announcement regarding the future closure of the smelter and refinery in 2015 will result in a reduction of full time jobs in Thompson and a dampening of pressures on its economy, workforce and services. The two scenarios have considered the closure of the smelter and refinery based on the limited information that was available about Vale's plans when this document was being finalized.

Short-Term (2010-2014)

The **low growth scenario** would maintain growth in the community but at a noticeably lower rate than the high rates experienced between 2005 and 2009. This would allow for a more controlled response by the municipal government and local businesses as the city adjusts. The population growth would likely be more gradual with more movement of people from within Canada and northern Manitoba.

A **suppressed economy scenario** could become reality due to a prolonged reduction in nickel markets should world demand for nickel decline again and require a long recovery period. The closure of the smelter and refinery in 2015 has the potential to contribute to the effects of a decline. This could manifest itself in high vacancy rates, a major reduction in housing prices and an exodus of some professionals and skilled workers. A portion of the population decline due to layoffs could be offset by increased in-migration from outlying northern communities as University College of the North (UCN) gears up and housing costs decline. This would change the population demographics of the city and the standard of living as there would be fewer high paying jobs associated with mining and related support services.

Table 4C-1: Potential Economic Scenarios for Thompson's Future 2010 – 2014 (before commencement of Project construction)

Low Growth Scenario	Suppressed Economy Scenario
Economic Activity - varies by scenario	
Vale – main economic driver	Vale – main economic driver
Minimal rise in nickel price Bonus pay Overtime pay Some hiring of own and contractor staff Complete tailings pond expansion and upgrade Increased mineral exploration as commodity price rises	Prolonged low nickel price No bonus pay No overtime pay Layoffs of own staff, no additional contractor staff Tailings pond expansion and upgrade scaled back Temporary closures of all operations Cutbacks in mineral exploration
Minimal retail and commercial expansion due to limited available land inventory Labour shortage causing increased stress for businesses	No retail and commercial expansion, potential contraction Surplus supply of entry level workers for retail and service sector
Housing Increased development of Manitoba Housing units 10-20 new residential units per year Infill Expansion of City of Thompson boundaries and new subdivision planning Two new hotels with an additional 149 rooms for short-term and extended stay guests	Housing Increased development of Manitoba Housing units 0-10 new residential units per year Infill Expansion of City of Thompson boundaries, but no new subdivisions
Thompson Regional Airport Authority – continue to plan for construction of a new airport terminal and water treatment plant	Thompson Regional Airport Authority – plan for renovation and expansion of the existing airport terminal
Slow but steady increase in Health Care Services, upgrades and expansion of services.	Slow increase in Health Care Services, upgrades and expansion of services
City of Thompson infrastructure renewal – initial work in 2010 with planned renewal projects for the next 10 years	City of Thompson infrastructure renewal – initial work in 2010 with planned renewal projects over a 10-15 year timeframe
Cold Weather Testing - Slow increase in automotive and recreation vehicle testing activity	Cold Weather Testing -Prolonged slow-down in automotive and recreational vehicle testing activity
In-migration of people seeking work	In-migration of people seeking work

Table 4C-1: Potential Economic Scenarios for Thompson's Future 2010 – 2014 (before commencement of Project construction)

Low Growth Scenario	Suppressed Economy Scenario
From within Canada	From northern MB communities
From International	Increased enrolment in UCN and fluctuating enrolment in the School Division
From northern MB communities	Out migration of skilled trades and professionals seeking work
Increased enrolment in UCN and School Division	
Moderate short-term temporary worker population growth for construction projects (2-5 years)	Moderate short-term temporary worker population growth for construction projects (1-3 years)
Low sustained population growth for new mine workers, commercial and retail growth, construction workers, UCN campus and housing	Minimal population growth for commercial and retail growth, construction workers, UCN campus and housing

Medium-Term (2014-2021)

As Project construction gets underway, each scenario would show varying levels of impact. The suppressed economy scenario would likely show the greatest effects from the Project. In the low growth scenario, the Project would inject a stimulus to the economy resulting in short-term growth. In the suppressed economy scenario, the Project could provide stability to a potentially depressed economy.

Table 4C-2: Potential Economic Scenarios for Thompson's Future 2014 – 2021 (overlap with Project construction)

Low Growth Scenario	Suppressed Economy Scenario
Economic Activity - varies by scenario	
Vale – main economic driver Prolonged nickel price $6.00 to $8.00/pound Bonus pay Overtime pay Some hiring of own and contractor staff Small increase in mineral exploration Slow expansion of new mining operations (new open pit mines)	*Vale – main economic driver* Prolonged nickel price below $5.00/pound No bonus pay No overtime pay Layoffs of own staff. No additional contractor staff Temporary closures Smelting and refinery closes in 2015
Thompson Regional Airport Authority Construction of new terminal building and commercial space begins within the next 5-10 years including new water treatment plant on the north side of the river	*Thompson Regional Airport Authority* Renovations to existing facilities take place as the expansion plans are put on hold
Some Commercial Expansion as the airport infrastructure develops. This would result in more demand for skilled and unskilled workers	Minimal Commercial Expansion to service a less affluent population. Uncertainty in the retail sector. Unskilled labour force would increase in size
Housing Increased development of Manitoba Housing units Infill New North and East subdivision delayed slow development by local contractor/developer	*Housing* Increased development of Manitoba Housing units Infill No subdivision expansion
Slow but steady increase in Health Care Services, upgrades and expansion of services	Slow increase in Health Care Services, upgrades and expansion of services
City of Thompson infrastructure renewal – initial work in 2010 and planned renewal projects for the next 10 years	City of Thompson infrastructure renewal – initial work in 2010 and planned renewal projects over a longer timeframe
Completion of the construction of the new campus for UCN in 2013 or 2014	Completion of the construction of the new campus for UCN in 2013 or 2014
Cold Weather Testing – minimal increase	Cold Weather Testing – minimal slow-down due to long-term suppressed economy
In-migration of people seeking work From within Canada From International From northern MB communities	In-migration of people seeking work From northern MB communities Increased enrolment in UCN Initial drop in Public School enrolment with long-term recovery

Table 4C-2: Potential Economic Scenarios for Thompson's Future 2014 – 2021 (overlap with Project construction)

Low Growth Scenario	Suppressed Economy Scenario
Increased enrolment in UCN and School Division	Out migration of skilled trades and professionals seeking work
Maintain short-term temporary worker population growth for construction projects (3-4 years) Low, but sustained population growth for new mine workers, commercial and retail growth, construction workers, increased UCN enrolment and housing	Temporary worker population decreases as construction projects end Minimal population growth for commercial and retail growth, construction workers, increased UCN enrolment and housing

Table 4C-3 below attempts to project population change for Thompson based on the information in the previous two tables. An important unknown is the actual current population of Thompson. The Statistics Canada population estimate for Thompson in 2006 was 13,445 and the BRHA's figures were 14,074 for 2006 and 13,925 in 2008. However, the key person interview program indicated that the population of Thompson might have been as large as 18,000 people in 2009 (Thompson KPI Program 2008-2010). What is difficult to determine is the number of temporary workers who would report another location as their permanent address and the Aboriginal population, which may still refer to their home community as their permanent address.

Table 4C-3: Scenario based Population Projections for Thompson to 2020*

Low Growth Scenario	Suppressed Economy Scenario
14,000 to 17,000	11,000 to 14,000

*Projections based on an unofficial population of 17,000 to 18,000 as of the third quarter of 2008 (this is based information provided during the Thompson KPI Program 2008-2010).

SECTION 5

PERSONAL, FAMILY AND COMMUNITY LIFE

KEEYASK
Hydropower Limited Partnership

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

Page

LIST OF FIGURES

Page

LIST OF PHOTOS

Page

5.0 PERSONAL, FAMILY AND COMMUNITY LIFE

5.1 INTRODUCTION

This section examines the effects of the Project on personal, family and community life. Personal, family and community life plays a central role in the quality of life that people experience. This section responds to Sections 8.3 (Existing Environment) and 9 (Environmental Effects Assessment) of the Final EIS Guidelines for the Project, as issued by the Canadian Environmental Assessment Agency in March 2012.

The following Valued Environmental Components (VEC) are assessed in this section:

- Community governance, goals and plans;
- Community health;
- Mercury and human health;
- Public safety and worker interaction;
- Travel, access and safety;
- Culture and spirituality; and
- The way the landscape looks (aesthetics).

Many of these VECs are closely linked to each other and to other VECs in the Socio-economic supporting volume (SE SV). The dynamic nature of personal, family and community life is difficult to illustrate, however it is recognized that physical, ecological, social and economic factors play an important role in shaping these important contributors to quality of life. As Lawrence (2004) notes in the CEAA's Research and Development Monograph Series the *Significance of Social and Economic Impacts in Environmental Assessment*:

> Context is dynamic. Historical, current, likely and desired future social, cultural and economic characteristics and interaction patterns among people and between people and the physical (both natural and built) and ecological environments all need to be taken into account. Context operates at multiple levels. Contextual interpretations from multiple perspectives are essential.
>
> Social impacts can be physical (as experienced) and/or psychological (as perceived). Sometime proponents "play down" community perceptions of potentially significant impacts. Often those perceptions, once investigated, turn out to be "real", both because perceptions affect behaviour and because community knowledge of impact likelihood and magnitude is frequently underestimated (Lawrence 2004).

This is particularly true in relation to personal, family and community life as people's perspectives about current circumstances and possibilities for the future are a key consideration.

There are a multitude of approaches to assess the factors that contribute to or detract from people's quality of life. The common elements to most approaches include consideration of economic well-being (*e.g.*, employment and income to meet the basic needs of food, shelter, clothing, *etc.*), physical well-being (*e.g.*, personal health and safety), social well-being (*e.g.*, family stability and social supports), and the environment. The latter is particularly relevant to Aboriginal people who have been engaging in activities on the landscape such as hunting, trapping and fishing for traditional and domestic purposes throughout their history and who have strong relationships to the environment. The CNP Keeyask Environmental Evaluation Report notes "The customs, practices and traditions that are integral to our distinctive cultural identity and that are reflected in our social organizations are rooted in our relationships with Mother Earth."

This section recognizes that the additive effects of the Project have the potential to influence personal, family and community life. These effects are difficult to predict as they may vary considerably from the individual, to the family or to the community level. Such effects are equally difficult to describe succinctly as they may be experienced differently by different people. "Context is composed of multiple elements (*e.g.*, spatial, temporal, cultural, ecological, social, economic, institutional)" writes Lawrence (2003), and "what is important is highly dependent on a project and community characteristics." Context considers a community's "history, culture, social structure, patterns of life, access to resources, community control and cohesion, and values and perspectives" (Dale and Lane 1994; Harrison and Thomas 2003; Ross 1990; as quoted in Lawrence 2004). While the immediate effects of the Project may be described, the interactions between all of these effects and how they are experienced by individuals, families and communities are more challenging to characterize and at times impossible to predict with accuracy.

An important element of context for this section is the Cree worldview (see Chapter 2 of the EIS) that shapes the perceptions and experiences of the KCNs whose personal, family and community life will be most affected by the Project. The Cree worldview considers all components of the environment, both natural and socio-cultural as related and having the capacity to affect all levels of an ecosystem, temporally and spatially. Therefore, it is difficult for First Nation people to turn away from the historical events that have changed their lives and focus on events that may change their lives in the future. In considering the potential Project-interactions with personal, family and community life, it is important to acknowledge that the Aboriginal worldview differs from a technical perspective.

As the CNP note:

> Every culture is defined by its worldview. It is the lens through which someone sees and interprets the world. It is a set of fundamental beliefs that are so internalized as to go largely unnoticed and unquestioned – so much a part of everyday life as to be virtually invisible" (CNP Keeyask Environmental Evaluation Report).

CNP describe their worldview in saying:

> As a people, we are inseparable from our relationships with Mother Earth – relationships that have developed over thousands of years. This is the foundation of our worldview and is integral to our survival. Our relationships with Mother Earth are the basis of our language, history and spirituality – cumulatively, our culture (CNP Keeyask Environmental Evaluation Report).

YFFN worldview is reflected in "the things we do and why we do them. They are our beliefs and what we were taught when growing up" (YFFN Evaluation Report (*Kipekiskwaywinan*)). These things are grounded in their relationship with *Askiy*:

> *Askiy* is the whole of the land, water, people, plants, animals and all things. We are part of **Askiy** and we have relied on *Askiy* since we have existed. We respect Askiy and we are affected by even the smallest changes to *Askiy*. *Askiy* is beyond value (YFFN Evaluation Report (*Kipekiskwaywinan*)).

and in *Kiskinohamakaywina* (teachings):

> Cree teachings have been handed down through the generations, and continue to be passed on today. These teachings embody the values of our ancestors and today's Elders giving us daily guidance (YFFN Evaluation Report (*Kipekiskwaywinan*)).

Important to FLCN's worldview:

> Embedded within *Ininewak* society is a philosophy referred to as *mino pimatisiwin*. *Mino pimatisiwin*, which is the overall health of a people and *Askiy*, is a fundamental *Ininewak* value. Human well-being is dependent upon the well-being of *Askiy*, including our perceptions of the well-being of *Askiy*. It is our responsibility to care for and nurture the well-being of *Askiy*, so that it can provide for the future *Inninuwak* (Chapter 2 of the EIS).

The KCNs respective experiences with past hydroelectric development have historically been at odds with their worldviews. CNP describes this in saying:

> Of all the changes imposed from the outside, the dams and diversions brought about the largest changes… Although we have adapted somewhat, and survived, our culture has been seriously damaged by these projects, as they have reduced our ability to sustain our cultural identity through traditional activities (CNP Keeyask Environmental Evaluation Report).

For greater detail on the KCNs' worldview, see Chapter 2 of the Response to EIS Guidelines.

The KCNs' experience with past hydroelectric development informs part of the context in which the effects of the Keeyask Project are being considered. Potential effects of the Project during the construction phase could arise from the following:

- Participation in construction employment and business opportunities by Members of the KCNs and residents of Gillam and Thompson;
- Potential worker-interaction issues in the Local Study Area, particularly during the peaks of construction activity and as a result of the south access road construction camp;
- Physical changes to the landscape as a result of clearing and construction activities;
- New access to the Gull Lake and Gull Rapids area;
- Construction related traffic; and
- Implementation of the KCNs' Adverse Effects Agreements (AEA).

During the operation phase, effects on personal, family and community life may stem from:

- Continued implementation of the programs and measures under each KCNs' Adverse Effects Agreements (AEA);

- The KCNs receive return on their respective investments to the benefit of their communities;
- Potential participation in operation phase employment and contracting opportunities;
- Physical and biophysical changes to the landscape (including the reservoir), and resources used by people, as a result of operation of the generating station;
- Water-related changes in the Keeyask reservoir;
- Elevated methlymercury levels in some species of fish in Gull and Stephens lakes as a result of flooding;
- Changes to the community of Gillam to accommodate the operational workforce;
- Increased access to the Keeyask reservoir; and
- Re-routing of PR 280 allowing for a shorter travel time between Gillam and Thompson.

This section focuses on the Local Study Area. Effects on personal, family and community life occur almost entirely in the Local Study Area. Regional Study Area effects are expected to be very small and would be difficult to discern and describe.

5.2 APPROACH AND METHODOLOGY

This section describes the approach and methodology used to assess the effects of the Project on each of the VECs for personal, family and community life. In addition to the approach and methods described below, KCNs' Aboriginal traditional knowledge (ATK) is also considered. For each VEC, the following information is presented:

- Relevant background about the scope, nature and importance of the VEC;
- Summary and highlights of the approach used to assess effects; and
- Identification of Project-related drivers of change that could contribute to Project induced effects on the VEC.

Additional details to frame the assessment are also presented in the relevant existing environmental setting and or effects sections where applicable. The approaches and methods selected to assess Project-related changes are built on pathways of effect that connect relevant features of the Project with the socio-economic environment in which the Project would occur. This serves as the baseline or existing conditions upon which effects of the Project could occur. The drivers of change presented in this section originate from these pathways.

The environmental setting and effects assessment drew heavily on community-based research including the following:

- **Key person interviews (KPIs):** A program of KPIs was undertaken to establish the existing environment, to identify issues potentially affected by the Project, to discuss potential means to enhance positive effects and mitigate negative effects. In the case of CNP, sample KPI guides were

provided to CNP, who undertook the research independently and produced technical memos on various subjects. For FLCN and YFFN, the community-based approach involved the hiring and training of community coordinators and researchers who assisted in the coordination of research, completion of KPIs and gathering of other data.

- **Workshops:** Depending upon the interests of the KCNs, workshops were held with targeted groups in each community.
- **KCNs documents:** KCNs' respective Environmental Evaluation Reports were considered, as were other KCNs-authored reports. Materials from these documents were used with the permission of each community.

As Lawrence (2004) notes, an approach that involves the community in the research aids in "determining what is acceptable, what is unimportant, what is important and what is more important." The community-based research helped identify issues and concerns related to Project development. Past experiences with hydroelectric development are very relevant to the KCNs, since each of the communities has experienced first-hand how a project can affect the surrounding areas and the people – be it the physical changes to the landscape or as a result of Project activities. This information was also an important consideration in the determination of effects, as the KCNs have considerable first-hand experience on which to draw.

ATK plays an important role in understanding personal, family and community life as the collective knowledge of the KCNs is based upon first hand experiences with hydroelectric development. The ATK presented in this section is pulled from the KCNs' Environmental Evaluation Reports and other community-based documents and research. ATK is passed down through the generations and it reflects the ease by which certain understandings are recognized, organized and used. Although there are commonalities among this knowledge, each of the KCNs also draws from its own unique experiences. As such, the materials in this section may be supported by all of the KCNs statements, and in others it may be focused on a single community. This is not to say that each of the KCNs do not hold similar concerns, but rather that the information used to describe VECs reflects the issues and interests expressed by each community. For example, FLCN has considerable direct experience with worker-interaction issues as many Members reside in, or live in proximity to Gillam where Manitoba Hydro is headquartered in the north. WLFN does not have the same level of experience to draw upon as the community was not a hub of activity for workers during past hydroelectric projects. In such instances, the discussion is guided by the information provided by the communities. ATK, as documented in each of the KCNs' respective Environmental Evaluation Reports provides insights not only into the existing environment, but to an understanding of the factors that have contributed to each community's current characteristics. In addition to being able to describe the historic factors that have shaped the present, ATK can contribute to the understanding of the potential effects of the Project as the transformation and re-transformation of the Nelson River by hydroelectric development has been witnessed and experienced by each community. In addition to community-based research, this section considered other available data including the following:

- **Statistical data sources:** Where available, statistical data sources were considered. For example health indicators data was collected for the KCNs, the town of Gillam and the city of Thompson.

- **Literature:** Where available, reference material relevant to the Local Study Area was used to profile the existing environment. In addition, reference materials with respect to key issues and other experiences with resource projects in Canada were used in the analysis of effects, potential enhancement or mitigation measures, and monitoring. This includes consideration of other environmental impact assessments in Canada.

5.2.1 Community Governance, Goals and Plans

The Project was considered within the context of each of the Local Study Area communities' governance structures, goals and plans. Analysis of the effects to community governance, goals and plans considered the drivers of change associated with Project construction and operation. The existing conditions in the Local Study Area were determined through the KPI programs, and in reference to various KCNs documents and secondary sources regarding their communities. Each of the Local Study Area communities' overall goals and plans were considered in terms of compatibility with the Project.

The KCNs have described how hydroelectric development has placed demands on each community's respective Chiefs and Councils since the Lake Winnipeg Regulation (LWR) and Churchill River Diversion (CRD) projects were implemented. During the late 1970s and early 1980s some of those demands involved trying to address complaints by Band Members and resolve claims under the Northern Flood Agreement (NFA). In the late 1980s, focus shifted to negotiating comprehensive agreements with Manitoba Hydro for adverse effects arising from LWR and CRD and related hydro developments. Since the late 1990s and early 2000s, substantial community and leadership attention has been directed at establishing the basis for a partnership in the Keeyask Project. These initiatives have placed distinctive demands on the community leadership while at the same time increasing the community's capacity to deal with complex challenges. It is anticipated that the Project will place continuing demands on local governance, in addition to contributing to community goals and plans.

The assessment of effects on community governance, planning and goals identifies potential Project-related drivers of change and assesses how these would influence the ability of affected communities to govern themselves and achieve their goals, taking into account information gleaned from community-based research and the KCNs' own studies.

5.2.1.1 Construction Phase

During construction, the effects of the Project would stem from the capability of local governance to deal with the activities associated with a major development, employment and business opportunities, and the potential socio-economic effects that stem from these changes. The drivers of change during the construction phase considered several factors including:

- Activities of the KCNs Future Development and Negotiations teams with regard to Project implementation, including but not limited to increased strain associated with securing the necessary funds to enable equity participation in the Project.

- Implementation of the JKDA and AEAs, including:
  - Participation in the Keeyask Hydropower Limited Partnership (the Partnership), including representatives on the Board of Directors;
  - Participation in the Advisory Group on Employment, Construction Advisory Committee and the Monitoring Advisory Committee;
  - Negotiation and implementation of the DNCs; and
  - Implementation of offset programs.
- Continued demand on governance and local services associated with a potential influx of construction workers into the area.

5.2.1.2 Operation Phase

During operation, community governance, goals and plans are likely to experience effects of the Project in relation to the longer-term changes resulting from the Project. Among the drivers of change associated with Project operation are the following:

- Ongoing participation in the Partnership (including representation on the Board of Directors);
- Annual distribution of equity income resulting from the Project;
- Ongoing implementation of the AEA Offsetting Programs; and
- Continued pressure on governance and local services resulting from an increase in population in Gillam.

5.2.2 Community Health

The health of individuals, families and communities is shaped by a variety of factors or determinants of health, which include the social and economic environment, the physical environment, and the person's individual characteristics and behaviours (WHO 2009). The approach to understanding community health in the Local Study Area considered factors such as the state of the environment, access to resources to meet basic needs, exposure to risks and capacity to cope with them, income and education level, and social networks and relationships with friends, families, and neighbours that all contribute to health and well-being (Quigley, R.L. *et al.* 2006). Many of these factors are discussed in other volumes of this EIS, in addition to within sections of this Supporting Volume. The KCNs' Environmental Evaluation Reports also provide valuable insights to their overall perspectives on community well-being.

Health goes beyond the simple absence of disease. A full understanding of community health also requires consideration of a community's social, physical and economic environments as well as individual factors that contribute to overall health (*i.e.,* a more holistic approach). Table 5-1 describes some of the well-documented relationships between the social, economic, environmental and individual factors that can affect health.

Table 5-1: Factors Contributing to Health

Factor	Link to Health
Education	• Improves opportunities to access employment and income • Provides one with a sense of control over life's circumstances • Increased understanding of information related to maintaining health
Income	• Higher income is linked to improved living conditions • Higher income increases ability to access resources • Stressors such as job strain, financial problems, and marital problems are more common among lower income individuals
Social Networks	• Social support networks act as supports when family, friends and community contribute to problem solving, dealing with adversity, and sense of control over life's circumstances • Social supports act as a buffer against health problems
Physical Environment	• Exposure to contaminants through air, water, soil and food can result in a variety of adverse health effects • Quality of housing (including the density of dwelling requiring major repairs, average number of persons per room, and indoor air quality) are linked to overall health • Distance to services (*e.g.*, distance to nearest hospital) • Personal security (*e.g.*, incidents of personal and property crime)
Individual	• Genetic factors • Personal practices/behaviours (*e.g.*, diet, exercise, smoking, use of alcohol, *etc.*) • Coping skills

Sources: Health Canada 2003, Health Canada 2004, Health Council of Canada 2005, Hou and Chen 2003, Orpana *et al.* 2007, Atlas of Canada 2009, WHO 2009.

Beyond this, Aboriginal status itself is considered by some as one of the key determinants of health in Canada (Raphael 2004). Among the determinants of health described in Table 5-1, Aboriginal people are more likely than other Canadians to experience inequalities that affect health. For example:

- Education: Aboriginal people are less educated than their non-Aboriginal counterparts. Aboriginal youth are less likely to complete high school.
- Employment: Insufficient education diminishes the level of skills people have to enter the labour market. Aboriginal people are less likely to end up in positions where they have control over their working environment. Unemployment rates are higher for Aboriginal people than the general Canadian population.
- Income and Social Status: Aboriginal people are typically overrepresented in the low income bracket. Annual earnings are lower than other Canadians irrespective of whether they are working full-time or part-time.

- Social Support Networks: Colonialism resulted in losses of land (*e.g.,* changes associated with *The Manitoba Natural Resources Transfer Act* and registered trapline system [see Section 2.2.1.3]) , language, and socio-cultural resources. The residential school system furthered these losses by removing young children from their communities, which has been linked to Aboriginal people being unable to establish effective family relationships.
- Physical Environments: Aboriginal communities often face housing shortages and people are more likely to live in crowded conditions or in homes in need of major repairs. This can result in stressors such as children having little room to study or play, or adults lacking private space to relax.
- Personal Health Practices and Coping Skills: Among the most relevant health behaviours by Aboriginal people are the over or misuse of alcohol, smoking, and lack of exercise and diet. Aboriginal communities are less likely to have community facilities and infrastructure to promote.
- Healthy lifestyle choices/ behaviours (*e.g.*, recreation centers, playgrounds, swimming pools).

(Loppie Reading and Wien 2009; Health Council of Canada 2005)

The Cree concept of *mino pimatisowin* or living "a good and honourable life" (Chapter 2 of the EIS) is another way of characterizing health. Adelson (1998), in her work on Cree concepts of health and well-being, describes this in saying, "Someone is said to be *miyupimaatisiiun*[1] if he or she eats the right foods, keeps warm and performs the activities needed to accomplish one's goals, whatever they may be." Further, Adleson suggests that Cree concepts of health are ultimately linked to a community's social and political well-being. These concepts illustrate how health can be understood in much broader terms than those described by indicators.

Given the complexity of the factors influencing health, the approach to community health began by gaining a broad understanding of the factors influencing health in the Local Study Area. This included information from the KPI programs, community workshops, and the various KCNs' Environmental Evaluation Reports and documents. In addition to this, a review of health indicators data[2] from the First Nations and Inuit Health Branch, INAC, and Manitoba Health was undertaken. The discrepancies among these data sets and limitations of the data are explained in Appendix 5A.

The following indicators were chosen based on practicalities such as the availability of data at the community level, as well as to provide a comprehensive picture of health for the KCNs, Gillam and Thompson:

- Birth rates and infant health – including birth rates, pregnancy rates, high and low birth weights, and spontaneous abortion rates;

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[1] Adelson's work focused on the Whapmagoostui Cree of northern Quebec whose dialect translates mino pimatisiwin to miyupimaatisiiun. FLCN has identified Adelson's work as an accurate reflection of their community's ATK in relation to health.

[2] Data from the First Nations and Inuit Health Branch and Manitoba Health was provided with the permission of the KCNs.

- Hospitalization and physician visits – overall use of medical services including reasons such as chronic diseases (cardiovascular disease and diabetes), infections of skin and subcutaneous tissue, and injuries;
- Communicable diseases; and
- Mortality – including mortality rates, premature mortality, and potential years of life lost.

Based on analysis of these indicators, key trends related to health were identified and are presented herein. Wherever feasible, perspectives and insights of the communities are used to support the health indicator data.

The assessment of effects on community identifies potential Project-related drivers that could affect community health and examines their implications on the selected health indicators.

5.2.2.1 Construction Phase

During construction the effects of the Project on community health are likely to result from the various factors capable of influencing health, as opposed to as a result of Project activities. The exception to this is the safety, security and emergency response at the work site, which is addressed by Manitoba Hydro under provincial workplace safety regulations. The drivers of change with the potential to influence community health include:

- Increased income and the potential for both positive and negative spending by the KCNs and other construction workers in the area.
    - The increased availability of income may result in increased opportunity for spending on alcohol and drugs. This may have spinoff effects to the broader community including the potential for family instability.
- Worker interaction – in addition to those effects described under Public Safety, there is the potential for increases in sexually transmitted infections as a result of the presence of a non-local workforce.
- Increased demand for services – the presence of a large construction workforce could place pressure on local services (see Section 4.4).

Worker interaction also presents the potential for an increase in violence and associated injury within the community, which from past hydroelectric developments is often associated with the presence of a non-local construction workforce.

5.2.2.2 Operation Phase

During the operation of the Project, effects to health may stem from factors similar to those described under the construction phase, although issues associated with worker-interaction will no longer be of similar heightened concern. The factors with the potential to affect community health during the operation of the Project are:

- Increased income – positive and negative spending; and

- Additional health and social services may also be required to address the growing population in Gillam (see Section 4.3).

In the case of Project operation there is also the effect of physical changes to the environment from flooding resulting in the release of methylmercury into the environment. Due to the importance of the issues surrounding mercury and human health, it is considered as a VEC in its own right (and is addressed in Sections 5.2.3, 5.3.3 and 5.4.3).

5.2.3 Mercury and Human Health

Mercury is a metal found naturally in small amounts in rock, soil, water, living organisms, as well as in man-made products. Humans can be exposed to different forms of mercury including mercury vapor from dental amalgams, from occupational exposures (*e.g.*, dentistry, mining, fluorescent lamp factories), and through artisanal and small-scale gold and silver mining operations. Flooding of forested lands with soils with high organic content, or flooding of wetlands, commonly results in a temporary large increase in mercury (in the form of methylmercury) in the water, and subsequently in the organisms that live and use those environments. Methylmercury is the form of mercury discussed here, as it is a potent toxin that bio-accumulates through the aquatic food chain, placing people who consume fish at risk (Mergler *et al.* 2007).

The health effects of mercury depend on the form of mercury, duration and quantity of exposure. If the exposure is of elevated levels for an extended period of time, all forms of mercury may cause health effects to the nervous system (*e.g.*, motor skills, irritability, tremors, changes in vision/hearing, memory loss, decreased IQ). Generally, young children and women of child-bearing age are of primary concern with respect to mercury exposure, although persons of any age or gender may experience health effects if the exposure is great enough. Consequently, there can be different recommendations for minimizing exposures depending on which group of the population an individual falls (Wilson 2012).

Since the Project will result in flooding and the subsequent release of methylmercury into the Nelson River system, and in response to concerns expressed by the KCNs, the approach to understanding mercury and human health was twofold. First, efforts were placed on considering the KCNs' issues and concerns in relation to mercury contamination (in particular each communities' history with the issue). This was accomplished through the establishment and activities of a Mercury and Human Health Technical Working Group (hereafter the "Technical Working Group"), comprised of representatives of the KCNs, Manitoba Hydro and its consultants, and experts in the area of mercury and human health identified and retained by the group. Second, a human health risk assessment was undertaken.

It should also be noted that the effects of mercury to aquatic and terrestrial life are examined in those respective supporting volumes.

5.2.3.1 Construction Phase

The assessment of effects of mercury on human health is limited to the operation phase as there are no anticipated effects of construction of the Project in relation to mercury and human health. Although reservoir impoundment occurs in the latter stages of the construction phase, effects from the release of

methylmercury do not reach peak levels until 3-7 years after impoundment; therefore, effects on human health are included under the operation phase.

5.2.3.2 Operation Phase

In order to characterize the effects of impoundment on mercury levels and subsequently human health, exposure to mercury considered both the current and post-impoundment conditions. Concentrations of mercury were measured or predicted for country foods identified by the KCNs, including fish, wild game, waterfowl, and surface water.

The methods used to estimate human health risks followed the following steps:

- Problem formulation – human receptors and relevant exposure pathways were identified;
- Exposure assessment – exposures to mercury were estimated based on a variety of assumptions relations to the use of Gull Lake and Stephens Lake and the surrounding area, and the dietary habits of people in the area;
- Toxicity assessment – toxicology literature was reviewed to identify exposure rates for mercury that have been determined by health agencies to be acceptable (*e.g.*, exposure rates without noticeable risks of adverse health effects);
- Risk assessment – estimated exposure rates were compared to the rates considered acceptable for humans for the various consumption scenarios considered in the assessment; and
- Uncertainty assessment – key assumptions or uncertainties that could affect the risk outcomes were identified (Wilson 2012).

In order to assess the risk of exposure to mercury as a result of the Project, the human health risk assessment considered both the current and post-impoundment conditions for Stephens Lake and Gull Lake. The area surrounding Gull Lake and Stephens Lake is used for a variety of purposes, including hunting, fishing, and gathering. The human health risk assessment evaluated the potential exposure to mercury for the KCNs, as these are the communities at greatest risk due to their use of country foods. Although the human health risk assessment focused on the KCNs, the baseline conditions and results of the risk assessment would also be generally applicable to non-First Nation individuals who use Stephens Lake and or Gull Lake for resource harvesting (*e.g.*, residents from Gillam).

Specific species were selected for evaluation based on KCNs' inputs through the Technical Working Group. The foods selected for evaluation included:

- Fish - whitefish, jackfish, pickerel and sturgeon;
- Wild game - beaver, muskrat and moose;
- Waterfowl - ducks and gull eggs; and
- Wild plants - northern tea, blueberries and Seneca root.

Modeling was not undertaken for gull eggs and wild plants because no reliable model exists for these foods (Wilson 2012). Details on the proceedings of the Technical Working Group and the details of the approach used in the human health risk assessment are found in Appendix 5B and 5C, respectively.

5.2.4 Public Safety and Worker Interaction

Public safety refers to the overall prevention and protection of people from issues that affect their personal and collective safety and security (*e.g.*, acts or activities that may cause harm). As a socio-economic VEC, the main focus of public safety is analysis of the effects related to interaction of non-local Project workers with local residents. These have been identified as the source of greatest concern with regard to the public safety implications of the Project. While this is the focus of the analysis, public safety in the Local Study Area includes discussion on the overall public safety trends within the area, as well as key interests and perspectives expressed by each of the communities.

Analysis of the effects to public safety considered the drivers of change associated with Project construction and operation. The existing conditions in the Local Study Area were determined through the KPI programs, annual crime statistics from the two RCMP units that police the Local Study Area, and consideration of public safety concerns witnessed at other major projects in Canada. Particular attention was paid to the KCNs' experience with past hydroelectric development.

Based on their experience with past projects, the assessment of effects focused on issues associated with the influx of non-local construction workers into communities and new income associated with employment on the Project. An assessment of worker interaction risks was carried out taking into account the size of the incoming workforce, availability of leisure time amenities at the construction camp and in Gillam and Thompson, travel distances and local resident knowledge of, and previous direct experience with, past projects and what might be done to avoid similar occurrences during Project construction. A worker interaction workshop was held with FLCN Members in January 2010 to better understand past experience and identify potential mitigation measures.

5.2.4.1 Construction Phase

It is anticipated that effects to public safety would be limited to the construction phase. The drivers of change during the construction phase considered several factors, all of which were identified by the KCNs as areas of potential concern. Among the drivers of change, the following were identified as the concerns most likely to result in effects to public safety:

- An influx of non-local construction workers and the potential for indirect effects stemming from having more people in the community. Factors considered in relation to this influx include:
  - The number, timing and location of non-local construction workers;
  - Working hours;
  - Leisure amenities at camps;
  - Travel distance from construction camps to communities; and
  - Services and amenities available within the Local Study Area.

- New income from Project employment providing workers with the ability to purchase alcohol and drugs and to participate in a "work hard, play hard" lifestyle. (Goldenberg *et al.* 2007) that has been associated with past project development. The KCNs have expressed concerns about alcohol and drug use by their Members, particularly as controlled and illegal substances might become more readily available with an influx of non-local workers, and potentially gangs.

5.2.4.2 Operation Phase

Effects of the Project related to public safety and worker-interaction are limited to the construction phase because the required workforce for the operation phase will be longer-term in nature and establishing residence within the community of Gillam.

5.2.5 Travel, Access and Safety

As a socio-economic VEC travel, access and safety considers two general forms of transportation and associated issues with access and safety: 1) water-based (or in winter, ice-based) travel; and 2) road-based travel. The existing conditions in the Local Study Area were determined through a variety of sources including traffic volume and collision data from Manitoba Infrastructure and Transportation (MIT) and the RCMP, through the KPI programs, and in reference to the KCNs Environmental Evaluation Reports. The approaches to understanding changes to travel, access and safety as a result of the Project were specific to the type of travel being examined; *e.g.*, specific methods were used to consider water-based transportation, and specific methods were used to understand road-related transportation. In both instances, the drivers of change associated with Project construction and operation were examined in relation to the VEC. The assessment of effects examined the implications of these drivers on future travel, access and safety arising from the Project.

The assessment of water-based travel effects took into account the extensive waterways management programs that have been established through the Comprehensive Implementation Agreements with TCN and YFFN and the JKDA. These programs along with anticipated access management plans address most of the potential effects of Project-related drivers on open water transportation. In the case of road travel, the analysis took into account the extensive improvements to PR 280 that are currently being carried out to meet the added traffic loads of the Keeyask Infrastructure Project (KIP) as well as the proposed Project. These improvements mitigate most of the potential effects on road travel of added traffic during Project construction.

5.2.5.1 Construction Phase

5.2.5.1.1 Water / Ice-Based Travel

During the construction phase, effects to travel, access and safety would stem from in-stream Project activities, in addition to changes on the landscape as a result of the Project's footprint.

Among the Project activities likely to impede the use of the Nelson River as a transportation corridor during construction are the following:

- Interference of natural flows as a result of the construction of an ice boom in the Nelson River upstream of the Project, construction of cofferdams and associated changes to water flows, and construction of the north and south dykes;
- Restricted access along the shoreline in proximity to construction activities; and
- Construction of the south access road.

5.2.5.1.2 Road Travel

During construction, the effects of the Project on road travel would stem from increased vehicular traffic servicing a variety of needs at the construction site (*e.g.*, delivery of materials, equipment and personnel). This increase in traffic has the potential not only to affect overall safety of the public travelling on PR 391 and PR 280, but also to the overall condition of the highways. There is limited potential for measurable effects to PTH 6, and as such while it is described in the baseline it is not carried forward to the effects assessment.

The effects assessment on road travel considered existing traffic levels along potentially affected road segments along with predicted Project-related traffic levels. The percentage increase in travel levels was estimated for each segment and the implications of the increase for traffic safety identified, taking into account anticipated improvements to PR 280. Data from MIT was used to estimate background traffic on the roadways in the Local Study Area. Average Annual Daily Traffic data (AADT) (the number of vehicles passing a point on an average day of the year) was used to describe the overall volume of traffic on particular segments of the road on a daily basis over a one-year period (Manitoba Infrastructure and Transportation 2009). Construction-related road traffic was estimated based upon the construction schedule and material delivery requirements. Three categories of traffic were considered including traffic hauling freight, traffic from support services, and traffic associated with personnel transport to and from the Project site.

Consideration was also given to travel on ice roads in the Local Study Area. Traffic volumes are not recorded on these roads, and as such, information relies on data collected during the community-based fieldwork research program, in addition to government reports on ice roads.

5.2.5.2 Operation Phase

5.2.5.2.1 Water / Ice-Based Travel

The operation of the Project is expected to alter various characteristics of the existing water and ice regimes within the Project's predicted open water hydraulic zone of influence which extends approximately 40 km upstream from the Project site (to the outlet of Clark Lake). The primary changes to navigation will be limited to areas upstream in the predicted open water hydraulic zone of influence and immediately downstream of the generating station (*e.g.*, the outlet immediately into Stephens Lake). The creation of a reservoir and operation of the generating station is expected to cause a backwater effect

upstream of the generating station and result in changes to the water levels, velocities, water surface profiles and ice formation (see PE SV).

5.2.5.2.2 Road Travel

Operation of the Project is not expected to have a measurable effect on the number of vehicles travelling on roads in the Local Study Area. The driver of change during operation is the rerouting of PR 280 along the north and south access roads and across the generating station. This will reduce the overall travel time between Thompson and Gillam, and has implications for the use of roads in the Gillam area.

5.2.6 Culture and Spirituality

Culture and spirituality are considered a single VEC of particular importance to the KCNs when examining the effects of the Project. This section provides the results of a qualitative and quantitative study to assess the effects of the Project on the culture and spirituality of the KCNs.

Culture and spirituality represent a composite of values, beliefs, perceptions, principles, traditions and world views that are based on individual and collective history, experience and interpretation. These cognitive values can sustain cultural experience(s) and also act as a cohesive force to direct the flow of cultural change. One of many definitions describes "Culture" as the socially conditioned assemblages of activities and thoughts that are associated with particular social groups or populations (Harris 1994). Spirituality describes peoples' relationships with their ecosystems and the awareness that goes beyond the immediate sensible world from which knowledge, ability, or medicine is derived. These complimentary modes of knowing, being and caring about the sensory and the spiritual realms reveal the essence of their knowledge and have been continually transmitted in the oral tradition from the spirits to the Elders and from the Elders to the youth through spiritual teachings (Battiste and Henderson 2000).

The culture and spirituality study conducted was focused on identifying linkages and pathways specific to each community, organized by cultural indicator, to illustrate the potential effects on the KCNs. Community-based studies and open dialogue provided a holistic cultural record, historic and current. Further detail on the data sources used in the analysis are provided in Appendix 5D. The assessment took into account ATK that describes potential effects during the construction and operation phases of the Project.

Basic methods were rooted in applied anthropological processes that were used to identify, record and understand certain aspects of culture unique to each of the KCNs. A participatory action research (PAR) approach was used in these studies which were mainly self-directed with minimal outside input. Training in oral history interviewing techniques was provided to YFFN and WLFN and interviewing of Band Members was conducted by the trained community researchers. FLCN and TCN also conducted independent cultural studies as noted in Section 5.2.2 which included interview processes and workshops with their membership. Further, a key person interview process was used with YFFN and FLCN as a part of the overall understanding of personal, family and community life.

5.2.6.1 Cultural Indicators

Cultural indicators were employed to facilitate a description and analysis of change of culture and spirituality. Cultural indicators of change developed for the Local Study Area represent characteristics of the VEC that can be used to help describe the amount, state or condition of the VEC; and that are measurable quantitatively and qualitatively. Cultural indicators also assist in illustrating linkages between culture and spirituality on one hand, and the pathway that may lead to an effect on the other.

Indicator measures can be understood as the amount, location, size, volume, frequency, distribution and or status that describe the indicator in quantitative or qualitative terms (for example, a decline in language or cultural practices). In addition, close attention was given to data and sources overlapping with other specialist disciplines conducting concurrent fieldwork. Research prepared by Lawrence (2004), supported by the CEAA characterizes socio-economic studies and suggests that "…impact significance should be interpreted from multiple perspectives and from several levels of social aggregation" (Lawrence 20044). In this regard, the studies conducted within the Local Study Area incorporated an anthropological perspective to contextualize culture and spirituality as a VEC, whereas older studies represent a baseline for comparison to the input provided by KCNs communities.

Nine indicators were used to facilitate the description and analysis of change of culture and spirituality in relation to the KCNs. The indicators highlight the relationships of people to their environmental setting and contribute to assessing cultural values and potential Project effects. Figure 5-1 developed as an adaptation from Whiting and Whiting's 1975 cultural system model (Petch 1999) illustrates the components that have been considered in the development of these nine cultural indicators. The nine cultural indicators used in the analyses, and their relevance to the KCNs are described in Table 5-2. Effects on culture and spirituality determined the implications of Project-related drivers of change on the nine cultural indicators. The assessment took into account programs flowing from the Adverse Effects Agreements negotiated between Manitoba Hydro and each of the KCNs. Most of these programs addressed effects of the Project related to culture and spirituality.

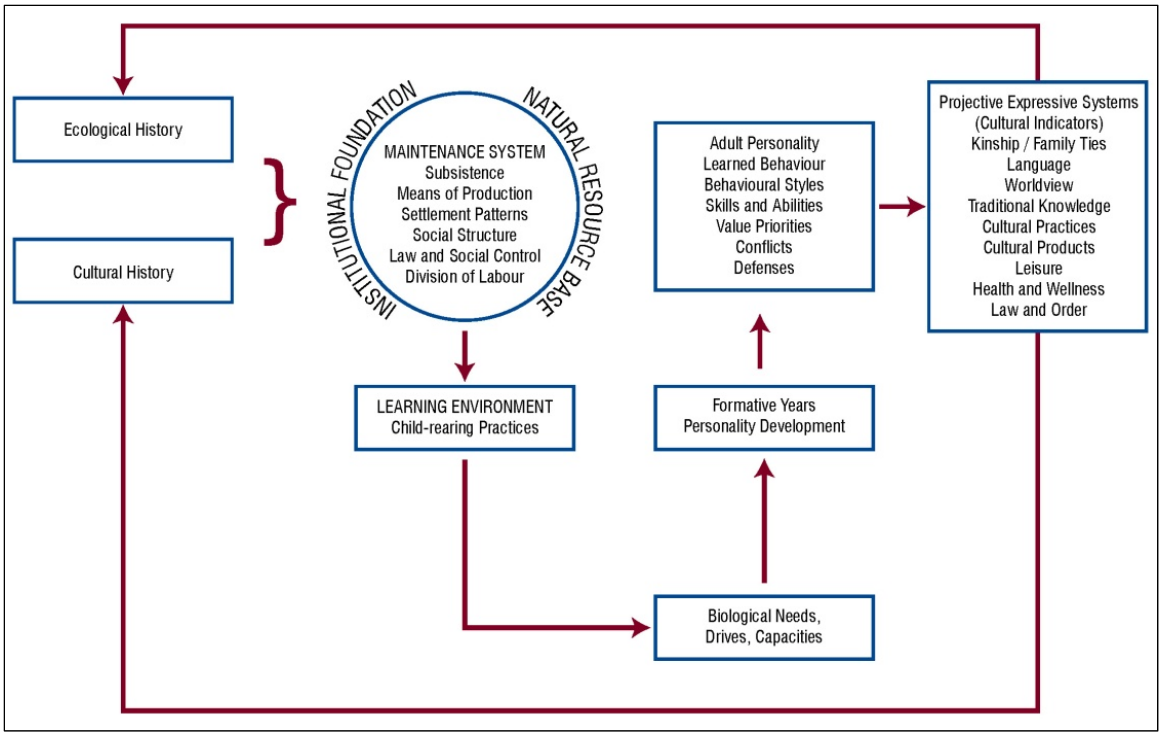

Figure 5-1: Cultural System Model

Table 5-2: Cultural Indicators

Indicator	Description	Relevance to the Local Study Area
Worldview	Encompasses the relationships and interconnectedness of the natural environment and people forming the spirituality as understood by a given community.	For the KCNs communities, worldview provides the ethics for living. In addition to providing guidance for interactive conduct between people and the natural environment, Worldview is based on the cognitive and perceptive interchange which forms the dynamics of culture.
Language	A vehicle for expression and can be spoken, written or signed and is critical to the transmission of cultural knowledge.	Provides insight into the daily use of Cree language as a means of communication. There is also an age relationship between Elders and children through the oral transmission of gender specific information.

Table 5-2: Cultural Indicators

Indicator	Description	Relevance to the Local Study Area
Traditional Knowledge[1]	Generally understood to represent the customary knowledge, innovations and practices of indigenous and local communities developed from experience gained over time and adapted to culture through environment, and is transmitted orally from generation to generation.	Reflects the extent to which KCNs community Members understand their own traditional practices as transmitted through oral narratives (oral traditions and oral history). This includes the KCNs perspectives on what is considered "specialized knowledge" or "common knowledge" within the communities, and the fact that some knowledge will be held by specific individuals who are qualified to hold and transmit knowledge.
Cultural practices	Modes of completion of activities that distinguish one cultural group from another. It entails a "way of doing." Cultural practices or "what people within the communities do" is a dynamic process within KCNs communities.	Reflects the extent of traditional practices and cultural activities undertaken by the KCNs.
Health and wellness	Health and wellness includes the physical, emotional, mental and spiritual qualities of life that instil a sense of well-being and security.	For KCNs communities, the health and wellness of Members is contingent upon the availability of both western modes of health and wellness programming and traditional health and wellness practices. Western modes include nursing stations, visiting doctors, dentists, pharmacists, psychiatrists or psychologists. Traditional health and wellness practices include midwives, healers and traditional medicines, such as plants, roots and herbs and shamanistic ritual.
Kinship	Social relations, both biological[2] and fictive[3], based on culturally recognized ties by descent, marriage and alliance; that is, who's related to who and what are the obligations of the relationship.	Incorporates both a western view of the nuclear family (family cohesion), and traditional views on extended families (what or who is family). Kinship as an indicator considers marriage patterns and the understanding that traditional kinship terminology assists with determining the obligatory role and status of individuals in community as well as understanding terms of reciprocity or sharing.

Table 5-2: Cultural Indicators

Indicator	Description	Relevance to the Local Study Area
Leisure	Recreation provided by the cessation of work or dutiful activities and is usually associated with enjoyment or pleasure.	Considers the types of activities KCNs Members undertake for relaxation or enjoyment during their time free from work or duties. For the KCNs, leisure may include the types of activities KCNs Members undertake for relaxation or enjoyment provided during their time free from work or duties. Examples of leisure time activities include bingo, skating and baseball. Leisure within KCNs communities is utilized as a time to share stories of past, present, and future during shared activities.
Law and order	The governance and systematic manner by which social harmony and balance are achieved. This can include customary law and unspoken agreements.	Illustrates the historic and current enforcement of western imposed laws, such as the *Indian Act*, the *Natural Resources Transfer Act*, *Migratory Birds Act*, Registered Trap Lines and *the Family Allowances Act*. Customary laws are those traditional mores and folkways that determine social sanctions. They are the result of certain successful ways of dealing with difference, discrepancies and argument that have maintained social harmony and balance.
Cultural products	Cultural products can be understood as expressions of culture that represent the essence of self-identity. Included in this theme are various forms of artistic endeavours (painting, music, literature-oral and written), crafts and cultural landscapes.	This indicator is illustrative of the number and type of cultural products that KCNs Members produce or create.

Notes:
1. Traditional Knowledge is the general term for any indigenous population's knowledge and is used here as a cultural indicator.
2. Biological kinship is a term used to identify relationships of a consanguinal (by birth) or affinal (by marriage) nature.
3. Fictive kinship is a term used to identify relationships such as god-parents, clan or other customary convention rather than consanguinal or affinal.

5.2.6.2 Construction Phase

During the construction phase the following pathways of change from the Project as they relate to each indicator were considered:

- Worldview: is linked to physical effects, construction camp effects and employment and business effects. This is due to the fact that Worldview as an indicator provides guidance for interactive

conduct between people and the natural environment. It acts as a cognitive and perceptive coping mechanism for cultural change and defines a measure of the relationships and interconnectedness of the natural environment, people and spirituality as understood by the KCNs communities.

- Language: This indicator is linked to mechanisms of cultural transmission and stewardship. Living away from home, leisure time and the presence of non-Cree speakers within the construction camp presents effects on Cree language through intercultural and intracultural interactions.
- Traditional knowledge: This indicator is linked to the changes to culture and spirituality and a connection to the land where physical changes including clearing, drilling and excavation; changes to water levels and water flow[1]; access; and borrow areas all potentially affect the communities' understanding and experience vis a vis heritage resources, resource use and the cultural landscape.
- Cultural practice: This indicator is linked to the construction camp through pathways that derive from living away from home, leisure activities and long-term interactions with non-Cree cultural components. Cultural practices can also be found during the construction phase under the pathway of health and wellness with changes to sharing practices and the reduction of country foods as a cultural practice.
- Health and wellness: This indicator is linked to changes to cultural practices and the reduction of country food use that may arise from KCNs Members being employed on the Project. It is also present as a pathway through mechanisms of cultural transmission and stewardship.
- Kinship: This indicator is a mechanism of cultural transmission and a contributor to health and wellness. It is linked to the worker interaction at the construction camp and pertains to potential effects initiated by intercultural and intracultural processes. Traditional interaction between Elders and children and other community members are also critical to understanding the transmission of **fictive kinship** and gender roles. As a pathway for health and wellness, kinship is seen as potentially affecting cultural practices and can manifest as changes to sharing practices.
- Leisure: This indicator, as a measure of, for example, family cohesion, may be reduced by family absences due to the potential construction employment opportunities on the Project for KCNs Members.
- Law and order: This indicator represents a mechanism for achieving social harmony and balance aided by customary law and unspoken agreements. During the construction phase, law and order would be relied upon by KCNs communities to reconcile intercultural and intracultural dilemmas that arise due to the Project.
- Cultural products: This indicator is primarily linked to the physical changes that the Project may potentially cause. Cultural products are linked within indicators that involve changes to cultural practices as a mechanism of cultural transmission or to sharing practices.

[1] Initial flooding of the reservoir will occur in the latter stages of the construction phase. Effects related to flooding are described in the operation phase.

5.2.6.3 Operation Phase

During the operation phase the following pathways of change from the Project as they relate to the nine cultural indicators were considered:

- Worldview is linked to the physical changes associated with the operation of the Project and will provide guidance to the interactive conduct between people and the natural environment. Worldview acts as a cognitive and perceptive coping mechanism for change.
- Language as an indicator may be affected, however the various AEA Offsetting Programs are designed to address the expected physical changes.
- Traditional knowledge: Changes to traditional knowledge may occur as a result of changes to the physical environment, which are linked to the connection people have to the land.
- Cultural practice, as an indicator, is linked to employment and business. Changes may be manifested by enhancing social stratification. Changes in physical and cultural landscapes will additionally change cultural practices, either by adaptation, abandonment or relocation.
- Health and wellness represent both physical and mental aspects and are linked to the physical changes that may result from the Project.
- Kinship could be affected through employment as it pertains to potential effects initiated by intercultural and intracultural processes. Long-term employment may reduce the opportunities for interaction among family members, cultural practices and sharing practices.
- Leisure: Project operation may result in long-term employment and an associated reduction in all forms of leisure.
- Law and order would be relied upon by the KCNs communities to reconcile intercultural and intracultural dilemmas that arise due to the Project.
- Cultural products may be affected by the physical changes caused by the Project through potential disruptions to resource use, heritage resources, aesthetics, and long-term income opportunities.

5.2.7 The Way the Landscape Looks - Aesthetics

Aesthetics provide a sense of what people consider beautiful or suitable, and may vary between individuals and cultural groups. "The essence of aesthetics is that humans experience their surroundings with multiple senses" (BEST 2007). The aesthetics of natural environments and urban or 'built' environments are considerably different. The approach to the analysis of aesthetics considered the physical changes to the Local Study Area that result from the construction and operation of the Project. Visual impacts are the focus of this assessment; however, consideration is also given to the auditory effects resulting from the Project. The KCNs in particular, characterize aesthetics as "the way the landscape looks."

The locations considered in the assessment of aesthetic effects were determined on the basis of where physical changes would occur. Characterization of these locations (*e.g.*, the existing environment) relied upon the KPI program, in addition to inputs from various document from the KCNs, and KCNs perspectives on past development. The assessment covers the following types of areas and locations where aesthetic effects could be relevant:

- Scenic areas that are likely to be affected by Project activities, in particular Gull Rapids;
- Locations that are not necessarily considered scenic, but that will be altered by changing from a natural area to one with man-made features; and
- Developments in Gillam in response to increased population that have the potential to alter the overall appearance and character of parts of the community.

The characterization of effects from Project construction and operation on the aesthetic environment included the following:

- **Project description:** All site alterations arising from Project activities, including the development of access roads and trails, use of granular and impervious borrow areas, the actual development of the dam infrastructure, and flooding of the area between Gull Rapids and the outlet of Clark Lake;
- **Project visibility within landscape context:** The characteristics that make a location distinctive in contrast with the presence of the Project with consideration of the number and types of viewers; and
- **Viewer value and sensitivity levels:** Consideration of the viewer's expectations and cultural values (*e.g.*, the KCNs' worldview would result in a different appreciation of the area's aesthetics than an average resident from Gillam or southern Manitoba).

The assessment of aesthetic effects also gives consideration to the reversibility of an effect; *e.g.*, whether a change to the landscape is likely to be temporary (*e.g.*, borrow areas that will later be rehabilitated) or permanent (*e.g.*, flooding of the rapids and creation of a reservoir).

5.2.7.1 Construction Phase

The drivers of change to the aesthetic environment will include a physical alteration of the landscape, physical changes in the Nelson River, noise, dust, and increased human presence. Perceptions of the aesthetic effects of construction may vary depending upon an individual's worldview and perspective and is considered in describing the Project effects.

5.2.7.2 Operation Phase

Upon completion of construction and final commissioning of the generating station, several outcomes of the Project have the potential to affect the aesthetic nature of the area. This will stem largely from the creation of a reservoir with the flooding of 45 km^2 between the generating station and Clark Lake. The drivers of change associated with Project-operation include:

- The change from a riverine to a reservoir environment;

- The loss of Gull Rapids;
- The replacement of the rapids with a physical barrier (*e.g.*, the dam) (*e.g.*, transition from a natural to built environment);
- The changes to the landscape from the potential re-routing of PR 280 via the north access road, over the dam, and via the south access road into Gillam; and
- Changes within the town of Gillam to accommodate the growth of the community (*e.g.*, new housing/neighbourhoods).

5.3 ENVIRONMENTAL SETTING

5.3.1 Governance, Goals and Plans

Community governance, goals and plans are linked, as it is typically a community's leadership and associated administration that is responsible for the execution of activities to achieve its goals and plans. The following section provides an overview of the governance systems of the communities in the Local Study Area, in addition to describing the goals and plans of each community.

5.3.1.1 Keeyask Cree Nations

GOVERNANCE

For thousands of years First Nations in Canada lived in accordance with traditions rooted in the land. Traditional laws encouraged people "to be wise, humble, respectful, truthful, brave, loving, and honest in (one's) dealings with others" (Borrows 2008). Leaders emerged or were selected based on their knowledge and skills (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a). The relationships between people and the land were an integral component of governance (NCFNG 2009). The arrival of Europeans fundamentally changed the way of life for First Nations across Canada, including the social, economic and political structures that governed people and their lands (Missens 2008). Among such changes identified by the KCNs are participation in the fur trade, the signing of Treaties, the development of the Bayline railway, the implementation of the registered trapline system, and above all the onset of hydroelectric development (see Section 2.2).

Today, First Nations governments across Canada are endeavouring to find "a balance between First Nations' culture, custom, tradition and protocol and Canadian social, economic and political systems" (Missens 2008). Governance goes beyond a set of elected decision makers and represents an integrated system of political, social and economic institutions (Missens 2008).

Effective governance has been identified as the single greatest contributing factor to a community's socio-economic progress and its overall well-being as it allows First Nations to:

- "Take greater control over the decisions that affect their lives;
- "Carry out effective relationships with other governments;

- "Take advantage of economic development opportunities;
- "Improve programs and services; and
- "Enhance their social and economic well-being" (INAC 2009a).

The primary institution for community governance for each of the KCNs is a Chief and Council and their supporting administration, as described in subsequent sections. These entities are responsible for making decisions for their community in regards to the allocation of Band financial resources to support community needs. A continuing challenge for each of the KCNs' respective Chiefs and Councils is to allocate funding, which is often considered inadequate in addressing all of their communities' needs.

Since LWR and CRD were implemented, hydroelectric development has placed substantial demands on the Chiefs and Councils of some of the KCNs (see Section 2.2.1.4). During the late 1970s and early 1980s some of those demands involved trying to address complaints by band Members and resolve claims under the NFA[1]. For signatories to the NFA, the late 1980s saw a shift to negotiating NFA comprehensive implementation agreements with Manitoba Hydro for adverse effects arising from LWR and CRD and related developments. For others, the late 1990s and early 2000s saw the negotiation of settlement agreements for adverse effects stemming from these same developments. The implementation and negotiation of these agreements has overlapped with the partnership negotiations for Keeysak since the late 1990s and early 2000s. These initiatives have placed substantial and distinctive demands on the community leadership while at the same time increasing the community's capacity to deal with complex challenges.

NFA implementation and other settlement agreements have increased the KCNs' influence over decisions affecting their communities through the creation of Resource Management Areas (RMAs) and Resource Management Boards (RMBs). As described in Section 2.2.3.1, the Spilt Lake RMA and York Factory RMA and associated RMBs resulted from implementation agreements under the NFA, while the Fox Lake RMA and RMB resulted from their Settlement Agreement with Manitoba Hydro and the Province. WLFN does not have an RMA, although their traditional territory is included within the southern-most section of TCN's RMA (CNP Keeyask Environmental Evaluation Report, CNP 2010e) WLFN also has a representative on the Split Lake RMB to represent its community interests. The role of these RMBs is to provide advice on resource use allocation and issues including policy and programs in their respective RMAs.

The KCNs are also members of the Keewatin Tribal Council (KTC) and the Manitoba Keewatinowi Okimakanak (MKO), both of which have offices located in Thompson and Winnipeg. MKO is the political organization that represents 30 Chiefs and Councils from First Nations in northern Manitoba and is headed by an elected Grand Chief. The KTC represents 11 northern Manitoba communities (including the KCNs) and is mandated to "maintain, strengthen, enhance, lobby for, and defend the rights of northern Manitoba First Nations within its jurisdiction" (KTC 2008a).

Each of the KCNs also has governance structures unique to their community, as described below.

[1] WLFN and FLCN were not signatories to the NFA (see Section 2.2.1.4).

GOALS AND PLANS

The KCNs share certain common goals, as are reflected in the JKDA and their respective AEAs (described in Section 1.2.1). Among the common goals are the following:

- To increase each First Nation's influence over decision making regarding development activities in their respective RMAs;
- To increase the benefits flowing to communities as a result of development activities in their respective RMAs;
- To increase access to financial resources to support community development (both economic and social);
- To increase employment opportunities for their respective memberships; and
- To maintain and renew traditional culture and associated activities.

(CNP *et al.* 2009; TCN and Manitoba Hydro 2009; WLFN and Manitoba Hydro 2009; FLCN and Manitoba Hydro 2009; and YFFN and Manitoba Hydro 2009)

Although the AEAs and the JKDA may enable the KCNs to achieve these goals, a similarity among the communities is their sense of internal conflict and uncertainty in regards to becoming partners with Manitoba Hydro on the Project. These reservations are best expressed by the KCNs' own perspectives, as demonstrated by the following quotations:

CNP: "By negotiating the *Joint Keeyask Development Agreement* (JKDA) and separate *Adverse Effects Agreements* (AEAs) and by partnering with Manitoba Hydro for the Keeyask Project, CNP are seeking to restore and enhance the capacity of our homeland ecosystem to sustain our people both physically and culturally. Knowing that the Keeyask Project would irreversibly alter our homeland ecosystem already affected by hydroelectric development, we nevertheless came to see an opportunity to ensure it would come closer to meeting its original purpose of sustaining us than it does today" (CNP Keeyask Environmental Evaluation Report).

YFFN: "We have chosen to join the Partnership and make the best that we can of the Keeyask Project, but we do so with caution and uncertainty. We still have misgivings about identifying ourselves as partners with Manitoba Hydro and we are conflicted about supporting a project that will cause more damage to our lands. We recognize that our children will live with the consequences of our decisions and we are determined not to let them down" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

FLCN: "Fox Lake views all Hydro projects, including Keeyask, as one continuous staged process of development with long-term and cumulative impacts. Unlike in the past, Fox Lake now has an opportunity to participate as a partner and to educate, inform and influence the Keeyask Project. This partnership serves as a way to ensure the protection of *Askiy*.…Through the signing of the JKDA in May of 2009, Fox Lake Cree Nation (FLCN) decided to engage in the Keeyask Partnership to maximize benefits for the people of FLCN" (Chapter 2 of the EIS).

The KCNs' level of unease and uncertainty is also more fully described in Chapter 2 of the Response to EIS Guidelines.

5.3.1.1.1 Cree Nation Partners

TATASKWEYAK CREE NATION – GOVERNANCE

Traditionally, TCN maintained a way of life in which the family was the main governing unit, with certain members of a clan emerging as leaders based on their knowledge and skills. The people "followed the practice of selecting peacekeepers to maintain in their own customary fashion the peace, order and mutual respect that was central to the way of life" (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

The role of Chief and Council emerged after the signing of treaty in 1908, although did not alter the earlier approach to community leadership of respect for those with skills and knowledge, respect for Elders, and respect for the peacekeepers. TCN's "ancestors approached the Treaty discussions based on our cultural imperative of sharing, and so viewed the Treaty as a means to improve their economic condition in exchange for access to the land and resources by the Crown, with only minor limitations on (their) rights to continue historical pursuits throughout (their) homeland ecosystem" (CNP Keeyask Environmental Evaluation Report). From this time, TCN felt the effects of a series of external influences and decisions (post-Treaty health care, education (including residential schools), technology, *etc.*) that ultimately resulted in a loss of the sense of control over activities in their ancestral homeland (CNP Keeyask Environmental Evaluation Report).

In the mid-twentieth century the pressures of resource extraction and development in northern Manitoba began to change the role of leadership, as younger generations became more actively involved in governance. The negotiation of the NFA in the 1970s "marked a formal beginning to reclaiming the power and authority (the community) once held" (CNP Keeyask Environmental Evaluation Report). Subsequent negotiation of an implementation agreement in the late 1980s into the 1990s, strengthened the community's ability to adapt to their changing environment (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a). CNPs Environmental Evaluation Report states that "The NFA was an empowering revitalization of our connection to our lands and waters" (CNP Keeyask Environmental Evaluation Report). By the late 1990s, TCN "believed our rights and interests could be advanced by building upon the terms of our past agreements and being a participant in the proposed Keeyask Project" (CNP Keeyask Environmental Evaluation Report).

The efforts required to participate in the Project are highlighted by the following quote:

> For more than two decades Tataskweyak Cree Nation sought a more inclusive role in participating in future hydro developments being contemplated by Manitoba Hydro. The increasingly complex technical and legal issues associated with Manitoba Hydro project planning and development, including regulatory approvals processes, coupled with the advent of s.35 Treaty and Aboriginal rights in 1982 and their subsequent delineation by the Supreme Court of Canada, have placed enormous demands upon Chief and Council to ensure Members' best interests were being served throughout negotiations with Manitoba Hydro (CNP 2010c).

A Chief and six Councillors elected under Section 74 of the Indian Act govern TCN. A custom election code has been developed and is pending ratification by community vote prior to formal submission to the Minister of Indian Affairs (CNP 2010c). Currently the Chief and six Councillors serve a two-year term. "Chief and Council are mandated to provide leadership, guidance, service and accountability to TCN Members (on and off-reserve) in an impartial and just manner. Council follows the roles and responsibilities as defined in the Indian Act and has adopted a portfolio method of management, providing each Councillor with specific areas of responsibility and accountability" (CNP 2010c). Each Councillor is generally responsible for a portfolio, as well as between six and eight departments.

Council is supported by an administrative structure with departments providing material community functions/services as follows:

- **Intergovernmental Affairs:** Responsible for Band Office administration, including Membership registration, the Tataskweyak Housing Authority, and social income assistance programs;
- **Finance and Administration:** Provides appropriation of various sources of funding for the benefit of Members, including funding through the Tataskweyak Trust Authority;
- **Public Works:** Operates a diverse set of public works, which are detailed later in this section;
- **Health and Wellness**: Responsible for the delivery of a variety of healthcare and social services, which are detailed later in this section;
- **Economic Development:** Responsible for developing business opportunities with the two-fold goal of increasing investment revenue and employment opportunities for Members (including the TCN Gaming Commission);
- **Education:** Provides education policy and curriculum through the Tataskweyak Education Authority (TEA);
- **Employment and Training:** Provides a variety of training, upgrading and employment opportunities to qualified Members through the Community Employment and Training Program (CETP) and regional coordination of courses offered by University College of the North (UCN);
- **Natural Resource Management:** Responsible for the protection of natural resources, including commercial and domestic resource use, in the Split Lake RMA and is active on the 12-person Split Lake RMB;
- **Future Development:** Responsible for directing all business activity with Manitoba Hydro, including management of DNCs;
- **Culture and Recreation:** The Tataskweyak Recreation Committee provides cultural and recreational activities for youth and adults, including sports programs and more traditional cultural programming such as hunting, fishing and trapping. Annual plans and budgets guide activity, and the community has a long-term development plan and five year capital plan; and
- **Policing and Emergency Response Service:** Responsible for local constabulary and volunteer fire department, including ambulance and medivac services (CNP 2010c).

In addition to the administration described above, staff was hired specifically in relation to the Project to manage the OWL (Our Lands and Waters) process. This staff was responsible for, among other things, providing support to Chief and Council in negotiations with Manitoba Hydro.

A Junior Chief and Council are also part of TCN's governance structure, although at present this group is not very active. Community Elders continue to play an important role in the community, in particular in regards to decisions regarding resource and land use.

TATASKWEYAK CREE NATION – GOALS AND PLANS

Tataskweyak Cree Nation's community planning and capital planning processes have been in place for over four decades. Plans are updated periodically in consultation with the community to reflect the overall status of infrastructure, facilities and services. "The most recent Plan, Tataskweyak Cree Nation Community Plan Update, recorded all completed buildings and infrastructure to date. The 2003 Plan also reported on future development including cost estimates for all anticipated buildings and infrastructure projects for the next 20 years" (CNP 2010c).

As with all TCN community planning, TCN recognized that control over the development of lands within its traditional resource area are key to future economic sustainability. The 1992 NFA Implementation Agreement established the Split Lake RMA and the Split Lake RMB. This provided TCN with influence over resource allocation decisions within the RMA as the RMB is able to provide recommendations to the federal and provincial governments on activities in the area. The vision of being a self-sufficient community requires "shared use of resources with the Split Lake (RMA) according to a long-term regional economic development strategy. This strategy is based on sustaining the natural environment through careful management, with an understanding of the inter-relatedness of all things" (TCN 2001).

The TCN land use objectives, as approved by Chief and Council in 2002, relate to the natural environment, the interrelatedness of all things, the capacity of the Split Lake RMA to sustain TCN, to domestic harvesting, traditional lifestyles, protection of TCN gravesites, protection of sacred sites, protection of traditional sites, benefits from resource development, protection of TCN development options, recognition of spiritual values, and shared use of the RMA (CNP Keeyask Environmental Evaluation Report).

The NFA Implementation Agreement also established an Economic and Social Development Account, and identifies how monies paid into a Trust can be used. Appropriate uses of monies from the Economic and Social Development Fund include:

- Economic development;
- Employability and employment development;
- Cultural and recreational enhancement;
- Social development initiatives; and

- Community infrastructure development, capital development, and the related operations and maintenance costs.

Investments (permitted both on and off-reserve) can be made with the approval of Chief and Council and the Split Lake Cree Trustees to further enable TCN to achieve the goals and plans. The Keeyask AEA provides additional monies to the Economic and Social Development Account ($3 million as full Residual Compensation), which may enable decisions/activities that TCN leadership believe to be of benefit to the community.

WAR LAKE FIRST NATION – GOVERNANCE

The predecessors of the WLFN are Members of the Split Lake Band (or today's TCN), although its membership has affiliation with many First Nations. WLFN achieved Band status in 1980, when reserve lands in Ilford were acquired as part of its TLE selection. A Chief and two Councillors govern WLFN under a custom electoral system that was implemented in 2005. The Chief and two Councillors serve a three-year term.

"Chief and Council are mandated to provide leadership, guidance, service and accountability to all WLFN Members in an impartial and just manner" (CNP 2010e). They are supported by an administrative structure with departments including finance and administration, health and social services, education, and public works. Each department follows established policies and procedures, adheres to plans and budgets, and is managed by a designated employee or committees, and reports to Chief and Council A five year capital plan is in place for the community and a long-term economic strategy is being developed (CNP 2010e).

Services are delivered to WLFN Members by various departments and organizations including:

- Public Works;
- Future Development;
- Awasis Child and Family Services;
- The Mooseocoot Housing Authority;
- The Mooseocoot Education Authority; and
- The Recreation Committee.

As described in Section 2, when the NFA was signed, WLFN was not a separate community, but rather a part of the Split Lake First Nation (now TCN). Since the NFA was not successfully implemented in the years post-signing, the First Nation signatories pursued negotiations for independent implementation agreements, specific to their impacts. During this same timeframe, the WLFN received status as an independent Band and community. As such, when the 1992 Split Lake Comprehensive Implementation Agreement was signed, WLFN Members were excluded from any benefits of the agreement, as they were not considered among the original signatories. The comprehensive agreements that were signed established specific relationships/responsibilities among the signatory First Nations, the province, the federal government, and Manitoba Hydro. WLFN pursued their own interests relevant to their

community and in 2005 signed the War Lake Past Adverse Effects Agreement with Manitoba Hydro and the Province of Manitoba. The agreement establishes the Moosecoot Trust, which is administered by three trustees appointed by Chief and Council.

War Lake First Nation is located at Ilford, which is a Northern Affairs Community represented by a Mayor and Council under the *Northern Affairs Act*. Ilford is governed by a Mayor and five Councillors, some of whom are also Members of the WLFN Band. Ilford has a community Council office, and provides service to WLFN including water and sewer, a pumper truck for fire fighting, and maintenance of roads.

There are negotiations underway between the provincial and federal governments for additional parcels of land within Ilford to be transferred to WLFN through the TLE process. This includes lands with additional housing and infrastructure.

WAR LAKE FIRST NATION – GOALS AND PLANS

In 2008, WLFN submitted a long term development strategy to INAC, which identified the following priorities:

- Further development and implementation of an accountability structure for program and service delivery;
- The development and implementation of a new housing policy;
- The recruitment of a band manager responsible for financial management; and
- The implementation of the human resource policy manual (completed in 2008) (CNP 2010e).

Negotiations with Manitoba Hydro resulted in WLFN's 2005 NFA Implementation Agreement that provides compensation and benefits to assist in development opportunities and resources to improve the quality of life in their community. As part of this 2005 agreement, the Mooseocoot Trust was established to address past adverse effects, and provides for a community development fund for the associated income. Funds from the Trust are intended to benefit the entire community (and not individuals) and spending must be approved through a community approval process. Each year, War Lake Members and community organizations may submit proposals for approval, and the community is able to vote on how the funds are spent. Proposals must be in line with the intent of the Implementation Agreement, and funding can be awarded for plans related to the implementation of the agreement, for the economic, social and cultural development of the community, for compensatory, mitigatory and remedial programs, or for other undertakings deemed beneficial to the community (WLFN *et al.* 2005). Additional monies as full Residual Compensation are part of WLFN's Keeyask AEA, whereby $255,000 is to be paid into the Mooseocoot Trust for projects the community has determined are beneficial.

5.3.1.1.2 Fox Lake Cree Nation

GOVERNANCE

In 1912, FLCN established a permanent settlement at Kettle Rapids, which had traditionally been a meeting place of some Fox Lake families. This marked the beginning of a continuous relationship between FLCN and what is now the town of Gillam (FLCN 1997). In 1947, Indian Affairs officially recognized FLCN as the Gillam Band, with a population of 95 Members. At this time FLCN began a lengthy process to establish a reserve in the Gillam area where Members had resided "for many years prior to the establishment of the LGD of Gillam" (FLCN 1997). It was not until 1985 that a reserve was created in Bird (approximately 53 km north-east of Gillam) and many FLCN Members feel that "the Bird Reserve was created as a community primarily as a result of the inability to secure a reserve in the vicinity of Gillam" (FLCN 1997). In 2009, FLCN established the A Kwis Ki Mahka Indian Reserve on Kettle Crescent in Gillam, as is described in Section 4.3.2.

Today, FLCN is governed by a Chief and three Councillors under a custom electoral system. Chiefs and councillors do not have a set term in office. The portfolios of the current Councillors cover a broad range of subjects. One portfolio is focused more towards social programming including daycare/Headstart, membership, education, training and employment, health, Awasis (child and family services), youth, gaming, land and trust, TLE, and the FLCN Final Settlement Agreement. The second portfolio addresses housing, operations and maintenance, economic development, justice, Fox Lake contracting, fire prevention and emergency measures organization, Framework Report (past grievances), treaties, research and specific claims.

There are also several FLCN institutions that support community decision making:

- Fox Lake Housing Committee;
- Local Child Care Committee;
- Fox Lake School Education Authority;
- Lowland Cree Development Board; and
- Fox Lake Resource Management Board.

For each of these, FLCN provides notice of vacancies to Members and requests individuals who want to participate to submit a letter of interest to Chief and Council, who then appoints Members to the committee, authority or board.

Until recently, the majority of FLCN Members (over 75%) resided off-reserve, with a large portion (over 500) of these Members located in Gillam. With the creation of the A Kwis Ki Mahka Indian Reserve in Gillam in 2009, this proportion shifted somewhat, with about a third of residents in Gillam now residing on-reserve on Kettle Crescent. The community, irrespective of whether they live in Gillam or Fox Lake (Bird) is administered by the Band Office at Fox Lake (Bird). Although there are no plans to increase the number of positions on FLCN's Chief and Council or administration at present, it is expected that the creation of the new reserve will result in additional administrative duties (*e.g.*, applying for CHMC

housing programs to develop further housing on-reserve in Gillam) (FLCN KPI Program 2009-2011). Fox Lake Cree Nation also has an administrative presence in the town of Gillam. Examples of this include the Fox Lake Negotiations Sub-Office (the main office is located in Winnipeg), the Awasis Agency (child and family services), and a placement home for the elderly.

In recent years, FLCN has asserted its role as a long-term resident of the town of Gillam, by ensuring that its presence is acknowledged in town signage (*e.g.*, at the airport and upon driving into the community), and other monuments (*e.g.*, the memorial monument in front of the Gillam Hospital). Among the processes in which Fox Lake and Manitoba Hydro participate jointly, is the Harmonized Gillam Development (HGD) process (see Section 5.3.1.1) which also involves the Town of Gillam and the province on an "as-necessary" basis (Gillam KPI Program 2009-2010).

Recent involvement with Manitoba Hydro has resulted in the potential for improved governance as Members develop skills, knowledge and resources (FLCN 2009c).

GOALS AND PLANS

Fox Lake Cree Nation was not part of the NFA (signed in 1977) and concerted efforts and negotiations to resolve Fox Lake's outstanding grievances with Manitoba Hydro did not start until 1993. In 1997, FLCN formally identified the scope of impacts and grievances in their 1997 Grievance Statement: Forgotten Nation in the Shadow of the Dams. In 2004, the Fox Lake Settlement Agreement was completed with Manitoba Hydro and the Province, resulting in compensation for past and future hydro development adverse effects and provisions for a Nikanihk Itapowin (Future Vision) Trust to be established to promote the economic, spiritual and cultural well-being of Fox Lake citizens, civic improvement and recreation. Each year, FLCN Members, community organizations or Chief and Council may submit proposals for approval by the Trustees. If a proposal is large in nature or large in amount, a community meeting is held to seek community consent prior to approval. Proposals must be in line with the intent of the agreement. Following the meeting of FLCN Members, the Trustees are empowered to make a decision on the allocation of available funds.

A long time goal of FLCN has been to establish a reserve in Gillam, which was realized in 2009 with the establishment of the A Kwis Ki Mahka Indian Reserve on Kettle Crescent. This may intensify the demands on the community's leadership and administration, as the new reserve has created a challenge of accommodating FLCN Members in Gillam and Bird in an equitable manner. Some community Members feel there is a disconnect created by their geography, as Members in Fox Lake and in Gillam are not only separated by distance, but have access to different services and amenities (FLCN KPI Program 2009-2011).

The establishment of a reserve in Gillam provides several opportunities for FLCN. First, it will allow for more land for housing and access to funding through the CMHC. It will also allow for economic development as it provides a tax free basis for business development. In addition, it may allow access to programming that would otherwise only be available to Members residing in Fox Lake (Bird), such as social assistance. Perhaps most importantly, reserve status offers FLCN a sense of place, as the establishment of a reserve recognizes officially that Gillam is "home" (FLCN KPI Program 2009-2011).

Despite the establishment of an urban reserve in Gillam, FLCN have continued ambitions to acquire additional parcels of land to set aside as reserve lands. Three of these parcels were identified under the FLCN 2004 Settlement Agreement to be transferred as fee simple lands to the FLCN Land Corporation:

- The Angling Lake Site;
- The Sundance Site; and
- The Limestone Construction Camp (when Manitoba Hydro no longer requires the site for the potential Conawapa Generation Project).

In addition to this, FLCN has requested the transfer of 80 acres of land called the Kettle River Site from INAC to FLCN for the purposes of reserve land, as a partial fulfillment of their outstanding TLE selections (Fox Lake Settlement Agreement 2004). Many Fox Lake Members also reside in the Gillam Trailer Court, resulting in an interest of FLCN in ownership of the land related to FLCN units in the Gillam Trailer Court. No decisions have been made by INAC on additional transfer of Crown land (beyond the A Kwis Ki Mahka Reserve).

Another long time goal for FLCN has been to improve its relationship with Manitoba Hydro, which plays a dominant role in the community's economy and contributing to the community's overall size/population through its workforce requirements. Progress is being made towards this goal through the Gillam Harmonization Process, which was formalized by an agreement to facilitate joint initiatives in Gillam between FLCN and Manitoba Hydro (see Section 4.3.3.2).

The Joint Statement on Harmonized Gillam Development (HGD) was signed by FLCN and Manitoba Hydro in 2007. Key features of the statement include:

- "Clarification on sharing of long-term goals and objectives of FLCN, Manitoba Hydro, the town of Gillam and, where applicable, Manitoba in the Gillam area;
- "Identification of challenges and issues, which have arisen in the past and with future developments, and of opportunities to implement planning and development activities that provide for mutual gain; and
- "A regular process of interaction to discuss mutual interest" (FLCN and Manitoba Hydro 2007a).

Prior to the establishment of the HGD there was no regular process for Gillam-area stakeholders to discuss issues of mutual concern and interest. The HGD has focused on building a community where residents work, play and prosper together. One of the most important outcomes of the process has been improved relationships and more open communication among stakeholders (FLCN KPI Program 2009-2011; Gillam KPI Program 2009-2010).

The HGD provides a forum for FLCN to express its interests and concerns to other local stakeholders. Issues under discussion may evolve and change. Among the current interests of FLCN in the HGD process are:

- Building better business relationships with Manitoba Hydro;

- Developing cultural training for Manitoba Hydro (which is now mandatory for Generation North employees and also provides spaces for Gillam residents not associated with Manitoba Hydro);
- The development of the Via Rail Station as a tourist attraction; and
- Youth and recreation opportunities in the community (FLCN KPI Program 2009-2011).

5.3.1.1.3 York Factory First Nation

GOVERNANCE

In 1910, YFFN signed an adhesion to Treaty 5 at York Factory. In 1957, the Government of Canada relocated YFFN Members to York Landing (*Kawechiwasik*), as described in Section 2.2.3.3. Only one year after their arrival at York Landing, Manitoba Hydro started the construction of the Kelsey Generating Station, followed by the LWR and CRD projects, which reversed seasonal flows on Split Lake and along the Nelson River. Hydroelectric developments were met with a sense of loss of control over the community's ability to influence and address concerns for the community (YFFN Evaluation Report (*Kipekiskwaywinan*)). YFFN eventually became Members of the Northern Flood Committee as a means to assert their rights. This was a time when community governance shifted towards younger generations that were educated in English and capable of negotiating and bargaining with provincial and federal authorities.

Today, YFFN is governed by a Chief and four Councillors under a custom electoral system. Chief and Councillors serve a two-year term, although some discussion has occurred in recent years about extending this term to three years. Portfolios typically held by Councillors include management/community development, health, community infrastructure, education and housing, and social development.

There are also several YFFN institutions that support community decision making:

- York Factory Housing Authority;
- York Factory Education Authority;
- York Factory Daycare Board;
- Learning Institute Board; and
- York Factory Resource Management Board.

Members of these organizations are either elected or appointed by Chief and Council. There is also a volunteer recreation committee. The York Factory RMB was formalized by YFFN's Comprehensive Implementation Agreement in 1995.

GOALS AND PLANS

In York Landing (*Kawechiwasik)*, YFFN envisions future community planning to include a focus on improving their Members' connection to Cree culture, customs and traditions, while enabling successful and active participation in modern society (YFFN Evaluation Report (*Kipekiskwaywinan*)). A focus on

children and youth means ensuring there are meaningful opportunities within the community at York Landing (*Kawechiwasik)* for those who choose to live there. There is an awareness within the community that children and youth should "be able to retain their Cree culture and language and be proud of who they are and where they have come from." (YFFN 2004a). Among the initiatives underway are activities associated with "nation-building, governance and institutional strengthening that could contribute to improved community wellness and sustainability, *e.g.*, the various economic development and social services portfolios of the Band Council and Administration, Future Development Office initiatives and operations, the Awasis Centre… the Annual Goose Camp where traditional knowledge and skills are shared with youth, the York Factory Learning Institute and the modern school and recreation facilities. These and other such initiatives may help to redress the stresses felt in the current socio-economic environment of YFFN" (YFFN 2004b).

The YFFN community has a desire to connect fully with their history at York Factory and in their RMA along the Hudson Bay coast. Many YFFN Members "choose to live York Landing (*Kawechiwasik*) and come together for traditional dances, goose camps, and feasts, and return to [their] territory at York Factory (*Kischewaskahekan*) as often as [they] can" (YFFN Evaluation Report (*Kipekiskwaywinan*)). Although the area is more difficult and costly to access from York Landing (*Kawechiwasik)*, the community believes this area is important to their future well-being (YFFN 2004a). The York Factory RMA offers not only resource harvesting opportunities for its Members, but also potential for ecotourism development (YFFN KPI Program 2009-2010). Cultural camps, sites and programs have been established to reclaim and maintain their Cree language and traditional relationship with the land, water, fish and wildlife, and help intergenerational relationships in the community (York Factory website).

York Landing (*Kawechiwasik)* and YFFN remain geographically isolated from the outside world and have identified the need for infrastructure to assist in achieving their community goals and plans (YFFN 2004a). Among the things the community has identified it would like to see to improve its overall well-being are:

- A water treatment facility capable of addressing community concerns about the colour, smell, taste, and associated boil water advisories; and
- Infrastructure to improve the community's accessibility (*e.g.*, a reliable ferry landing in the short-term, and the longer-term ideal of an all-weather road).

York Factory First Nation is hesitant about its partnership in the Keeyask Project but recognizes that long-standing sentiments of distrust will not change quickly. "We have been working with our partners to develop and manage the Project in accordance with our Cree values and worldview. As a First Nation, and as a Partnership, we need to make a strong commitment to stewardship and to maintaining our relationship to the land" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

5.3.1.2 Gillam

GOVERNANCE

In 1966, the Province and Manitoba Hydro entered into agreement to create the Local Government District (LGD) of Gillam, in which the Town of Gillam is located. This decision was made when FLCN was awaiting approval for a reserve in Gillam (FLCN 1997). It was mandated, among other things, to oversee the development of Gillam and to ensure that essential services and infrastructure were in place to serve the population arriving in the area to construct the Kettle Generating Station. At this time, there was a shift in governance from an area with limited political structure to a town with an elected council, and considerable inputs from Manitoba Hydro. A Town Planning Scheme was developed in 1968, a Development Plan created in 1979, and a Zoning By-Law implemented in 1984; although there is acknowledgement that these documents need to be updated to respond to the existing conditions (Gillam KPI Program 2009-2010).

The Town of Gillam operates under an agreement signed with Manitoba Hydro in the 1960s, as the town has a limited tax base or tax revenues to fund its activities. Manitoba Hydro covers 100% of the Town's capital costs. Operational budgets are negotiated annually. The Town or Manitoba Hydro has the ability to cancel this agreement at any time and generally speaking the relationship between the two entities is amicable (Gillam KPI Program 2009-2010). Today, Gillam is governed by a Mayor and four Councillors who are elected for a four-year term.

Although the Town of Gillam and Manitoba Hydro are linked through their existing funding arrangements and are in regular communication, in recent years the Town of Gillam has begun to recognize the importance of interaction with FLCN, in particular as the First Nation worked towards the establishment of a reserve in the community. In recognition that the creation of a reserve within the town limits could create jurisdictional challenges in terms of basic service delivery for residents, the Town of Gillam and FLCN entered into a Municipal Services Agreement. The Agreement identifies facilities and services subject to cost sharing, as well as processes that both parties must adhere to for changes to land use in the community. The Agreement is intended to address jurisdictional issues as land is transferred to federal jurisdiction as reserve land, and to ensure that all of the residents of Gillam have equal access to the services the Town provides.

GOALS AND PLANS

The Gillam land use planning study undertaken through the Gillam Harmonization process identified the following community needs:

- The need to develop housing (in particular to attract long term employees);
- The fact that certain services, including the school and the day care, are already operating at capacity;
- The potential need to relocate the RCMP detachment to accommodate growth of the unit;
- The potential for the Co-op for example to develop a new site for its gas station; and

- The fact that the Gillam Mall is dated and requires redevelopment (HTFC 2008).

The development frameworks, partnerships and funding required to address these needs may place greater than normal demands on the municipal government in Gillam in the next decade.

Despite current efforts to improve relationships between Gillam stakeholders, communication between groups such as Manitoba Hydro, FLCN, and the Town of Gillam historically were irregular and at time adversarial. As noted in the previous section, the HGD process was designed to accommodate growth in Gillam while considering the interests of different stakeholders. Under the HGD process, the Town of Gillam has expressed interest in developing a community culture and a sense of permanence for the community. It supports development that can accommodate growth in the residential, commercial, industrial and recreational sectors.

The HGD has identified the following areas requiring further joint efforts between MH, FLCN and the Town of Gillam:

- Re-plan the commercial area including Railway Street and the train station area with consideration of the immediate needs for a new mall, FLCN government building, and Hydro accommodation requirements;
- Re-plan the trailer court with consideration to FLCN's ambitions for reserve land; determine development program for lot size, distribution, services, performance standards, *etc.*;
- Develop qualitative development standards that are supportive of private development;
- Identify areas suitable for higher density residential development;
- Develop service and infrastructure expansion plans;
- Develop options to make the community more pedestrian friendly (pathways, trails, *etc.*);
- Update the Community Development Plan and Zoning By-law in a matter the reflects all parties needs;
- Develop railway crossing options that integrate the community in a safe manner and apply to all rail crossings; and
- Consider private investment and management opportunities for Manitoba Hydro employee housing as a means to integrate Hydro's needs within the fabric of the community rather than as separate developments (HTFC 2008).

As a result of these discussions, the Town of Gillam has drafted an updated community development plan. The plan provides a vision for the community to be "a safe, family oriented, close-knit community where residents and visitors enjoy a vibrant historic full service town, unique natural beauty, and outdoor adventure" (Dillon Consulting 2012).

5.3.1.3 Thompson

GOVERNANCE

Thompson is governed by a Mayor and seven Councillors who are elected for a four-year term. The current Mayor and Council consist of individuals who grew-up in Thompson and witnessed the changes that have shaped the community over the years, including the city's industry-centred development. The current leadership and administration have a positive outlook for the community and are taking greater control over planning and future development of Thompson as a regional centre (Thompson KPI Program 2008-2009).

Mayor and Council have roles related to representation, policy-making, and management of the municipality's resources. The standing committees of council are as follows:

- Recreation and Community Services Committee;
- Finance and Administration Committee;
- Legislative and Intergovernmental Affairs Committee;
- Human Resources Committee;
- Public Safety Committee; and
- Public Works and Infrastructure Committee.

Development Review Committee (City of Thompson 2010).There is usually little in the way of formal public participation in decisions; participation in community hearings or other public events is typically low, although Council are responsive to community inquiries and complaints. The exception to this trend is when large projects or controversial issues arise, whereby the Mayor and Council will consult with the public prior to making a decision. If a community member contacts the Council with a concern about a policy or bylaw, Council makes attempts to address that concern (Thompson KPI Program 2008-2009).

In the past five years, Thompson has experienced rapid growth from an expanding local economy and population. This has created substantial demands on the elected council to address infrastructure needs and social challenges that have accompanied this growth.

GOALS AND PLANS

According to the Thompson Planning District Development Plan (the Plan), the City of Thompson is experiencing dramatic economic opportunities on a number of fronts. The Plan specifically highlights the mining industry, which is currently going through a period of transition as well as hydroelectric power development in the region. The Plan acknowledges that these opportunities will have a major impact on the community in the immediate future and that they do not come without challenges (Thompson Community Planning Services Office 2008). Given Vale's announcement in 2011 that the smelter and refinery will be closing in 2015, it is likely that aspects of the Plan will be revisited by the community. The Plan outlines primary goals in the areas of the environment, sustainable development, social development

and economic development. The Plan notes that increased pressure may be placed on existing residential, commercial, industrial and recreational inventories. It also points out that with the changing demographics of the community, there is an increased demand for a variety of residential housing choices, as well as demand to accommodate different commercial formats as the retail sector evolves (Thompson Community Planning Services Office 2008).

The City of Thompson has committed to a sustainable future by developing a sustainable community plan (SCP). The SCP provides a vehicle through which long term community sustainability goals can be met, to develop future land use and infrastructure policies and to assist in the coordination of policies and actions. In addition, the SCP lays out strategies for growth management and sustainable asset management for the City of Thompson. The plan includes key themes such as diverse housing opportunities, protection of natural environments and the development of a major City Park Network to be used as a "building block" for local sustainability. The SCP is a starting point to achieving Thompson's 2010 vision for sustainability, which will be attained through short, mid and long-term actions and partnerships of a vast group of stakeholders. The SCP will be implemented by adopting the best practices related to land use planning and development. It was noted in the plan that while "innovative practice by municipalities and partner organizations could be used to develop or implement a SCP"; in some cases the Best Practices will depend on Provincial enabling legislation (City of Thompson 2010a).

There are numerous projects planned for Thompson (and surrounding areas) by the City of Thompson, industry, and others. Among the known developments planned over the next five years are:

- Construction of a cold weather aerospace engine testing plant;
- Development of Phase 3 of the Regional Recreation Centre;
- UCN campus, dormitory house and childcare facility;
- Renewal of water sewer and streets;
- Low income housing units; and
- New water treatment plant on north side of the river.

Potential Projects that may be developed include:

- New subdivisions and commercial development with expansion of city boundaries; and
- New airport terminal (Thomson KPI Program 2008-2010).

Amidst the planned developments, there are also potential closures of existing facilities. As noted above, Vale announced in the fall of 2010 that the smelter and refinery will be closed and demolished in 2015. The City of Thompson has since joined with Vale to create the Thompson Economic Development Working Group, which is designed to help the city develop an economic diversification strategy in light of the closure (Flanagan 2011).

In addition to the above projects/plans, the City of Thompson recognizes that the Aboriginal population is an important attribute of the community. As such, the city has been working with the MKO, which has

been contracted to provide administrative support for a Thompson Urban Aboriginal Strategy. The strategy prioritizes improving life skills, supporting Aboriginal women, children and families, and promoting job training, skills and entrepreneurship. The strategy is lead by a steering committee consisting of 15 people from various social services and health organizations, Aboriginal organizations, the City of Thompson, Vale Inco, and the provincial and federal governments. Two successful projects implemented under the strategy to date include the creation of eight affordable housing units (targeted for families with children attending schools in Thompson), and the creation of an additional 20 spaces in home daycares (Thompson KPI Program 2008-2010).

5.3.2 Community Health

The communities in the Local Study Area fall within the Burntwood Regional Health Authority (BRHA). The BRHA delivers health care to residents of a large geographic area spanning more than half the province's land mass. Among the challenges faced in the delivery of health care services is the fact that many communities, including two of the KCNs communities (WLFN and YFFN), are not accessible by all-season roads. Transportation can be a consequential barrier to accessing health services (BRHA 2009a) (see Section 4.3.3 for a description of the health facilities and services available in the Local Study Area).

The BRHA is also unique in that 72% of its population is Aboriginal. First Nation Members residing in the region who live on-reserve receive health care services on-reserve through the federal First Nations and Inuit Health Branch (FNIHB). These residents also access services off-reserve through the BRHA as necessary (*e.g.*, physician services as required, screening services, and hospitalization). Jurisdictional challenges exist relating to access to health services and are addressed through strong relationships with Aboriginal organizations such as the MKO and KTC, as well as through dialogues with First Nation communities and FNIH (BRHA 2009a).

As described in Section 5.2.2, health is influenced by a wide variety of factors, which makes it challenging to describe the overall health status of a community. Drinking water quality, food choices, behaviours such as smoking, level of physical activity and air quality all affect health. Socio-economic factors such as housing, income social status, education, early childhood development, and family and community supports must also be considered. Measuring these determinants of health can be challenging due to the breadth of factors that can contribute to health and the availability of data. Data on some indicators are not routinely collected and may be only available through sources such as surveys or community consultation. For example, while incidences of lung cancer may be collected, statistics on smoking rates among young adults are not readily available. Further, a full understanding of community health requires consideration of both health indicators, (*e.g.*, determinants such as birth rates and infant health, hospitalization and physician visits, communicable disease and mortality), and community perspectives on health and well-being at the individual and community level. This section presents health indicator data for the KCNs communities, Thompson and Gillam, as well as information on community-based understanding of health and well-being.

5.3.2.1 Keeyask Cree Nations

5.3.2.1.1 Perspectives on Health and Well-being

Mino-pimatisiwin means living a good and honourable life. *Mino-pimatisiwin* includes many things such as being a good person, respecting *Askiy*, harvesting and consuming healthy *Ininewak* foods, and following Cree values (see Chapter 2 of the EIS for further detail). Adelson, in her work on Cree concepts of health and well-being, describes this in saying "Someone is said to be *miyupimaatisiiun*[1] if he or she eats the right foods, keeps warm and performs the activities needed to accomplish one's goals, whatever they may be" (1998). "Indeed, from a Cree perspective, health has as much to do with social relations, land, and cultural identity as it does with individual physiology" (Adelson 2000).

Adelson argues that the Cree concept of health "cannot be understood outside of the context of colonial and neo-colonial relations in Canada. Aboriginal people in Canada continue to live with the effects of displacement, discriminatory legislation, failed attempts at assimilation, forced religious conversion, and pervasive racism" (Adelson 2000). The KCNs have described such circumstances in different ways.

For CNP, this is expressed as they evaluate harmony and balance in their ancestral homeland ecosystem (see CNP Keeyask Environmental Evaluation Report). Before contact with Europeans, the ancestral homeland ecosystem was intact and capable of sustaining their population. Upon contact, activities/policies such as the *Indian Act*, cash payments to First Nations, the signing of Treaties, schooling, the construction of the Hudson Bay Rail line, the *Migratory Birds Convention Act* , the Natural Resources Transfer Agreement and the implementation of the registered trapline system, slowly began to erode the ancestral homeland ecosystem and created an unbalanced system. The onset of Manitoba Hydro's activities placed further pressure on this system, and at present the communities feel as though the vital relationships that sustain the community are "the weakest in (their) history" (CNP Keeyask Environmental Evaluation Report).

FLCN's history describes numerous events, activities and policies that affected their community, who before contact with Europeans lived with intimate familiarity with their surrounding environment, guided by concepts such as *pimatisowin* and *oochinehwin*[2]. Events that transformed the community in one way or another include the signing of the adhesion to Treaty 5, the construction of the Hudson Bay Railway, the Indian residential school system, the closure of York Factory in 1957, settlement at Gillam, and struggles to secure reserve land, among others. Some of these changing circumstances were complimentary with FLCN's lifestyle (*e.g.*, people were able to incorporate seasonal employment with the rail line along with traditional pursuits), while others often had negative consequences (*e.g.*, the Indian residential school system). Perhaps the most profound of all these experiences was the construction of three hydroelectric

[1] Adelson's work focused on the Whapmagoostui Cree of northern Quebec whose dialect translates mino pimatisiwin to miyupimaatisiiun. FLCN has identified Adelson's work as an accurate reflection of their community's ATK in relation to health.

[2] The Cree term oochinehwin refers to known consequences for inappropriate behavior as described in Ninan (FLCN 2009 DRAFT).

generating stations in FLCN's traditional territory. Not only did this affect FLCN's relationship with the land and waterways "but also with each other and with the town of Gillam" (FLCN 2009a Draft).

YFFN describes their experiences in saying, "Our First Nation has been subject to successive forms and practices of colonialism since the 17th century" (YFFN Evaluation Report (*Kipekiskwaywinan*)). Major events that have shaped the community include its role in the fur trade at York Factory, joining the Anglican Church, signing Treaty 5, and relocation to York Landing in 1957. Just as the community was becoming familiar with their new surroundings resulting from the forced relocation to York Landing, hydroelectric development resulted in profound changes to their surrounding environment. Of particular concern to the community in this regard is the decline to water quality the community has witnessed over time. However, YFFN remains certain that the community's ability to adapt to imposed changes is likely to prevail once again. This perspective is reflected in YFFN's Evaluation Report, which states: "The people of York Landing have seen many changes over the years and yet they have maintained their proud cultural traditions adapting to major disruptions such as relocation, the loss of their traditional lands, and the impacts of major hydro-electric projects. Today, the people of York Factory First Nation are preparing for the future by re-establishing their connection with the land, and becoming more self-reliant again" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

Adelson's understanding of *pimatisowin* "has everything to do with life on the land" (2000) and is "inseparable from being able to hunt, pursue traditional activities, live well in the bush, eat the right foods, keep warm and provide for oneself and others" (Adelson 2000). Traditional foods from the land and water, which have sustained communities over the centuries, are acknowledged today as providing a better diet than what store-bought food typically provides (CINE 2006). Traditional foods are also acknowledged as providing for "strengthened cultural capacity and well-being" (CINE 2006). The ties between health/well-being and the land have been experienced firsthand by the KCNs, who maintain that the advent of hydroelectric development in northern Manitoba resulted in devastating effects to their abilities to pursue activities on the land and subsequently on community health. The factors affecting traditional food consumption patterns include but are not limited to:

- Loss of traditional ancestral hunting, trapping, and fishing locations;
- Unfamiliarity with the land and associated safety hazards and concerns;
- Need to go further afield to access traditional food sources;
- Concerns about water quality;
- Changes to the taste and texture of fish; and
- Concerns about mercury in fish.

(Split Lake Cree – Manitoba Hydro Joint Study Group 1996a; CNP Keeyask Environmental Evaluation Report; FLCN 2009a Draft, FLCN KPI Program 2009-2011; YFFN Evaluation Report (*Kipekiskwaywinan*); YFFN KPI Program 2009-2010).

These factors resulted in changes to diet and increased reliance on store-bought food, in addition to a shift to a more sedentary lifestyle. Such factors are thought to be linked to deterioration of health and

increased incidences of modern illnesses (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a; FLCN KPI Program 2009-2011).

5.3.2.1.2 Community Health Assessment

Many northern and First Nations communities have undergone major changes over the past decades. While some of the changes have been beneficial, some of the changes have had negative impacts on health such as the decrease in physical activity; increasing high fat, high caloric, high sugar diet; access to cigarettes, alcohol, and motor vehicles, which can increase risks of injuries, diabetes, heart disease, obesity, and cancer. There have also been major changes in the socio-cultural-economic lives of First Nations people.

Health is influenced by the interaction of a wide variety of factors including physical, mental, emotional and spiritual components. Understanding KCNs' concepts and realities of health and well-being requires a holistic approach to considering the total health of a person within the total environment. A community health assessment recognizes the many layers of health and well-being and the things that make the community unique, including its social systems, environmental factors, and demographics. Many of these aspects are discussed in different sections of this document, in Section 3 on the economy, and Section 4 on population, infrastructure and services. An important component to the assessment is the development of a set of key community indicators or measures that will help describe the baseline state of health in the community. Criteria for selecting indicators include availability, timeliness of the indicator, validity, stability, reliability, and responsiveness. This often means that certain types of data (such as administrative data collected through births and deaths registries, hospitalizations and medical appointments) are included to a much greater extent than other types of data that may be more difficult or costly to collect.

After consultation and review of available data, this community health assessment includes information obtained through community visits and key person interviews along with administrative health data that was requested from Health Canada, the First Nations and Inuit Health Branch, and Manitoba Health (with permission received from each of the KCNs). Technical health documents were prepared for each of the KCNs separately. Due to the sensitivity of the contents of these documents, the information is summarized here for the KCNs collectively, in addition to reports for Gillam and Thompson.

A holistic picture of health status includes physical, mental, emotional and spiritual health issues. The scope of this section includes a review of broad health indicators as well as common health conditions and chronic diseases.

SELECTION OF HEALTH STATUS INDICATORS

The broad indicator areas in the KCNs' Community Health Assessment include Population, Births and Infant Health, Communicable Diseases, Hospital and Physician Visit Data and Mortality. Appendix 5A provides a brief description of some of the International Classification of Disease[1]classifications that may

[1] The International Classification of Disease (ICD) is the international standard diagnostic classification for all general epidemiological, many health management purposes and clinical use. It is used to classify diseases and other

be reported on through the physician billing, hospitalization and mortality data. This disease classification system is endorsed by the World Health Organization (2010) and is used for all physician and hospital billing.

These broad ICD-10 disease classification areas are presented in this chapter if they were a "leading cause" of physician visits, hospitalization or death. In addition, specific indicators ("conditions of interest") within each area were chosen based both on practicalities such as availability of the data at the community level and providing the most comprehensive picture of health in each community. In some cases, data were not available for every community (for example information about chronic diseases). The results of the analysis were shared with each of the KCNs' respective health professionals in order to confirm whether the findings were consistent with experiences in the communities and to identify other issues not captured in the data.

Other important indicators and facets of health, including education, employment, income, services, language, culture, and spirituality are considered in other sections of this document.

Population

Information about population size and change helps identify how quickly communities are growing and if there are certain age groups growing at a faster rate than other parts of the population. Communities with largely young populations tend to have high birth rates, fewer people available for employment (proportionally as many are under age 15) and may experience specific health risks such as more injuries and fewer chronic diseases. From a First Nations perspective, population projections "suggest a growing demand for services – social, educational and health" and also "point to the impact on Bill C-31 on the future diminishing resources of the communities as their populations grow" (First Nations Regional Health Survey 2005).

Births and Infant Health

Information about births and infant health such as infant mortality and low and high birth rates provide very good information about the health of the community in general. For example, infant mortality rates have often been found to be one of the single best measures of health in a community, with communities that experience higher rates of infant mortality also experiencing higher rates of poor health overall. This is due in part to the fact that "Infants are considered to be vulnerable to adverse underlying social, economic, and environmental conditions. It is this vulnerability that makes infant health measures sensitive 'sentinels' to underlying population health determinants" (First Nations Regional Health Survey 2005).

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health problems recorded on many types of health and vital records including death certificates and health records. In addition to enabling the storage and retrieval of diagnostic information for clinical, epidemiological and quality purposes, these records also provide the basis for the compilation of national mortality and morbidity statistics by WHO Member States.

Communicable Diseases

Transmission of some communicable diseases is related to lifestyle, general health of the population and availability of resources to aid with personal hygiene. That is, certain communicable diseases are spread due to poorly cooked food, or lack of hand washing. Some general risk factors that can increase the burden of communicable disease include:

- Lack of access to safe water, sanitation and cooking facilities can put a population at increased risk of outbreaks of waterborne and food borne diseases;
- An overcrowded population increases the risk of transmission of communicable diseases, particularly respiratory diseases;
- Poor nutrition can impact a person's natural immunity and lead to more frequent, severe and prolonged episodes of infections; and
- Poor access to health services may mean that people do not receive treatment in a timely manner, which can impact that disease course and increase risk of transmission to others.

Selected Conditions of Interest

Most conditions of interest were selected based on several criteria including the relationship of the condition to water, conditions identified through research that are likely to be of importance to a northern community (such as diabetes or injury) as well as conditions identified by the KCNs as relevant to their communities. The specific conditions chosen for review include:

- Injury;
- Cardiovascular Disease;
- Infections of Skin and Subcutaneous Tissue;
- Mental Health Disorders;
- Diabetes;
- Congenital Anomalies diagnosed in newborns;
- Intestinal Infectious Diseases;
- Disorders of the Thyroid Gland;
- Hepatitis A;
- Noxious influences affecting newborns; and

- Mercury-related illnesses[1].

Physician visits data can provide information on how many people in a community are living with certain illnesses or experiencing certain events (such as injury). However, there is generally no administrative database used to record visits and diagnoses with a nurse at a nursing station (unlike physician visits where such data are generally available). Therefore these data can be of limited value for First Nations communities. While the physician visit rate can under-represent the true numbers of events in a community, it is still reported as an indicator to provide a picture of a community's health status.

Hospitalization data provide information about residents who were admitted as in-patients to a hospital (regardless of which hospital). This indicator provides information about illnesses that become severe enough for hospitalizations and what resources might be needed in the community to help people better manage their health. For example, if hospitalizations due to diabetes are increasing, it can be an indicator that the number of people living with diabetes is increasing but it can also suggest there may not be enough resources in the community to help people manage their diabetes before complications occur (as most people should not need to be hospitalized for this illness). Because these data include only people who have been admitted to hospital, it is reasonable to assume that in most cases the patient was ill enough to require hospitalization. However, in some cases, nurses in the community may determine that they have the resources to deal with a particular situation or to diagnose a problem and then refer the patient to hospital. Because the patient is transported from the community, they may be more likely to be admitted to hospital for tests or observation when a local community member may be more likely to be treated as an outpatient. Therefore, it is important to consider both acuity of illness and local resources in interpreting the hospital data.

Mortality

Mortality data are another set of information that can contribute to the understanding of the health status of the community. For example, the premature mortality rate (deaths before age 75) has been identified as one of the best single measures of health status and many researchers rely on this indicator above others to measure the health of the community. Communities with higher premature mortality rates also tend to have higher rates of illnesses, hospital utilization and poorer health overall. Mortality data by cause also provides information with respect to how many deaths may have been preventable (for example, those due to injuries).

LIMITATIONS OF THE DATA

The following sections describe the results of the community health assessment, which is based largely on available indicator data and community-based research results. One of the challenges in interpreting the data is that while each indicator presents information on a specific aspect of health, it is challenging to portray the concept of overall wellness. According to the First Nations Regional Longitudinal Health

[1] International Classification of Disease code 985.0 was used. 985.0 is a subcomponent of code 985 which is Toxic Effect of Other Metals. 985.0 specifically refers to Mercury and its Compounds and more specifically Minamata Disease. Minimata Disease is a neurological (brain) disorder caused by high levels of mercury poisoning.

Survey 2002/03 (2005), wellness "is a very complex and multilayered philosophy." The study goes on to explain that for First Nations, "human beings are connected to the natural world and thus to Creation, through many different levels or layers…all levels are interconnected" (First Nations Regional Longitudinal Health Survey 2005). Describing the overall interconnectedness between factors is a challenge, particularly as certain determinants of health have limited available data at the community level.

For example, one area of limitation in using a determinant of health indicator approach is an ability to consider the influence of certain risk factors. Information on risk factors includes personal health practices such as smoking, diet and exercise, which have important linkages to current and future health status of the population. While some risk factor data are available at the national level through tools such as the First Nations Longitudinal Health Survey, risk factor data specific to the Local Study Area are not readily available.

Generally, data used in the community health assessment were available for the years 1984-2006. Data are presented for this time period for population, infant health, physician visit and hospitalization data. In cases where data are collapsed into 10-year time frames, the two most recent time periods are usually chosen -1987-1996 and 1997-2006. In some cases, in order to present changes over time the earliest and latest time periods are chosen. Data presented are from Manitoba Health with the exception of some mortality data that was provided by FNIHB. In this case, the time period covered is not the same for each community and is not as lengthy as the time frame presented for the other health indicators as it was not available.

Data for Manitoba First Nations (as a whole) and the province of Manitoba are provided for comparison purposes where appropriate.

CAUTIONS IN INTERPRETING THE DATA

With individual communities, the size of the population can also be a limitation in identifying potential health issues because of the wide confidence intervals that result during the analysis. A change or impact needs to be fairly large in order to confidently say there is a statistically significant difference.

Several graphs presented in this section include the actual rates as well as the upper and lower 95% confidence intervals. Confidence intervals gives the range of rates in which are likely to be the true value 95% of the time – that is, that we are confident that 95% of the time, the true value or rate would be within the given range of confidence interval.

The small size of the KCNs' population relative to Manitoba First Nations and the Province as a whole may result in more pronounced peaks and valleys in some of the graphs. This may not be indicative of an erratic trend, but rather may be a reflection of the small size of the communities whereby a relatively small number of incidents results in large changes from year to year.

Finally, when attempting to determine whether there are actual changes over time in disease burden or deaths as well as when attempting to compare different populations, rates are required. These may be presented as "per 1,000" residents or "%" (which is the same as "per 100 residents") *etc.* This means that comparisons can be made. However, it is often important when considering resources needed at the community level to also consider the actual number of patients, hospitalizations, deaths or other events.

This can assist in planning for health care resources, particularly in populations that may also be increasing (for example, if a community population is growing at the same rate as a certain illness, then there won't be an increase in "rates" shown even though the number of actual people requiring health care services for a disease has actually increased). This is why, in many cases, the actual number of events for community residents may be presented as well as rates for comparison over time as well as between the community and other comparison areas.

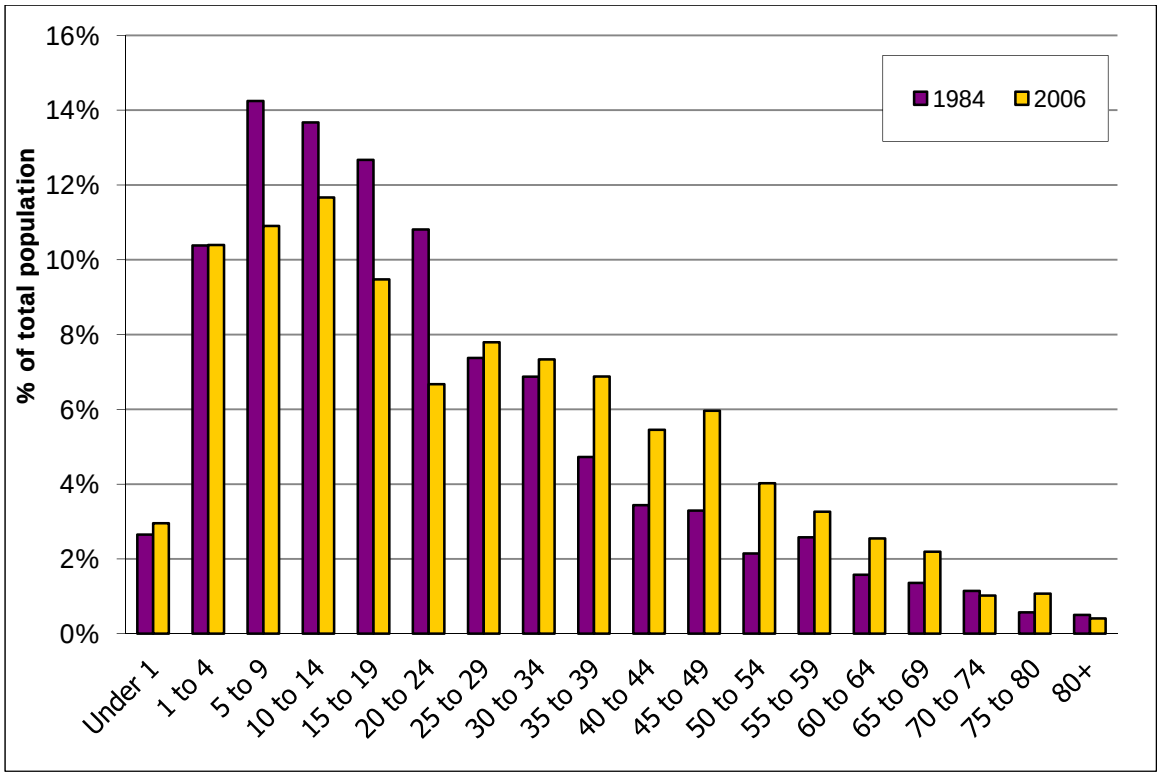
5.3.2.1.3 Health Characteristics Associated with Population Characteristics

An understanding of population lays the foundation for interpreting the health of First Nations communities (First Nations Regional Longitudinal Health Survey 2005). As discussed in Section 4.3.1, the KCNs have a young population with at least 40% of residents under the age of 20. This is a much different and younger population distribution than seen in Manitoba overall where only about 25% of residents are under the age of 20. KCNs communities are young and growing; according to Manitoba Health population data[1], overall they have grown by 40.5% between 1984 and 2006 (slightly higher than all Manitoba First Nations living on-reserve at 36%). Although the KCNs communities have a large population of young people, the population make-up of KCNs communities has changed over the past 25 years with an increasing proportion of the population in the 25 to 69 year age group and a decrease in the proportion of residents under 25 years.

Communities with larger numbers of young people like the KCNs may be more likely to have higher rates of illnesses or health needs related to younger people (such as issues related to pregnancy, immunization, child health and injury) than Manitoba overall. A younger community may also appear to have lower rates of illnesses such as chronic diseases or deaths because these issues typically happen later in life.

While only 4.7% of KCNs residents are over age 65 (compared to 13.8% of Manitobans), this group is growing (see Figure 5-2). This has an impact on the types and numbers of illnesses seen in the communities today compared to 1984. When more people in a community start living longer, this means that the community might start seeing some diseases that they have not seen in the past. For example, many chronic diseases such as diabetes, heart disease, and cancers are typically found in older people. Increases in rates of these types of illnesses are being seen in some First Nations populations. The prevalence of these conditions and the prevalence of individuals experiencing multiple conditions increases with age (First Nations Regional Longitudinal Health Survey 2005) and other risk factors such as diet, exercise and smoking.

[1] Manitoba Health population data are presented in this section, as these figures are used to calculate rates for all health data provided by this source. For accuracy, it is important that both the number of health events, and the population used to calculate the rates, come from the same source. In cases where INAC has provided health or mortality data, population figures from the same source are used to calculate rates.

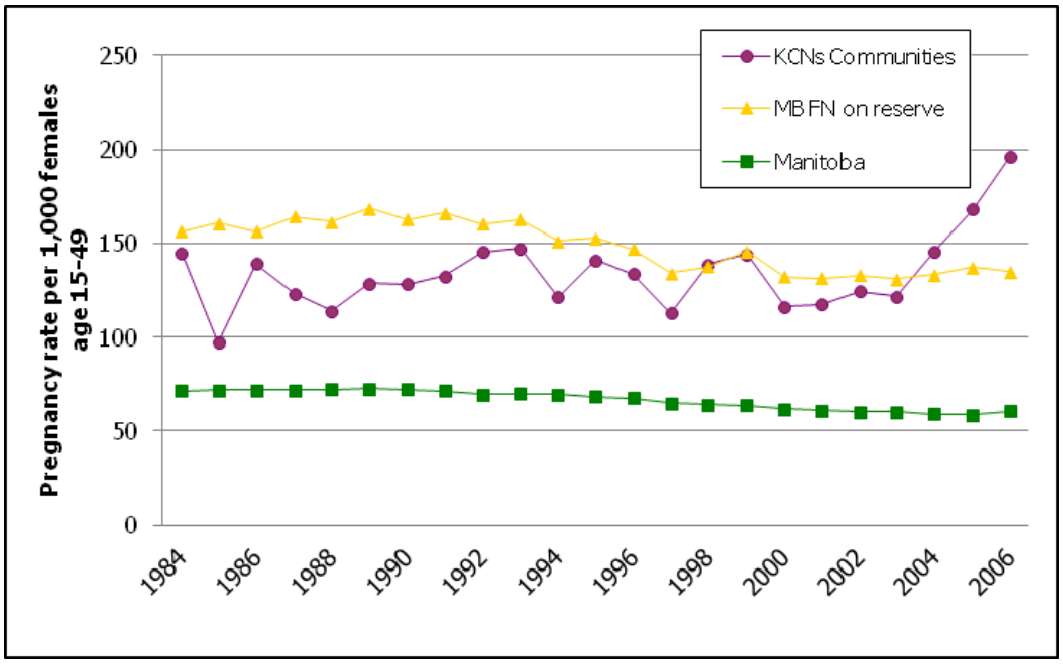


Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-2: Keeyask Cree Nations Communities Change in Population Structure (1984 and 2006)

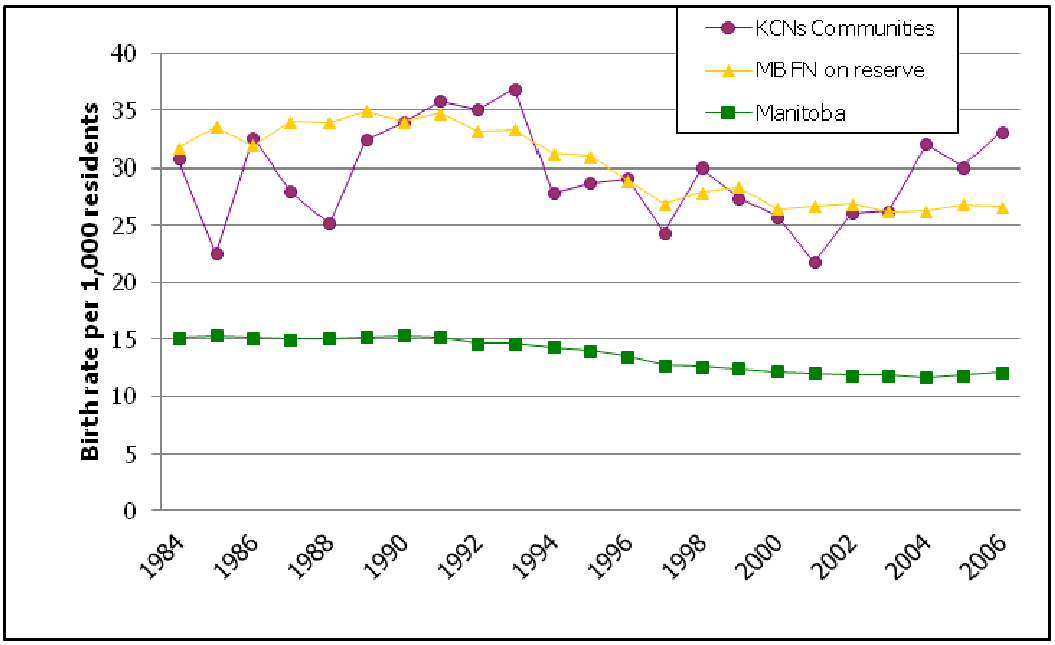
Since 2004, pregnancy and birth rates in the KCNs communities have been higher compared to Manitoba and to other First Nations residents living on-reserve. According to Manitoba Health data, in 2006 the pregnancy rate for residents of KCNs communities was 195.8 pregnancies per 1,000 females age 15 to 49 compared to Manitoba First Nations rate of 135.1 per 1,000 and Manitoba at 60.7 per 1,000 (see Figure 5-3 and Figure 5-4).



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-3: Pregnancy Rates Over Time, Females Age 15-49 (1984-2006)



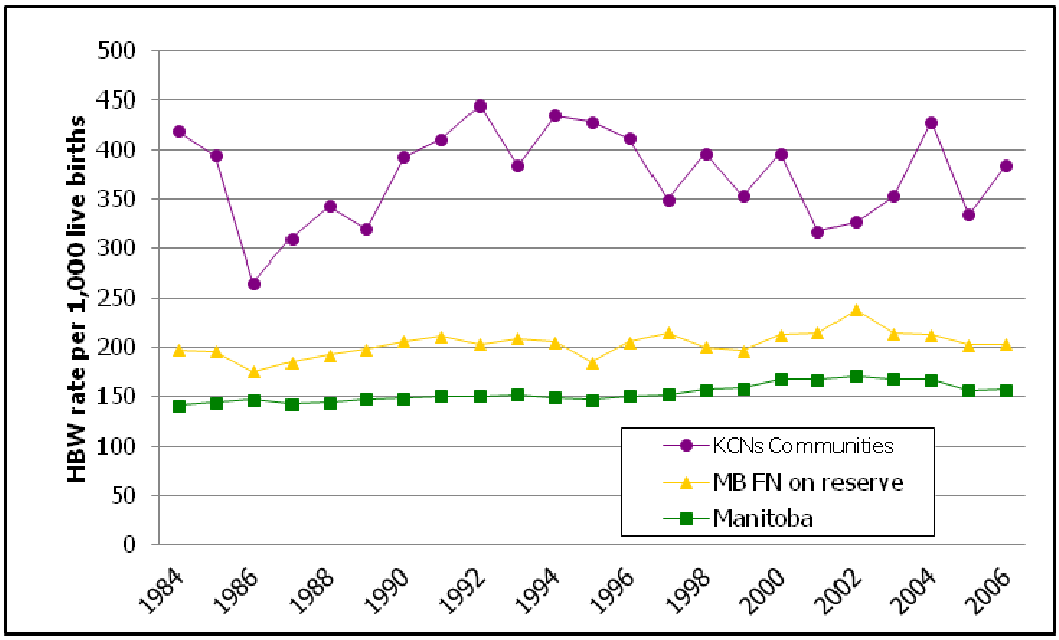
Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-4: Birth Rates Over Time (1984-2006)

Birth and pregnancy outcomes reviewed included low (LBW) and high birth weight (HBW) rates. International definitions of birth weight are used; low birth weight is defined as a birth weight of less than 2,500 grams and high birth weight is defined as a birth weight of more than 4,000 grams. These are medical definitions used for classifying the normal range of births. Risk factors for high birth weight infants include diabetes in the mother; and babies born at high birth weight are then themselves at increased risk for developing diabetes (Stene *et al.* 2001).

However, it is important to note that although there are increased health risks associated with both LBW and HBW infants, not all infants in these weight categories will have negative health impacts. In First Nations communities, HBW infants are typically much more common than LBW infants. For example, in 2006 there were 25 babies born weighing more than 4,000 grams to KCNs community Members (compared to fewer than five born at LBW). The 25 HBW infants among KCNs community Members can be converted to a rate for comparison to other areas. The KCNs' HBW rate of 384.6 infants per 1,000 live births was higher than Manitoba First Nations rate of 202.4 per 1,000 and the provincial rate of 156.4 per 1,000 in 2006. This means that in 2006, just over one in three babies born to a KCNs community resident had a high birth weight. While HBW rates among Manitobans appear relatively consistent, it does appear that there may be an increasing trend in HBW infants among KCNs residents (see Figure 5-5).



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-5: High Birth Weight Rates (1984-2006)

5.3.2.1.4 Diseases of Interest to the Keeyask Cree Nations

Specific diseases of interest were identified by the KCNs through the community-based research programs. Many of these are represented on the chronic conditions lists that were provided by the nursing stations for KCNs communities. Data about both physician visit and hospitalization were collected and reviewed for each of these conditions. However, for some conditions there were no cases as illustrated in the physician visit data in Table 5-3 and the hospitalization data inTable 5-4.

Note that obstetrics data related to routine deliveries are not included as this is typically the most common reason for hospitalization but is not related to illness. It is also important to note that the data were provided by year so that the patients may be counted multiple times when summarizing the time trend data as illustrated in the table.

These tables concur with the community Chronic Disease Lists, which are kept by the nurses in many communities. That is, in both the community Chronic Disease List as well as the data retrieved from physician visit and hospitalization administrative data sets, cardiovascular diseases and diabetes were ranked highly in terms of numbers of residents living with the disease (Chronic Disease list) as well as being treated for the disease (physician visit and hospitalization data). This agreement between different data sources is important when evaluating reliability of data. While injury was ranked low on the Chronic Conditions list and accounts for the most patients and physician visits, this is because injury is usually an acute event and does not always lead to chronic conditions.

In the following sections, each chronic condition is examined, with further detail on time trend and comparison data for selected illnesses provided where sufficient data are available. Sufficient data were not available to review Hepatitis A (seven hospitalizations between 1980 and 2006), Disorders of the Thyroid Gland (nine hospitalizations) or Intestinal infectious disease (28 hospitalizations) in further detail.

Table 5-3: Physician Visits by Selected Cause, KCNs Community Members (1984-2006)

Selected Cause of Illness	Total patients	Total visits
Injury	7,587	14,253
Cardiovascular Disease	2,963	8,202
Diabetes	2,797	7,826
Mental Health and Behavioural Disorders	2,398	5,307
Infections of Skin and Subcutaneous Tissue	1,950	3,125
Congenital Anomalies diagnosed in newborns	488	831
Disorders of the Thyroid Gland	222	425
Intestinal Infectious Diseases	93	121
Noxious influences affecting newborns	0	0
Mercury-related illness	0	0
Hepatitis A	0	0

Source: Manitoba Health, special data run 2011.
Notes:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.
- Patients can be counted multiple times from year to year and do not represent unique individuals over the time frame.

Table 5-4: Hospitalizations by Selected Cause, KCNs Community Members (1984-2006)

Selected Cause of Illness	Total hospitalizations
Injury	1,571
Cardiovascular Disease	742
Infections of Skin and Subcutaneous Tissue	326
Mental Health Disorders	341
Diabetes	307
Congenital Anomalies diagnosed in newborns	73
Intestinal Infectious Diseases	28
Disorders of the Thyroid Gland	9
Hepatitis A	7
Noxious influences affecting newborns	0
Mercury-related illness	0

Source: Manitoba Health, special data run 2011.
Notes:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.
- Patients being hospitalized can be counted multiple times from year to year and do not represent unique individuals over the time frame.
- Obstetrics data are not included.

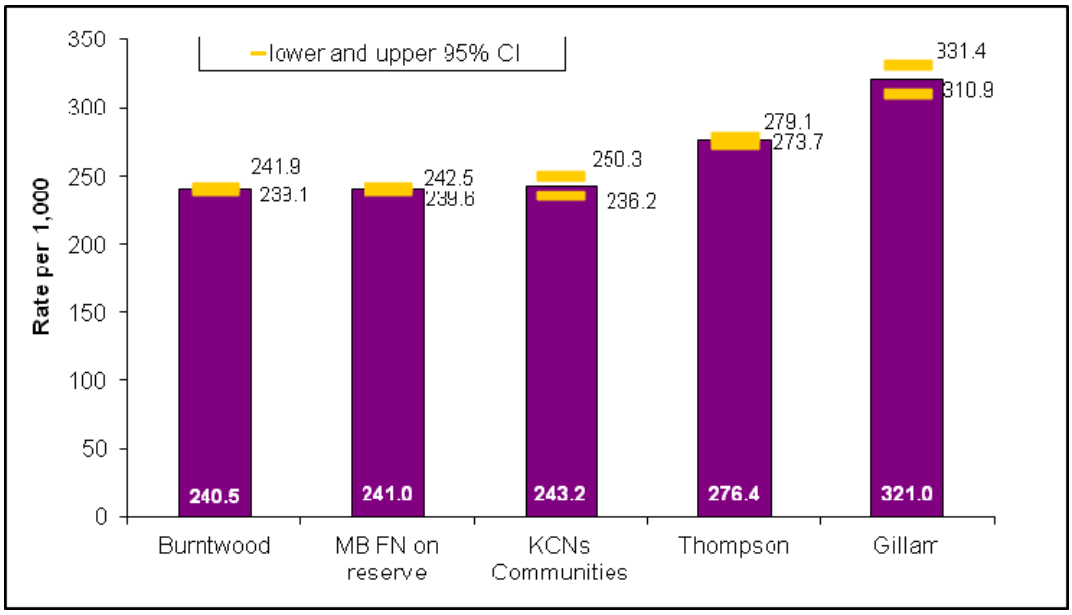
CARDIOVASCULAR DISEASE

Cardiovascular disease includes a wide range of diseases involving the heart and blood vessels. Angina, narrowing of the arteries, heart attack, congestive heart failure and stroke are examples of cardiovascular disease. Many of the risk factors for cardiovascular disease (such as obesity, lack of physical activity and stress) are common to Type 2 Diabetes and many cancers. KCNs communities indicated that diabetes, hypertension, stroke and heart conditions are current health issues among adults (CNP KPI Program 2009-2010; YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2011).

The 10-year average annual rate of physician visits between 1997 and 2006 was 243.2 visits per 1,000 residents (see Figure 5-6). This is statistically lower than rates in Gillam and Thompson but statistically similar to the BRHA and Manitoba First Nations on-reserve.

The 10-year average annual physician visit rate for cardiovascular disease for KCNs females appears to be the lowest among comparison populations at 226.9 visits per 1,000 residents. This rate is statistically lower than all comparison populations with the exception of Manitoba First Nations living on-reserve. Among KCNs males, the average annual physician visit rate for cardiovascular disease between 1997 and

2006 was 258.7 visits per 1,000 residents. This rate is statistically lower than the rate in Gillam[1] but higher than the rates of the BRHA and Manitoba First Nations living on-reserve.



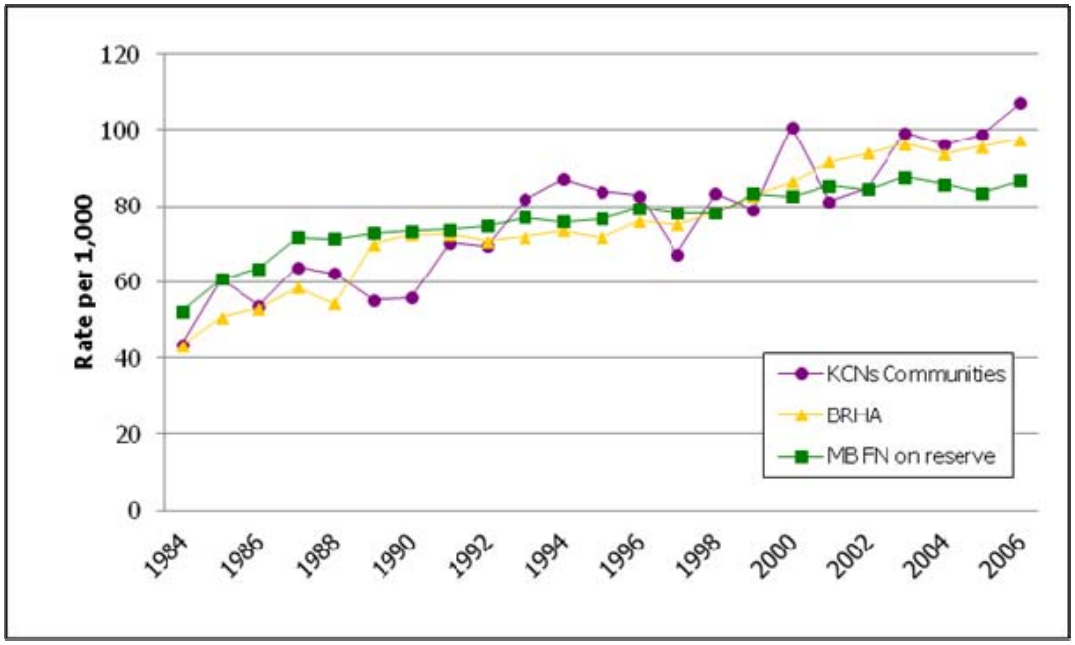
Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.
- CI refers to confidence interval. The confidence interval gives the range of rates in which it is likely to be the true value 95% of the time – that is, that we are confident that 95% of the time, the true value or rate would be within the given range of confidence interval (CI).

Figure 5-6: Average Physician Visit Rates For Cardiovascular Disease by Area (1997-2006)

As illustrated in Figure 5-7, treatment rates for cardiovascular disease appeared to be increasing for all comparison areas reviewed. While rates are presented in the graphs to allow for comparison of different areas, the actual number of patients and physician visits among KCNs community Members is also useful to help for resource planning. The actual number of KCNs residents who were treated by a physician for cardiovascular disease increased by 244% from 61 unique patients in 1984 to 210 in 2006. This is the highest rate of change among the comparison areas. The number of physician visits for these patients (where individuals can be counted more than once if they make multiple visits to the doctor) increased at a similar rate from 118 visits in 1984 to 468 visits in 2006 (an increase of 296.6%).

[1] Note that all data are based on community of reported residents, not community of service or Band affiliation. For example, "Gillam" refers to all residents who have provided Manitoba Health with a mailing address in Gillam, regardless of where they received services and regardless of Band affiliation. A member of TCN, WLFN, FLCN or YFFN who lives in Gillam would be recorded under "Gillam" in this analysis.

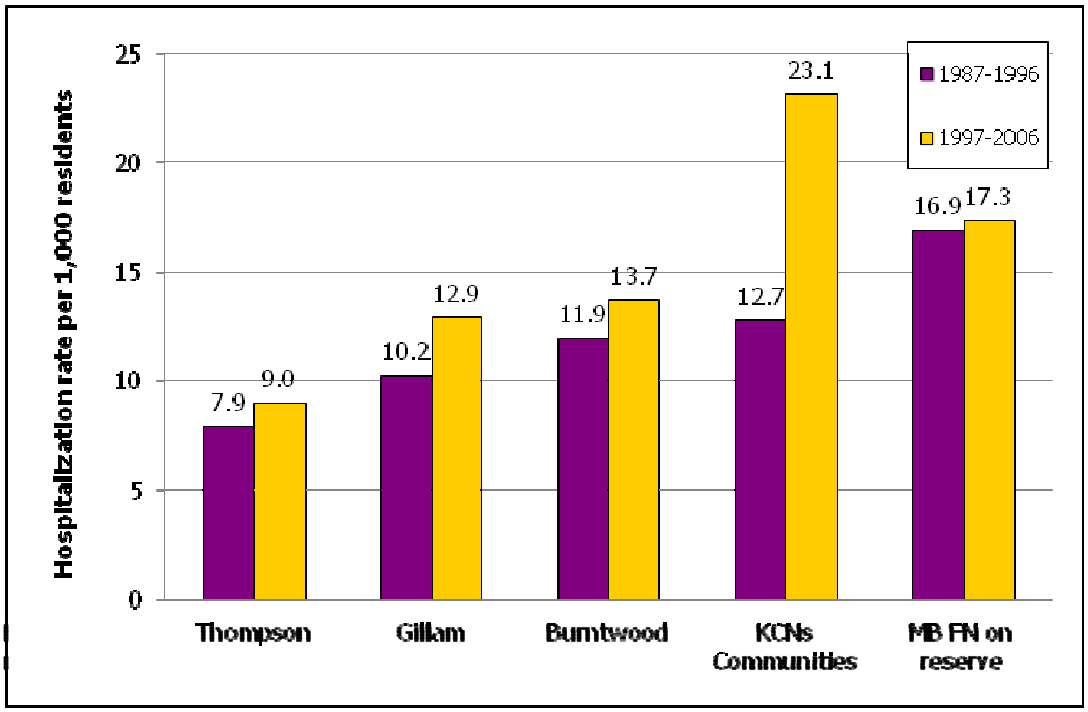


Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-7: Patient Treatment Rates for Cardiovascular Disease by Year, All Residents (1984-2006)

Generally, cardiovascular disease tends to be a disease among older residents and this is also the case for KCNs community Members. KCNs residents age 50 and older accounted for 83.7% of hospitalizations for cardiovascular disease. It is important to consider the hospitalization data with respect to the physician visit data. The physician visit data shown in Figure 5-6 showed KCNs residents as having the lowest or second lowest rates of physician visits for cardiovascular disease, yet hospitalization rates are the highest among the comparison communities (see Figure 5-8). This may be due to a variety of factors including data quality. Ongoing care or treatment that occurs at the nursing station would not be included in the physician visit data. In addition, any physicians that provide services in the community and are paid through a contract or other arrangement may not provide the diagnostic data to Manitoba Health, so these visits would not be captured. It is also possible that there are more hospitalizations due to more acute level of illness or because the staff at the nursing station determine that there are not resources at the community level to manage a condition, which in another community may be managed on an out-patient basis.



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-8: 10-year Hospitalization Rates for Cardiovascular Disease by Area (1987-1996 and 1997-2006)

DIABETES

Diabetes and related complications were identified by the KCNs as a priority health concern in KCNs communities. The availability of places to exercise and programs to participate in were also noted. Concerns about the loss of traditional lifestyles, ability to safely eat traditional foods, the high cost of food in communities, and the convenience of 'prepared or processed foods' may be leading residents to eat in a way that puts them at higher risk for certain health conditions, including diabetes. The KCNs indicated that several people, particularly Elders, already have diabetes and there is concern about late diagnosis of diabetes. There was also agreement that although there are other risk factors, diet and lifestyle are major contributors to diabetes (CNP KPI Program 2009-2010; YFFN KPI Program 20092010; FLCN KPI Program 2009-2011).

Diabetes is an important chronic disease that has a major impact on the health of Canadians and on the health care system. According to the Public Health Agency of Canada , 40% of Canadians with diabetes develop long-term complications such as high blood pressure, vision loss, cardiovascular disease, lower limb amputation or kidney disease. The Public Health Agency of Canada also reports that there are a disproportionate number of First Nations people who are being diagnosed with type 2 diabetes. Rates among Aboriginal people in Canada are three to five times higher than those of the general Canadian population (Public Health Agency of Canada 2009).

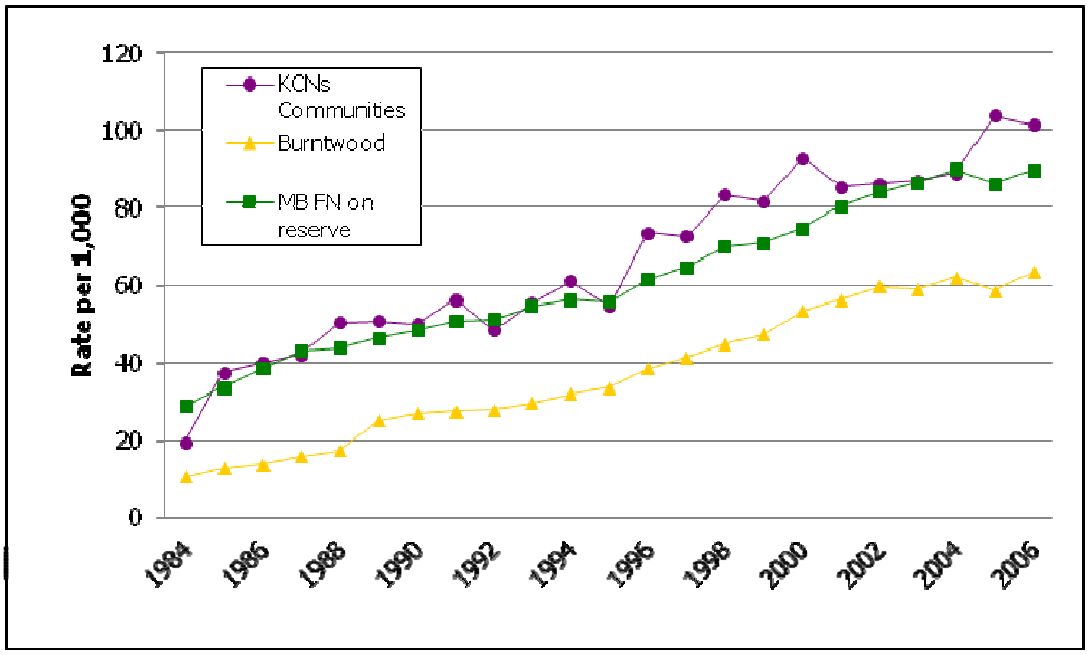
Canada's Public Health Agency identifies several risk factors for type 2 diabetes (see Table 5-5) and the more risk factors an individual has, the greater his/her likelihood of developing type 2 diabetes.

Table 5-5: Risk Factors for Diabetes

Risk Factor	Description
Obesity and 'Apple-shaped' figure	A high body weight increases diabetes risk. People who carry most of their weight in the trunk of their bodies (*e.g.*, above the hips) tend to have a higher risk of diabetes than those of similar weight with a 'pear-shaped' body (excess fat carried mainly in the hips and thighs).
Inactive lifestyle	Being overweight can be prevented by regular physical activity. A second benefit of regular physical activity is improved blood sugar control in people who already have type 2 diabetes.
Age	Age increases the risk of type 2 diabetes. According to PHAC, in 2006/07, the prevalence rate (people living with the disease) of diabetes in those aged 65 and over (21.3%) was three times as high as the rate in those 35 to 64 (7.1%).
Ethnic Ancestry	Being of Aboriginal, African, Latin American or Asian ethnic ancestry increases the risk of developing type 2 diabetes. Risk levels for these groups are between two and six times higher than for Canadians of Caucasian origin.
Family History	Having a blood relative with type 2 diabetes increases risk. If that person is a first-degree relative (*e.g.,* a parent, sibling or child), the risk is even higher.
History of Diabetes in Pregnancy	Almost 40% of women who have diabetes during their pregnancy go on to develop type 2 diabetes later, usually within five to 10 years of giving birth.
Impaired Glucose Tolerance	Impaired glucose tolerance or impaired fasting glucose is often seen before the development of type 2 diabetes.

Source: Public Health Agency of Canada (PHAC) 2009.

The number of people treated for diabetes among all KCNs residents increased by 637% from 27 people in 1984 to 199 people in 2006. This is the highest rate of change in numbers of patients among the comparison areas. The number of physician visits associated with these patients increased from 101 in 1984 to 614 in 2006, which is an increase of 507.9%. Figure 5-9 shows the patient numbers as rates per 1,000 to allow for comparison to other areas. This figure shows that patient treatment rates are increasing in all areas and that while KCNs community rates are very similar to the rates seen among all Manitoba First Nations living on-reserve, rates are consistently higher than for the BRHA population overall.



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-9: Patient Treatment Rates for Diabetes by Year, All Residents (1984-2006)

Trends in Diabetes

Diabetes is a very important cause of illness as well as a driver of medical service use in KCNs communities. Between 1984 and 2006, diabetes accounted for 7,912 or 20% of all physician visits for KCNs community Members. KCNs residents age 50 and older accounted for 68.1% of these visits.

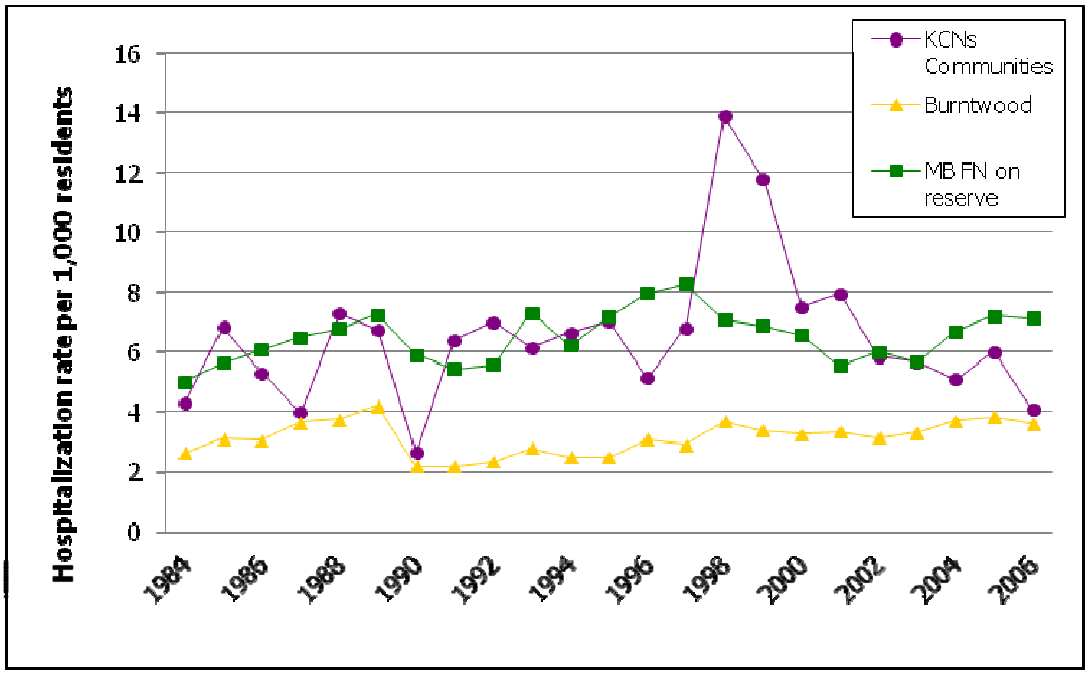
In this same time period, diabetes accounted for 258 or 8.3% of all hospitalizations for KCNs community Members compared to 4.8% of hospitalizations for all residents of the BRHA among conditions of interest reviewed[1]. Overall, KCNs residents accounted for 7.9% of all BRHA hospitalizations for diabetes, which is higher than the 3.8% of the BRHA population that they represent[2].

Among KCNs residents, those age 50 and older accounted for 61% of hospitalizations for diabetes.

[1] A list of conditions for physician visits and hospitalizations were identified as key "conditions of interest." When conditions of interest are referred to, it means that for example, diabetes accounted for 8.3% of all hospitalizations for those conditions on the list, but not necessarily 8.3% of ALL hospitalizations. This is a way of identifying, which of the conditions of interest resulted in greatest burden of illness and need for treatment.

[2] Throughout this section, there will be comparisons of the percentage of an event (such as hospitalizations or physician visits) in relation to the entire BRHA population. This gives the reader an idea as to whether the rate of the event seems out of line with the amount of the population accounted for by that community. If a certain illness, is more of a burden in the community we may see that it is out of proportion to the population.

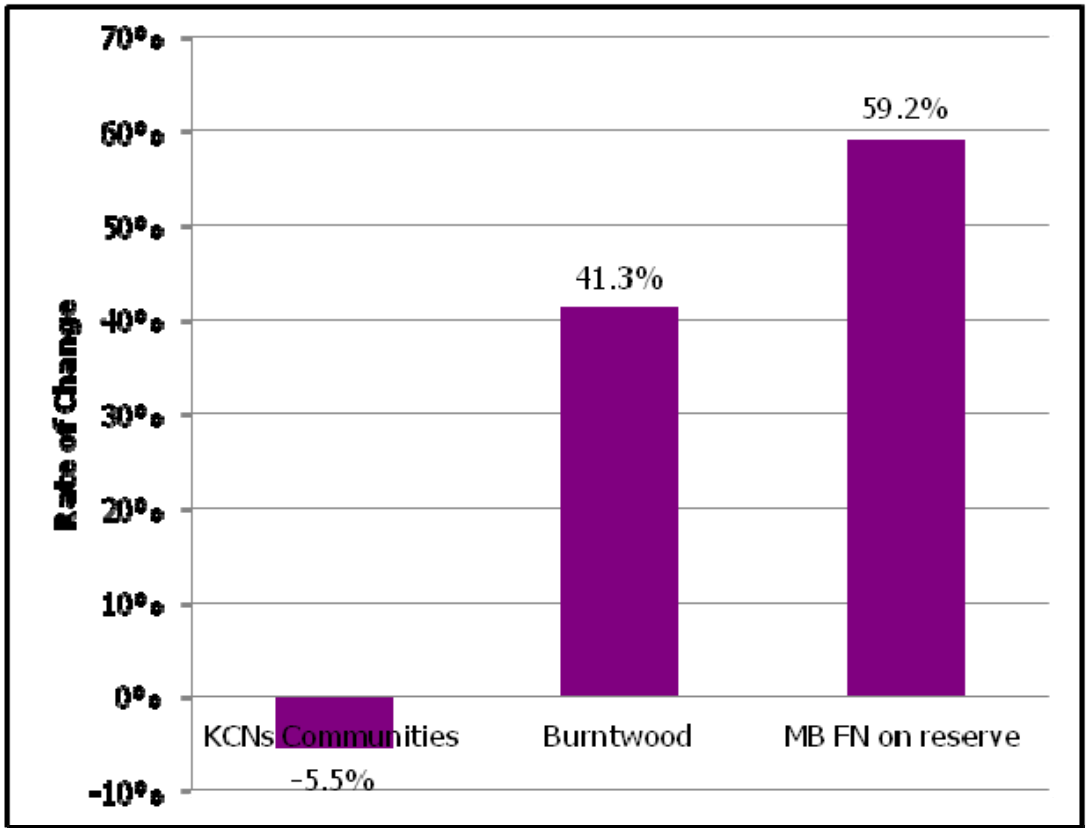
Figure 5-10 illustrates the hospitalization rates per 1,000 residents (to allow for comparison) by year between 1984 and 2006 for KCNs, Manitoba First Nations living on-reserve and BRHA residents. Figure 5-11 presents the percentage change in the actual number of hospitalizations between the first and last five year time periods. Due to extreme variation from year to year (due to small numbers), it is difficult to identify any meaningful trends from Figure 5-10 aside from the observation that diabetes hospitalization rates among KCNs residents are consistently higher than for BRHA residents overall. Figure 5-11, which compares two five-year time periods (and allows for more stability in numbers), shows that the number of hospitalizations for Burntwood residents have increased by only 3% compared to 26.8% for KCNs residents. This may indicate that although there has been a demonstrated increase in treatment prevalence rates (through the physician visit data), there may not be enough other resources available in KCNs communities to help residents manage their diabetes. Other BRHA communities such as Thompson may have more community resources available so that people living with diabetes remain healthier and do not require hospitalization for their diabetes.



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-10: Hospitalization Rates for Diabetes by Year, All Residents (1984-2006)



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-11: Percentage Change in Numbers of Hospitalizations for Diabetes (1984-1988 and 2002-2006)

INJURY

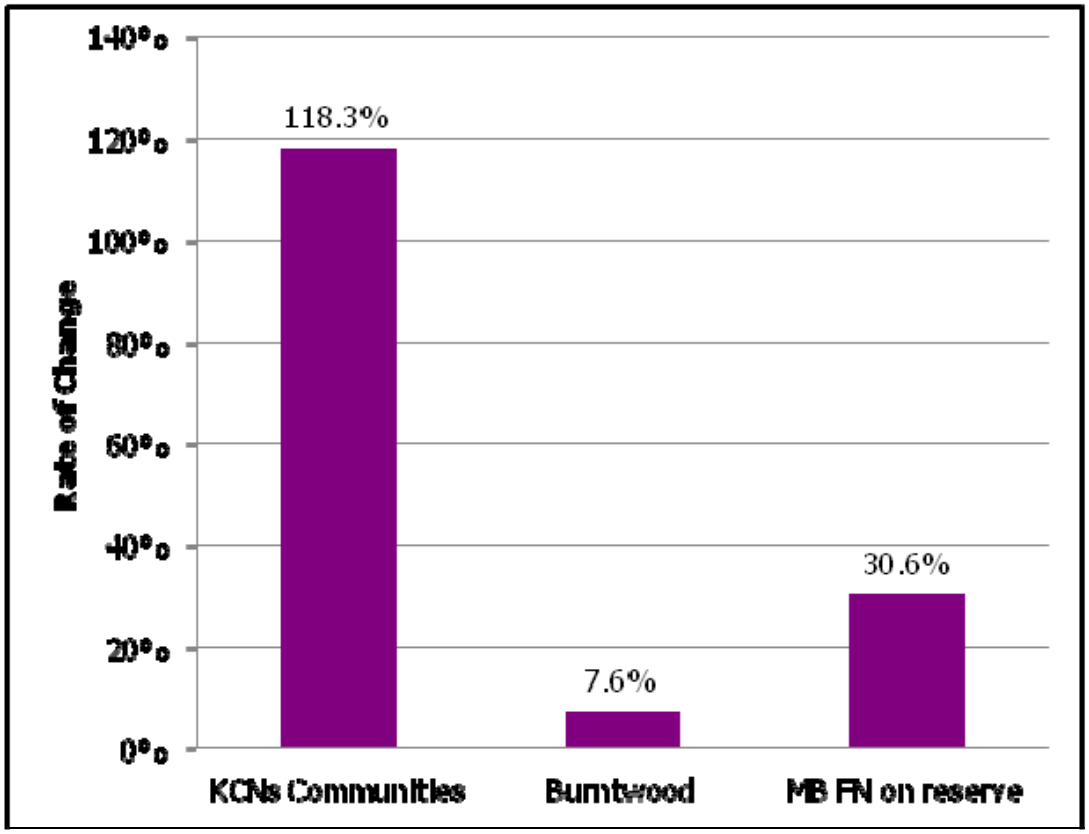
The First Nations Regional Longitudinal Health Survey (2005) notes that "Injuries are a serious public health problem in Canada, and even more so in many First Nations communities…First Nations injuries tend to follow a similar pattern to the rest of the Canadian population but occur with much greater frequency. Falls, sports, motor vehicle crashes and violence are all frequent causes of injury. Alcohol contributes to some types of injuries, particularly suicide attempts and violence." These findings are consistent with trends experienced by the KCNs, where injury is seen as an important health issue. The KCNs indicated that youth in particular are perceived to be taking more risks and that it is not uncommon to see children and or youth with a broken arm or ankle. Participants indicated that injuries tend to be more common for those under the age of 30. As well, there is the perception that alcohol can contribute to accidents and injury (examples of different types of accidents were discussed such as snowmobile and car accidents related to alcohol use) (CNP KPI Program 2009-2010; YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2011).

Just over one in four physician visits for the conditions of interest in 2006 was for injuries (27.2%). In that year there were 313 patients accounting for 606 physician visits for injuries. Overall, between 1984 and 2006, injuries accounted for 14,255, or 36% of all physician visits among KCNs community residents.

As indicated by KPI participants, data shows that younger residents and younger men in particular, tend to be at high risk for injury. For example, KCNs residents age 19 and under accounted for about one in five (20.8%) physician visits for injuries. Looking at the numbers of visits specifically by gender and age group, the highest number of physician visits was among male residents ages 15 to 29.

Although physician visits for injuries among KCNs residents were statistically lower than all of the comparison populations, this was not the case for hospitalizations. Between 1984 and 2006, injuries among KCNs residents accounted for 6.9% of all injury hospitalizations for BRHA residents while accounting for only 3.8% of the BRHA population. Among KCNs residents, people age 19 and under accounted for 41.4% of hospitalizations for injuries, with the highest number of hospitalizations seen among male residents ages 15 to 19.

For planning purposes, the actual number of hospitalizations for injuries among all KCNs residents increased from 224 hospitalizations between 1984 and1988 to 454 between 2002 and 2006. This represents an increase of 102.7% between the two five year time periods and is by far the highest rate of change among the comparison areas (see Figure 5-12).

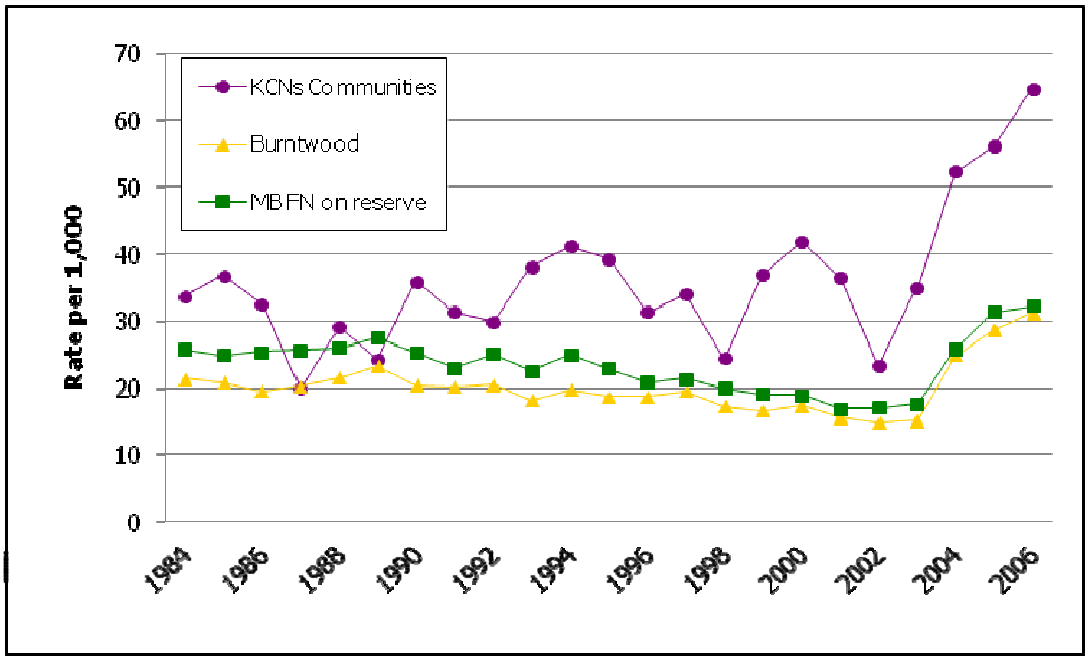


Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-12: Percentage Change in Numbers of Hospitalizations for Injuries (1984-1988 and 2002-2006) Averages

Although physician visits for injuries among KCNs residents were consistently lower than the comparison areas, hospitalization rates for injuries were higher in almost every year and show a clearer trend towards a sharp increase in the most recent five years. This may reflect lack of reporting of treatment for injuries (for example if treated by the nurse and not a physician who notifies Manitoba Health), or it may reflect that when there are injuries they may be more severe, or are severe enough that they cannot be managed in the community and require hospitalization outside the community. Figure 5-13 illustrates injury hospitalization rates per 1,000 residents to allow for comparison over time and between comparison areas. The hospitalization rate for KCNs community residents increased from 33.6 hospitalizations per 1,000 residents in 1984 to 64.7 per 1,000 in 2006.



Source: Manitoba Health, special data run 2011.
Note:

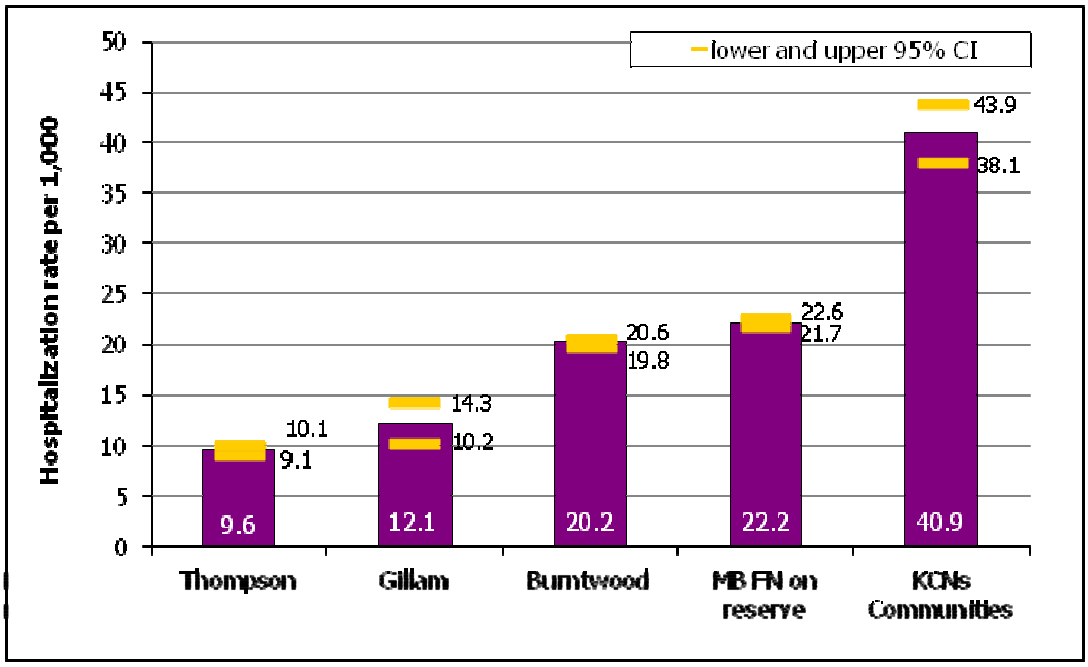
- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-13: Hospitalization Rates for Injuries by Year, All Residents (1984-2006)

The 10-year average annual injury hospitalization rate of 40.9 per 1,000 for KCNs community Members was statistically higher than for all comparison populations (see Figure 5-14). The next closest rate to KCNs is Manitoba First Nations living on-reserve where injury hospitalization rates between 1997 and 2006 were 22.2 per 1,000.

The 10-year average annual hospitalization rate for injuries among KCNs females was the highest among comparison populations at 36.2 hospitalizations per 1,000. The KCNs rate is statistically higher than all other comparison areas. The next highest rate is Manitoba First Nations living on-reserve and that rate is about half the KCNs rate at 19.6 hospitalizations per 1,000 females.

Among KCNs males, the average annual hospitalization rate for injuries between 1997 and 2006 was higher than the rate among KCNs females at 45.4 hospitalizations per 1,000 residents. As with females, this rate is statistically higher than the other comparison areas.



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.
- CI refers to confidence interval. The confidence interval gives the range of rates in which it is likely to be the true value 95% of the time – that is, that we are confident that 95% of the time, the true value or rate would be within the given range of confidence interval (CI).

Figure 5-14: Hospitalization Rates for Injuries by Area (1997-2006) Average

MENTAL HEALTH

According to a survey conducted by the Canadian Mental Health Association, approximately 3.4 million Canadians have experienced a major bout of depression at some point in their lives. Women and those between 25-54 years of age are more likely to have experienced depression or anxiety (Canadian Mental Health Association 2011). A Statistics Canada survey reported that half a million Canadian workers experience depression and almost 80% of them indicate that the symptoms they experience interfere with their ability to work (Statistics Canada 2007b). The high incidence and prevalence of mental illness that often goes untreated means the human and economic costs of mental illness are considerable.

The First Nations Regional Longitudinal Survey (2005) notes that various types of trauma contribute to First Nations peoples' mental health and wellness, and attributes some of this to the intergenerational effects of colonialism. Kirmayer *et al.* (2000) note "the high rates of suicide, alcoholism, violence and the pervasive demoralization seen in Aboriginal communities can be readily understood as a direct consequence of (a) history of (dislocation) and disruption of traditional subsistence patterns and connection with the land." This is consistent with the histories of the KCNs (see Section 5.3.2.1), and their observations of current health challenges.

The KCNs have expressed concerns about mental health issues. Residents and health care workers have indicated that social problems in the community such as addictions and low self-esteem may limit people's ability to access permanent employment. Concerns were raised about social problems observed during previous hydro development including increased alcohol and drug use among community Members. With respect to youth, participants in several community focus groups indicated there is a perception of an increase in suicides among young people in recent years and that drug and alcohol use is already common among youth (CNP KPI Program 2009-2010; YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2011).

Mental health is an important area to track and ensure appropriate services and supports are in place for KCNs residents. The KCNs indicated that although people are becoming more aware of issues associated with mental health (such as anxiety and depression), there is still a lack of awareness about services that are available. It was also noted that adults may be more open to talking about mental health compared to youth and Elders. Although men have typically been less willing to discuss mental health, there is a perception that this is slowly changing. Community Members indicated that alcohol abuse contributes to a variety of mental health related issues, including family stability and violence in the community (CNP KPI Program 2009-2010; YFFN KPI Program 2009-2010; FLCN KPI Program 2009-2011).

Rates are presented for comparison between areas but for KCNs planning, numbers of patients and visits are presented first. The number of patients treated for mental health and behavioural disorders among all KCNs residents increased by 130.2 % from 53 patients in 1984 to 122 in 2006. This rate of change is higher than for BRHA but lower than for Manitoba First Nations living on-reserve. The number of physician visits increased from 111 in 1984 to 349 in 2006 — an increase of 214.4%. Given that mental health patients often require multiple appointments and support, this increase could have considerable impact on local community resources. It is also important to note that hospitalizations among KCNs residents for mental health and behavioural disorders were seen among residents as young as 10 to 14 years of age.

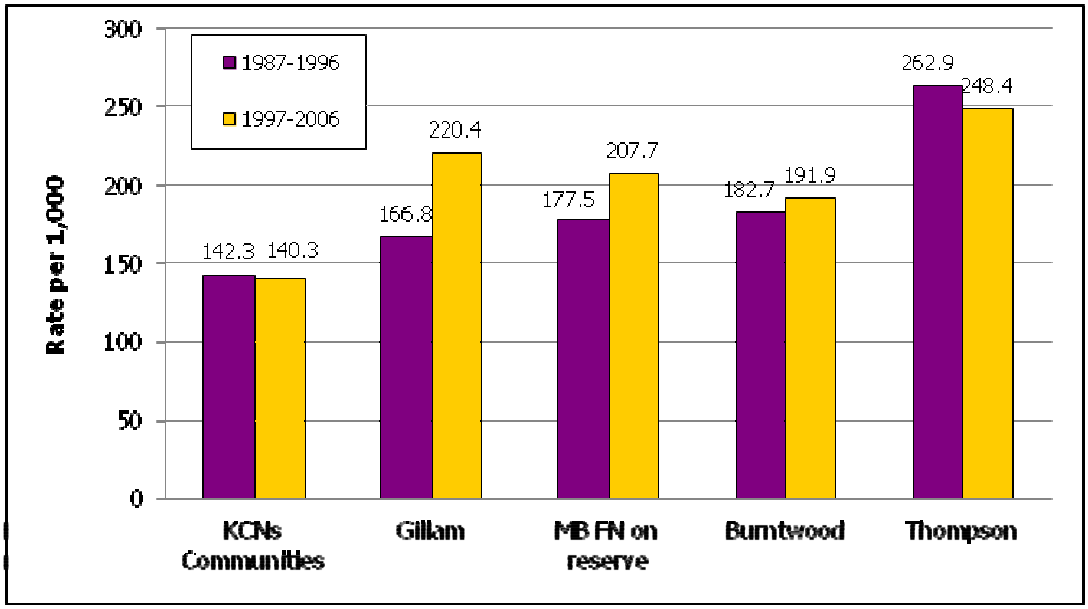
In 2006, there were 122 patients accounting for 349 physician visits for mental health disorders recorded among KCNs residents. These visits accounted for 15.6% of all physician visits for conditions of interest in 2006. Overall, between 1984 and 2006, mental health disorders accounted for 5,307, or 13.4% of all physician visits among KCNs residents.

Figures 5.3-14 to 5.3-16 illustrate the changes in physician visit rates (per 1,000 residents) for mental health disorders by area for two 10-year periods. Data are presented for all residents (Figure 5-15), females (Figure 5-16) and males (Figure 5-17). The 10-year rates offer additional stability and more confidence in interpreting changes over time and differences between areas.

Figure 5-15 shows that for all residents, the 10-year physician visit rates for mental health disorders among KCNs community residents remained almost unchanged at 142.3 and 140.3 visits per 1,000 between 1987-1996 and 1997-2006. These rates appear to be lower than all comparison areas. Among KCNs residents, the total number of physician visits actually increased from 2,257 to 2,656 between 1987-1996 and 1997-2006; however the increase in number of visits is not reflected in the most recent rate due to the higher increase in population (an example as to why it is important to consider both absolute numbers and rates if possible).

Among KCNs females, the 10-year physician visit rate for mental health disorders increased from 96.8 to 154.2 visits per 1,000 females between 1987-1996 and 1997-2006 (see Figure 5-16). The rate in the most recent time period appears to be much lower than for all comparison areas; in fact, the KCNs rate is approximately half the rate of several of the other areas. The actual number of physician visits among KCNs females increased from 759 to 1,425 between 1987-1996 and 1997-2006.

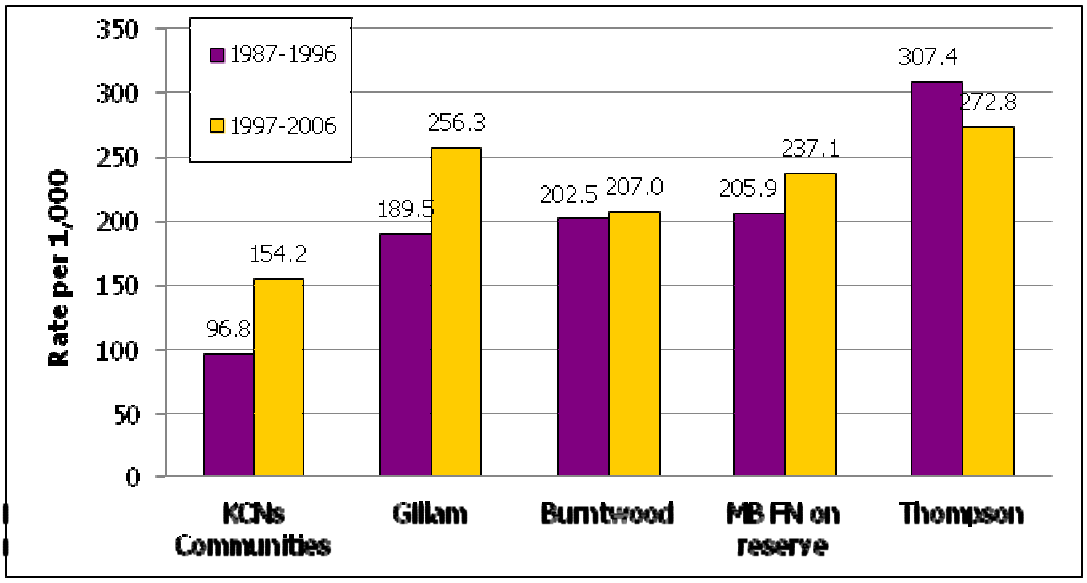
The physician visit rate among KCNs males decreased from 186.6 visits per 1,000 males to 127.1 per 1,000 between 1987-1996 and 1997-2006 (see Figure 5-17). As with females, the most recent rate appears to be lower than all other comparison areas. The actual number of physician visits among KCNs males for mental health disorders decreased from 1,498 to 1,231 between 1987-1996 and 1997-2006.



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

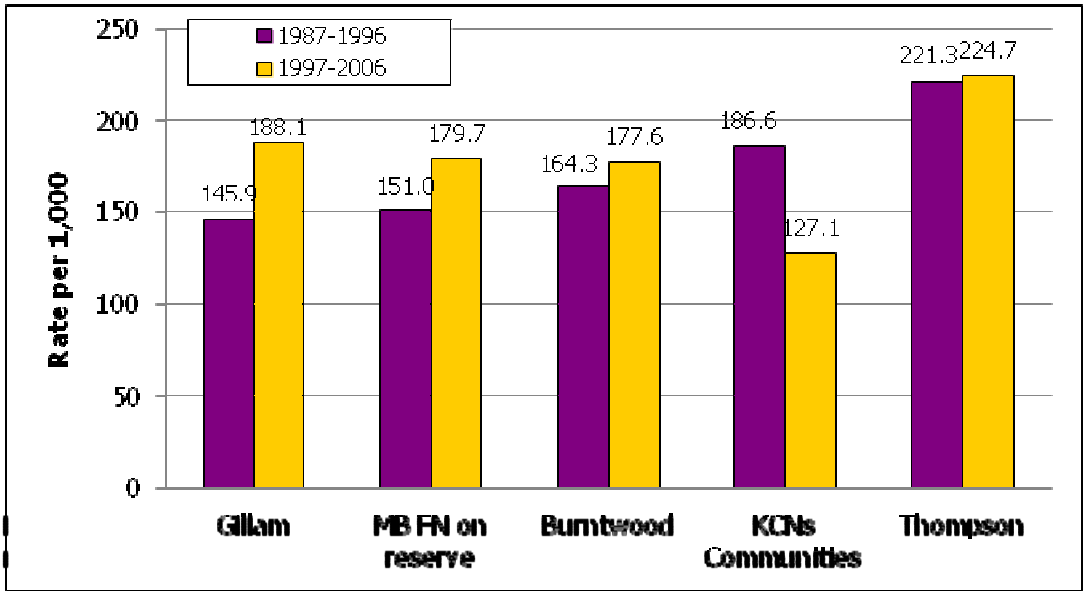
Figure 5-15: 10-Year Physician Visit Rates for Mental and Behavioural Disorders by Area, All Residents (1987-1996 and 1997-2006)



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-16: Female 10-year Physician Visit Rates for Mental and Behavioural Disorders by Area (1987-1996 and 1997-2006)



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-17: Male 10-year Physician Visit Rates for Mental and Behavioural Disorders by Area (1987-1996 and 1997-2006)

KCNs residents age 50 and older accounted for 26.4% of physician visits for mental health disorders, with the highest number of physician visits seen among male residents ages 50 to 54 followed by males age 15 to 19. Table 5-6 shows the number and per cent of physician visits by age group and gender for all visits for mental and behavioural disorders between 1984 and 2006 for KCNs residents. Some physician visits occurred in very young children and infants under the age of one. It is important to note that this International Classification of Disease (ICD-10) category (for reference see Appendix 5A) includes the diagnoses of "mental retardation" as well as "behavioural and emotional disorders that are diagnosed in childhood and adolescence." This means that although these data may appear to be erroneous at first, there are valid reasons for inclusion of the younger age groups.

Table 5-6: Physician Visits for Mental and Behavioural Disorders by Gender and Age Group, Keeyask Cree Nations (1984-2006)

	Female	%	Male	%	Total	%
< 1	5	0.1%	7	0.1%	12	0.2%
1 to 4	40	0.8%	74	1.4%	114	2.1%
5 to 9	45	0.8%	138	2.6%	183	3.4%
10 to 14	85	1.6%	100	1.9%	185	3.5%
15 to 19	266	5.0%	220	4.1%	486	9.2%
20 to 24	276	5.2%	436	8.2%	712	13.4%
25 to 29	282	5.3%	517	9.7%	799	15.1%
30 to 34	280	5.3%	372	7.0%	652	12.3%
35 to 39	289	5.4%	429	8.1%	718	13.5%
40 to 44	260	4.9%	191	3.6%	451	8.5%
45 to 49	197	3.7%	128	2.4%	325	6.1%
50 to 54	166	3.1%	180	3.4%	346	6.5%
55 to 59	67	1.3%	47	0.9%	114	2.1%
60 to 64	25	0.5%	55	1.0%	80	1.5%
65 to 69	13	0.2%	30	0.6%	43	0.8%
70 to 74	5	0.1%	34	0.6%	39	0.7%
75 to 79	11	0.2%	23	0.4%	34	0.6%
80 +	4	0.1%	10	0.2%	14	0.3%

Source: Manitoba Health, special data run 2011.
Note:
- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

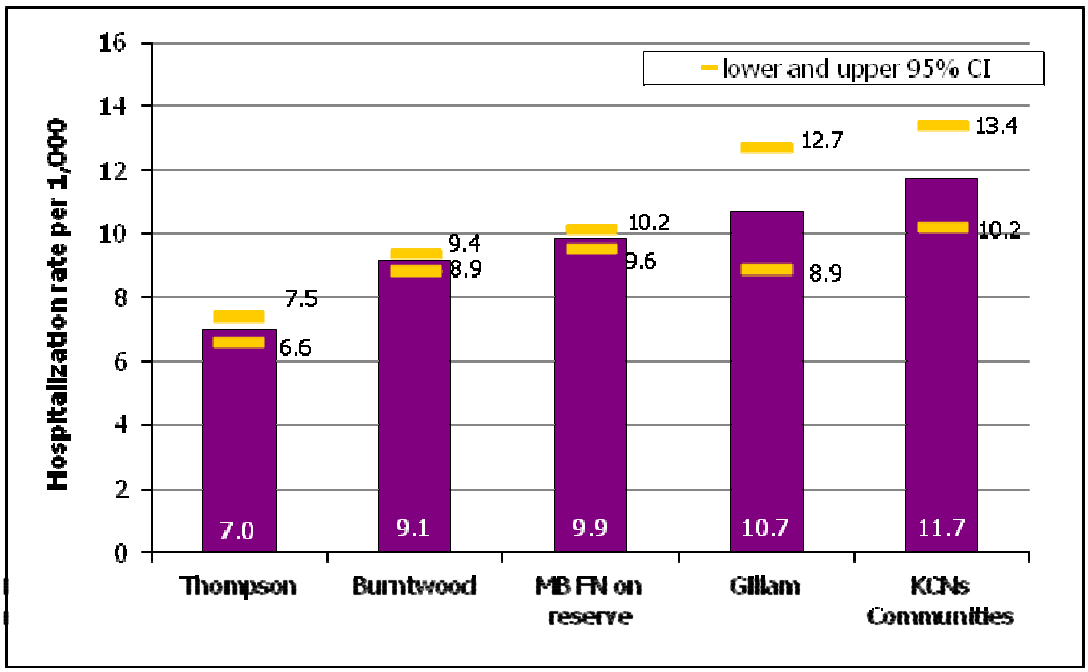
Due to the small numbers of hospitalizations for mental health disorders by year, only 10-year average annual hospitalizations rates were reviewed to assess whether there were statistical differences between the areas examined.

The 10-year average annual rate (between 1997 and 2006) of 11.7 hospitalizations per 1,000 KCNs residents is statistically higher than all comparison populations with the exception of Gillam, which is statistically similar at 10.7 hospitalizations per 1,000 residents (see Figure 5-18).

The 10-year average annual hospitalization rate for mental health disorders for KCNs females was 11.7 per 1,000 females. The KCNs female hospitalization rate between 1997 and 2006 was not statistically different from any of the comparison areas with the exception of Thompson (at 7.4 hospitalizations per 1,000 residents) and the BRHA (at 8.9 hospitalizations per 1,000 residents).

Among KCNs males, the average annual hospitalization rate for mental health disorders between 1997 and 2006 was also 11.7 hospitalizations per 1,000 residents. This rate was statistically different only from Thompson, which is lower at 6.6 hospitalizations per 1,000.

The fact that the Thompson hospitalization rate (7.0 per 1,000 residents) for mental health disorders was the lowest among the comparison areas and yet physician visit rates were very high indicates that perhaps with more support at the community level (and availability of physicians for ongoing treatment and monitoring), hospitalizations could be avoided.



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.
- CI refers to confidence interval. The confidence interval gives the range of rates in which it is likely to be the true value 95% of the time – that is, that we are confident that 95% of the time, the true value or rate would be within the given range of confidence interval (CI).

Figure 5-18: Average Hospitalization Rates for Mental and Behavioural Disorders by Area, All Residents (1997-2006)

SKIN INFECTION

Skin infections are becoming a greater public health concern in Canada, occurring both in the community and in health care settings. The increase in infection rates can be partly attributed to improved and more

actively used screening techniques; however, another issue is the misuse of antibiotics, which can make infections more resistant and more difficult to contain and treat (Public Health Agency of Canada 2008).

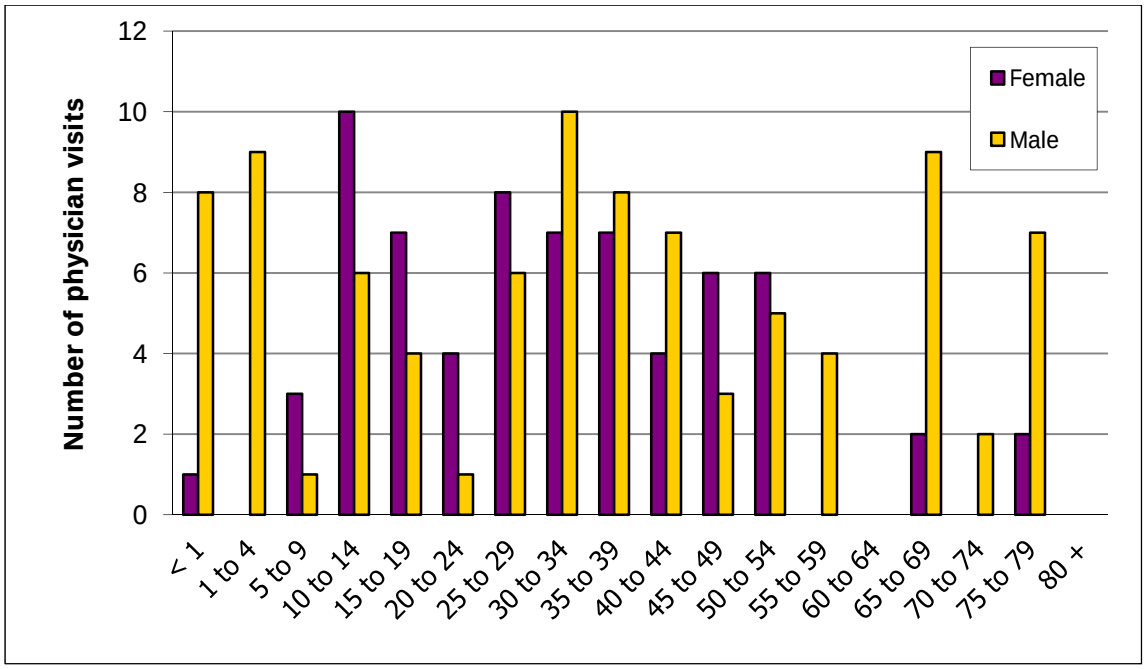
Children and those with weakened immune systems are particularly susceptible to these infections. Public health and infection control officials have underlined the importance of access to a clean water supply, hand washing and the use of hand sanitizers as a way to avoid infections.

For the KCNs, skin infection concerns exist in relation to water quality. In York Landing (*Kawechiwasik)*, for example, there are concerns about skin rashes and itchy skin believed to be caused by the community's water supply. The same types of concerns are noted by individuals who swim near the community (YFFN KPI Program 2009-2010, CNP *pers. comm.* 2012).

Treatment prevalence rates for skin infections overall were among the lowest among comparison areas but hospitalization rates were higher. This may be due to treatment at the nursing station and a lack of recording of all treatment due to limited physician services, or it may be due to other risk factors that indicate skin infections can become more acute and require hospitalizations. For example, KCNs residents age 50 and older accounted for 40.9% of hospitalizations for infections of skin and **subcutaneous tissue** and given that there is a higher incidence of diabetes among this age group, there may be a relationship between the risk factor of diabetes and the outcome of more acute skin infections.

Between 1984 and 2006, skin infections accounted for 3,125, or 7.9% of all physician visits among KCNs residents. In this time period, KCNs residents accounted for 4.2% per cent of all BRHA physician visits for infections of skin and subcutaneous tissue, which is slightly higher than the 3.8% of the BRHA population that they represent.

Within KCNs communities, residents age 50 and older accounted for almost one in four (23.6%) physician visits for skin infections. Looking within specific age groups however, the highest number of physician visits is seen among male residents ages 30 to 34, followed by females age 10 to 14 (see Figure 5-19). It is important to note that the numbers of physician visits within each age group are quite small (10 and under) so it would not be appropriate to attempt to draw conclusions about reasons for higher numbers of visits within certain age groups.

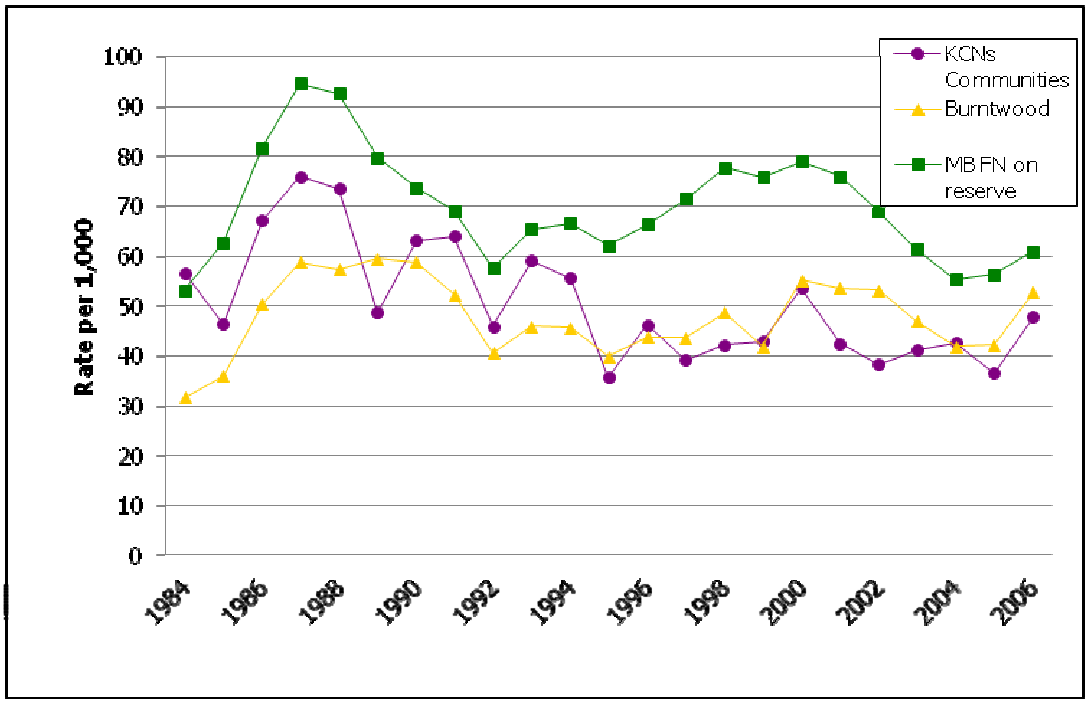


Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-19: Physician Visits for Infections of Skin and Subcutaneous Tissue by Gender and Age Group, Keeyask Cree Nations (2006)

Figure 5-20 illustrates the patient rates by year between 1984 and 2006 to allow for comparison between KCNs, Manitoba First Nations living on-reserve and BRHA residents. The patient rate among KCNs community residents shows variation over the years but appear to be consistently similar to the BRHA rates and lower than for all First Nations living on-reserve in Manitoba. Among KCNs residents, the number of patients declined somewhat from 56.5 patients per 1,000 residents in 1984 to 47.9 per 1,000 in 2006.

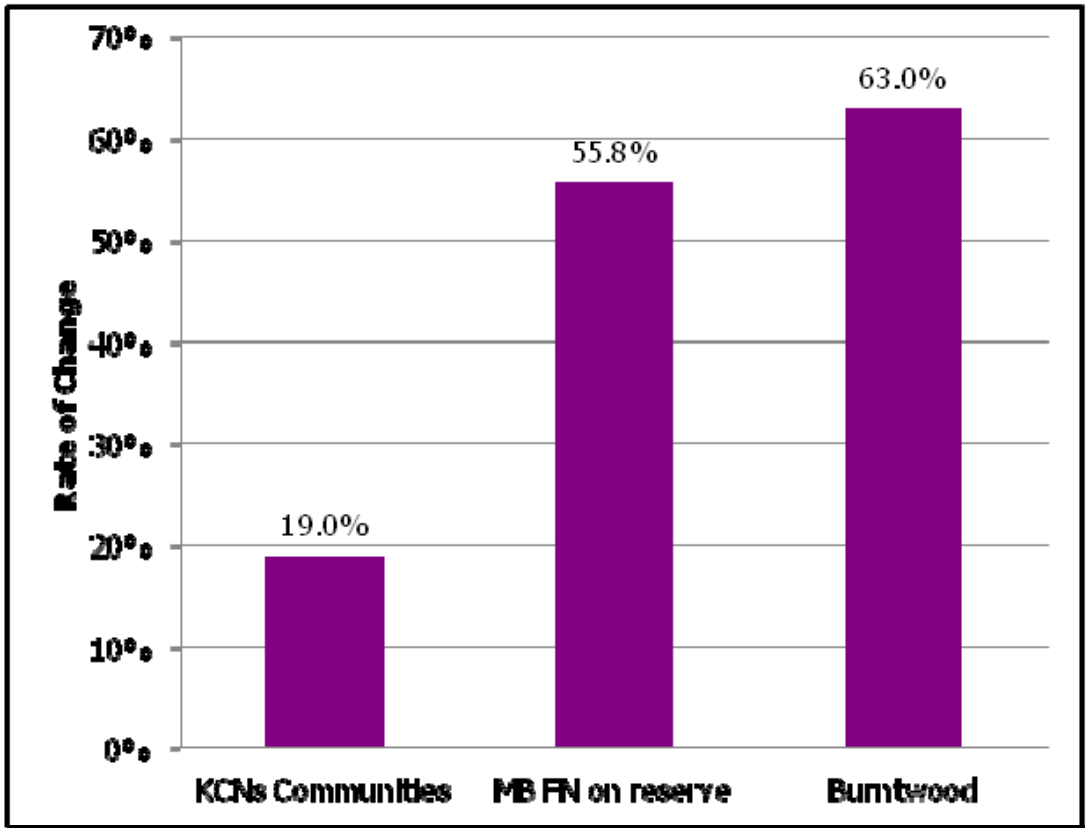


Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-20: Patient Rates for Infections of Skin and Subcutaneous Tissue by Year (1984-2006)

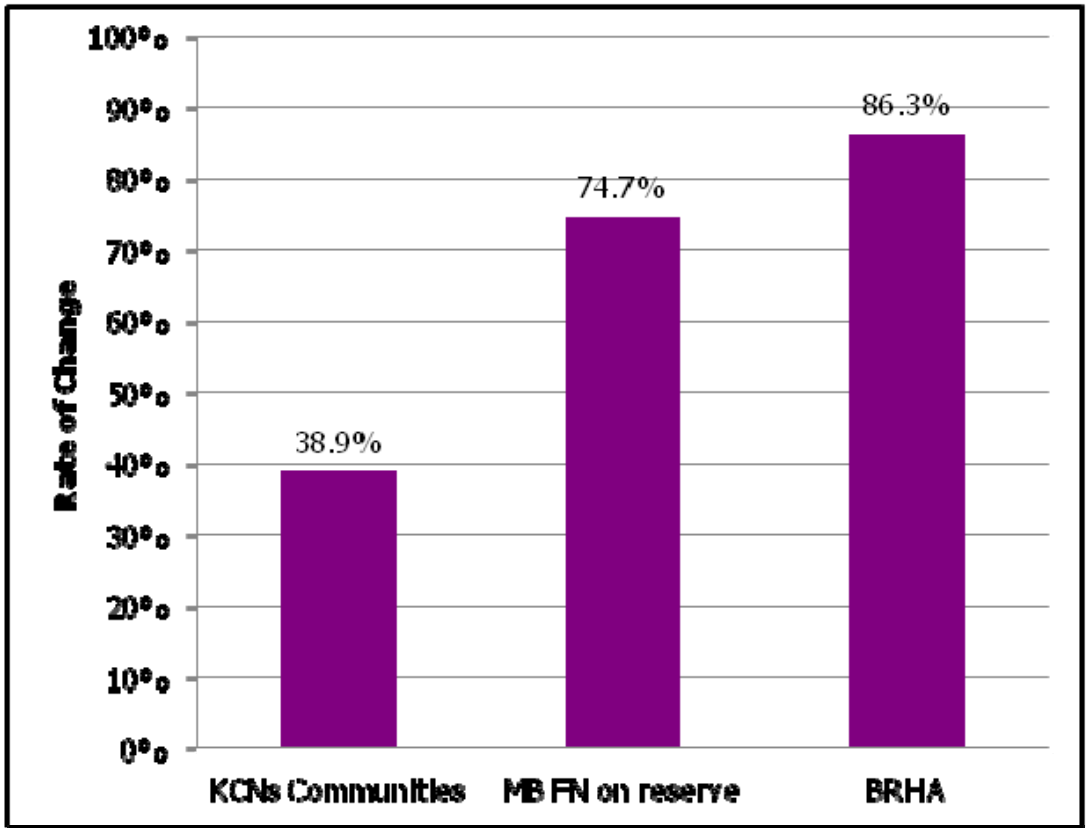
Although rates of patients being treated for skin infections have decreased (due to a larger increase in population compared to number of patients), it is important to note that the actual number of patients treated for skin infections among all KCNs residents increased by 19.0% from 79 patients in 1984 to 94 patients in 2006. This is the lowest rate of change among the comparison areas (see Figure 5-21). In this same time period, the number of physician visits among KCNs residents increased from 113 in 1984 to 157 in 2006, an increase of 38.9% (see Figure 5-22).



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-21: Percentage Change in Numbers of Patients for Infections of Skin and Subcutaneous Tissue, All Residents (1984-2006)



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-22: Percentage Change in Numbers of Physician Visits for Infections of Skin and Subcutaneous Tissue, All Residents (1984-2006)

Between 1984 and 2006, skin infections accounted for 326 or 9.6% of all hospitalizations for the conditions of interest. In this time period, KCNs residents accounted for 6.6% of all BRHA hospitalizations for infections of skin and subcutaneous tissue, which is higher than the 3.8% of the BRHA population they represent.

Within KCNs communities, residents age 50 and older accounted for more than one in three (39.1%) hospitalizations for infections of skin and subcutaneous tissue. Table 5-7 shows the per cent of hospitalizations by age group and gender for all hospitalizations for infections of skin and subcutaneous tissue for KCNs residents.

Table 5-7: Hospitalizations for Infections of Skin by Gender and Age Group, KCNs (1984-2006)

	Female	%	Male	%	Total	%
< 1	5	1.7%	7	2.4%	12	4.1%
1 to 4	8	2.7%	6	2.1%	14	4.8%
5 to 9	13	4.5%	6	2.1%	19	6.5%
10 to 14	5	1.7%	8	2.7%	13	4.5%
15 to 19	7	2.4%	2	0.7%	9	3.1%
20 to 24	5	1.7%	11	3.8%	16	5.5%
25 to 29	7	2.4%	10	3.4%	17	5.8%
30 to 34	9	3.1%	13	4.5%	22	7.5%
35 to 39	11	3.8%	7	2.4%	18	6.2%
40 to 44	5	1.7%	8	2.7%	13	4.5%
45 to 49	6	2.1%	12	4.1%	18	6.2%
50 to 54	11	3.8%	14	4.8%	25	8.6%
55 to 59	6	2.1%	19	6.5%	25	8.6%
60 to 64	5	1.7%	10	3.4%	15	5.1%
65 to 69	4	1.4%	5	1.7%	9	3.1%
70 to 74	16	5.5%	7	2.4%	23	7.9%
75 to 79	14	4.8%	10	3.4%	24	8.2%
80 +	3	1.0%	6	2.1%	9	3.1%

Source: Manitoba Health, special data run 2011.
Note:
- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake First Nation and York Factory First Nation.

CAUSES OF DEATH

Mortality (death) rates provide information about the overall health of the population, similar to life expectancy. That is, most typically, communities with high mortality rates will also have lower life expectancy. Mortality rates can be a useful indicator to examine changes over time. For example, while life expectancy measures do not change a great deal in the short term, some mortality rates can be drastically reduced in short periods of time. One example is the reduction in SIDS-related (sudden infant death syndrome) deaths that has been observed since the implementation of "Back to Sleep" and other education campaigns. Other examples include suicide or other injury prevention programs that can have an immediate impact on risky behaviours.

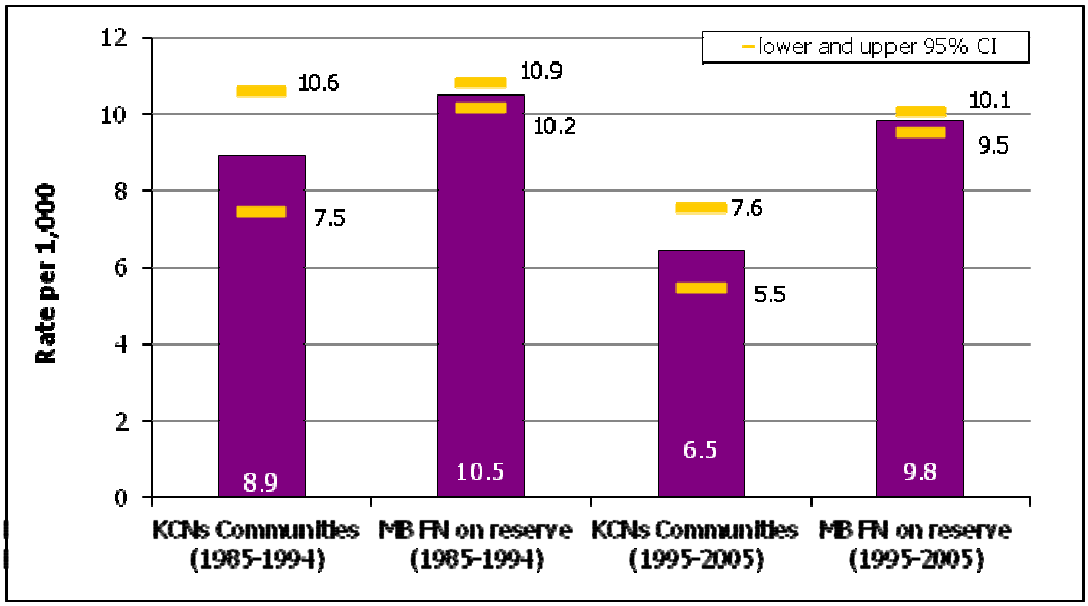
Mortality rates that take longer to change include cancer related mortalities as they often occur, at least partially, as a result of risk factors engaged in over a lifetime. For example, lung cancer mortality rates are

impacted by smoking behaviours over decades. Therefore, smoking cessation campaigns that occur today will not immediately have an impact on lung cancer mortality rates.

It is important to look at mortality and causes of mortality both in terms of all deaths as well as specifically at deaths that occur at younger ages as these deaths are more likely to be preventable.

According to First Nations Inuit Health, there were a total of 310 deaths from all causes among KCNs community Members in the 26 year period between 1980 and 2005. This means that that there were on average 11.5 deaths per year. Females accounted for 116 (37.4%) of these death while males accounted for 194 (62.6%).

Rates have also been calculated for two 10-year periods to allow for comparison between different communities. Among KCNs community Members, the mortality rate decreased from 8.9 deaths per 1,000 residents between 1985 and 1994 to 6.5 deaths per 1,000 between 1995 and 2005. In the first time period, although the KCNs community rate appears to be lower than the Manitoba First Nations living on-reserve rate of 10.5 deaths per 1,000 residents, the difference between the two groups is not statistically significant (as illustrated by the overlapping confidence intervals). In the second time period (1995-2005), however, the KCNs rate of 6.5 deaths per 1,000 residents is statistically lower than the Manitoba First Nations living on-reserve rate of 9.8 deaths per 1,000 residents (see Figure 5-23). Although the calculated mortality rate among KCNs residents decreased, the true number of deaths increased slightly from 127 between 1985-1994 to 150 between 1995-2005. The mortality rate decreased because the population grew at a higher rate than the number of deaths.

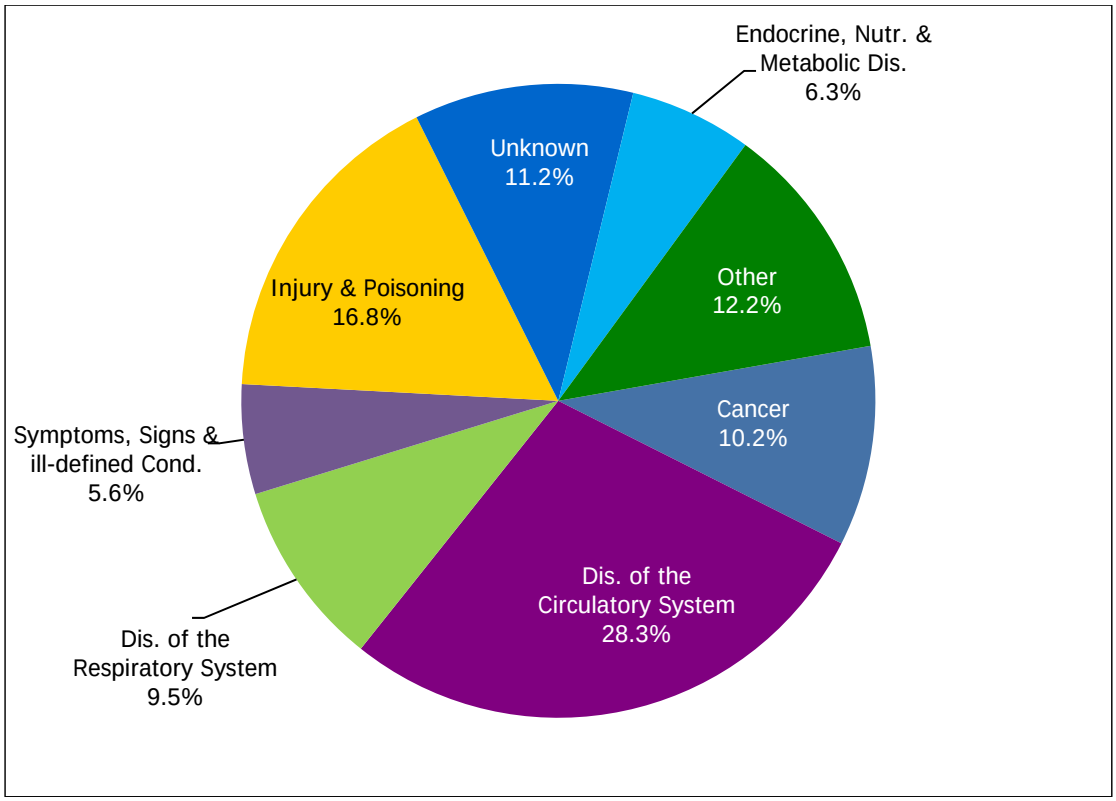


Source: Health Canada, First Nations and Inuit Health and Regions and Programs Branch (In-house data).
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.
- CI refers to confidence interval. The confidence interval gives the range of rates in which it is likely to be the true value 95% of the time – that is, that we are confident that 95% of the time, the true value or rate would be within the given range of confidence interval (CI).

Figure 5-23: Total Mortality Rate by Area (1985-1994 and 1995-2005)

A review of causes of death among all KCNs community Members showed that diseases of the circulatory system accounted for more than one in four deaths (28.3%) followed by injury and poisoning at 16.8% of all deaths. The third leading cause of death among all KCNs residents was unknown followed by cancer accounting for one in 10 deaths (see Figure 5-24 and Table 5-8), which lists the 12.2% of "other" causes of mortality based on the ICD-10 coding system). Among KCNs males in particular, disease of the circulatory system was a noteworthy cause of death accounting for almost one in every three deaths (32.3%) between 1980 and 2005. This was followed by injury and poisoning at 17.5% (almost one in five deaths) and cancer at 11.1% of all deaths. Among KCNs men, disease of the circulatory system and injuries alone account for over one half of all deaths. However, a positive trend is that the mortality rates for both appear to be decreasing.



Source: Health Canada, First Nations and Inuit Health and Regions and Programs Branch (In-house data).
Notes:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.
- See Table 5-6 for a listing of the "other" causes of death.

Figure 5-24: Causes of Mortality in Keeyask Cree Nations Communities, All Residents (1980-2005)

Table 5-8: "Other" Causes of Mortality in Keeyask Cree Nations Communities, All Residents (1980-2005)

	Number	%
Diseases of the Digestive System	9	3.0%
Diseases of the Genitourinary System	9	3.0%
Diseases of the Nervous System	8	2.6%
Certain Conditions Originating in Perinatal Period	4	1.3%
Certain Infectious and Parasitic Disease	3	1.0%
Pregnancy, Childbirth and Puerperium	1	0.3%
Congenital malformations, deformations and chromosomal abnormalities	1	0.3%
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	1	0.3%
Mental and Behavioural Disorders	1	0.3%
TOTAL	**37**	

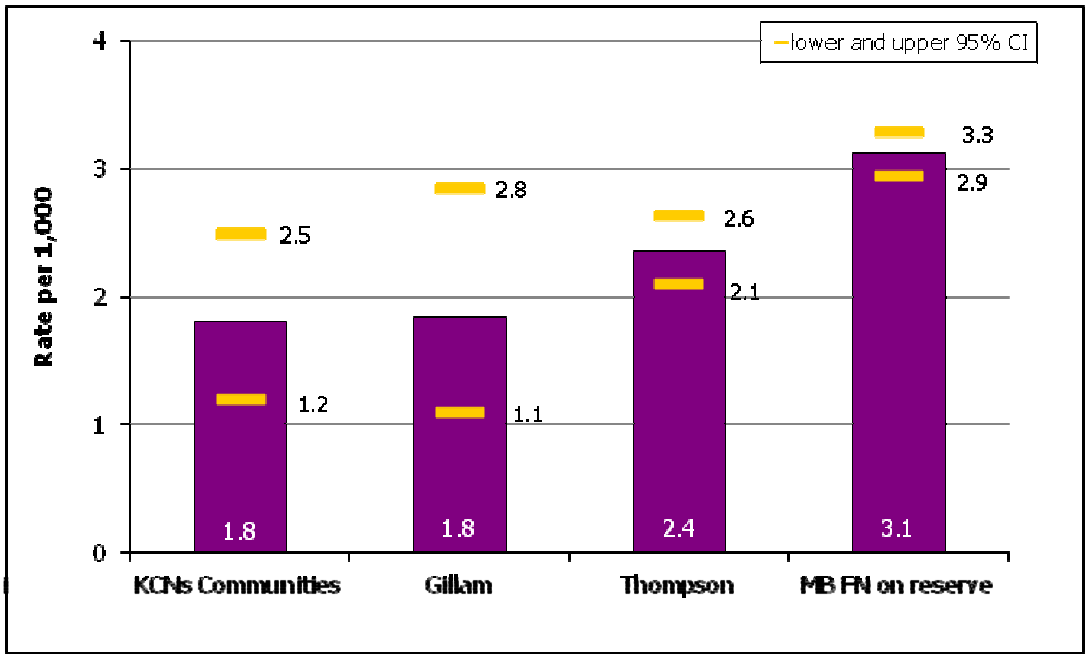
Source: Health Canada, First Nations and Inuit Health and Regions and Programs Branch (In-house data).
Note:

- All causes are ICD-10 classifications. See Appendix 5A for details of each classification.
- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

The premature mortality rate (deaths before age 75) has been identified as one of the best single measures of health status and many researchers rely on this indicator above all others to measure the health of the community. Communities with higher premature mortality rates also tend to have higher rates of illnesses, hospital utilization and poorer health overall. Premature deaths data by cause can help to identify how many deaths may have preventable (for example, those due to injuries).

One useful measurement of premature mortality is "Potential Years of Life Lost" (PYLL). PYLL is calculated by subtracting age at death from age 75 (the standard "death age") for each person who died, and then adding all of these differences for a total PYLL. This information is usually grouped by cause of death for comparison with cause-specific death rates. This measure emphasizes causes of death that tend to be more common among younger persons, such as injuries and inherited anomalies.

Figure 5-25 shows the average annual premature mortality rates for KCNs communities and the comparison areas. The premature mortality rate for KCNs was 1.8 deaths per 1,000 residents on average between 1998 and 2006. This rate was statistically similar to both Gillam and Thompson but statistically lower than the rate of 3.1 deaths per 1,000 for all Manitoba First Nations living on-reserve.



Source: Manitoba Health, special data run 2011.
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.
- CI refers to confidence interval. The confidence interval gives the range of rates in which it is likely to be the true value 95% of the time – that is, that we are confident that 95% of the time, the true value or rate would be within the given range of confidence interval (CI).

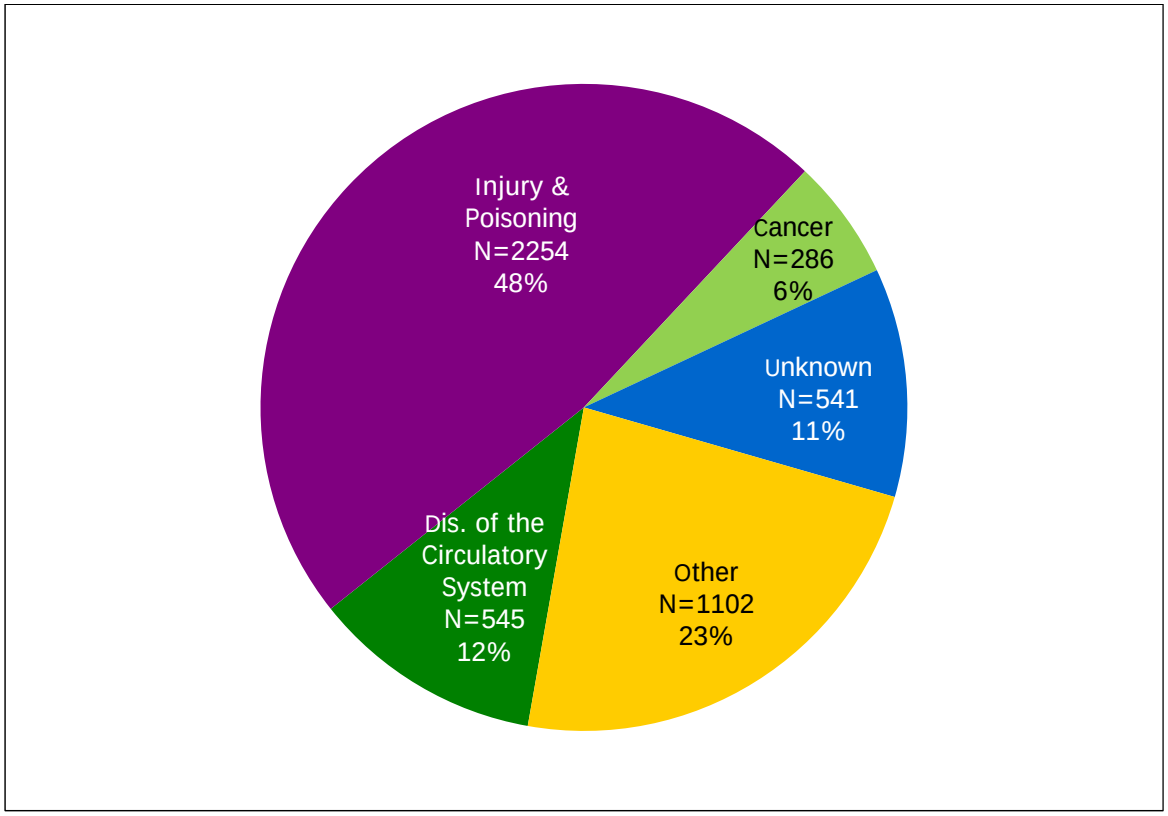
Figure 5-25: Premature Mortality Rates by Area (1998-2006)

While diseases of the circulatory system were the leading cause of all KCNs resident deaths, when only premature deaths (those that occurred before age 75) were reviewed, there are different trends. Injury and poisoning, which are almost totally preventable, accounted for 2,254 or 48% of all PYLL between 1980 and 2005. Diseases of the circulatory system was second accounting for 12% of PYLL and unknown causes were third accounting for 11% of PYLL. This shows that while diseases of the circulatory system account for the most deaths and are very important, many of these deaths occur at an older age and may not be preventable. Injury deaths however, impact younger residents and are preventable for the most part (see Figure 5-26 and Table 5-9) which lists all causes of death presented in the category of "other" in the pie chart).

Among KCNs females, the leading cause of death was diseases of the circulatory system but the leading cause of PYLL was injury and poisoning accounting for 38.9% (or 731 potential years of life lost) of all PYLL. Unknown deaths were second accounting for 11.9% of PYLL and disease of the nervous system was third at 9.3% (174 PYLL) of PYLL among KCNs females.

Among KCNs males, injury and poisoning is a very important cause of PYLL accounting for more than half (53.4%) of all PYLL among KCNs males (or 1,523 PYLL). The next leading cause of PYLL is diseases of the circulatory system at 14.4% of PYLL followed by unknown causes at 11.2%. While

injuries and diseases of the circulatory system combined accounted for almost half of all deaths among KCNs males, they account for almost three quarter of potential years of life lost before age 75.



Source: Health Canada, First Nations and Inuit Health and Regions and Programs Branch (In-house data).
Note:

- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

Figure 5-26: Causes of PYLL in Keeyask Cree Nations Communities, All Residents (1980-2005)

Table 5-9: "Other" Causes of PYLL in Keeyask Cree Nations Communities, All Residents (1980-2005)

	Number	%
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	187	4.0%
Diseases of the Nervous System	179	3.8%
Diseases of the Digestive System	176	3.7%
Diseases of the Respiratory System	129	2.7%
Endocrine, nutritional and metabolic diseases	114	2.4%
Diseases of the Genitourinary System	93	2.0%
Congenital malformations, deformations and chromosomal abnormalities	69	1.5%
Mental and Behavioural Disorders	51	1.1%
Pregnancy, Childbirth and Puerperium	49	1.0%
Certain Infectious and Parasitic Diseases	43	0.9%
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	12	0.3%
TOTAL	**1102**	

Source: Health Canada, First Nations and Inuit Health and Regions and Programs Branch (In-house data).
Note:
- All causes are ICD-10 classifications. See Appendix 5A for details of each classification.
- KCNs communities include Tataskweyak Cree Nation, War Lake First Nation, Fox Lake Cree Nation and York Factory First Nation.

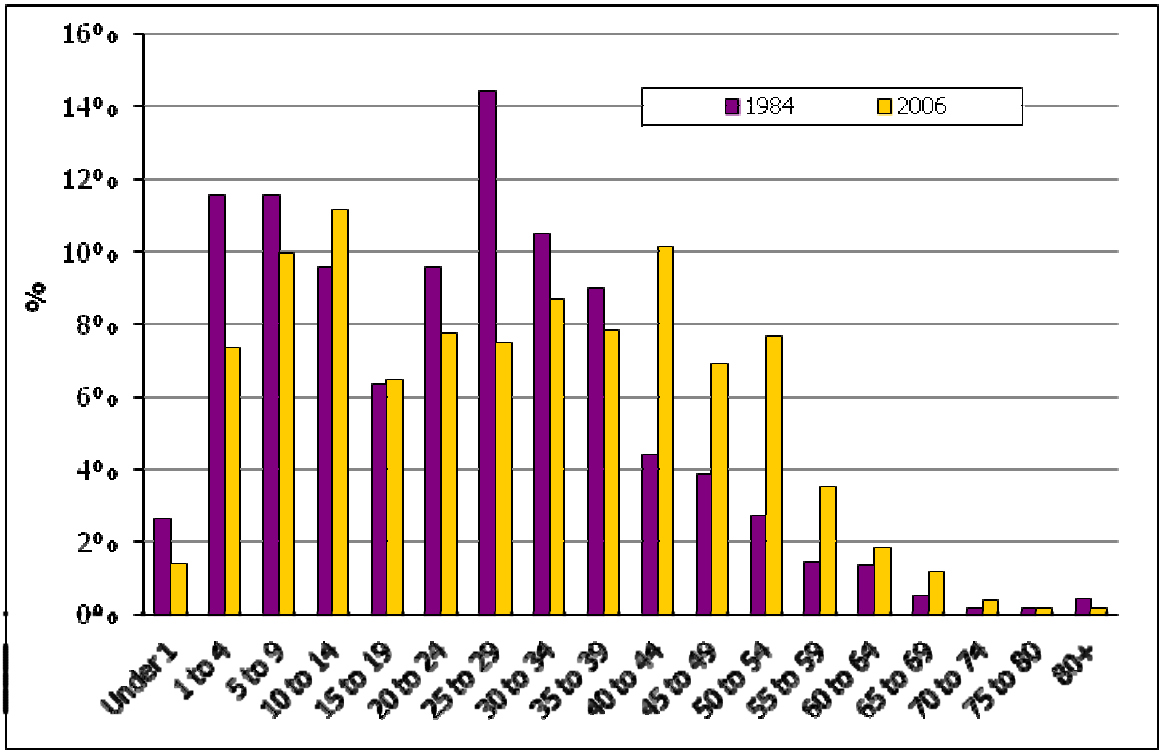
5.3.2.2 Gillam

Gillam is the second largest off-reserve community in the BRHA, and is also home to approximately 500 FLCN Members who can access health services in the community (see Section 4.3.3.1). The following data is inclusive of the FLCN Members residing in Gillam as long as these residents identify to Manitoba Health that Gillam is their mailing address. Because of the way data are collected by Manitoba Health, it is very difficult to separate out FLCN resident data from other Gillam community residents when all have the same postal code.

5.3.2.2.1 Health Characteristics Associated with Population Characteristics

Gillam residents account for fewer than three per cent of the BRHA population. While the population of the region has declined, the extent of decline is greater in Gillam. According to Manitoba Health, the population of Gillam in 1984 was 1,403 and the 2006 population of 1,085 representing a decrease of 22.7% residents.

While the population of Gillam is relatively young compared to the rest of Manitoba, it is the younger age groups (particularly age 20 to 34) where the population has experienced the largest decrease since 1984 (see Figure 5-27). According to Manitoba Health, in 1984, 6.7% of the Gillam population was over the age of 50; this increased to 14.9% by 2006. The change in population distribution will likely impact health and service needs in the community and may result in higher rates of chronic disease and cancer being observed in the community.



Source: Manitoba Health.

Figure 5-27: Gillam Change in Population Structure (1984 and 2006)

Gillam residents most commonly are sent to Thompson or Winnipeg to give birth. Birth and pregnancy rates for Gillam residents have declined over time. The birth rate for Gillam residents in 2006 was 14.7 births per 1,000 residents; this is lower than Manitoba First Nations on-reserve rate of 26.5 but higher than the provincial rate of 12.1 per 1,000. The pregnancy rate for Gillam women age 15-49 was 69.3 per 1,000; this was much lower than Manitoba First Nations rate of 135.1 but higher than the provincial rate of 60.7 in 2006.

Some of the birth and pregnancy outcomes reviewed included low and high birth weight rates, spontaneous abortion and infant mortality. In most cases, Gillam rates were similar to, or lower than, comparison areas. In some cases, such as infant mortality, there were no cases at all among Gillam residents. One area where change was observed was in the rate of spontaneous abortions (also known as miscarriage). The 10-year average annual rate increased from 29.3 to 63.6 per 1,000 residents between 1987-1996 and 1997-2006. This appears to be similar to the Manitoba First Nations (on-reserve) rate of 65.4 per 1,000 residents but higher than the provincial rate of 49.0 per 1,000 between 1997 and 2006.

However, these rates are based on small numbers and the Gillam rate was not statistically different from the other comparison areas.

In 2006 there were two babies born weighing more than 4000 grams (high birth weight) and no low birth weight babies (less than 2500 grams). Because of the small numbers of births and very small numbers of low and high birth weight infants it is difficult to identify clear trends (for example, low birth weights go up and down in extremes).

CARDIOVASCULAR DISEASE

For several chronic conditions, including cardiovascular disease, patient rates and physician visit rates were higher than the comparison areas but hospitalization rates were often lower. This may indicate that with more access to resources by Gillam residents (either within the community or through travel to Thompson or Winnipeg), patients were better able to manage their chronic illnesses at the community level and were less likely to require hospitalization.

In 2006, there were 133 patients accounting for 344 physician visits for cardiovascular disease recorded among Gillam residents. These visits accounted for 26.3 per cent of all physician visits for conditions of interest in 2006. Overall, between 1984 and 2006, cardiovascular disease accounted for 8,324, or 22.7 per cent of all physician visits. The number of patients treated for cardiovascular disease increased by 35.7% between 1984 and 2006. This indicates that cardiovascular disease is a very important cause of illness as well as driver of medical service use in Gillam communities.

For comparison purposes, rates have also been calculated. The 2006 rate of 113.6 per 1,000 females in 2006 was statistically similar to all other comparison areas. The 2006 patient rate of 131.1 per 1,000 males was statistically similar to all comparison areas with the exception of higher than both BRHA males (98.3 per 1,000) and Manitoba First Nations males living on-reserve (87.5 per 1,000). Overall, the 2006 Gillam patient rate of 122.6 per 1,000 was higher than the BRHA (97.5 per 1,000) and Manitoba First Nations living on-reserve (86.7 per 1,000). The difference in physician visit rates was more striking with Gillam residents having 317.1 visits per 1,000 residents, which is statistically higher than all comparison areas with the exception of Thompson (at 318.3 visits per 1,000 residents). This may indicate a difference in access to services between Gillam residents and other comparison areas (although similar rates of patients are treated at least once, Gillam residents may have more frequent access to treatment) or it may indicate that Gillam residents tend to be more ill and require more care (but hospitalization rates do not appear to support this).

The average annual 10-year hospitalization rates for cardiovascular disease for all Gillam residents increased slightly from 10.2 to 12.9 per 1,000 between 1987-1996 and 1997-2006. This is similar to the BRHA at 13.7 per 1,000 but statistically lower than Manitoba First Nations living on-reserve at 17.3 per 1,000 as well as KCNs community residents (23.1 per 1,000 in 1997-2006). The Gillam hospitalization rate in this time period was only statistically higher than the rate for Thompson residents at 9.0 per 1,000 residents. For community planning purposes it is noted that the total number of cardiovascular disease hospitalizations among Gillam residents also increased very slightly from 146 to 152 between 1987-1996 and 1997-2006.

DIABETES

While treatment and hospitalization rates were consistently lower among Gillam residents compared to the comparison areas, the trend for Gillam appears to be towards an increase in the rate of residents being treated for diabetes.

In 2006, there were 63 patients accounting for 220 physician visits for diabetes recorded among Gillam residents. These visits accounted for 16.8% of all physician visits for conditions of interest in 2006. Overall, between 1984 and 2006, diabetes accounted for 3,897, or 10.6% of all physician visits.

The actual number of unique patients treated for diabetes among all Gillam residents increased by 320% from 15 patients in 1984 to 63 in 2006. This is the lowest rate of change among the comparison areas. The number of physician visits among Gillam residents also increased, from 52 in 1984 to 220 in 2006 and is an increase of 323.1%.

The patient rate among Gillam residents for diabetes increased from 10.7 patients per 1,000 residents in 1984 to 58.0 per 1,000 in 2006. Both Burntwood and Manitoba First Nations living on reserve also show a sharp and steady increase in patient rates over time. The 2006 rate of 58.1 per 1,000 was statistically lower than Manitoba First Nations living on-reserve (89.6 per 1,000) and KCNs community residents (101.4 per 1,000). The Gillam rate was statistically similar to both Thompson (43.4 per 1,000) and Burntwood (63.4 per 1,000).

Among Gillam females, the 10-year hospitalization rate for diabetes decreased from 5.8 to 4.5 per 1,000 between 1987-1996 and 1997-2006. The most recent rate is statistically similar to the BRHA at 3.8 per 1,000 and Manitoba First Nations living on-reserve (6.8 per 1,000) but statistically higher than Thompson (1.8 hospitalizations per 1,000 residents).

Unlike females, among Gillam males, the 10-year hospitalization rate for diabetes increased somewhat from 2.2 to 3.4 per 1,000 between 1987-1996 and 1997-2006. The most recent rate is statistically similar to the BRHA at 3.1 per 1,000 but statistically lower than Manitoba First Nations living on-reserve (6.6 per 1,000) and KCNs community residents (6.7 per 1,000).

While physician visits have increased, overall, the 10-year hospitalization rates for diabetes for Gillam remained the same at 3.9 per 1,000 between 1987-1996 and 1997-2006. The most recent rate is statistically similar to the BRHA at 3.4 per 1,000 and statistically lower than Manitoba First Nations living on-reserve at 6.7 per 1,000.

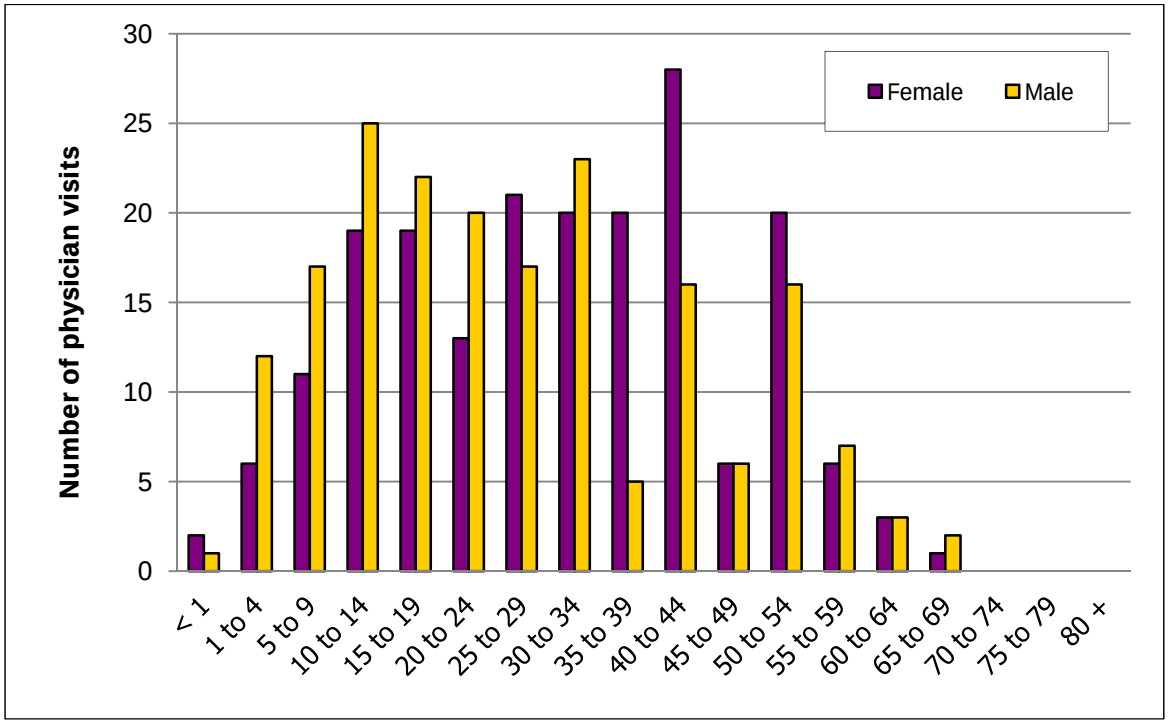
It is important to note that the physician visit data shows that the numbers of people (and resulting need for consulting with a physician) diagnosed with diabetes was increasing, particularly among males. That the hospitalization rate data did not show the same trend may indicate that Gillam residents have had good access to primary health care and physician services to help successfully manage diabetes in the community and avoid health problems that lead to hospitalization.

INJURY

Between 1984 and 2006, injuries accounted for 14,382, or 39.3% of all physician visits. In 2006, there were 218 patients accounting for 387 physician visits for injuries recorded among Gillam residents.

Between 1984 and 2006, Gillam residents accounted for 3.8% of all BRHA physician visits for injuries, which is slightly higher than the 2.9% of the BRHA population that they represent. However, this difference may be more of a result in differences in service provision and submission of data to Manitoba Health (compared to many communities in the region, particularly First Nation communities where services are provided by nurses who do not submit data to Manitoba Health) than an actual difference in rates of physician visits.

In 2006, Gillam residents age 19 and under accounted for about one in three (34.6%) physician visits for injuries. Figure 5-28 shows the number of physician visits by age group and gender for injuries between 1984 and 2006.



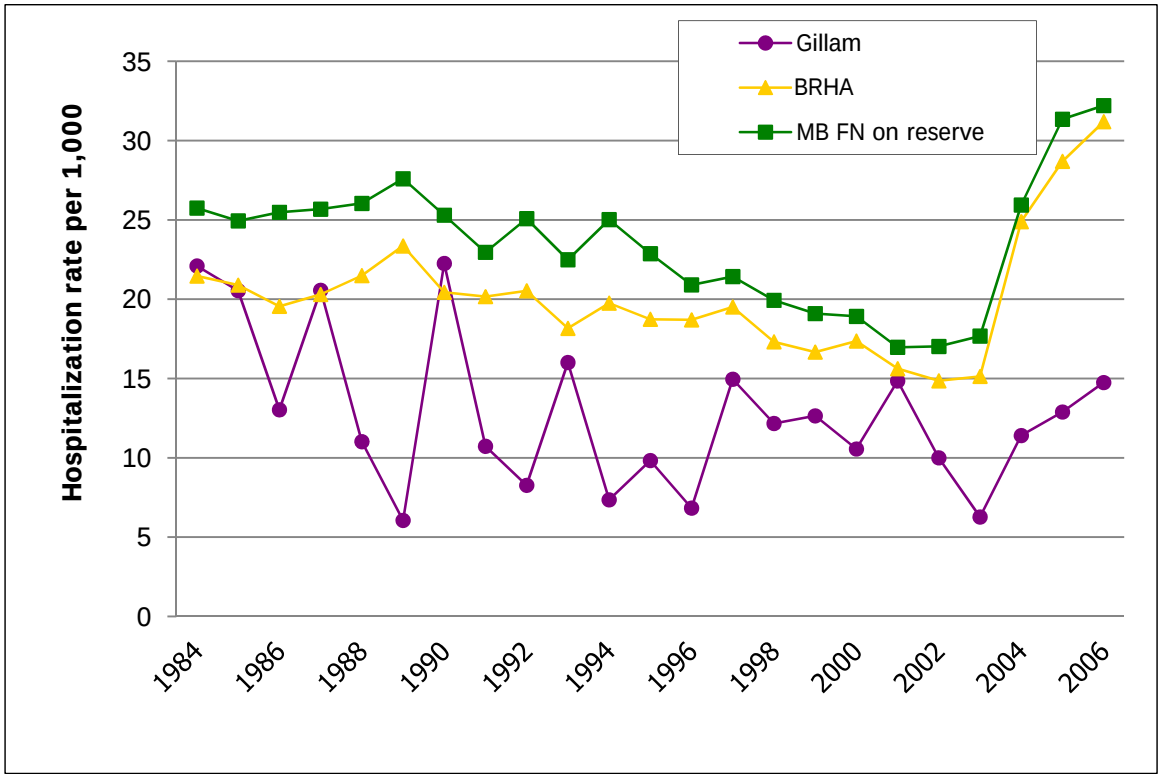
Source: Manitoba Health, special data run 2009.

Figure 5-28: Physician Visits for Injuries by Gender and Age Group, Gillam (2006)

Between 1984 and 2006, Gillam residents accounted for 1.9% of all BRHA hospitalizations for injuries which is lower than the 2.9% of the BRHA population that they represent. As with physician visits, within Gillam, residents age 19 and under accounted for about one third (35.5%) of hospitalizations for injuries.

The patient rate among Gillam residents for injuries decreased from 265.9 patients per 1,000 residents in 1984 to 200.9 per 1,000 in 2006. Manitoba First Nations living on-reserve also showed a slight decrease from 199.2 to 179.1 per 1,000, while the BRHA residents showed a very slight increase from 157.1 to 162.7 per 1,000. However, the Gillam patient rates are typically higher than the comparison areas throughout the time period (but this may be due to better reporting of physician visits).

Figure 5-29 shows a large variation from year to year in injury hospitalization rates among Gillam residents. This variation may be attributed to small population numbers. By comparison, the BRHA and Manitoba First Nations living on-reserve show more clear trends. For community planning, it is noted that the number of actual patients hospitalized for injuries among all Gillam residents decreased by 41.6% from 373 patients in 1984 to 218 in 2006. The number of physician visits for these patients also decreased by 48% from 744 in 1984 to 387 in 2006.



Source: Manitoba Health, special data run 2009.

Figure 5-29: Hospitalization Rates for Injuries by Year, All Residents (1984-2006)

Among females, the 10-year average annual hospitalization rate for injuries remained unchanged at 8.9 per 1,000 between 1987-1996 and 1997-2006. These rates are statistically lower than the most recent rates for the BRHA at 17.5 per 1,000 females and for Manitoba First Nations living on-reserve at 19.6 per 1,000 females. It should be noted that the number of hospitalizations among Gillam females decreased from 61 to 50 between 1987-1996 and 1997-2006 but because the population also decreased during this period, the calculated rates are the same.

A similar trend was evident among Gillam males, with the 10-year average annual hospitalization rates changing very little from 14.5 to 15.0 per 1,000 males between 1987-1996 and 1997-2006. As with females, the most recent rate is statistically lower than the BRHA (22.8 per 1,000 males) and Manitoba First Nations living on-reserve (24.6 per 1,000 males). As with females, please note that the actual number of hospitalizations for Gillam decreased from 108 to 93 between 1987-1996 and 1997-2006.

Because the population decreased more than the cases decreased, the calculated hospitalization rate increased slightly.

MENTAL HEALTH

Mental health is an important area to consider as part of overall health characteristics.

In 2006, there were 101 patients accounting for 209 physician visits for mental health disorders recorded among Gillam residents. These visits accounted for 16.0% of all physician visits for conditions of interest in 2006. Overall, between 1984 and 2006, mental health disorders accounted for 5,469, or 14.9% of all physician visits among Gillam residents.

Between 1997-2006, the calculated 10-year average annual physician visit rate of 220.4 per 1,000 residents for mental health and behavioural disorders was statistically higher than all other comparison areas with the exception of Thompson (at 248.4 per 1,000 residents) (but this difference may be a result of better reporting of data to Manitoba Health by physicians).

The number of physician visits for mental and behavioural disorders among Gillam females stayed very stable, increasing by just 1.9% between 1984 and 2006 (from 54 to 55). The 2006 calculated rate, for community comparison, of 104.2 per 1,000 Gillam females in 2006 is statistically higher than the BRHA at 93.1 per 1,000 and similar to Manitoba First Nations living on-reserve (105.1 per 1,000). The number of physician visits among Gillam males for mental and behavioural disorders increased by 58.6% between 1984 and 2006 (from 29 to 46). The 2006 calculated rate of 82.6 physician visits per 1,000 Gillam males is similar to both the BRHA (82.4 per 1,000) and Manitoba First Nations living on-reserve (78.1 per 1,000).

There were a small number of hospitalizations for mental health and behavioural disorders among Gillam residents. In 2006, there were a total of 12 hospitalizations for mental health disorders recorded among Gillam residents. These visits accounted for 24.5% of all hospitalizations for conditions of interest in 2006. Overall, between 1984 and 2006, mental health disorders accounted for 250 or 17.7% of all hospitalizations for conditions of interest. Overall, Gillam residents accounted for 2.7% of all BRHA hospitalizations for mental and behavioural disorders, which is very similar to 2.9% of the BRHA population that they represent.

Rates have also been calculated for comparison to other areas. Between 1996 and 2007, the 10-year average annual rate of 10.7 hospitalizations per 1,000 Gillam residents was statistically similar to all comparison populations with the exception of Thompson, which was lower at 7.0 per 1,000.

Among Gillam females, hospitalization rates for mental and behavioural disorders have fluctuated over the years but increased from 5.9 hospitalizations per 1,000 in 1984 to 7.6 per 1,000 females in 2006. In 2004, there appeared to be a spike in hospitalization rates for Gillam females (to over 15 per 1,000 females). This may mean that in this year several females were hospitalized or it may indicate that one female was very ill and was hospitalized several times in that year. It is important to note that between 2004/05 and 2006/07 one of the leading reasons for hospitalizations among Gillam females was "behavioural disorders related to alcoholism." This may be related to the spike in hospitalization rates for mental health disorders in 2004.

The fact that physician visit rates are higher in some cases for Gillam community members while hospitalization rates are similar to most comparison areas may indicate that there is better physician visit data being reported for communities such as Thompson and Gillam. It may also mean that there are enough primary health care services in the community to provide support to residents and allow them to be treated at the community level (and avoid hospitalization).

SKIN INFECTION

Hospitalization and physician visit rates among Gillam residents for skin infections appear to be lower than comparison areas, and for the most part, declining.

In 2006, there were 43 patients accounting for 60 physician visits for infections of skin and subcutaneous tissue recorded among Gillam residents. These visits accounted for 4.6% of all physician visits for conditions of interest in 2006. Overall, between 1984 and 2006, these infections accounted for 2,226, or 6.1% of all physician visits.

Physician visits by Gillam residents for infections of skin and subcutaneous tissue accounted for 1.4% of physician visits for all BRHA residents. In comparison to the proportion of the population (2.4%), these visits are proportionally lower than the Gillam population proportion. Between 1984 and 2006 overall, Gillam residents accounted for 3.0% of all BRHA physician visits for infections of skin and subcutaneous tissue, which is very similar to the 2.9% of the BRHA population that they represent in this longer time period.

Among Gillam females, physician visit rates for infections of skin and subcutaneous tissue decreased by 60.5% between 1984 and 2006. The 2006 rate of 28.4 per 1,000 was lower than both the BRHA (51.2 per 1,000) and for Manitoba First Nations living on-reserve (63.3 per 1,000).

Male physician visit rates for infections of skin and subcutaneous tissue for Gillam increased by 33.3% between 1984 and 2006. The 2006 rate of 50.3 per 1,000 in 2006 was similar to the BRHA (54.3 per 1,000) as well as Manitoba First Nations living on-reserve (58.7 per 1,000).

Overall, the total physician visit rates for infections of skin and subcutaneous tissue decreased 27.1% (from 59 visits to 43 visits) between 1984 and 2006. The 2006 rate of 39.6 per 1,000 was statistically lower than both the BRHA (52.8 per 1,000) and Manitoba First Nations living on-reserve (61.0 per 1,000).

The 10-year hospitalization rate for infections of skin and subcutaneous tissue for Gillam residents decreased from 3.8 to 2.3 per 1,000 between 1987-1996 and 1997-2006 (from 54 hospitalizations to 27). This is lower than the BRHA rate at 3.7 per 1,000 and for Manitoba First Nations living on-reserve at 4.6 per 1,000 between 1997-2006. Among females, the 10-year average annual hospitalization rates for infections of skin and subcutaneous tissue decreased from 3.5 to 2.1 per 1,000 between 1987-1996 and 1997-2006; the most recent rate is lower than both the BRHA at 3.3 per 1,000 and for Manitoba First Nations living on-reserve at 4.3 per 1,000 in 1997-2006.

Among males, the 10-year hospitalization rate also declined, from 4.0 to 2.4 per 1,000 between 1987-1996 and 1997-2006. The most recent rate is lower than both the BRHA at 4.0 per 1,000 and Manitoba First Nations living on-reserve at 4.8 per 1,000 in 1997-2006.

MORTALITY

In many northern communities, disease of the circulatory system and injuries are typically among the leading causes of death. Gillam is different in that cancer was the leading cause of death in the community between 1998 and 2006. The second leading cause of death was diseases of the digestive system. A review of premature deaths indicated that injury was the leading cause of potential years of life lost among males but this was only based on two deaths so must be interpreted with caution.

In Gillam, there were 27 deaths among residents between 1998 and 2006 for a total mortality rate of 2.6 deaths per 1,000 residents. This was lower than Manitoba First Nations living on-reserve at 4.1 per 1,000 and Manitoba at 8.5 per 1,000. Females accounted for 10 (37%) of these deaths while males accounted for 17 (63%). This is a very small number of deaths to make inferences about changes over time or differences between areas.

There were seven deaths among Gillam residents due to cancer, leading to a mortality rate of 0.7 per 1,000 between 1998-2006; this is similar to Manitoba First Nations living on-reserve (0.6 per 1,000) but statistically lower than Manitoba at 2.3 deaths per 1,000.

There were three deaths due to diseases of circulatory system accounting for a mortality rate of 0.29 per 1,000, lower than Manitoba First Nations living on-reserve (1.0 per 1,000) and Manitoba (2.9 per 1,000). There were also three deaths due to diseases of the respiratory system accounting for a mortality rate of 0.3 per 1,000; this is similar to Manitoba First Nations living on-reserve (0.2 per 1,000) but lower than Manitoba at 0.7 deaths per 1,000 residents.

Between 1998 and 2006, there were 19 deaths among residents younger than 75 (considered "premature deaths"). The Gillam rate of 1.8 premature deaths per 1,000 residents was statistically lower than the rate among Manitoba First Nations living on-reserve (3.1 premature deaths per 1,000) but is statistically similar to the other comparison areas.

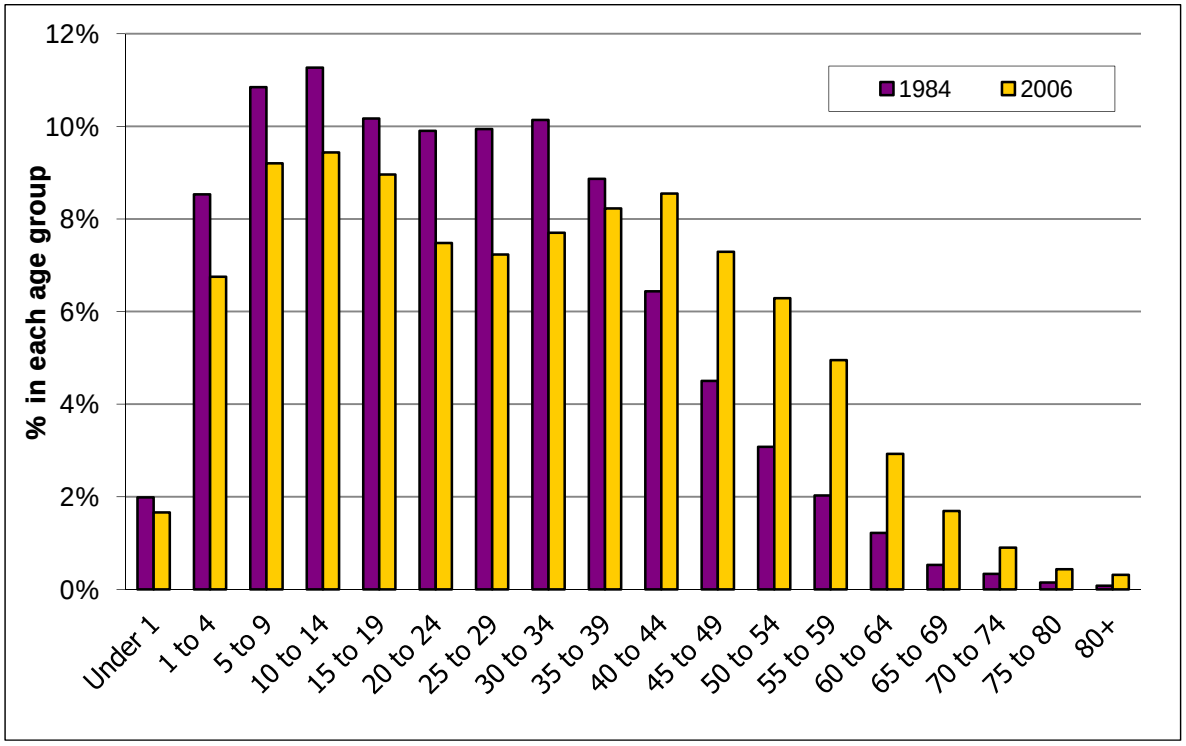
PYLL among Gillam females increased from 46 to 111years between 2000-2003 and 2004-2007. Among Gillam males, PYLL decreased from 133 to 63 years for the same time period. The leading cause of PYLL was cancer for males and diseases of the digestive system for females. The causes of premature mortality in Gillam is based on small numbers but is noteworthy as they are different from other northern communities where the leading cause of PYLL and premature mortality overall is typically injury and poisoning.

5.3.2.3 Thompson

5.3.2.3.1 Health Characteristics Associated with Population Characteristics

Thompson is the largest community in the BRHA and Manitoba Health reports the 2008 population as being 13,931 residents. Given that the population of the BRHA is 46,818, Thompson residents account for just about one third of all residents in the region. Only 3.3% of the Thompson population is over 65 years old. This is very similar to the Manitoba First Nations rate of 3.4% and much lower than the provincial average of 13.8% in 2008.

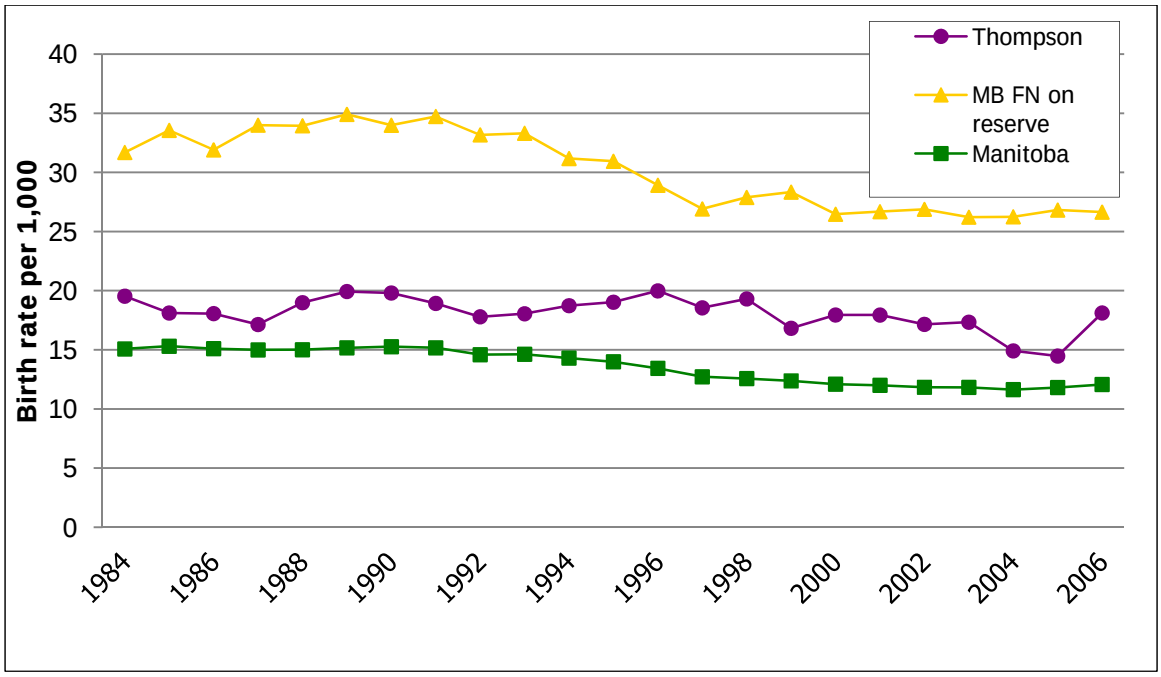
According to Manitoba Health, the population of Thompson in 1984 was 14, 946 and the 2006 population of 14,074 represents a decline of 5.8%. Although the population of Thompson is still relatively young compared to the rest of Manitoba, Figure 5-30 shows that the population has grown in the older age groups, while the younger age groups (particularly age 20 to 34) have experienced the largest decrease since 1984. In 1984, 32.6% of the population was under the age of 15 and 7.4% was over the age of 50. This changed by 2006 to 27% of the population being under age 15 and 17.5% over age 50.



Source: Manitoba Health, special data run, 2009.

Figure 5-30: Thompson Change in Population Structure (1984 and 2006)

The birth rate for Thompson in 2006 was 21.2 births per 1,000 residents; this is statistically lower than the Manitoba First Nations living on-reserve rate of 33.5 but statistically higher than the provincial rate of 14.8 per 1,000 in 2006. As Figure 5-31 shows, the 20-year trend in birth rates for Thompson has been quite stable. The 2006 pregnancy rate for Thompson women age 15-49 was 76.6 per 1,000 females; this is lower than the Manitoba First Nations living on-reserve rate of 135.1 per 1,000 females but higher than the provincial rate of 60.7 per 1,000 in 2006. Like birth rates, the pregnancy rate for Thompson has changed very little between 1984 and 2006.



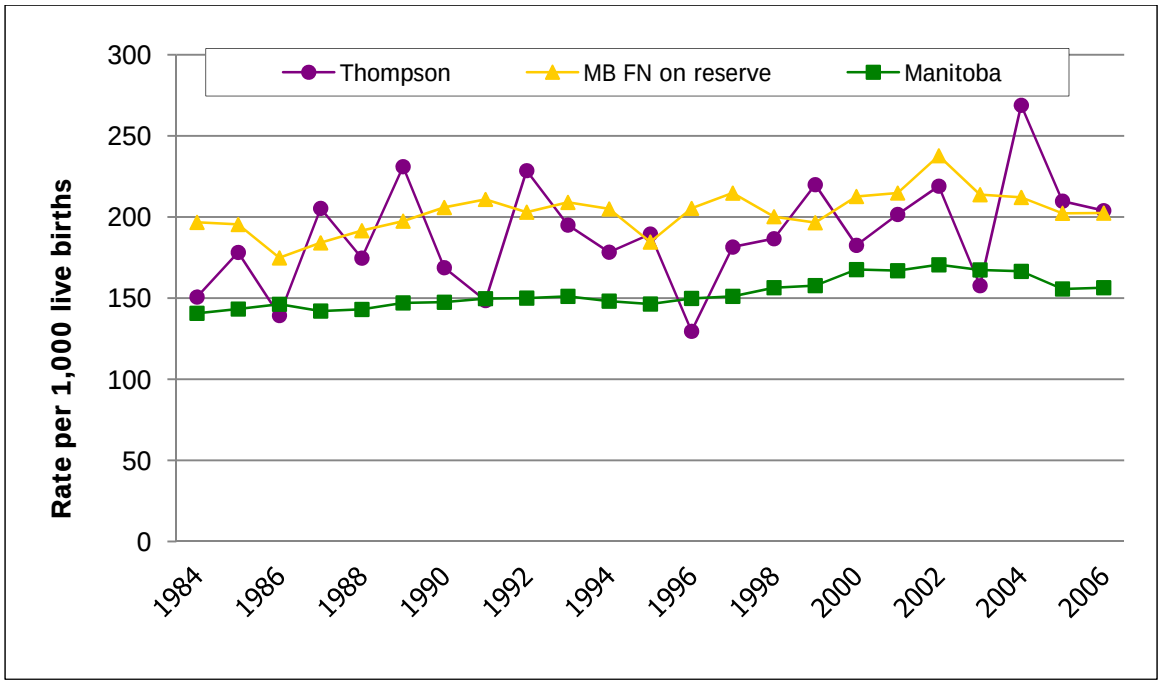
Source: Manitoba Health, special data run 2009.

Figure 5-31: Birth Rates for Thompson, MB First Nations on-Reserve and Manitoba (1984-2006)

In 2006, the rate of low birth weight (less than 2,500 grams) infants in Thompson was 70.6 per 1,000 live births, which is statistically higher than the Manitoba First Nations rate of 59.2 per 1,000 live births and the provincial rate of 56.6 per 1,000 live births. It is important to note that the actual number of low birth weight infants born to residents of Thompson in 2006 was 18 (compared to 74 in Manitoba First Nations communities and 807 in Manitoba overall). This is important, as the small number leads to a large variation in rates from year to year.

The high birth weight rate (greater than 4,000 grams) for Thompson was 203.9 births per 1,000 live births, which is similar to the Manitoba First Nations rate of 202.4 per 1,000 live births but statistically higher than the provincial rate of 156.4 per 1,000 live births. For Thompson, this rate is calculated based on a total of 52 high birth weight infants born in 2006 (accounting for 20% of all births in that year). There appears to be a trend toward an increase in the rate of high birth weight infants in Thompson (see Figure 5-32).

The 10-year average annual rate of reported spontaneous abortions (also known as miscarriage) for Thompson increased from 12.1 to 51.0 per 1,000 reported pregnancies between 1987-1996 and 1997-2006. It is important to note that this increase is based on reported miscarriages and pregnancies. Therefore, it is possible that at least some of the increase in rates for Thompson is due to better reporting of pregnancy and miscarriage. The most recent rate for Thompson is statistically lower than Manitoba First Nations at 65.4 per 1,000 but statistically similar to the provincial rate of 49.0 per 1,000 pregnancies between 1997-2006.



Source: Manitoba Health, special data run 2009.

Figure 5-32: High Birth Weight Rates for Thompson, MB First Nations on-Reserve and Manitoba (1984-2006)

CARDIOVASCULAR DISEASE

For several chronic conditions, including cardiovascular disease, patient rates and physician visit rates were higher than the comparison areas but hospitalizations were much lower. This may indicate that with more resources in a larger community, such as Thompson, patients are better able to manage their chronic illnesses at the community level and are less likely to require hospitalization.

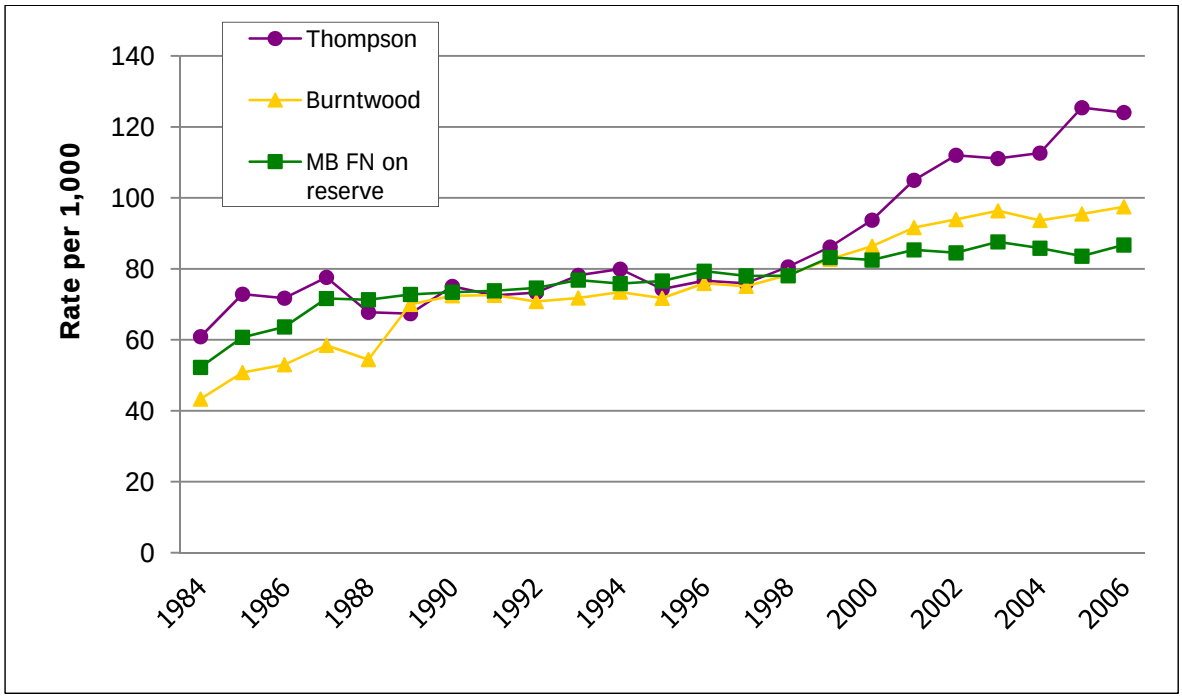
Between 1984 and 2006, cardiovascular disease accounted for 81,990, or 21.5% of all physician visits among Thompson residents. In this time period, Thompson residents accounted for 37.5% of all BRHA physician visits for cardiovascular disease, which is slightly higher than the 33.3% of the BRHA population that the community represented in that time period. This indicates that cardiovascular disease is an important cause of illness as well as a driver of medical service use in Thompson.

Thompson residents age 50 and older accounted for two out of three (66.9%) physician visits for cardiovascular disease, with the highest number of physician visits seen among male residents ages 55 to 59.

The total number of physician visits for cardiovascular disease among Thompson residents increased 57.5% (from 2,844 to 4,480) between 1984 and 2006. While we know the population of Thompson has decreased, it important to note that the number of unique patients that were treated almost doubled from 910 to 1,746 in this time period.

Among Thompson females, the physician visit rate increased by 95.9%. The 2006 physician visit rate of 127.0 visits per 1,000 was statistically higher than both the BRHA (96.6 per 1,000) and Manitoba First Nations living on-reserve (86.0 per 1,000). The male physician visit rate for cardiovascular disease increased 111.7% between 1984 and 2006. The 2006 rate of 121.2 per 1,000 was statistically higher than both the BRHA (98.3 per 1,000) and for Manitoba First Nations living on-reserve (87.5 per 1,000).

Among Thompson females, the unique patient rate for cardiovascular disease increased from 64.8 patients per 1,000 residents in 1984 to 127.0 patients per 1,000 females in 2006. Thompson males had the highest rate of patients among comparison areas in 1984 and rates steadily increased from 57.3 unique patients per 1,000 in 1984 to 121.2 per 1,000 in 2006. Figure 5-33 shows that as with the rates among the BRHA and Manitoba First Nations living on-reserve, there is a gradual but clear increase over time in patient rates for residents of Thompson. This may be partly due to the increase in the numbers of older residents living in the community.

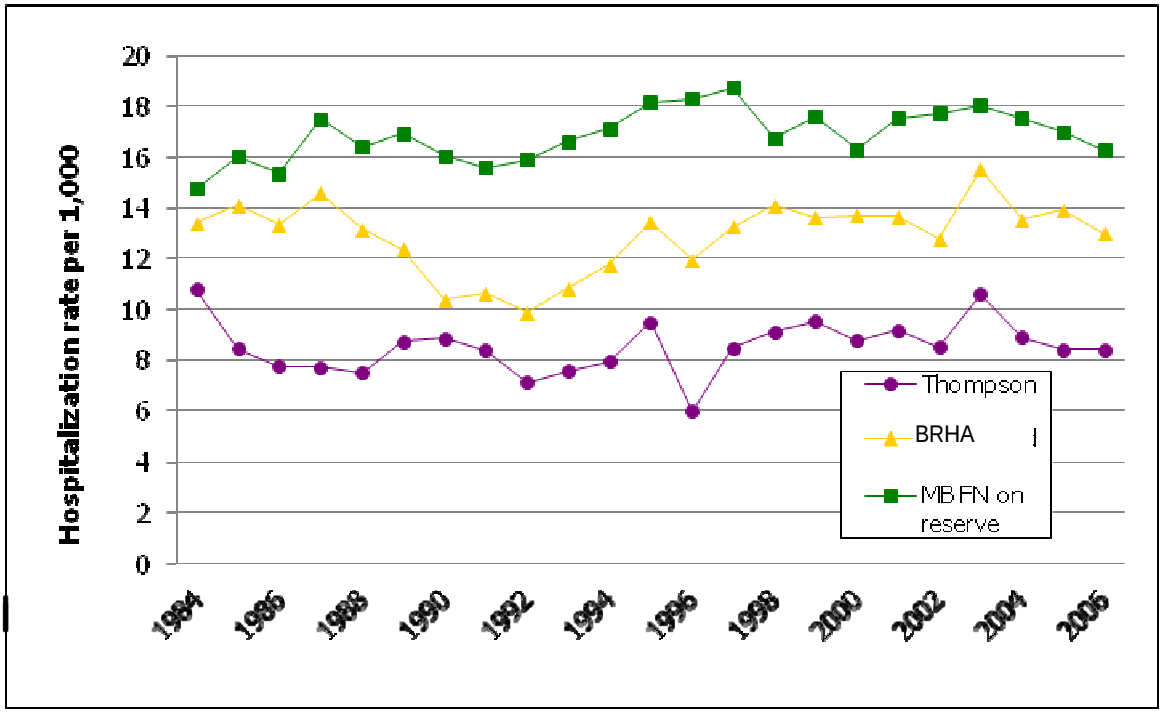


Source: Manitoba Health, special data run 2009.

Figure 5-33: Patient Rates for Cardiovascular Disease by Year, All Residents (1984-2006)

The 10-year average annual hospitalization rate for cardiovascular disease increased very slightly from 7.9 to 9.0 per 1,000 between 1987-1996 and 1997-2006. The slight rate increase for Thompson represents an increase of actual hospitalizations from 1,228 to 1,280 (a much smaller increase than seen for physician visits). As Figure 5-34 shows, hospitalization rates for Thompson residents are consistently lower than rates for BRHA and Manitoba First Nations living on-reserve. For Thompson females, the 10-year average annual hospitalization rate for cardiovascular disease remained quite stable at 6.5 and 7.1 per 1,000 between 1987-1996 and 1997-2006. This was statistically lower than the BRHA at 12.2 per 1,000

females and for Manitoba First Nations living on-reserve at 16.0 per 1,000 females between 1997-2006. For Thompson males, the 10-year average annual hospitalization rate for cardiovascular disease increased slightly from 9.2 to 10.7 per 1,000 between 1987-1996 and 1997-2006. The Thompson male rate is statistically lower than the BRHA at 15.1 per 1,000 males and Manitoba First Nations living on-reserve at 18.6 per 1,000 in 1997-2006.



Source: Manitoba Health, special data run 2009.

Figure 5-34: Hospitalization Rates for Cardiovascular Disease by Year, All Residents (1984-2006)

DIABETES

In 2006, there were 611 patients accounting 1,638 physician visits for diabetes recorded among Thompson residents. These visits accounted for 9.8% of all patients seen for conditions of interest in 2006.

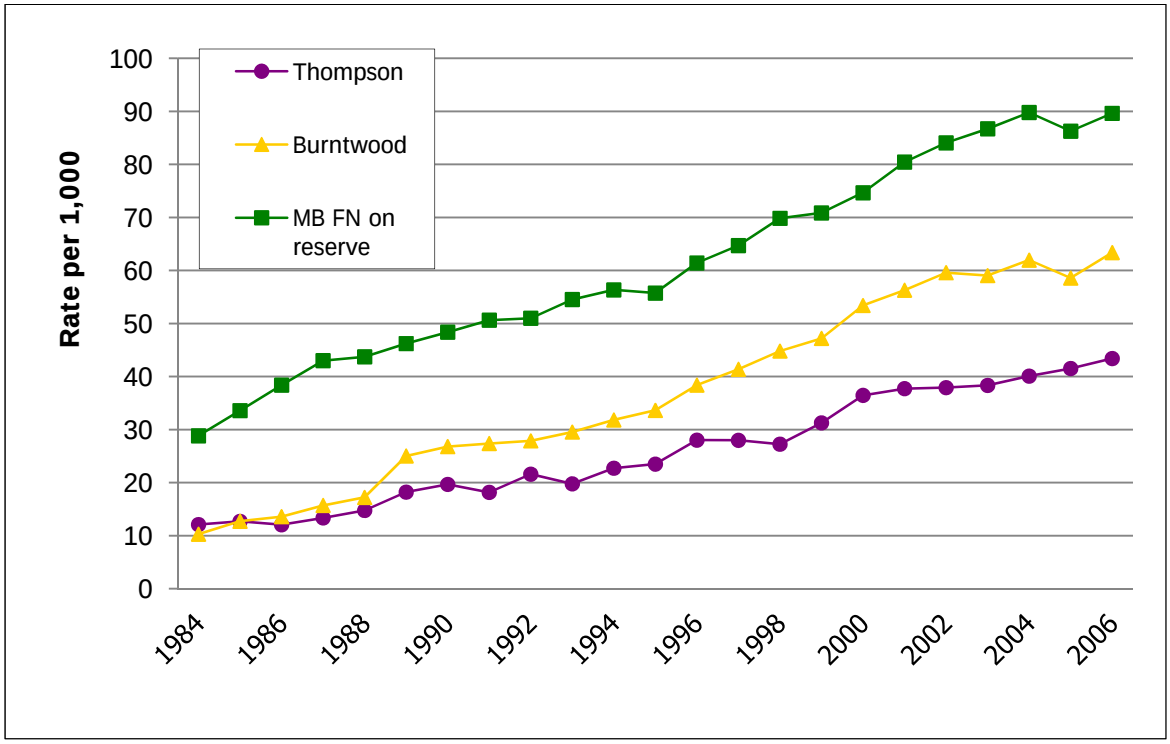
Overall, between 1984 and 2006, diabetes accounted for 26,115, or 6.8% of all physician visits.

In this time period, Thompson residents accounted for 23.2% of all BRHA physician visits for diabetes which is lower than the 33.3 per cent of the BRHA population that they represent.

Thompson residents age 50 and older accounted for two thirds (68.2%) of physician visits for diabetes, with the highest number of physician visits seen among female residents ages 60 to 64 followed by males age 55 to 59.

The patient rate among Thompson residents increased from 12.1 patients per 1,000 residents in 1984 to 43.4 per 1,000 in 2006 (see Figure 5-35). Both BRHA and Manitoba First Nations living on-reserve,

appear to consistently have higher patient rates than Thompson residents and both also show a steady increase in physician visit rates.



Source: Manitoba Health, special data run 2009.

Figure 5-35: Patient Rates for Diabetes by Year, All Residents (1984-2006)

For community planning purposes, it is noted that the actual number of unique patients treated for diabetes among all Thompson residents increased by 237.6% from 181 patients in 1984 to 611 in 2006. This is the lowest rate of change among the comparison areas. The number of physician visits also increased, but less than the number of individual patients, from 694 in 1984 to 1,638 in 2006 - an increase of 136%.

Among Thompson females, patient rates for diabetes increased from 13.1 patients per 1,000 residents in 1984 to 44.0 patients per 1,000 in 2006 (from 94 to 304 patients). The number of physician visits increased by 161.4% from 329 in 1984 to 860 in 2006.

The number of males treated for diabetes increased even more than females at 252.9% (from 87 to 307). The number of physician visits increased from 365 in 1984 to 778 in 2006 and is an increase of 113.2 per cent.

Between 1997-2006, the 10-year average annual hospitalization rate for diabetes among Thompson residents remained very stable at about 1.9 per 1,000 residents. This was statistically lower than both the BRHA (3.4 per 1,000) and Manitoba First Nations (6.7 per 1,000). It is noted that the actual number of diabetes hospitalizations among Thompson residents decreased from 299 to 266 between 1987-1996 and 1997-2006 but the rate did not change due to the decrease in population.

Among Thompson females, the 10-year hospitalization rate for diabetes decreased from 2.4 to 1.8 per 1,000 between 1987-1996 and 1997-2006. This is statistically lower than the BRHA at 3.8 per 1,000 as well as Manitoba First Nations living on-reserve at 6.8 per 1,000 in 1997-2006. Among Thompson men, the 10-year hospitalization rate for diabetes increased slightly from 1.4 to 1.9 per 1,000 between 1987-1996 and 1997-2006. However, these remains statistically lower than both the BRHA at 3.1 per 1,000 and Manitoba First Nations at 6.6 per 1,000 in 1997-2006.

It is important to note that the physician visit data show very clearly that the numbers of people (and resulting need for consulting with a physician) diagnosed with diabetes is increasing steadily. That the hospitalization data does not show the same trend may indicate that Thompson residents have better access to primary health care and physician services to help them successfully manage their diabetes in the community and avoid health problems that would lead to hospitalizations.

INJURY

In 2006, there were 2,642 patients accounting for 4,693 physician visits for injuries recorded among Thompson residents. These visits accounted for 28.2% of all physician visits for conditions of interest in 2006. Overall, between 1984 and 2006, injuries accounted for 144,704, or 37.9% of all physician visits.

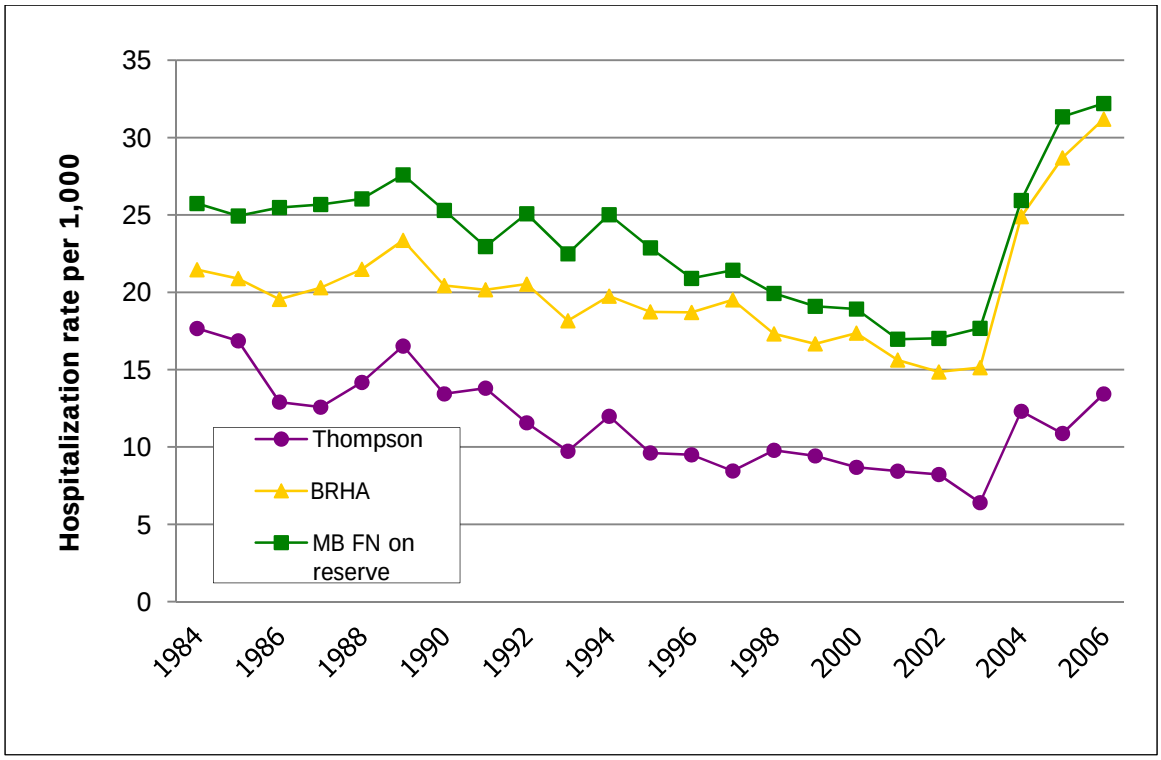
Between 1984 and 2006 overall, Thompson residents accounted for 38.5% of all BHRA physician visits for injuries, which is higher than the 33.3% of the BRHA population that they represent.

Between 1984 and 2006, injuries accounted for 144,704, or 37.9% of all physician visits. In the same time period, Thompson residents accounted for 38.5% of all the BRHA physician visits for injuries, which is higher than the 33.3% of the BRHA population that they represent.

Thompson residents age 19 and under accounted for 34.8% of physician visits for injuries, with the highest number of physician visits seen among male residents ages 15 to 19 and 30 to 34.

Between 1984 and 2006, injuries accounted for 4,002 or 36.6% of all hospitalizations for conditions of interest. In this same time period, Thompson residents accounted for 19.2% of all the BRHA hospitalizations for injuries, which is lower than the 33.3% of the BRHA population that they represent. Within Thompson, residents age 19 and younger accounted for 34.1% of injury hospitalizations.

Figure 5-36 illustrates the calculated hospitalization rates by year between 1984 and 2006 to allow for comparison between Thompson, Manitoba First Nations living on-reserve and BRHA residents. Each of these populations show minor variation from year to year with a trend toward declining rates until 2004 where rates increased again.



Source: Manitoba Health, special data run 2008.

Figure 5-36: Hospitalization Rates for Injuries by Year, All Residents (1984-2006)

Among Thompson females, the 10-year average annual hospitalization rate for injuries decreased slightly from 8.9 to 7.7 per 1,000 between 1987-1996 and 1997-2006. This is statistically lower than BRHA females at 17.5 per 1,000 and Manitoba First Nations females living on-reserve at 19.6 per 1,000 in 1997-2006. The Thompson male 10-year average annual hospitalization rate for injuries also decreased from 15.5 to 11.4 per 1,000 between 1987-1996 and 1997-2006. Similar to rates among females, the most recent rates are statistically lower than BRHA males at 22.8 per 1,000 as well as Manitoba First Nations males living on-reserve at 24.6 per 1,000 males between 1997-2006.

Among Thompson residents, the total 10-year average annual hospitalization rate for injuries decreased from 12.3 to 9.6 per 1,000 between 1987-1996 and 1997-2006 (a decrease from 1,911 to 1,371 hospitalizations).

MENTAL HEALTH

Mental health is another important characteristic of overall health. Rates of patients and treatment with a physician are typically higher than comparison areas and continue to increase over time. While hospitalizations are typically lower than the comparison areas (again likely pointing to increased ability to manage the condition at the community level), these rates are increasing.

In 2006, there were 1,612 patients accounting for 3,737 physician visits for mental health and behavioural disorders recorded among Thompson residents. These visits accounted for 22.4% of all physician visits

for conditions of interest in 2006. Overall, between 1984 and 2006, mental health disorders accounted for 87,626, or 22.9% of all physician visits among Thompson residents.

Between 1984 and 2006 overall, Thompson residents accounted for 47.4% of all BRHA physician visits for mental health and behavioural disorders, which is higher than the 33.3% of the BRHA population that they represent.

Within Thompson, residents age 50 and older accounted for 17% of physician visits for mental and behavioural disorders, with the highest number of physician visits seen among female residents ages 30 to 39.

The patient rate among Thompson residents for mental health and behavioural disorders appears to be consistently higher than the comparison areas and increased from 109.2 patients per 1,000 residents in 1984 to 114.5 per 1,000 in 2006. Both Burntwood and Manitoba First Nations living on reserve show a more pronounced and steady increase in patient rates.

The actual number of patients treated for mental health and behavioural disorders among all Thompson residents decreased by 1.2% 1,632 patients in 1984 to 1,612 in 2006; however, the rate increased slightly due to the decrease in population, which is used to calculate rates. The rate of change in numbers of patients is lower than for Burntwood and Manitoba First Nations living on-reserve. Among Thompson residents, the number of physician visits decreased from 3,755 in 1984 to 3,737 in 2006 and is proportionally a small decrease at 0.5%.

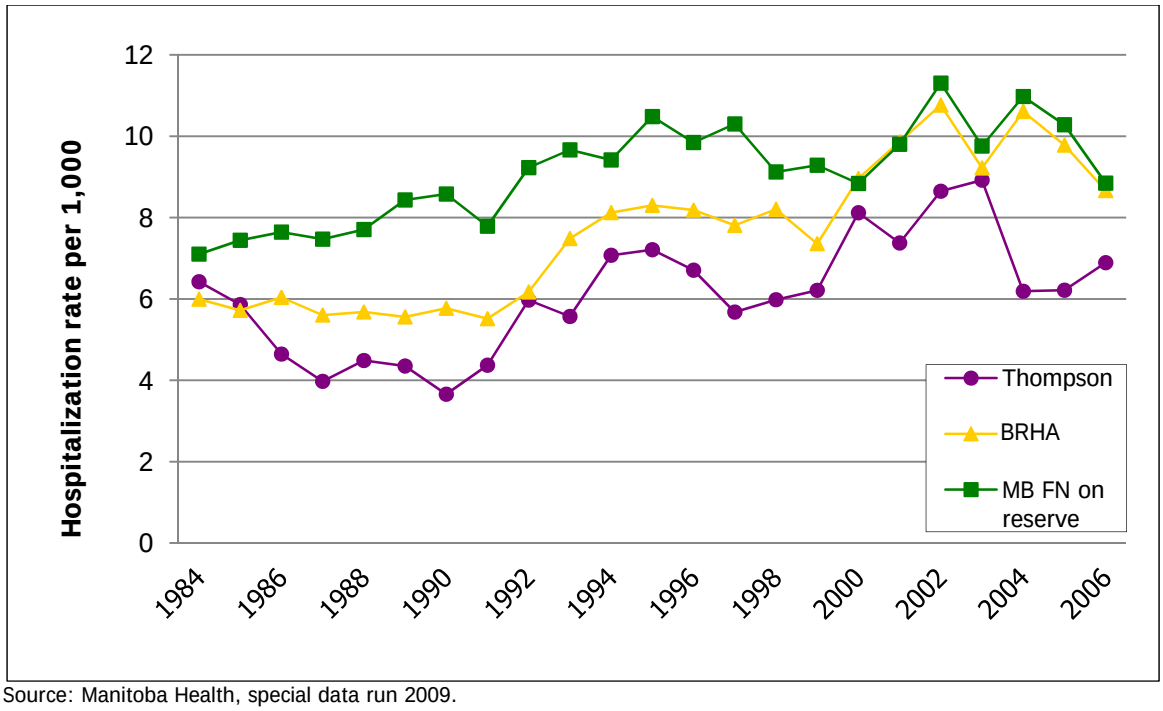
Among Thompson females, the patient rate for mental health disorders appears to have decreased slightly over time (from 131.7 patients per 1,000 residents in 1984 to 122.8 patients per 1,000 in 2006). However, rates are consistently quite a bit higher than the comparison areas.

The actual number of patients among Thompson females decreased by 10.1% between 1984 and 2006 from 943 patients in 1984 to 848 patients in 2006. The number of physician visits decreased by 13.3% from 2,238 in 1984 to 1,940 in 2006. The number of Thompson male patients increased by 10.9% between 1984 and 2006 (from 689 patients to 764 patients). The number of physician visits increased by 18.5% from 1,517 in 1984 to 1,797 in 2006.

The female physician visit rate among Thompson residents for mental and behavioural disorders decreased by 6.8% (from 943 to 848 physician visits) between 1984 and 2006 to 122.8 visits per 1,000 in 2006. However, this rate remains statistically higher than BRHA females (93.1 per 1,000) and Manitoba First Nations females living on-reserve (105.1 per 1,000). The opposite trend is seen for males where male physician visit rates for mental and behavioural disorders increased by 20.5% between 1984 and 2006 to a rate of 106.6 visits per 1,000. This rate is higher than for BRHA males (82.4 per 1,000) and for Manitoba First Nations living on-reserve (78.1 per 1,000 males). Overall, the total physician visit rate for mental and behavioural disorders increased by 4.9% between 1984 and 2006 to 114.5 per 1,000 in 2006. This rate is higher than the BRHA at 87.7 per 1,000 residents as well as for Manitoba First Nations living on-reserve at 91.3 per 1,000 residents.

Between 1984 and 2006, mental health disorders accounted for 2,082 or 19.0% of all hospitalizations for conditions of interest. Thompson residents accounted for 26.5% of all BRHA hospitalizations for mental and behavioural disorders, which is lower than the 33.3% of the BRHA population that they represent.

The hospitalization rate for mental and behavioural disorders increased very slightly from 6.4 hospitalizations per 1,000 in 1984 to 6.9 per 1,000 in 2006 (see Figure 5-37). Both BRHA and Manitoba First Nations living on-reserve also show relatively stable trends in hospitalization rates with slight increases for BRHA residents (from 6.0 per 1,000 in 1984 to 8.7 per 1,000 in 2006) and for all Manitoba First Nations living on-reserve (from 7.1 per 1,000 to 8.8 per 1,000).



Source: Manitoba Health, special data run 2009.

Figure 5-37: Hospitalization Rates for Mental and Behavioural Disorders by Year, All Residents (1984-2006)

The 10-year average annual rate of 7.0 hospitalizations per 1,000 Thompson residents was statistically lower than all comparison populations. As noted in the physician visit data, treatment prevalence rates were much higher than the comparison areas in the same time period. This suggests that Thompson community residents have more support at the community level through access to physicians, and likely other support services, to manage mental health conditions in out-patient settings and are less likely to become ill enough to require hospitalization.

SKIN INFECTION

In 2006, there were 719 patients accounting for 1,209 physician visits for infections of skin and subcutaneous tissue recorded among Thompson residents. These visits accounted for 7.3% of all physician visits for conditions of interest in 2006. Overall, between 1984 and 2006, these infections accounted for 24,091, or 6.3% of all physician visits.

Between 1984 and 2006 overall, Thompson residents accounted for 32.3% of all BRHA physician visits for infections of skin and subcutaneous tissue, which is very similar to the 33.3% of the BRHA population that they represent.

Among Thompson residents, the total number of physician visits for infections of skin and subcutaneous tissue increased by 9.6% from 656 to 719 between 1984 and 2006. The calculated 10-year average annual physician visit rate for Thompson residents between 1997 and 2006 was 70.9 visits per 1,000 residents. This rate was statistically lower than both the BRHA (76.7 visits per 1,000) and Manitoba First Nations living on-reserve (106.3 visits per 1,000), but higher than Gillam (62.9 visits per 1,000) as well as the combined KCNs rate.

Overall, the 10-year hospitalization rates for infections of skin and subcutaneous tissue for Thompson remained relatively stable, changing from 2.1 to 1.9 per 1,000 between 1987-1996 and 1997-2006 (from 329 to 267 hospitalizations). The most recent 10-year average annual hospitalization rate of 1.9 per 1,000 for Thompson residents was statistically lower than for all comparison areas with the exception of Gillam.

MORTALITY

According to Manitoba Health, there were a total of 362 deaths among Thompson community residents in the nine year period between 1998 and 2006 for a total mortality rate of 2.8 deaths per 1,000 residents. This is statistically lower than both Manitoba First Nations (4.1 per 100,000) and Manitoba (8.5 per 100,000). Females accounted for 134 (37%) of these deaths while males accounted for 228 (63%).

Similar to Gillam and unlike many northern communities, cancer was the leading cause of death accounting for almost one in three deaths (30%) between 1998 and 2006. This was followed by diseases of the circulatory system, which accounted for 23% of deaths and injury at 16% of deaths. Overall, cancer and diseases of the circulatory system account for just over one half of deaths among Thompson residents.

Within Thompson, nine per cent of deaths among females and seven per cent among males occurred before the age of twenty. The leading causes of death for both young males and females were injury and poisoning.

According to Manitoba Health, there were 362 deaths among Thompson community residents in the nine year period between 1998 and 2006. This means that that there were on average 40 deaths per year. Females accounted for 134 (37%) of these death while males accounted for 228 (63%).

Among Thompson residents, the total mortality rate was 2.8 deaths per 1,000 residents between 1998-2006. The 95% confidence intervals, ranging from 2.6 to 3.1 deaths per 1,000 for Thompson residents, illustrates that the rate in Thompson is statistically lower than Manitoba First Nation on-reserve (4.1 deaths per 1,000 residents) and Manitoba overall (8.5 deaths per 1,000 residents).

The average annual mortality rate due to **Neoplasm** (cancer) in Thompson was 0.8 deaths per 1,000 residents between 1998 and 2006. This is statistically higher than the Manitoba First Nations rate of 0.6 deaths per 1,000 but statistically lower than Manitoba overall at 2.3 deaths per 1,000.

The average annual mortality rate due to diseases of the circulatory system for Thompson residents was 0.7 deaths per 1,000 residents between 1998-2006. This is statistically lower than Manitoba First Nations at 1.0 deaths per 1,000 and Manitoba overall at 2.9 death per 1,000 residents.

The average annual mortality rates due to **endocrine and metabolic disorders** (including diabetes) among Thompson residents was 0.1 deaths per 1,000 residents between 1998 and 2006. This is statistically lower than both Manitoba First Nations and Manitoba overall, both of which had rates of 0.34 deaths per 1,000.

External causes (injury) accounted for 57 deaths among Thompson residents between 1998 and 2006 for a calculated rate of 0.4 deaths per 1,000 residents. The Thompson rate is statistically higher than Manitoba First Nations living on-reserve (0.2 deaths per 1,000) and Manitoba overall (0.1 deaths per 1,000).PYLL among Thompson females decreased from 1,270 to 1,120 between 2000-2003 and 2004 2007. Among Thompson males, PYLL increased from 1,695 to 2,664 between 2000-2003 and 2004-2007. The leading cause of potential years of life lost was injury and poisoning for both males and females. However, rates among males were much higher than females in the most recent time period. Cancer was the second leading cause of potential years of life lost for both males and females in Thompson.

5.3.3 Mercury and Human Health

This section provides an overview of mercury and why there is a concern regarding mercury and the Project. A brief historical account of past monitoring activities in the Local Study Area is provided to set context for current on-going concerns by the KCNs regarding mercury in traditional country foods. This is followed by a description of the process whereby Manitoba Hydro and the KCNs looked at the issue of mercury and human health through a Technical Working Group and the preparation of a Human Health Risk Assessment (HHRA). The section ends with information on mercury in traditional foods today, focusing on the importance of eating healthy country foods for both health and cultural reasons.

Mercury is a common and naturally occurring metal found in the environment across Canada. It occurs naturally in the soil; in the Local Study Area, it is found around Gull and Stephens Lake and in the fish found in these lakes and other lakes in the region, including lakes off-system (see AE SV). Mercury exists in several forms in the environment. Only one form, called **methylmercury**, can **bioaccumulate** (build up and become more concentrated at higher levels in the food chain), which is demonstrated to have consequences on human health. For the purposes of this report, the term mercury is used to mean methylmercury.

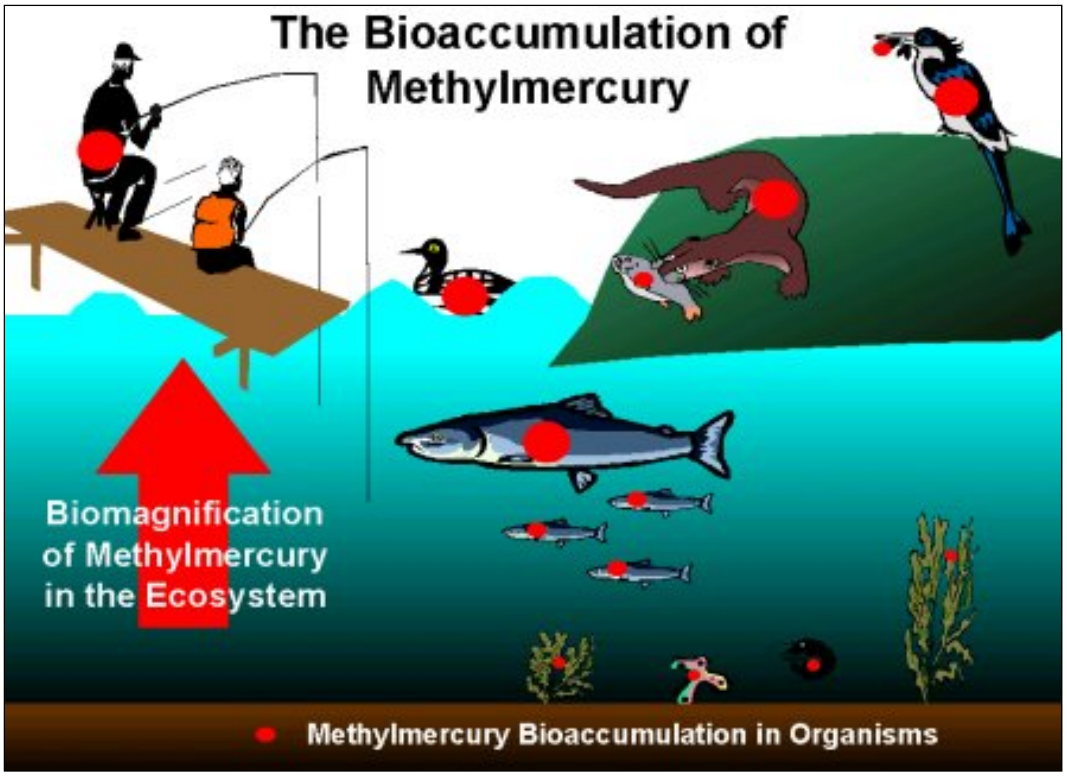
Although mercury occurs naturally in the environment, human activities may result in increased concentrations in the environment, potentially leading to increased exposure for people. Human activities that contribute to increased sources of mercury exposure include:

- Releases of mercury into the air from combustion processes such as coal-fired power generation, metal mining, metal smelting operations and waste incineration;
- Disposal of products that contain mercury (*e.g.*, fluorescent lights, batteries, thermostats, barometers, switches and relays) into landfill sites and subsequent leaching into the environment; and

- Flooding of soils for new hydroelectric reservoirs (this can result in mercury from flooded soils releasing methylmercury into the aquatic food chain).

The vast majority of exposure to people is in the form of mercury through the consumption of fish. Fish with the highest mercury levels tend to be the large and long-lived predatory fish; however, most exposed fish contain some level of mercury. Various lakes across Canada and lakes in the Local Study Area have fish with naturally high levels of mercury and it is not an issue that is restricted to hydro reservoirs. Fish from the freshwater environment that often contain elevated levels of mercury include lake trout, burbot, jackfish (northern pike) and pickerel (walleye)[1], depending on the localized environment (see AE SV). Several other marine fish also are known to have elevated mercury levels; the most commonly eaten of these marine fish are fresh and frozen tuna or canned albacore tuna.

Mercury accumulates mainly in the muscles of fish, though it is also present in other organs. At each higher level in the food chain, the concentration of mercury in the animals increases. This process is called bioaccumulation (see Figure 5-38).



Source: Environment Canada. 2004.
Note:
- The size of the red dots indicates the mercury concentration of the different organisms and people.

Figure 5-38: The Bioaccumulation of Mercury

[1] For the purposes of this SE SV, the term jackfish will be used in lieu of northern pike, and pickerel in lieu of walleye as both jackfish and pickerel are terms commonly used by the people in the Local Study Area.

The effects of mercury on human health depend on the form of mercury, the length of time a person is exposed as well as the level of exposure. If the exposure is of a higher level for a long time, all forms of mercury could cause health effects to the nervous system. In the context of the Project and relevance to the Local Study Area, mercury and its effect on human health is the main concern with respect to hydroelectric reservoir development.

At very high concentrations, health effects primarily associated with mercury have included damage to the brain (*e.g.*, motor skills, irritability, shyness, tremors, changes in vision/hearing, memory problems, and decreased IQ). Mercury in most foods, consumer products, and the natural environment are not at concentrations large enough to cause the health effects listed above (see Appendix 5B). With regard to the Local Study Area, given the cultural importance of eating country foods and their substantial contribution to a healthy diet (particularly in remote communities), it is important to describe the current situation with regard to mercury in the local area, as well as a discussion of safe consumption guidelines.

Acceptable levels of exposure to mercury have been developed by government agencies in Canada and elsewhere to protect public health. Health Canada, the World Health Organization, the US Environmental Protection Agency (EPA) and others have provided guidance on dose rates that protect the health of the public. Because mercury is found throughout the global environment, health agencies around the world have dedicated considerable effort in determining mercury exposure rates considered to be acceptable. This process has prompted health agencies such as Health Canada to recommend that people be made aware of the benefits and risks of mercury exposure to arrive at their own decisions regarding fish consumption (Health Canada 2007).

Guidelines[1] for mercury are based on studies that looked for the lowest concentrations of mercury, which produce any effect in people, and are then further reduced by a safety factor. The guidelines are based on an average weekly amount of fish eaten by a person of a certain weight. Generally speaking, young children and pregnant women (or women of child-bearing age) are of primary concern to health agencies with respect to mercury exposure; however, persons of any age may experience health effects if the exposure is great enough. Because of this, there can be different recommendations for minimizing exposure depending upon which group of the population a person may fall into. For example, many health agencies recommend that pregnant or breastfeeding women and young children restrict their eating of certain types of fish that may contain high concentrations of mercury. However, most health agencies also agree that eating fish is an important part of the diet and these agencies stress that eating fish represents a healthy part of the diet for pregnant and breastfeeding women (as well as for young children). Specific guidelines for Mercury in Fish in Manitoba are developed by Manitoba Water Stewardship (2007)[2].

[1] Guidelines work under the general assumption that eating fish several times during a week is the same as one large meal of fish.

[2] The department of Manitoba Water Stewardship has recently changed to Manitoba Conservation and Water Stewardship.

5.3.3.1 Mercury in Northern Manitoba in the Past

The effects of past hydroelectric projects prompted concerns about elevated mercury levels in fish, including the effect of mercury on human health. In 1986, the Department of the Environment (DOE) and the Department of Fisheries and Oceans (DFO) began a joint five-year program of environmental research and monitoring in northern Manitoba, called the Federal Ecological Monitoring Program (FEMP)[1]. One of the research programs focused on mercury. FEMP was undertaken in relation to the environmental effects of Manitoba Hydro projects including Lake Winnipeg Regulation, Churchill River Diversion and the hydroelectric projects along the Nelson River.

The 1992 FEMP Final Report reported on mercury testing done by Health Canada between 1976 and 1990 as part of a national program to test people in First Nation communities. The communities at Split Lake and York Landing (*Kawechiwasik)* were included in the testing (along with other Northern Flood Agreement communities at Nelson House, South Indian Lake, Norway House and Cross Lake) and summary data were presented in the FEMP report. Health Canada continued to test First Nation communities until 1999. After that, testing was done at the request of the community.

In general, the Health Canada results reported in FEMP showed that:

- The majority of the mercury values found in samples in all communities from the late 1980s were in the normal range of 0 - 0.019 ppm[2] in blood; concentrations of 0.020 - 0.1 ppm and greater than 0.1 ppm are considered by health authorities to put a person "at increasing risk" and "at risk", respectively (ranges as defined by Health Canada).
- For women of child-bearing age:
  - All women of Split Lake and York Landing (*Kawechiwasik)* had normal mercury values; and
  - Some women in South Indian Lake and Nelson House had values in the 0.020 to 0.080 ppm range.

Results from the community of Split Lake showed that 15% of community Members were tested in 1989/90 (or 192 people). Of those tested, 98% had mercury values in the normal range of 0 - 0.019 ppm; the rest were in the 0.020 – 0.1 ppm range.

Results from the community of York Landing (*Kawechiwasik)* showed that 33% of the population were tested in 1989/90 (or 102 people). Of those tested, 98% had values in the normal range and 2% in the 0.020 – 0.1 ppm range. In both Split Lake and York Landing (*Kawechiwasik)*, no women of child-bearing age or children between 1 and 12 years of age had values outside the normal range (*e.g.*, greater than 0.019 ppm).

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[1] The program was a result of Claim 18 in 1981, under the Northern Flood Agreement (NFA), which alleged that Canada, Manitoba and Manitoba Hydro had not met a responsibility of the NFA "to implement a long-term coordinated ecological monitoring and research program that would allow evaluation of impacts on the communities" that signed the NFA and belonged to the Northern Flood Committee.

[2] ppm means parts per million.

Health Canada data showed the highest levels of mercury in people living at South Indian Lake and Nelson House. People living at Split Lake and York Landing (*Kawechiwasik)* showed lower values as compared to South Indian Lake and Nelson House. The lowest mercury levels were found in residents of Norway House and Cross Lake. The Final Report noted that the Health Canada data had several limitations that made it difficult to look for trends in the data[1].

Other mercury testing that has been done was at the request of Nisichawayasihk Cree Nation and was reported on in the Wuskwatim Environmental Impact Statement. Two sample groups (a random group and a volunteer group) from Nelson House and South Indian Lake were tested in 2000 – 2001, which provided a brief snapshot of mercury levels in those who were tested. No one tested in the "at risk" range from either community:

- Random group: 97-98% tested in the normal range; and 2-3 per cent in the "increasing risk" range; and
- Volunteer group: 91-96% tested in the normal range; and 4-9 per cent in the "increasing risk" range.

5.3.3.2 Keeyask Cree Nations

Based on their experiences with previous hydroelectric development and through the FEMP, the issue of mercury and human health became a primary concern for the KCNs in relation to the Project. As such, a Mercury and Human Health Technical Working Group (hereafter the Technical Working Group, or TWG) was established by the Keeyask EIS Coordinators, which included representatives from each of the KCNs communities, the Environmental Assessment Study Team and Manitoba Hydro. The EIS Coordinators agreed that it was essential that invitations be extended to each of the four KCNs communities. The TWG similarly was composed of KCNs Members and representatives of Manitoba Hydro and the Environmental Assessment Study Team. An independent specialist, Dr. Laurie Chan (at the time associated with the University of Northern BC; now with the University of Ottawa), was hired to provide guidance to the Technical Working Group as well as to undertake a peer review of the human health risk assessment; and an independent toxicologist, Mr. Ross Wilson of Vancouver, BC was hired to do the human health risk assessment. The TWG occasionally included the participation of the Medical Health Officer of the Burntwood Regional Health Authority.

Informed by the first workshop in June 2007, three purposes of the TWG were identified by participants:

- To answer the KCNs communities' and Manitoba Hydro's questions about mercury and human health today;
- To answer the KCNs communities' and Manitoba Hydro's questions about future mercury effects on human health if the Project is developed and ways to reduce those effects; and
- To develop ways to effectively communicate with communities about what has been learned.

[1] Limitations included the large unevenness in the number of community members tested each year; the fact that the data did not allow one to follow an individual person from year to year in the published records; and that reporting was done on an annual basis, which does not allow finding any seasonal patterns or trends.

The TWG met 14 times between June 2007 and June 15, 2011 for workshops to address the purposes noted above (see Appendix 5B for a complete list of meeting dates). Over the course of 2007-2011, TWG members reviewed and provided feedback on presentations, technical reports, summary reports and a variety of products that were being developed for communication to community members (most notably the KCNs communities). Throughout the process, feedback from TWG members regarding the content, style and method of communication guided the development of communication products. This included advice with regard to language on placemats, posters, presentations and other communication tools, types and size of fish to include in the risk assessment, as well as the most effective community communication methods (such as videos, pictures of people holding different size fish for scale and cardboard cut outs of fish) (see Section 5.3.3.5 for further details on the communication strategy and products).

One of the purposes of the TWG was to provide the KCNs communities with information about mercury in people today – before the Project may change the environment. Mercury builds up in the tissue and organs of fish (especially predatory fish such as jackfish and pickerel), aquatic mammals and birds, all of which are traditional food sources of the KCNs. People are at the top of this food chain therefore mercury levels in fish, aquatic mammals and birds can build up in people eating these animals. Through the TWG, the KCNs communities asked questions about the levels of mercury that could cause health effects, the kinds of health effects that are caused by mercury and the levels of mercury that have been found in people in the KCNs communities. Past and current research demonstrates that exposure to elevated levels of mercury for an extended period of time may cause health effects to the nervous system, (*e.g.,* motor skills, irritability, tremors, changes in vision/hearing, memory loss, decrease IQ). Generally, young children and women of child bearing age are of primary concern with respect to mercury exposure, although persons of any age or gender may experience health effects if the exposure if great enough (Wilson 2012; Mergler *et al* 2007).

The TWG provided the opportunity for the KCNs to voice their questions and concerns as they related to mercury. The types of queries raised throughout discussions included the following (see Appendix 5B for the full list of questions and answers):

- What the mercury guidelines suggest about safe levels of fish to eat in the Keeyask area and in proximity to KCN communities today (*e.g.*, Stephens Lake, Gull Lake, Split Lake, and Clark Lake);
- The effects, signs and symptoms of high levels of mercury on people;
- Whether mercury stays in the body forever;
- The treatment for mercury poisoning;
- The effect of mercury on mental health;
- The effect of eating a large amount of fish at once (*e.g.*, eating a lot of fish when out on the land) compared to smaller amounts over time (such as over one week);
- Whether communities should be concerned about the amount of fish being eaten by young people and children when out on the land;

- The safety of swimming in water that has mercury;
- Whether mercury will be released after the water is chlorinated through the water treatment process;
- The commercial limits for mercury in fish (are they the same as health guidelines?); and
- The plan if fish in a lake are found to have levels of mercury that are too high for eating.

Although the list of community concerns in relation to mercury were valid, an important message for the TWG was to emphasize that eating of traditional foods such as fish needs to be balanced with the knowledge of mercury levels in different food sources. Country foods including fish are very important to a person's diet and contribute to overall health. Due to perceived risk/fears and lack of information from trusted sources, many KCNs Members indicated that they had either stopped, or decreased, the level of eating fish and other traditional foods. Because fish in the right quantity are very healthy components to a diet, it was important to address the community concerns and encourage community Members to eat appropriate amounts and types of fish. To this end, a communication strategy was identified as a very important component of the TWG's work together. Details of this strategy are presented in Section 5.3.3.5.

As a result of these concerns, and in an effort to ensure that risks (and benefits) associated with eating a diet rich in traditional foods was understood, the TWG selected Ross Wilson (Wilson Scientific) a toxicologist expert in the field of mercury, to complete a human health risk assessment (HHRA). The purpose of the HHRA was to address current and potential increased mercury concentrations in the environment that may result if the proposed Project is approved. The HHRA Technical Report is provided in Appendix 5C. As noted earlier, Dr. Laurie Chan, a mercury and human health specialist was selected by the TWG to provide independent advice to the TWG, including conducting a peer review of the HHRA Technical Report and communication products developed for use in the communities.

At the TWG workshop in October 2007, Ross Wilson explained the purpose of the HHRA and the steps he would take in preparing the risk assessment – these included:

- The HHRA would aim to provide an accurate assessment of current consumption, and future impact of mercury. The assessment would identify if certain country foods need to be avoided, and which country foods are safe to eat and in which amounts. This information could be presented to the communities to help inform individuals how to make safe choices within the understanding that the benefits of eating these country foods are substantial in contributing to overall health.
- The approach would be consistent with that used by the World Health Organization and Health Canada, which is based on the concept to minimize exposure to toxic chemicals (in this case mercury), and to note that there will be levels where it is safe to eat certain country foods.

The TWG participated in the "Problem Formulation" to identify the people of concern and the exposure pathways of concern related to mercury. Through discussion, the following was identified:

- People of concern were identified as all ages that can be exposed. In terms of the risk assessment calculations, three groups were included: adults (men and women past child-bearing age), toddlers up to 4 yrs. of age and women of child-bearing age; and

- Exposure pathways are primarily country foods.

Once the people of concern (by cohort group), exposure pathways and chemical were identified, the human health risk assessment was prepared (see Appendix 5C for details).

The specific questions that the HHRA addressed were:

1. Is it safe to eat fish under present conditions?
2. If the proposed Project is approved, what are the risks to persons consuming fish, aquatic fur-bearing animals and ducks?

The HHRA also considered the domestic uses of the land by the various First Nation groups. In addition, the most recent scientific evidence on health effects from mercury was reviewed and considered in the risk assessment. The HHRA also produced guidelines for the consumption of select traditional foods for the existing environment (see Section 5.3.3) in addition to projections for the post-Project environment (see Section 5.4.2).

As input to the HHRA, the TWG members were asked to assist with providing information about the types of country foods used by people in the communities in the area (Gull Lake, Stephens Lake and Split Lake). They were asked which country foods were eaten, how often, and in which season(s). The TWG identified country foods in the main food groups of fish (whitefish, jackfish, pickerel and sturgeon), wild game (beaver, muskrat, moose and snowshoe hare), and waterfowl (ducks). The TWG also identified that community members had concerns about Gull eggs and wild plants (northern tea, blueberries and Seneca root); however, there are no estimates of mercury concentrations in these foods so the risk assessment did not include these foods. The TWG members were also concerned about drinking surface water from Gull or Stephens Lake and swimming in these waters, and whether there was an exposure pathway to mercury through these sources. As such, ingestion of surface water and skin contact with surface water in Gull and Stephens lakes was included in the HHRA (Wilson Scientific 2012).

Realistic estimates of country foods eaten were required and the KCNs community Members assisted in providing this information as well as ensuring that all major food groups of country food were represented. The KCNs community Members were also asked to advise if anything was missed.

Risks were estimated as Hazard Quotient values and used the following formula:

$$\text{Hazard Quotient} = \frac{\text{Estimated Exposure (µg/kg body weight/day)}}{\text{Tolerable Daily Intake (µg/kg body weight/day)}}$$

With respect to Health Canada guidance for foods, a Hazard Quotient value of 1 is typically considered to be the maximum acceptable exposure that will not be associated with unacceptable risks; therefore this value was used as the acceptable risk for mercury.

In addition to estimation of risks as Hazard Quotients, the Recommended Maximum Weekly Intakes (RMWIs) for the various country foods were estimated in the HHRA. The RMWI represents the amount of food that if consumed on a weekly basis would result in an exposure that is equal to the Tolerable Daily Intake (and thus result in a Hazard Quotient value equal to 1) (Wilson Scientific 2012).

MERCURY CONCENTRATIONS AND TRADITIONAL FOODS TODAY

Current levels of mercury in the traditional foods identified as central to the HHRA were obtained and are presented below. This information was used to calculate risk and make recommendations about consumption of each type of food. Surface water was also examined and is presented in this section.

Table 5-10 provides a summary of the mercury concentrations in fish muscle tissue that were used in the HHRA and referred to as "present concentrations". These concentrations were estimated by the aquatic study team and can be found in the AE SV. Note that present mercury concentrations in lake sturgeon are based on only 13 fish from one location (Gull Lake).

Table 5-10: Total Mercury in the Muscle Tissue of Length Standardized* Fish from Gull and Stephens Lakes: Present Concentrations (2001-2006 for Gull Lake, 2001-2005 for Stephens Lake)

Species	Mercury Concentration (ppm; wet weight)*	
	Gull Lake	Stephens Lake
Lake whitefish	0.07	0.09
Jackfish	0.22	0.26
Pickerel	0.23	0.29
Lake sturgeon	0.20	No measurements currently available

Source: concentrations provided by the aquatic study team and summarized in Wilson Scientific 2012.
Note:
* Standard lengths: lake whitefish 350 mm; jackfish 550 mm; pickerel 400 mm, lake sturgeon 1,300 mm. Individual mercury concentrations will be dependent upon the size of the fish with the smaller fish having generally lower concentrations than bigger fish.

Table 5-11 provides a summary of the mercury concentrations in muscle tissue of wild game that were used in the HHRA for present concentrations. Mercury in wild game was estimated as total mercury concentrations (*e.g.*, present in both inorganic and methylmercury forms). These concentrations were estimated by the terrestrial study team and can be found in the Terrestrial Environment (TE) SV.

Table 5-11: Total Mercury in the Muscle Tissue of Wild Game Collected from the Project Area: Present Concentrations

Species	Mean Mercury (ppm; wet weight)	Range of Concentration (ppm; wet weight)
Beaver	0.01	<0.01 – 0.05
Muskrat	0.02	<0.01 – 0.06
Moose	0.07*	<0.01–0.17
Snowshoe Hare	0.05*	<0.01–0.12

Source: concentrations provided by the terrestrial study team and summarized in Wilson Scientific 2012.
Note:
* Mercury concentrations in moose and snowshoe hare was only a literature estimate and may have greater uncertainty than other species for which measured values were obtained from the study area.

As described in the HHRA Report (see Appendix 5C), the terrestrial study team estimated that concentrations of mercury in ducks would be similar to or less than concentrations measured in local whitefish; therefore mean mercury concentrations for ducks in Gull Lake are estimated as ≤0.07 ppm and ≤0.09 ppm in Stephens Lake. All mercury in ducks was assumed to exist as methylmercury and mirrored lake whitefish concentrations. No information was available on mercury concentrations in gull eggs, therefore an assessment on gull eggs was not possible (Wilson 2012).

The KCNs communities also identified the key plant species of blueberries, Northern or Labrador tea and Seneca root; however, there was no information available on present concentrations in these plants. In order to establish some baseline information, a volunteer plant collection protocol was developed in 2011 for the KCNs community Members to collect samples of these plants and provide them to an independent lab for testing. At the time of submission, no plant samples had been provided and tested.

Mean total mercury concentrations in surface water measured in Gull and Stephens lakes were less than the analytical method detection limit[1] of 0.05 µg/L (see AE SV). The maximum measured total mercury concentration for the entire Study Area (Split Lake to the Nelson River estuary) was 0.32 µg/L measured in August 2003. Mercury has been detected across the Study Area and at three sites has occasionally exceeded the Manitoba Water Quality Standards, Objectives, and Guidelines for freshwater aquatic life of 0.1 µg/L. However, all samples were within the Manitoba drinking water guideline of 1 µg/L.

Table 5-12 presents the assumed consumption rates of the country foods examined in the HHRA. These rates of consumption were used at the request of the KCNs communities as provided at the Country Foods Workshop in October 2009. The HHRA considered these values in order to ensure a conservative assessment and address all concerns of the KCNs communities.

[1] The lowest level of detection according to the analytical method used for the Keeyask Project.

It was also recognized that certain fish are only consumed at certain times of the year (*e.g.*, sturgeon are only consumed in the spring and the fall). This less than continuous exposure is not considered in the HHRA because the key concern is developmental toxicity. Developmental toxicants sometimes only require a couple of weeks of exposure to bring on adverse effects and the fact that a pregnant woman only consumed a certain country food for a few weeks during pregnancy would not necessarily be a mitigating factor that would diminish the potential developmental toxicity.

Due to developmental toxicity risks, groups at increased risk (*e.g.*, women of child-bearing age and young children) need to be more cautious and selective in the types and amount of country foods eaten. Overall however, it is important to maintain eating safe country foods (including fish) as a key contributor to a healthy diet.

Table 5-12: Assumed Consumption Rates of Various Country Foods Consumed by First Nation Communities

Food Type	Serving Size for Young Child	Serving Size for Adult	Frequency of Consumption
Fish			
Whitefish	100 g (or 3.5 ounces)	400 g (or 14 ounces)	Three times per week
Jackfish	100 g (or 3.5 ounces)	400 g (or 14 ounces)	Three times per week
Pickerel	100 g (or 3.5 ounces)	400 g (or 14 ounces)	Three times per week
Sturgeon	100 g (or 3.5 ounces)	400 g (or 14 ounces)	Three times per week
Wild Game			
Beaver	57 g (or 2 ounces)	200 g (or 7 ounces)	Three times per week
Muskrat	57 g (or 2 ounces)	200 g (or 7 ounces)	One time per week
Moose	100 g (or 3.5 ounces)	400 g (or 14 ounces)	Five times per week
Snowshoe hare	57 g (or 2 ounces)	200 g (or 7 ounces)	One time per week
Waterfowl			
Duck	57 g (or 2 ounces)	200 g (or 7 ounces)	One time per week

Source: Wilson Scientific 2012.

Based on the measured current mercury concentrations in lake whitefish, jackfish, and pickerel in Gull and Stephens lakes and lake sturgeon in Gull Lake, and the respective serving sizes and eating rates, a range of risks were calculated for the groups evaluated (*e.g.*, young children up to 4 yrs. of age, women of child-bearing age and adult males/women beyond child-bearing age).

The greatest risks were estimated from eating jackfish and pickerel (due to their higher tissue mercury concentrations relative to other fish species) from either Gull or Stephens lakes. These two predatory fish species have mean mercury concentrations that are in the range (greater than 0.2 ppm but less than 0.5 ppm) where various health agencies have recommended that young children and women of child-bearing age may want to restrict eating these types of fish to a meal or so per week (Wilson Scientific 2012).

The concentrations of mercury in lake whitefish were below the concentrations where restrictions may apply to young children and women of child-bearing age; lake sturgeon in Gull Lake were equal to the arithmetic mean concentrations of 0.2 ppm. Wilson Scientific is not aware of any international health agencies that would take issue with persons consuming fish with mercury concentrations less than 0.2 ppm. Importantly, both lake whitefish and sturgeon fish are excellent sources of nutrition.

In order to minimize risks (due to bioaccumulation of mercury), smaller, younger or non-predatory fish should be selected over larger, predatory fish. Other ways to reduce the risk would be to eat smaller serving sizes or eat the fish less frequently.

Table 5-13 provides fish consumption recommendations using the serving sizes provided by the KCNs. These recommendations are for present day conditions and are based on actual size distributions that currently exist.

In the case of lake sturgeon (for which only data for 13 fish from Gull Lake was available and for which the length-mercury concentration relationship was not significant), it is recommended that sturgeon of less than 48 inches (or 1,200 mm) can be eaten on an unrestricted basis (*e.g.*, these fish would have mercury tissue concentrations of 0.2 ppm or less).

Table 5-13: Eating Recommendations Based on Fish Size Class: Current Conditions (based on Mean Mercury Concentrations)

Receptor Group of Concern	Lake Whitefish			Jackfish (Northern Pike)			Pickerel (Walleye)		
	<300 mm	300-450 mm	>450 mm	<400 mm	400-800 mm	>800 mm	<400 mm	400-550 mm	>550 mm
Gull Lake									
Women of childbearing age and toddlers	Unrestricted eating	Unrestricted eating	Unrestricted eating	Unrestricted eating	Eat up to 1 serving per week	Avoid eating	Unrestricted eating	Avoid eating	Avoid eating
Women past child-bearing age; adult men	Unrestricted eating	Unrestricted eating	Unrestricted eating	Unrestricted eating	Eat up to 1 serving per week	Avoid eating	Unrestricted eating	Eat up to 1 serving per week	Avoid eating
Stephens Lake									
Women of childbearing age and toddlers	Unrestricted eating	Unrestricted eating	Unrestricted eating	Unrestricted eating	Avoid eating	Avoid eating	Unrestricted eating	Avoid eating	Avoid eating
Women past child-bearing age; adult men	Unrestricted eating	Unrestricted eating	Unrestricted eating	Unrestricted eating	Eat up to 1 serving per week	Avoid eating	Unrestricted eating	Eat up to 1 serving per week	Avoid eating

Source: Wilson Scientific 2012.

Notes:

- Based on serving sizes of 14 ounces (400 grams) per serving for men and women and 3.5 ounces (100 grams) per serving for toddlers.
- A Hazard Quotient value of one was assumed to be acceptable; however, all fish less than 0.2 ppm were classified as low and no eating restrictions were recommended.

Risks from eating wild game (beaver, muskrat, moose and snowshoe hare) were estimated for the current conditions. The serving size and how often wild game is eaten were based on information provided by the KCNs and are considered to represent upper bound exposures.

Based on the predicted current total mercury concentrations in beaver, muskrat, moose and snowshoe hare, respective serving sizes and how often these foods are eaten, no unacceptable risks were calculated for the groups evaluated (*e.g.*, toddler, women of child-bearing age or adult males/women beyond child-bearing age). People can continue to eat these foods at the amounts and frequencies that they are accustomed to under current conditions (Wilson Scientific 2012).

There is some uncertainty in regard to the moose and snowshoe hare concentrations of mercury and it is recommended that monitoring of these species be completed to confirm that the assumed mercury concentrations were reasonable. In addition, a 2010 and 2011 volunteer sample protocol was established with the KCNs whereby samples from harvested moose and caribou could be sent to an independent lab for mercury concentration analysis to provide further baseline conditions. Some moose and caribou samples have been collected (no snowshoe hare samples); however, the sample size was very small.

Risks from eating ducks were estimated for the current conditions. The serving size and how often waterfowl are eaten were based on information provided by the KCNs. Based on the predicted current mercury concentrations in ducks from Gull Lake and Stephens Lake (expected to mirror those of lake whitefish concentrations) and the respective serving sizes and how often waterfowl are eaten, no unacceptable risks were calculated for the groups evaluated (*e.g.*, toddler, women of child-bearing age or adult males/women beyond child-bearing age)[1]. Geese are expected to have lower concentrations than ducks; therefore, no unacceptable risks are predicted for consuming geese (Wilson Scientific 2012). There is some uncertainty regarding duck concentrations and monitoring of these species has been recommended to ascertain if the assumed mercury concentrations remain reasonable (see TE SV).

No risk estimates were available for gull eggs as no estimate of the mercury concentration of these eggs was available.

No risk estimates were available for northern tea, blueberries or Seneca root as no estimate of the mercury concentration of these wild plants was available. To provide an estimate of risks, monitoring of wild plants would be necessary. As noted previously, in 2011 a plant sampling protocol was developed to enable the volunteer collection of plant samples of these species for independent mercury testing under current conditions. No samples have been provided as yet.

For the purposes of the risk assessment only, it was assumed that KCNs communities would drink surface water as a drinking water source. In addition, it was assumed that the KCNs communities would use the water for bathing/swimming. Mercury was assumed to be present in surface water at a concentration equal to the analytical method detection limit of 0.05 µg/L. This concentration is considerably lower than the Canadian Drinking Water Guideline of 1 µg/L for total mercury.

[1] Mercury present in duck is assumed to be methylmercury rather than total mercury.

The result of the risk estimates found that contact with or drinking surface water does not pose unacceptable health risks under the current conditions (in relation to mercury).

The risk assessment also considered potential risks to people who may be exposed to mercury from various elements of the environment (*e.g.*, people who drink the water and eat the identified country foods or people who may eat moose, fish and duck all in one week).

In the case of adding mercury-related risks from surface water exposures to eating country foods, the combination of these activities does not change the conclusions or recommendations presented above or in the HHRA. This is because the Hazard Quotients for contact with surface water are so low that when the Hazard Quotients are added to together, the value essentially remains unchanged.

In the case of interactive effects from eating multiple foods, there are too many possible combinations to fully evaluate all possible interactions that may occur. However, it is clear that eating fish is the main contributor in terms of health risk. Despite a number of combinations where the exposure may exceed the Tolerable Daily Intake, the recommendations for eating country foods are sufficient as noted in the HHRA. Because the most risk comes from eating large predatory fish (jackfish and pickerel) and long-lived fish (lake sturgeon), the recommendations indicated in the HHRA should be followed in order to reduce the risk of additive exposure from eating other foods that may contain mercury (Wilson Scientific 2012).

5.3.3.3 Gillam

Residents of Gillam could be exposed to fish primarily from Stephens Lake, both through personal and or sport fishing and through restaurant and store-bought pickerel supplied by the only special-licence holder who sells his catch locally. It is assumed that serving sizes and frequency of meals would be less than those estimated for the KCNs; however, to be cautious, the same recommendations used for the KCNs would be applicable to residents of Gillam concerning domestic consumption of fish from Stephens Lake. Sport fishers should refer to the Manitoba Water Stewardship Guidelines for Mercury in Fish in Manitoba (Manitoba Water Stewardship 2007).

5.3.3.4 Thompson

Residents of Thompson could be exposed to fish from Gull and Stephens lakes through personal and or sport fishing; however, Thompson residents are not likely to be consuming fish from these areas to the same degree as residents of Gillam or the KCNs. Thompson residents should follow the Manitoba Water Stewardship Guidelines for Mercury in Fish in Manitoba (Manitoba Water Stewardship 2007).

5.3.3.5 Communication Strategy and Products

COMMUNICATION STRATEGY

As noted in Section 5.3.3.2 above, the Mercury and Human Health TWG developed a communication strategy to communicate the results of the technical analysis about mercury and human health to communities in the vicinity of the Project. The key elements of the strategy include:

- **Balanced Message:** The message should balance risks and benefits of country food use. The message should encourage country food use, within consumption guidelines based on the technical human health risk analysis. The messages should be set within the overall context of healthy nutrition and the role that country food plays in a healthy diet.
- **Two Phases of Communication:** Phase 1 would focus on the existing environment – consumption guidelines based on mercury levels today. Phase 2 would focus on the environment after impoundment. Just prior to impoundment, communication products would introduce the upcoming changes in mercury levels that will come within 3-5 years after impoundment of the reservoir. Consumption guidelines will be provided through the Project's Monitoring Advisory Committee based on estimates and updated with monitoring results (see Sections 5.4.1.3 and 5.4.2.3 for further detail on effects of the Project on mercury and consumption guidelines).
- **Target Groups:** Communities who may use and or help inform the public in the area in the vicinity of the Project:
  - TCN, WLFN, FLCN and YFFN (Chiefs and Councils, health care providers and Members);
  - Gillam (Mayor and Council, health care providers and general public);
  - Health care agencies (provincial and federal); and
  - Other resource users (*e.g.*, sport fishers) who make use of the area.

COMMUNICATION PRODUCTS

In order to assist communities and individuals in achieving the right balance – *e.g.*, continuing to eat country food safely while being knowledgeable of the risk – the Mercury and Human Health TWG is preparing a series of communication products for use in the communities in the vicinity of the Project. The products are to be sent to provincial and federal health agencies in addition to each of the KCNs communities and Gillam. The communication products include mercury placemats, a poster, maps, a mercury yardstick, a PowerPoint presentation for health care providers and a video-enhanced PowerPoint for in-community use.

The communication strategy and associated products are intended to inform and educate KCNs communities and residents of Gillam about the health benefits and risk re: mercury associated with eating country foods. Currently, as noted in the preceding sections, there is some level of mercury in existing country food, most notably pickerel and jackfish that requires young children and women of child-bearing age to be more selective in the type and amount of fish they consume. Overall, eating country

foods safely is an important part of a healthy diet; community residents are encouraged to follow the consumption recommendations that afford substantive health benefits from eating country food

5.3.4 Public Safety and Worker Interaction

Public safety refers to the overall prevention and protection of people from issues that affect their personal and collective safety and security (*e.g.*, acts/activities that may cause harm) (Public Safety Canada 2009). "Security is a fundamental component of well-being that involves safety and protection from harm. It also involves individual and community perceptions of safety, which can be just as important to well-being as the experience of threats or harm" (Human Resources and Skills Development Canada n.d.). In the context of the Project, effects related to public safety would mainly be attributable to an influx of workers into nearby communities and spending of new income associated with Project employment. Public safety as a VEC does not include safety concerns related to the actual construction or operation of the Project, which Manitoba Hydro is required to address under regular workplace safety standards.

This section addresses the following topics:

- A review of the public safety concerns experienced with past hydroelectric projects in the Local Study Area, including worker interaction and alcohol related issues;
- An overview of available crime and public safety statistics; and
- A description of the public safety enforcement infrastructure and programs available in each community as well as issues, concerns and gaps identified during key person interviews.

5.3.4.1 Public Safety Issues from Past Hydroelectric Projects

The KCNs have witnessed the development of multiple hydroelectric projects on the Nelson River system (see Section 2.2.1.4). This has resulted in a variety of experiences with a non-local workforce, some positive and some negative; although the latter are more likely to be identified in relation to the Project. These past experiences have resulted in fears associated with negative interaction with non-local workers at the construction camp (*e.g.*, racism), negative interaction with non-local workers who go into Thompson or Gillam during their "off" time, and finally the potential for non-local workers to visit the KCNs' home communities and the potential for disruptive behaviour to ensue. While concerns about effects on public safety related to an influx of non-local workers are most frequently raised by and cause anxiety for FLCN, similar concerns have also been identified by the other KCNs based on experiences with past major construction projects in the Local Study Area. For example, TCN has raised similar concerns about worker interaction in their community of Split Lake based on past experience of their Members (CNP, *pers. comm.* 2012).

The Town of Gillam's history in particular includes periods of large influxes of transient construction workers primarily associated with hydroelectric development. During these periods, Gillam was known to become a rowdier community, with higher rates of alcohol-related incidents (Gillam KPI Program 2009-2010). During the construction of Limestone a separate RCMP detachment was created in the

temporary community of Sundance to deal with the influx of non-local construction workers to the area, and with potential worker interaction issues with the local community (FLCN 2009a Draft).

Because of their location in and in-proximity to Gillam, FLCN has a long history of interaction with hydro development construction workers, beginning with the development of the Kettle Generating Station in the 1950s. When Manitoba Hydro began construction of the Kettle Generating station in 1966 the population of Gillam was approximately 350 people. By 1969, there were approximately 1,800 people living in Gillam, and an additional 1,500 living at the construction camp. (Manitoba Department of Industry and Commerce 1969, 1978). FLCN describes this transition in saying "within months, the demographic of Gillam changed from being predominately Cree families to predominately non-Aboriginal men" (FLCN 2009a Draft). One Member of the community described this in saying, "Before Hydro came we always thought we were one people. After Hydro there was a lot of friction and discrimination" (FLCN 1997).

Alcohol often fuelled the negative experiences that FLCN Members remember. One description of the bar at the Kettle construction camp stated "the male-only bar quickly became the centre for many workers, and drinking became one of the most popular leisure activities in the camps" (FLCN 2009a Draft). "The quiet town (FLCN) once knew was transformed almost overnight into a place where street parties, brawls and violence were commonplace" (FLCN 2009a Draft). One Elder described this in the Fox Lake History saying, "I can't say how many thousands of men there were – but there were a lot of men and all the women around here were ours. Ours, unfortunately" (FLCN 2009a Draft).

In recent years the Members of FLCN have spoken candidly of their past experiences with hydroelectric development. There are numerous stories associated with rampant alcohol use in combination with the influx of non-local male construction workers. The FLCN History describes the results of the "party" atmosphere that existed with past projects including stories of fights, assaults, sexual assaults, pregnancy, and a hit-and-run incident involving drunk driving that resulted in the death of a community Member (FLCN 2009a Draft). Among the issues identified by the community were harassment, racist comments, enticement to alcohol and drug use, sale of drugs, physical abuse, violence, infidelity, pregnancy, and paternal abandonment (FLCN KPI Program 2009-2011). FLCN has reported that interaction incidents during past hydroelectric projects have left psychological and emotional scars with their victims that have lasted for many years and in some cases a lifetime. The consequences of these incidents, such as depressive-like behaviour, have not only affected the victims of these incidents, but also their families and friends.

The use of alcohol was not limited to the construction crews who arrived in the area to work on projects. Alcohol also became readily available to the Members of FLCN, in particular those who found employment on the project. The Fox Lake History provides numerous accounts of Members finding employment on projects and spending their earnings on alcohol; however, the history also notes that alcohol abuse could be attributed to a range of factors including coping with residential school experiences as well as coping with the changes to the social environment in Gillam.

5.3.4.2 Public Safety Indicators in the Local Study Area

Two of the key public safety indicators related to community well-being are rates of property crimes and rates of violent crimes (Human Resources and Skills Development Canada2012). As of 2010, the overall "volume and severity of crime reported by police declined or remained stable across most of the country" (Brennan and Dauvergne 2011). That being said, Manitoba continues to report the highest violent Crime Severity Index[1] of all the provinces, despite an 8% decrease between 2009 and 2010. In addition to this, the police-reported Crime Severity Index ranked Thompson as the second highest value for centres with more than 10,000 people in the country (Brennan and Dauvergne 2011). Most of the crimes reported to police (79% nationally in 2010) are non-violent[2] in nature (Brennan and Dauvergne 2011). "Although property crime does not involve violence or direct confrontation, it can still undermine the confidence and sense of personal safety of those who have been victimized" (Human Resources and Skills Development Canada2012).

Policing statistics were gathered from the RCMP detachments in Thompson and Gillam, in addition to a policing report specific to the City of Thompson (prepared by the RCMP) for the five year period between 2005 and 2009. The data were aggregated based on each community's RCMP detachment and size, so as to ensure the confidentiality of the smaller communities. As such, the data is presented for the City of Thompson, Split Lake (TCN) and York Landing *(Kawechiwasik)* (YFFN) combined, and Gillam, Fox Lake (Bird) and Ilford (WLFN) combined. These statistics are provided in Appendix 5E.

Despite the high Crime Severity Index ranking provided to the City of Thompson (Brennan and Dauvergne 2011), overall policing statistics for the City of Thompson indicate a decreasing trend in infractions over the period between 2005 and 2009 (Thompson Municipal Policing Reports 2005-2009). This includes a decrease in the overall number of assaults, number of breaking and entering (both business and residential), total theft (over and under $5,000), total fraud, total drug offences, and "other criminal code" offences. The exceptions to this trend include motor vehicle theft and criminal code traffic offences, which have both risen over the same five year period. Similarly provincial statute infractions, under the *Intoxicated Persons Detention Act* have increased since 2005 (Thompson Municipal Policing Reports 2005-2009). The Thompson RCMP detachment indicated that a considerable amount of time is spent dealing with intoxicated persons, who represent a very small proportion of the overall population (Thompson KPI Program 2008-2009).

In Split Lake and York Landing *(Kawechiwasik)* crime rates have fluctuated somewhat over the five year period between 2005 and 2009, although in many cases are limited to one or two infractions per year. For assaults, infractions were at a low of 49 in 2005 and a high of 94 in 2006, although from 2007 to 2009 the number of assaults only varied by one incident per year, with an average of 82. Theft over $5000 is a rare occurrence (only 1 incident in the five year period), with theft under $5000 only on occasion (between

[1] The Crime Severity Index (CSI) is based upon the volume of crime in addition to the seriousness of crime. In the calculation of the CSI, each offence is weighted based upon the average sentence handed down by criminal courts.
[2] Non-violent crimes include both property crimes and other non-violent criminal code offences. (Brennan and Dauvergne 2011).

zero and eight times per year). Motor vehicle thefts averaged around seven per year, and varied from a low of three incidents in 2007 and a high of 10 incidents in 2006. "Other criminal offences" accounted for the majority of remaining infractions.

The data provided for the Gillam RCMP detachment (including Ilford [WLFN] and Fox Lake [Bird]) was aggregated differently than the Thompson RCMP detachment data, and as such presents the results on slightly different indicators. For example, instead of presenting information on total assaults, all "crimes vs. person" were combined. In the five-year period examined, the overall volume of crimes vs. persons ranged between a high of 82 in 2006 to a low of 42 in 2009. Crimes vs. property have fluctuated over the five year period, with a high of 108 offences (2006), a low of 49 (2005) and an average of approximately 69 offences per year. A large majority of crimes vs. property are a result of mischief (Gillam KPI program 2009-2010). Thefts under $5,000 at an average of 12 incidents over each of the years considered are more common than thefts over $5,000 where the average was three incidents per year, with a high of seven (2009) and low of zero (2005) in the years considered. "Other criminal code" accounted for the majority of remaining infractions. Drug related offences have generally decreased over the five year period, although remain limited to a few infractions each year. Traffic code offences (including both infractions to the criminal code and to provincial statutes) fluctuated over the five year period. Infractions under the *Intoxicated Persons Detention Act* and other liquor related offences were reported under provincial statute infractions, and the Gillam RCMP detachment indicated that a considerable amount of time is spent dealing with a small number of intoxicated persons (Gillam KPI Program 2008-2009).

5.3.4.3 Keeyask Cree Nations

PUBLIC SAFETY SUPPORT AND PROGRAMS

This section provides a discussion of the existing public safety support and programs for the KCNs communities in the Local Study Area. This section includes a discussion of issues, concerns and gaps identified during key-person interviews as well as future plans for public safety programs and infrastructure.

Section 4.3.3 details the policing available in each of the Local Study Area communities. There are two main entities responsible for policing: the RCMP and Band constables hired by each of the KCNs. Band constables are hired directly by each First Nation under a program through Aboriginal Affairs and Northern Development Canada (AANDC) to provide basic policing services on-reserve. There are two RCMP detachments with headquarters in Gillam and Thompson, while the Band constables work on their respective reserves. Band constables work in cooperation with the RCMP detachments as necessary.

5.3.4.3.1 Cree Nation Partners

TATASKWEYAK CREE NATION

The RCMP detachment in Thompson serves the community of Split Lake, in addition to two full-time special constables who are responsible for taking emergency calls and dispatching assistance as required. In addition, the community has two full-time Band constables that have not received training through AANDC; and 7-10 part-time untrained constables who fulfill a security role in the community. The Band

constables/peacekeepers respond to most incidents, which most often relate to domestic disturbances and vandalism (CNP 2010c). The Band constables work closely with the RCMP detachment but the community is not involved in any of the crime prevention, restorative or alternative justice programs that the RCMP offer in other communities (CNP 2010c).The RCMP is called upon largely in relation to assaults (domestic, sexual, aggravated and weapons related) (CNP 2010c, CNP *pers. comm.* 2011).

The TCN Ooskahtisuk Club Project was recently approved for multi-year funding by Public Safety Canada. Designed to reduce substance abuse and anti-social behaviour among children/youth, the program is likely to benefit over 60 children and their families. The goals of the project are:

- "Reducing crime rates among youth;
- Enhancing safety in the Community;
- Improving educational outcomes for youth;
- Increasing high school graduation rates; and
- Encouraging greater success in pursuing upcoming employment opportunities" (CNP 2010c).

TCN Members have expressed the following public safety concerns in their community:

- "Increased vandalism and youth crime;
- Increased incidences of physical violence;
- Drug and alcohol abuse; and
- Self-injurious behaviour" (CNP 2010c).

The community has identified some deficits in terms of the public safety services available over the past five years. Some Members have expressed a desire to see more direct RCMP involvement in the community, while others have noted an increase in Band-hired security positions in recent years to deal with issues like vandalism and youth crime (CNP 2010f; CNP *pers. comm.* 2011).

WAR LAKE FIRST NATION

The Gillam detachment of the RCMP is responsible for policing in Ilford and WLFN. In addition, the Band employs one Band constable in the community. The Band constable will call upon the RCMP for assistance with issues such as domestic violence (CNP *pers. comm.* 2011), although the response time can be slow, usually taking a minimum of two hours from the time a call is placed (CNP 2010f). Use of alcohol on this dry reserve was cited as the most common public safety issue. The Band has applied for funding for a second constable (CNP *pers. comm.* 2011).

WLFN does not have any of the RCMP crime prevention programs available elsewhere in the Local Study Area, although the RCMP has assisted with community recreation initiatives in the past. There is a safe house available to women who experience domestic violence (CNP 2010f).

5.3.4.3.2 Fox Lake Cree Nation

The FLCN Band constable is responsible for policing the reserve in Bird. The Band constable works with the RCMP in Gillam and both parties indicate they have a good working relationship (Gillam KPI Program 2009-2010; FLCN KPI Program 2009-2011). Typically, the types and numbers of incidents in Bird do not require assistance from the RCMP, and consist of things such as traffic offenses, the occasional breaking and entering into homes/businesses, and illegal drugs and alcohol being brought onto the reserve (Bird is a dry reserve) (FLCN KPI Program 2009-2011).

During key-person interviews, FLCN Members generally stated that both Fox Lake and Gillam are safe communities in which to live, due in part to the small size of the community. However, FLCN Members also noted some public safety related concerns:

- The use of alcohol and drugs on-reserve;
- Community Member use of alcohol while in Gillam where alcohol is more readily available;
- A lack of opportunities for youth (*e.g.*, recreation) who are at times prone to mischief;
- The lack of a female Band constable to address issues related to female Members of FLCN; and
- A certain level of mistrust with the current RCMP due to a range of factors including their historical relationship, and regular turnover of the local RCMP complement.

5.3.4.3.3 York Factory First Nation

The Thompson RCMP detachment is responsible for policing the community of YFFN at York Landing (*Kawechiwasik)*. In addition, the Band hires six Band constables for policing in the community who call upon the RCMP as necessary. Conducting patrols, dealing with family violence, search and rescue, and conducting searches for alcohol (York Landing (*Kawechiwasik)* is a dry reserve) are among the list of items Band constables encounter and handle regularly. For more grave incidents such as assault, sexual assault, or weapons-related incidents, the Band constables have two holding cells for imprisoning suspects until the RCMP can arrive from Thompson. It should be noted that it typically takes at least one day before the RCMP can arrive due to the remote location of the community and the lack of all-weather road access (YFFN KPI Program 2009-2010).

Many YFFN Members interviewed feel that York Landing (*Kawechiwasik)* is a very safe community in which to live, due in part to the small size of the community and the extended family relationships that link people together. One of the challenges with the small size of the community is that Band constables are not necessarily recognized as law enforcement officers. As such, the Band constables sometimes call upon Chief and Council for support in enforcing the laws (YFFN KPI Program 2009-2010).

YFFN Members have voiced the following public safety concerns:

- Increasing alcohol-related injuries;
- Changes in the local environment (*e.g.*, high water levels and flooding) that make resource use activities and going out on the land more precarious; and

- Lack of resources/funding to support youth programming, which results in youth being prone to mischief and at times exhibiting violent behaviour (YFFN KPI Program 2009-2010).

5.3.4.4 Gillam

PUBLIC SAFETY SUPPORT AND PROGRAMS

The Gillam detachment of the RCMP is responsible for policing the communities of Gillam, FLCN (in Bird), Ilford and WLFN. The detachment has six constables and one sergeant (with one of the constables being a supplement or temporary employee, providing additional support during periods of turnover).

Key person interviews generally indicated that Gillam is a safe community to live in, due in part to the small population that resides there. Several people suggested the fact that "everyone knows everyone" makes it quite easy to keep track of what is going on, where people are, and what people are doing (in particular children and youth). Most of the interviewees felt that compared to other towns and urban centers, Gillam is a safe place (Gillam KPI Program 2009-2010). The Gillam RCMP confirmed that the detachment is a safe place to live, with the highest number of complaints received associated with alcohol-related incidents limited to a small number of residents in the community. The Gillam RCMP are involved in several public safety programs in Gillam and in Fox Lake including:

- Crime Prevention
  - KARE – Kids Are the Responsibility of Everyone;
  - DARE – Drug Abuse Resistance Education; and
  - School Liaison – An RCMP officer is attached to each of the schools in the detachment.
- Restorative and Alternative Justice
  - Restorative Justice – Detachment members participate in forums related to minor offences to identify alternative solutions. This includes coordination with the Native Alcohol and Drug Abuse Program for FLCN; and
  - Community and Youth Corrections – involves a probation officer who travels on a monthly basis from Thompson. Information on various clients is shared and participants are kept up to date on activities/progress (Gillam KPI Program 2009-2010).

With the designation of Kettle Crescent as reserve land, there is potential that the Band constable program may extend its reach into Gillam, however no official plans have been confirmed to date.

5.3.4.5 Thompson

PUBLIC SAFETY SUPPORT AND PROGRAMS

The RCMP is responsible for policing in the City of Thompson. In addition, the City of Thompson has engaged Prairie By law Enforcement (PBE), a private company to assist in enforcing Thompson's

behavioural bylaws such as public drunkenness, fighting, urinating or other unwanted public behaviours (Thompson KPI Program 2008-2009).

The community benefits directly and indirectly from strategic partnerships that the RCMP forms with other law enforcement and governmental agencies and other community groups. Several unique associations have been formed between the RCMP and various organizations and agencies in the community including the City of Thompson, School District of Mystery Lake, the Addictions Foundation of Manitoba Advisory Board, among others (RCMP 2009). In October of 2009 the Thompson RCMP, the Ma Mow We Tak Friendship Centre, the University of Manitoba's School of Social Work, the Mystery Lake School District and the Thompson Community Foundation launched a new program called Safeguarding Aboriginal Youth Spirits. The Safeguarding Aboriginal Youth Spirits program is a community based mobilization project that looks to assist in the development of a toolkit for gang awareness, prevention and alternatives for Aboriginal youth in Northern Manitoba who are deemed to be at risk for gang involvement.

Thompson is one of nine communities in Canada participating in the "Municipal Drug Strategy." The Thompson RCMP had 3,400 incidents related to the *Intoxicated Persons Detention Act*. These statistics have been increasing each year. The Alcoholism Foundation of Manitoba (AFM) has seen a significant increase in their case loads related to drugs and alcohol abuse in the north. Staff at the YWCA see a direct correlation between the increase in addictions and the increase in money in the community (Thompson KPI program 2008-2009).

A major concern noted by the RCMP in Thompson is the recruitment of young people into gangs. Thompson is working to address this issue by investing in recreation opportunities for youth such as the skate park, the arena upgrade and sport camps in order to provide alternatives for youth during leisure time (Thompson KPI program 2008-2009).

5.3.5 Travel, Access and Safety

As a socio-economic VEC travel, access and safety considers water/ice-based transportation (and the land-based trails used to access traditional and resource use areas that are accessed from the rivers and lakes) and road travel in relation to traffic volumes, access and safety. Existing travel, access and safety conditions in the Local Study Area were determined using a variety of sources including the socio-economic KPI programs, the KCNs' Environmental Evaluation Reports as well as traffic volume and collision data from Manitoba Infrastructure and Transportation (MIT) and the RCMP. Section 5.3.5.1 describes the characteristics of water and ice-based travel on the Nelson River system and includes information on the KCNs' use of the areas in close proximity to the Project. Section 5.3.5.2 describes existing travel, access and safety conditions on roadways in the Local Study Area, including travel on ice roads.

5.3.5.1 Existing Water/Ice-based Travel Conditions

Over many generations, rivers and lakes have served as a travel conduit, a means of communication, and as a valuable dietary resource for First Nations people. According to FLCN, the rivers and lakes provide people with the ability to travel from place to place, which in turn allows them to reaffirm social,

economic and diplomatic ties between one another (FLCN 2010 Draft). Although the Nelson River was known for its swift and fierce rapids before the river was developed as part of Manitoba Hydro's generating system, KCNs Members used the Nelson River like a highway, traveling between communities, resource harvesting areas and the coast for purposes such as hunting, fishing, trapping, gathering and visiting friends and families (CNP Keeyask Environmental Evaluation Report; YFFN Evaluation Report (*Kipekiskwaywinan*); FLCN 2010 Draft). Over the course of time, certain land-based trails and paths used to access traditional resources on foot and by dog sled have evolved and are now used as travel corridors for snowmobiles and all-terrain vehicles. Some of these paths are still used today to access traplines and resource harvesting areas (CNP 2010b).

Rivers, lakes and land-based trails that intersect the waterways in the Split Lake Resource Management Area (SLRMA) are used by KCNs resource harvesters and other residents in the Local Study Area. Of the 83 traplines in the Resource Use Regional Study Area for example, 21 have road access (either all-weather or winter roads) however 62 have no road access (SE SV, Resource Use Section 1.4.3). Waterways and land-based trails are used to gain access to many areas for resource gathering activities including hunting, fishing and trapping.

There are areas throughout the SLRMA that support the Cree's existence and way of life. Many areas are used for traditional practices such as hunting, trapping and fishing, or for recreational activities such as swimming, canoeing and camping. Since the SLRMA is large, the community subdivides it into 12 smaller base camp areas defined by a base camp serving access trails in a particular area. For example, the Split Lake base camp is closest to the Split Lake community (CNP 2010b). In the area around the Project site, TCN have identified 86 km of portages facilitating canoe routes, including Stephens Lake (CNP 2010b). The portages vary in quality with approximately 51 km being overgrown and in need of clearing, 15 km being burned over and in need of re-cutting, and 20 km being deemed acceptable. About 5 km of portages characterized as overgrown extend around the north side of Gull Rapids, with another 15 km proceeding north and east of Gull Rapids to Stephens Lake, intersecting the planned route of the north access road to the Project (CNP 2010b).

There are 208 km of identified and frequently used snowmobile trails in the Split Lake base camp area. A major snowmobile trail between Split and Stephens lakes begins at Split Lake and proceeds 51 km along the north side of the Nelson River to Gull Lake, where it then veers north and east to Stephens Lake, intersecting the planned north access road to the Project. As with the portages, the snowmobile routes in the Split Lake area are in varying conditions with approximately 103 km in acceptable condition (including all of the trail from the community of Split Lake to Gull Lake), 75 km of which is overgrown and in need of clearing, and 30 km that is burned and in need of re-cutting (CNP 2010b).

The Nelson River from Split Lake downstream through Gull Rapids and into Stephens Lake is used by many KCNs Members and Project-induced changes to the water regime in these waterways could affect their travel, access and safety. The following provides a summary of the physical characteristics of the open water and ice conditions between Split and Stephens lakes to provide context for existing travel, access and safety in this area.

OPEN WATER

Split Lake is a widening of the channel on the Nelson River system, which creates a lake-like environment. As shown in Map 1-1 (Communities in the Socio-Economic Local Study Area), the communities of TCN (at Split Lake) and YFFN (at York Landing (*Kawechiwasik)*) are located on the north and south shores of the lake respectively. As described in the Physical Environment supporting volume (PE SV), the present water level on Split Lake is affected by the LWR and CRD projects; and immediately downstream of Split Lake, the river narrows and flows into Clark Lake. Birthday Rapids is approximately 10 km downstream of Clark Lake. The 10 km reach between Clark Lake and Birthday Rapids is approximately 600 m wide and characterized by a turbulent continuous series of rapids and a 4 m drop in water levels. A 2 m drop through the length of Birthday Rapids results in water velocities greater than 1.5 m/s. Two Goose and Portage creeks both discharge into the Nelson River between Birthday Rapids and Gull Lake. Gull Lake is a wide channel in the Nelson River leading up to Gull Rapids. Several small creeks including Broken Boat and Box Bay enter the river in this stretch. Upstream from Gull Rapids, numerous rock outcrops create multiple channels of flow and at Gull Rapids a change in topography creates a drop of approximately 11 m across its length (PE SV). Almost immediately downstream of the rapids is the inlet to Stephens Lake, which acts as the reservoir for the Kettle Generating Station located at the downstream end of the lake. A short distance downstream of the Kettle Generating Station is the town of Gillam.

WINTER ICE

Over the course of the winter a number of different processes lead to the creation of a thermal ice cover in the reach of the Nelson River between Split Lake and Gull Rapids. The specific nature of the ice cover is a function of many variables and can change from year to year depending on water flow, meteorological conditions and effects from past projects. Prior to the LWR and CRD, the timing of ice cover formation and the characteristics of ice on many rivers, lakes and streams was fairly consistent from year to year; although the rise and fall of water levels caused by natural ice formation processes could make the ice cover unpredictable along some parts of the Nelson River including Split Lake (PE SV).

Beginning sometime between mid-October and mid-November an ice cover forms on Split Lake under existing conditions. This cover thickens throughout the winter but is affected by air temperature and the depth of snow cover on the ice. The thickness of ice on the lake can range from 0.8 m to 1.2 m depending on the meteorological conditions. If the snow cover becomes too deep, the weight of the snow can cause the ice cover to sink below the water surface. This can cause cracks to form in the ice and allow water to flood over the ice surface creating "slush" on the lake (PE SV).

In the upstream portion of Gull Lake, the ice cover typically grows to between 5 m and 8 m thick. Downstream from the Project site, low flow velocities in the reach between the foot of Gull Rapids and the inlet to Stephens Lake allows much of the reach to freeze in early fall as lake ice. Depending on air temperatures, a thermal cover of lake ice typically begins to form on Stephens Lake in the early fall (PE SV).

5.3.5.1.1 Keeyask Cree Nations

HISTORIC AND CURRENT TRAVEL AND ACCESS

The existing open water and ice conditions along the Burntwood-Nelson watershed have been altered over the past several decades by hydroelectric developments in particular CRD, LWR and the Kettle Generating Station (see Section 2.2.2). Changes brought about by these activities continue to affect the waterways and shorelines, modifying them from their natural state and affecting the pursuits, activities and lifestyles of residents in the Local Study Area. These developments have reduced the ability of people to travel safely due to water level fluctuations, the reversal of seasonal flows, increased amounts of debris in the water such as peat and deadheads (submerged trees) and shoreline instability and erosion (FLCN 2009a Draft; FLCN 2010 Draft; CNP 2010b; YFFN Evaluation Report (*Kipekiskwaywinan*)).

Within the Local Study Area, parts of the Nelson River immediately upstream from the Project site (upstream from Gull Rapids) are rarely traveled by boat in the summer time. Open water travel from the west downstream to the Project site is known to occur but is impeded by Birthday Rapids, which requires a boat operator that is knowledgeable of local navigation hazards. The waters between Birthday and Gull rapids are navigable According to key person interviews the water through the rapids is fast and dangerous and difficult to traverse in a boat. There were portages on both the north and south sides of the river, however with infrequent use these portages have become overgrown and are not currently in use. Some respondents suggested that those familiar with the rapids might be able to successfully navigate them in a motor boat (FLCN KPI Program 2009-2011). There are three cabins located on the north side of the Nelson River between Birthday and Gull Rapids, two of which are located on the same site (RU Section).

Historically, people traveled by dog team to access both resource use areas and communities prior to the construction of all-weather roads; however, today people travel by snowmobile in order to get out to their trap lines, go ice fishing or to access their cabins (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a; FLCN KPI Program 2009-2011). FLCN Members have indicated there are inherent dangers associated with going out on the ice in winter since water fluctuations and thin ice in some areas can cause unsafe conditions. (FLCN KPI Program 2009-2011).

Large ice pans and sheets that jam or form hanging ice on portions of the river between Birthday and Gull rapids limit ice-based travel in winter, although these ice conditions do not form every year. Additionally, a lack of safe and smooth shore ice between Birthday and Gull rapids reduces or prevents snowmobile travel in winter along some portions of the Nelson River. Under certain weather and ice conditions, the upper portion of the reach between the outlet of Clark Lake and Birthday Rapids forms border ice, which is smooth enough to navigate with a snowmobile. This type of condition is not available every year due to ice front progression that often progresses through Birthday Rapids (Manitoba Hydro. *pers comm.* 2011).

Cree Nation Partners: Tataskweyak Cree Nation and War Lake First Nation

Prior to the construction of roadways and hydroelectric projects in the Local Study Area, CNP Members traveled by boat in summer and dog-team in the winter on established routes over the open or frozen

water. These routes acted as the principal transportation corridors within the Local Study Area and provided linkages to the outside world and places such as Ilford and Gillam. The waterways have been described by Elders as the "lifeblood of their existence" and they were travelled in safety and with confidence.

> They could land anywhere along the banks of the lakes and rivers; the shorelines had not yet been destroyed and desecrated. They could navigate the lakes and rivers in safety and know what to expect. In the winter time they would know where to travel, where the ice was safe (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

Gull Rapids has been an important part of the culture and heritage of TCN. Large social gatherings would occur at the rapids during sturgeon spawning season (CNP Keeyask Environmental Evaluation Report).

The benefits of traditional trapping, hunting and fishing activities are inherently connected to CNP's cultural relationship to the land and waterways of the SLRMA. The social importance of traditional activity is linked to the preservation of the connection between CNP Members and the land, as well as the economic benefits enjoyed from these activities (CNP 2010b). Previously, Members of TCN have said there have been extensive adverse effects from past hydroelectric projects and that, developments of the 1970s reduced access and made it more costly and less safe for people to access their traditional territory. The CRD, LWR and construction of the Kettle Generating Station caused much terrestrial and shoreline habitat to be destroyed by flooding or rendered inhospitable for wildlife and human use by water level and flow changes. The projects flooded shorelines, introduced mud, silt, vegetation and wood debris into the waterways and made the water dirtier (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a, 1996b).

CNP has noted that hydroelectric developments in the 1970s altered the ice regime causing ice to form later in the year and to break-up earlier. In addition, higher winter water flows caused thin ice and slush ice, which resulted in perilous travel conditions (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a, 1996b). The seasonal reversal of water levels on Split Lake from LWR affected ice formation on Split Lake, leaving thin spots requiring travelers to be cautious. There are reports of some community Members going through unstable ice with their snowmobiles.

Today, CNP Members generally access trapline areas and fishing locations using all terrain vehicles (ATVs), snowmobiles, planes, boats and canoes. Members of CNP carry out activities in all seasons that often require the use of waterways including berry picking, hunting, trapping and fishing (CNP 2010b; CNP 2010e).

Based on available information, there is no evidence that TCN navigates through Gull Rapids in the open water season or in winter. Ann 11 m drop across its length, very high water velocities, and numerous rock outcrops prevent safe open-water boat travel across Gull Rapids.

Fox Lake Cree Nation

FLCN Members have permanently resided in the Gillam and Bird area since the construction of the Hudson Bay Railway, although their use of their traditional area has persisted over centuries. In the past, prior to hydro development on the Nelson River, people would travel back and forth between Gillam

and Split Lake as well as downstream toward Hudson Bay. According to Members of FLCN, the original, unaltered Nelson River was known to be powerful, and parts of the river were regarded as fast and dangerous. Areas with a lot of rapids were not usable for travel although people were able to predict river dynamics and practiced strict river safety. Among other things, the water gave people the freedom to move seasonally (FLCN 2010 Draft).

Prior to the impoundment of the reservoir for the Kettle Generating Station, FLCN Members made extensive use of a number of rivers in the Local Study Area including the Nelson, the Kettle, the Butnau and the Moosokot rivers. Both the Butnau and Moosokot confluences were important way-stations for FLCN Members and these areas have been identified as locations for campsites, fishing, hunting, and burial locations (FLCN 2010 Draft). Large rapids including Gull Rapids and Kettle Rapids have been identified as important fishing areas and the rapids between Gull Rapids and the Kettle Generating Station (an area that is now flooded) were highly regarded as sturgeon fishing areas (FLCN 2010 Draft).

Since hydroelectric development began, the waterways have not been the same and this has altered people's use of the area. The creation of Stephens Lake flooded most of the former watershed of the Moosokot River; however, the upper reaches of this river still exist, and draw fishers from FLCN. Stephens Lake continues to be used by a number of FLCN Members for recreational hunting, fishing and berry picking along the shoreline. The western and northern portions of Stephens Lake, continue to be an important resource area for FLCN Members. FLCN reports that fishing is practiced all around Stephens Lake, with considerable activity focused on the Keeyask Rapids area (FLCN 2010 Draft).

Members of FLCN note that when traveling on Stephens Lake by boat, they need to keep an eye out for "floaters[1]" and submerged trees that can damage boats and motors. In addition, debris along the shoreline is noted to be an impediment to landing and accessing the shoreline (FLCN KPI Program 2009-2011).

In the winter, parts of Stephens Lake do not freeze solid and FLCN Members note that this is a safety hazard for snowmobile travel since some people have had their snowmobiles go through the ice (FLCN KPI Program 2009-2011).

Under open water and winter ice conditions most FLCN Members do not travel upstream of Gull Rapids. The reasons given for this include the difficulties associated with navigating the rushing waters of the rapids and difficult ice conditions; and the fact that the area is seen as Split Lake territory (FLCN KPI Program 2009-2011).

FLCN has identified fishing in and around Gull Rapids in the post-Kettle period. A portage route on the north side may have been passable in the past; however, the portage around the north side of the Keeyask rapids is reported to be in an "overgrown" condition, which suggests that travel may be difficult (CNP 2010b).

[1] Floaters are masses of tree and peat that form floating islands and may sometimes have logs in them.

York Factory First Nation

"All of the major waterways in northern Manitoba that flow into the Hudson Bay served as highways for the York Factory Cree and their ancestors" (YFFN 2010). The means of travel between Split Lake and the coast for YFFN Members have included boat, dog team, rail, and a combination thereof. The community's traditional land use and occupation has strong ties to the post at York Factory. The relocation of YFFN to York Landing in 1957 changed the community's physical and cultural landscape. The relocation, combined with Manitoba Hydro developments on the Nelson River system, have "interfered with people's abilities to adapt to the changing physical environment" (YFFN 2010). As the YFFN Evaluation Report *Kipekiskwaywinan* notes, "We no sooner were re-settled on the Aiken River at Split Lake when the first Hydro dam at Kelsey was built. Our new homelands and waters were changed, before we had barely begun to understand and learn about them" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

The CRD and LWR changed water levels on Split Lake, flooding the Aiken River, eroding shorelines, and causing considerable changes in the area. According to YFFN Elders, further subtle changes followed the development of the Kettle Generating Station. According to YFFN Members "increasingly unsafe travel conditions not only make it harder to engage in traditional harvesting activities, but make many of us nervous to travel outside of the community" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

The relocation to York Landing also resulted in travel and access challenges associated with modern means of travel. Access to the community is a key concern for YFFN Members. York Landing is isolated for up to 12 weeks each year as freeze-up and break-up on Split Lake make the lake impassable. This condition is exacerbated by restrictions to air travel, such as extended periods where fog prevents aircraft from landing or taking off. Travel out of the community for meetings, medical appointments, grocery trips, and family visits are equally expensive and this creates an on-going sense of social and psychological confinement in the community (YFFN Evaluation Report (*Kipekiskwaywinan*)).

In the summer, York Landing is accessible by air, by personal watercraft and via ferry service operated by Manitoba Infrastructure and Transportation. Ferry operations, which have been operating for 30 years, begin in the spring when the ice on Split Lake breaks up; and the service typically continues until the end of October. During the spring thaw, debris and floating logs in the lake sometimes cause navigation problems for the ferry, and Members of YFFN have noted that in the summer water erodes the shorelines, pulling away dead trees which pose a threat to boat and ferry navigation on Split Lake (YFFN KPI Program 2009-2010). As quoted in the YFFN Evaluation Report (*Kipekiskwaywinan*), a YFFN Member states : "There's debris along the shoreline and it's hard to land a boat. You have to get out and haul logs away before you can get to shore…sometimes you can't even land your boat. They talk about shoreline clean up; it doesn't even work. It doesn't matter how many trees you clean up." YFFN also note that "Boat drivers now have to learn how to navigate boulders, currents and other new hazards under ever changing water conditions" (YFFN Evaluation Report (*Kipekiskwaywinan*)). Although many Members of YFFN use the ferry service to access their community, this form of travel can be delayed when debris such as floating trees have to be pried out from beneath the ferry or when fog is too thick to navigate safely (YFFN KPI Program 2009-2010).

Travel, access and safety are an important concern for YFFN when undertaking traditional resource use activities – activities that are considered socially and culturally important to YFFN. Some engage in resource use along the Mistuska River and in areas north of Stephens Lake (YFFN Evaluation Report (*Kipekiskwaywinan*)). The Aiken River south to the rail crossing, Split Lake to the mouth of the Burntwood River and the Lower Nelson River are used for open water travel by boat. Winter travel to access traplines is done along transmission line corridors as well as trails and frozen waterbodies.

Further to this, use of the winter road system to access York Landing requires considerable safety precautions as adverse weather conditions and wave action on ice crossings can seriously affect the road. One KPI respondent noted that water fluctuations close to the community throughout the winter can cause "slush ice" to form at certain points along the winter road. At present, water levels on Split Lake reportedly fluctuate up to 0.6 m in the winter and cause the ice to be unsafe and intermittently cause access problems at the ice road to the land road transition leading into the community (YFFN 2010). This can have a serious effect on the communities that rely on the winter road for shipments of supplies. Drivers of large vehicles have reportedly found it difficult to negotiate the steep topography at certain locations, and occasionally heavy equipment is required for assistance (YFFN KPI Program 2009-2010).

EXISTING AGREEMENTS BETWEEN KCNS AND MANITOBA HYDRO

Since the 1960s the LWR and CRD projects have changed the water regime of the Nelson River, resulting in adverse effects on travel, access and safety.

In order to address the adverse effects of LWR, CRD and associated hydroelectric projects, the 1977 Northern Flood Agreement (NFA) and several subsequent implementation agreements with individual First Nation communities were negotiated. TCN and YFFN were signatories to the original NFA along with Cross Lake First Nation (now called Pimicikamak Cree Nelson), Nelson House First Nation (now called Nisichawayasihk Cree Nation) and Norway House Cree Nation. The NFA and subsequent Comprehensive Implementation Agreements are described in the SE SV Section 2: Historical Context.

The NFA contains provisions regarding navigation, including activities that Manitoba Hydro must undertake to ensure the safety of affected waterways. The NFA states that Manitoba Hydro will ensure that debris resulting from their operations including construction, flooding of land or diversion of waters, do not become a hazard to navigation. The NFA has several components to ensure safe passage for those using affected waterways including:

- Boat patrols;
- Debris clearing measures;
- Shoreline stabilization; and
- A safe ice trails program.

The measures noted above are implemented through the Waterways Management Program (WMP), the express purpose of which is to improve safety on waterways affected by Manitoba Hydro's operations. As part of their WMP, Manitoba Hydro now assumes a role in performing cleanup and removal of deadheads in waterways affected by the LWR and CRD and performs extensive cleanup along the

shorelines to prevent more debris from entering the waterways (Manitoba Hydro 2010d; Niezen 2003). In addition, boat patrols map and record daily routes, mark deadheads and reefs, identify debris work areas, place hazard markers identifying safe travel routes for resource users, gather floating debris, deadheads, old nets, *etc.* The debris is gathered on the shoreline and burned over the winter. The boat patrol workers are seasonal Manitoba Hydro employees, hired from the surrounding northern Aboriginal communities (Manitoba Hydro 2010d).

Cree Nation Partners: Tataskweyak Cree Nation and War Lake First Nation

Following the 1977 NFA, TCN entered into the Northern Flood Implementation Agreement in 1992 with Manitoba Hydro, the Province and Canada. The 1992 Agreement established ongoing mechanisms among the parties to implement NFA obligations and defined land and resource management, and environmental monitoring processes within the Resource Management Area. The 1992 Agreement also contained provisions and processes to determine compensation for adverse effects related to "Future Development" and led to the Agreement in Principle (AIP) (2000), which sets out principles and understandings relating to the potential development of the Keeyask Project including Project planning, design, construction and operation.

TCN and War Lake signed a Memorandum of Cooperation and Understanding (2001) setting out the basis upon which they, as the Cree Nation Partners (CNP), would continue to work together to negotiate all matters related to the Keeyask Project. At the time that the NFA was signed, WLFN had not yet been formed as a First Nation separate from TCN and was therefore not a signatory to the 1977 NFA. In 2005, WLFN entered into an agreement with Manitoba Hydro, which outlines methods to offset adverse effects stemming from development in the Churchill, Nelson, Rat and Burntwood River systems as well as the LWR (WLFN *et al.* 2005). This Agreement calls for Manitoba Hydro to provide maps showing potential sites for future hydroelectric development; as well as descriptions of the intended development including the anticipated extent of inundation and an outline of anticipated effects on water levels and rates of change in water levels in the SLRMA.

Fox Lake Cree Nation

Fox Lake Cree Nation has been affected by operations of Manitoba Hydro including the LWR and CRD projects. Although they were not signatories to the original NFA, in 2004 the Fox Lake Impact Settlement Agreement was reached providing the FLCN with compensation. In addition to the financial contributions, the FLCN Agreement also provided for a Resource Management Area within FLCNs traditional territory. Although the risks associated with the use of the Nelson River are fewer downstream of the Conawapa Rapids, in an effort to further reduce the risks associated with the use of the river between the rapids and Hudson Bay, Manitoba Hydro agreed to construct three cabins and install a portable boat landing ramp in the vicinity of each of Monkey Island, Jackfish Island, Weir River, Angling River and Roblin River/Deer Island. In addition, Manitoba Hydro is responsible for the installation, removal and replacement of the boat landing ramps on a seasonal basis. As a further safety measure, Manitoba Hydro also provides FLCN with three satellite phones for the use of FLCN Members who use the Nelson River downstream of Conawapa Rapids (FLCN *et al.* 2004).

York Factory First Nation

York Factory First Nation was a signatory of the 1977 NFA and in 1995 entered into a Comprehensive Implementation Agreement (CIA) that addressed many of the effects of northern hydroelectric development. The YFFN CIA established transportation programs associated with the water flow levels and volumes along waterways affected by Manitoba Hydro's operations. The responsibilities of Manitoba Hydro as outlined in the CIA include:

- Annually supply, install and maintain reef markers as aids to navigation and implement boat patrols.
- Remove debris at shoreline locations where winter ice trails intersect the shoreline and a hazard to access exists.
- Annually prepare, mark, monitor and maintain ice crossings and main trails on the ice for use by snowmobiles and pedestrians (this includes ice trails on Split Lake (near York Landing) and up the Aiken River.
- Post notices on changing ice conditions and load limits and conduct annual public meetings to provide information to YFFN Members on safe use of ice crossings.

5.3.5.1.2 Gillam

EXISTING WATER / ICE TRAVEL

The town of Gillam is located north of the 56th parallel on the south shore of Stephens Lake. Many Gillam residents, including FLCN Members use Stephens Lake recreationally. A number of residents of Gillam have cabins on Stephens Lake. These residents have noted that water fluctuations on the lake are a safety concern for boaters in the summer and snowmobilers in the winter. Water level fluctuations can vary by as much as six feet in one week and can cause dangerous ice conditions. The water fluctuations occur as a result of the Kettle Generating Station, which uses Stephens Lake as a reservoir for its operations (PE SV).

Residents with cottages use snowmobiles in the winter to access their cabins. Information gathered through key person interviews indicates that it is sometimes difficult to get out to cabins in the spring due to fluctuations in water levels that can cause the ice to be slushy; or can create a ditch of water between lake ice and the islands where some residents have their cabins (Gillam KPI Program 2009-2010).

There are snowmobile trails around the town that are groomed about once a week or every two weeks depending on the snow conditions. There are no major snowmobile trails (or network of trails) in the vicinity of Gull Rapids (Gillam KPI Program 2009-2010).

5.3.5.2 Existing Road Conditions and Traffic

5.3.5.2.1 Local Study Area

PROVINCIAL ROADWAYS

The Local Study Area encompasses a large geographic area, is sparsely populated and the distances between communities are quite large as shown in Map 4-1 (Travel Distances in the Local Study Area). Some communities are connected to southern parts of the province by a network of provincially maintained year-round roads. All-weather roads that are open and maintained year-round provide access to the communities of Thompson, Split Lake, Fox Lake (Bird) and Gillam. The roadways relevant to the Project in the Local Study Area include PR 391 and PR 280. These roads, in addition to the ice roads used to access the KCNs communities, are shown in Map 4-1. PR 391 runs north from the city of Thompson. PR 280 runs from the junction of PR 391 northeast to the Keeyask north access road and onward to the town of Gillam. PR 280 is used to access the communities of Split Lake, the ferry landing or ice road to York Landing, Fox Lake (Bird) and Gillam.

The following section describes the present condition of roadways and ice roads including their physical attributes, traffic volume and collision statistics for PR 391 and PR 280 within the Local Study Area. In Manitoba, highways under the control of the Minister of Infrastructure and Transportation (MIT) are classified as either Research Transportation Association of Canada (RTAC) routes, Class "A1" or Class" B1" highways[1]. Each class of highway has its own specific axle loading and gross vehicle weight limits. Both highways are designated as Secondary Arterial[2] by MIT, which means that they are designed to carry up to 6,000 vehicles per day depending on their geometric features (Dillon Consulting 2003; ND Lea Engineers and Planners Inc. 2002).

The Government of Manitoba through MIT has been making improvements to PR 391 and PR 280 for a number of years. In 2002 for example, the Minister of Transportation and Government Services announced that $700,000 would be invested to add additional gravel on various locations of PR 280 between PR 391 and PR 290 including gravel stabilization on 261 km of road (Government of Manitoba 2002; Keeyask Hydropower Limited Partnership 2009). Since then, the roads in the Local Study Area have undergone regular maintenance and improvements, including road upgrades, signage and pull-offs, which should improve travel on PR 280.

In the 2009 Manitoba Budget Address, the Minister of Finance announced that upgrades would be made to PR 280 between Thompson and Gillam as part of the 2009/2010 Highway Infrastructure Projects. MIT requested that Manitoba Hydro manage upgrades to the roads prior to future hydro development such as the Keeyask Project. The project costs are being shared on a 50/50 basis between Manitoba

[1]Class A1 highways are any Provincial Trunk Highway numbered from 1 to 110 while Class B1 highways have number designations higher than 110 (Government of Manitoba 2010d).
[2]Primary Arterials provide intra/inter-provincial and international connections and direct service to the most important and larger population centres. Secondary Arterials connect other important population centres (Government of Manitoba 1997).

Hydro and MIT. The detailed design, contract negotiations, and contract management during construction are managed by Manitoba Hydro while MIT is responsible for environmental licensing, land acquisition, and review and approval of designs. MIT continues to own and maintain the roadway as their asset (Government of Manitoba 2009b). The upgrades to PR 280 are being undertaken by Amisk Construction (a joint venture between TCN and Sigfusson Northern). Tasks associated with the upgrades include widening, smoothing and grading (see Section 4.3.5 for additional information).

PR 391

PR 391 is a two-lane undivided gravel roadway with a posted speed limit of 90 kph (ND Lea Engineers and Planners Inc2002). From the city of Thompson to the Thompson Airport access road, PR 391 is classified as a RTAC Class A1 highway. However, commencing December 1st in any year to the last day of February in the ensuing year, the road is approved as a Seasonal RTAC Route from the city of Thompson and gross vehicle weights (GVW) of 62.5 tonnes are allowed. From March 1 to November 30, the weight limit is reduced to approximately 55 tonnes (Government of Manitoba 2010f.).

PR 391 Traffic Volume

Table 5-14 describes PR 391 traffic volume data collected by MIT for the years 2003, 2005, 2007, 2008 and 2009 as a count for the Average Annual Daily Traffic (AADT[1]) and Average Summer Daily Traffic (ASDT[2]). The counts, shown in Table 5-14, represent one-way traffic at Traffic Monitoring Station 2151. The AADT on PR 391 for the years 2003, 2005, 2007 range between 760 and 830 vehicles. The ASDT for the same period is between 897 and 1004 vehicles. There is a noticeable increase in the AADT from 2008 to 2009, which may be a result of traffic associated with projects occurring in the area.

PR 391 Collision Statistics

The collision data presented in Table 5-15 below represents the total collisions that occurred on two control sections of PR 391 (control section 05391010 and control section 05391015), which are between Thompson and PR 280, over the period from 1996 to 2004. In total, 178 collisions were reported along sections of the highway that would be used during construction of the Project, which works out to an average of approximately 20 collisions per year. Of these, 137 resulted in property damage, 40 resulted in injuries and one collision resulted in a fatality.

[1]AADT represents the number of vehicles passing a particular point on the roadway on an average day of the year (Manitoba Infrastructure and Transportation 2009).

[2] The average summer daily traffic is the number of vehicles passing a point on an average day during the period May 1 through September 30. The ASDT % is typically expressed as a percentage of the AADT but in the tables here is presented as a whole number representing the estimated number of vehicles.

Table 5-14: PR 391 Traffic Volume Summary

Year	Average Annual Daily Traffic (AADT)	Average Summer Daily Traffic (ASDT)
2003	800	968
2005	760	897
2007	830	1004
2008	830	*
2009	1230	*
2010	*	*

Source: (MIT and University of Manitoba 2010).
Notes:
Traffic volume for PR 391 is observed at Traffic Monitoring Station 2151 (West of Thompson Airport Access and East of PR 280 junction).
* Data not available from MIT.

Table 5-15: PR 391 Collision History (combined) for Highway Control Sections 05391010 and 05391015 (1996-2004)

Year	Number of Collisions
1996	28
1997	25
1998	23
1999	27
2000	20
2001	14
2002	12
2003	5
2004	24
Total	178

Source: MIT 2007. Tallied by InterGroup Consultants.
Note:
- Includes RCMP-reported collisions only.

PR 280

PR 280 is a two-lane undivided roadway constructed with a mix of gravel and asphalt (Dillon Consulting 2003). From its junction with PR 391 to the Town of Gillam, PR 280 is classified as a RTAC Class A1 highway (Government of Manitoba 2010d).

PR 280 Traffic Volume

Table 5-16 describes the PR 280 traffic volume data collected by MIT for several years from 2003 through 2010. The traffic counting stations used in this report are known as coverage count stations and are short-term traffic count stations that are surveyed on a two-year cycle. On the selected cycle year, coverage count stations are typically surveyed 2 times a year for 48 hours each time. The traffic counting stations were correlated to the appropriate highway section as described in the Methodology Section 5.2. The traffic along each highway section varies. Table 5-16 presents traffic volumes as an average for the portion of the road from the PR 391 junction with PR 280 to the junction with the Keeyask north access road. Average annual daily traffic volumes on PR 280 as shown in Table 5-17 range between 130 and 186 vehicles depending upon the year. The average summer daily traffic ranged between 190 and 244 vehicles. The data show a 16 vehicle decrease in AADT between 2003 and 2010.

Table 5-16: PR 280 Traffic Volume Summary

Year	Average Annual Daily Traffic (AADT)	Average Summer Daily Traffic (ASDT)
2003	186	244
2005	161	190
2007	167	202
2008	130	*
2009	170	*
2010	170	*

Source: MIT and University of Manitoba (2010). Tallied by InterGroup Consultants.
Notes:

- Data for the Average AADT and Average ASDT comes from MIT counting stations 2293, 2376, 2377, 2437, 2438, 2441, 2442 between the PR 391 junction and the Keeyask north access road junction. AADT values for 2008, 2009, 2010 were derived by calculating the sum of the first five traffic stations beginning with those nearest to the PR391/PR280 junction.

* Data not available from MIT.

PR 280 Collision Statistics

To assist in identifying safety issues, the latest available collision data was obtained for PR 280 along the roadway control sections identified in Table 5-17. The collision data covered the period of time from 1996 to 2004. In total, 139 collisions were reported along sections of the highway in the Local Study Area. Of these, 90 collisions resulted in property damage and 49 resulted in injuries. None of the collisions involved fatalities.

Table 5-17: PR 280 Collision History by Highway Control Section (1996-2004)

Highway Control Section	Total Collisions
05280010	23
05280020	16
05280030	27
05280040	11
05280050	23
05280060	9
05280070	11
05280080	19
Total	**139**

Source: (Larsen, *pers. comm.* 2009).
Note:
- Data not provided for control section 05280090 as there were no reported collisions.

PR 391 AND PR 280 ESTIMATED BACKGROUND TRAFFIC VOLUMES (2012-2020)

Table 5-18 presents the projected peak background traffic for the summer season and Table 5-19 presents the projected peak background traffic for the winter season along four highway sections of PR 391 and PR 280 for the years 2014 to 2021. The traffic counts presented in the table are round trip estimates of the vehicles that would be using the roads assuming no future Keeyask Project.

Highway Section 1 in Table 5-18 and Table 5-19 represents the stretch of PR 391 between Thompson and PR 280. This highway section has the greatest volume of background traffic of all of the highway sections in the Local Study Area. For the summer months, the background traffic is estimated to range between 518.9 and 580.7 vehicles. For the winter months, the background traffic for this section of PR 391 is estimated to be between 432.4 and 473.3 vehicles.

Highway Section 2 represents the stretch of PR 280 between PR 391 and the Split Lake Junction and the summer traffic for this highway section is estimated to range between 108.6 and 118.8 vehicles; and in winter the traffic is estimated to range between 88.3 and 96.6 vehicles.

Highway Section 3 represents the stretch of road between the Split Lake junction and the Keeyask junction (where the Keeyask north access road meets PR 280). The summer traffic for this highway section is estimated to range between 96.9 and 106.0 vehicles and in winter the traffic is estimated to range between 80.7 and 88.4 vehicles.

Highway Section 4 represents the stretch of road between the Keeyask junction and PR 290 (north of Gillam). The summer traffic for this highway section is estimated to range between 39.2 and 42.9 vehicles and in winter the traffic is estimated to range between 31.5 and 34.4 vehicles.

Table 5-18: Estimated Background Traffic (Summer: Round Trips) in the Local Study Area (2014-2021)

	2014	2015	2016	2017	2018	2019	2020	2021
Highway Section 1: PR 391-Thompson to PR 280	518.9	525.6	532.4	539.4	546.4	553.5	580.7	568.0
Highway Section 2: PR280-PR 391 to Split Lake Junction	108.6	110.0	111.4	112.8	114.3	115.8	117.3	118.8
Highway Section 3: PR 280-Split Lake Junction to Keeyask Junction	96.9	98.1	99.4	100.7	102.0	103.3	104.7	106.0
Highway Section 4: PR 280-Keeyask Junction to PR 290	39.2	39.7	40.3	40.8	41.3	41.9	42.4	42.9

Source: KGS-Acres 2010.

Table 5-19: Estimated Background Traffic (Winter: Round Trips) in the Local Study Area (2014-2021)

	2014	2015	2016	2017	2018	2019	2020	2021
Highway Section 1: PR 391-Thompson to PR 280	432.4	438.0	443.7	449.5	455.3	461.2	467.2	473.3
Highway Section 2: PR 280-PR 391 to Split Lake Junction	88.3	89.4	90.6	91.7	92.9	94.1	95.4	96.6
Highway Section 3: PR 280-Split Lake Junction to Keeyask Junction	80.7	81.8	82.8	83.9	85.0	86.1	87.2	88.4
Highway Section 4: PR 280-Keeyask Junction to PR 290	31.5	31.9	32.3	32.7	33.1	33.6	34.0	34.4

Source: KGS-Acres 2010.

NORTH ACCESS ROAD

The north access road, which is being constructed as part of the Keeyask Infrastructure Project, will be the primary route used for transporting materials, equipment and workers between PR 280 and the Project site. The north access road will intersect with PR 280, 174 km northeast of the PR 391/PR 280 junction and extend approximately 25 km east to the Project site on the north shore of the Nelson River at Gull Rapids. The north access road has been designed to meet or exceed MIT standards and a fully-developed by-pass intersection was built at the intersection of PR 280 to provide safety for local road users. Additional facilities associated with the access road include a security gatehouse, communication tower, clear-span bridge and signage (Keeyask Hydropower Limited Partnership 2009).

The north access road will be operated as a private road during construction of the Keeyask Project, with use restricted to the following:

- Persons associated with the Project;
- KCNs officials, Members, and persons operating under the direction of the KCNs and authorized by the Project Manager or as otherwise agreed to by the Partnership;
- Manitoba Hydro, its agents and contractors; and
- Emergency use by the RCMP, or for forest fire suppression by Manitoba Conservation (Keeyask Hydropower Limited Partnership 2011).

If for some reason, the Project does not proceed, the north access road will be decommissioned.

Provisions are in place to restrict construction workers from bringing, using or storing snowmobiles, all terrain vehicles (ATVs) and boats at the Project site (including the access road). KCNs resource harvesters and Members may travel on surrounding Crown land by snowmobile or ATV (as use of Crown land is not restricted) for the purposes of carrying out commercial and or domestic harvesting, and for spiritual/ceremonial activities; however, use of the access road for travel by snowmobile or ATV is not permitted for safety reasons. According to the KIP Access Management Plan, snowmobile crossings have been developed at intersections of selected established snowmobile trails to facilitate the safe crossing of the road by local resource users. Such crossings can also be used by ATVs for safe crossing (Keeyask Hydropower Limited Partnership 2011).

WINTER ROADS

In the Local Study Area, the communities of War Lake (at Ilford) and York Landing are isolated by a lack of all-weather roads. Ilford can be accessed year-round by rail line. York Landing is accessible by ferry during the open water season, and by a 32 km winter road typically between mid-January to mid-March depending on weather conditions. It is not until the rivers, lakes, creeks and muskeg have frozen to a safe thickness that the construction of temporary winter roads allows cars and trucks access to these communities.

Temporary winter roads allow a greater amount of freedom of travel for people in the north and also allow for more cost-effective delivery of construction materials, fuel and other supplies to remote

communities. The direct access provided by winter roads is more convenient and affordable for residents than other modes of transportation such as air and rail. According to the Government of Manitoba, "approximately 2,500 shipments are transported each year by commercial trucks from the south to the north on the winter road system including essential items such as fuel, groceries as well as construction materials and general freight" (Government of Manitoba 2008).

The timing of the onset of ice cover and the conditions under which it forms and eventually breaks up in the spring are important considerations in the construction of the winter road system. The thickness of the ice as well as the date of freeze up, rate of ice growth, and the quality of the ice cover depends on a number of factors, including weather conditions and the size and depth of the water body, which affects the length of time the roads are able to stay open. Winter roads are typically open for a brief period of about eight weeks from mid-January to mid-March, although the prevailing weather conditions can shorten or extend this period by as much as two weeks (MIT n.d.). In years with less than ideal meteorological conditions, the winter roads may operate for a shorter period of time.

Within the Local Study Area, the winter road system is constructed across a portion of Split Lake and along the Aiken River. YFFN Members have noted that winter conditions are dangerous due to the seasonal reversal of water levels on Split Lake that arise from hydroelectric developments (YFFN 2004a; YFFN Evaluation Report (*Kipekiskwaywinan*)).

The impacts of climate change are already being witnessed in Manitoba and climate models predict that in the future, Manitoba will experience springs that are earlier and wetter, summers that are warmer and drier and winters that are shorter and milder. For Aboriginal and northern communities, climate change has implications for traditional ways of life and culture. "One of the most significant negative impacts of climate change on transportation infrastructure in Manitoba is the safety, sustainability and seasonal duration of winter roads" (Government of Manitoba 2008b).

During the 2008-2009 winter road season, Manitoba's winter road system did not officially open until February 2, 2009 and closed at the end of March after about seven weeks of operation (Government of Manitoba 2009d). The 2009-2010 winter road season was even shorter than the previous year, with the full system officially opening on February 12, 2010 and closing on March 15, 2010 after a quick thaw (Government of Manitoba 2010b). The 2011-2012 winter road season opened on February 17, 2012 and closed during the week of March 13th, comparable to the 2010 winter road season.

5.3.5.2.2 Regional Study Area

Traffic approaching the city of Thompson from the south must do so using Provincial Trunk Highway (PTH) 6. PTH 6 is a primary arterial designed to carry up to 6,000 vehicles per day on a two lane cross-section. Traffic counts on PTH 6 are measured at multiple locations; however for the purposes of the assessment, consideration was given to measurement locations in proximity to major intersections (*e.g.*, where traffic volumes were likely to change due to the location of other roads and or communities). These sections include the following:

- Section 1: PR 236 to PTH 68 (118 km);
- Section 2: PTH 68 to PTH 60 (258 km);

- Section 3: PTH 60 to PTH 39 (210 km); and
- Section 4: PTH 39 to Thompson (153 km).

The most recent traffic counts provided by MIT for 2009 and 2010 show the volume on Section 1 at 3,890 vehicles[1]; on Section 2 at 1,930 vehicles[2]; on Section 3 at 550 vehicles[3]; and on Section 4 at as 1,440 vehicles[4] (MIT and University of Manitoba 2009, 2010). Generally, traffic volumes decrease as one travels north, until after the junction of PTH 39, where traffic counts increase towards Thompson. Overall, these volumes are higher than those experienced within the Local Study Area and considerably lower than their design criteria of 6,000 vehicles per day.

5.3.6 Culture and Spirituality

Culture and spirituality are especially relevant since they represent a composite of values, beliefs, perceptions, principles, traditions and world views and religion that are based on individual and collective history, experience and interpretation. These cognitive values act as a cohesive force to direct the flow of cultural change. Culture and spirituality is an all-encompassing term that underscores the integral relationship of all things that maintain a way of life. Culture in this discussion can be referred to as socially conditioned assemblages of activities and thoughts that are associated with particular social groups or populations (Harris 1994). Spirituality is descriptive of peoples' relationships with their ecosystems and the awareness that goes beyond the immediate sensible world from which knowledge, ability, or medicine is derived. Spirituality also includes the Creator (see Ch. 2 of the Response to EIS Guidelines). Culture and spirituality is a dynamic and interactive process that is commonly celebrated through the oral tradition as traditional knowledge and is constantly evolving through experience, information, knowledge and wisdom.

Each First Nation is a discrete socio-political unit that draws from the traditions and knowledge of community Elders. However, the historical roots point to a common ancestry and cultural core that is strengthened by the many kinship relationships that exist across the communities. The methods used by the four KCNs communities to gather and analyze information were a reflection of each community's unique and distinct historic experiences. For the purpose of the assessment culture and spirituality considers an area spatially much broader than the Local Study Area, so as to include ancestral and traditional lands of TCN, WLFN, FLCN and YFFN. Data sources were derived from the analysis of the nine cultural indicators which formed the core of analysis which are defined in Section 5.2.6. Knowledge that was shared with the research team formed the foundation of analysis along with the Environmental Evaluation Reports of each of the KCNs.

[1] Count at the provincial traffic counting station #522.
[2] Count at the provincial traffic counting station #725.
[3] Count at the provincial traffic counting station #1891.
[4] Count at the provincial traffic counting station #1885.

5.3.6.1 Keeyask Cree Nations

Each First Nation conducted emic[1] studies that focussed on community perspectives and understandings of the land and cultural resources. While all four communities trace their ancestral roots to the York Factory region, each First Nation's historic experience has been unique. This is reflected in the methods used and products created as a result of the process. A summary of the data sources used to understand culture and spirituality of each of the KCNs is provided in Appendix 5D.

Each of the KCNs has had a unique set of historical experiences that has shaped their individual communities; however, while each community's identity and experience is unique, there are common threads that exist collectively. For example, the KCNs are Cree, they self-identify as Cree, speak the Cree language and all acknowledge their roots to York Factory coastal Cree. The KCNs also share an intimate and interconnected relationship of the people to *Askiy* that is strong and unconditional.

Although the KCNs are four distinct groups, they came together to be partners in the Project. As partners, it was important that their collective Cree worldview guide the Project. In order to reach a collective Cree worldview, KCNs Elders and community Members gathered together on four separate occasions to discuss, share stories and thoughts and arrive at a consensus statement on their core beliefs and Cree worldview. This is described in Chapter 2 of the EIS and highlights are provided below, prior to focusing on each of the KCNs communities.

The Cree are *Ininewak*, placed on earth or *Askiy* by the Creator/*Manitou* (also *Munito* and Great Spirit see Chapter 2). As a people, they are a part of *Askiy*. *Askiy* means the whole of the land, water, animals, plants, people and all other living and non-living things, including the interconnection between them *(i.e.*, all things are related). *Ininewak* culture and spirituality are part of *Askiy*. The *Ininewak* are meant to care for *Askiy* and are sustained by *Askiy*.

Ininewak follow important teachings on how to conduct themselves while living; these include, but are not limited to, the following:

- *Mino-pimatisiwin* means living a good and honourable life (*e.g.,* being a good person, respecting *Askiy*, following our values);
- *Ochinewin* – what comes around goes around (*e.g.,* if a person harms or abuses anything that is part of *Askiy*, there will be consequences for this behaviour) (see Chapter 2 of the EIS); and
- Harmony and balance – if we are harmful or disrespectful, we must acknowledge that harm and make a sincere attempt to put things right, to strive for harmony and balance (see Chapter 2 for a more detailed description).

As described in Section 5.2, nine indicators were used to facilitate the description and analysis of change of culture and spirituality in relation to the KCNs. The indicators highlight the relationships of people to

[1] Emic is a term that refers to the understanding of culture and experience from the viewpoint of the participant, not the observer , whereas Etic refers generally to the understanding of culture based on observed and scientific recordings of a particular cultural group as analyzed and interpreted from the observer's perspective (Harris 1987).

their environmental setting and contribute to assessing cultural values and potential Project effects. Figure 5-1 was developed as an adaptation from Whiting and Whiting's 1975 cultural system model (Petch, 1999), illustrates all of the components that have been considered in the development of these nine cultural indicators.

The following sections use the nine indicators as applied to each of the KCNs communities.

5.3.6.1.1 Cree Nation Partners

TATASKWEYAK CREE NATION

This section reviews the nine cultural indicators defined in Section 5.2.6 in relation to TCN.

Worldview

Worldview as an indicator for TCN sheds light on the importance of articulating and communicating perspectives to help others understand their holistic Cree worldview:

> As a people, we are inseparable from our relationships with Mother Earth – relationships that have developed over thousands of years. This is the foundation of our worldview and is integral to our survival. Our relationships with Mother Earth are the basis of our language, history and spirituality – cumulatively, our culture (CNP Keeyask Environmental Evaluation Report).

The effects of development to the waterways and lands on which the Split Lake Cree had always relied, produced changes reflected by the indicator worldview. The extensive impacts of development affected every facet of the First Nation's use of its traditional lands and waters. Spirituality was at the root of changes felt by the community:

> Many young people, steered towards educational endeavours, were less capable of carrying on traditional activities and began to hold animals in less esteem than had their Elders. The centre of traditional pursuits had always been the shorelines, but shoreline activity decreased because of the adverse effects of hydroelectric development. People lost faith in the altered waterways and in the natural environment that had always sustained them. In short, the sudden environmental degradation in the traditional territories resulted in a traumatic break in the pattern of evolution and sometimes difficult adaptation that had characterized earlier eras (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

In addition, according to CNPs own Keeyask environmental evaluation:

> The Cree worldview identifies us, as a group and individually, as Members of the natural world. Through our beliefs, values, practices and traditions, we have established relationships and obligations with all other parts of the natural world as an integral part of that world. The foundation of the Cree relationship is spiritual. We believe that all parts of nature, animate and inanimate, have a spirit or a soul and are worthy of respect. Thus, when one part of nature is impacted all the other parts are also impacted, which creates an imbalance that must be remedied0 (CNP Keeyask Environmental Evaluation Report).

Language

Language as an indicator for TCN is considered an integral tool for the transmission of traditional knowledge and life skills; and is important to maintain Cree culture through language. Community

research indicates that two main factors have influenced changes to Cree language use within the community: residential schools and technology (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

The precise impact of the residential schools of this era, as the population of children attending residential school increased in the 1960s, is beyond the scope of this study. The effect however, directly impacted the use of Cree language in the teaching of traditional knowledge and skills to young people. This created a generational gap and a chasm between Elders and youth which normally would have provided the foundation for the instructional use of language inherent in the Cree culture (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

The other main factor, technology, became more influential after the residential school system had been halted. As modern technological advances were made for personal entertainment the gap between generations was maintained as youth began to replace traditional activities utilized for transmission of language with distractions offered by the introduction of television and video games (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a). Technology and its effects are discussed further under the indicator measure kinship.

Traditional Knowledge

For TCN, traditional knowledge as an indicator of change is closely linked to language and cultural practices. Youth that were displaced from the community during the residential school era returned and took on leadership roles; many had been affected by loss of their first language (Cree) as previously discussed. The community history represented in Analysis of Change (Split Lake Cree – Manitoba Hydro Joint Study Group) notes, that:

> While the younger generation took more of a leadership role in terms of political responsibilities, the Elders continued to take responsibility for ensuring respect for the moral and customary practices of the community (Split Lake Cree – Manitoba Hydro Joint Study Group).

The CNP discuss traditional knowledge as:

> Knowledge that reflects our experience, understanding, wisdom, values, beliefs, norms and priorities governing our relationships with Mother Earth and all her beings, derived and developed through living in our homeland ecosystem since time immemorial. ATK is inextricably linked to our culture and our worldview (CNP Keeyask Environmental Evaluation Report).

This specialized knowledge for cultural survival persisted despite all the disturbances to the Cree cultural identity and remained strong because of an ongoing relationship with the land:

> …our people made great efforts to adapt to ensure traditional learning continued. Learning of traditional knowledge still took place during this period; our young people were stil taught the customs, practices and traditions integral to our cultural identity; everyone still spoke our Cree language; and our worldview was still rooted in our relationships with the land that itself was unchanged by the education system imposed by the Indian Act (CNP Keeyask Environmental Evaluation Report).

Cultural practices were also affected by hydroelectric development as they relate to traditional knowledge as an indicator:

> From a Tataskweyak Cree Nation community perspective, hydroelectric development was by far the most profound agent of change, causing both major physical impacts on the lands and waters, as well as the resulting undermining of the essence of Aboriginal practices and customs (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

Cultural Practices

Considering the stresses placed on traditional knowledge as a mechanism of cultural transmission, cultural practices as an indicator reveals considerable changes to the community with measurable origins beginning in the 1950s.

Rapid changes to the physical environment also played a role in cultural practices:

> Commercial and domestic harvesting activities were seriously affected. Fur bearers and waterfowl were destroyed, or driven from their ruined habitats. Moose, deer, and lynx were forced upland as the shorelands could no longer support them. Fish habitat was changed by the increased turbidity, and the relative abundance of various species changed. Mercury contamination of fish, particularly in Stephens Lake, became a problem, and Split Lake Cree were advised not to eat certain species. There was a local perception that the fur and fish that were caught were of inferior quality (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

The community response to increased environmental issues was one of adaptation of their spiritual values and continued attachment to the lands and waters. As traditional pursuits continued to be adversely affected along 'on-system' waterways, hunters, fishermen and trappers had to go further afield in order to harvest game and fish, incurring additional expenses.

With regard to cultural practices it was also noted that major forces of change that affected the community through the 1960s and 1970s are still being felt today within the community:

> Traditional religious beliefs were practiced only by the Elders, who were also the First Nation member's most frequently attending church services. Although there was a reported decline in active church attendance, the Anglican Church and its practices and moral code remained a predominant influence on everyday life (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

Health and Wellness

Health and wellness as an indicator brings to light the physical and emotional effects that have changed dietary processes in TCN. Reliance on store-bought food has continued to grow and replace many of the former traditionally harvested foods. This change in dietary habits and shift to more sedentary lifestyle has changed the health of residents with increased incidence of modern illnesses, particularly diabetes. Changes to water flows due to LWR and CRD, especially in winter where thin ice and slush ice result in dangerous travel conditions has increased the risks of travelling on the lakes and rivers. This has meant that fewer people are venturing out to acquire traditional foods:

> Fluctuating water levels in winter resulted in very dangerous ice conditions, for example on Stephens Lake, where water levels varied by as much as six feet in one week. The seasonal

> reversal of water flows, combined with debris, limited shoreline access and water-based transportation (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

Kinship

Kinship as an indicator of change for TCN was closely linked to technology and cultural practices. With regards to technology, community research noted below suggests that television played a role in influencing changes to kinship patterns in the community:

> Television was also introduced into many community homes and its impact cannot be underestimated. It created expectations, some false. It exposed young people to the outside world, on the one hand introducing previously unknown cultural influences, but at the same time bringing readier access to information about the struggles of other Indian peoples, in far off parts of the country, to assert their rights. The greater difficulty and less satisfying nature of traditional, outdoor activities tended to make television a substitute, thus isolating the youth even more from the experience of the Elders and the traditional values of the Split Lake Cree (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

Kinship is also affected by changing cultural practices, also reflected in TCN research:

> Parents placed increasing emphasis on formal education as a means of understanding and dealing with the changes being experienced, as well as of obtaining future employment. This, combined with continued residential school attendance, left many of the youth unfamiliar with the traditional ways of living off the land. Increased access to Thompson with its 'city ways' was another destabilizing factor. By the early 1970s there was scheduled air service between Split Lake and Thompson. Taxi service from the Odei River, near Orr Creek, began in the mid-1970s. The completion in 1979 of a year-round road, Provincial Road 280, between Thompson and Split Lake consolidated the link. As a result of all of these factors, the social fabric in Split Lake began to erode and young people, alienated from the old ways, increasingly questioned the wisdom of traditional life and values. Church attendance began to drop. The curfew disappeared. Alcohol and drug use increased, although still mainly off reserve (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

Leisure

As noted in the discussion of cultural indicators in section 5.2.6.1, Leisure is described as the recreation provided by the cessation of work or dutiful activities and is usually associated with enjoyment or pleasure. Leisure activities are relevant within all KCNs communities because recreation is utilized as a time to share stories of past, present, and future during shared activities. Leisure as an indicator for TCN links the cultural uses of lands and waterways to recreational uses, which act as venues for the transmission of traditional knowledge and spiritual connections to the community.

Historic changes to the cultural landscape has altered and limited recreational activities:

> Dirty water made swimming less attractive and debris inhibited boating. Children got sores from swimming in the lake. Winter recreation was adversely affected as ice conditions made many activities more dangerous. Summer activities had to be curtailed because camping and picnicking sites had either been flooded or left high and dry. Boating was dangerous below the Kettle dam because of severe water level fluctuations. The Churchill River was completely destroyed for recreational use and its pristine wilderness values were lost (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

Law and Order

Law and Order as an indicator reflects changes to the communities' mechanism of balancing social stresses through close knit family groups:

> The traditional gathering times were most frequently happy social occasions, an opportunity to renew ties among families and clans. These times were also when self-governance was most actively practiced by the Split Lake Cree, in lengthy, regular meetings among the First Nation members to consider and take decisions on all matters of collective importance to the people (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

And:

> In the early days the First Nation government was not formally institutionalized. Rather, it functioned as was needed to maintain the traditional Aboriginal way of life. The family was the main governing and social unit. Next was the clan or group of families and beyond that the tribe followed by the Cree Nation as a whole. Certain members of a clan earned a level of authority based on their skills and knowledge in particular areas of resource harvesting. Clan leaders would emerge as a result of their general leadership skills, personality and effectiveness in dealing with outside contacts. Leaders could not force their views on families or individuals, who were free to obey or to ignore the leadership and even move away if they chose. First Nation laws and their enforcement were made and exercised through general clan opinion and concerns. Decisions were made by consensus. The people already followed the practice of selecting peacekeepers to maintain in their own customary fashion the peace, order and mutual respect that was central to the way of life. Elders report that their grandfathers carried out this collective governance function, leaving its actual origin shrouded in the mists of time (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

TCNs community research attributes changes to law and order to a heightened pace of resource exploitation by outsiders beginning in the 1950s. The community felt that their structure of governance was poorly equipped to manage such relatively rapid and unknown change:

> Little practical advice and support was available from the governments, which tended to either ignore the impacts, or to view them as 'short term pain for long term gain' (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

Cultural Products

Cultural products as an indicator for TCN is closely linked to the environmental and bio-physical changes that surround the community. As a result of outside influences, stressed resources, and environmental changes, the community struggled to facilitate local economic opportunities that could provide a self-reliant alternative to the diminishing traditional way of life:

> Notwithstanding the continuing attachment to resource harvesting, severe unemployment characterized the local economy for most of the year in the first half of the decade, with a corresponding increase in social assistance dependency. Women's handicraft production all but ceased... The customary division of labour became blurred as women began to work and men took more of a role in raising children (Split Lake Cree – Manitoba Hydro Joint Study Group 1996a).

WAR LAKE FIRST NATION

This section reviews the nine cultural indicators defined in Section 5.2.6 in relation to WLFN. In keeping with the philosophy of OWL, a participatory action research[1] (PAR) approach was taken for oral history interviews which was guided by the worldview and needs of the community. Community researchers were hired for the project.

Worldview

Worldview as an indicator for WLFN is a reflection of the holistic relationships held within the Mother Earth Ecosystem Model. This model was utilized by WLFN community researchers to represent life processes for community Members. Many teachings are held by WLFN Members, but there is a concern that the teachings are not being handed down and are being lost. Values such as honesty, trust, loyalty and respect are held in high esteem by WLFN Members:

> The Mother Earth Ecosystem Model is seen as a way of explaining the worldview of War Lake First Nation and reminding the larger society that the relationships that are found within the model are the way War Lake First Nation views the world. Members state that if one part of the model is affected then other parts will be affected and there will be a loss of harmony and balance (WLFN 2002).

Language

Language as an indicator for WLFN is considered to be a yardstick of cultural well-being. All the interviewees who participated in oral history interviews conducted by WLFN OWL researchers were very concerned about the loss of Cree language and identified different categories of Cree speakers:

- Those that speak and understand Cree and are fluent;
- Those that do not speak Cree but understand it; and
- Those that neither speak nor understand Cree (WLFN 2002).

Community Members who are considered fluent Cree speakers are those who use their language daily for communication and can include Elders, middle-aged adults and those who work as interpreters. An interesting observation by community researchers is that those people who dropped out of school for one reason or another prefer to use Cree as their first language (WLFN 2002).

The WLFN community Members that do not speak Cree but understand it include those who are a product of the residential school system and those who have had minimal interaction with their Elders. Other Members of the WLFN that do not speak or understand Cree were identified as school children who are being taught in English, or those people who had been away from the reserve for a number of years:

[1] Participatory Action Research is a community driven approach to research, which is directed by the needs of the community.

> At War Lake First Nation, the Elders have stated that Cree language must be kept alive and the way to do this is to teach the young people, taking the time to speak Cree instead of English. However, all acknowledge that the decision to speak Cree was personal and this was often dependent on whether or not Cree was spoken in the household (WLFN 2002).

Understanding the relationship of places to people is often captured through traditional knowledge and the cultural transmission of the names people in the community use to remember certain areas and events. While it is acknowledged that language is dynamic, people are speaking less and less Cree and the changing language has caused a communication gap, especially with the exposure to English-language TV and more recently computers and the internet.

Traditional Knowledge

For WLFN, traditional knowledge is viewed as a body of knowledge that has been passed down from one generation to the next and as a method of performing traditional pursuits and activities that contains the recipe for survival. Language is seen as a very important part of traditional knowledge. There is concern that if traditional knowledge is not soon passed on to younger generations it will be lost (WLFN 2002).

The oral tradition is still practiced by WLFN Members, but to a lesser extent than before. Certain skills are still communicated orally, such as teaching young people how to snare rabbits, fish and hunt. However, other practices such as preparing hides and tanning are being lost. The Elders are not being asked to pass their knowledge on to the younger generations and as a result the communities' body of traditional knowledge is losing strength (WLFN 2002).

Cultural Practices

Cultural practices as an indicator for WLFN represents a manifestation of the balance and harmony described in the Mother Earth Ecosystem Model. WLFN Members believe that the Mother Earth Ecosystem Model was affected by physical and cultural changes and was in a state of imbalance (see also CNP Keeyask Environmental Evaluation Report). Practices such as traditional ceremonies are not currently being carried out in the community. However, people occasionally do go outside the community to attend these ceremonies:

> In the past, ceremonies were held at the beginning of the trapping season to give thanks for the animals that were provided and pray for a good winter. Other ceremonies and feasts were held, for example when a young man made his first hunt. Young men were taught to respect the animals that gave themselves to the people and do certain things out of respect for the animals (WLFN 2002).

Health and Wellness

Health and wellness as an indicator for WLFN is strongly linked to worldview and exhibits the harmony and balance illustrated in the Mother Earth Ecosystem model. The community described four aspects of balanced health as physical, mental, spiritual and emotional.

Physical health was presented as a state of health that existed in the community both in the past and as a part of current health conditions.

Before the snowmobile was introduced, people used to walk long distances by foot or on snowshoes or travel by dog team. According to interviewees, people were physically active all the time and were always healthy. There was no need for a physical fitness program (WLFN 2002).

Diet currently presents the greatest challenge for the community with a diminished wild food harvest and a reliance on store-bought foods. Western medicine has almost completely replaced traditional medicines such as the use of different leaves, roots, berries, and barks (WLFN 2002).

Mental health or the way people dealt with mental problems in the past was an aspect of the health and wellness indicator that was not known or discussed. Generally, various forms of mental illness are found in all societies. The ethnographic record for the Cree in general indicates that people were accepted no matter what kinds of deficiencies presented (Mandelbaum 1994).

Spiritual health was considered to be too personal to discuss as everyone has their own way of keeping their spirit healthy (WLFN 2002).

Emotional health was well controlled and this is learned from the family. In general, people feel safe and secure in their community. There is a lot of emotional support in the community but there is also a need to share feelings which is a new experience for most people in the community and many feel uncomfortable talking about this topic. However, it was noted that there is a need for balance among the four kinds of health (WLFN 2002).

Kinship

Kinship as an indicator of cultural change is the glue that holds all other indicators together and allows a cultural group to make sense of relationships with its ecosystem. For WLFN, all things are related and until recently, the interaction between Elders and children within a family unit was a way of guaranteeing culture would continue:

> The terms that were used for family members were the same for both the father and mother's side of the family. Adoption was a means of ensuring that all children were looked after. Orphans were usually adopted by their grandparents, but other family members such as aunts and uncles and even older siblings also took responsibility for their extended families (WLFN 2002).

Leisure

Leisure as a cultural indicator for WLFN defines a time in which community members utilize the opportunity to interact with other community or family members on a harmonious level for the cultural transmission of necessary processes to maintain balance in life.

For example, Members from the community described a traditional game that was used to relay critical life skills:

> Certain bones were used as games. For example, the wishbone was broken and the person with the larger piece was considered to be the winner. In another game, the "a pahikun" or acetabulum (hip joint) of the beaver was used. The object was to try to get your finger to touch the ball joint with your eyes shut. If your finger touched the ball joint then you would find beaver. The ball joint was referred to as the beaver house and the foramen, or hole was called the lake. The entire bone was called os pi chi kuy (WLFN 2002).

Members of WLFN currently enjoy a variety of leisure activities, many of which involve community participation and planning. Baseball tournaments, fishing derbies, and winter carnivals are among the major events that take place. Jigging still takes place and there are competitions in the community as well as in other communities. Two special events, the kindergarten and grade eight graduation are celebrated to mark two very important life stages.

Law and Order

To a large extent, law and order as an indicator represents the current model of the Canadian legal system enforced at both provincial and federal levels of government in addition to the traditional leadership present in the community:

> There are two band constables that report to War Lake First Nation Chief and Council and Ilford Mayor and Council. The constables are hired for the Reserve and the community of Ilford. This is cost-shared. There used to be a police committee that was appointed by Chief and Council but the status of this is not known. The RCMP visits the community about once a month. Court is held at either Gillam or Thompson. There is a holding cell for people where they are kept for public safety or until the RCMP picks them up (WLFN 2002[1]).

As in other communities, WLFN has experienced unpleasant social issues such as crime. Chief and Council along with the general membership of WLFN strive to make the community safe and secure and are always looking for new programs that will help people.

Despite the dominant western forces of law and order that are pervasive within the community, customary law is still active within the First Nation:

> Sharing was, and continues to be, a very important part of the community. It occurs freely and without any expectation of payment. There was an unwritten law that existed at York Factory that Elders were looked after first, then the widows and children. This is still the practice at War Lake (WLFN 2002).

Cultural Products

Cultural products as an indicator of change for WLFN illuminates changes that have occurred with the transmission of traditional skills, such as constructing snowshoes or porcupine quillwork products. These have declined over the years to the point that these skills are perceived as lost. The decline of the production of traditional products that connect the communities' spirituality to the land is linked to the decline of traditional knowledge pursuits between Elders and the youngest generations within the community:

> The Elders are the people who know, and continue to create a variety of crafts but their skills are not being used and they are not passing their knowledge of craft-making on to the younger generation. Many of the Elders are going blind and have a difficult time doing beadwork. They are worried because few people are learning this art form. The younger generation is focusing on other things (WLFN 2002).

[1] Since the time of the 2002 report, there is now only one band constable.

5.3.6.1.2 Fox Lake Cree Nation

This section reviews the nine cultural indicators defined in Section 5.2.6 in relation to FLCN.

WORLDVIEW

Worldview as an indicator provides a cognitive map FLCN incorporates into their daily lives as a method of balance between cultural self awareness, spirituality and landscape understood as Mother Nature. Worldview becomes an overlying template for community decision making, leadership and daily living. Concern regarding changes to worldview was reflected in FLCN's grievance statement *Forgotten Nation in the Shadow of the Dams* by noting that:

> The research completed…provides a sound basis for Fox Lake First Nation to understand how, and to what extent, the First Nation's rights and interests were affected by Manitoba Hydro's developments since the early 1960s (FLCN 1997).

The community history Ninan presents part of their worldview as *Pimatisowin*:

> Pimatisowin, or more simply life or living well, refers to the knowledge people carry with them about life and how to survive. Pimatisowin can encompass a broad range of topics including medicines, spirituality, geography, climate, and ecology, and usually concerns, and is informed by the local environment and landscape (FLCN 2009a Draft).

Also:

> These values are part of the larger concept of maintaining respectful relationships generally, and are a key to traditional Inninu values (FLCN 2009a Draft).

The values developed through worldview also have moral implications for the community:

> The knowledge that there are consequences for inappropriate behaviours, that is, oochinehwin, was an important part of the people's worldview, and directly influenced the choices they made in their daily lives (FLCN 2009a Draft).

These values are also noted in Chapter 2 of the Response to EIS Guidelines.

LANGUAGE

Language is reflected by the community as critical in the role of an overarching support to preserve and propagate Cree life and spirituality within the FLCN community:

> Traditions were woven into the essential fabric of the Fox Lake community, and people continued to conduct themselves according to the values passed to them by teachings from the 'old people'. Relationships were well defined and understood within the community and were reflected and reinforced in particular relationship words that existed in the Cree language (FLCN 2009a Draft).

As an indicator, language is linked to traditional knowledge through community documentation and oral histories and discussed as an integral method of cultural transmission:

> Kitayatisuk, or the eldest members of society ('old people'), played a key role in the preservation of knowledge. Due to their life experience, kitayatisuk acquired an in-depth understanding of the world around them that younger, less experienced people typically did not have. Thus, kitayatisuk bore the greatest responsibility for ensuring that children and grandchildren received all types of knowledge (FLCN 2009a Draft).

TRADITIONAL KNOWLEDGE

Traditional knowledge for FLCN is a fundamental means of cultural transmission. In the community history research conducted by FLCN, this is discussed and reflects the synergy that is shared with all indicator discussion:

> …our ancestors passed down knowledge through storytelling, showing, games, art, dancing, music, and other forms of expression. This way of transferring information was highly suited to our ancestors' way of life, could be both enjoyed by the listeners and easily remembered, and allowed knowledge to be retained over long periods of time. For example, some legends known by Fox Lake Elders have likely been told for hundreds of generations. That this knowledge was passed down over long periods of time, and in a wide area, demonstrates the continuity between the generations, and the importance of our Elders and their stories to link us with our recent and ancient past (FLCN 2009a Draft).

Traditional knowledge also represents a mechanism for the maintenance of cultural practices within the community:

> In addition to contributing the family income, picking berries, and making moccasins and other crafts allowed the people to maintain some relationship with the land, and for mothers, in particular, to pass down traditional skills to their daughters (FLCN 2009a Draft).

CULTURAL PRACTICES

Cultural practices as an indicator defines the manifestation of traditional knowledge within FLCN:

> For hundreds of generations, Ininuwak travelled to time-honoured sites located at the estuaries of the Nelson and Hayes Rivers to take advantage of the spring and early summer geese and caribou migrations. Seasonal gatherings represented the first opportunity after the winter to socialize with friends and relations, hold ceremonies, trade, and arrange marriages. With the onset of colder weather people dispersed to their Winter hunting lands throughout a vast territory that included Kettle River (Askiyko Sipi) Fox Lake (Mekeso Sakahikan), Kaskattama River (Kaskattamaw Sipi), Shamattawa (Kisahmatawakh), Whitebear Creek (Wapusk Sipisis), and Whitefish Lake (Utlkumak Sakuhikun) (FLCN 2009a Draft).

Cultural practices illustrate the worldview and the seasonal lifestyle at the core of the Cree in Fox Lake. As historical events touched and challenged these practices, adaptation was critical to survival, as is noted in their community history:

> In essence the people had incorporated seasonal labour into other seasonal activities as they had in the past while working for CN (FLCN 2009a Draft).

And that:

> This, in turn, caused individuals to doubt the validity of their beliefs and life knowledge, leaving many with little to help them adapt to the many changes occurring almost simultaneously around them (FLCN 2009a Draft).

HEALTH AND WELLNESS

Health and wellness as an indicator for FLCN represents the physical aspects of wellbeing, and is understood as part of the balance that constitutes individual and community health. Community history research provides a baseline on types of country foods that were part of the community's diet in the past:

> In addition to caribou, moose and fish, rabbits and spruce grouse made up a regular part of the people's diet throughout the year. Berries including niskeminah (blueberries), wesahkeminah (cranberries), anouskanuk (raspberries), odahihminah (strawberries), ostikonihminah (cloudberries) oskisihkhominah (logan berries) and osapominah (gooseberries) were found in sandy areas, marshes and along riversides, and were enjoyed in late summer. Medicinal plants were in plentiful supply and harvested for use and trade in the coming winter. Frozen berries could be harvested throughout the winter, and kept frozen until spring, but required specialized knowledge to recognize nonpoisonous plants without their summer foliage. Hunting and fishing were generally practiced in tandem with other activities such as berry picking and plant gathering, with the entire family participating. Families chose their riverside campsites, in part, on the basis of whether they could obtain a variety of resources within the vicinity, and because they knew they would be able to support the needs of the gathered people who renewed relationships, dealt with political issues, arranged marriages, and were able to enjoy the abundance of summer with family and friends they had not seen over the winter (FLCN 2009a Draft).

In contrast, the community research also provides insight into current issues that affect the health and wellness of the community:

> In addition to increased turbidity, water quality was compromised by the release of mercury from the creation of Stephens Lake and similar reservoirs. Once the people became aware that mercury levels had increased in the fish and water, and learned the health risks associated with consuming the fish containing mercury, they responded by drastically reducing their consumption of all aquatic foods originating from the Nelson River. Not only did increased mercury affect the people's right to fish, it also affected their perception of the aquatic environment. In the eyes of our people, the river was no longer pristine, and the food from it was no longer healthy (FLCN 2009a Draft).

The same factors outlined in the community history research are also reflected in a study of sturgeon in the Nelson River. Concern for the health of the community also illustrates the connection to cultural practices and the spiritual connection to the land and waters of the region:

> As an indicator of the decline in water quality, Johnny Beardy (2008) explained that prior to the dams there was never a need to clean one's nets. Today, nets must be cleaned frequently because they quickly become covered with silt and algae. The Fox Lake people articulate very clearly that the health of the Nelson River is intrinsically related to the quality of the fish (FLCN 2009a Draft).

KINSHIP

As with all indicators, kinship links to other indicators. Changes to one aspect of community life (as viewed through indicators) has repercussions to all other connections within FLCN cultural processes. Kinship provides the foundation for Cree families and therefore community life. It is the connection between Elders and youth that preserves and directs community ethos:

> Until very recently, the force keeping the oral tradition alive was the fact that every person's survival depended on the transfer of knowledge held by older people to younger generations (FLCN 2009a Draft).
>
> Although the identity of belonging to a larger community still exists for today's Elders, it is much less prominent among younger people, in part, because they lack an understanding of their shared community, genealogy and history (FLCN 2009a Draft).

LEISURE

Leisure as an indicator for FLCN involves activities that are participated in during the cessation of dutiful activities. It is also a time for community members to find solace and a healthy mindset. Leisure also becomes critical in the process of cultural transmission between Elders and youth:

> In addition to imparting practical teachings, many old people were renowned as storytellers. Storytelling served many purposes, both practical and recreational, and was generally in the form of legends or histories. Oral histories, or atchmowina, were accounts about events in the past as remembered by the storyteller, and were considered factual (FLCN 2009a Draft).

LAW AND ORDER

Law and order as an indicator for FLCN Members depicts the values directly attributed and manifest through kinship and kin relationships. Fox Lake community history explains that:

> Through marriages and customary adoption, the people formed highly integrated and complex extended families throughout the territory that provided stability and support to family members and a model for appropriate behaviours (FLCN 2009a Draft).

And that:

> …people helped each other in keeping with established practices, were expected to live without violence or hostility. Customs that relate to helping each other were reinforced by the practical fact that one's life and success depended on working closely together with other people (FLCN 2009a Draft).
>
> …living closely with other people required rules to protect the privacy of individuals and cultural values, and, generally, to maintain a harmonious state within the home (FLCN 2009a Draft).

In regards to FLCN law and order, community history research concludes that:

> Old people played an important role in maintaining the standards of appropriate behaviour. These standards were communicated both through example and oral teachings. It was primarily the elder family members' responsibility to ensure the values, customs and belief systems of the people were passed down to other members of society (FLCN 2009a Draft).

CULTURAL PRODUCTS

Cultural products for FLCN are linked to economically driven cultural practices, both historically and currently. The connection between spirituality, land use and an adaptation to a changing cultural landscape through the construction of the Hudson Bay Railway is contextualized in Fox Lake history research:

> With the men away during the day, and sometimes the entire week, women carried out some of the activities that had traditionally been performed by men, such as hunting large game, which contributed significantly to the household economy. Women also sold their handicrafts, berries and other items to local non-Aboriginal people, and to tourists who came by railway to the area (FLCN 2009a Draft).
>
> Young Fox Lake girls often made money by selling berries, sewing and beadwork to the non-Aboriginal residents of Gillam as well as to tourists, who were usually travelling from the south to Churchill on the railway (FLCN 2009a Draft).

5.3.6.1.3 York Factory First Nation (YFFN)

This section reviews the nine cultural indicators defined in Section 5.2.6 in relation to YFFN.

WORLDVIEW

YFFN members who shared knowledge and information regarding the community's worldview discussed a decrease or an absence in some cases of the understanding of the relationships and interconnectedness of the natural environment and spirituality.

Impacts from historical events that have independently shaped the community's modern perspectives include the ongoing process of the incremental loss or decrease in the understanding of spiritual connections to the land. Worldview as transmitted through traditional values and education directly affect future leadership qualities due to a lack of understanding past, current and future needs of the community. YFFN's Evaluation Report, *Kipekiskwaywinan* presents a thoughtful reminder of the need to consider the worldview of it people.

LANGUAGE

Language as an indicator for YFFN is related to kinship and cultural practices with the community noting a decrease in the number of Members, especially children and youth, who speak Cree or write/understand syllabics. The community oral histories and workshops describe a decrease in Cree as a first or second language, which also involves a decrease in fluency (understanding Cree without the ability to speak or write). This has been linked by the community to a decrease in Cree language use in home environments as well as a decrease in cultural transmission of traditional knowledge between Elders and Children including gender specific information and kinship roles. For YFFN, the loss of Cree language affects the transmission and understanding of the value of their culture; for this reason, the YFFN adverse effects agreement has a Cultural Sustainability Program to assist in sustaining cultural identity and language (YFFN Evaluation Report (*Kipekiskwaywinan*)).

TRADITIONAL KNOWLEDGE

Community comments on traditional knowledge as an indicator focus on the extent to which community Members' understood their own traditional practices through oral narratives (oral traditions and oral history). YFFN has stated that their traditional knowledge "Ininiwi-kiskénihtamowin is absolutely fundamental and central to who we are as a people and culture. Our traditional knowledge is held by our Elders and passes from generation to generation. It is a dynamic, living process that is added to and adapted in the lives of successive generations of Cree people. It lives within our way of life." (YFFN Evaluation Report (*Kipekiskwaywinan*)). In recent years, a decline in the transmission of traditional knowledge has been linked to a decrease in Cree language use and a true understanding of oral narratives. Community Members also discussed a breakdown which has occurred in the process of passing down traditional knowledge affecting individual and community physical, social, emotional and mental well-being due to generational gaps and disruptions linked to residential school practices. To address this concern, YFFN's Adverse Effects Agreement includes a strengthening of traditional knowledge for their

community through, for example, their Cultural Sustainability Program(see Section 5.4.2) (YFFN Evaluation Report (*Kipekiskwaywinan*)).

CULTURAL PRACTICES

Cultural practices as an indicator within the KCN region and for YFFN illustrates the type of activities that occur within the community that do not include leisure. Community Members of York Landing noted a decrease in cultural ceremonies as part of cultural practices within their lifetime and to a lesser extent a decrease in gender-based practices. The decrease in participation in subsistence and economically-based cultural activities is such that continued changes in physical and cultural landscapes will change cultural practices by the process of adaptation or abandonment. YFFN also noted [Our community comes] "together for traditional dances, goose camps, and feasts, and return to our territory at York Factory (*Kischewaskahekan*) as often as they can. They respect the teachings of our ancestors and look for ways to apply them in the modern world" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

HEALTH AND WELLNESS

For Members of YFFN, changes to the health and wellness of the community are linked to an increased availability of western modes of health and wellness such as nursing stations, visiting doctors, dentists, pharmacists, psychiatrists and psychologists. Changes in health are also linked to a decrease in the availability and extent of traditional health and wellness practices such as midwifery, gathering traditional medicines (plants, roots and herbs) and shamanistic practices. Within the sphere of health and wellness discussions, YFFN Members commonly indicated a fear of pollution and changes to water quality with the increased presence of mercury within the water systems utilized by the community. Pollution, it is believed, would ultimately cause further changes in diet, and traditional harvest. YFFN is hopeful however, that healing and reconciliation in the future will result in a more healthy community (YFFN Evaluation Report (*Kipekiskwaywinan*)).

KINSHIP

For YFFN, kinship as an indicator illustrates changes in family patterns associated with the adoption of western views by the nuclear family, resulting in the diminished extent of traditional extended family life. With the waning of extended family patterns there is also a decreased understanding by youth and other YFFN Members in regard to what or who is family. According to the community this has also affected family obligations such as subsistence sharing and marriage patterns which have been disrupted due to an enforced sedentary lifestyle associated with the relocation from York Factory to York Landing. YFFN community Members residing in the isolated community of York Landing also link 'sedentary lifestyle' to a diminished contact with other communities due to a lack of year-round access.

Understanding of traditional kinship relationships has decreased and affected Member's ability to determine the status and role of individuals which had normally been supported by an established fictive kinship. A decrease in traditional interaction between Elders and children (also reflected in cultural

practices and language) has diminished the transmission of knowledge for example, in determining traditional male and female roles within the community (YFFN Evaluation Report (*Kipekiskwaywinan*)).

LEISURE

Leisure as an indicator for YFFN reflects an important aspect of the cultural transmission of traditional knowledge. The community indicated a general increase in leisure time that is not used for the cultural transmission of oral narratives (oral traditions and oral histories). This has been linked by the community to the availability of television programming. Other adverse effects linked by the community to a decrease in leisure time for transmission of traditional knowledge include alcohol and drug use and vandalism, especially among the children and youth within the community. The decrease of traditional leisure practices represents missed opportunities to share stories of the past, present, and the future through shared activities. This becomes substantial as there is a decrease in the types of children's activities that involve Elders, and a reliance on daycare and western schooling. Fear has been expressed by adults and Elders that a continued reduction of land area or specific sites like Sandy Beach and other beaches will continue to affect leisure activities (YFFN Evaluation Report (*Kipekiskwaywinan*)).

LAW AND ORDER

Law and order as an indicator for YFFN illustrates changes to community worldviews on social sanctions. There was a feeling expressed by some community Members that the historic enforcement of western law and modes of sanctioning has resulted in the loss of some cultural identity linked to a decreased understanding of the spirituality of their ancestors. YFFN oral histories suggest there is a community understanding that aspects of First Nation culture share a synergy with the concept of traditional knowledge as a basis for cultural transmission. Any disruption in traditional knowledge will result in the loss, decrease or absence of understanding traditional mores and folkways that determine customary law (YFFN Evaluation Report (*Kipekiskwaywinan*)).

CULTURAL PRODUCTS

Cultural products as an indicator for YFFN represent a manifestation of the cultural practices and beliefs that are also shared and transmitted through traditional knowledge. A considerable decrease in the number and type of cultural products that community Members produce or create has been affected by changes in the bio-physical environment. This has had an economic impact on supplemental incomes and is reflected in the reduction of furs for traditional clothing and beadwork. The community noted that there was also a reduction in subsistence processes such as smoking meat and fish, and preparing pemmican. The reduction in the availability of plants for traditional use was also noted and discussed as directly affecting the indictor health and wellness (YFFN Evaluation Report (*Kipekiskwaywinan*)).

Despite the existing fear and skepticism expressed in YFFN's Evaluation Report (*Kipekiskwaywinan*), there is also the expression of hope and expectations of a better future.

5.3.7 The Way the Landscape Looks (Aesthetics)

Construction and operation of the Project would primarily affect the way the landscape looks *(e.g.,* aesthetics) in the area between Gull Rapids and the outlet of Clark Lake. In addition, Project-related population increases that would occur in Gillam would result in changes to the urban environment. This section describes the characteristics of the area around Gull Rapids; KCNs perspectives on the aesthetic quality of the area and perspectives on the aesthetic nature of the Town of Gillam.

5.3.7.1 Local Study Area

The Nelson River system flows northeast from Lake Winnipeg and drains into Hudson Bay. The nature of the river varies as it changes from riverine to lake environments depending on the width of the channel. The Nelson River has been substantially altered by numerous past hydroelectric developments, beginning in the south with the Jenpeg Generating Station, and travelling downstream to the Kelsey, Kettle, Long Spruce and Limestone generating stations. For the KCNs in particular, the area is no longer a pristine environment; rather is an altered river environment. The Project is located at the eastern end of Gull Lake, and the western end of Stephens Lake - the reservoir created by the construction of the Kettle Generating Station. All of these generating stations result in fluctuating water levels within their respective license ranges.

The area in proximity to the Project features gently sloping terrain with lakes of various sizes scattered across the landscape. Bogs and peatlands occur throughout much of the area. The area is also characterized by the presence of discontinuous permafrost. Gull Rapids are located immediately above Stephens Lake. The shorelines around Gull Lake and Gull Rapids are gently sloping with rocky outcroppings in some areas (see PE SV for more details).

Source: Manitoba Hydro, 2011.

Photo 5-1: Gull Rapids

There are two sets of rapids between Clark Lake and Stephens Lake: Birthday Rapids and Gull Rapids. Birthday Rapids consists of a single set of rapids with approximately two meters of drop, while Gull Rapids consists of multiple channels with 11 meters of drop flowing into Stephens Lake. In between Birthday Rapids and Gull Rapids is Gull Lake, which is a wide channel in the river where water flows at low velocities with wind and waves producing lake-like conditions. Although the area between Clark Lake and Gull Lake is navigable during open water conditions, Gull Rapids are generally considered unsafe to travel through. Navigation is also a challenge in winter as the formation of ice can result in border ice, anchor ice, and hanging ice dams, in addition to areas of open water, which results in unstable and unsafe ice cover as described in the Physical Environment supporting volume.

USE OF THE RIVERS AND LAKES ALONG THE NELSON RIVER

Navigability presents challenges to the use of Gull Rapids for any traditional or recreational pursuits, and as such the area is not frequently used for boating. The scenic value of the rapids is appreciated by the people who travel in and around the area, although descriptions of the rapids themselves indicate the powerful nature of the water and considerable drop into Stephens Lake. The water coursing over the

rapids has both a visual and an auditory component, and can be heard well before it is seen when approached by boat.

The lakes above and below Gull Rapids are more accessible and thus are used more frequently by the KCNs and residents of the Gillam area alike. The following are typical patterns of use in the area:

- TCN Members are the predominate users of the Gull Lake area, and pursue activities such as hunting, fishing, and trapping. There are trappers' cabins around Gull Lake, in additional to traditional camp sites. The area is accessed by boat from Split Lake (CNP Keeyask Environmental Evaluation Report).
- Stephens Lake is used mostly by residents of Gillam (including FLCN Members) and has numerous cabins, which are largely located on islands. The area is typically accessed by boat from the Gillam Marina, although it is possible to launch boats where Stephens Lake comes into proximity with PR 280 (Gillam KPI Program 2009-2010).
- The area to the west of Stephens Lake is an important resource use area for FLCN, in particular for moose hunting (FLCN 2010 Draft).

5.3.7.1.1 Keeyask Cree Nations

The KCNs worldview is reflected in the ATK principles described in Section 1.2.3. These principles acknowledge that Cree traditional knowledge and technical knowledge are distinct worldviews (see also Chapter 2 of the Reesponse to EIS Guidelines). As such, the KCNs' perspectives on the aesthetic value of the Local Study Area relate to their understanding of their environment. The KCNs' traditions are rooted in a relationship with the land, and each of the communities recount stories about how their existence was intertwined with the rivers and lakes and how important a role the waterways play in many aspects of their lives, as is demonstrated by the following quotations:

- "Locations or features in the landscape, connected by routes travelled historically, act as memory tools for stories about people's relationships with their environment" (CNP 2010b; CNP 2010e).
- "Although the size of the territory frequented by the Fox Lake people was considerable, the river systems, in particular some of the larger tributaries of the Nelson River, including the Limestone, Weir, Kettle, Fox and Wabuttnakh Rivers (now called Butneau River), made it accessible by canoe in summer. The rivers provided drinking water for the people and habitat for the animals they hunted, and were the main routes of travel for generations of Inninuwak" (FLCN 2009a Draft).
- "The Hudson Bay Lowlands are a vast area of wetlands and across this expanse of low-lying, often frozen swamp are gravel beach ridges that outline former, ancient shorelines. Through these physical barriers, large and powerful rivers and many streams have carved their paths, replenishing the living ocean and providing a network of accessible travel routes for our people" (YFFN 2010).

The existing landscape that was the ancestral homeland of the KCNs communities is markedly different than the landscape their ancestors knew, and has witnessed substantial changes through the development of major infrastructure projects such as the Hudson Bay Railway, road development, and hydroelectric development (including generating stations, transmission lines and converter stations). The effects of

hydroelectric development, in particular, have deeply affected the KCNs relationship to the land. CNP describes the Keeyask reach of the Nelson River as "much different today from (that) experienced by (their) ancestors" (CNP Keeyask Environmental Evaluation Report). FLCN observes, "The life knowledge that people acquired from their parents and grandparents about how to live well, could no longer predict environmental outcomes when the seasonal flows of the Nelson River were reversed" (FLCN 2009a Draft). FLCN Members have witnessed changes in their traditional territory associated with hydroelectric development. For example, one Elder is quoted as saying "When I was young we mostly stayed at Wabuttnow Sipi and Moose Nose, upper Nelson. There was a very large island at the Wabbuttnow Sipi. People used to live on this island. Today I hear from others that this island is not there anymore. It was completely flooded over" (FLCN 2009a Draft). YFFN notes "Hydro-electric development on the Nelson River system has affected our land, our families and each of us as individuals. The water, land and the people have been fundamentally damaged by hydro-electric development. The changes began with the water" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

Since the construction and operation of past hydroelectric facilities (see Section 5.3.5), the Nelson River continues to be used for traditional and recreational purposes. Today, from Birthday Rapids into Stephens Lake, there are a number of cabins located along the shore that are used by both First Nation and non-First Nation resource users. Although Gull Lake is an area utilized by some Members of the KCNs, accessibility deters the area from being a high-use location. Stephens Lake has become a common recreation area for Gillam residents, with numerous cabins (55) located largely on islands. Stephens Lake and the environs around the lake are used by FLCN Members and resource harvesters from Gillam and Fox Lake (Bird). The Cache Lake area has also been an important location for FLCN Members, both before and after the construction of hydroelectric facilities, as it was adjacent to the CNR and therefore acted as a conduit to activities such as hunting, trapping, and gathering in more remote locations (FLCN 2009a Draft).

5.3.7.1.2 Gillam

The appearance of the town of Gillam has changed over time, as the community evolved from a predominately-Aboriginal community, to a seemingly-temporary trailer town to a permanent community. Long-term residents in the community have noted recent improvements to the town's appearance through efforts by the town's beautification committee. Others have noted derelict buildings and areas overtaken by weeds and litter. Residents speak of the need to improve certain facilities such as the mall, which is viewed as being outdated. FLCN, for which Gillam is also their home, continues to increase its visual presence within the community through the introduction of signage and buildings throughout the community.

People note that although many residents go to lengths to maintain their yards and properties, the overall transience of the population results in many properties being treated as short-term homes. One long-term resident noted that since the majority of homes are owned and maintained by Manitoba Hydro and other employers, some residents are more likely to put time and effort into the maintenance of cottage properties on Stephens Lake as there is a stronger sense of ownership (Gillam KPI Program 2009-2010).

Source: Manitoba Hydro 2011.

Photo 5-2: Aerial View of Gillam, Manitoba

5.4 ENVIRONMENTAL EFFECTS ASSESSMENT

5.4.1 Construction Effects and Mitigation

5.4.1.1 Community Governance, Goals and Plans

As noted in Section 5.3.1, community governance, goals and plans are linked, as it is typically a community's leadership and associated administration that are responsible for the execution of activities to achieve its goals and plans. The following sections present the construction effects on KCNs Governance, followed by KCNs Goals and Plans. Construction effects on Gillam and Thompson are also noted.

Activities associated with the construction of a major development, including employment and business opportunities and the potential socio-economic effects that stem from these opportunities, may affect the ability of the communities and their leadership to achieve their goals and plans. The capability of local governments to plan for and respond to these changes will influence the nature and extent of potential effects. The KCNs' respective leadership and the Town of Gillam have been and will continue to be key parties involved in considering and planning for the Project; they will also be key parties involved in responding to changes associated with the Project.

5.4.1.1.1 Keeyask Cree Nations

GOVERNANCE

During the construction phase, the KCNs will be involved with the implementation of the proposed Project and addressing its effects, including effects on their Members. KCNs' Future Development and Negotiations teams will need to continue to coordinate with their communities' Chiefs and Councils as the Project transitions from the planning phase into the construction phase. Among the activities likely to require attention on the part of community leadership are the implementation of the JKDA and AEAs (including participation in the various advisory committees identified therein) and decision-making regarding investment and equity participation in the Project.

Throughout these processes, any community concerns that arise as a result of the Project, be they inquiries about employment or business opportunities or complaints about worker interaction, are likely to be directed towards each community's leadership. As such, Chiefs and Councils will need to continue to be well-informed of Project activities in order to respond to their community's interests and concerns. Specific activities that would require attention are described in further detail in the following sections.

Implementation of the Joint Keeyask Development Agreement and the Adverse Effects Agreements

Through the negotiations of previous agreements with Manitoba Hydro, and throughout the process of entering into the JKDA and AEAs, the KCNs have increased their communities' abilities to assert their interests with regard to activities within their traditional land use areas. The JKDA provides $ 11 million in funding for the KCNs during the construction phase for participation in Project processes, including involvement in the KHLP Board and advisory committees established under the JKDA. These committees include the Advisory Group on Employment[1] (AGE), a Construction Advisory Committee[2] (CAC) and a Monitoring Advisory Committee[3] (MAC). These groups are forums for the KCNs to continue to play a meaningful role in the implementation of the Project. While the CAC and AGE are limited to the construction phase of the Project, MAC will continue through the life of the Project. As construction unfolds, Chiefs and Councils, with the support of their Future Development and Negotiations teams, will also be responsible for ensuring that obligations under the JKDA and AEA for their respective communities continue to be met.

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[1] Schedule 12-7 of the JKDA outlines the terms of reference for the Advisory Group on Employment which is intended to provide a forum for addressing employment-related issues, in particular Aboriginal employment, related to Project construction.

[2] Schedule 4-6 of the JKDA outlines the terms of reference for the Construction Advisory Committee which is intended to be a communications forum to discuss timely, accurate and pertinent information related to Project construction activities.

[3] Schedule 4-7 of the JKDA outlines the terms of reference for the Monitoring Advisory Committee which is intended to provide information regarding monitoring of the Project, and to discuss the environmental, social and economic monitoring activities, including ATK, during Project construction, commissioning, operations and decommissioning.

Equity Investment Participation

During the construction phase, each of the KCNs will be responsible for decision-making on equity investment and securing the funds necessary to enable participation in the Keeyask Hydropower Limited Partnership. The amount required to secure this participation will vary among the KCNs, with CNP eligible for 15% equity in the Project, FLCN 5% and YFFN 5%. Each partner will be required to make three payments to complete this obligation, including a nominal subscription payment, an initial closing payment, and a final closing payment that will ultimately determine their community's total equity in the Project. The KCNs communities can choose to invest in the Project in one of two ways: 1) a common equity option, which requires a higher level of investment and generates a proportionate share of distributions from the Project based on Partnership financial performance; or 2) a preferred equity option. The latter option involved a lower investment and a guaranteed return on investment. In the long-term, annual dividends may approach tens of millions of dollars, providing substantial long-term, sustainable income for the communities.

Addressing Community Interests and Concerns

Despite their involvement in the Project through the planning stages, the KCNs have noted some reservations about their participation. This is due in part to the fact that altering the natural environment is contrary to Cree worldview values and beliefs regarding stewardship of *Askiy*, in combination with each community's respective history with Manitoba Hydro (see Chapter 2 of the Response to EIS Guidelines and each of the KCNs Environmental Evaluation Reports). There is uncertainty among the KCNs that the effects will be exactly as predicted. Monitoring will be put in place to address some of this uncertainty (see Chapter 8 of the Response to EIS Guidelines). Involvement of KCNs' leadership and Future Development teams through the Board and advisory committees provides a forum for addressing community concerns.

GOALS AND PLANS

As identified in Section 5.3.1.2, the KCNs share several common interests in regards to their communities including increased influence in decision making within their respective RMAs and traditional territories, improving their financial resources so as to support community development and increased employment opportunities for their membership. In addition, the KCNs see the opportunities to maintain and renew their relationship to the land through traditional pursuits as essential to their cultural identity and viability. Each of the KCNs held a community ratification process to approve the JKDA as well as a separate vote on each community's AEA (see Chapter 2 of the Response to EIS Guidelines).

The KCNs have unique perspectives as to how the Project relates to their community's goals and plans, as is reflected in comments made in their respective Environmental Evaluation Reports:

- **CNP:** "Our belief that the long term benefits provided by the Keeyask Project are likely to help restore harmony and balance in our homeland ecosystem " (CNP Keeyask Environmental Evaluation Report).

- **YFFN:** "As we stated, our story is not tidy, balanced and objective. Our history of interactions with Manitoba Hydro is full of frustrations, miscommunications, mistrust and lack of mutual respect"; and "Our future generations are one of the main reasons we have decided to become partners in the Keeyask Project. We must maintain our future generations, their involvement in the Keeyask Project, and the different benefits and opportunities that will become available to them as key objectives as we move forward in partnership" (YFFN Evaluation Report (*Kipekiskwaywinan*)).
- **FLCN:** With greater involvement in the development of the Keeyask Project, FLCN may in a better position to work towards rebuilding a unified community that consists of both Gillam and Fox Lake (FLCN Environment Evaluation Report Draft).

Each of the KCNs has experienced some uncertainty with respect to entering into the Partnership. YFFN have noted the limited Partners need to further define how stewardship of the land can be maintained though effective monitoring and follow-up to deal with any uncertainty of the effects assessment. Manitoba Hydro has supported community research and involvement in the planning and assessment processes for the Project and continues to work with the KCNs to develop the Project.

Decision-making within Resource Management Areas

A key goal of the KCNs has been to increase their influence over decisions that affect their RMAs. For TCN and YFFN, this goal was advanced through provisions in their Comprehensive Implementation Agreements resulting from the NFA. For WLFN, an RMA was never designated, although the community does have representation on the Split Lake RMB. FLCN's RMA resulted from its 2004 Settlement Agreement. These agreements helped to enable direct negotiations with Manitoba Hydro in regards to the Project. Respect for the land, maintaining relationships with the land, and strengthening cultural identity are integral to the KCN's goals and plans. These values were considered throughout each of the KCNs' negotiations for the JKDA and their respective AEAs.

During the planning process the KCNs were able to influence key characteristics of the Project, including the following:

- In the early stages of Project planning, TCN insisted on the modification to the original design features from a high head design to a low head design to reduce the overall extent of flooding from over 120 km^2 down to 45 km^2;
- TCN also required Manitoba Hydro to reduce the forebay levels so that water levels on Split Lake would not be affected during open water conditions. This resulted in the limitations on the operating range of the reservoir (one meter) and agreement that open water levels on Split Lake will not be affected in the JKDA;
- Fundamental design features of the Project that cannot be altered without the written consent of TCN and YFFN as per the JKDA (construction and operating features); and without the consent of YFFN for operating features as per the JKDA;
- Measures that promote and enhance safe travel in open water and ice cover conditions;
- Measures to protect and preserve historic resources;

- Rehabilitation of disturbed sites used during construction; and
- No release on Manitoba Hydro's liability should unknown or unforeseen adverse effects arise from the Project (CNP Keeyask Environmental Evaluation Report; YFFN Evaluation Report (*Kipekiskwaywinan*)).

In addition to this, each of the KCNs participated in bi-lateral and multi-lateral processes detailed in Chapter 2 of the EIS. These processes allowed the KCNs to have considerable inputs into the environmental assessment studies and the overall effects assessment of the Project.

For the CNP and YFFN, the AEAs include programs which allow the community to undertake ongoing monitoring of resource use activities throughout their respective RMAs. The JKDA also includes provisions to provide on-going opportunities for the KCNs to be involved in Project-related monitoring through the Monitoring Advisory Committee described in the Section 5.4.1.1 above. ATK monitoring arrangements are also being negotiated with each of the KCNs for implementation during construction and operation. For YFFN, an important goal in becoming a partner is to increase the community's influence in the Project Partnership and the Project, particularly monitoring (YFFN Evaluation Report (*Kipekiskwaywinan*)).

Improving Financial Opportunities

Another key goal of the KCNs is improving their abilities to support community development and increased opportunities for their membership. The KCNs' respective AEAs provide a defined stream of funding to enable the implementation of offset programs, some of which began in 2009, and others that are scheduled to come into place before the construction phase begins. This includes the payment of Guaranteed Annual Amounts from Manitoba Hydro to each of the KCNs. The Guaranteed Annual Amounts will be instrumental in each community's ability to implement the objectives of their respective AEA. The AEAs are a reflection of the practices and customs of each First Nation, and provide insight into the priorities each community holds.

In addition to the AEAs, participation in the Project provides the KCNs with opportunities to negotiate directly on a group of contracts (*i.e.*, DNCs) that include a wide scope of construction related activities. Schedule 13-1 of the JKDA identifies which contracts would be DNCs and indicates the KCNs communities being provided the opportunity to negotiate these contracts directly. The experience gained in implementing the DNCs are expected to strengthen the KCNs capacity to undertake future work. (See Section 3.4.1.3.1 for further detail).

Partnership in the Project also provides each of the KCNs the potential for long-term revenues from equity investment.

Increased Employment Opportunities

The KCNs generally feel that in past hydroelectric developments, employment opportunities for their Members were limited and generally only as unskilled labour. With the Keeyask Project, there was "significant emphasis placed on training to prepare Members years before construction begins. With existing hiring preferences and employment targets it is expected that our Members will be hired in both

unskilled and skilled trade positions on the project" (CNP Keeyask Environmental Evaluation Report). The Hydro Northern Training and Employment Initiative (as described in Section 3.4) designed, developed and implemented community-based training programs to achieve this end. This, in combination with hiring preferences, DNCs and JKDA employment targets provide the opportunity for the KCNs to achieve goals associated with employment and training. Similarly, the Project should provide opportunities for KCNs businesses and partnerships to access contract opportunities (see Section 3.4.1.8). YFFN states "our members chose to support Chief and Council signing the JKDA to pursue the potential benefits for our current and future generations, to sustain and achieve respect for our Cree culture, and have a voice in this partnership (YFFN Evaluation Report (*Kipekiskwaywinan*)).

Traditional Land Use

The ability to maintain and enhance traditional customs and practices was paramount in the KCNs' negotiations of their respective AEAs.

The CNP described their process of arriving at the AEAs as several steps, starting with avoiding activities that would cause adverse effects, looking at ways to mitigate unavoidable adverse effects, and then looking at opportunities to provide replacements and substitutions where there were likely "infringements on our customs, practices and traditions" (CNP Keeyask Environmental Evaluation Report). The offset programs represent an opportunity that would "actually enhance our culture by providing increased opportunities to engage in the customs, practices and traditions integral to our distinctive cultural identity" (CNP Keeyask Environmental Evaluation Report).

In YFFN's *Kipekiskwaywinan*– Our Voices, they note that their approach to adverse effects was informed by a worldview based on traditional values: "We insisted on offsetting programs to support resource access and use, environmental stewardship (*Kanawaynichikaywin*) and cultural sustainability, as well as residual compensation, YFFN program control and flexibility. We insisted that the AEA reflect a strong environmental monitoring commitment and our participation and application of traditional knowledge in the monitoring of Keeyask Adverse Effects" (YFFN Evaluation Report (*Kipekiskwaywinan*)).

For FLCN, their AEA includes offset programs such as the Alternative Resource Use Program to "access alternate resource areas, within the Fox Lake Resource Management Area, to pursue their traditional activities'; and their Youth Wilderness Traditions Program, which enables youth to go out on the land and experience a traditional lifestyle (FLCN and Manitoba Hydro 2009).

Role of Fox Lake Cree Nation in the Town of Gillam

FLCN has worked in recent years to further enhance their role in the community of Gillam, and was able to reach a long-term goal in establishing a reserve on Kettle Crescent in 2009. The HGD process has also provided a forum for FLCN to voice its interests with stakeholders such as Manitoba Hydro and the Town of Gillam; and FLCN is a participant in the Gillam Land Use Planning process. The implementation of FLCN's AEA would further support FLCN's presence in Gillam (*e.g.,* the Gathering Centre that provides a permanent presence in Gillam).

5.4.1.1.2 Gillam

GOVERNANCE, GOALS AND PLANS

Gillam will be the closest Town to the construction site[1]. The influx of construction workers into the area may result in increased pressures on the Town's government and increased demand for local services (as described in Section 4.4.1.3). Services most likely to experience increased demand include health and social services and policing and enforcement services. As FLCN has indicated, these pressures will be experienced by FLCN Members who represent a large part of the community's population. The Town's Mayor, Council and Chief Administrative Officer, along with Manitoba Hydro and FLCN, will need to maintain communication on construction related activities, timing and the need for potential increased capacity for these services to ensure issues are addressed proactively.

The Town of Gillam and Manitoba Hydro have historically had an amicable working relationship. Through their funding agreement, it is anticipated that Manitoba Hydro will continue to communicate and work with the Town of Gillam and administration in order to ensure that the community has the capacity to deal with any potential construction related changes. The Harmonized Gillam Development process has also enabled FLCN to become involved in discussions about their interests and concerns for the future of the community. The current Gillam Land Use Planning process in place will allow for continued dialogue among stakeholders including FLCN.

5.4.1.1.3 Thompson

GOVERNANCE, GOALS AND PLANS

The governance, goals and plans in the City of Thompson are affected by a variety of factors, many of which relate to the community's role as a major service centre for northern Manitoba. Given the broad range of development that may occur in Thompson (by the City of Thompson, by industry, and by others), it may be difficult to detect if any effects are directly attributable to the Keeyask Project. As the largest community in the Local Study Area, Thompson has a greater capacity to react to any changes that may occur.

Effects on community governance, goals and plans would be indirect and arise from other predicted effects on the community including:

- The potential for an influx of workers into the area (during time off) adding to demand for services; and
- The use of Thompson as a storage and transportation hub *(e.g.,* off-loading of equipment and materials).

[1] Split Lake is the closest community to the Project site on the north side of the Nelson River.

5.4.1.1.4 Mitigation

KEEYASK CREE NATIONS

Key measures to address Project construction effects on KCNs governance are already in place through provisions in the JKDA and AEAs. These include implementation funding, participation in advisory and monitoring committees and AEA Offsetting Programs to address known adverse effects related to the Keeyask Project. It is recommended that the KCNs leadership *(e.g.,* Chiefs and Councils), and their Future Development and Negotiations teams or other designated party remain well-informed about Project activities to respond to community concerns.

Key measures to address Project construction effects on KCNs goals and plans are already in place through provisions in the JKDA and AEAs. These include the Guaranteed Annual amounts that support the implementation of AEA Offsetting Programs to "provide appropriate replacements, substitutions or opportunities to offset unavoidable Keeyask Adverse Effects on practices, customs and traditions integral to the distinctive cultural identity" of the KCNs, hiring preferences and DNCs, which facilitate employment and business opportunities related to the construction of the Project. The measures that will be required to address FLCN's goals of living in a safe environment in the Town of Gillam *(e.g.,* concerns over worker interaction issues) will require leadership and coordination among FLCN, the Town and Manitoba Hydro. These measures are identified under Section 5.4.1.4 Public Safety and Worker Interaction, and Section 4.4.1.3 Infrastructure and Services.

GILLAM

There will be continued coordination among Manitoba Hydro, FLCN and the Town of Gillam to ensure the needs of the residents are met, particularly in relation to influx of workers into the community. More detail on this mitigation is found under Section 5.4.1.4 Public Safety and Worker Interaction. No further mitigation or enhancements are required.

THOMPSON

Manitoba Hydro will continue to liaise with Thompson to ensure construction-related Project needs are aligned with Thompson's goals and plans. No further mitigation or enhancements are required.

5.4.1.2 Community Health

This section describes potential effects of construction of the proposed Project on health of residents in the Local Study Area. As discussed in Section 5.3.2.1, from a Cree perspective, health has as much to do with social relations, land, and cultural identity as it does with individual physiology and disease. This is similar to current day perspectives on population health research, which focus on broad social and economic determinants and their interactions with, and impacts on, health.

Both direct and indirect sources of change from the Project were examined. Potential direct pathways of change to human health are expected to be limited to the area in closest proximity to the Project, and are associated with changes to the water regime. This includes both safety concerns arising from changes to the water regime and associated navigability of the area, in addition to water quality concerns arising from

Project activities. The issue of potential changes in resource harvesting specifically related to mercury and human health were considered particularly relevant, and are discussed in Section 5.4.1.3. Changes to resource harvesting patterns as a result of changes to travel/access/safety in relation to the health benefits of eating country foods are also considered.

Other potential changes in the determinants of community health as a result of the Project were examined to the extent possible. These include changes in factors that can indirectly affect the health of people, such as housing conditions and income (see Section 5.2 for a discussion on the factors contributing to health).

The key determinants of health that are expected to be impacted by the Project (either positively or negatively, or both) include indicators of income and social status, employment and working conditions, social environments, physical environments and health services. In the case of the Project, key potential effects on health determinants include: employment, income, education and training, potential worker-interaction issues, pressure on local infrastructure and services, increased traffic on roadways in the Local Study Area, and changes to the environment. Although it is possible to list some of the factors that have the potential to affect health determinants, the ability to draw firm conclusions with any precision about these indirect effects of the Project on human health is limited. Sources of uncertainty associated with any such assessment include:

- Heath determinates are affected by many factors beyond those which may be connected to the Project, thus it is very difficult to isolate the specific effects of Project changes;
- Some influences may be positive and others negative; in fact, the same source of change can have both positive and negative consequences in some cases; and
- There are uncertainties associated with some predictions made in the assessment *(e.g.,* degree to which negative worker-interaction incidents will occur).

It is important to note that the Local Study Area includes a diverse range of communities. Although indicators have been identified, not all communities will be impacted to the same extent by changes to these determinants of health.

During the construction phase, direct pathways of effect to health may include changes to water quality and travel safety (including both land and water). Indirect pathways of effect may include changes resulting from people's ability to access country foods, employment and income, from issues associated with public safety related to worker interaction, and any effects to health services in Gillam and Thompson as a result of the Project.

5.4.1.2.1 Community Health Issues Directly Associated with Project Construction

WATER QUALITY

The KCNs have a special relationship with the land and waterways in the Local Study Area and note that "Spiritual, physical and emotional relationships with land and water are the essence of our culture" (CNP Keeyask Environmental Evaluation Report). As such, many Local Study Area residents have identified concerns regarding changes to the land and water as a result of construction activities, and in particular concerns about water quality. Concerns about water quality relate to consumption of water while spending time on the land, and include consideration about water and wastewater treatment and other changes to water quality associated with construction activities.

The construction phase represents the beginning of physical changes to the water of Gull Lake. Changes in water quality are expected to be limited primarily to changes in turbidity and associated sediment in the water and are isolated to the area in the vicinity of the construction site (including immediately up and down stream (PE SV). Changes to the water regime and shoreline erosion may lead to changes in sedimentation processes, including the transport and deposition of mineral sediment and peat material. Construction activities during river management *(e.g.,* cofferdam construction) will introduce additional sediment into the Nelson River near Gull Rapids. There is a potential that some of the additional sediment will flow downstream, which may affect the sedimentation environment in Stephens Lake (PE SV). However, it is important to note that the majority, if not all, changes regarding turbidity are expected to be limited to the construction site area. All of the communities in the Local Study Area are located beyond the anticipated open water hydraulic zone of influence, and as such, there should be no changes to community drinking water supplies. In addition to this, the areas in closest proximity to the construction site will be restricted from public access due to safety reasons. Therefore, most KCNs community Members as well as others, even if engaging in activities on the land, should not encounter increased turbidity in the water during the construction phase of the Project.

The other pathway to water quality would arise from the treatment of wastewater at the construction site. The construction camp will house workers at the Project work site; the workforce will vary over the approximately eight years of construction and will generally be higher during the summer construction season. The work camp will include treatment of liquid waste; effluent will meet provincial waste treatment and camp drinking water supplies will meet all regulatory guidelines (PE SV).

The AE SV provides additional information on water quality in relation to the Project and measures water quality in relation to the Manitoba Water Quality Standards, Objectives, and Guidelines for the protection of aquatic life. The guidelines for the protection of aquatic life are typically more stringent for things like metals (*e.g.*, mercury), while drinking water guidelines are more stringent for organic compounds (*e.g.*, benzene). The AE SV concludes that metals should generally remain within Manitoba Water Quality Standards, Objectives, and Guidelines for the protection of aquatic life in the reservoir and downstream. The key exceptions are iron and aluminum, which are currently present at concentrations well above these water quality guidelines. The Human Health Risk Assessment conducted in relation to

mercury and human health does not identify any risk to human health associated with surface water (refer to Appendix 5C).

Public access, including resource users, to the construction site will be restricted for safety reasons. In addition to this, it is expected that noise from construction activities and the presence of the construction workforce will dissuade resource users from undertaking activities in close proximity to the site. Further, the KCNs have offset programs defined in their respective AEAs that enable community Members to pursue traditional activities at alternative locations. These programs will be in place prior to the onset of construction activities. As such, the potential for resource users to consume surface water in the area will be minimized. It is also important to note that, regardless of location, direct drinking of surface water is not a recommended practice; Health Canada indicates that all untreated water should be boiled for one minute before consumption (Health Canada 2008).

INJURY AND TRAVEL, ACCESS AND SAFETY

Section 5.4.1.5 describes the likely changes to travel, access and safety as it relates to travel on water/ice in addition to travel on roadways in the Local Study Area.

In terms of water/ice-based travel, KCNs community Members have expressed concerns related to accident and injury associated with past hydroelectric developments including hazards such as floating debris, creation of reefs, fluctuating water levels, and changes to how ice forms. As a result, Manitoba Hydro has implemented a Waterways Management Program (WMP) on Split Lake under TCN's 1992 Comprehensive Implementation Agreement to deal with unpredictable conditions (see Section 5.4.1.5). Other measures such as the Project Reservoir Clearing Plan and WMP (delineated respectively as Schedule 11-1 and 11-2 of the JKDA) will also be in place to address potential travel, access and safety concerns arising from Project construction along the Nelson River downstream of Clark Lake to Stephens Lake.

Project activities will also result in an increase in traffic volumes in the Local Study Area (see Section 5.4.1.5). KCNs community Members have expressed concerns about increased traffic and the risk of death and injury, particularly on PR 280 (CNP Keeyask Environmental Evaluation Report; YFFN KPI Program 2009-2010). The Government of Manitoba has been making improvements to PR 391 and PR 280 including road upgrades *(e.g.,* clearing and grading), signage, and pull-offs, which are all expected to continue to improve road travel conditions.

Section 5.3.2.1 notes that injury is the leading cause for physician visits and hospitalization for the KCNs; while the rate of physician visits associated with injury was lower than in the comparison populations, the rate for hospitalizations for injuries was higher in almost every year considered and shows a clearer trend towards a sharp increase in the most recent five years. Among KCNs Members, people age 19 and under accounted for 41.4% of hospitalizations for injuries, with the highest number of hospitalizations seen among male residents ages 15 to 19. As such, any increase to injury rates may pose concern to local health care providers in addition to KCNs community Members.

Project activities may produce the opportunity for increases in accidents in the Local Study Area due to changes on waterways and or increased traffic on roads, however it is difficult to predict with any

accuracy what increase is likely. There is also potential that with the safety measures that have been and will be put in place, travel in the Local Study Area may become safer.

5.4.1.2.2 Community Well-Being

Community well-being is shaped by a broad range of factors, including how people perceive their current circumstances and their future. As described in Section 5.3.2.1 the Cree concept of *mino pimatisiwin* or "living a good life" (as noted in Chapter 2 of the Response to EIS Guidelines) has as much to do with "social relations, land, and cultural identity as it does with individual physiology" (Adelson 2000).

Through the community-based research process, in tandem with concerns identified in the KCNs' respective Environmental Evaluation Reports, various concerns about potential Project-effects on community well-being were identified. During construction, these concerns include:

- Changes to people's abilities to access country foods;
- Changes to community well-being as a result of worker-interaction issues;
- Changes to community health and well-being as a result of employment and income; and
- Potential Project-related demands on local health services.

As previously noted, the effects of the Project will vary for individuals and families, depending on the specific experience of sources of change. Determining, on balance, whether effects of construction phase activities will result in positive or negative effects on community well-being as a whole is difficult.

ABILITY TO ACCESS COUNTRY FOODS

As discussed in Section 5.3.2.1, the ability to access traditional foods and lands are essential to Cree concepts of health and living a good life. It is clearly beneficial if more people are eating country foods in recommended amounts (see Section 5.3.3.3 for examples) and if fewer people are accessing the land and eating country foods, the health of the community is impacted. During community-based research several residents remarked on the change in health status of people in the Local Study Area particularly related to diabetes and obesity, and noted that this may be related to eating less traditional foods and more packaged/prepared foods from the store. The higher cost of foods is also referenced as a reason that less healthy options are often chosen (*e.g.*, country foods can be less expensive) (FLCN KPI Program 2009-2011).

There have been concerns expressed by KCNs community Members about the potential effect of construction phase activities on people's ability to access country foods. Concerns identified by TCN Members include the impact on the actual land, access to land, noise and its effect on wildlife and the possibility that new construction workers will hunt in areas that are traditionally used by community Members (CNP Keeyask Environmental Evaluation Report).

As discussed in Sections 5.3.5 and 5.4.1.13, due to required restrictions near the Project construction site for safety reasons, the construction phase of the Project will affect access to traditional hunting and trapping areas. If community Members are not willing or able to access other areas, or access their traditional areas in proximity to the construction site through alternative routes, there is a potential

negative effect on health as a result of less availability of healthy traditional foods. It is important to note that all KCNs communities have Offsetting Programs in their AEAs that enable them to access healthy country foods (including fish and wild game) in areas unaffected by the Project within their respective RMAs, and to practice traditional activities. In the case of TCN, WLFN and YFFN, there is also an element of food distribution within the communities as a part of their AEA Offsetting Programs. This will allow for country foods to be shared by those who are unable to go out on the land themselves. These programs ensure that there is no cost to community Members to access country foods in new areas and or by new routes within their respective RMAs.

WORKER INTERACTION ISSUES

More than 90% of the construction workforce will be at the main construction site north of the Nelson River, while less than 10% of the workforce will be involved in activities associated with the south access road and dykes. Section 5.4.1.4 outlines the projected numbers of workers by year and by quarter as numbers vary over time and season. While numbers peak at more than 1,600 workers, in the majority of the quarters for five years of construction activities, at least 500 people will be living at the main construction site. At the south construction site, numbers are much lower ranging up to about 100 workers. However, it is recognized that even small numbers of temporary construction workers have the potential to affect small communities.

Key person interviews indicate many health-related concerns about the potential outcomes of worker-interaction issues, particularly if a negative event occurs. Among the concerns identified in relation to community well-being are the following:

- Increased availability of drugs and alcohol resulting from increase income availability and presence of a non-local work force in the area. KCNs communities are "dry communities" and Members have concerns related to increased income, job stress, loneliness and potential impact on alcohol use. TCN and FLCN have expressed strong concern over increased use of alcohol and resulting effects on their Members.
- Potential for increased violence in the communities. The impact of alcohol is a concern both for the non-local workers as well as community Members who may also engage in the use of alcohol and or be involved in violence as a result of someone becoming intoxicated.
- Risk of inappropriate sexual behaviour between construction workers and community Members within the Local Study Area. This is not limited to community Members getting involved in the "party atmosphere" often associated with major construction camps, but also for the potential for non-local workers to abuse and or assault local community Members. Women and youth have been identified as particularly at risk for this sort of potential interaction.

Section 5.4.1.4 details the potential for public safety issues to arise in each of the KCNs communities in addition to Gillam and Thompson. Overall, the principle source of concern is the potential for non-local Project construction workers to travel to communities in the Local Study Area during their leisure hours to socialize at the bar, restaurants, community events or in resident's homes. The impact on each community may be different, depending on its size and amenities available.

Section 5.3.2 notes that between 1984 and 2006, physician visits and hospitalizations associated with mental health and behavioural disorders increased for residents of the Local Study Area (although 10 year average annual rates appear stable as the population increased by more than the number of events). In addition, the 10 year average annual hospitalization rate (1997-2006) was statistically higher for the Local Study area in comparison to the BRHA overall. Concerns about the social problems observed during previous hydro development including increased alcohol and drug use among community members have also been noted by the KCNs. Since worker interaction issues have the potential to adversely affect individual and community mental health and well-being, mitigation measures have been proposed in Section 5.4.1.4. Mitigation measures focus on construction workers on site (*e.g.,* measures to make it more attractive to stay on site), and the KCNs communities and Gillam.

Further to this, worker-interaction presents the risk of inappropriate sexual behaviour between construction workers and community members. Although sexually transmitted infection rates were not presented in Section 5.3.2 to respect the confidentiality of communities in the Local Study Area, there is evidence to suggest that resource projects in Canada can pose public health issues through increased rates of sexually transmitted infections associated with temporary or transient workforces (Goldenberg *et al.* 2008). While the potential risk of increased sexually transmitted infections resulting from worker interaction is impossible to predict, it is suggested that discussions with the BRHA be coordinated prior to the onset of construction so that public information campaigns can be in place.

EMPLOYMENT AND INCOME

Employment and income have the potential to affect community health and well-being in various ways. Employment opportunities, for example, may provide opportunities for individuals to gain new skills and experience, which may contribute to an individual's self-esteem. At the same time, employment may create pressure on the worker's family who would be separated from the worker while they are at the construction site for several days or weeks. If a family member is away for an extended period of time, the remaining parent may be faced with greater responsibilities in managing the household, and associated increased stress (Clover Taylor and Graetzs Simmonds 2009; YFFN Future Development 2010). It is difficult to predict precisely how an individual or family will react to the outcomes of employment, although there is likely to be a balance between the potential positive and negative outcomes. The KCNs' negotiation of the JKDA and involvement in pre-project training suggest that the communities are hopeful that Members will benefit from construction employment opportunities.

Similarly, the potential increase in income for local residents who are employed during the construction phase can have both positive and negative effects. Increased income is often associated with better health and longer life expectancy. For example, increased income allows people to purchase higher quality foods, heat for homes or to pay for advanced education opportunities. Many of these factors, particularly costs of healthy foods have been identified by KCNs community Members in the community-based research as affecting current health status of community Members. On the other hand, "with more disposable income, alcohol and substance abuse problems are likely to increase" (National Aboriginal Health Organization 2008). Higher levels of disposable income have been linked to "intense drinking and drug use" in other resource projects in Canada (Goldenberg *et al.* 2010).

It should be noted that most research that shows the positive relationship between a higher income and improved health, uses data from people who have these higher incomes over longer periods of time. This is related to "higher socio-economic status", not necessarily those who experience sudden increases in income for limited periods of time (which does not necessarily change long-term socio-economic status) (Scott and Lessard 2002). Construction employment opportunities will vary seasonally and annually (see Section 3.4.1.6). While research suggests that after one or two years communities can adjust to increased income levels through an increase in social stability and improved services (National Aboriginal Health Organization 2008), without mitigation there is potential that the variations in income availability over the eight-year construction phase may not allow for a shift in community well-being to occur. That said, the mitigation measures identified in relation to public safety and worker-interaction (see Section 5.4.1.4) should help to alleviate some of the potential negative influences of new disposable income, while also putting mechanisms in place to identify and address issues if they arise. Further to this, FLCN's and YFFN's DNC for Employee Retention and Support will provide counselling services at the construction site that could be extended to a worker's family members if needed.

5.4.1.2.3 Health Services

During the construction phase there will be anywhere between approximately 100 and 1,600 workers on site at the main construction camp, while there will be approximately 100 employees at the south construction camp at any point in time. Although there will be emergency health services provided on site for accidents, more serious incidents may require treatment in Gillam, Thompson or Winnipeg where a broader range of services are provided. Similarly, the resident construction workforce may require medical care for minor ailments from time to time, and may choose to access services in the Local Study Area. Section 4.4.1.3 notes that infrequent use of health services in Gillam or Thompson are likely to be accommodated by the existing services. As noted in Section 4.4.1.3, the main construction camp will provide some health care services, largely in relation to emergency medical response. This includes the provision of a minimum of two accredited primary care paramedics on duty at all times, in addition to one on-shift advanced care paramedic during the day shift. Emergency medical and ambulance services will be available 24 hours a day, seven days a week. Further to this, there will be a health monitoring clinic to manage things on site such as flu outbreaks or other situations that could affect the camp occupants. There may be some health issues, particularly as it relates to diagnostics[1] that are referred to the hospital in Gillam or Thompson.

5.4.1.2.4 Mitigation

There are no specific mitigation measures proposed directly related to community health; however those measures identified in relation to public safety and worker interaction, to travel, access, and safety, to culture and spirituality, and to infrastructure and services should help to alleviate some of the potential pressures that could affect community health and well-being. It also is suggested that discussions with the BRHA take place prior to the onset of construction to help them prepare and plan for the construction

[1] In Manitoba primary care paramedics and advanced care paramedics only provide services as per the Emergency Medical Response and Stretcher Transport Act C.C.S.M. cE83 and the Land Emergency Medical Response System Regulation 22/2006.

period, including the potential need for public information campaigns to address such issues as sexually transmitted infections.

5.4.1.3 Mercury and Human Health

Section 5.3.3 described the risks to human health associated with mercury in the existing environment. To briefly reiterate, mercury is a naturally occurring metal found in the environment and occurs naturally in the soil around Gull and Stephens Lake and in the fish found in these lakes and other lakes in the region. One form of mercury, called methylmercury, can bioaccumulate (build up and become more concentrated at higher levels in the food chain). For people, the vast majority of exposure to methylmercury is through the consumption of fish. Fish with the highest methylmercury[1] levels tend to be the large and long-lived predatory fish; however, most fish contain some levels of mercury. Fish that often contain higher levels of mercury include lake trout, burbot, jackfish and pickerel, depending on the localized environment (see AE SV). Mercury accumulates mainly in the tissue of fish, although it is also present in other organs.

Without the Project, it is assumed that the current levels of mercury in traditional food sources such as fish, wild game, furbearers, and waterfowl would remain at similar levels to today, and that similar consumption guidelines would prevail (see Section 5.3.3 for guidelines). With the Project, flooding of soils is expected to release mercury into the environment and food chain (see PE SV for further details regarding flooding and the total area expected to be flooded).

There are no anticipated effects of the Project during the construction phase in relation to mercury and human health. Although impoundment will commence in the latter years of the construction phase, increased mercury levels in the environment do not occur until 3-7 years after impoundment, which occurs during the operation phase. Communication products on existing mercury levels in country foods (which coincide with the construction phase) have been described in Section 5.3.4. Communication products on increased levels of mercury in country foods (applicable during the operation phase) and consumption recommendations will be prepared through the Monitoring Advisory Committee (MAC) and distributed to local communities just prior to impoundment – these are detailed in Section 5.4.2.3 below.

5.4.1.4 Public Safety and Worker Interaction

In the Local Study Area, construction of the Project may result in effects to public safety arising from Project activities. These effects may arise primarily due to two main pathways of effect: 1) the influx of non-local construction workers, and 2) the availability of new and sporadic disposable income for residents employed during construction. Potential effects, if they arise, would likely be confined to the construction period, since the main pathways relate to construction employment.

[1] From this point forward for ease of reading, reference to methylmercury is shortened to mercury, unless otherwise noted.

CONSIDERATIONS IN EVALUATING EFFECTS TO PUBLIC SAFETY

The principle sources of concern for potential adverse effects to public safety from worker interactions relate to Project construction workers who travel to communities in the Local Study Area during their leisure hours to socialize at the bar, restaurants, community events or in residents' homes. In order to assess the potential for adverse effects it is important to understand the number, timing and location of construction workers, factors that affect where workers choose to spend leisure time and the social context of the potentially affected communities.

THE NUMBER, TIMING AND LOCATION OF CONSTRUCTION WORKERS

More than 90% of the total construction workforce is expected to be based at the main construction camp located on the north side of the Nelson River near the end of the north access road. Workers will be based at the main construction camp over the entire construction period with the quarterly peak number varying from 110 towards the end of construction to over 1600 in the middle of 2016 and 2017 (see Table 5-20). There are estimated to be in excess of 1000 workers at the main construction camp for most of the period between 2016 to 2017. During 18 consecutive quarters from the third quarter of 2014 to the fourth quarter of 2019, more than 500 workers are expected to be living in the main construction camp, with peak quarterly estimates of over 1,000 workers during seven of these quarters.

Table 5-20: Main Construction Camp Quarterly Employment Peaks

Quarters/Years	2014	2015	2016	2017	2018	2019	2020	2021
Q1	0	291	598	532	603	596	319	123
Q2	123	450	1,167	1,615	1,071	613	312	145
Q3	503	498	1,610	1,522	1,019	638	323	146
Q4	404	536	1,135	924	849	509	262	110

Notes:
- Derived from data provided by Manitoba Hydro, 2010.
- The quarterly peak numbers include Contractor Supervisory and Manitoba Hydro Site Staff.
- The Project is scheduled to start in June 2014 and finish in March 2021. Quarterly employment peaks for Q2, Q3 and Q4 of 2021 include main camp decommissioning, security, catering, first aid, maintenance, employee retention and support job categories.

It is likely that some workers will leave the Project site for leisure time visits to communities with amenities including shopping, banking, bars, liquor vendors, hotels and restaurants. The nearest communities with these types of amenities are Split Lake, Gillam, and Thompson. Traveling to these communities would involve traveling from the main construction camp along the north access road and onto PR 280.

Less than 10% of the total construction workforce will be involved in building the south access road and south dyke. These components of the Project are located on the south side of the Nelson River and will be accessed from Gillam via the Butnau Road and the South Access Road. This will consist of approximately 100 people including construction staff, service staff (catering, security, first aid, *etc.*) and Manitoba Hydro employees starting in Q3 2014 until Q3 2015 (not inclusive of the time required to set-up the camp). Gillam would be the main choice available for these workers looking for offsite leisure-time amenities. Construction of the south access road and south dyke has a much shorter duration and involves a much smaller workforce than construction activity occurring on the north side of the Nelson River. As this contract to develop the south side access road is identified as a potential DNC for CNP, a sizeable portion of the workforce is expected to be comprised of Members of KCNs communities. Still, even an influx of a small number of non-local workers poses the potential for negative interactions with community members.

FACTORS INFLUENCING LEISURE TIME DECISIONS

The decision by workers to travel in their off hours will depend on a number of factors. Some factors will influence them to remain in the camp, while others will serve to push them away from the camp towards a nearby community. Where workers decide to go will also depend on how much time off they have *(e.g.,* evening vs. day off), the location of the amenities they seek and the distance they have to travel.

- **Working hours:** The Burntwood Nelson Agreement indicates that most workers will work 10 to 12 hour days, six days a week and have only one day off, typically Sunday, although the exact working hours for the general civil contract will not be finalized until after the contract is awarded. This limits the amount of leisure time workers have available to make offsite trips, particularly for the main construction camp, which is a considerable distance from Gillam or Thompson, and less than 100km from Split Lake (see Table 5-21). Such trips are most likely to occur on the evening before their day off and the following day when they are not working. End of shift visits for leisure amenities outside the main construction camp are less likely due to the long work days and distances from the camp to the nearest communities. Exceptions could be workers who have spare time while waiting for commercial flights or out-of-province workers who may have extended periods of time off *(e.g.,* one week) depending on the terms of the general civil contract.

- **Leisure amenities at camps:** The main construction camp will have a lounge and high quality recreational facilities and programming on site. It will also provide free meals for workers. These factors are expected to result in a large portion of workers choosing to remain at the camp during off-hours and not wanting to go offsite for leisure amenities, particularly during their shifts. The situation is different for south side construction activities that will be accessed from Gillam. Because of its size and the short duration of the south access road/south dyke construction activities, the camp is unlikely to have a bar and recreational facilities. Workers would have to leave the camp area to find leisure amenities.

- **Travel distances to communities with amenities:** Split Lake is the closest community to the Project, at approximately 72 km from the main construction camp, and offers a few amenities such as a gas bar, Northern Store, and fast food outlet. Thompson and Gillam have the key leisure

amenities that workers would be seeking, *e.g.*, shopping, banking, bars, restaurants, hotels, liquor vendors and recreational facilities. The return trip to/from Gillam will take about three hours total while the return trip to/from Thompson is about an hour longer. These long travel times will likely constrain evening-only visits, but in the event workers did choose to leave the main camp in the evening it is likely they would choose to travel to Split Lake or Gillam because they are closer. For visits on off-days, either Gillam or Thompson would be feasible.

- **Services and amenities available in the Local Study Area:** Thompson offers a much greater number and variety of the amenities typically sought by construction workers than does Gillam, making it a much stronger attraction for workers (see Table 5-21). The greater selection of available amenities is likely to result in more workers at the main construction camp choosing to travel to Thompson for day-off visits, despite the somewhat greater travel time. However, some workers may still choose to travel to Gillam.

From the south access road, Gillam will be much closer than Thompson for making off-hour visits. If the camp is located near the community, the travelling time will be virtually negligible; and if located away from the community, travelling time will be under 40 minutes. Gillam will be close enough that workers could easily make the two-way trip to and from Gillam on evenings after finishing the shift for that day. Because of their lack of relevant amenities, Fox Lake is not expected to attract off-hours construction workers, although some visits may be made simply to see the communities. In the case of Split Lake, some off-hour visits may occur to access the gas station and Northern Store as well as to see the community. There may be some interest in fishing on lakes in between the construction site and these communities.

Table 5-21: Leisure and Recreation Amenities of Communities in the Local Study Area[1]

	Gillam	Thompson	Fox Lake	Split Lake[2]
Leisure Amenities Sought by Workers	1 bar 1 vendor 1 liquor store (ltd) 2 hotels 2 restaurants 1 gas station Fishing on Stephens Lake	10 or more bars and lounges 2 or 3 beer vendors 1 LCBO 7 hotels, 2 hostels, 1 B&B 30 or more restaurants 5 or more gas stations	Fishing Dry community	1 hotel 1 store 1 gas station 1 restaurant Good fishing lakes Dry community
Distance via North Access Road[3]	142 km	208 km	130 km	72 km
Distance via South Access Road[4]	0 to 17 km[5]	337 km	88 km	201 km

Notes:
1. Only communities with all-weather road access in the Local Study Area are included.
2. Refers to TCN at Split Lake.
3. Distance from main construction camp to a community.
4. Distance from the south construction camp to a community.
5. The precise location of the south access construction camp is yet to be determined. The range presented is from a) just outside the town of Gillam to b) near the Butneau Dam.

In addition to the above factors, the overall size of the community also requires consideration. Although Split Lake has a larger population than Gillam and is located about 72 kms from the north camp, the community may be more sensitive to visits from non-local workers as this is not as common an occurrence as it is in Gillam and Thompson. Thompson's population is over 10 times larger than Gillam and as such the effects of workers visiting the community are more likely to be buffered than in a smaller community. This is not to say that KCNs Members residing in Thompson are never going to experience any form of worker-interaction, rather that there may be fewer opportunities for interactions to occur due to the relative size of the community. Gillam is a smaller community and as such is more likely to notice a non-local workforce. FLCN Members living in the community have experienced serious negative impacts from past hydroelectric projects as a result of interactions with visiting construction workers. This combination of factors makes FLCN Members living in Gillam much more vulnerable to worker interaction problems than what people in Thompson and perhaps even the rest of Gillam may experience. A relatively small number of incidents could have a damaging effect on the FLCN population in their home community of Gillam.

5.4.1.4.1 Keeyask Cree Nations

The KCNs' past experience with hydroelectric projects such as Kettle, Long Spruce and Limestone generating stations indicate that influx of non-local workers can result in a broad array of adverse effects on public safety for those residing in communities close to the developments, as described in Section 5.3.3. FLCN expects effects from the Project similar to effects experienced during past projects.

EFFECTS RELATED TO WORKER INTERACTIONS

The presence of a temporary workforce leads to concerns about the potential for harmful interactions between workers and vulnerable community members. The potential for these interactions also leads to broad concerns about adverse effects on general public safety in the community. Adverse effects on public safety can also change how community members feel about the community, leading to impacts on community cohesion and well-being. TCN has expressed concerns that non-local workers will visit Split Lake as it is the closest community to the north construction camp, is en route to Thompson and offers amenities such as a gas station, northern store and fast food outlet. With these visits, there is potential for adverse interactions with community Members, with particular concern expressed in regards to women. FLCN Members have identified potential adverse effects of construction worker interaction with community Members, in particular women and youths, as their greatest concern associated with new major projects being developed in their traditional territory. YFFN has noted that many of their youth attend high school in Thompson and there is the potential for adverse interactions with construction workers. The communities' concerns are based on direct experience with the construction of previous hydroelectric generation projects, with FLCN's experience centred in the Gillam area (see Section 5.3.3.3). With respect to the changed perceptions, Vanclay (2007) indicates, "the impacts that will likely result from these change processes are changed perceptions about the nature of the community, changed perceptions about personal attachment to the community, and possibly annoyance and upsetness as a result of the project."

The KCNs' past experience with hydroelectric projects such as Kettle, Long Spruce and Limestone generating stations indicate that influx of non-local workers can result in a broad array of adverse effects on public safety for those residing in communities close to the developments, as described in Section 5.3.3. TCN and FLCN have expressed concerns that effects from the Project will be similar to effects experienced during past projects.

EFFECTS RELATED TO INCREASED DISPOSABLE INCOME

Increased disposable income may lead to inappropriate spending on alcohol and drugs and associated effects on health, well-being and public safety. New income and the "boom and bust" cycle that a major construction project creates will result in relatively short-term periods of increased (high paying) opportunities. Past experience with resource development projects across North America, including the KCNs' past experience with hydro development indicate that increases in disposable income can result in increased spending on activities that are deleterious to the health, well-being and safety of individuals, families and communities. The KCNs have expressed concerns about new income providing increased disposable income to spend on things that might otherwise not be afforded, such as alcohol and or drugs.

COMBINED EFFECTS OF WORKER INTERACTION AND INCREASED DISPOSABLE INCOME

These two pathways can have combined effects. The correlation between alcohol and violence/aggression has been documented by many (Bushman 1993; Chermacks *et al.*, 1997; Parker Nash and Auerhahn 1998), as well as witnessed within the KCNs community context (FLCN KPI Program 2009-2011; TCN 2010). The potential for aggressive and even violent behaviour that threatens an individual or group's safety is at the root of the KCNs concerns. Social and health effects have been known to follow heavy use of alcohol, including a large percentage of crimes such as assaults that relate directly or indirectly to drug and alcohol abuse (Gibson and Klinck 2007). Such concerns are common to development projects across Canada, in particular where Aboriginal communities are located in proximity to worksites (Goldenberg *et al.* 2007; Vanclay 2002).

Workers may or may not be prepared for the intense work regime (long daily routine, little time off during work rotation schedule), the separation of living in a work camp (away from their home community), and the sudden increase in income. These conditions may result in stress for some workers. Substance abuse is a known coping factor for stress (Gibson and Klinck 2007), with alcohol in particular identified as a coping mechanism for a host of issues (Gallo *et al.* 2001; Holahan *et al.* 2003; Ofrord *et al.* 2001; Martin *et al.* 2003). Concerns around alcohol include the fact that the KCNs communities are dry communities and alcohol is not readily available. An increase in income and access to a lounge on the construction site may provide KCNs Members with access to alcohol they are not accustomed to having in their home communities.

The presence of temporary construction workforces is often associated with a 'work hard, play hard' mentality (Vanclay 2002), which can exhibit itself in 'binge partying' that is bolstered by the availability of disposal income (Goldenberg *et al.* 2007). FLCN noted the community identified the "arrival of outside workers and abundance of alcohol as two of the most detrimental effects of the Kettle Project" (FLCN 2009 Draft). CNP noted concerns regarding the risk to women associated with the presence of a construction workforce (CNP Keeyask Environmental Evaluation Report). The availability of new income also poses an opportunity for spending on substances other than alcohol, and the presence of illicit drugs and associated gangs is also known to occur in tandem with major projects (The Economist 2007; Shandro *et al.* 2011). The KCNs feel that this may pose a particular risk for youth in their communities (CNP 2010b; FLCN KPI Program 2009-2011; YFFN KPI Program 2009-2010).

The temporary/transient nature of construction workforces exacerbates conditions for several reasons. First, work in remote locations is often most feasible for individuals with limited financial responsibilities *(e.g.,* no families) (Gibson and Klinck 2007). Second, higher than average levels of disposable income have been known to contribute to a disproportionately high amount of wasteful, "if not socially abusive" (Hobart 1982) spending on things such as alcohol and or drugs (Goldenberg *et al.* 2007), in part because of a lack of alternative expenditure opportunities. In addition, construction workers, in particular those who are not drawn from the local workforce, do not develop an affiliation or attachment to the location, which can result in behaviours that might not be exhibited in their 'home' communities (Vanclay 2002; Goldenberg *et al.* 2007). Service providers in the oil and gas industry in Northern B.C. have described how this affects the local community in saying "the influx of workers (erodes) a local sense of

community, negatively affecting the ways in which people related socially and sexually" (Goldenberg *et al.* 2007).

This, in combination with past experience with the construction of hydroelectric projects, has resulted in concerns about worker interaction, particularly in relation to workers visiting communities to "party" and interacting with local community members, in particular young women and youth. From TCN's and FLCN's perspective, it is not a question of 'if' such effects will occur, but rather a question of 'when' (FLCN KPI Program 2009-2011; CNP, *pers. comm.* 2012). This is particularly relevant as the social impacts of project-development "tend to be more prominent in small (communities)" (Lawrence 2004).

In summary, adverse worker interactions and increased alcohol and drug use both present a potential risk to the safety of individuals, families, and communities as a whole. Public safety effects resulting from negative worker-interactions are particularly relevant to those communities in closest proximity to the Project, namely Gillam, whose population consist of a substantial number of FLCN members, and Fox Lake (Bird), and Split Lake. The KCNs have also noted that their Members residing in Thompson have the potential to come into contact with non-local workers. Effects stemming from the misspending of new income on alcohol and drugs have the potential to affect any individual working on the Project.

5.4.1.4.2 Gillam

The Project-related effects to public safety in Gillam are similar to those described for the KCNs. Gillam residents, however, sometimes hold different perspectives on issues related to worker-interaction. Some Gillam residents, including some who have resided in the community through the construction of previous hydroelectric projects, perceive the construction employment as an opportunity for the community to benefit from influx of new people. Further, some residents also see this as an opportunity for local businesses and the local social scene to flourish (Gillam KPI Program 2009-2010). This difference in perspective highlights the fact that context is crucial in understanding socio-economic effects, and that individuals may experience the same effect in different ways (Lawrence 2004).

Some workers are likely to make trips to Gillam, despite the limited number of amenities available. The number of visits cannot be reliably predicted. However, for the following reasons the number of visits is expected to be small:

- Availability of a lounge, recreational facilities and programming at the main camp;
- Thompson offers substantially more amenities than Gillam with little added travelling time for workers at the main construction camp; and
- Fewer workers will be employed on south access construction activities that will make Gillam the most accessible community (see Table 5-21).

Most visits by construction workers would likely be benign with no occurrences of adverse effects. However, based on TCN and FLCN knowledge, a proportion of the visits could still result in some adverse public safety effects as a result of interactions between construction workers and residents (see Section 5.3.4.1). The following points are also worth noting:

- Problematic encounters with construction workers would not be limited to FLCN Members. These interactions could extend to other Aboriginal and non-Aboriginal residents of Gillam, including family members of Manitoba Hydro employees living in the community;
- Construction worker visits to Gillam and or Split Lake may cause an increase in traffic on PR 280, PR 290, the access road into Split Lake and the Butnau Road, which could result in increased traffic accidents. This could be particularly problematic if workers drive back to the construction site after consuming alcohol;
- Workers arriving in or leaving Gillam by plane or bus have been identified as a potential source of worker interaction problems; and
- While the current Gillam and Thompson RCMP caseload is considered manageable, additional call-outs as a result of worker-interaction issues in Gillam or Split Lake could strain their capacity.

The number of workers involved in building the south access road and south dyke will be quite small and the south access road specifically is a DNC for CNP, meaning that many employees may be KCNs Members; however, because of the proximity of Gillam and lack of recreational facilities or lounge at the camp, workers are likely to visit Gillam in the evening after work. As such, the prospects of interacting socially with residents are increased, raising the potential for problems arising from the interaction of community members and construction workers.

5.4.1.4.3 Thompson

The majority of construction workers from the main construction camp seeking amenities outside of the camp, particularly during their days off hours, are likely to travel to Thompson, due to the superior number and variety of services and relatively small additional travelling time. Given that Thompson is the largest community in the Local Study Area, effects are more likely to be buffered than in a smaller community. As noted in Section 3.3.1.4 the economy in Thompson is more diverse than other communities in the Local Study Area. The fact that Thompson already hosts various short term and contract workers also suggests that it would be difficult to observe or determine whether worker-interaction/public safety issues are directly attributable to Project-construction.

Irrespective of how Project effects to public safety could be measured in Thompson, it is important to note that the KCNs have expressed concerns in this regard in relation to their Members who reside there.

5.4.1.4.4 Mitigation

Due to the concerns of the KCNs in relation to public safety and worker interaction, in particular for FLCN in relation to Gillam and TCN in relation to Split Lake, a suite of mitigation measures were

developed. Mitigation includes preventative measures, mechanisms to assist people in coping should negative effects arise, and monitoring to determine if further mitigation measures are required. Mitigation is geared not only towards the KCNs, but also to construction workers on site, and the broader community in Gillam. Additional mitigation measures are noted under Population, Infrastructure and Services Section 4.4.1.3.

MITIGATION MEASURES AT THE CONSTRUCTION SITE

Several activities will be undertaken at the main construction camp to reduce the potential risk for adverse effects to arise. For example, facilities will be provided to ensure that construction workers have recreational options on site to minimize the attractiveness of going into Gillam for entertainment. Amenities available on site will include a lounge, a gym, exercise equipment, and a TV viewing area, similar to the amenities available at the Wuskwatim construction camp. In addition, individual rooms will be equipped for cable and or internet hook-up, should workers want to bring a TV or computer for their personal use. The recreational facilities at the main construction camp will be restricted to employees working on site, and unauthorized public visits to the camp will be restricted. A staffed security gate will prevent unauthorized visitors to the main construction camp, and the south access road will also be a private road for the duration of construction *(e.g.,* there will be no public access to the road).

Other mechanisms to encourage construction workers to stay on site include discouraging non-northern workers from bringing their personal vehicles to site and restrictions on using company vehicles for personal purposes. A shuttle service to- and from- airports in Gillam and Thompson will be provided to ensure workers can arrive at the site to start their shifts. As a part of orientation for all workers at the main site, workers will be required to participate cultural awareness training as a part of the Employee Retention and Support DNC expected to be implemented by FLCN and YFFN. This will provide opportunity for the KCNs to explain parts of their culture, and their community's histories with hydroelectric development. In addition, this will provide an opportunity to describe local expectations for respectful behaviour by construction workers both on site and when visiting communities. Cross-cultural training was developed and provided by NCN at the Wuskwatim construction camp, and thought to be a successful mechanism to promote understanding within the workforce. The cross-cultural and retention support contract at Wuskwatim also included provisions for on-site counselling for employees. The Employee Retention and Support Contract is being developed in consultation with YFFN and FLCN and will also include a counselling component.

MITIGATION MEASURES FOCUSED ON PREVENTION AND COPING

Measures addressing prevention and coping are focused primarily on Gillam and Fox Lake (Gillam and Fox Lake (Bird)) and Split Lake. Considerable uncertainty exists concerning the expected number of visits by non-local construction workers in Local Study Area communities (especially Gillam) and the expected number and types of adverse occurrences. Ongoing dialogue between Manitoba Hydro and Gillam and Thompson RCMP, who are responsible for policing in the KCNs communities, during the construction phase will assist in identifying whether worker interaction is an issue in Gillam, in other

KCNs communities *(e.g.,* Split Lake) or in Thompson. Discussions will also begin prior to the start of construction among Manitoba Hydro, the Town of Gillam, FLCN and TCN to determine the best mechanism for tracking and addressing worker interaction issues and concerns across all of Manitoba Hydro's proposed projects in the vicinity of Gillam. It is anticipated that local justice and social agencies will be involved in these discussions, where appropriate, to gather data and to participate in the development of suitable mitigation measures.

5.4.1.5 Travel, Access and Safety

Section 5.3.5 described the existing environment regarding travel, access and safety within the Local Study Area. Without the Project, it is expected that the present water and ice conditions, and the way that people use the waterways, would continue as in the past. The open water regime (flows, velocities and levels) on the Nelson River, which has been modified by the LWR and CRD projects, would continue as it currently exists and winter ice processes on the river would also continue to vary from year to year depending on specific water flows and meteorological conditions (PE SV).

In the Local Study Area, construction and operation of the Project and related activities may affect the waterways, roadways and trails. These activities could impede travel along the Nelson River, affect shoreline access, affect navigation safety on the river and increase traffic levels and associated traffic accidents. As the pathways of effect for travel on waterways are different from the pathways for travel on land, the effects on access and safety for water and ice-based travel and road-based travel are considered separately.

The key traffic routes in the Local Study Area, PR 391 and PR 280, will continue to be maintained by Manitoba Infrastructure and Transportation (MIT) and traffic volumes will vary according to the fluctuations of the local populations using the highways. As noted in Section 5.2.5.1, Project-related traffic has the potential to affect overall safety of the public travelling on PR 391 and PR 280, but also the condition of the highways.

There is limited potential for measurable effects to roadways in the Regional Study Area *(e.g.,* PTH 6). This is due to the existing traffic volumes and road design criteria of accommodating 6,000 vehicles per day. As such, while PTH 6 is described in the environmental setting (Section 5.3.5.1) it is not carried forward to the effects assessment.

5.4.1.5.1 Water / Ice-based Travel

Resource harvesters and others who use the Nelson River for transportation and for traditional activities such as hunting, fishing and trapping could be affected by Project-related effects on water and ice travel, access and safety. In general, boat and snowmobile access and travel will be restricted in areas where construction activity is occurring to ensure safety of both construction workers and the resource users likely to travel through the area. Restrictions can be anticipated in relation to the construction of the cofferdam, dykes, and the south access road. There are very few resource users currently travelling on open water and ice on waterways in the immediate vicinity of the construction site *(e.g.,* in and around

Gull Rapids and the immediate vicinity), but those that do will have to modify their travel patterns while construction is taking place.

Other construction activities that could affect water/ice based travel include:

- **Changes to water flows associated with construction of cofferdams**
  - The presence of the cofferdams will cause the water in the vicinity of the Project to flow through a channel that is much narrower than the existing channel. Flow rates will increase making travel through the channel even more hazardous than existing conditions, which are already described as dangerous by the KCNs (see Section 5.3.5); and
  - Construction, along with the presence of the cofferdams, will mean that access will be restricted to prescribed shoreline areas and landing sites on the north shore of the Nelson River in the immediate vicinity of the Project.
- **Installation of the ice boom**
  - An ice boom to protect the construction area from ice will be installed in the central part of the river. Boats travelling along the river will have to travel near the shoreline and avoid the middle of the river. A gap of about 80 m between the ends of the boom and each river bank will allow boat access around the boom during the open-water season.
- **Reservoir clearing**
  - Although the purpose of reservoir clearing is ultimately related to improved safety during Project operation, the activity itself will remove trees and alter the landscape during construction, including trails used for accessing the river.

KCNs Members are the predominant users of the waterways up and downstream of the Project. Waterways are an important cultural and economic resource for KCNs Members and have been an integral part of their traditional activities. For several decades, Manitoba Hydro and signatory First Nations to the Northern Flood Agreement have been implementing programs to facilitate safe travel under open water and ice conditions on the Nelson River. Through these programs, much has been learned about what is required to ensure safe travel along the river.

During construction, the Project will affect accessibility and navigation in areas where and when construction is occurring. Implementation of the Keeyask Reservoir Clearing Plan and Waterways Management Program (Schedule 11-1 and Schedule 11-2 of the JKDA respectively) will mitigate potential effects on water travel upstream, downstream and in the vicinity of the Project. These plans, developed jointly with the KCNs and Manitoba Hydro, build on previous experience and will help to accommodate existing users of the Nelson River and manage safety liabilities associated with the Project. In addition, each of the KCNs has negotiated AEAs with Manitoba Hydro to enable resource harvesting activities to occur in areas not affected by the Project.

MITIGATION

Notable features for addressing construction related effects on water and ice travel include:

- Posting signs on access trails, shorelines and in waterways identifying restricted access areas and warning of potentially dangerous boating and snowmobiling (PD SV);
- Identification of safe water and ice routes and use of safety signage and buoys to mark these locations. Their condition will be regularly monitored as well as the extent of their use (WMP);
- Identification of areas where water or ice travel is unsafe using signage and buoys to mark these locations (WMP);
- Operation of a multi-purpose boat patrol that will monitor waterway activities and liaise with individuals and groups using the Nelson River (WMP);
- Issuance of timely, community notification bulletins to inform local users about the disruptions around the Project footprint (PD SV). This will enable local users to plan their travels accordingly;
- Safe trails and portages will be cut and maintained (WMP);
- Installation of strategically located safety cabin and shelters (WMP);
- Undertake, maintain and monitor shoreline stabilization measures at sensitive stream locations (WMP);
- Development of a number of safe landing sites along the future reservoir shorelines to facilitate access that has been compromised by Project activities. These sites will be cleared of stumps, peat and other vegetation to ensure safe access/egress to the shoreline; and will include required docks and shelters (WMO); and
- Ice monitoring and water gauges for measuring water levels to assist in establishing safe and unsafe travel areas (WMO).

Concerns have been raised about the ability of KCNs Members working on Project construction jobs being able to access the job site by boat or snowmobile from the Nelson River. There are no major snowmobile trails (or networks of trails) in the vicinity of Gull Rapids however one KPI respondent noted that if a road is constructed from the town to the Project site, then more trails might be created in the area (Gillam KPI Program 2009-2010). For safety reasons associated with a major construction site, access to the Project site will be restricted to using the north and south access roads only. The Access Management Plan already developed and being implemented for the Keeyask Infrastructure Project will control access by land on the north side of the Nelson River to the Project site and waterways located near the construction site (Keeyask Hydropower Limited Partnership 2009); and the Keeyask Construction Access Management Plan will cover the operation of the north access road and the construction and operation of the south access road. Unauthorized use of the north access road and its extension to the ice boom area, as well as the south access road will be controlled through security

protocols *(e.g.,* security gates and guards) and restrictions for firearms and access. In terms of use of Stephens Lake from the Gillam area for recreational use (including fishing), the majority of the lake will be unaffected by construction activities. The exception will be an area in the immediate vicinity of Gull Rapids where construction activities will take place. Appropriate safety signage and community notification in Gillam will provide the necessary warning to recreational users to avoid the area around Gull Rapids.

It should be noted that YFFN has expressed concerns related to travel safety related to ice and open water travel across Split Lake as their Members will be using these means to access transportation to the site for Project employment. Manitoba Hydro does not expect any Project-related changes to open water travel on Split Lake during the construction or operation period; and expects effects to the ice regime on Split Lake infrequently (*i.e.,* on average every 20 years) during the operation period (see PE SV). It is anticipated that current conditions on Split Lake will continue throughout these time periods.

No additional mitigation measures are required to address construction effects related to water travel, access and safety.

5.4.1.5.2 Road-based Travel, Access and Safety

Increases in traffic volume due to construction activities could affect road conditions and the safety of road users. This section examines the nature, extent and effects of Project-related construction traffic.

LOCAL STUDY AREA

During construction, effects on road travel will stem from increased vehicular traffic associated with delivery of materials, equipment, and construction personnel and travel by construction service providers on public roads in the Local Study Area. Increased traffic volume on public roads could affect the condition of the roads and traffic safety.

Existing roads between Thompson and Gillam along PR 391 and PR 280 will be affected. These are shown on Map 1-1 Socio-Economic Local Study Area. The distance between relevant junctions and communities in the Local Study Area is shown in Table 5-22.

For purpose of assessing the effects of Project-related construction traffic, the potentially affected roadways have been divided into four road sections:

- Road Section 1 (PR 391): Thompson to PR 280;
- Road Section 2 (PR 280): PR 391 to Split Lake Junction;
- Road Section 3 (PR 280): Split Lake Junction to Keeyask Junction; and
- Road Section 4 (PR 280): Keeyask Junction to PR 290.

Background traffic levels (under existing conditions) for these road sections are presented in Section 5.3.5. Due to the seasonal variation of background traffic flow, the estimates for Project-related traffic are shown for both summer and winter. The north and south access roads will be private roads to the Project

during construction, with traffic restricted by a security gate to those with authorization to use the roads. The north access road, which will have been built as part of the Keeyask Infrastructure Project, will be in place and ready for use from the start of Project construction. The south access road is being built as part of the Project and will be operated as a private road during the construction phase.

A Project Construction Access Management Plan will be in place prior to construction to address the ongoing implementation and maintenance of the north access road, and access related to the south access road. Similar to the north access road, the south access road will remain a private road until the end of the construction phase, and will be gated to prevent public access.

Project-related traffic will be generated to move freight (equipment and materials), construction workers and contractors providing incidental services. The vast majority of this traffic is expected to travel between Thompson and the Project, along PR 391 to the PR 280 junction and along PR 280 to the north access road junction. A small portion is expected to originate at Long Spruce Siding and Gillam and approach the Project site from the northeast (KGS-Acres 2010). Detailed summer and winter forecasts of Project related traffic levels were developed to assess the effects of construction traffic on infrastructure and travel safety. The forecasts are based on the following assumptions:

- Project-related traffic would access the Project site from the north side of the Nelson River via PR 280;
- The Project traffic would travel from Winnipeg, Thompson, Split Lake, Gillam or other communities, before turning onto the north access road;
- All traffic during construction is assumed to access the Project site via PR 280 with the exception of materials required for the construction of the south dykes and associated access road. A very small proportion of the Project-related traffic is expected to use this route (KGS-Acres 2010); and
- Travel between the north access road and the south access road across the Nelson River would not occur during the construction phase.

The Project-related traffic projections are organized by three categories:

- Heavy trucks hauling freight;
- Incidental support service vehicles traveling to the camp and construction work areas; and
- Vehicles transporting people to and from the Project site.

Freight Traffic

Freight traffic includes heavy transport trucks hauling bulk cement, fuel, reinforcing steel, heavy construction equipment, construction supplies and equipment for installation in the generating station. It also includes trucks used to haul construction camp buildings, catering supplies and miscellaneous items associated with the Project. Projected traffic volumes are based on estimates of the amount and size of equipment and materials required for construction and shipped from manufacturers and suppliers to the

Project. It does not include traffic to move aggregate materials as this will all occur on roads dedicated to Project traffic, not on public roads.

Incidental Service Traffic

Incidental service traffic is intended to cover routine traffic providing various services to the camp and construction work areas. It potentially includes removal of recyclable refuse, mail/courier, venders/suppliers, commercial service vehicles and visitors traveling to and from the site each day. The estimated volumes of traffic for this category were based on experience and judgment. The forecast for incidental service traffic has been assumed to be constant over the duration of the Project, although it may be somewhat lower in years when construction activity is lower (KGS-Acres 2010).

Construction Personnel Traffic

The labour force for the Project will be made up of personnel from various local communities, including Thompson, Split Lake, York Landing, Ilford, Gillam (including FLCN), and other northern Manitoba communities. Workers from the south are expected to fly to Thompson or Gillam and then be transported to the Project site by shuttle transportation. Virtually all workers will live at the construction site while on the job. This means most will travel to and from the site at the beginning and end of their shifts. The forecasts for shuttle vehicle usage and personal vehicle usage were based on experience and judgment and were calculated based on the 2008 monthly manpower estimate for the Project (KGS-Acres 2010).

Table 5-22 below summarizes what sources of traffic are expected in each road section based on the assumptions presented above.

Table 5-22: Roadways Used by Project Traffic

Road Section 1 (PR 391): Thompson to PR 280	• All of the freight for the Project • Incidental service vehicles for both projects traveling from Thompson and south of Thompson • Construction personnel for the Project traveling by personal vehicle from Thompson and any point south of Thompson
Road Section 2 (PR 280): PR 391 to Split Lake Junction	• All of the freight for the Project • Incidental service vehicles for the Project traveling from Thompson and south of Thompson • All construction personnel for the Project traveling by personal vehicle or shuttle bus via Thompson
Road Section 3 (PR 280): Split Lake Junction to Keeyask Junction	• All of the freight for the Project • Incidental service vehicles for the Project traveling from Thompson and south of Thompson • All construction personnel for the Project traveling by personal vehicle or shuttle bus via Thompson and the Split Lake area
Road Section 4 (PR 280): Keeyask Junction to PR 290	• All of the incidental service vehicles for the Project traveling from Gillam • All construction personnel for the Project traveling by personal vehicle or shuttle bus from Gillam

Source: KGS-Acres (2010).
Note:
- Personnel traffic attributable to the small number of workers who might fly into Gillam and be transported out to the Project site could not be predicted and is not included.

Project-related traffic projections based on the above considerations are presented in Table 5-23 for each road section and season during construction. This table also shows how the projected volumes compare to background volumes and what the combined projected and background volumes are estimated to be[1]. Table 5-24 illustrates the percentage increase in traffic on each road section and in each season during construction from Project-related freight traffic, which is the source of greatest concern for wear and tear and road safety (including the potential for accidents with other users of the road).

[1] Since the traffic projections were completed in 2010, workforce estimates were updated. A supplemental filing will be undertaken to update the traffic projections. It should be noted that these estimates are not expected to produce materially different percentage increases in traffic levels due to the Project; however, absolute numbers will change. The estimates are reasonable data for which to undertake the traffic assessment and are not expected to change the conclusions.

Table 5-23: Forecast of Combined Background and Project-related Traffic (2014-2021)

	Road Section 1 (PR 391) Thompson to PR 280			Road Section 2 (PR 280) PR 391 to Split Lake Junction			Road Section 3 (PR 280) Split Lake Junction to Keeyask Junction			Road Section 4 (PR 280) Keeyask Junction to PR 290		
	BG Traffic	Project Traffic	BG and Project Traffic	BG Traffic	Project Traffic	BG and Project Traffic	BG Traffic	Project Traffic	BG and Project Traffic	BG Traffic	Project Traffic	BG and Project Traffic
2014 Summer	518.9	11.8	530.7	108.6	13.7	122.3	96.9	19.2	116.1	39.2	4.4	43.6
2014 Winter	432.4	8.6	441.0	88.3	9.6	97.9	80.7	13.7	94.4	31.5	3.5	35
2015 Summer	525.6	32.6	558.2	110.0	43.2	153.2	98.1	61.8	159.9	39.7	12.8	52.5
2015 Winter	438.0	13.1	451.1	89.4	17.4	106.8	81.8	26.5	108.3	31.9	6.7	38.6
2016 Summer	532.4	34.0	566.4	111.4	46.6	158.0	99.4	68.3	167.7	40.3	14.8	55.1
2016 Winter	443.7	12.7	456.4	90.6	16.7	107.3	82.8	25.2	108.0	32.3	6.3	38.6
2017 Summer	539.4	19.8	559.2	112.8	28.5	141.3	100.7	44.3	145.0	40.8	11.0	51.8
2017 Winter	449.5	14.8	464.3	91.7	21.4	113.1	83.9	33.9	117.8	32.7	8.9	41.6
2018 Summer	546.4	17.5	563.9	114.3	26.1	140.4	102.0	41.8	143.8	41.3	10.9	52.2
2018 Winter	455.3	14.2	469.5	92.9	20.6	113.5	85.0	32.8	117.8	33.1	8.7	41.8
2019 Summer	553.5	11.8	565.3	115.8	15.1	130.9	103.3	22.7	126.0	41.9	5.8	47.7
2019 Winter	461.2	10.8	472.0	94.1	13.5	107.6	86.1	20.2	106.3	33.8	5.2	39.0
2020 Summer	580.7	8.0	588.7	117.3	8.0	125.3	104.7	10.6	115.3	42.4	2.5	44.9
2020 Winter	467.2	9.1	476.3	95.4	9.4	104.8	87.2	12.4	99.6	34.0	2.8	36.8
2021 Summer*	568.0	unavailable	--	118.8	unavailable	--	106.0	unavailable	--	42.9	unavailable	--
2021 Winter	473.3	unavailable	--	96.6	unavailable	--	88.4	unavailable	--	34.4	unavailable	--

Source: Adapted from KGS-Acres 2010; Manitoba Infrastructure and Transportation.
Notes: BG = background. These numbers represent round trip estimates.
*The original traffic analysis did not provide Project-related traffic estimates beyond 2020. An updated traffic projections based on 2011 workforce estimates and construction schedule will be provided in a supplementary filing (see previous footnote).

Table 5-24: Percentage Increase in Traffic Levels Resulting from Project-related Traffic (2014-2021)

	Road Section 1 (PR 391) Thompson to PR 280		Road Section 2 (PR 280) PR 391 to Split Lake Junction		Road Section 3 (PR 280) Split Lake Junction to Keeyask Junction		Road Section 4 (PR 280) Keeyask Junction to PR 290	
	% Freight	% Project Traffic	% Freight	% Project Traffic	% Freight	% Project Traffic	% Freight	% Project Traffic
2014 Summer	33.0%	2%	28.5%	11%	20.3%	17%	0.0%	10%
2014 Winter	11.9%	2%	14.6%	10%	10.2%	15%	0.0%	10%
2015 Summer	53.9%	6%	40.7%	20%	28.4%	39%	0.0%	24%
2015 Winter	25.2%	3%	19.0%	16%	12.5%	24%	0.0%	17.3%
2016 Summer	50.9%	6%	37.1%	29%	25.3%	41%	0.0%	27%
2016Winter	25.2%	3%	19.2%	16%	12.7%	23%	0.0%	16%
2017 Summer	32.3%	4%	22.4%	20%	14.4%	31%	0.0%	21%
2017 Winter	20.9%	3%	14.5%	19%	9.1%	29%	0.0%	21%
2018 Summer	23.4%	3%	15.7%	19%	9.8%	29%	0.0%	21%
2018 Winter	19.0%	3%	13.1%	18%	8.2%	28%	0.0%	21%
2019 Summer	22.9%	2%	17.9%	12%	11.9%	18%	0.0%	12%
2019 Winter	20.3%	2%	16.3%	13%	10.09%	19%	0.0%	13%
2020 Summer	21.3%	1%	21.3%	6%	16.0%	9%	0.0%	6%
2020 Winter	27.5%	2%	26.6%	9%	20.2%	12%	0.0%	8%
2021 Summer*	unavailable	unavailable%	unavailable	unavailable	unavailable	unavailable	0.0%	unavailable
2021 Winter	unavailable	unavailable%	unavailable	unavailable	unavailable	unavailable	0.0%	unavailable

Source: Adapted from KGS-Acres 2010; Manitoba Infrastructure and Transportation.
Notes: These numbers represent round trip estimates.
*The original traffic analysis did not provide Project-related traffic estimates beyond 2020. An updated traffic projections based on 2011 workforce estimates and construction schedule will be provided in a supplementary filing (see previous footnote).

The largest increase in traffic is expected to occur during the summer seasons during the peak construction periods. As shown in Table 5-23 the greatest overall amount of Project-related traffic in the summer season is expected to occur in the summers of 2015 and 2016, with the latter experiencing the highest volumes. The greatest amount of Project-related winter traffic is expected to occur in winter 2017 and 2018, with the highest levels reached in the winter of 2017. Overall, Road Section 3 will experience the largest percentage increase in Project-related traffic. As shown in Table 5-24, for Road Section 1 (PR 391 - Thompson to PR 280), the expected volume of traffic in Summer 2016 based on normal traffic growth is 532 vehicles/day and the number of Project-related vehicles using this road is expected to add another 34 vehicles for a total of 566 vehicles/day during the core construction period. Of those Project-related vehicles, 51% of them are expected to be freight vehicles while the remainder of traffic will come from incidental service and personnel vehicles. The overall increase in Project freight traffic on this section is 6% or less in all periods. As, noted in the existing environment Section 5.3.5, PR 391 is designed with a capacity of up to 6,000 vehicles per day. The increase in traffic on the road as a result of the Project should be readily accommodated by the road design.

During the peak construction period on Road Section 2 (PR 280 - PR 391 to Split Lake Junction), the expected background traffic volume is estimated to be 111 vehicles/day, and the number of Project-related vehicles using this road is expected to add another 47 vehicles for a total of 158 vehicles/day during the core construction period. This is an increase of 29% over the expected background traffic. Of the Project-related traffic, 17 vehicles (37%) are expected to be transporting freight. The remainder of the vehicles will be incidental service and personnel vehicles. On Road Section 2, the Project is expected to increase the number of vehicles on the road in summer months in excess of 20% in years 2015 (20%), 2016 (29%) and 2017 (20%). During the winter months Project-related traffic will increase the number of vehicles on the road and will peak in winter 2017 (19%) and winter 2018 (18%).

Road Section 3 (PR 280 - Split Lake Junction to Keeyask Junction) is expected to experience the greatest amount of combined Project-related traffic. Road Section 3 will have three types of Project vehicles traveling along it including: heavy trucks hauling freight, incidental support service vehicles traveling to the camp and construction work areas and personnel vehicles transporting people to and from the Project site. In summer 2016, the expected background traffic volume is estimated to be 99 vehicles/day, and the number of Project-related vehicles using the road is expected to add another 68 vehicles for a total of 167 vehicles/day during the core construction period. Although Road Section 3 will see the greatest total amount of Project traffic in summer 2016, only 25% of the Project traffic will be made up by freight traffic. The majority (66.6%) will be attributable to personnel traffic. On Road Section 3, the Project is expected to increase the number of vehicles on the road in excess of 20% in both summer and winter seasons for the years 2015-2018. As construction ramps up, the increase in Project traffic on Road Section 3 is expected to be approximately 39% in summer 2015 and is expected to reach a peak of 41% in summer 2016. The greatest increase in traffic due to the Project in the winter months is expected to occur in 2017 when the Project is estimated to increase traffic by 29%.

On Road Section 4 (PR 280 - Keeyask Junction to PR 290) during the peak construction period, the expected background traffic volume is estimated to be 40 vehicles/day, and the number of Project-related vehicles using this road is expected to add another 15 vehicles for a total of 55 vehicles/day. In summer 2016, this is an increase of 27% over the estimated background traffic. The only Project traffic

expected to travel along this Road Section is incidental service and personnel vehicles. Road Section 4 is expected to have increases in traffic volume in excess of 20% in the summer in years 2015-2018, and in winter in years 2017-2018. Although the Project will contribute to increases in traffic volume greater than 20%, as shown in Table 5-24, none of the Project-related traffic is expected to be from freight vehicles.

In summary, the percentage increase in traffic due to the Project on Road Section 1 (PR 391) is low and should be readily accommodated by the roadway design tolerances. Road Sections 2, 3, and 4 all have percentage increases in traffic from Project-related traffic that exceed 20% at peak times although the total volume of background and Project-related traffic is well below the roadway design tolerances. Low background traffic levels in each section are accentuating the extent of the percentage increases.

Local residents and regular haulers already travelling these routes are likely to notice the increase in the number of vehicles that they meet or have to travel behind or pass. This contributes to concerns about added potential for accidents to occur. As well, many of the Project-related vehicles will be large trucks. TCN interviewees have noted that large trucks travelling on PR 280 can stir up large amounts of dust reducing driving visibility and can be intimidating to drivers of smaller vehicles (CNP *pers. comm.* 2011). Other KCNs Members and residents of the Local Study Area have expressed concern about the safety and conditions of PR 280 prior to the improvements, citing numerous examples of damaged windows and vehicles, traffic accidents as well as concern over dust from trucks causing visibility hazards. At the time of submission, it was not known whether planned road improvements will fully address the concerns voiced by the KCNs.

MITIGATION

In anticipation of increased traffic levels and truck usage on PR 280 related to construction of the Project, highway improvements will be made by MIT starting in 2012 at numerous locations on PR 280 between the PR 391 junction and the Project turnoff. These improvements include widening, curve shaving and grade improvements.

While these improvements are intended to address the added traffic volume from the Project, MIT may need to provide increased signage during peak construction seasons (May to October) to advise motorists to expect increases in traffic, and to monitor accidents and dust complaints from truck traffic on the roads between Thompson and Gillam during the peak years of construction of the Project. If problems arise, MIT may need to consider additional mitigation such as speed reduction and more aggressive dust control.

THOMPSON

Thompson is likely to experience increased traffic levels within the City comparable to those for Road Section 1. The highest percentage increase over background levels is 6% for freight traffic in summer

2016. This is a fraction of the total traffic measured for Thompson Drive North in 2000[1], which was 14,360 vehicles per day (ND Lea Engineers and Planners Inc.2002).

5.4.1.6 Culture and Spirituality

5.4.1.6.1 Keeyask Cree Nations

As noted in Section 5.3.1, culture and spirituality represent a composite of worldviews, values, beliefs, perceptions, principles and traditions that are based on individual and collective history, experience and interpretation. These cognitive values act as a unified force to direct the flow of cultural change. In the context of this assessment, cultural indicators are used to capture cultural issues and perspectives of importance to the KCNs. The nine cultural indicators used in the effects assessment are: worldview, language, traditional knowledge, cultural practices, health and wellness, kinship, leisure, law and order, and cultural products. The assessment of effects examines how the existing and projected characteristics of each indicator could be altered by Project-induced changes in the physical, aquatic and terrestrial environment, by participation in Project opportunities and by the KCNs' participation in the Project partnership.

As described in Chapter 2 of the Response to EIS Guidelines, the Cree worldview indicates that everything is alive, is interconnected and needs to be respected. The Cree view themselves as important stewards of Askiy (land, water and living things). As part of everything, it is important to give thanks and respect for the gifts given through rituals[2], ceremonies, vigil and offering of prayer. Through KCNs efforts and their desire to uphold this worldview, processes and measures have been put in place to address, in a meaningful and enduring manner, the potential effects of Project construction and operation on Cree culture and spirituality. These measures and processes, tailored to the specific circumstances and priorities of the KCNs, strive to moderate and offset potential effects on culture and spirituality that are expected to be experienced as a result of the Project. The following are especially important in this regard:

- Being partners in the Project;
- The AEAs negotiated and signed by each of the KCNs; and
- The Employee Retention and Support Services direct negotiated contract.

Each of these factors is described in further detail below.

[1] Traffic volumes are not regularly measured within the City of Thompson. As such, the 2000 data collected by ND LEA is the most recent data available.

[2] The culture and spirituality study conducted for the Project does not discuss ritual as part of an environmental effects assessment. However, ritual, in the context of religious practice is included as a self-descriptor by the KCNs. The term *ceremony* however is used in the culture and spirituality descriptions of potential environmental effects and mitigation.

PARTNERSHIP

Being partners in the Project provides KCNs with meaningful involvement in Project decision-making and legitimate influence over how the Project has been planned, and will be constructed and operated. Through this mechanism, the KCNs are able to bring to bear the Cree worldview and implications for Cree culture and spirituality in Project decision making. As a partner in the planning, as well as the assessment and implementation of the Project the KCNs have been afforded an opportunity to care for *Askiy* for the Cree today and for future generations (see Chapter 2 of the Response to EIS Guidelines for more details on the KCNs' worldview). The KCNs can provide oversight of the Project to partner as stewards of the Project through involvement in the Keeyask Hydropower Limited Partnership Board, the Construction and Monitoring Advisory Committees, and community-specific ATK monitoring(see also Section 6.6.5.1 Governance, Goals and Plans). Further details on each of the KCNs being partners in the Project are included in their respective Environmental Evaluation Reports.

ADVERSE EFFECTS AGREEMENTS

The AEAs between Manitoba Hydro and the individual KCNs Partners were designed to address and resolve all known and foreseeable Project adverse effects[1]. Within each agreement, a set of Offsetting Programs were developed which deal directly with the potential adverse effects of the Project on culture and spirituality. Programs agreed upon in the AEAs deal with traditional lifestyles, Cree language, land/environmental stewardship, access programs for resource harvesting of healthy country foods, wellness counselling and a cultural sustainability program that can assist in maintaining cultural success and tempering Project effects. The AEAs provide an opportunity for economic development in addition to reconciling differing worldviews by addressing and acknowledging the need for continued stewardship of the land, culture and spirituality that binds the KCNs to their environment.

Each of the AEAs differs among the communities; however, most of these programs will be in place by the start of construction. During the construction phase, the AEA programs will be ongoing to minimize the loss of use of the Project site. In addition, the AEAs will actively engage the mechanisms of cultural transmission, stewardship and spirituality within the communities. AEA programs will also proactively engage the health and wellness of the communities to promote employment and business opportunities, and increased country food usage; and offer the return to cultural sharing practices. During the operation phase, AEA programs will continue to address physical changes to the landscape, inter and intra cultural and community interactions and long-term employment and business goals.

EMPLOYEE RETENTION AND SUPPORT SERVICES CONTRACT

The Employee Retention and Support Services contract implemented by the KCNs, which will extend over the entire construction phase, will include cultural training of construction workers. Counselling for construction workers will be available, and if necessary may be extended to a worker's family in KCNs

[1] The AEAs also include a process for program changes that requires agreement by the respective First Nation and Manitoba Hydro prior to implementation.

communities. There will also be opportunity for conducting ceremonies at key Project milestones, all of which will provide opportunities for cultural engagement at the construction work area. The ceremonies component of the contract can be used to give thanks and show respect for *Askiy* when a noteworthy feature of *Askiy*, such as the rapids, is being disturbed or lost for the benefit of future generations.

Anticipated construction effects on the cultural landscape and intangible culture and spirituality within the Footprint/hydraulic zone of influence and Local and Regional study areas are summarized below, according to each of the nine cultural indicators.

Worldview: Being a Partner in the Project has facilitated a greater than normal ability to express and gain acceptance of Cree culture and worldview, including having a Project oversight role. A Project feature aligned with the Cree worldview is the AEA Offsetting Programs of each Cree Nation; as well as actively participating in the development and implementation of monitoring (including ATK monitoring) and follow-up programs. The KCNs involvement in Project planning, assessment and monitoring, along with ceremonies at Project milestones will address the KCNs noted incremental loss or decrease in the understanding of the spiritual connection to the land (which could affect community organization). However, while working at the construction site, there is potential for other worldviews *(e.g.,* non-Aboriginal) to be in conflict with the Cree worldview. Anticipated grief associated with the loss of part of the cultural landscape, in particular the rapids, may express itself in anxiety which could lead to social distress.

Language: KCNs Members working at the construction site are expected to have reduced opportunities to use Cree language as the language of Project construction will be English. However, ceremonies and rituals at Project milestones are opportunities for conducting traditional activities in Cree. The development of cultural centres and conducting cultural transmission programs will provide the opportunity for maintaining and or strengthening the use of the Cree language. Each of the KCNs also has Cree language programs identified in their AEAs.

Traditional knowledge: There is concern by some KCNs Members that traditional knowledge within the construction area will undergo rapid change and be lost. Accelerated change and loss of Aboriginal traditional knowledge are linked to parts of the physical landscape disturbed by Project construction and changes in water regime. Traditional knowledge provides the opportunity for interaction between generations – it provides a 'how-to' manual that guides the next generation through cultural ways of doing that is based on years of experience and observation. Traditional knowledge is dynamic and interactive. While this interaction is notably in decline because of other factors, the process of loss may be accelerated. On the other hand, traditional land use and related studies undertaken with funding from the Project have contributed to the retention and transmission of aspects of ATK. Further, ATK monitoring programs implemented as part of the Project are expected to provide opportunities for Elders, resource users and youth to undertake site visits and participate in monitoring based on traditional knowledge. Traditional activity programs in each of the AEAs will provide the opportunity to foster ongoing traditional knowledge related to the offset areas.

Cultural practices: Changes to cultural practices and traditional activities within the Project site will occur due to physical changes to the Project environment requiring adaptation, abandonment or relocation to other areas. This will include the inability to access certain construction-related areas for

future gathering of medicinal and edible plants, and harvesting of animals and fish and continuation of the oral tradition of knowledge. However, the AEA Offsetting Programs that provide access to resource harvesting at alternative sites present substantial opportunity to continue undertaking traditional activities in areas away from the disturbed environment.

Health and wellness: Loss of traditional medicines and knowledge of resource habitat in the Footprint area may result in adverse effects on health and wellness, particularly if resource harvesting levels decline resulting in changes in country food diet. There may also be stress resulting from the destruction of *Askiy*. This can be offset by increased opportunity to pursue traditional activities through the access programs in other 'offset' areas and the implementation of ATK monitoring programs that address community-specific interests and concerns related to the Project. See also Section 6.6.5.2 Community Health for a review of effects on health and wellness within on a western analytical framework.

Kinship: Kinship relationships are built on old and established practices that are characteristic of northern Cree bands. Traditionally, multiple bonds were created between limited numbers of relatives and others such as clan members where certain rules and obligations were followed (Smith 1974). Kinship terminology has been modified to reflect a western tradition; however, subtle, inherent rules still apply. The new cultural and traditional lifestyle programs available through the AEAs should help to maintain kinship ties.

Kinship effects may also be felt through the separation of family members as a result of construction employment. For example, Wuskwatim monitoring reported that NCN families with members working at the Wuskwatim construction site reported some negative effects related to long work schedules, income issues and other family-related stresses (Wuskwatim Power Limited Partnership 2010.

Leisure: Leisure activities *(e.g.,* playing sports, skating, bingo) may be decreased due to being away from their home community while employed on the Project. However, other forms of leisure will be available to construction workers on-site at the recreation centre *(e.g.,* gym, weight room, computer lab) and activities such as fishing are accessible to workers.

Law and order: At the construction site, KCNs workers will be exposed to a set of rules as different from their traditional customary law. However, being partners in the Project and having an oversight role as stewards of *Askiy* provides a balance that includes traditional customary law as it is interpreted by the KCNs. Cultural awareness training provides a linkage between activity on site and traditional customary law (see also Section 6.6.5.1 on governance).

Cultural products: The preparation of cultural products may be affected by changes to the environment and or availability of time to commit to making cultural products due to Project employment. This is counterbalanced by the offset programs and their opportunity for pursuing traditional activities leading to provision of furs and other items for creation of cultural products.

5.4.1.6.2 Mitigation

Mitigation to address the potential for loss and grieving associated with, for example, the loss of the rapids include:

- Ceremonies and rituals at key Project milestones *(e.g.,* stream crossings, road cleaning); and

- Counselling services as part of the Employee Retention and Support DNC to assist in Cree Members in coping with changes to the landscape through construction activities, the inevitable loss of the rapids and the changes in Gull Lake due to flooding. Counseling services may be extended to a worker's family members in the KCNs communities.

See also effects of construction activities on heritage resources (Section 6.8.3.1 which is more focused on the tangible resource) for proposed mitigation measures that have overlapping concern related to culture and spirituality.

KCNs Members are anticipated to experience culturally-related disturbances and losses during project construction, particularly in conjunction with losses in their cultural landscape and from working at the construction site. These effects would be offset by the combination of processes and measures established during the planning stage of the Project, including the AEA programs, and moderated by the proposed mitigation measures. No further mitigation is required.

5.4.1.7 The Way the Landscape Looks (Aesthetics)

The characterization of Project effects on the way the landscape looks considers all site alterations arising from Project activity, the project visibility within the landscape context *(e.g.,* characteristics that make the location distinctive in contrast with the presence of the Project), and value to the viewer and associated sensitivity levels, as described in Section 5.2.6.

Construction activities will result in physical alteration of the landscape, noise, dust, and increased human presence. During construction there will be changes to the way the landscape looks along the south access road (from the Project site to Gillam) and in proximity to the construction site itself. Changes to the landscape that affect aesthetics include the excavation/development of identified borrow areas as well as development of the construction site (*e.g.,* dyke construction).

The construction of cofferdams[1] will change the overall flow of the Nelson River, diverting water into the south channel of the river so that construction of various components of the Project *(e.g.,* the powerhouse and the spillway) can occur in dry conditions. Eventually, water will be diverted through the spillway to enable completion of the dam. There are likely to be temporary visible changes to water quality during certain phases of construction *(e.g.,* diversion of water to enable construction may expose shorelines to erosive forces that wouldn't be experienced under normal flow conditions, as described in the PE SV). These effects will occur for a short time in association with specific activities and would typically be limited to the construction site, although some effects could extend downstream into Stephens Lake.

Construction effects to aesthetics will be limited in duration, and in many instances, decommissioning activities will strive to return disturbed areas to their previous state *(e.g.,* rehabilitation of borrow areas using native plant types to the extent feasible). Access to the construction site will be limited by security measures *(e.g.,* staffed gate), meaning that the highest proportion of people likely to witness the aesthetic effects will be limited to those employed at the construction site, including Members of the KCNs.

[1] All but one of the cofferdams will be constructed "in the wet" as described in the Project Description volume.

Although activities will be visible from both up and downstream of the Project site, it is unlikely that the effects to the way the landscape looks will be witnessed directly by many people aside from construction workers as well as resource users and the families that actively use the area. In addition, site tours with KCNs community Members and those participating in ATK monitoring will be a witness to changes to the landscape. It is anticipated that construction activities and noise will result in the resource users avoiding the area, thus minimizing the extent to which an effect is experienced by viewers.

In order to minimize the overall extent of the effects of flooding, two main activities will alter the aesthetic quality of the future reservoir. First, dykes will be constructed on the north and south side of the river to limit the extent to which water can inundate the surrounding lands. These will be earthen filled structures, similar to those in place at other generating stations in the Local Study Area. In addition to this, a Reservoir Clearing Plan is being implemented as per the JKDA in order to minimize the overall amount of debris resulting from flooding. This will clear the area of brush and trees using a combination of mechanical and hand clearing methods depending on the proximity to the Nelson River. Where mechanical clearing is employed, loose and dead woody debris, along with hummocks of sphagnum moss will be accumulated and removed, thereby minimizing the amount of debris left in the reservoir when it is flooded. The clearing of the reservoir will ultimately transform the area from a vegetated to a clear-cut environment, although this effect will be limited in duration.

Perceptions of the aesthetic effects of construction may vary depending upon an individual's worldview and perspectives. For example, a construction worker from Winnipeg may simply view the appearance of the landscape during construction as his/her worksite. A Gillam resident with a cabin on Stephens Lake may view the Project as an obstruction to certain views, and if the cabin is in close enough proximity to the construction, there is potential for noise to alter the auditory environment, and increased sediment to alter the water quality. Others may perceive very limited change from what is already a reservoir environment.

KCNs Members are more likely to have adverse reactions to the aesthetic changes associated with Project construction, as their worldview inherently values characteristics of the landscape including the earth, the trees, the water, the rocks, the rapids and other features. The CNP express concerns about changes to the land in saying:

> We live in a world where all things are both related and interrelated and can exist in a state of harmony and balance if proper care is given and respect is shown for Mother Earth and all her beings. In return for respecting and caring for Mother Earth, she will provide all that is required for our well-being. Conversely, if proper care and respect is not shown, there will be serious consequences for us. This relationship is an integral part of our culture (CNP Keeyask Environmental Evaluation Report).

FLCN explains:

> Nipe, or water is vital to life and all living things. Mary Beardy remembered learning about how it is crucial for people to look after the water. Through her traditional teachings she learned that water is a medicine that needs to be protected. Water, she mentioned, is a part of the four elements essential to life (personal communication, September 2009) (FLCN 2010 Draft).

It is also demonstrated by a story shared in the YFFN Evaluation Report (*Kipekiskwaywinan*):

> We were taught to respect everything. Even the littlest insect, you're not supposed to hurt because it's there for a reason. I remember we got in big trouble once as kids when we tied a piece of string around a bulldog [horsefly] to watch it fly on the string. Oh, my mother gave us a LONG talking to. She never used to yell at us, but when you got a talking to, you knew you'd done something wrong! My grandmother sat us down and she explained to us that every little thing is there for a reason. It has a spirit, and it's there for a reason. Everything is connected, so you don't hurt even one little thing (YFFN Evaluation Report (*Kipekiskwaywinan*)).

KCNs' expectations that Project construction will be destructive in nature are likely to result in different perspectives as to the severity of changes to the aesthetic environment. Similarly, the construction of Keeyask will alter the sound of Gull Rapids as water is diverted through channels and the spillway, thereby dampening the sound. The AEAs agreed to by the KCNs address known and foreseeable adverse effects of the Project, including the changes to the way the landscape looks and loss of the rapids. Specifically, the AEA Offsetting Programs will provide for replacement opportunities to access resources off-system to the Nelson River in areas not disturbed by hydro development. Further mitigation in the form of nature tails within the north construction camp will allow KCNs construction workers to find beauty (*e.g.,* access to water, views of sunsets or sunrises and quiet). The KCNs are considering the incorporation of ceremonies and rituals as a part of the Employee Retention and Support Services Contract (expected to be implemented by FLCN and YFFN). A video taken of the rapids and Gull Lake prior to construction will be available for viewing in a visitor space at the generating station once the station is in operation. In addition, a park/rest area with boat launches is proposed at the location of the north construction site as well as a commemorative plaque/memorial to recognize people who have used and continue to use the Gull Lake area (see Section 5.4.2.6 for further detail).

5.4.1.7.1 Mitigation

No further mitigation or enhancement is required.

5.4.1.8 Construction Monitoring

As noted in Chapter 8 of the EIS, monitoring of socio-economic effects will be organized into a coordinated Socio-Economic Monitoring Program (SEMP) whose details will be developed after the Project has been filed. It will be adjusted upon receipt of the Project's approvals and licence to incorporate any required terms of the licence. The program will define in detail the process, scope, methods, documentation and application of the socio-economic monitoring for the Project. It will be part of a larger strategy to identify where the proposed approaches to conducting the Project and mitigating its effects may have to be adjusted in order to address observed Projects effects that do not align with what had been predicted. This adaptive management approach will be inherent in the design and implementation of the SEMP.

The plan will be designed to satisfy licence conditions and to address monitoring proposals set out in the EIS. The SEMP will be developed by the Keeyask Partnership with representatives of the KCNs expected to play a central role in its development and implementation.

In relation to personal, family and community life, monitoring of construction phase effects is proposed for selected VECs.

PUBLIC SAFETY AND WORKER INTERACTION

There is potential for adverse interactions between non-local construction workers residents of the Local Study Area, particularly those who live in Gillam, including FLCN Members, and in Split Lake. Since it is difficult to predict the frequency and nature of issues that may occur during the construction of the Project, monitoring is proposed to identify potential problems and allow for mitigation measures to be developed for problems if they arise.

Manitoba Hydro, working with FLCN and TCN will determine the best mechanism to track the number and type of adverse incidents on a regular basis, including possible discussion with local justice and social agencies in the gathering of the data.

Manitoba Hydro will work closely with RCMP in Thompson, Gillam and other KCNs communities to discover if incidents indicate that worker interaction involving Project construction workers are an issue. If they are an issue, the above noted stakeholders will evaluate the situation and if needed, develop strategies to reduce of the likelihood of future occurrences.

TRAVEL, ACCESS AND SAFETY

Concerns were expressed regarding travel safety related to ice and open water travel . Open water and ice monitoring is part of the WMP, which the KCNs will play a role in implementing.

Concerns were expressed about increased traffic on PR 280. The Partnership will track statistics collected by MIT on traffic volumes and incidents. If traffic incidents and or complaints have increased considerably, the Partnership will work with MIT to determine if additional mitigation measures are appropriate *(e.g.,* speed reduction and dust control), and how these measures could be implemented.

CULTURE AND SPIRITUALITY

There is uncertainty as to how the construction phase of the Project would affect KCNs culture. This includes uncertainty about how employment experience during Project construction would affect the culture of workers and their families. Adverse Effects Agreements have been negotiated with each of the KCNs based on each community's assessment of the project's potential effects, including any interference with its traditional customs and practices. The AEAs include various Offsetting Programs designed to support and enhance cultural practices.

In terms of monitoring, each community undertakes its own internal evaluation of the AEA Offsetting Programs on an annual basis. This evaluation would determine whether the programs continue to address the adverse effects of the Project. If required, the AEAs provide flexibility for the Offsetting Programs to be modified to more adequately address Project effects as they are experienced. The agreements also provide the opportunity for the communities and Manitoba Hydro to negotiate additional programming if unforeseen or unanticipated effects arise. Within this context, the Partnership could undertake further evaluation of the effects of Project construction on culture.

5.4.2 Operation Phase Effects and Mitigation

5.4.2.1 Community Governance, Goals and Plans

5.4.2.1.1 Keeyask Cree Nations

During the operation phase there will be a continuing role for the KCNs in the limited Partnership (KHLP). Each of the KCNs will have representatives appointed to the Board of Directors of the General Partner and MAC[1] (see PD SV). Through these roles they will have the opportunity to continue to shape the Project; and will be involved in long-term monitoring. Under provisions of the JKDA, the KCNs are eligible to own up to 25% of Project equity (TCN and WLFN 15%, FLCN 5% and YFFN 5%), although the actual amount will not be determined until six months after the completion of construction. As limited partners, the KCNs will be entitled to receive annual distributions from their equity investment on the Project's profits. This income may be used to support projects and programs that assist the communities in achieving their goals and plans. However, specific uses by the KCNs for this potential new income have yet to be determined.

Research suggests that as new wealth is created it can be invested and stimulate the economy (Raybould 2006). The KCNs will likely need to develop strategies for the financial management of their equity income. Given the long lifespan of the Project, there is opportunity to address community priorities as they arise as well as achieve long-term community goals and plans. This may initially increase pressure on community leadership as they determine the optimal ways to use investment income to support community needs and interests.

5.4.2.1.2 Gillam

Gillam will experience an increase in operational jobs available to community Members or people moving into the community. Operation of the Project will result in 46 operational jobs located in Gillam, which is expected to result in the growth of population of Gillam between 120 to 150 people (see Section 4.4.2.1). The Town of Gillam, including Members of FLCN who call Gillam home, will need to respond to the needs of the growing population and associated changes. Gillam is already undertaking land-use planning in coordination with Manitoba Hydro and FLCN to plan for increases in population. As well, it is expected that the ongoing implementations of Harmonized Gillam Development will continue to play a role in identifying and addressing concerns of each party.

The increased presence of Manitoba Hydro employees and their families may also increase the opportunity for achieving community goals and plans through indirect means. Overall, a larger population may add to the vitality of the community by increasing local income and spending on local businesses and services (see Section 3.4.2.2). It may also contribute to the overall number of volunteers available to undertake various roles in the community.

[1] The General Partner would be owned and controlled by Manitoba Hydro.

5.4.2.1.3 Thompson

There are no anticipated effects from the operation of the Project on community governance, goals and plans in the community of Thompson.

5.4.2.1.4 Mitigation

No further enhancement or mitigation is required.

5.4.2.2 Community Health

During the operation phase, the direct effects to health are expected to be limited to the area in proximity to the Project. The effects associated with changes in the water regime include effects related to mercury and human health, water quality and travel safety (including both land and water). The indirect effects may include changes resulting from the ability to access country foods, employment and income, and any effects to health services in Gillam as a result of increases in population associated with the Project.

5.4.2.2.1 Community Health Issues Directly Associated with Project Operation

MERCURY AND HUMAN HEALTH

The KCNs have expressed concern about continuing to eat local fish and wildlife due to fears of mercury exposure. The operation of the Project will result in a release of methylmercury into the environment. As discussed in Section 5.3.3, there are health effects associated with exposure to mercury and these can be mitigated by following consumption guidelines provided in Section 5.4.2.3.

WATER QUALITY

In the operation phase, the main physical change to water relates to impoundment and associated changes in the anticipated open water hydraulic zone of influence. The PE SV notes that the backwater effect will not extend beyond approximately 41 km upstream of the Project site or about 3 km downstream of the Clark Lake outlet. Accordingly, the open water levels at Split Lake and Clark Lake, and typically winter levels as well, are not expected to be affected by the Project[1].

Upon impoundment, the new generating station will flood land and existing waterways resulting in peatland disintegration and associated shoreline changes. Total releases of organic sediments, peat and debris are expected to decline quickly during the first five years of operation. Over time, there will be a reduction in peat shoreline length, and an increase in mineral shoreline length. Mineral sediment releases are also expected to decline quickly during the first five years of operation. Downstream of the Project, the mineral shoreline erosion rates and sediment load will decrease because the hanging ice dam below Gull Rapids will no longer form. Peatlands are absent downstream of the Project.

[1] On average, effects to the ice regime could see Project operation effects every 20 years (see PE SV).

York Factory First Nation's Evaluation Report *Kipekiskwaywinan* notes that many community residents express concern about the ongoing impact of the Project on water quality as well as the fish in the water. Members of YFFN for example, strongly believe that the effects of the Project will go beyond the predicted open water 'hydraulic zone of influence'. This perception in and of itself can be considered an effect, and is discussed further in subsequent sections of this document.

It is anticipated that during operation the KCNs will change resource use locations to areas identified in their respective AEA Offsetting Programs. As such, it is unlikely resource users would be at risk of consuming surface water upstream of the Project. It is also important to note that, regardless of location, direct drinking of surface water is not a recommended practice; Health Canada indicates that all untreated water should be boiled for one minute before consumption (Health Canada 2008). Manitoba Water Quality Standards, Objectives and Standards note the following: "It is therefore assumed that all raw surface water supplies will be disinfected as the minimum level of treatment prior to consumption" (Manitoba Water Stewardship 2011). This applies to potential areas identified for the purpose of offset programs, in addition to downstream resource users and cabins on Stephens Lake. This caution is applicable even without the Project moving forward.

INJURY AND TRAVEL, ACCESS AND SAFETY

Operation phase effects to health stemming from travel, access and safety would stem from the creation of a reservoir and associated changes to the water regime. Upstream waterbody characteristics will change from a turbulent river to a reservoir environment, generally resulting in safer open water and ice conditions between the generating station and Clark Lake (see Section 5.4.5 for a full description). Similar to the construction phase, the WMP will remain in place to address potential travel, access and safety concerns arising from Project operation. Operation specific measures are detailed in Section 5.4.5.

Accidents and injury are preventable, and although it is impossible to predict whether any accident or injury will occur during Project operation, it is expected the mitigation measures put in place will reduce the overall potential for incidents to occur.

Project related traffic levels will be much lower during the operation phase than during construction. During operation the number of additional vehicles travelling on the roadways are not expected to be noticeable compared to existing background traffic levels, and would be comprised of cars, vans and small trucks. This level of additional traffic is not expected to have a noticeable effect on the traffic levels and safety in the Local Study Area. As such, the measures put in place to improve road conditions during construction should continue to improve the overall driving conditions and safety in the Local Study Area.

5.4.2.2.2 Community Well-Being Indirectly Associated with Project Operation

ABILITY TO ACCESS COUNTRY FOODS

As discussed in Section 5.3.2.1, the ability to access traditional foods and lands are essential to Cree concepts of health and living a good life. It is clearly beneficial if more people are eating country foods (in recommended amounts - see Section 5.3.3.3 for examples); and if fewer people are accessing the land

and eating country foods, the health of the community is affected. The operation of the Project will result in changes to the way people are able to spend time on the land, and in particular access to harvesting areas will be affected by the creation of a reservoir. Flooding will result in changes to habitat and subsequent changes to wildlife use/availability in the area (see the TE SV). Further to this, creation of the reservoir will result in the release of methylmercury into the environment. Precautionary guidelines for the safe consumption of fish and wildlife will be implemented in the Local Study Area (see Section 5.4.2.3). These factors will displace resource users who will be required to find alternative resource use locations in order to harvest resources.

TCN, WLFN and YFFN have long-term AEA Offsetting Programs that enable them to access healthy country foods (including fish and wild game) in areas unaffected by the Project. In the cases of TCN, WLFN and YFFN there are also food distribution programs within the communities so that country foods can be shared by those who are unable to go out on the land themselves. These programs ensure that there is no cost to community Members to access country foods in new areas and or by new routes.

EMPLOYMENT AND INCOME

During operation, fewer jobs will be created than during the construction phase, however these positions will be long term and permanent. Similar to the construction phase, operation employment and income have the potential to affect community health and well-being in various ways. Overall, the health benefits associated with higher income is expected to be more pronounced during operation, as the jobs available will be of a permanent nature, and not subject to the "boom-bust" cycle that is typical of construction. Conversely, the loss of construction employment when the Project transitions to operation may affect some people as the end of employment will result in an associated loss in income.

INVESTMENT INCOME

In the long term, the KCNs' equity participation as Project partners will result in new revenues for the communities. Although the KCNs have not yet determined precisely how their respective investment income will be spent, there is potential for spending to benefit overall community health and well-being through investment in infrastructure, services, and other community initiatives. These priorities are likely to contribute, to some extent, to improved community well-being (see Section 3.4.2.3 for details on the potential substantial contribution the KCNs return on investment can have).

HEALTH SERVICES

The operation of the Project will result in an increase in the population of the town of Gillam, by approximately 120 to 150 people (see Section 4.4.2). Population growth is a driver for health care services, not only from an emergency response perspective, but also in terms of providing for on-going health care needs. Section 4.4.2.3 notes that the hospital facility in Gillam, which is the primary health care provided for the community, can only accommodate a modest increase in population. During the operation Phase, population growth may result in the need for expanded health services. Community planning between Manitoba Health, the Town of Gillam, FLCN, and Manitoba Hydro will be necessary to address the community's longer-term health service needs. This will include consideration of services

that Manitoba Hydro already funds, such as the cost of travel for health service providers for specialty services that might not otherwise be provided in a remote northern community (see Section 4.3.3.2). Changes to the Gillam Hospital may also be required to make the facility more functional, such as improving existing spaces.

RESIDENTS' SCEPTICISM AND MISTRUST

The First Nations Regional Longitudinal Survey (2005) notes that various types of trauma contribute to First Nations peoples' mental health and wellness, and attributes some of this to the intergenerational effects of colonialism. For the KCNs, the onset of past Manitoba Hydro's activities have acted as a continuation of colonization, and were particularly challenging as they affected the communities' abilities to understand their surrounding environment (see Section 5.3.2.1). Becoming members of the Keeyask Hydropower Limited Partnership marks an important departure from the KCNs' history with Manitoba Hydro, as participation in the Partnership has changed their position from affected community to Project-proponent. Although this shift has resulted in a certain degree of stress for some KCNs Members, it also means that the communities have been able to participate in Project planning in a meaningful way, including access to benefits that were not realized with previous developments.

Even though the KCNs have assumed a different role in this Project than with past hydroelectric developments, many Members still experience a certain level of scepticism and mistrust, particularly as it relates to the prediction of effects. Some KCNs Members have expressed concerns that the anticipated open water hydraulic zone of influence will extend beyond Clark Lake and will reach into Split Lake. While Manitoba Hydro has a high degree of confidence in the hydraulic modelling, and no changes to open water conditions on Split Lake is a fundamental feature of the Project in the JKDA, the KCNs' experience with past hydroelectric projects does not support such confidence. The KCNs point out that previous hydroelectric projects by Manitoba Hydro have caused changes to the lake and river systems that, from their perspective, have drastically increased the risks associated with traveling (YFFN Evaluation Report (*Kipekiskwaywinan*)). This is of particular concern to YFFN who reside on Split Lake, and already face challenges in accessing the community at York Landing due to the lack of an all-weather road. Monitoring of open water and ice conditions on Split Lake is described in Section 5.4.2.8.

5.4.2.2.3 Mitigation

There are no specific mitigation measures proposed directly related to community health; however those measures identified in relation to travel, access, and safety, to culture and spirituality, and to infrastructure and services should help to alleviate some of the potential pressures that could affect community health and well-being.

5.4.2.3 Mercury and Human Health

In order to characterize the effects of impoundment on mercury levels and subsequently human health, exposure to mercury under post-impoundment conditions was calculated in a human health risk assessment (HHRA) by a toxicologist on the Project (Wilson Scientific). A HHRA is a process that is accepted by Canadian and international health agencies for evaluating the potential for chemical, biological and physical agents to cause adverse health effects in people (Wilson Scientific 2012).

Regulatory agencies that use risk assessment to assist in making health-based decisions include Health Canada, the World Health Organization and the US Environmental Protection Agency.

Section 5.3.3 provides summary level detail of the methods used to estimate human health risks associated with mercury in country foods; also refer to Appendix 5C for the full HHRA report.

Concentrations of mercury were predicted for foods identified by KCNs community Members, including fish, wild game, waterfowl and surface water. The predicted mean mercury concentrations in the peak year were made by the aquatic team for fish and surface water, and the terrestrial team for wild game and waterfowl. These values are reported on in the HHRA; and provided input into calculating the risk assessment related to consumption of country foods.

In order to assess the risk of exposure to mercury as a result of the Project, the HHRA considered post-impoundment conditions for Gull Lake and Stephens Lake as these are the waterbodies that will have increased levels of mercury, particularly Gull Lake where flooding for the reservoir will occur. The HHRA evaluated the potential exposure to mercury for the KCNs, as these are the communities at greatest risk due to their use of country foods in the Gull and Stephens lakes area. To be cautious, the predictions for the KCNs are applicable to other users of Gull and Stephens lakes; although it is recognized that other users may not consume the same amount of fish at the same frequency levels.

As discussed in Section 5.3.3, specific species were selected for evaluation based on KCNs' inputs through the Mercury and Human Health Technical Working Troup (or TWG). Serving sizes and rates of eating for all foods studied were based on information obtained from KCNs community Members. The foods selected for evaluation included:

- Fish: lake whitefish, jackfish (northern pike), pickerel (walleye) and lake sturgeon;
- Wild game: beaver, muskrat, moose and snowshoe hare;
- Waterfowl: ducks and gull eggs; and
- Wild plants: northern tea, blueberries and Seneca root.

Details on the proceedings of the Technical Working Group and the details of the approach used in the HHRA are found in Appendix 5B and 5C.

5.4.2.3.1 Estimates of Mercury in Traditional Foods and Surface Water Post-Impoundment

FISH SPECIES

To estimate maximum mercury concentrations in whitefish, jackfish, and pickerel following impoundment, various modeling approaches have been used (see AE SV). Based on the modeling results and taking into account the strength and weaknesses of the different models used, the best estimates of average post-impoundment concentrations that would occur in the maximum year would be equal to the values provided in Table 5-25. No model is available to predict and monitor maximum post-impoundment mercury concentrations in lake sturgeon; therefore values in Table 5-26 are "best guess" estimates provided by North South Consultants (Wilson Scientific 2012).

As shown in Table 5-25, as compared to Table 5-26 (existing conditions), mercury concentrations of certain fish are predicted to increase markedly following impoundment while other fish would be much less affected. Jackfish and pickerel from Gull Lake will be the most affected fish as their mercury concentrations are predicted to increase from 0.22 ppm and 0.23 ppm, respectively, to 1.0 ppm wet weight. Lake whitefish from Stephens Lake is predicted to have the lowest increase in mercury concentration following impoundment (from 0.09 ppm under existing conditions to 0.15 ppm post-impoundment).

Table 5-25: Average Estimated Mercury Concentration in Fish Muscle for Standardized* Fish from Gull and Stephens Lakes: Predicted Maximum Post-Impoundment Concentrations

Fish Type	Average Estimated Mercury Concentration in Fish Muscle (for Standardized Size)[1] (ppm; wet weight)	
	Gull Lake	Stephens Lake
Whitefish	0.19	0.15
Jackfish (Northern pike)	1.0	0.50
Pickerel (Walleye)	1.0	0.50
Sturgeon	0.30	0.25

Source: Wilson Scientific 2012, as reported by Aquatic Study Team.

Notes:

1. Standard lengths: lake whitefish 350 mm; jackfish 550 mm; pickerel 400 mm, lake sturgeon 1,300 mm. Individual mercury concentrations would be dependent upon the size of the fish with the smaller fish having generally lower concentrations than bigger fish.

- ppm wet weight is the same as µg/g wet weight as noted in the HHRA; ppm is used in the EIS as it is more readily understood.

WILD GAME

In the case of mercury concentrations in wild game following impoundment, Wildlife Resources Consulting Services considered that the best estimate of concentrations during the maximum year post-impoundment would be equal to the values provided in Table 5-26. Mercury in wild game was estimated as total mercury concentrations.

Table 5-26: Total Mercury in the Muscle Tissue of Wild Game from the Project Area: Predicted Maximum Post-Impoundment Concentrations

Species	Total Mercury Concentration in Muscle (ppm; wet weight)	Most Likely Range in Total Mercury Concentration in Muscle (ppm; wet weight)
Beaver	0.01	<0.01 – 0.05
Muskrat	0.04	<0.01 – 0.12
Moose	0.07*	<0.01–0.17
Snowshoe Hare	0.05*	<0.01–0.12

Source: Wilson Scientific 2012, as provided by Terrestrial Study Team.
Note:
- Mercury concentration in moose and snowshoe hare was a literature based estimate and likely has greater uncertainty than other species for which measured concentrations were obtained from the study area.

As shown in Table 5-26 as compared to Table 5-27 (existing conditions), mercury concentrations in beaver, moose and snowshoe hare are not expected to be affected by the Project (the values and the range of concentrations remain unchanged). Muskrat is predicted to have an increase of total mercury concentration of 0.03 ppm (from 0.01 to 0.04 ppm), with the range increasing to an upper limit of 0.12 ppm (over 0.06 ppm under existing conditions). Post-impoundment mercury levels in muskrat are still below levels that would cause concern.

WATERFOWL

In the case of the mercury concentrations in waterfowl following impoundment, the best estimate of concentrations during the maximum year post-impoundment would be similar to or less than concentrations in whitefish. Consequently, the mercury levels provided for ducks are those previously provided for whitefish *(e.g.,* ≤ 0.19 ppm wet weight for Gull Lake and ≤ 0.15 ppm wet weight for Stephens Lake). Compared to current estimated concentrations for waterfowl of ≤0.07 ppm wet weight (Gull Lake) and ≤0.09 ppm wet weight (Stephens Lake), it is evident that the concentration increases in ducks are expected to be relatively modest following impoundment. No estimates are provided for gull eggs as no information on mercury concentrations in gull eggs is available; therefore, gull eggs would need to be directly measured in the field if further information is required.

WILD PLANTS AND SURFACE WATER

Although many types of wild plants can be consumed from the Project Local Study Area, the key plants that were identified from discussions with KCNs community Members were northern tea (also known as Labrador tea), blueberries and Seneca root. As there is no information available on present mercury concentrations in these plants, future concentration estimates could not be calculated. If samples are provided through the volunteer sampling program for wild plants, mercury analysis can be undertaken to predict and monitor future concentration estimates for these plants under post-impoundment conditions.

Project-related increases in mercury in surface water are not expected to be detectable or to cause or contribute to exceeding the drinking water quality guideline in or downstream of the Keeyask reservoir *(e.g.,* <0.05 µg/L) (see AE SV). Concentrations of mercury are expected to remain below the Manitoba water quality guideline of 1 µg/L and below the analytical detection limits from the combined effects of peatland disintegration and flooding. Mercury was not detected in the Nelson River between Clark and Stephens lakes and the predicted average increases due to peatland disintegration and flooding are expected to be very small (see AE SV). However, during periods where organic particulate materials are notably elevated as a result of re-suspension or peatland disintegration, total mercury concentrations may be higher than existing conditions. Effects on Stephens Lake are also not expected to be detectable (Wilson Scientific 2012; AE SV).

5.4.2.3.2 Post-Impoundment Risks and Recommendations

Post-impoundment risk estimates were based on the predicted mean mercury concentrations in lake whitefish, jackfish and pickerel that would occur in the maximum years *(e.g.,* approximately 3 to 8 years following impoundment). Concentrations are predicted to return to current concentrations approximately 25 to 30 years after they peak (see AE SV).

Based on the predicted post-impoundment mercury concentrations in lake whitefish, jackfish and pickerel in Gull Lake and Stephens Lake and the respective serving sizes and rates of eating, a range of risks were calculated for the same groups.

The greatest risks were estimated from eating jackfish and pickerel from Gull and Stephens lakes. It was recommended that young children and women of child-bearing age should avoid eating these species of fish from either of these lakes. Adult men and women past child-bearing age should avoid eating these species from Gull Lake; and restrict their consumption to one meal per week from Stephens Lake (see Table 5-27 below). For lake sturgeon, standard size fish from either lake *(e.g.,* 1,300 mm) is predicted to contain mercury concentrations that would not be advisable for young children and women of child-bearing age to eat. Adult men and women past child-bearing age could eat up to one meal per week of lake sturgeon (1,300mm or smaller).

Risks from lake whitefish from Gull Lake and Stephens Lake were the lowest of the fish evaluated. Consumption recommendations indicate that lake whitefish of standard length *(e.g.,* 350 mm) from either lake may be eaten on an unrestricted basis (Table 5-27).

Consumption categories based on the size of fish are not available for the post-impoundment scenario. In order to create the size-based categories, fish would need to be caught and analyzed under such conditions. However, general consumption categories were generated from the model results for the standardized lengths of fish (see notes in Table 5-25 for standard lengths).

Table 5-27: Fish Eating Recommendations Based on Fish Size Class: Post-Impoundment Conditions

Receptor Group of Concern	Lake Whitefish (350 mm)	Jackfish (Northern Pike) (550 mm)	Pickerel (Walleye) (400 mm)
Gull Lake			
Women of childbearing age and toddlers	Unrestricted eating	Avoid eating	Avoid eating
Adult men and women past child-bearing age	Unrestricted eating	Avoid eating	Avoid eating
Stephens Lake			
Women of childbearing age and toddlers	Unrestricted eating	Avoid eating	Avoid eating
Adult men and women past child-bearing age	Unrestricted eating	Eat up to 1 meal per week	Eat up to 1 meal per week

Source: Wilson Scientific 2012.
Notes:

- Based on serving sizes of 400 grams per serving for men and women and 100 grams per serving for toddlers.
- A Hazard Quotient of 1 was assumed to be acceptable; however, all fish with mercury concentrations less than 0.2 ppm were classified as acceptable mercury concentrations and no consumption recommendations from current frequencies were recommended.

An alternative to reduce post-impoundment mercury exposure is to encourage eating fish from appropriate offset lakes. Adverse Effects Agreements have been signed between Manitoba Hydro and each of the four First Nations to provide offset harvesting programs to enable harvesting of country food in locations away from Gull Lake and Stephens Lake. TCN's and WLFN's AEAs specifically include Healthy Food Fish and Community Fish programs respectively to access fish from identified off-system lakes to replace fish with increased mercury levels in Gull Lake. YFFN's AEA includes a program that provides access to "off-system lakes and rivers for purposes of harvesting fish and other resources, to replace fish supplies that have the potential to be affected by Keeyask Adverse Effects" (YFFN 2009). FLCN's AEA provides for an Alternative Resource use Program to access resources within their RMA.

It is stressed that it will still be necessary to consider size and species of fish for people wanting to reduce their mercury exposure even from offset lakes. Mercury concentrations in fish from the offset lakes are variable. However, some mercury testing in offset lakes has indicated that certain fish from specific lakes have mercury concentrations that warrant consumption recommendations, with the highest levels in jackfish and pickerel (see AE SV). This does not preclude harvesting of fish from offset lakes since not all lakes have the same background levels of mercury; however, it bears caution.

Risks from eating wild game (beaver, muskrat, moose and snowshoe hare) were estimated for post-impoundment conditions. As noted previously in Section 5.3.3, the serving size and how often wild game is eaten were based on information provided by the KCNs.

Based on the predicted post-impoundment total mercury concentrations in beaver, muskrat, moose and snowshoe hare and the respective serving sizes and how often these foods are eaten, no unacceptable

risks were calculated for the groups evaluated *(e.g.,* toddler, women of child-bearing age or adult males/women beyond child-bearing age). KCNs Members can continue to eat these foods at the amounts and frequencies that they are accustomed to under current conditions as well as post-impoundment conditions.

It is noted that some aquatic mammals such as otter and mink may experience appreciably higher increases in total mercury concentrations than the mammals considered in the risk assessment. However, feedback from KCNs Members received through the TWG indicated that these mammals are not eaten by Members of the KCNs communities. It is important to note that risks from consumption of these aquatic mammals were not considered in the HHRA.

For post-impoundment conditions there is some uncertainty in regard to the moose and snowshoe hare concentrations of mercury and it is recommended that monitoring of these species be completed to confirm that the assumed mercury concentrations were reasonable (see Chapter 8 of the EIS).

Risks from eating ducks were estimated for post-impoundment conditions. The serving size and how often waterfowl are eaten were based on information provided by the KCNs. Based on the predicted current and post-impoundment total mercury concentrations in ducks from Gull Lake and Stephens Lake and the respective serving sizes and how often waterfowl are eaten, no unacceptable risks were calculated for the groups evaluated *(e.g.,* toddler, women of child bearing age or adult males/women beyond childbearing age).

Although geese were not considered in the HHRA, geese are not expected to have higher mercury concentrations than ducks as geese are not more piscivorous (fish-eating) than the ducks considered in the HHRA.

No risk estimates were available for gull eggs as no estimate of the mercury concentration of these eggs was available. To provide an estimate of risks from eggs, sampling and monitoring of gull eggs would be required.

No risk estimates were available for northern tea, blueberries or Seneca root as no estimate of the mercury concentration of these wild plants was available. To provide an estimate of risks, sampling and monitoring of wild plants would be required.

As noted in Section 5.3 3, for the sole purposes of the assessment, it was assumed that the KCNs communities would drink surface water as their drinking water source. The risk assessment calculated that there are no changes in surface water mercury concentrations post-impoundment; therefore, contact with surface water will not pose unacceptable health risks from mercury under the post-impoundment conditions.

The risk assessment also considered potential risks to people who may be exposed to mercury from various elements of the environment *(e.g.,* people who drink the water and eat the identified country foods or people who may eat moose, fish and duck all in one week).

In the case of adding mercury-related risks from surface water exposures to eating country foods, the combination of these activities does not change the conclusions or recommendations presented above.

This is because the Hazard Quotients for contact with surface water are so low that when the Hazard Quotients are added together, the value essentially remains unchanged.

In the case of interactive effects from eating many types of country food, there are too many possible combinations to fully evaluate all possible interactions that may occur. However, it is clear that eating fish is the main contributor in terms of risks. Because the most risk comes from eating certain fish species, the recommendations for eating fish should be followed in order to reduce the risk from eating the fish but also to reduce the risk of additive exposure from eating other foods that may contain mercury. In particular, toddlers and women of child-bearing age should not eat the larger predatory fish (northern pike, walleye and lake sturgeon) from either Gull or Stephens lakes.

It is important to note that the risk assessment was completed using a series of assumptions that are intended to over-estimate actual health risks and thereby ensure a conservative assessment. Given the conservative assumptions used in this assessment, it is quite possible that actual risks may be substantially lower than estimated in the HHRA (see Appendix 5C for further details). Certain assumptions were key determinants in the acceptability of risks, most notably the serving size and frequency of eating certain country food; and the modeled post-impoundment estimates that in some cases had wide ranges (see Appendix 5C for a more detailed discussion of uncertainty).

It is unlikely that human health risks have been underestimated in the risk assessment and it is quite possible that already low risks have been overestimated. However, it is possible (but not likely) that risks may have been underestimated for certain receptors in some cases. The two main conditions where risks may have been underestimated would include:

- Any situations where environmental sampling or modeling has underestimated mercury concentrations either currently or that would occur following impoundment; and
- Any situations where people are not accurately represented by the assumed receptor assumptions.

Risk management measures should be undertaken to ensure that neither of the conditions described above occur. If such conditions do occur, additional risk analysis would be recommended to address potential increases in human health risks.

Overall, the bottom line is that with following the consumption guidelines, the continued consumption of country foods is considered safe and a very healthy source of nutrition for community residents.

5.4.2.3.3 Mitigation

It is important to balance the eating of traditional foods such as fish with the knowledge of what the mercury levels are in different food sources. Country foods including fish are very important to people's diet and contribute to overall health. Due to fears and lack of information from trusted sources, many KCNs community Members have indicated that they have either stopped or decreased the consuming of fish and other traditional foods, which has its own health effect. Because fish are very healthy components to a diet in the right quantity, it is important to address the community concerns, while still encouraging community Members to eat appropriate amounts and types of fish.

In their respective AEAs the KCNs have Offsetting Programs to enable them to pursue continued use of country foods from areas unaffected by the Project and within their respective RMAs. For CNP, this

includes programs specific to the harvesting and distribution of fish in their communities (see Section 5.4.2.3.2 above). In addition to these AEA Offsetting Programs, additional mitigation measures will be put in place, along with monitoring programs (see Section 5.4.2.8 and Chapter 8 of the EIS) to address Project effects. These include the following:

- The Partnership, working through the MAC, will prepare a risk communication strategy and series of communication products for the KCNs, Gillam and other users of the affected lakes prior to impoundment. The strategy will include communication products and development of a monitoring program. The strategy will also include a balanced message to encourage residents to eat country foods (including fish from unaffected areas provided via AEA Offsetting Programs for the KCNs communities), and to avoid high mercury fish from affected areas.(see further details below);
- Prior to impoundment, preparation and distribution of communication products *(e.g.,* poster, placemat, fish yardstick, maps and video) to inform KCNs communities and Gillam about increases in mercury concentrations post-impoundment, and implementation of monitoring;
- Based on monitoring of fish and terrestrial species noted in the AE and TE SVs, additional human health risk assessments will be undertaken every five years after peak mercury levels have been reached to determine if adjustments can be made to the consumption recommendations;
- The HHRA will be updated (as needed) until mercury levels return to pre-Project conditions. These monitoring results will be communicated as they become available; and
- Liaison with provincial and federal health authorities and Manitoba Conservation and Water Stewardship regarding preparation of restrictions at Gull and Stephens lakes.

A communication strategy was identified as a very important component by the Mercury and Human Health Technical Working Group. As discussed in Section 5.3.3, the TWG developed this communication strategy and a series of products to be used in the KCNs communities to ensure people are aware of the issue and can make the right choices when harvesting and eating country foods. Under post-impoundment conditions, the Monitoring Advisory Committee (MAC) on behalf of the Keeyask Hydro Limited Partnership, will be the group responsible for developing post-impoundment communication about mercury levels and what types of country foods are safe to eat. In addition, monitoring of selected country foods will be undertaken during the operation phase of the Project (see the AE SV and TE SV for further details). Monitoring plans will be developed after filing the EIS, and will include KCNs involvement in the development and implementation of these plans.

Table 5-28 presents a summary of the conclusions regarding the expected post-impoundment experience as well as information regarding suggested plans for monitoring and for continued communication with community Members and stakeholders concerning eating safe country foods. No further mitigation is required.

Table 5-28: Summary of Risk-Based Conclusions and Recommendations

Exposure	Post-Impoundment Scenario Risk Based Conclusion	Recommendations for Further Action
Fish consumption from Gull Lake and Stephens Lake	Average sized or smaller lake whitefish can be consumed without restriction by the entire population from both lakes. For jackfish, pickerel and sturgeon various consumption recommendations are provided. No size-specific recommendations can currently be provided; however, smaller and less predatory fish will have lower concentrations. It is possible that size-specific recommendations will be possible if sampling was completed.	Consult on findings and approach with communities, health agencies and stakeholders. Continued monitoring. Appropriate education *(e.g.,* presentations in the community, newsletter, pamphlets, *etc.*) with emphasis on consumption recommendations specific to fish species and fish size.
Wild game consumption	Beaver, muskrat, moose and snowshoe hare can be consumed at current frequencies by all members of the communities.	Consult on findings and approach with communities, health agencies and stakeholders. Periodic volunteer sampling of wild game submitted by hunters. Appropriate education that clearly states that wildlife is safe to eat.
Waterfowl consumption	Ducks and geese can be consumed at current frequencies by all members of the communities.	Consult on findings and approach with communities, health agencies and stakeholders. Periodic volunteer sampling of wild game submitted by hunters. Appropriate education that clearly states that waterfowl is safe to eat.
Wild plant and gull egg consumption	No conclusions possible (no measurements of mercury have been collected).	Consult on findings and approach with health agencies and stakeholders. Periodic volunteer sampling of plants submitted by community members. Monitoring required if risk-based conclusions are desired.

Table 5-28: Summary of Risk-Based Conclusions and Recommendations

Exposure	Post-Impoundment Scenario Risk Based Conclusion	Recommendations for Further Action
Surface water ingestion and contact from Gull Lake and Stephens Lake	Surface water is safe to bathe and swim in; solely from a methylmercury perspective, the water can be used as a drinking water source by all members of the communities.	Consult on findings and approach with health agencies and stakeholders. Communicate on other risks associated with drinking untreated surface water and lack of issue related to mercury.

Source: Wilson Scientific 2012.

5.4.2.4 Public Safety and Worker Interaction

Effects to public safety are associated largely with the influx of non-local construction workers. Since operation employment is expected to be permanent and long-term, there is limited anticipated effect to public safety since the number of workers involved in the operational workforce is small, workers may be a combination of KCNs Members as well as non-local people, and workers will be living in Gillam long-term resulting in a stake in the community. These factors will assist in minimizing the potential for adverse worker interactions. As noted, a coordinated approach to addressing issues related to worker interaction across all Manitoba Hydro projects in the vicinity of Gillam is planned. Any related processes and measures implemented during the construction phase could be extended into operations if required.

5.4.2.5 Travel, Access and Safety

5.4.2.5.1 Water / Ice-based Travel

The operation of the Project is expected to alter the existing water and ice regimes within the Project's anticipated open water hydraulic zone of influence which extends approximately 40 km upstream from the Project site to the outlet of Clark Lake (see PE SV). The most notable aspects of the Project expected to affect the travel along the Nelson River and shoreline access during the operation phase are the following:

UPSTREAM EFFECTS

- Creation of a reservoir for the Project is expected to alter upstream waterbody characteristics, changing some parts of the watershed from a riverine to a reservoir environment. This will affect water levels, velocities and water surface profiles (PE SV).
- During open water conditions, these changes are expected to result in safer boat travel conditions between the generating station and Clark Lake by stabilizing flows and levels along most of this reach of the river. There would continue to be some fast-flowing sections, for example at Birthday Rapids, which although dampened by the backwater effect, will not be eliminated entirely.

- During winter conditions, ice cover is expected to occur earlier in winter, developing a thermal ice cover extending approximately 25 km upstream of the station and resemble that of Stephens Lake. The ice cover in the reservoir would create safer ice travel conditions than the existing environment. In the reach between Two Goose Creek and the outlet of Clark Lake, higher water levels will result in earlier formation of the ice cover (PE SV).
- Some hinging of the ice in the Project reservoir along the shoreline is expected as a result of water level fluctuations of reservoir water levels. There may be areas along the shoreline where cracks that form fill with water and subsequently create slush ice conditions, which could create hazardous travel conditions within the reservoir. This is most likely in the early winter when the cover is relatively thin (see PE SV).
- Reservoir impoundment will also result in the flooding of portions of land-based trails along the Nelson River requiring access points and boat launch and landing sites to be relocated.
- Reservoir flooding is expected to create navigation hazards from mobilized debris, floating islands, bogs, submerged rocks and islands.

Hydraulic modelling of the Project water regime indicates that changes in open water and ice conditions from the Project are projected to extend no further than Clark Lake. Further, this prediction has been incorporated as a fundamental feature of the JKDA that states that operation of the Project will not affect water levels on Split Lake during open water conditions. However, some CNP and YFFN Members have expressed concern that backwater effects may occur upstream of Clark Lake and possibly into Split Lake; thus resulting in safety concerns regarding boat travel.

Members of YFFN strongly believe that the effects of the Project will go beyond the predicted open water hydraulic zone of influence. Since York Landing does not have all-year road access, travel access and safety are a constant part of life for YFFN Members. YFFN Members have expressed concern the Project may result in additional effects on ice processes on Split Lake that could affect the winter road system. YFFN Members believe that unreliable winter road conditions already exist in part because of the seasonal reversal of water levels on Split Lake as a result of hydroelectric development (YFFN 2004; YFFN Evaluation Report (*Kipekiskwaywinan*)). The addition of the Project to the Nelson River system further exacerbates the community's concerns about the accessibility of York Landing, and associated travel safety and costs (YFFN Evaluation Report (*Kipekiskwaywinan*)).

While Manitoba Hydro has a high degree of confidence in the predicted open water hydraulic zone of influence, KCNs' experiences with past hydroelectric projects provides a different perspective. Some of the KCNs believe that past assertions made by Manitoba Hydro about anticipated changes in the water regime are now different to what the communities have experienced. Given this difference in the confidence of the modelling results and the important implication to travel for KCNs Members if open water and ice conditions were to be affected by the Project, it will be important to monitor water and ice conditions on Split Lake.

While the moderating and smoothing of ice conditions will make winter travel on ice safer from Clark Lake to the generating station, uncertainty exists about the change in ice development on the rivers and lakes in some locations.

A comprehensive Physical Environment Monitoring Program (PEMP) will be developed and will include monitoring of water and ice regime conditions. This will help to verify the results of the water and ice regime assessment as well as monitor changes in the ice regime both during and after construction. This information will be used to help identify and map safe and unsafe travel areas (PE SV). Monitoring will be reviewed and discussed at the MAC.

PRESENCE OF THE GENERATING STATION, DYKES AND THE SOUTH ACCESS ROAD

- The generating station will be a barrier to continuous water-based travel between the area upstream and downstream of Gull Rapids. The area around the generating station and spillway poses distinctive hazards to water travel.
- The presence of a series of earth dykes along the north and south sides of the Nelson River along with inundation of the surrounding lands will alter the ways in which people can access this reach of the Nelson River by inundating or impeding use of existing access points and launching sites.

DOWNSTREAM EFFECTS

- During open water conditions, boaters will continue to be required to use a portage trail around the generating station (as opposed to around Gull Rapids). There should be no further changes to open water travel on the majority of Stephens Lake (exception noted below).
- During winter conditions, the existing hanging ice dam that occurs immediately downstream of Gull Rapids is not expected to form in the future; instead a thermal ice cover will form (PE SV Section 4.4.2).
- Immediately downstream of the powerhouse, an area approximately 800 m long is expected to remain ice free all winter; and a portion of the south channel of Gull Rapids near the spillway is expected to be dry when the spillway is not operational (approximately 88% of the time based on historical records) (PE SV).
- Travel during winter will require a modification of snowmobile routes to go around the facility and avoid the spillway.

As with the construction phase, effects of the Project operation on water travel, access and safety are addressed through a comprehensive program of mitigation measures contained in the Waterways Management Program (WMP) (Phase II) (Schedule 11-2 of the JKDA). The WMP was developed to address the issues of flooding of portions of land-based trails, relocation of access points, new boat launches and safe landing sites. The WMP also includes provision to identify navigation hazards (including debris) and provide alternative safe open water routes and ice trails.

Travel access and safety measures that will be implemented during the operation phase, as identified in Phase II of the WMP include:

- Marking safe travel routes by installing and maintaining navigation and hazard markers along primary travel routes and along charted routes to shore access points at locations where there is a serious risk of striking a rock or reef depending on water levels;

- In locations where it is expected that travel on the ice will be dangerous and where ice conditions will be unknown or uncertain, safe trails over the ice will be marked, and the ice will be monitored until ice travel maps are considered reliable;
- Preparation of reservoir depth charts to illustrate the depth of water throughout the reservoir upstream from the Keeyask Generating Station as an aid for boat travel. The depth charts will also illustrate safe travel routes that should be used during all water level conditions;
- Installing and maintaining water level staff gauges to provide information required to interpret the reservoir depth charts and determine the depth of water along travel routes under conditions prevailing at the time;
- Recognizing that the reservoir will be used for resource harvesting, boat travel and a variety of other pursuits, a number of potential landing sites have been identified along the shoreline. At these landing sites, required docks and shelters will be constructed and maintained;
- Maintenance of trails and portages;
- Collection of floating debris; reservoir clearing will minimize the source of such debris; and
- Monitoring waterway activities and liaising with individuals and groups.

As noted in the Project Description SV, the following measures will be implemented to ensure safe travel immediately upstream and downstream of the generating station infrastructure:

- Similar to current practice to avoid travelling through the rapids, access to Stephens Lake will be via a new portage around the new generating station;
- Posting signs on both sides of the shoreline on the upstream and downstream side of the generating station, warning people of potentially dangerous boating and swimming conditions;
- Fencing off potentially hazardous areas *(e.g.,* slopes leading to the spillway discharge and tailrace channels);
- Installing safety railings on the spillway deck, powerhouse reservoir deck, the main dam and tailrace deck; and
- Installation of a siren system to provide advance warnings of the movement of the spillway gates.

EFFECTS OF CHANGES TO OPEN WATER AND WINTER ICE ON GILLAM

Residents in the town of Gillam who use Stephens Lake for recreational and traditional activities are unlikely to notices changes in Stephens Lake water and ice conditions due to downstream flows from the Project. Immediately downstream of the generating station, safe trails over open water and ice will be marked, and the open water and ice will be monitored until open water and ice travel maps are considered reliable.

5.4.2.5.2 Road-based Travel, Access and Safety

Project-related traffic levels will be much lower during the operation phase than during the construction phase. It is expected that the daily workforce at the Keeyask site will consist of approximately 37 maintenance staff (Manitoba Hydro 2009). The required workforce to operate the plant will result in a negligible amount of traffic on PR 391 as employees will be housed in Gillam. Daily commuting to the Project by employees in addition to occasional delivery vehicles on PR 280 are not expected to have a noticeable effect on the traffic volumes in comparison to background traffic levels in the Local Study Area.

MIT plans to re-route PR 280 along the north access road, across the generating station and along the south access road to Gillam, thus reducing travel distance between Thompson and Gillam by 54 km; travel patterns may change as a result. FLCN Members living in the community of Fox Lake (Bird) have expressed concerns about any closure since their trip to Thompson is shorter on the existing route than via the south access route.

5.4.2.5.3 Mitigation

No further mitigation is required.

5.4.2.6 Culture and Spirituality

5.4.2.6.1 Keeyask Cree Nations

The operation effects on known intangible culture and spirituality within the Core, Local and Regional Study Areas are summarized below, according to the nine cultural indicators:

Worldview: Long-term, some KCNs Members may question their decision to be partners in the Project because of its disturbance to *Askiy*. The Partnership however, provides the opportunity for the Cree to offer respect for the giving of the land and the rapids for future generations through ceremony and ritual at key Project milestones (some of which may occur in the early stages of the operation phase as units are coming on line and components of the site are re-established are rehabilitated). As well, there is the opportunity for oversight and long-term monitoring of effects, thus partially fulfilling their stewardship role to care for *Askiy* (see Chapter 2 for more details on the KCNs worldview statement). This includes environmental and stewardship programs identified in TCN's and YFFN's respective AEAs, in addition to participation in ATK monitoring.

Language: Cree place names and other mnemonic devices act as catalysts for language and the oral narrative. Loss of Cree language associated with loss of place names/landmarks affected by the Project could cause grief and unhappiness because the Cree words that describe an area may be rendered meaningless once those areas are disturbed or lost. This is balanced by the AEAs Offsetting Program (re: language) to strengthen long-term use of Cree in the communities; as well as the overall AEAs agreed to by the KCNs.

Traditional knowledge: There will be rapid change and loss of applicable Aboriginal traditional knowledge associated with physical and biophysical changes in the environment affected by the Project. This will be offset by the retention and transmission of ATK that continues to flow from the land use

and related studies already undertaken with funding from the Project, the development and implementation of ATK monitoring programs, and the implementation of offset programs as defined in the AEAs to promote traditional land use and transmission of knowledge.

Cultural practices: Cultural practices and pursuit of traditional activities within the Footprint study area will diminish and may not be transferable to other areas. The reservoir area will be restrictive to current traditional activities. Winter access will be altered due to changing water levels and ongoing shoreline erosion, and summer access could be dangerous in the vicinity of the generating station. KCNs Members who regularly camp will likely have to find new areas for their traditional campsites. This will be balanced by the ongoing Waterways Management Program (new camp sites and trail access). In addition, opportunities are available for conducting traditional activities and cultural practices in areas visited as part of the AEA Offsetting Programs where such activity was more difficult due to access or ability to reach these locations. This will also result in an overall benefit to health and well-being.

Health and wellness: Overall health and wellness may increase due to access to healthy country foods (fish and wild game) through the access programs, as well as opportunities for wilderness camps and actively undertaking traditional activities. See also Section 5.4.2.2 for a review of effects on western modes of health and wellness.

Kinship: Kinship and family ties have the potential to be strengthened during the operation phase through the AEA Offsetting Programs.

Leisure: There is not expected to be any Project operation effect on leisure *(e.g.,* playing sports, bingo, skating).

Law and order: Customary law and order is not expected to be affected by the operation of the Project.

Cultural products: The emotional and historic connection to particular areas for harvesting of traditional plants and resources for making cultural products will be altered due to physical changes to the environment during operation. However, the ability to collect materials and create cultural products from the offset areas identified in the AEAs will provide opportunities for completing traditional tasks and continuing the flow of ATK.

The same AEA programs noted above during the construction phase also apply during the operation phase. Degree of confidence for all indicators is high.

5.4.2.6.2 Mitigation

KCNs Members will continue to experience culturally-related disturbances and losses in conjunction with losses in their cultural landscape. These effects would be offset by the combination of processes and measures established during the planning stage of the Project, including the AEAs, and moderated by the proposed mitigation measures including the following:

- Prior to construction, prepare a video of Gull Rapids and the river between the outlet of Clark Lake and Stephens Lake (including the sound of the rapids). In a visitor space at the generating facility, include the video and interpretative boards that enable KCNs and other community Members to visit, remember the area prior to construction of the Project and pay ongoing respect for *Askiy*.
- Cultural training to be provided to Keeyask operation staff.

No further mitigation is required.

UNCERTAINTY

The AEAs Offsetting Programs and associated success ultimately will be determined by each of the KCNs communities. These programs were developed based on each of the KCNs' individual experiences with past hydro development that affected their community. The KCNs communities held ratification votes and ultimately agreed to the implementation of the programs. There is also latitude within the programs for adjustment or reallocation of funding to areas deemed of greatest importance. Therefore, from a culture and spirituality perspective, the degree of confidence in mitigating the adverse effects identified above is high.

5.4.2.7 The Way the Landscape Looks (Aesthetics)

The characterization of effects from Project operation on the aesthetic environment included consideration of the Project description, the Project visibility within the landscape context, and the viewer value and sensitivity levels, as described in Section 5.2.6.

5.4.2.7.1 Local Study Area

Upon completion of construction and final commissioning of the generating station, the Project will affect the aesthetic nature of the area, including the following:

- The flooding of 45km^2 between the generating station and the outlet to Clark Lake;
- Changes from a riverine to a reservoir environment;
- Ongoing shoreline erosion;
- Loss of the rapids, including the loss of the sound of the rapids;
- Replacement of the rapids with a physical barrier (the dam and generating station) resulting in a transition from a natural to built environment);
- Re-routing of PR 280 via the north access road, over the dam, and via the south access road into Gillam; and
- Potential changes to the Town of Gillam as a result of an increase in population.

Operation effects to aesthetics will be permanent in nature and will change the overall character of the area. The reservoir will resemble the environment present at Stephens Lake, although the extent of debris is likely to be less given the Reservoir Clearing Plan. There-routing of PR 280 will increase overall access to the area, and thus a higher number of viewers and users are likely.

The effects of the Project's operation on the way the landscape looks (*e.g.*, aesthetics) will depend largely on an individual's perspective, and as such are likely to vary considerably. For example, an engineer may view the dam as a marvel of construction. A Gillam resident may view the area as an opportunity for recreation. A cabin-owner on Stephens Lake may feel their view is obstructed; and a resource user may feel their environment has been changed forever.

KCNs Members may be more likely to experience an adverse reaction to the aesthetic changes associated with the Project's operation, as the creation of a reservoir is a reminder of other changes to the landscape that have historically altered their connection to the land. FLCN describes their experience with a past project on the Nelson River saying "The flooding of the Nelson River and loss of land during the following construction of the Kettle Generating Station left a permanent scar on the landscape of the home environment of the Fox Lake people. This once unaltered area, a major local source of country food, medicinal plants and places of cultural importance was changed forever – following the impoundment and the creation of Stephens Reservoir. Old timers witnessed the large-scale receding movements of animals out of the territory as the water rose" (FLCN 2010 Draft). The AEAs and above-noted mitigation will help to address the considerable changes to the way the landscape looks.

5.4.2.7.2 Gillam

The Project will require an operational workforce that cannot be accommodated in existing housing in Gillam. As such, additional housing is being considered by Manitoba Hydro, although the exact location for new developments is being determined in concert with the Gillam Land Use Planning process.

The Project will also result in changes to the physical appearance of the town of Gillam through the construction of new housing and infrastructure to accommodate growth of the community currently under consideration. It is expected that these new additions will enhance the overall aesthetic quality of the community.

5.4.2.7.3 Mitigation

A park/rest area associated with boat launches both upstream and downstream of the generating station on the north side of the Nelson River are planned. A video taken of the rapids and Gull Lake prior to construction will be available for viewing in a visitor space at the generating station once the station is in operation. As well, a commemorative plaque and memorial is planned to recognize people who have used and continue to use the Gull Lake area. Rehabilitation of site construction areas such as borrow areas are to follow the principles set out in Schedule 7-1 of the JKDA, including using local plant species in disturbed areas.

5.4.2.8 Operation Monitoring

As noted in Chapter 8 of the Response to EIS Guidelines, monitoring of socio-economic effects will be organized into a coordinated SEMP whose details will be developed after the Project has been filed. It will be part of a larger strategy to identify where the proposed approaches to conducting the Project and mitigating its effects may have to be adjusted in order to address observed Projects effects that do not align with what had been predicted. In relation to personal, family and community life, monitoring of operation phase effects is proposed for selected VECs.

MERCURY AND HUMAN HEALTH

The operation of the Project will result in increased mercury levels in country foods used by communities in the Local Study Area. Mercury monitoring will occur under the Aquatic and Terrestrial monitoring programs and follow-up programs will involve the KCNs in various capacities. For example, follow-up

programs include having KCNs Members collect (on a voluntary basis) samples of wild game, waterfowl and plants for mercury testing to confirm mercury concentrations remain acceptable for domestic consumption. Other monitoring would include periodic surveys of consumption of country food in KCNs communities. Monitoring will also help to ensure that KCNs communities are aware of the Health Canada program for voluntary testing of mercury levels in people (subject to cross-check that program is still available). Finally, the KCNs would be involved in designing and implementing communication strategies for reporting of mercury sampling results to their home communities.

TRAVEL, ACCESS AND SAFETY

During operation, travel, access and safety concerns have been expressed in relation to KCNs Members who use Split Lake and Gull Lake for traditional activities. Monitoring is contained under the Waterways Management Plan Phase II (Sch. 11-2 of the JKDA) in relation to Gull Lake area. Further to this, MIT will maintain responsibility for the monitoring and ongoing maintenance of ferry landing sites and winter road conditions on Split Lake. Manitoba Hydro will continue to monitor water levels on Split Lake.

CULTURE AND SPIRITUALITY

There is some uncertainty as to how much operation of the Project will affect the culture of the KCNs. Adverse Effects Agreements have been negotiated with each of the KCNs based on each community's assessment of the Project's potential effects, including any interference with its traditional customs, practices and traditions. In terms of monitoring, each community would undertake its own internal evaluation of the AEA Offsetting Programs and determines whether they continue to address the adverse effects of the project. If required, these agreements provide flexibility for the AEA Offsetting Programs to be modified to more adequately address Project effects as they are experienced. The agreements also provide the opportunity for the communities and Manitoba Hydro to negotiate additional programming if unforeseen or unanticipated effects arise. These mechanisms will be used to ensure the AEAs continue to mitigate adverse effects of the Project on the KCNs communities.

5.5 SUMMARY OF RESIDUAL PROJECT EFFECTS

This section summarizes residual effects of the Project (after mitigation) on socio-economic VECs related to personal, family and community life for both the construction and operation phases.

5.5.1 Construction Phase

Table 5-29 provides a summary of expected Project construction effects, high-level mitigation and monitoring identified to address those effects, assessment characteristics used (*e.g.*, magnitude, geographic extent and duration) and the residual effects (after mitigation) pertaining to the Local Study Area. Effects beyond the Local Study Area are not anticipated.

Table 5-29: Summary of Construction Effects on Valued Environmental Components for Personal, Family and Community Life

Potential socio-economic effect	Mitigation measures, monitoring and follow-up	Residual socio-economic effect	Assessment characteristics[1]
GOVERNANCE, GOALS AND PLANS			
KCNs: • Need for KCNs to participate in implementation of the Partnership • Ongoing opportunity for oversight of the Project and participation in advisory committees.	Measures already in place in the JKDA and AEAs	Increased demand on KCNs to address construction issues and participate in Partnership committees and the KHLP board. Increased capacity of KCNs representatives from intensive involvement in project planning and development	Direction: Positive Magnitude: Moderate Geographic Extent: Medium Duration: Long-term
Gillam/Thompson: Increased demand on community leadership,	Involvement in Gillam Land Use Planning process underway	On going demand for community planning	Direction: Neutral

Table 5-29: Summary of Construction Effects on Valued Environmental Components for Personal, Family and Community Life

Potential socio-economic effect	Mitigation measures, monitoring and follow-up	Residual socio-economic effect	Assessment characteristics[1]
COMMUNITY HEALTH			
Increased demand for community health and social services.	• Health and safety services provided at the construction camps. • Measures identified in the KCNs AEAs, as well as measures identified for other VECs (e.g., public safety).	On-going demand for health and social services.	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Medium-term
MERCURY AND HUMAN HEALTH			
No construction related effects			
PUBLIC SAFETY			
KCNs and Gillam Risk to public safety related to influx of non-local construction workers	• Preventative measures focused on construction workers at Project • Coordinated discussion among Manitoba Hydro, the Town of Gillam, TCN and FLCN (where appropriate) to determine the best mechanism for tracking and addressing worker interaction issues • Socio-economic monitoring and adaptive management	Risk to public safety	Direction: Adverse Magnitude: Moderate Geographic Extent: Medium Duration: Short to medium-term

Table 5-29: Summary of Construction Effects on Valued Environmental Components for Personal, Family and Community Life

Potential socio-economic effect	Mitigation measures, monitoring and follow-up	Residual socio-economic effect	Assessment characteristics[1]
Thompson Risk to public safety related to influx of non-local construction workers	Socio-economic monitoring and adaptive management	Risk to public safety	Direction: Adverse Magnitude: Moderate Geographic Extent: Small Duration: Short to Medium-term
TRAVEL, ACCESS AND SAFETY			
Changes to travel on and access to Nelson River; restricted access near construction site	Implementation of the Reservoir Clearing Plan, the Waterways Management Plan (WMP) Phase I and the Access Management Plan. Existing waterways management programs under the Comprehensive Implementation Agreement with TCN and YFFN	Changes to travel and access	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Long-term
Increased traffic volumes on PR 280 and PR 391 with potential for increased accidents	Improvements to PR 280 undertaken by MIT prior to Project Construction Access Management Plan	Increased traffic	Direction: Adverse Magnitude: Moderate Geographic Extent: Medium Duration: Short-term

Table 5-29: Summary of Construction Effects on Valued Environmental Components for Personal, Family and Community Life

Potential socio-economic effect	Mitigation measures, monitoring and follow-up	Residual socio-economic effect	Assessment characteristics[1]
CULTURE AND SPIRITUALITY			
Loss of cultural landscape and the rapids	Offsetting Programs in AEAs are key to addressing effects on culture and spirituality Ceremonies and rituals at key Project milestones Counselling services as part of Employee and Retention Support DNC	Loss of cultural landscape and rapids	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Long-term
THE WAY THE LANDSCAPE LOOKS (AESTHETICS)			
Changes in physical landscape and scenic views	Implementation of Reservoir Clearing Plan Ceremonies and rituals at key Project milestones; vigil at river closing Nature trails within north camp area Rehabilitation of construction site as per Sch. 7-1 of JKDA	Ongoing changes to physical landscape and views	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Long-term

Notes:
Direction: Positive, Neutral or Adverse
Magnitude: Small, Moderate, or Large
Geographic Extent: Small, Medium, Large
Duration: Short-term, Medium-term or Long-term

5.5.2 Operation Phase

Table 5-30 provides a summary of expected Project operation effects, high-level mitigation and monitoring identified to address those effects, assessment characteristics used (*e.g.*, magnitude, geographic extent and duration) and the residual effects (after mitigation) pertaining to the Local Study Area. Effects beyond the local study area are not anticipated.

Table 5-30: Summary of Operation Phase Effects on Valued Environmental Components for Personal, Family and Community Life

Potential socio-economic effect	Mitigation measures, monitoring and follow-up	Residual socio-economic effect	Assessment characteristics
GOVERNANCE, GOALS AND PLANS			
KCNs: Ongoing role in oversight of the Project, including on the KHLP board and committees. Demand on KCN leadership regarding the use of equity income.	Measures already in place through JKDA and AEAs	Ongoing demands related to planning and decision making regarding the use of equity income	Direction: Positive Magnitude: Small to Moderate Geographic Extent: Medium Duration: Long-term
Gillam: Ongoing demand for leadership in community planning	Continued involvement in Gillam Land Use Planning Process already underway	Same as effect	Direction: Neutral
COMMUNITY HEALTH			
Increased demand for health and social services in the KCNs communities and Gillam	Offsetting Programs noted in each of the KCNs AEAs Continue existing dialogue with health and social services providers in Gillam (e.g., NNADAP, Awasis, RCMP, BRHA) Continued involvement in the Gillam Land Use Planning process already underway	Increased demand for health and social services	Direction: Positive Magnitude: Small Geographic Extent: Medium Duration: Long-term

Table 5-31: Summary of Operation Phase Effects on Valued Environmental Components for Personal, Family and Community Life

Potential socio-economic effect	Potential socio-economic effect	Potential socio-economic effect	Potential socio-economic effect
MERCURY AND HUMAN HEALTH			
Elevated levels of methylmercury will result in consumption restrictions on Gull and Stephens lakes	Monitor mercury concentrations in fish (see AE SV) Voluntary sampling of wild game, waterfowl, plants and gull eggs for mercury analysis (see TE SV) Encourage use of fish from unaffected lakes (via AEA programs) Employment of a risk communication strategy and communication products for post-impoundment conditions; encourage use of country foods generally, and use of fish with low mercury concentrations Prior to impoundment prepare and distribute communication products (e.g., poster, placemat, fish yardstick, maps and video) to KCNs communities and Gillam about increases in mercury concentrations post-impoundment, and implementation of monitoring Employment of a risk communication protocol for residents of Gillam (including signage) Communicate monitoring results Liaison (through MAC) with federal and provincial health authorities/Water	Restricted consumption of pickerel and jackfish (all groups) and lake sturgeon (for toddlers and women of child-bearing age only) in Gull and Stephens lakes Restricted consumption of walleye and northern pike	Direction: Adverse Magnitude: Moderate Geographic Extent: Medium Duration: Medium-term

Table 5-31: Summary of Operation Phase Effects on Valued Environmental Components for Personal, Family and Community Life

Potential socio-economic effect	Potential socio-economic effect	Potential socio-economic effect	Potential socio-economic effect
	Stewardship re: consumption restrictions HHRA redone until pre-Project levels are achieved Socio-economic monitoring plan (see Chapter 8 of the EIS)		
PUBLIC SAFETY			
Some risk to public safety related to community growth from operation workers in Gillam	If needed, extension of the coordinated approach to addressing worker interaction issues identified under the construction phase	Risk to public safety	Direction: Adverse Magnitude: Small Geographic Extent: Medium Duration: Long-term
TRAVEL, ACCESS AND SAFETY			
Improved travel conditions on and access to Nelson River; use of new trails and portage routes to navigate around facilities	Implementation of the WMP Phase II safety features (*e.g.*, fencing) Safety features associated with generating facility (*e.g.*, siren and fencing) Existing waterway management programs under the Comprehensive Implementation Agreements with TCN and YFFN	Changes to travel and access	Direction: Positive Magnitude: Small Geographic Extent: Medium Duration: Long-term
Shorter travel distance between Thompson and Gillam	None required	Same as effect	Direction: Positive Magnitude: Small Geographic Extent: Medium Duration: Long-term
CULTURE AND SPIRITUALITY			
Loss of cultural landscape and the rapids	• Offsetting Programs in AEAs are key to addressing effects on	Loss of cultural landscape and rapids	Direction: Adverse Magnitude: Small

Table 5-31: Summary of Operation Phase Effects on Valued Environmental Components for Personal, Family and Community Life

Potential socio-economic effect	Potential socio-economic effect	Potential socio-economic effect	Potential socio-economic effect
	culture and spirituality • Video of Gull Rapids and stretch of the Nelson River between Birthday Rapids and Stephens Lake prior to construction • Interpretative display in visitor room of generating station • Cultural training for operation staff		Geographic Extent: Medium Duration: Long-term
THE WAY THE LANDSCAPE LOOKS (AESTHETICS)			
Gull Lake changed from riverine to lake environment; loss of rapids	• Park/rest area with boat launch • Commemorative plaque or memorial • Video of Gull Rapids and stretch of the Nelson River between Birthday Rapids and Stephens Lake prior to construction Interpretative display in visitor room of generating station	Ongoing changes to Gull Lake and loss of rapids	Direction: Adverse Magnitude: Moderate Geographic Extent: Medium Duration: Long-term

Notes:
Direction: Positive, Neutral or Adverse
Magnitude: Small, Moderate, or Large
Geographic Extent: Small, Medium. Large
Duration: Short-term, Medium-term or Long-term

5.5.3 Summary of Residual Effects for the Construction and Operation Phases

In summary, residual effects on KCNs governance, goals and plans during construction are expected to be positive (due to experience gained in negotiations and planning and implementation of the Project) of moderate magnitude and short-term. During the operation phase, residual effects are expected to be positive (due to opportunity to use equity income for community goals and plans), medium in geographic extent, of small to moderate magnitude, and long-term.

Residual effects on governance related to Gillam are expected to be neutral due to ongoing planning in place now and into the future to prepare for future Project changes. Residual effects on governance related to Thompson are limited to the construction phase and are neutral.

Residual effects related to community health in the construction phase (KCNs, Gillam and Thompson) are adverse (due to increased demand for health and social services), of medium geographic extent, medium-term and medium in magnitude; and in the operation phase (KCNs, Gillam and Thompson) are positive (due to employment and equity income providing the opportunity for a higher standard of living), of medium geographic extent, of long-term duration and small to moderate in magnitude.

There are no residual effects related to methylmercury and human health in the construction phase. During the operation phase, there will be elevated levels of methylmercury, particularly in pickerel and jackfish from Gull Lake (and to a lesser extent Stephens Lake). Residual effects after mitigation are expected to be adverse, of moderate magnitude, medium in geographic extent, and medium-term and continuous for several decades, with declining trends over time. Undertaking further human health risk assessments will provide the necessary information to reduce the consumption restrictions as the methylmercury levels decline.

Residual effects, after mitigation, related to public safety and worker interaction for the KCNs and residents of Gillam and Thompson during the construction phase are expected to be adverse, moderate in magnitude and short to medium term in duration. A key mitigation measure is the development of a coordinated approach across all Manitoba Hydro projects in vicinity of Gillam among Manitoba Hydro, the Town, TCN (where appropriate) and FLCN (where appropriate). Residual effects during the operation phase are expected to be adverse, medium in geographic extent, small in magnitude and long-term in duration.

Residual effects, after mitigation, related to water and ice-based travel access and safety during the construction phase are expected to be adverse due to change in travel patterns and restricted access, small in magnitude, of long-term duration and of medium geographic extent. During the operation phase, residual effects are expected to be positive (due to provisions in the Waterways Management Program, including new trails, boat launches and a portage and safe landing sites), of small magnitude, medium in geographic extent and long-term in duration.

Residual effects, after mitigation, related to road-based travel access and safety during construction are expected to be adverse (due to increased traffic), of medium geographic extent, moderate in magnitude and short-term. Residual effects during the operation phase are expected to be positive (due to shorter

travel distance between Thompson and Gillam), medium in geographic extent, small in magnitude and long-term.

Effects on culture and spirituality are moderated by the KCNs' involvement in shaping the Project, the AEA Offsetting Programs that are focused on culture and the DNC that includes cross-cultural training and provision for ceremonies at key milestones. Residual effects of both construction and operation, after mitigation, on culture and spirituality are adverse, medium in geographic extent, small in magnitude and long-term.

Residual effects after mitigation related to the way the landscape looks during the construction phase are expected to be adverse (due to the physical alteration of the landscape), small in magnitude, medium in geographic extent and long-term. During the operation phase, residual effects are expected to be adverse (due to a change from riverine to a reservoir environment and the loss of the rapids), moderate in magnitude, medium in geographic extent, and long-term.

APPENDIX 5A
HEALTH INDICATOR DATA

KEEYASK
Hydropower Limited Partnership

LIST OF TABLES

Page

5A.0 HEALTH INDICATOR DATA SOURCES

Three main sources of data for KCNs were used to compile information on the selected sets of indicators.

There are some discrepancies in the way in which data are collected and reported by these agencies. FNIH data can include both on- and off-reserve data for residents using the health center on-reserve for the Chronic Conditions by Diagnosis List. In addition, because WLFN residents obtain primary services at the Ilford Health Centre (under BRHA), there is no Chronic Condition List for these community Members.

Data for First Nation residents living on reserve for the province of Manitoba overall and for the entire BRHA area were only available from Manitoba Health for selected indicators. Therefore, provincial First Nation and regional rates are not provided for every indicator in this report.

There are discrepancies in population counts between INAC, FNIH and Manitoba Health. Usually, the population figures from Manitoba Health are much lower than those from the federal agencies. This is partly because Manitoba Health data are based strictly on geography and refer only to those residents actually living on-reserve. However, even the on-reserve population figures are different. This means that any health data with a source of Manitoba Health refers only to the smaller number of residents and this smaller population has been used as the denominator in calculation of rates.

It is also important to note that administrative health data are collected specifically by geographic location and not ethnicity. This means, for example, that we cannot compare KCNs residents with all Aboriginal residents living in BRHA. Comparison can only be made to BRHA residents living on-reserve or off-reserve or all residents. Because over three quarters of residents of the region self-identify as Aboriginal, we have chosen to compare to the entire region. For Manitoba overall, we can compare health data to all First Nation residents living on-reserve but not to all Aboriginal residents in Manitoba.

5A.1 LIMITATIONS OF THE DATA

One of the major challenges of determining whether there are impacts on the health of small populations from environmental change is that of sensitivity. Many environmental factors known to have an impact on community health can have relatively small effects, which can be lost amongst the multitude of influences on the health of a community. Over the past several decades there have been marked changes in the health, environmental, economic and social circumstances of northern First Nation peoples. There have been changes in diet, housing, income, employment, tobacco and alcohol misuse, transportation, education, physical activity, and exposures to a wide variety of environmental factors within the home, school and workplace. Trying to tease out the impact of an individual environmental change can be a challenge for many conditions. This is particularly true for chronic conditions and cancer, though more easily determined for more acute events such as infectious diseases like diarrhea from factors influenced by water quality.

With individual communities, the size of the population can also be a limitation in picking-up potential impacts because of the wide confidence intervals that result during the analysis. A change or impact needs to be fairly large in order to confidently say that there is a significant difference.

Many of the data sources use health service use as the measure for health status. An example of this is using hospitalization rates as an indicator for health. Hospitalization rates are influenced by health status but they are also influenced by general policy on hospitalization use, the availability of hospital beds, the practice patterns by various physicians, and the use and availability of ambulatory care services. Thus changes that occur between populations or within the same population over many years can be influenced by other factors over and above changes in health.

The Chronic Condition by Diagnosis List was used to assess a number of non-cancer chronic conditions. This type of data source has significant limitations because it does not capture all of the chronic conditions and there may be variations in the criteria for the diagnosis. These limitations need to be considered in the interpretation of various results.

Table 5A-1: International Classification of Disease and Cause of Death Classifications

Classification	Brief Description
I. Certain Infectious and Parasitic Disease	These are diseases that are generally recognized as communicable or transmissible. This includes tuberculosis, bacterial diseases, hepatitis and sexually transmitted infections.
II. Neoplasms (Cancer)	A group of diseases in which cells grow unusually and uncontrolled. Common forms of cancer include lung cancer, breast cancer, prostate cancer, colorectal cancer and skin cancer.
III. Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	Diseases that are caused by not having enough blood cells. Iron deficiency anemia is a common disease in this category (person does not have enough iron in the diet).
IV. Endocrine, nutritional and metabolic diseases	Diseases as a result of not eating properly, by glands that do not work properly or substances in the body that are toxic. Some conditions under this category include diabetes, malnutrition, obesity, and thyroid disease.
V. Mental and behavioural disorders	Disorders that affect people's mood or thinking over time. Some common disorders include depression, disorders caused by drugs or alcohol, and schizophrenia. Also included are mental retardation and childhood and adolescent behavioural and emotional disorders.
VI. Diseases of the nervous system	Those diseases that affect the ability to sense, feel and use reflexes. Some common nervous system diseases include Multiple Sclerosis, Alzheimer's disease and Parkinson's Disease.

Table 5A-1: International Classification of Disease and Cause of Death Classifications

Classification	Brief Description
VII. Diseases of the eye and adnexa; VII Diseases of the ear and mastoid process	Diseases of the Eye and Ear are those that affect a person's ability to see and hear. The most common eye diseases include blindness, nearsightedness, farsightedness, and astigmatism. A number of ear conditions can affect hearing or balance. Ear infections are the most common among children, tinnitus (roaring in one's ears) and Meniere's disease (inner ear disease affecting balance).
IX. Diseases of the circulatory system	Diseases that affect the movement of blood in heart and blood vessels. These diseases can cause problems for the lungs, the brain, kidneys or other parts of the body. The most common circulatory diseases are heart diseases and stroke.
X. Diseases of the respiratory system	Diseases that affect breathing. Examples of respiratory diseases include the common cold, asthma, lung cancer, pneumonia, tuberculosis, Chronic Obstructive Pulmonary Disease (COPD) and cystic fibrosis.
XI. Diseases of the digestive system	Conditions that affect the digestive tract in the body. Diseases included are appendicitis, Crohn's disease, colitis, ulcers, disorders of the gallbladder and liver disease.
XII. Diseases of the skin and subcutaneous tissue	Diseases that affect the layers of skin. Acne, blisters and rashes are common conditions in this category. Many of these diseases may be related to quality and availability of clean water as well as personal hygiene practices.
XIII. Diseases of the musculoskeletal system and connective tissue	This classification includes muscles disorders, arthritis, and osteopathies (disorders of bone density).
XIV. Diseases of the genitourinary system	Diseases affecting the reproductive system of men and women. Some common examples include kidney and gall bladder stones, urinary tract infections, kidney failure, and prostate cancer.
XV. Pregnancy, childbirth and the puerperium	Conditions related to, or aggravated by, the pregnancy, childbirth or by the puerperium (the six week period following childbirth). These can be due to maternal causes or obstetric causes. Some examples include pregnancy with abortive outcome, complications of labour and delivery and hypertension in pregnancy.
XVI. Certain conditions originating in the perinatal period	These are conditions that originated perinatal period (the time period from about 20 weeks gestation until about 4 weeks after birth) even though death or illness occurs later. This includes birth trauma, disorders related to length of gestation and fetal growth

Table 5A-1: International Classification of Disease and Cause of Death Classifications

Classification	Brief Description
	and infections that occurred during the perinatal period.
XVII. Congenital malformations, deformations and chromosomal abnormalities	Birth defects that develop before birth. Example include infants are born with heart defects, cleft lip or palate, Down syndrome, spina bifida, and limb defects.
XVIII. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	The conditions and signs or symptoms included consist of: Cases for which no more specific diagnosis can be made even after all the facts bearing on the case have been investigated; Signs or symptoms existing at the time of initial encounter that proved to be transient and whose causes could not be determined; Provisional diagnoses in a patient who failed to return for further investigation or care; Cases referred elsewhere for investigation or treatment before the diagnosis was made; Cases in which a more precise diagnosis was not available for any other reason; and Certain symptoms, for which supplementary information is provided, that represent important problems in medical care in their own right.
XIX. Injury, poisoning and certain other consequences of external causes	This classification involves the specific injury type and site. For example injuries to the head, the neck etc with details. Burns and frostbite are also included in the category.
XX. External causes of morbidity and mortality	This is the cause of the injury. For example, the external cause of a "head injury" may be motor vehicle accident. This classification would note the nature of the external cause (such as car accident) that lead to injury.
XXI. Factors influencing health status and contact with health services	This classification is used for reasons other than disease or injury: When a person donates an organ or tissue, receives vaccination or discusses a problem that is in itself not a disease or injury. When some circumstance or problem is present that influences the person's health status but is not in itself a current illness or injury. They can be recorded as an additional factor to be considered when the person does receive care for an illness or injury.

Source: WHO 2010.

APPENDIX 5B

MERCURY AND HEALTH

TECHNICAL WORKING GROUP

KEEYASK

Hydropower Limited Partnership

LIST OF TABLES

Page

5B.0 PURPOSE

The Keeyask Mercury and Human Health Technical Working Group (the Working Group) was formed in June 2007 to address concerns expressed by the Keeyask Cree Nations (KCNs) respecting an increase in methylmercury (mercury) resulting from the flooding of land in the forebay of the proposed Keeyask Generation Project. Two key questions were raised:

- Would flooding increase mercury levels in fish and other animals eaten by people so that mercury levels in people would also increase?
- If there was an increase, would this pose a health risk to people?

The Working Group was struck by the EIS Coordination Team[1], which recognized that the topic of mercury and human health is highly complex in both technical analysis and language. The level of technical complexity presents a challenge when trying to discuss study results with communities in ways that are clear and helpful. As discussed at the first workshop in June 2007, the purposes of the Working Group were as follows:

- To answer the KCNs communities' and Manitoba Hydro's questions about mercury and human health today;
- To answer the KCNs communities' and Manitoba Hydro's questions about future mercury effects on human health if the Keeyask Generation Project is developed and ways to reduce those effects; and
- To develop ways to effectively communicate with communities about what has been learned.

The Working Group undertook its work between June 2007 and June 2011. A record of all meetings and presentations has been maintained.

5B.1 BACKGROUND: THE MERCURY CONCERN

The effect of mercury on human health was an issue of concern to each of the KCNs and to Manitoba Hydro. Manitoba Hydro and some members of the KCNs communities are aware of mercury as a health issue due to past hydroelectric development. In northern Manitoba, the Churchill River Diversion, Lake Winnipeg Regulation and generating station projects along the Nelson River (*e.g.,* Kettle Generating Station) in the 1970s led, unexpectedly, to raised levels of mercury in fish from affected waterways. For example, mercury levels in lake whitefish, jackfish and pickerel rose in differing amounts within three to seven years after flooding. These elevated levels then declined over time so that, 20 to 30 or more years after flooding, they had returned to near-original concentrations or levels that are similar to those found in fish from lakes in the area that were not affected by flooding.

Country food is an important part of the diet in KCNs communities. In the period after flooding, many communities in northern Manitoba became aware they should not eat fish from affected waterways because

[1] The EIS Coordination Team was established under the Joint Keeyask Development Agreement to coordinate the Environmental Assessment of the Keeyask Generation Project. It includes representation from the KCNs and Manitoba Hydro and is supported by the environmental assessment study team (EA Study Team).

of mercury contamination. This caused alarm and led many people to reduce the amount of local fish in their diet.

The prospect of development of the Keeyask Generation Project renewed questions about the safety of fish today and about the effects of flooding and mercury elevation in fish and people with development of the Project.

5B.2 PARTICIPANTS

The Working Group included representatives from each of the KCNs, Manitoba Hydro and the environmental assessment study team (EA Study Team). An independent toxicologist, Mr. Ross Wilson of Vancouver, BC was hired to do the human health risk assessment (HHRA). An independent specialist, Dr. Laurie Chan of the University of Ottawa (formerly of the University of Northern BC), was hired to assist the Working Group; he provided information about mercury and human health at the outset of the process, undertook the peer review of the HHRA results and reviewed the draft communication products. In addition, for a portion of the process, the Medical Health Officer of the Burntwood Regional Health Authority participated in the process (Dr. Lisa Richards and Dr. Randy Gesell each participated).

5B.3 ACTIVITIES OF THE WORKING GROUP

The Working Group held 14 workshops between June 2007 and June 2011. See Table 5B-1 for details on the workshops.

At the initial workshops, the Working Group gathered facts about mercury to enable everyone to gain a better understanding of the concern and to answer the KCNs communities' and Manitoba Hydro's questions about mercury.

Through presentations and discussion, the Working Group covered topics such as the following:

- What is methylmercury and where does it come from;
- Mercury in freshwater environments in northern Manitoba (including lakes unaffected by hydroelectric projects);
- Mercury in fish;
- Mercury in furbearers;
- Mercury in birds;
- Mercury and people;
- Guidelines for mercury in fish and for people eating the fish; and
- Changes in mercury levels at previously constructed generation stations in northern Manitoba.

Secondly, the Working Group commissioned the HHRA that was undertaken by Ross Wilson. The study examined ways in which mercury could reach human receptors in the areas that will be affected by the Project – through use of country foods from the area, through drinking of surface water and from skin contact with surface water. The study examined both the present-day conditions without the Project and future conditions

with the Project. The Working Group reviewed and discussed interim and then final results of the HHRA. In addition, the details of interim pathways from the environment to country foods – through mercury in fish, mammals, plants and water – were discussed with specialists from the EA Study Team who prepared these analyses. The HHRA included recommendations to reduce the risk associated with mercury in country food. The HHRA confirmed the importance of the programs included in each of the KCNs' Adverse Effects Agreement to enable Members to harvest country food in locations unaffected by the Project. The recommendations also recognized the health benefits of eating fish and encouraged the KCNs to focus on fish with low mercury content, especially for the vulnerable groups, such as women of child-bearing age and children. Monitoring of mercury content in country foods (primarily in fish, but also in mammals and plants to confirm their low mercury content) was included.

The draft HHRA was peer reviewed by Dr. Laurie Chan.

The third major focus of the Working Group was to consider effective ways to communicate the results of this work to the KCNs communities. The topic of mercury is highly technical and very complex, in particular because the health benefits of fish are important to confirm as well as the risks of mercury. The Working Group wanted to ensure that communication was clear and well understood.

Communication products were developed, based on experience elsewhere (*e.g.,* northern Québec), the knowledge of Working Group Members from the KCNs and the specific results to be communicated about the present-day and future conditions. Draft products included placemats, maps, a poster, a fish "yardstick" for measuring fish length in the field and a PowerPoint presentation for local health care providers. A two-phased communication strategy was developed for delivery of the products, including an initial phase to communicate present-day conditions and a second phase that would be undertaken prior to impoundment to communicate the risks that are expected in the period three to seven years after impoundment in Gull Lake and Stephens Lake. The communication products were tested by some of the KCNs communities for effectiveness. In addition, the HHRA background, results and communication products were presented to federal and provincial health staff.

Table 5B-1: Technical Working Group Workshops

Workshop One	
Date:	June 13, 2007
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Manitoba Hydro EA Study Team Members
Handouts:	Draft Meeting Agenda Working Group Members Identified So Far Memo on candidate profiles of technical experts
Summary:	This workshop discussed the purpose of the Mercury and Human Health Technical Working Group, goals, schedule, hiring a health expert and next steps.
Workshop Two	
Date:	July 30, 2007
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Manitoba Hydro EA Study Team Members
Handouts:	Draft Meeting Agenda Working Group Members Background and Guidelines for Consumption (J. Whitaker) Mercury in Freshwater Environments in Northern Manitoba (F. Schneider-Vieira Memo on Effects of Mercury Loading on Piscivourous Birds; Memo on Effects of Mercury on Bald Eagles; Article – Effects of Environmental Methylmercury on the Health of Wild Birds, Mammals, and Fish (L. Wyenberg) Mercury in Furbearers (R. Berger) Mercury and Human Health in Northern Manitoba – Initial Comments (J. Kinley)
Summary:	This workshop focused on gathering facts about mercury – the big picture, mercury in the environment in northern Manitoba, mercury in water and fish, mercury in birds, mercury in furbearers, mercury and human health in northern Manitoba – mercury and health in KCNs communities, questions about mercury and health that remain to be answered and next steps.

Table 5B-1: Technical Working Group Workshops

Workshop Three	
Date:	September 27, 2007
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Manitoba Hydro EA Study Team Members Specialist Presentation -- Dr. Laurie Chan
Handouts:	Draft Meeting Agenda Members @ 31 August 2007 A Brief Introduction to Mercury Toxicology (presentation slides prepared by Dr. Laurie Chan)
Summary:	This workshop included a presentation by Dr. Laurie Chan on mercury and human health followed by discussion of specific questions and answers, outstanding questions yet to be answered and next steps.
Workshop Four	
Date:	November 23, 2007
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Manitoba Hydro EA Study Team Members
Handouts:	Draft Meeting Agenda What We've Covered to Date Additional Questions from the Last Meeting Predicting Fish Mercury Concentrations for the Keeyask Project – Approach and Preliminary Results (presentation) Estimating Effects of Mercury on People
Summary:	This workshop addressed what was learned at the last meeting, the status of predictive modeling to estimate effects of the Keeyask Generation Project on mercury, communicating with the communities about what we've learned and next steps.

Table 5B-1: Technical Working Group Workshops

Workshop Five	
Date:	January 31, 2008
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Manitoba Hydro EA Study Team Members Specialist Dr. Laurie Chan (via speaker phone)
Handouts:	Draft Meeting Agenda Fish Mercury Concentrations for the Keeyask Project – Projects Lakes and Offset Lakes (presentation) Approach to Assessing the Effects of Mercury on Birds (presentation) Predicting Furbearer Mercury concentrations for the Keeyask Project – Preliminary Approach (presentation) Health Risk Assessment – correspondence, CVs and Comparison of Specialists and Approaches table Updated draft "Good for You and Good to Eat" placemat DVD of videotapes explaining the Federal Ecological Monitoring Plan (FEMP) mercury testing from Member E. Morris of Tataskweyak Cree Nation
Summary:	This workshop included clarity on guidelines (Dr. Chan on speaker phone), reporting on action items from the last meeting, mercury levels in other lakes being fished, status of predictive modeling for birds, communication results with the communities and next steps.
Workshop Six	
Date:	March 27, 2008
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Manitoba Hydro EA Study Team Members

Table 5B-1: Technical Working Group Workshops

Handouts:	Draft Meeting Agenda Mercury in Fish and Guidelines for the Consumption of Recreationally Angled fish in Manitoba (Manitoba Water Stewardship) Article: Mercury Connections: The extent and effects of mercury pollution in northeastern North America Article: Maternal Fish Intake during Pregnancy, Blood Mercury Levels, and Child Cognition at Age 3 Years in a US Cohort October 2006 Fact Sheet: Balancing Choices: Supporting Consumer Seafood Consumption Decisions (Institute of Medicine of the National Academies) Initial Draft Mercury and Health Question and Answer Summary for Input to Communication Products for Communities Graph of mercury levels in fish in Sipiwesk Lake Updated draft "Good for You and Good to Eat" placemat
Summary:	This workshop included reporting on selected items, factual questions, communication results regarding current mercury levels with communities, and next steps.
Workshop Seven	
Date:	May 22, 2008
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Manitoba Hydro EA Study Team Members
Handouts:	Draft Meeting Agenda Keeyask Mercury and Human Health Technical Working Group Interim Summary Report (draft May 14, 2008) Summary PowerPoint presentations for communities to use (long and short version) Hydro Quebec's Nutrition Guide and map
Summary:	This workshop included reporting on selected action items, a review of interim summary report and PowerPoint presentations, communication of results regarding current mercury levels with communities, health risk assessment (Ross Wilson) and next steps.
Consumption Workshop	
Purpose:	Workshop to set assumptions about country food use for the HHRA
Date:	October 7, 2009

Table 5B-1: Technical Working Group Workshops

In Attendance:	Each of the KCNs was asked to bring community representatives who were familiar with country food use in their community; representatives were from: Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Also attending: Wilson Scientific Manitoba Hydro InterGroup Consultants
Handouts:	Draft Meeting Agenda
Summary:	This workshop included a review of the agenda and background on the Mercury and Human Health Technical Working Group. Questions were posed to participants regarding the types of country foods eaten by communities and the quantities eaten by adults and children. The intent was to establish assumptions for the HHRA.
Workshop Eight	
Date:	November 24, 2009
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Wilson Scientific Manitoba Hydro EA Study Team Members
Handouts:	Draft Meeting Agenda Members of the Mercury and Health TWG as of Nov. 24, 2009 Mercury and Human Health in Northern Manitoba – A Status Report Predicting Fish Mercury concentrations for the Keeyask Project – Update of Estimates (November 2009) Birds: Estimated Levels of Mercury in Water Birds – Pre and Post Impoundment Human Health Risk Assessment of Country Foods: Update Keeyask Country Foods consumption Assumptions
Summary:	This workshop included an updated status report, a review of the HHRA and an update on some preliminary draft results and next steps.

Table 5B-1: Technical Working Group Workshops	
Workshop Nine	
Date:	March 23, 2010
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Wilson Scientific Manitoba Hydro EA Study Team Members
Handouts:	Draft Meeting Agenda Nov. 24, 2009 Draft Meeting notes of the Mercury and Health TWG PowerPoint presentation: Estimated Levels of Mercury in Mammals Pre and Post Impoundment (R. Berger) PowerPoint presentation: Human Health Risk Assessment of Country Foods: March 2010 Update (R. Wilson)
Summary:	This workshop included a presentation about mercury in mammals as well as the HHRA. In addition, a communications strategy was discussed along with next steps.
Workshop Ten	
Date:	May 20, 2010
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Wilson Scientific Manitoba Hydro EA Study Team Members Dr. Lisa Richards, Medical Officer of Health
Handouts:	Draft Meeting Agenda March 23, 2010 Draft Meeting notes of the Mercury and Health TWG PowerPoint presentation: Estimated Levels of Mercury in Mammals Pre and Post Impoundment (R. Berger) PowerPoint presentation: Human Health Risk Assessment of Country Foods: May 2010 Update (R. Wilson) Communication Strategy – Methylmercury and Human Health Today and After the Keeyask Generation Project

Table 5B-1: Technical Working Group Workshops	
Summary:	This workshop included a review of the agenda, the moose and caribou monitoring program, HHRA, communications strategy and next steps.
Workshop Eleven	
Date:	September 9, 2010
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Wilson Scientific Manitoba Hydro EA Study Team Members Dr. Lisa Richards, Medical Officer of Health Dr. Susan Roberecki, Environmental Health Lead (via teleconference)
Handouts:	Draft Meeting Agenda May 20, 2010 Draft Meeting notes of the Mercury and Health TWG PowerPoint presentation: Human Health Risk Assessment: Sept 2010 Update (R. Wilson) PowerPoint presentation: Communicating Mercury and Human Health (J. Kinley) Revised draft placemat Draft "Yardstick": Mercury in Fish: Guide to Fish Size for Healthy Eating in Gull Lake and Stephens Lake (for use by resource harvesters in boats) Draft Map: Fish Consumption Guide for Keeyask Project Waterbodies Draft Wild Game Monitoring Program: Recommended Procedures for Obtaining and Submitting Tissue Samples Draft Lake Sturgeon Mercury Monitoring Program and Sample Collection Protocol
Summary:	This workshop included a review of the agenda, a presentation concerning HHRA (updated from the May 20th presentation), a presentation concerning communicating mercury and human health (including a discussion of the placemat update, sample map with consumption guidelines, and fish "yardstick"), a plan for discussion with health representatives in communities about mercury, the country food monitoring programs and next steps.

Table 5B-1: Technical Working Group Workshops	
Workshop Twelve	
Date:	November 3, 2010
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Wilson Scientific Manitoba Hydro EA Study Team Members Dr. Randy Gesell, Medical Officer of Health
Handouts:	Draft Meeting Agenda September 9, 2010 Draft Meeting notes of the Mercury and Health TWG PowerPoint presentation: Human Health Risk Assessment: Nov 2010 Update (R. Wilson) PowerPoint presentation: Communicating Mercury and Human Health (J. Kinley) Revised draft Placemats Revised draft "Yardstick" Revised draft Maps: Fish Consumption Guide for Split, Gull & Stephens Lakes, and for Keeyask Project Offset Lakes Draft Poster: Mercury, Fish and People
Summary:	This workshop included a review of the agenda, a presentation concerning the HHRA (updated from September 9, 2010 workshop), a presentation concerning communicating mercury and human health (including a discussion of revised placemat, maps, and yardstick and the poster), discussion with health representatives in communities, a presentation on the environmental contaminant monitoring program organized and managed by the First Nations University of Canada, AFM and Health Canada, a discussion of the country food monitoring program and next steps.
Workshop Thirteen	
Date:	February 2, 2011
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Wilson Scientific Manitoba Hydro EA Study Team Members Dr. Randy Gesell, Medical Officer of Health

Table 5B-1: Technical Working Group Workshops	
Handouts:	Draft Meeting Agenda November 3, 2010 draft meeting notes of the Mercury and Health TWG Finalizing the Work of the Mercury and Human Health TWG, Draft @ Jan 27, 2011 PowerPoint presentation: Status and Draft Plan to Complete the Original Tasks (Draft @ Feb 2, 2011; J. Kinley) PowerPoint presentation: Mercury and Human Health: Presentation to Health Care Providers – revised with TWG suggestions Revised draft placemats Revised draft yardstick Revised draft maps: Fish Consumption Guide for Split, Gull and Stephens Lakes, and for Keeyask Project Offset Lakes Draft poster: Mercury, Fish and People
Summary:	This workshop included a review of the agenda, the status and plan for completion of the work of the Mercury and Human Health Technical Working Group, discussion of the plain language version of the HHRA for communities, finalizing the communications strategy, discussion of communication strategy products (placemat, maps, yardstick, poster, report with health care professionals), discussion of country food monitoring programs and next steps.
Workshop Fourteen	
Date:	June 15, 2011
In Attendance:	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) Representatives York Factory First Nation Representatives Fox Lake Cree Nation Representatives Wilson Scientific Manitoba Hydro EA Study Team Members Dr. Randy Gesell, Medical Officer of Health
Handouts:	Draft Meeting Agenda PowerPoint Presentation: Finalizing The Work Of the Mercury and Human Health Technical Working Group (J. Kinley) Communication products
Summary:	This workshop included a review of the agenda, a review of the summary of the Mercury and Human Health Technical Working Group work, finalizing the communications products, finalizing the HHRA, including the full technical report and plain language summary, and review of country food monitoring programs.

APPENDIX 5C

HUMAN HEALTH RISK ASSESSMENT

KEEYASK
Hydropower Limited Partnership

APPENDIX 5C

Human Health Risk Assessment of the Mercury from the Proposed Keeyask Generation Project

DRAFT REPORT

Prepared for:

InterGroup Consultants Ltd.
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Prepared by:

_____
Ross Wilson, M.Sc., DABT
Toxicologist
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JUNE, 2012

EXECUTIVE SUMMARY

The Mercury and Human Health Technical Working Group, participating in the environmental assessment (EA) for the Keeyask Generation Project requested Wilson Scientific Consulting Inc. (Wilson Scientific) to complete a human health risk assessment (HHRA) to address current and potential increased mercury in the environment that may result if the proposed Keeyask Generation Project proceeds. The HHRA was to consider the traditional uses of the land by the various First Nation communities in the study area. In addition, the most recent scientific evidence on health effects from mercury was to be part of the assessment.

The methods used to estimate human health risks were based on risk assessment procedures cited by Health Canada, the World Health Organization (WHO) and the US Environmental Protection Agency (US EPA).

The items of main concern were:

- Consumption of country foods (*i.e.*, fish, wild game, waterfowl and wild plants); and
- Ingestion and direct contact with surface water.

The water bodies of primary interest for this assessment were Gull and Stephens lakes. The HHRA was greatly assisted by local First Nations' representatives who shared their knowledge regarding types and locations of country foods and food consumption patterns. In addition, it should be noted that the HHRA did not measure mercury concentrations in food or people but instead relied upon present and estimated post-impoundment concentrations in water and foods that have been provided by other experts (*i.e.*, fish and surface water mercury concentrations provided by North/South Consultants Inc.; wild game mercury concentrations by Wildlife Resource Consulting Services MB Inc.; and waterfowl concentrations of mercury estimated by TetrES Consultants Inc. [now known as Stantec]).

It is considered to be extremely important that persons follow the fish consumption recommendations provided in this HHRA (especially under the post-impoundment scenario). Individuals could be in the "at risk" range of exposures if consumption recommendations are not followed. The information provided in this evaluation should be used to make informed choices about fish consumption with special emphasis on the consumption of fish from lakes unaffected by the Project during the post-impoundment elevation in fish mercury concentrations. There could also be very real health risks if persons choose to reduce overall fish consumption (rather than supplementing their fish intake from the unaffected lakes). Thus, every reasonable effort should be made to encourage people to continue eating fish that are low in mercury concentrations under both present and post-impoundment conditions. The key conclusions of the HHRA are as follows:

1. Consumption recommendations (*i.e.,* recommendations for consumption restriction) may be required for certain fish under both the present conditions and the predicted post-impoundment conditions. Under post-impoundment conditions, it would still be possible to consume fish (just not as much as before). The fish with the predicted highest increase in mercury concentrations are from Gull Lake and include northern pike (0.22 µg/g to just over 1 µg) and walleye (0.23 µg/g to just over 1 µg/g) while the increase in lake whitefish would be less (0.07 µg/g to just below 0.2 µg/g). The same species from Stephens Lake would be impacted less than fish from Gull Lake.

2. Consumption recommendations are not currently required for wild game or waterfowl and would not likely be required following impoundment. Muskrat is the only mammal that was predicted to have increased tissue concentrations of mercury following impoundment; however, the increases are considered to be very minor (*i.e.,* 0.02 µg/g under baseline conditions versus 0.04 µg/g under post-impoundment conditions). No measurable change in mercury tissue concentrations under post-impoundment conditions in moose, beaver and snowshoe hare was predicted by Wildlife Resource Consultants.

3. Mercury concentrations in surface water would not pose unacceptable risks from contact or drinking under present or post-impoundment conditions (*i.e.*, risks are considered to be negligible). Typical total mercury surface water concentrations are predicted to remain less than the currently used analytical method detection limit (*i.e.*, less than 0.05 µg/L as compared to the Canadian Drinking Water Guideline of 1 µg/L).

4. No conclusions can be provided on consumption of wild plants or gull eggs since discipline experts have not been able to estimate mercury concentrations either presently or under post-impoundment conditions.

The key recommendations of the HHRA are as follows:

1. The fish consumption recommendations based on the current quality of fish and the predicted post-impoundment quality should be communicated to local First Nations and communities through appropriate means (*e.g.*, via community health practitioners). Fish species and size-specific consumption recommendations should be emphasized so that people may make the most informed decisions regarding their consumption of specific species (*i.e.*, smaller and non-predatory fish tend to have lower concentrations of mercury). Mercury concentrations in fish should continue to be monitored throughout the project life.

2. Options for collection of fish from lakes unaffected by the Project should be offered to the local First Nation communities under the post-impoundment scenario (as is planned in programs included in the First Nations' Adverse Effects Agreements); however, even from pristine offset lakes, it will be necessary to consider size and species of fish for persons desiring to reduce their mercury exposures (*i.e.*, certain fish from these natural, unimpacted lakes may have mercury concentrations that warrant consumption recommendations).

3. No unacceptable risks were estimated from consumption of wild game or waterfowl. Nevertheless, there could remain a perception among certain people that wild game or waterfowl is not safe to consume. To help address those concerns, it is recommended that samples, voluntarily submitted by hunters, are analyzed for mercury in order to confirm that wild game and/or waterfowl concentrations remain acceptable to consume. This should be coupled with appropriate education (*e.g.*, community presentations, posters, etc.) that clearly states that wildlife is currently safe to eat and that mercury concentrations in tissues of these animals are expected to remain acceptable due to project activities.

4. No recommendations are provided on consumption of wild plants or gull eggs. To help address local First Nations' concerns regarding consumption of those foods, it is recommended that wild plant samples are voluntarily submitted by gatherers and analyzed for mercury concentrations in order to confirm that wild plants are acceptable to consume. Also, the community should be educated about the findings of this work, so that wild plants can continue to be used by the community. In the case of gull eggs, it appears that collection of this food from the study area is not a common activity but nevertheless, if this were to occur in the future, sampling of this food group could be considered.

Table of Contents

Page #

HUMAN HEALTH RISK ASSESSMENT OF THE MERCURY FROM THE PROPOSED KEEYASK GENERATION PROJECT

DRAFT

1.0 INTRODUCTION

The Mercury and Human Health Technical Working Group (the Technical Working Group) for the Keeyask Generation Project requested that Wilson Scientific Consulting Inc. (Wilson Scientific) complete a human health risk assessment (HHRA) to address current and potential increased methylmercury (mercury) concentrations in the environment that may result if the proposed Keeyask Generation Project is approved. The specific questions that the HHRA needed to address were:

1. Is it safe to eat fish under present conditions?

2. If the proposed project is approved, what are the risks to persons consuming:
    a. Fish?
    b. Wild game?
    c. Waterfowl?
    d. Wild plants?
    e. Water?

The HHRA also needed to consider the domestic uses of the land by the various local First Nation communities. In addition, the most recent scientific evidence on health effects from mercury was required to be part of the assessment.

It is important to note that through a formal agreement with the Keeyask Cree Nations (KCNs), they participated in the environmental assessment (EA) for the Keeyask Generation Project; as part of the EA, a Mercury and Human Health Technical Working Group was established with representatives from the KCNs and Manitoba Hydro and their respective consultants. The First Nations consisted of representatives from:

- Tataskweyak Cree Nation
- War Lake First Nation
- Fox Lake Cree Nation
- York Factory First Nation

The Mercury and Human Health Technical Working Group played an important role in providing guidance and knowledge on traditional use of the land that has been incorporated into this HHRA.

This report outlines the methods, results, conclusions and recommendations of the HHRA and is organized as follows:

- Section 2 of the report introduces mercury as a chemical of potential concern, and the concept of HHRA;
- Section 3 summarizes the site setting and relevant documents that provide information cited in the HHRA;
- Section 4 provides methods used to complete the HHRA;
- Section 5 provides the results;
- Section 6 provides a discussion of the results including an uncertainty analysis;
- Section 7 provides the overall conclusions of the HHRA; and
- Appendix 5C-1 provides detailed technical information, worked example calculations and detailed risk estimates.

2.0 MERCURY AND HUMAN HEALTH RISK ASSESSMENT

2.1 WHAT IS MERCURY?

Mercury is a metal that naturally occurs in very small quantities in the soil, water, plants, animals, etc. in the Keeyask Project area as well as many other parts of Canada. Mercury can be found in various forms categorized as follows:

- Elemental mercury (a shiny silver-coloured liquid that slowly evaporates at room temperature and more rapidly when heated to moderate temperatures);

- Inorganic mercury (a form of mercury that results when elemental mercury combines with sulphur, chlorine or oxygen to form "mercury salts"); and

- Methyl mercury (a form of mercury that results when elemental mercury combines with carbon to form "organic mercury" and is naturally present in very small quantities in all foods, but almost always highest in carnivorous fish).

2.2 WHAT ARE TYPICAL SOURCES OF MERCURY?

Mercury is used by humans in a wide-variety of industrial processes and commercial products. Metallic mercury is used to produce chlorine gas and caustic soda. In consumer products, metallic mercury can be found in thermometers, dental fillings, batteries and fluorescent lights. Inorganic mercury salts can sometimes be found in various anti-septic creams and ointments. In terms of exposure to people, the vast majority of exposure is in the form of methyl mercury through the consumption of fish.

Although mercury occurs naturally in the environment, human activities may result in increased exposures. Human-contributed sources of mercury exposures include:

- Releases of mercury into the air from combustion processes such as coal-fired power generation, metal mining, metal smelting operations and waste incineration;

- Disposal of mercury containing products (*e.g.*, fluorescent lights, batteries, thermostats, barometers, switches and relays) into landfill sites and subsequent leaching into the environment; and

- Flooding of soils for new dam sites (this can result in mercury from flooded soils releasing mercury into the aquatic food chain).

2.3 HOW ARE CANADIANS EXPOSED TO MERCURY?

Canadians may be exposed to mercury from activities that include:

- Eating fish flesh of any kind. Fish consumption typically represents the greatest source of exposure to most Canadians. Fish with the highest muscle mercury concentrations tend to be the large and long-lived predatory fish; however, essentially all fish contain some levels of mercury. Fish in some lakes in Canada have naturally high concentrations of mercury and it is not an issue that is totally restricted to impoundments. Also, some marine fish often contain elevated concentrations of mercury. A list of fish with relatively high mercury concentrations includes the following:

    - Fresh and frozen tuna;
    - Canned albacore tuna (other canned tuna do not typically contain as much mercury);
    - Lake trout;
    - Burbot;
    - Walleye (or pickerel);
    - Jackfish (or pike);
    - Shark;

- Swordfish;
- Marlin;
- Orange roughy; and
- Escolar (a type of mackerel that is commonly used in sushi);

- Eating fish from localized areas impacted by mercury releases (concentrations also tends to be greatest in the larger, long-lived predatory fishes);

- Breathing vapours in air from spills, incinerators and industrial operations that release mercury into the air;

- Breathing mercury vapours that are released into a person's mouth during dental treatments (mercury amalgams used as fillings for cavities); and

- Use of medical treatments which contain mercury (various topical ointments and creams).

2.4 WHAT ARE THE HEALTH EFFECTS ASSOCIATED WITH MERCURY?

The health effects of concern depend on the form of mercury and the duration and magnitude of exposures. If the exposure is of elevated concentrations for a long duration, all forms of mercury may cause health effects to the nervous system. Methyl mercury (primarily from fish consumption) and elemental mercury (primarily from inhalation of vapours) tend to have greater ability to cause health effects than inorganic mercury due to an increased ability of these forms to cross body tissues and enter the nervous system. Important aspects of mercury toxicology include the following:

- Health effects primarily associated with methyl mercury have included damage to the brain (*e.g.*, motor skills, irritability, shyness, tremors, changes in vision/hearing, memory problems, decreased IQ);

- Health effects primarily associated with inorganic mercury have been associated with the kidneys, gastrointestinal damage and autoimmune effects. Mercury salts can cause blisters and ulcers on the lips and tongue. Rashes, excessive sweating, irritability, tremors, muscle weakness and high blood pressure have also been noted in persons exposed to elevated concentrations of inorganic mercury;

- Health effects primarily associated with elemental mercury, as vapours, have included hand tremors and memory problems;

- Short-term exposures to high levels of metallic mercury (primarily as vapours) may be associated with effects that include lung damage, nausea, vomiting, diarrhea, blood pressure, heart rate and skin rashes, and eye irritation; and

- Although there is some evidence of mercury causing cancer in animals at elevated exposures, there is not considered to be adequate evidence to conclude that mercury is a human carcinogen and most health agencies do not consider it necessary to consider the cancer endpoint in establishing safe levels of exposure.

Fortunately, mercury in most foods, consumer products, and the environment are at concentrations not great enough to cause the health effects listed above.

It is also noted that in order for mercury to cause toxicity, it must be absorbed. For example, if a child accidentally swallowed liquid mercury from a broken thermometer, it is unlikely that much of the ingested mercury would be absorbed into the body; however, mercury could enter the body via inhalation of vapours from the spill.

2.5 WHO IS MOST SENSITIVE TO MERCURY EXPOSURES?

Generally speaking, young children and pregnant women (or women of child-bearing age) (due to the potential harmful effects on the developing fetus) are of primary concern to health agencies with respect to mercury exposure; however, persons of any age may

experience health effects if the exposures are great enough. Consequently, there can be different recommendations for minimizing exposures depending upon the segment of the population a person may represent. For example, many health agencies recommend that pregnant or breastfeeding women and young children restrict their consumption of certain types of fish containing high concentrations of mercury; however, most health agencies also agree that consumption of fish is an important part of the diet and these agencies stress that consumption of fish containing low concentrations of mercury represent a healthy part of the diet for pregnant and breastfeeding women (as well as for young children).

2.6 IF MERCURY IS TOXIC, HOW IS ANY EXPOSURE SAFE?

Although mercury exposure is associated with some serious health effects, there are certain exposures considered to be "safe" and without appreciable health risks to the general public. Because mercury is ubiquitous in the global environment, health agencies around the world have dedicated considerable effort in determining mercury exposure rates considered to be acceptable. This process has allowed health agencies to recommend that people continue to consume fish because the benefits outweigh the risks.

Using a risk assessment approach, it is possible that no unacceptable health risks may exist from mercury even when concentrations in the environment are considered to be elevated above normal levels. This conclusion is most common when persons are not receiving elevated exposures to the mercury (despite its presence at elevated concentrations in the environment). Situations that can result in a conclusion of "no appreciable risk" from elevated mercury concentrations in the environment include:

- The mercury is found in environmental media with which people do not often come into contact (*e.g.*, located in subsurface soils that do not leach into groundwater and are not releasing appreciable mercury vapours);

- The mercury is found in a food (or foods) that people are not consuming or are consuming infrequently;

- The mercury is found in a form in the environment that is not very soluble and, therefore, cannot readily be absorbed into the body even when it is consumed (*i.e.,* it is in a form that is not very bioavailable); and

- The mercury is found in environmental media at concentrations that people regularly contact; however, the concentrations are low enough that exposures are still below levels considered to be acceptable by agencies such as the World Health Organization and Health Canada.

In such cases, it may be possible to arrive at conclusions that indicate acceptable risks from mercury even though elevated concentrations are present in the environment. Nevertheless, in all cases, conclusions must be based on a careful analysis supported by the available science (*e.g.*, risk assessment).

2.7 WHAT ARE ACCEPTABLE CONCENTRATIONS OF MERCURY IN FOOD?

For mercury occurring in commercial fish sold at the retail level, Health Canada (2007) provides a guideline of 0.5 µg/g (wet weight). Similarly, the European Community (2006) provides a maximum permissible mercury concentration of 0.5 µg/g (wet weight) for most fish but then allows up to 1.0 µg/g (wet weight) for a list of specific fish that includes northern pike (*Esox lucius*). It needs to be stressed that these maximum permissible concentrations are specific to commercial fish.

In the case of fish consumed for subsistence purposes, there is no official recommendation available from either Health Canada or WHO. Part of the difficulty in establishing acceptable concentrations of mercury is that fish (*i.e.,* often the major source of mercury exposure) has tremendous nutritional benefits.

Health Canada (2007) has noted the following:

> *"It is considered essential that any communications to the public include information on the health benefits of fish consumption alongside information on the risks of methylmercury exposure so that citizens can consider both the benefits and risks in reaching their own decisions about appropriate fish consumption. Studies on the nutritional benefits of fish are supportive of efforts to influence consumers' behaviour by modifying the types of fish regularly chosen rather than by decreasing overall fish consumption."*

In the case of other foods (*i.e.*, wild game, waterfowl and plants), no health agency recommendations were identified for allowable mercury content.

2.8 WHAT IS HUMAN HEALTH RISK ASSESSMENT?

Human health risk assessment is a process that is accepted by Canadian and international health agencies for evaluating the potential for chemical, biological and physical agents to cause adverse health effects in people. Although it is desirable to minimize exposures to some environmental chemicals, exposures to chemicals and physical agents cannot be avoided in many circumstances. Potentially harmful chemicals and physical agents can exist naturally, and there were exposures prior to modern civilization. This is also true for mercury. Regulatory agencies across Canada and around the world have adopted risk assessment as a scientifically-defensible tool for the evaluation of potential health risks to chemicals and physical agents. Examples of regulatory agencies that currently use risk assessment to assist in making health-based decisions include the World Health Organization, US Environmental Protection Agency and Health Canada.

Risks from environmental chemicals and physical agents are normally evaluated using the same principles and fundamentals that regulatory agencies use to develop standards to protect the general public from unacceptable risks for soil, water, air and food. It is stressed that there are uncertainties in risk assessment and it is virtually impossible to prove complete safety in almost anything that is evaluated. Consequently, risk assessment

normally comments on the reasonable likelihood of adverse health effects in people exposed to various environmental chemicals or physical agents rather than providing absolute certainties of no adverse health effects.

It should also be noted that most health agencies and scientists contend that risk assessment is much more likely to overestimate than underestimate risks. Due to the various uncertainties in risk assessment, health agencies tend to use large safety factors and default assumptions that result in overestimation of health risks. Further details on the HHRA methods are provided in Sections 4 and 5 of this report while some of the particularly important concepts are discussed below.

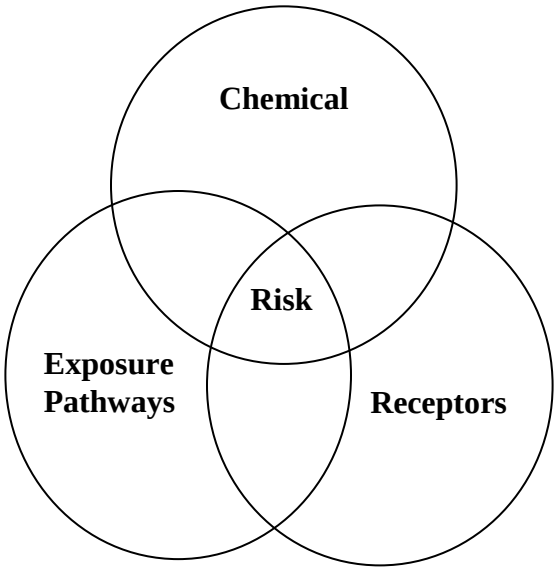
Basic Elements Required for Risk to Exist

One of the basic tenets of risk assessment is that in order for human health risks to exist the following elements must be present:

- A person (or receptor) is present in the area of concern;
- A chemical is present in the area of concern; and
- An exposure pathway must exist that allows a person (or persons) to be exposed.

For example, if a non-volatile chemical (such as lead) was present in subsurface soil and not leaching into groundwater, there would be virtually no risk from this chemical (as long as persons were not digging in the soil) as exposure pathways would not exist. However, as soon as persons dig in the subsurface soil, an exposure pathway would be open and exposures could then potentially exist. The need for all three of these elements to be present is illustrated below in Figure 2-1.

Figure 2-1: Required Elements for Potential Risks to Exist



Dose-Response Relationships

A second important fundamental of risk assessment is that the magnitude of risk is proportional to both the magnitude of exposure and the inherent potency of the chemical. Most health agencies agree that there are acceptable or "safe" levels of exposures unlikely to cause adverse health effects for even the most potent chemicals (*e.g.*, there are acceptable levels of exposure to chlorinated dioxins from pulp and paper effluent, benzo[a]pyrene from car exhaust, aflatoxin in peanut butter and various chemicals in a cup of coffee). Likewise, some seemingly innocuous chemicals may pose unacceptable risks if consumed in excess quantities (*e.g.,* although quite rare, people have become ill or even died from consumption of excessive amounts of water [due to electrolyte imbalance] or over consumption of Vitamin A from polar bear livers and carrot juice). In other words, there can be acceptable levels of the most hazardous substances and unacceptable levels of the most innocuous substances. Thus, for virtually all chemicals and physical agents that may be harmful to people, the principle of dose-response relationships apply.

According to the dose-response principle, as the level of exposure increases, the probability and/or magnitude of adverse health effects also increase. An important

exception to this theory, however, is for exposure rates that are so low that adverse health effects are not expected to be observed until dose rates increase above a certain threshold of exposure. For example, certain minerals such as iron and zinc are required in our diet and are not expected to cause adverse health effects at levels at or below our recommended daily allowances for proper health and fitness. It is only when these levels are exceeded that the adverse health effects begin to increase with increasing levels of exposure.

The principle that the magnitude of risk is in proportion to the level of exposure and the potency of the chemical can be summarized as follows:

Risk = Magnitude of Exposure x Toxicity of the Chemical

Human health risks were estimated using the concept of dose-response relationships to the maximum extent possible in this report.

Important Terms Used in Human Health Risk Assessment

Scientific terminology is commonly used to describe human health risks from chemicals and physical agents. Some of the more important terms in the context of the human health risk assessment are provided below.

> *Tolerable Daily Intake (TDI):* The daily amount of exposure that is considered unlikely to cause adverse health effects in the general population (including sensitive individuals). Tolerable Daily Intakes are usually provided as daily dose rates in units of mass of chemical per kilogram of body weight of a person per day (*e.g.*, the Tolerable Daily Intake for methyl mercury exposure to pregnant women is 0.2 μg of methyl mercury/kg body weight/day such that a 60 kilogram pregnant woman should not exceed 12 μg of methyl mercury per day). Other terms that are similar in meaning are the Acceptable Daily Intake (used by the World Health Organization) and Reference Dose (used by the US Environmental Protection

Agency). Health Canada-derived Tolerable Daily Intakes are meant to protect all members of the general public including First Nation individuals.

Hazard Quotient: Used to estimate risks for non-carcinogens, Hazard Quotient values can be estimated according to the following formula:

$$\textit{Hazard Quotient} = \frac{\textit{Estimated Exposure (}\mu\textit{g/kg body weight/day)}}{\textit{Tolerable Daily Intake (}\mu\textit{g/kg body weight/day)}}$$

A Hazard Quotient value that is less than 1 indicates that exposures are less than the Tolerable Daily Intake and, thus, adverse health effects are unlikely. A Hazard Quotient value that is greater than 1 indicates a situation where chemical exposure rates may exceed the acceptable rate and, thus, may indicate excessive or unacceptable risks. In all cases, however, Hazard Quotients require careful consideration of the underlying assumptions and uncertainties before final conclusions are made.

Incremental Lifetime Cancer Risk: An estimate of the increased level of cancer risk posed by exposure to a carcinogen at a site. Incremental Lifetime Cancer Risks can be estimated according to the following formula:

$$ILCR = \text{Lifetime Daily Exposure } (\mu g/kg/day) \times \text{Potency Factor } (\mu g/kg/day)^{-1}$$

In many parts of Canada, an Incremental Lifetime Cancer Risk estimate that is less than or equal to one in one hundred thousand (1×10^{-5}) is normally considered to be acceptable while an Incremental Lifetime Cancer Risk greater than this value generally indicates that clean-up or some other form of risk reduction/management is required. In all cases, however, interpretation of Incremental Lifetime Cancer Risk estimates requires consideration of the overall risk assessment process and assumptions to ensure conclusions on risks are not misrepresented.

It is noted that neither Health Canada nor the World Health Organization consider mercury to be a carcinogenic substance. Consequently, it was not necessary to estimate Incremental Lifetime Cancer Risks due to mercury exposures.

Some Limitations to Human Health Risk Assessment

With the above principles in mind, there are some important limitations to the HHRA process that need to be considered. Firstly, HHRA is completed as a science-based toxicological evaluation of the possibility for risks posed by chemicals. As a result, this toxicological evaluation does not cover all elements of health that local First Nations may be concerned about. To evaluate non-toxicological indicators of health, a different approach would be required that may involve other expertise (*e.g.,* sociologists, social scientists, spiritual leaders, etc.). Although the proposed Keeyask Project may affect health indicators not related to toxicological outcomes, only the toxicological evaluation of the potential for physical disease was the focus of the HHRA. No conclusions have been made about mental, emotional or spiritual health in this document.

Finally, risk assessment carries with it uncertainties and it is never possible to ensure absolute safety. Daily events may present exposures to chemicals and physical agents including: eating burned food (exposure to polycyclic aromatic hydrocarbons), consuming chlorinated drinking water (exposure to chlorinated organic chemicals), using environmentally friendly compact fluorescent lights (exposure to mercury), breathing indoor air of homes with carpeting (exposure to volatile organic compounds) and using electrical appliances that release electromagnetic fields. These exposures are associated with similar uncertainties. Although it is possible to estimate risks that may be associated with each of these individual activities, there is a level of uncertainty that exists despite our best efforts.

Overall, risk assessment is recognized as a scientifically-defensible tool that provides a methodology for evaluating potential risks from chemicals and physical agents; however, uncertainty is an element of risk assessment that cannot be avoided. Due to the existence of these uncertainties, a conservative approach is typically applied in risk assessment and

this approach tends to overestimate risks and, thus, minimize the potential for adverse health effects.

3.0 SUMMARY OF ENVIRONMENTAL CONCENTRATIONS USED IN THE HHRA

The focus of the HHRA was on local First Nation communities since these people would have the greatest amount of exposure from country foods under both present and post-impoundment conditions. Nevertheless, similar methods and results would be expected for members of the general public who fish and hunt at similar rates as the First Nations within the Project area. Local First Nations were assumed to be exposed to mercury from consumption of various local foods including fish, wild game, waterfowl and wild plants. Two scenarios were considered:

- Present conditions (*i.e.*, based on fish mercury data collected from 2001-2009).

- Post-impoundment conditions point in time when mercury concentration is predicted to reach peak concentrations in fish (it has been estimated in Keeyask Hydropower Limited Partnership [2011a,b] that this could occur approximately 3-7 years after impoundment).

The water bodies of primary interest were Gull and Stephens lakes. The HHRA did not measure mercury concentrations in food or people but relied on measured present and estimated post-impoundment concentrations in water and foods provided by other experts (*i.e.*, fish and surface water mercury concentrations by North/South Consultants Inc.; wild game mercury concentrations by Wildlife Resource Consulting Services MB Inc.; and waterfowl concentrations of mercury estimated by TetrES Consultants Inc. (now known as Stantec). Results of the various studies on mercury concentrations in fish, wild game, plants and water are critical input parameters used to assess human health risks. The reader is referred to Keeyask Hydropower Limited Partnership (2011a,b) for specific discussion on these concentrations and potential variability with time.

3.1 CONCENTRATION OF MERCURY IN FISH

The Aquatic Environment Supporting Volume (AE SV), Section 7.2) provides the present (up to year 2006) and predicted future concentrations of mercury in fish muscle and the reader is referred to that section for full details of historic, current, and potential future fish mercury concentrations in the Keeyask study area. To increase the sample size of fish mercury concentrations for the HHRA, particularly to strengthen the power of analysis for fish length-class specific exposure levels, available data from Stephens Lake for 2007 and 2009 were included.

For consideration in the HHRA, members of the Mercury and Human Health Technical Working Group arranged for a workshop in October 2009 with Members of local First Nations (known as the Keeyask Cree Nations). In this workshop, persons in the communities discussed how often and how much of each food type was consumed. The detailed results of this workshop are provided in the October 2009 memo provided by InterGroup Consultants. Although numerous fish species are available for consumption in the Keeyask area, the key fish species that are most frequently consumed by resource users and that will mainly contribute to human mercury exposure are:

- Lake whitefish;
- Northern pike (also known as jackfish);
- Walleye (also known as pickerel);
- Lake sturgeon.

Table 3-1 provides a summary of the total mercury concentrations in fish muscle tissue that were used in the HHRA and referred to as present concentrations (AE SV Section 7.2). It is noted that NSC has indicated that present mercury concentrations in lake sturgeon are based on only 13 fish from one location (Gull Lake).

Total mercury in fish was assumed to exist as methylmercury as recommended by Health Canada (2007). It is noted that there is considerable variability in the portion of total

mercury that will exist as methylmercury (Health Canada [2007] cites a range of 30 to 95% as methylmercury). Nevertheless, Health Canada (2007) recommends that HHRA consider the mercury in fish to be present only as methylmercury.

Table 3-1 Total Mercury in the Muscle Tissue of Length-Standardized* Fish from Gull and Stephens Lakes: Present (2001-2006 for Gull Lake, 2001-2005 for Stephens Lake) Concentrations

Fish species	Mercury Concentration in Fish Muscle (for Standardized Size)* (µg/g; wet weight)	
	Gull Lake	Stephens Lake
Lake whitefish	0.07	0.09
Northern pike	0.22	0.26
Walleye	0.23	0.29
Lake sturgeon	0.20	No measurements currently available

* Standard lengths: lake whitefish 350 mm; northern pike 550 mm; walleye 400 mm, lake sturgeon 1,300 mm. Individual mercury concentrations will be dependent upon the size of the fish with the smaller fish having generally lower concentrations than bigger fish.

To estimate maximum mercury concentrations in whitefish, pike, and walleye following impoundment, NSC have used various modeling approaches (AE SV, Section 7.2.2). Based on the modeling results and taking into account the strength and weaknesses of the different models used, NSC considered the best estimates of maximum post-impoundment concentrations would be equal to the values provided in Table 3-2. No model is available to predict maximum post-impoundment mercury concentrations in lake sturgeon, and the values included in Table 3-2 are "best guess" estimates by the author of the Fish Quality section of the Aquatics Environment SV (North South Consultants, *pers. comm*. 2010).

Based on this evaluation, it is evident that the mercury concentrations of certain fish may increase markedly following impoundment while other fish would be much less affected. Northern pike and walleye from Gull Lake would be the most affected fish species while the whitefish from Stephens Lake is predicted to have the lowest increase in mercury concentration following impoundment.

Table 3-2 Total Mercury in the Muscle Tissue of Length-Standardized* Fish from Gull and Stephens Lakes: Predicted Maximum Post-Impoundment Concentrations

Fish Type	Average Estimated Mercury Concentration in Fish Muscle (for Standardized Size)* (µg/g; wet weight)	
	Gull Lake	Stephens Lake
Whitefish	0.19	0.15
Northern pike	1.0	0.50
Walleye	1.0	0.50
Sturgeon	0.30	0.25

* Standard lengths: lake whitefish 350 mm; northern pike 550 mm; walleye 400 mm, lake sturgeon 1,300 mm. Individual mercury concentrations would be dependent upon the size of the fish with the smaller fish having generally lower concentrations than bigger fish.

3.2 CONCENTRATION OF MERCURY IN WILD GAME

Terrestrial Environment Supporting Volume (TE SV) (Section 8) provides the present and future concentrations of mercury in wild game tissue compiled by Wildlife Resource Consulting Services MB Inc. (WRCS) and the reader is referred to that section for full details of the measured and predicted concentrations.

As discussed earlier, members of the Mercury and Human Health Technical Working Group arranged for a workshop in October 2009 with members of local First Nations communities. In this workshop, persons in the communities discussed how often and how much of each food type was consumed. Although numerous wild game species can be consumed, the key species of concern (based on frequency of consumption and likelihood to accumulate mercury) are as follows:

- Beaver;
- Muskrat;
- Moose; and
- Snowshoe hare.

Table 3-3 provides a summary of the mercury concentrations in muscle tissue of wild game that were used in the HHRA for present concentrations. Mercury in wild game was estimated as total mercury concentrations (*i.e.*, present in both inorganic and methylmercury forms).

Table 3-3 Total Mercury in the Muscle Tissue of Wild Game Collected from the Project Area: Present Concentrations

Species	Total Mercury as an Average Concentration in Muscle (µg/g; wet weight)	Range of Total Mercury Concentration in Muscle (µg/g; wet weight)
Beaver	0.01	<0.01 – 0.05
Muskrat	0.02	<0.01 – 0.06
Moose	0.07*	<0.01–0.17
Snowshoe Hare	0.05*	<0.01–0.12

* Mercury concentration in moose and snowshoe hare was only a literature estimate and may have greater uncertainty than other species for which measured values were obtained from the study area.

In the case of the mercury concentrations in wild game following impoundment, Wildlife Resource Consulting Services considered the best estimate of concentrations during the maximum year post-impoundment would be equal to the values provided in Table 3-4. Mercury in wild game was estimated as total mercury concentrations.

Table 3-4 Total Mercury in the Muscle Tissue of Wild Game from the Project Area: Predicted Maximum Post-Impoundment Concentrations

Species	Total Mercury Concentration in Muscle (µg/g; wet weight)	Most Likely Range in Total Mercury Concentration in Muscle (µg/g; wet weight)
Beaver	0.01	<0.01 – 0.05
Muskrat	0.04	<0.01 – 0.12
Moose	0.07*	<0.01–0.17
Snowshoe Hare	0.05*	<0.01–0.12

* Mercury concentration in moose and snowshoe hare was a literature based estimate and likely has greater uncertainty than other species for which measured concentrations were obtained from the study area

Based on this evaluation, it is evident that wild game would not be expected to be greatly impacted by the proposed impoundment. Beaver, moose and snowshoe hare would not be predicted to have any measurable change in mercury tissue concentrations while muskrat would be only expected have an increased concentration of 0.04 µg/g (although this is a doubling of concentrations, it is still an increase of only 0.02 µg/g).

3.3 CONCENTRATION OF MERCURY IN WATERFOWL

The TE SV (Section 8 and Appendix 8A) provide the present and future concentrations of mercury in waterfowl tissue compiled by Stantec and the reader is referred to that section for full details of the measured and predicted concentrations. Although various species of waterfowl can be consumed, the waterfowl assessed were (based on frequency of consumption and likelihood to accumulate mercury):

- Ducks (*e.g.*, mallard, ring-necked duck, teal, golden eye);
- Gull eggs.

Table 3-5 provides a summary of the mercury concentrations in muscle tissue of ducks that were used in the HHRA of present concentrations. As described in TE SV (Section 8), Stantec has estimated that concentrations of mercury in ducks would be similar to or less than concentrations measured in local whitefish. Stantec has indicated that there is no information on mercury concentrations that may result in gull eggs and, as a result, could not provide an estimate of present concentrations for use in the HHRA. All mercury in ducks was assumed to exist as methylmercury (*i.e.*, mirrored lake whitefish concentrations).

Table 3-5 Total Mercury in Waterfowl from the Project Area: Present Concentrations

Taxon	Mean Mercury Concentration (µg/g; wet weight)	
	Gull Lake	Stephens Lake
Duck	≤0.07	≤0.09
Gull eggs	No measurements currently available	No measurements currently available

* Mercury concentration in ducks was an estimate where concentrations were assumed to be similar to or less than concentrations found in whitefish.

In the case of the mercury concentrations in waterfowl following impoundment, Stantec considered the best estimate of concentrations during the maximum year post-impoundment to equal the values provided in Table 3-6. Once again, Stantec has estimated that concentrations of mercury in ducks would be similar to or less than concentrations in whitefish and, consequently, the mercury levels provided in Table 3-6 for ducks are those previously provided for whitefish.

Based on this evaluation, it is evident that the increases in mercury concentrations in ducks are expected to be relatively modest following impoundment. No estimates are provided for gull eggs and, consequently, these would need to be directly measured in the field if further information is required.

Table 3-6 Total Mercury in Waterfowl in the Project Area: Predicted Maximum Post-Impoundment Concentrations

Taxon	Mean Mercury Concentration (µg/g; wet weight)	
	Gull Lake	Stephens Lake
Duck	≤0.19	≤0.15
Gull eggs	No estimates available	No estimates available

* Mercury concentration in ducks was an estimate where concentrations were assumed to be similar to or less than concentrations found in whitefish.

3.4 CONCENTRATION OF MERCURY IN WILD PLANTS

Although many types of wild plants can be consumed from the project area, the key plants that were identified from discussions with local First Nations community Members are:

- Northern tea (also known as Labrador tea);
- Blueberries; and
- Seneca root.

There was no information available on present mercury concentrations in these plants. Nor were future concentrations estimates provided for post-impoundment conditions. Consequently, these would need to be directly measured in the field if further information was required.

3.5 CONCENTRATION OF MERCURY IN SURFACE WATER

The AE SV (Section 2) provides a description of the present concentrations of mercury in surface water as well as an assessment of effects of the Project on concentrations in surface water in the study area and the reader is referred to that section for additional detail. The following provides a summary of this information presented in the AE SV.

Mean total mercury concentrations measured in Gull and Stephens lakes were less than the current analytical method detection limit of 0.05 µg/L. The maximum measured total mercury concentration for the entire study area (Split Lake to the Nelson River estuary) was 0.32 µg/L (site NR-5 August 2003). Mercury has been detected across the study area and at three sites (GT1, NR5, and NR6) concentrations have occasionally exceeded the Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOG) for freshwater aquatic life of 0.1 µg/L; however, all samples were within the Manitoba drinking water guideline of 1 µg/L.

Table 3-7 provides a summary of the measured total mercury concentrations in surface water that were used in the HHRA of present concentrations.

Table 3-7 Total Mercury Measured in the Surface Water from the Project Area: Present Concentrations

Mean Total Mercury Concentration in Surface Water (µg/L)	
Gull Lake	**Stephens Lake**
Less than 0.05	Less than 0.05

Project-related increases in mercury in surface water are not expected to exceed 0.05 µg/L or to cause or contribute to exceedences of the drinking water quality guideline in, or downstream of, the Keeyask reservoir (see Table 3-8). Based on modeling results and literature regarding measured concentrations of mercury in Manitoba and Ontario reservoirs, it is expected that total mercury concentrations would not exceed 0.05 µg/L; this value was therefore used as a conservative value in the HHRA. Concentrations of mercury are expected to remain below the Manitoba PAL water quality guideline and below the analytical detection limits employed in this study from the combined effects of peatland disintegration and flooding. Mercury was not detected in the Nelson River between Clark and Stephens lakes and the predicted average increases due to peatland disintegration and flooding are expected to be too small to exceed the analytical detection limit. However, during periods where organic particulate materials are notably elevated as a result of resuspension or peatland disintegration (*i.e.*, stochastic events), total mercury concentrations may be higher than existing conditions. Effects on Stephens Lake are also not expected to exceed total mercury concentrations of 0.05 µg/L.

Table 3-8 Total Mercury in Surface Water from the Project Area: Predicted Mean Post-Impoundment Concentrations

Mean Total Mercury Concentration in Surface Water (µg/L)	
Gull Lake	**Stephens Lake**
Less than 0.05	Less than 0.05

4.0 HHRA METHODOLOGY

4.1 INTRODUCTION

As mentioned earlier, the focus of the HHRA was on local First Nations communities but similar findings would be expected for members of the general public who frequently fish and hunt. These First Nations were assumed to be exposed to mercury from consumption of various local foods including fish, wild game, waterfowl and wild plants. Two scenarios were considered:

- Present conditions;

- Post-impoundment conditions at the point in time when mercury concentration is predicted to reach peak concentrations in fish.

The methods used to estimate human health risks were primarily based on risk assessment provided by Health Canada, World Health Organization (WHO) and the United States Environmental Protection Agency (US EPA). Important documents that have been used to estimate risks include the following:

- Health Canada. 2010a. (draft) Federal Contaminated Site Risk Assessment in Canada, Part V: Guidance on Human Health Detailed Quantitative Risk Assessment of Chemicals ($DQRA_{CHEM}$). Contaminated Sites Division, Safe Environments Programme, Health Canada, Ottawa, ON.

- Health Canada. 2010b. Toxicological Reference Values, Estimated Daily Intakes, or Dietary Reference Values for Trace Elements.

- Health Canada. 2009a. (draft) Federal Contaminated Site Risk Assessment in Canada – Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA).

- Health Canada. 2009b. Federal Contaminated Site Risk Assessment in Canada – Part IV: Spreadsheet Tool for Human Health Preliminary Quantitative Risk Assessment (PQRA).

- Health Canada. 2007. Human Health Risk Assessment of Mercury in Fish and Health Benefits of Fish Consumption.

- Health Canada. 2004. Canadian Handbook on Health Impact Assessment.

Briefly, exposures to mercury were estimated based on a variety of assumptions relating to the use of areas and the possible dietary habits (*i.e.,* consumption of animals and plants) of people in the vicinity of the site. The toxicological literature was then reviewed to identify exposure rates for mercury that have been determined by international health agencies to be acceptable or "safe" (or more specifically, exposure rates without appreciable risks of adverse effects). The next step in the risk assessment was a comparison of the estimated exposure rates to the dose rates considered acceptable or "safe" for humans for the various consumption scenarios considered in the assessment. Finally, the recommended maximum weekly intakes of the various foods were estimated.

Risks from historic exposures that may have occurred in previous decades were not evaluated in the assessment of off-site receptors. Instead, the focus of the exposure assessment was on exposures that may possibly occur under present and post-impoundment use.

In addition, it should be noted that health agencies have undertaken blood and hair analysis for mercury in local First Nation communities in the Keeyask study area in the 1990s. These data are confidential and were not available to Wilson Scientific for inclusion in this HHRA. As discussed by the Mercury and Human Health Technical Working Group, community specific data were available, in summary form at the community level (*i.e.,* no individual results), to each community by request directly to Health Canada.

The methods used to complete the risk assessment are described in detail in the following sections.

4.2 PROBLEM FORMULATION

4.2.1 Chemicals of Potential Concern

The HHRA focused on mercury as the main chemical of potential concern. Mercury was evaluated since it has appreciable potential to accumulate in the environment at concentrations that could affect food and other sources. Mercury can enter the aquatic food chain and prompt fish consumption advisories following reservoir creation. It should be emphasized that mercury occurs naturally in many foods, particularly predatory fish at the top of the food chain. Nevertheless, it is clear that some fish concentrations of mercury are expected to increase appreciably following impoundment.

4.2.2 Receptors of Concern

The Keeyask study area is used for a variety of purposes including the traditional collection of foods by local First Nations community Members. Persons participating in such activities could be of any age. Consistent with Health Canada (2009a; 2010a) guidance, the most sensitive toddler (ages 0.5 to four years) was the key receptor used to evaluate risks to mercury in the Keeyask area. Other receptors included women of childbearing age and adult males.

4.2.3 Assumed Receptor Characteristics

To the extent possible, receptor characteristics were based on data specific to the Canadian population. Values used in the risk assessment were based primarily on recommendations provided by Health Canada (2009a; 2010a). Other sources such as CCME (2006), Richardson (1997) and other published scientific literature were also considered.

Body Weight

For body weight, the values recommended in Health Canada (2009a; 2010a) were considered for the assessment of child and adult receptors.

Accordingly, the following values were selected as receptor characteristics in the assessment:

Younger Child (ages 0.5-4 yrs):	16.5 kg (Health Canada 2009a; 2010a);
Women of Child-bearing Age:	60 kg (Health Canada 2009a; 2010a);
Adults:	70.7 kg (Health Canada 2009a; 2010a).

Water Consumption Rate

Water consumption rates for the various human receptor types recommended by Health Canada (2009a; 2010a) were used in the exposure assessment.

Accordingly, the following values were selected as receptor characteristics in this assessment as the drinking water consumption estimates:

Younger Child (ages 0.5-4 yrs):	0.6 L/day (Health Canada 2009a; 2010a);
Adults:	1.5 L/day (Health Canada 2009a; 2010a).

Skin Surface Area

In the case of skin surface area available for contact with surface water, Health Canada (2009a; 2010a) has adopted values recommended by Richardson (1997) for the whole body surface area.

The following values were selected as receptor characteristics in the assessment:

Younger Child (ages 0.5-4 yrs):	0.60 m^2 (whole body) (Health Canada 2009a; 2010a)

Adults:	1.8 m^2 (whole body) (Health Canada 2009a; 2010a).

Time Spent at the Site

For traditional land use, it was assumed that these persons would spend seven days per week, 52 weeks per year for their entire life at the site. These estimates are not from literature sources but instead are based input from local First Nations, professional judgment and acceptable practice in HHRA (*i.e.,* use of conservative estimates).

The following values were selected as receptor characteristics in the assessment:

Traditional Land Use:	7 days per week, 52 weeks per year for 80 years (professional judgment)
Country Foods Consumer:	Various rates of consumption for an entire lifetime (see below).

Country Foods Consumption

The term "country foods" refers to foods that are not bought in stores or grown in home gardens or farms but instead are collected from the environment. Country foods include fish, wild game, waterfowl and wild plants.

The scientific literature contains an appreciable amount of information on the rate of country food consumption by First Nation communities in Canada. Although this information provides excellent sources for consideration, use of such data has limitations since rates of country food consumption vary from locale to locale. As a result, it is preferable to have site-specific information on the rates of consumption when such estimates are available.

For consideration in the HHRA, members of the Mercury and Human Health Technical Working Group arranged for a workshop in October 2009 with members of local First

Nations communities. In this workshop, persons in the communities discussed how often and how much of each food type was consumed. The detailed results of this workshop are provided in the October 2009 memo provided from InterGroup Consultants. According to this memorandum, the most common food types and rate of consumption are provided below.

It is recognized that the fish serving sizes provided in Table 4-1 represent quite large serving sizes compared to those typical, as identified by Health Canada. These serving sizes were determined through consultations with local First Nations representatives at the October 2009 workshop. It is possible that many persons would consume smaller portion sizes or may eat foods at a lower frequency. For such persons, the HHRA has provided risk estimates as Recommended Maximum Weekly Intakes in units of grams per week (*i.e.*, independent of serving size).

Table 4-1 Assumed Consumption Rates of Various Country Foods Consumed by Local First Nations Communities

Food Type	Serving Size for Young Child	Serving Size for Adult	Frequency of Consumption
Fish			
Whitefish	100 g (or 3.5 ounces)*	400 g (or 14 ounces)	Three times per week
Northern pike	100 g (or 3.5 ounces)	400 g (or 14 ounces)	Three times per week
Walleye	100 g (or 3.5 ounces)	400 g (or 14 ounces)	Three times per week
Sturgeon	100 g (or 3.5 ounces)	400 g (or 14 ounces)	Three times per week
Wild Game			
Beaver	57 g (or 2 ounces)	200 g (or 7 ounces)	Three times per week
Muskrat	57 g (or 2 ounces)	200 g (or 7 ounces)	One time per week
Moose	100 g (or 3.5 ounces)	400 g (or 14 ounces)	Five times per week
Snowshoe hare	57 g (or 2 ounces)	200 g (or 7 ounces)	One time per week
Waterfowl			
Duck	57 g (or 2 ounces)	200 g (or 7 ounces)	One time per week

* One ounce = 28.4 grams

The above information was used to estimate exposures to mercury that persons may receive from the consumption of various country foods. Using the period of exposure that may result in the greatest daily exposure over a period of one week, the daily intake rate was estimated for each of the food groups. For example, in the case of sturgeon which is consumed only in spring and fall, risk estimates are based on the period that it is consumed three times per week. This is considered to be a conservative assumption because it does not distinguish risks from foods consumed on a seasonal basis versus those consumed all year round. Nevertheless, no health agencies provide recommendations for addressing short-term exposures to methylmercury and, thus, this approach was conservatively adopted.

It is noted that local First Nation communities also identified the following country foods as a concern:

- Gull eggs;
- Wild plants:
    - Northern tea;
    - Blueberries; and
    - Seneca roots

However, as noted in Section 3, there are no estimates of mercury concentrations in these animals or plants either presently or that would occur following impoundment. Consequently, these foods were not further evaluated in the quantitative HHRA. It is recommended that these foods be part of future monitoring if information on risks from consumption is desired.

4.2.4 Exposure Pathways of Concern

The exposure pathways for the off-site receptors are receptor-dependent. In the case of traditional land use, the exposure pathways evaluated included:

- Ingestion of surface water from Gull Lake or Stephens Lake; and

- Dermal contact with surface water from Gull Lake or Stephens Lake.

In the case of the country foods consumers, risks from consumption of the following food groups were estimated:

- Fish:
  - Whitefish;
  - Northern pike;
  - Walleye;
  - Sturgeon.
- Wild Game:
  - Beaver;
  - Muskrat;
  - Moose;
  - Snowshoe hare;
- Waterfowl:
  - Ducks.

4.2.5 Conceptual Model

Based on the information provided in the previous section and following the guidance from Health Canada and various other international health agencies, conceptual models were developed to illustrate the receptors and exposure pathways identified for evaluation of risks to off-site receptors.

As discussed earlier, it is usually not possible to evaluate every individual and/or exposure pathway present; however, if the most sensitive receptors and most important pathways are evaluated, it can safely be concluded that other receptors and exposure pathways not considered would be adequately addressed by the result and conclusions of the HHRA. Consequently, the conceptual models summarized here have been developed with this objective in mind.

For the persons using the area for traditional land uses, the receptors and exposure pathways are provided in Table 4-2. Once again, the consumption of country foods was addressed as a separate pathway (see below).

Table 4-2 Conceptual Model for Traditional Land Use

Critical receptor		Exposure pathways	
	Infant		Soil Ingestion
X	Toddler		Soil dermal absorption
	Child		Particulate inhalation
	Teen		Vapour inhalation
X	Adult	X	Water dermal exposure
		X	Water ingestion
		X	Wild plant ingestion
		X	Fish ingestion
		X	Wild game ingestion

X – Requires evaluation in the human health risk assessment

4.3 EXPOSURE ASSESSMENT

4.3.1 Environmental Concentrations

As discussed earlier, receptors were assumed to consume country foods that include wild game, fish and plants. In addition, receptors were assumed to be exposed to surface water. The assumed concentrations of mercury in the various country foods and surface water are discussed in sections below.

Assumed Concentrations of Mercury in Fish

As identified by the Mercury and Human Health Technical Working Group, consumption of the following fish species was the primary concern to human health:

- Lake whitefish;
- Northern pike;
- Walleye; and
- Lake sturgeon.

Section 3.1 provides the measured and predicted concentrations of mercury in fish tissue that were used in the HHRA. The HHRA was based on the mean concentrations of mercury in fish tissue (current concentrations were measured while future concentrations were predicted).

The mercury concentrations reported in section 3.1 are specific to a standardized length of the various fish species. Because mercury concentrations are generally positively related to fish length, fish that are larger than the specified standard length usually have greater concentrations while smaller fish have lower concentrations. The standard lengths used here are based on the approximate size of fish that would typically be caught and eaten. Therefore, using mercury concentrations from fish of this size provides the best average estimate of mercury exposure to people over the long-term.

Assumed Concentrations of Mercury in Wild Game

As identified by the Mercury and Human Health Technical Working Group, consumption of the following wild game species were the primary concern to human health:

- Beaver;
- Muskrat;
- Moose; and
- Snowshoe hare.

Section 3.2 provides the measured and estimated concentrations of mercury in wild game tissue that were used in the HHRA. Similar to that discussed for fish, the HHRA of wild game consumption was based on the mean concentrations of mercury.

It is noted that other wild game species may be consumed by First Nations that were not directly evaluated in the HHRA. In most cases, these species would likely have similar or lower concentrations of mercury than those assumed in the HHRA. For example, caribou are consumed from the area but caribou would be expected to have lower concentrations of mercury than moose because they spend less time in the area (*i.e.,* larger home range)

and less time in contact with aquatic habitat. Consequently, it is likely that risks from such foods would be even lower than from the wild game evaluated in the HHRA. Nevertheless, it will be recommended that a program is established whereby hunters may submit tissue samples of any species of wild game that they have hunted in the area for mercury analysis. In this manner, the mercury content of other country foods can be monitored.

Assumed Concentrations of Mercury in Waterfowl

As identified by the Mercury and Human Health Technical Working Group, consumption of the following waterfowl species was the primary concern to human health:

- Ducks; and
- Gull eggs.

Section 3.3 provides the assumed concentrations of mercury in ducks. As discussed earlier, no estimate of mercury concentrations in gull eggs was possible for either present or future scenarios. Consequently, gull eggs would need to be monitored if risk estimates from this food group are required.

It is noted that other waterfowl may be consumed by local First Nations that were not directly evaluated in the HHRA (*e.g.*, geese). In the case of geese, they would likely have similar or lower concentrations of mercury than those assumed in the HHRA (due to their mainly plant-based diet, geese have a lower ability to accumulate mercury than ducks). Consequently, it is likely that risks from geese would be lower than from the ducks evaluated in the HHRA. Nevertheless, it will be recommended that a program is established whereby hunters may submit tissue samples of any species of waterfowl that they have hunted in the area for mercury analysis. In this manner, the mercury content of other country foods can be monitored.

Assumed Concentrations of Mercury in Wild Plants

As identified by the Mercury and Human Health Technical Working Group, consumption of the following wild plant species was the primary concern to human health:

- Northern tea;
- Blueberries; and
- Seneca root.

As discussed earlier, no estimates of mercury concentrations in wild plants were available for either present or post-impoundment scenarios. Consequently, wild plants would need to be monitored if risk estimates from this food group is required and it will be recommended that a program is established whereby food gatherers may submit tissue samples of species of edible plants that have been gathered for mercury analysis. In this manner, the mercury content of wild plants can be monitored.

Assumed Concentrations of Mercury in Surface Water

The approach for estimating potential human exposure to off-site receptors was based on measured water concentrations at the current time and estimated water concentrations that would occur at the maximum time following impoundment. As discussed previously in Section 3.5, the surface water concentrations were largely compiled from data presented in the AE SV, Section x. Briefly, North/South Consultants have indicated that both present and post-impoundment concentrations of mercury in surface water would be expected to be less than the method detection limit of 0.05 µg/L. For the purposes of the HHRA, it was assumed that mercury would be found in surface water at a concentration equal to the method detection limit of 0.05 µg/L.

4.3.2 Mathematical Equations Used to Estimated Exposures

As discussed earlier, the exposures that off-site receptors may receive were estimated for the following pathways:

- Ingestion of surface water;
- Dermal contact with surface water (bathing or swimming); and
- Consumption of country foods (wild game, fish and plants).

The mathematical equations used to estimate exposures from these pathways are discussed in Appendix 5C-1. Some of the other important concepts applied in the exposure assessment approach are discussed below.

4.3.2.1 Exposure Amortization

As noted earlier, the number of weeks assumed for the exposure duration of concern was important to the outcome of the risk assessment. Essentially, it is important that the exposure data match as closely as possible the toxicological data (*i.e.,* toxicity reference values [TRVs]) in terms of exposure duration.

For assessment of risks from mercury, no lifetime exposure amortization was completed for less than lifetime exposures. Although it was previously stated that persons spend 80 years of their lifetime at the site, this timeframe does not play a role in estimation of risks to the non-carcinogens. According to Health Canada guidance, any exposure that lasts more than three months is considered to be chronic in duration and lifetime exposure amortization is typically appropriate for exposures that last longer than this duration. With the above in mind, it was considered appropriate and consistent with Health Canada guidance to amortize exposures that occur two times per week over the entire week. Although it is likely that receptors will have lower exposures in the winter than in the summer (due to snow cover and potentially reduced use of off-site areas in some cases), the HHRA did not consider this in the quantitative evaluation. As a result, the HHRA has

been completed for exposures that occur during the season where the exposure took place (*i.e.*, exposures that occur over a one or two month period were not spread out over the entire year).

4.3.2.2 Bioavailability Assessment

As shown in the Appendix 5C-1 calculations, bioavailability was used to estimate the fraction of exposure that may actually enter a person's body. Bioavailability is an important factor that allows for the comparison of exposures via multiple routes. For example, bioavailability allows the risk assessment to compare health risks from dermal exposures to TRVs established for oral exposure routes. For the purposes of the HHRA, the bioavailability of mercury in food was assumed to be 100%. For dermal absorption from surface water, mercury was assumed to have a permeability constant of 1×10^{-5} m/hr as recommended by Health Canada (2009b).

4.4 TOXICITY ASSESSMENT

Toxicological data were available from regulatory agencies such as Health Canada, US EPA and the World Health Organization. In the case of mercury, the following TRVs were used:

- Tolerable Daily Intake (TDI) for methyl mercury = 0.2 µg/kg bw/day (for children, women of child bearing age) and 0.47 µg/kg bw/day (for other members of the general population) (Health Canada, 2010b).

- TDI for total mercury = 0.57 µg/kg bw/day for all persons (based on WHO [2010] provisional tolerable weekly intake of 4 µg/kg/week).

For mercury in fish and waterfowl, all mercury was assumed to be present as methylmercury since most experts would agree that the vast majority of mercury would be present in this form. For mercury in wild game and wild plants, mercury was assumed to be present as total mercury since information is not readily available on the mercury form in muscle tissue and, thus, was compared to the WHO/Health Canada total mercury

toxicity reference value. Appendix 5C-1 provides additional details regarding these TRVs.

4.5 RISK CHARACTERIZATION

Risks were estimated as Hazard Quotient values according to the following formula:

$$\textit{Hazard Quotient} = \frac{\textit{Estimated Exposure (µg/kg body weight/day)}}{\textit{Tolerable Daily Intake (µg/kg body weight/day)}}$$

With respect to Health Canada guidance for foods, a Hazard Quotient value of 1 is typically considered to be the maximum acceptable exposure that will not be associated with unacceptable risks (Health Canada 2004). Although a Hazard Quotient value of 0.2 is considered to be acceptable for contaminated soils (when environmental concentrations represented by the arithmetic means are considered) (Health Canada 2009a, 2010a), this value is not typically used for evaluation of foods. Indeed, there are numerous precedents where Health Canada has considered Hazard Quotient values of 1 to be acceptable (especially when food sources are considered). Consequently, a Hazard Quotient value of 1 was used as the acceptable risk for mercury.

Since mercury is not evaluated as a carcinogen by most health agencies (*e.g.*, Health Canada, World Health Organization and US Environmental Protection Agency), it was not necessary to estimate cancer risks.

In addition to estimation of risks as Hazard Quotients, the Recommended Maximum Weekly Intakes (RMWIs) for the various country foods were estimated. The RMWI represents the amount of food that, if consumed on a weekly basis, would result in an exposure that is equal to the Tolerable Daily Intake (and thus result in a Hazard Quotient value equal to 1).

RMWIs were estimated as:

$$RMWI = \frac{TDI \times BW \times 7\ days}{CF}$$

where:

RMWI = Recommended Maximum Weekly Intake (g/week)

TDI = Tolerable Daily Intake (µg/kg body weight/day)

BW = Body weight of person (kg)

CF = Concentration in food of concern (µg/g, wet weight)

In this manner, RMWIs were estimated for the country foods under present conditions and also that would result under the post-impoundment scenario (peak year).

5.0 RESULTS

The results of the risk assessment for receptors exposed to mercury are provided in the sections below. Worked examples of the risk calculations are provided in Appendix 5C-1.

5.1 RISKS FROM CONSUMPTION OF FISH

Risks from consumption of fish were estimated for the present conditions and for the possible post-impoundment scenario. Based on information provided by local First Nation communities, all fish were assumed to be consumed at a frequency of three meals per week with a serving size of 100 g (3.5 ounces) per meal for toddlers and 400 g (14 ounces) per meal for adults. These rates of consumption were used at the request of local First Nation communities and are considered to represent upper bound exposures (especially in regard to serving size). Nevertheless, the HHRA considered these values in order to ensure a conservative assessment and address all concerns of the local First Nation communities.

It is recognized that certain fish are only consumed at certain times of the year (*e.g.*, sturgeon are only consumed in the spring and the fall). Nevertheless, this less than continuous exposure is not quantitatively considered in the HHRA because the key concern regarding methylmercury is developmental toxicity. Developmental toxicants sometimes only require a couple of weeks of exposure to illicit adverse effects and the fact that a pregnant woman only consumed a certain country food for a few weeks during pregnancy would not necessarily be a mitigating factor that would diminish the potential developmental toxicity.

5.1.1 Present Conditions

Table 5-1 provides the risk estimates for consumption of fish under present conditions. Using the methods discussed previously, the key results of the risk analysis of present conditions include the following:

- In evaluation of the results of the HHRA, it is important to consider that relatively high rates of fish consumption were assumed.

- Toddlers and women of childbearing age had risks that were two to three times higher than adult males and Elders consuming the same fish species. This is mainly because the TDI for methylmercury is approximately 2.5 times lower for toddlers/women of child bearing age than for adults.

- The greatest risks were estimated from consumption of northern pike and walleye due to their higher tissue mercury concentrations relative to other fish species. These two predatory fish species have mean mercury concentrations that are greater than 0.2 µg/g but less than 0.5 µg/g and various health agencies have recommended that young children and women of childbearing age may want to restrict consumption of fish to a meal or so per week when mercury concentrations are in this range.

- Risks from consumption of lake whitefish were the lowest due to their low mercury concentrations; however, consumption of three large meals per week could still result in Hazard Quotient values that exceed the acceptable value. Nevertheless, whitefish at the present mercury concentrations represent an excellent source of nutrition and we are not aware of any international health agencies that would take issue with persons consuming fish with mercury concentrations less than 0.2 µg/g (fish from both lakes were substantially lower than this value).

- In the case of lake sturgeon in Gull Lake, these fish presently contain arithmetic mean mercury concentrations equal to 0.2 µg/g (the relationship between mercury concentration and fish length was not significant and standardized means should not be used; see AE SV (Section x). As noted above, we are not aware of any international health agencies that would take issue with persons consuming fish with mercury concentrations less than 0.2 µg/g. Nevertheless, consumption of

three large meals per week could still result in Hazard Quotient values that exceed the acceptable value.

Based on the results, frequent consumption of large meals of certain types of fish may exceed the acceptable Hazard Quotient. It should be noted that the adult Hazard Quotient values would have been lower in Table 5-1 if a more common serving size of 150 grams per meal was used (*i.e.*, 150 grams is the serving size commonly assumed by Health Canada). Indeed, the Hazard Quotient values for adults (both women of childbearing age and adult males and all Elders) would have been about 2.5 times lower than provided in Table 5-1; however, for toddlers, Health Canada policy uses a serving size of 106 g/meal and a body weight of 14 kilograms such that Hazard Quotient values would have been about 20% higher than provided in Table 5-1. Nevertheless, the information on serving sizes obtained directly from the communities is considered to supersede the Health Canada recommendations.

Table 5-1 Risk Estimates from Consumption of Fish: Present Conditions

Fish Species	Standardized Concentration* (µg/g, wet weight)	Hazard Quotient from Consumption of Three Large Meals per Week (Acceptable Value = 1)***		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Gull Lake				
Lake Whitefish	0.07	0.9	1.0	0.4
Northern Pike	0.22	2.8	3.1	1.1
Walleye	0.23	3.0	3.3	1.2
Lake Sturgeon**	0.20	2.6	2.8	1.0
Stephens Lake				
Lake Whitefish	0.09	1.3	1.4	0.5
Northern Pike	0.26	3.5	3.8	1.4
Walleye	0.29	4.2	4.7	1.7
Lake Sturgeon	No measurements currently available	No estimates currently available	No estimates currently available	No estimates currently available

* Standard lengths: lake whitefish 350 mm; northern pike 550 mm; walleye 400 mm,
Individual mercury concentrations would be dependent upon the size of the fish with the smaller fish having generally lower concentrations than bigger fish.
** Arithmetic mean concentration.
*** Based on information provided by local First Nation communities, all fish were assumed to be consumed at a frequency of three meals per week with a serving size of 100 g for toddlers and 400 g for adults.

In addition to estimation of risks as Hazard Quotient values, the Recommended Maximum Weekly Intake (RMWI) was estimated for fish under present conditions. Table 5-2 provides the RMWI that would result in a Hazard Quotient value of 1. The valuable aspect of this RMWI information is that it provides consumption recommendations that are independent of serving size. For example, if a RMWI of 1,200 g/week is acceptable for consumption of lake whitefish by women of childbearing age, it can be reasoned that a woman could have three meals per week if serving size is 400 g (14 ounces) or 6 meals per week if the serving size is 200 g (seven ounces) or eight meals per week if the serving size in 150 g (5.3 ounces). All three scenarios would still result in a woman consuming 1,200 g of lake whitefish which would equate to an exposure equal to a Hazard Quotient value of 1 (assuming consumption of lake whitefish of standard length).

Table 5-2 Recommend Maximum Weekly Intake of Fish for a Hazard Quotient Value =1: Present Conditions

Fish Species	Standardized Concentration (µg/g, wet weight)*	Recommended Maximum Weekly Intake (g/week) for a HQ =1 (All for Fish of Standard Length)		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Gull Lake				
Lake Whitefish	0.07	330	1,200	3,400
Northern Pike	0.22	100	380	1,100
Walleye	0.23	100	370	1,000
Lake Sturgeon**	0.20	120	420	1,200
Stephens Lake				
Lake Whitefish	0.09	260	940	2,600
Northern Pike	0.26	89	320	900
Walleye	0.29	80	290	810
Lake Sturgeon	No measurements currently available	No estimates currently available	No estimates currently available	No estimates currently available

* Standard lengths: lake whitefish 350 mm; northern pike 550 mm; walleye 400 mm,
Individual mercury concentrations would be dependent upon the size of the fish with the smaller fish having generally lower concentrations than bigger fish.
** Arithmetic mean concentration.

The amount that can be consumed on a weekly basis and result in an exposure equal to the Tolerable Daily Intake was also estimated for various sizes of fish. Using the mean mercury concentrations for each of three size classes for the three main fish species (North South Consultants Inc., unpubl. data), recommendations for consumption of various fish sizes were developed. Table 5-3 provides the size recommendations for consumption of fish. These recommendations are for present day conditions as they are based on actual size distributions that currently exist. If size recommendations were sought under post-impoundment conditions, fish would need to be caught and analyzed under such conditions.

Table 5-3 Recommendations for Consumption Based on Fish Size Class for a Hazard Quotient Value = 1: Present Conditions (based on Mean Mercury Concentrations)

Species	Fish Size Class								
	Lake Whitefish			Northern Pike			Walleye		
	<300 mm	300-450 mm	>450 mm	<400 mm	400-800 mm	>800 mm	400-550 mm	400-550 mm	>550 mm
Gull Lake									
Mean concentration of mercury in tissue (µg/g; wet weight)	0.042	0.071	0.149	0.129	0.270	0.789	0.117	0.394	0.688
Consumption Recommendation for Toddlers (g/week)	550	330	160	180	86	29	200	59	34
Consumption Recommendation for Women of Child Bearing Age (g/week)	2,000	1,200	570	650	310	110	720	210	120
Consumption Recommendation for Adult Males/ All Seniors (g/week)	5,600	3,300	1,600	1,800	870	300	2,000	600	340
Stephens Lake									
Mean concentration of mercury in tissue (µg/g; wet weight)	0.070	0.094	0.154	0.096	0.318	1.07	0.183	0.422	0.716
Consumption Recommendation for Toddlers (g/week)	331	250	150	240	73	22	130	55	32
Consumption Recommendation for Women of Child Bearing Age (g/week)	1,200	900	550	880	260	79	460	200	120
Consumption Recommendation for Adult Males/ All Seniors (g/week)	3,300	2,500	1,500	2,400	740	220	1,300	560	330

Although it is possible to estimate Hazard Quotient values greater than associated with very high rates consumption of fish (see below),it would seem unnecessary to recommend that consumption needs to be reduced for fish with mercury concentrations less than 0.2 µg/g. There is no known federal policy that strictly indicates that no risk management is required when fish concentrations are less than 0.2 µg/g. Nevertheless, it would seem that most agencies and experts would agree that such concentrations can be considered to be low and the nutritional benefits of such fish may outweigh any risk factors. Indeed, we are aware of no major health agency that has expressed concerns at such low concentrations. In addition, experience with Health Canada's Health Products and Food Branch and the First Nations and Inuit Health Branch have indicated that when the First Nation communities are encouraged to undergo routine blood and hair analysis this should provide further emphasis that it may be unnecessary to recommend restricting consumption of fish when mercury concentrations are less than 0.2 µg/g[1].

It is recognized that using an approach where no consumption restrictions are recommended for persons consuming fish less than 0.2 µg/g will result in Hazard Quotient values greater than 1 and this may seem to contradict the results of the HHRA. For example, if a woman of childbearing age consumed fish with a mercury concentration of 0.2 µg/g at a rate of five meals per week (400 g/serving), a Hazard Quotient of 4.8 would be predicted. However, as noted above, there is no health agency precedent to suggest that persons should reduce current frequencies of fish consumption. Nevertheless, in all cases it would seem prudent to communicate to communities that smaller, younger or non-predatory fish species will typically have lower mercury concentrations so that persons can make informed decisions for themselves and their families.

Consequently, the following approach was used to derive overall consumption recommendations:

[1] Health Canada has not as of yet reviewed the site-specific information nor do they have an official policy that mercury concentrations less than 0.2 µg/g do not require further assessment or restrictions. Instead, Health Canada would address such issues on a case-by-case basis and in all cases would encourage dissemination of information that emphasize which fish have the lowest mercury concentrations (*i.e.,* smaller, younger or non-predatory fish species that typically have lower mercury concentrations).

- A Hazard Quotient value of 1 was assumed to be acceptable; however, all fish less than 0.2 µg/g were classified as acceptably low and no consumption restrictions were recommended.
- Serving sizes are 100 g for toddlers and 400 g for adults.
- The following consumption categories were used:
    - Unrestricted eating;
    - Eat up to 1 meal per week;
    - Avoid consumption.

Using the above, Table 5-4 provides the overall consumption recommendations based on present conditions. Regardless of any decisions of proceeding with impoundment (*i.e.*, these risks are independent of impoundment), fish consumption recommendations for fish should be communicated to local First Nations people through community health practitioners. In the case of lake sturgeon for which only data for 13 fish from Gull Lake were available and for which the length-mercury concentration relationship was not significant (*i.e.*, length standardization was not meaningful), it is recommended that sturgeon of less than 1,220 mm fork length can be consumed on an unrestricted basis. This length represents the mean fork length of the 13 sturgeon which had an arithmetic mean mercury concentration of 0.18 µg/g (North South Consultants *pers. comm.* 2010).

Table 5-4 Overall Recommendations for Consumption Based on Fish Size Class: Present Conditions (based on Mean Mercury Concentrations)

Receptor Group of Concern	Lake Whitefish			Northern Pike			Walleye		
	<300 mm	300-450 mm	>450 mm	<400 mm	400-800 mm	>800 mm	<400 mm	400-550 mm	>550 mm
Gull Lake									
Women of childbearing age and toddlers	Unrestricted eating	Unrestricted eating	Unrestricted eating	Unrestricted eating	Eat up to 1 meal per week	Avoid eating	Unrestricted eating	Avoid eating	Avoid eating
Adult men and women past child-bearing age	Unrestricted eating	Unrestricted eating	Unrestricted eating	Unrestricted eating	Eat up to 1 meal per week	Avoid eating	Unrestricted eating	Eat up to 1 meal per week	Avoid eating
Stephens Lake									
Women of childbearing age and toddlers	Unrestricted eating	Unrestricted eating	Unrestricted eating	Unrestricted eating	Avoid eating	Avoid eating	Unrestricted eating	Avoid eating	Avoid eating
Adult men and women past child-bearing age	Unrestricted eating	Unrestricted eating	Unrestricted eating	Unrestricted eating	Eat up to 1 meal per week	Avoid eating	Unrestricted eating	Eat up to 1 meal per week	Avoid eating

Notes:
Based on serving sizes of 400 grams per serving for men and women and 100 grams per serving for toddlers.
A Hazard Quotient value of 1 was assumed to be acceptable; however, all fish less than 0.2 µg/g were classified as acceptable mercury concentrations and no consumption restrictions from current frequencies were recommended.

5.1.2 Post-Impoundment Scenario

Table 5-5 provides the risk estimates for consumption of fish that would occur under post-impoundment conditions. These risk estimates are based on the peak concentrations that would occur following impoundment and assuming consumption of fish of standard size (*i.e.*, lake whitefish = 350 mm; northern pike = 550 mm; walleye = 400 mm; and, lake sturgeon = 1,300 mm). Key results of the risk analysis include the following:

- The greatest risks were estimated from consumption of northern pike and walleye from Gull Lake due to tissue concentrations of mercury predicted to reach or slightly exceed 1.0 µg/g (Keeyask Hydropower Limited Partnership, 2012a). In order to maintain a desirable margin of safety, it is generally not advisable for young children and women of childbearing age to consume fish with such concentrations of mercury.

- In the case of northern pike and walleye from Stephens Lake and lake sturgeon from either Stephens Lake or Gull Lake, these fish are predicted to have mercury concentrations that are greater than 0.2 µg/g but less than or equal to 0.5 µg/g. Nevertheless, in order to maintain a desirable margin of safety, it is generally not advisable for young children and women of childbearing age to consume fish with such concentrations of mercury when mercury concentrations are in this range.

- Risks from lake whitefish from Gull Lake and Stephens Lake were the lowest of the fish evaluated; however, consumption of three large meals per week could still result in Hazard Quotient values that exceed the acceptable value. Nevertheless, it has been estimated that mercury concentrations of lake whitefish will remain less than 0.2 µg/g and, as noted earlier. Wilson Scientific is not aware of any health agency that has recommended that consumption of such fish should be restricted.

Based on the results, some fish from Gull and Stephens Lakes would still be acceptable to consume at current frequencies under the post-impoundment scenario while for other fish

it would be advisable that consumption should be restricted and, in some cases, avoided. Although concentrations of lake whitefish are predicted to increase under post-impoundment conditions (particularly in Gull Lake), the concentrations of mercury should still permit unrestricted consumption of lake whitefish that are standard size or smaller (*i.e.*, 350 mm) from either lake (*i.e.*, concentrations of such fish would be less than 0.2 µg/g). On the other hand, standard-sized northern pike (550 mm), walleye (400 mm) and lake sturgeon (1,300 mm) from either lake would contain mercury concentrations that would not be advisable for young children and women of childbearing age to consume. Northern pike, walleye and lake sturgeon from Stephens Lake and lake sturgeon from Gull Lake would fall into the category that consumption should be restricted to a meal per week for adult men and women past childbearing age. Finally, it would be recommended that the standard-sized northern pike and walleye from Gull Lake should be avoided by all ages under post-impoundment conditions.

It is noted that the above recommendations are for standard-sized fish as estimated by NSC. If, as planned, monitoring of fish mercury levels will occur in key water bodies should the Project be implemented, it may be possible to develop size-specific recommendations for the different fish species in the future. Under such an approach, the consumption recommendations could be refined and it may be possible that certain fish consumption recommendations may be less strict for smaller sizes of fish.

Another alternative to reduce post-impoundment mercury exposures would be to encourage consumption of fish from lakes unaffected by the Project, which are part of programs to provide for replacement country foods included in Adverse Effects Agreements established between Manitoba Hydro and the KCNs. It is stressed that it would still be necessary to consider the size and the species of fish for persons desiring to reduce their mercury exposures even from lakes unaffected by the Project. More specifically, NSC have measured mercury concentrations in fish from so-called offset lakes (specifically identified by one of the KCNs) and have indicated that certain fish from the various background lakes in the study area may have mercury concentrations that warrant consumption recommendations (tissue concentrations of mercury above 0.2

µg/g [Keeyask Hydropower Limited Partnership, 2012a]). As is the case in Stephens and Gull lakes, the mercury concentrations in fish from the offset lakes are variable but are generally highest in northern pike and walleye. Nevertheless, there are numerous fish with concentrations that are less than 0.2 µg/g in these lakes and, thus, would offer lower exposures than those expected at post-impoundment conditions that would be expected at either Gull Lake or Stephens Lake.

Table 5-5 Risk Estimates from Consumption of Fish: Post-Impoundment Conditions

Fish Species	Assumed Concentration* (µg/g, wet weight)	Hazard Quotient from Consumption of Three Large Meals per Week (Acceptable Value = 1)***		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Gull Lake				
Lake Whitefish	0.19	2.4	2.7	1.0
Northern Pike	1.0	12.9	14.2	5.1
Walleye	1.0	12.9	14.2	5.1
Lake Sturgeon**	0.30	3.9	4.2	1.5
Stephens Lake				
Lake Whitefish	0.15	1.9	2.1	0.8
Northern Pike	0.50	6.4	7.1	2.5
Walleye	0.50	6.4	7.1	2.5
Lake Sturgeon	0.25	3.2	3.5	1.3

* Standard lengths: lake whitefish 350 mm; northern pike 550 mm; walleye 400 mm,
Individual mercury concentrations would be dependent upon the size of the fish with the smaller fish having generally lower concentrations than bigger fish.
** Arithmetic mean concentration.
*** Based on information provided by local First Nation communities, all fish were assumed to be consumed at a frequency of three meals per week with a serving size of 100 g for toddlers and 400 g for adults.

Table 5-6 provides the post-impoundment RMWIs for the average-sized fish that would result in a Hazard Quotient value of 1. For some fish species, it should be clear that the RMWIs under post-impoundment are appreciably lower than under present day conditions. For example, the RMWI for northern pike and walleye are approximately four times lower under post-impoundment as compared to present conditions. For other fish

species, such as lake whitefish from Stephens Lake, the RMWI is lowered only slightly. In addition, it should be noted that these RMWIs are specific to fish of standard length and it would be possible to consume smaller fish at a greater rate than specified in Table 5-4. Finally, it should be noted that these RMWIs are specific to maximum mercury concentrations that are expected to occur a few (3-7) years after reservoir creation (Keeyask Hydropower Limited Partnership, 2012a). After that time, fish concentrations are expected to decline and it may be possible to gradually increase the RMWIs.

Table 5-6 Recommend Maximum Weekly Intakes of Fish for a Hazard Quotient Value = 1: Post-Impoundment Conditions

Fish Species	Assumed Concentration (µg/g, wet weight)*	Recommended Maximum Weekly Intake (g/week) for a HQ =1 (All for Fish of Standard Length)		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Gull Lake				
Lake Whitefish	0.19	120	440	1,200
Northern Pike	1.0	23	84	230
Walleye	1.0	23	84	230
Lake Sturgeon**	0.30	77	280	780
Stephens Lake				
Lake Whitefish	0.15	160	560	1,600
Northern Pike	0.50	46	170	470
Walleye	0.50	46	170	470
Lake Sturgeon**	0.25	93	340	940

* Standard lengths: lake whitefish 350 mm; northern pike 550 mm; walleye 400 mm,
Individual mercury concentrations would be dependent upon the size of the fish with the smaller fish having generally lower concentrations than bigger fish.
** Arithmetic mean concentration.

The important aspect of this RMWI information is that it provides consumption recommendations that are independent of serving size. For example, a RMWI of 440 g/week for women of childbearing age consuming lake whitefish from Gull Lake means that a woman could have about 1 meal per week if serving size is 400 g (14 ounces) or two meals per week if the serving size is 200 g (seven ounces) or three meals per week if

the serving size in 150 g (5.3 ounces). All three scenarios would still result in a woman consuming about 400 to 450 g of lake whitefish which would equate to an exposure approximately equal to a Hazard Quotient value of 1 (assuming consumption of lake whitefish of standard length). Thus, if a person does not consume 400 g of fish in a single serving, they can use these RMWIs to estimate the amount of fish that can be consumed.

The concentration of mercury will be directly dependent upon the size of the fish. In all cases, smaller fish will have lower concentrations. Nevertheless, NSC (North South Consultants *pers. comm*. 2010) concluded that there was not sufficient information to do a length-class specific analysis of mercury concentrations for the post-impoundment scenario. Consequently, in contrast to the present-day scenario, specific fish size recommendations for consumption are not provided for the post-impoundment scenario.

Consequently, the following approach was used to derive overall consumption recommendations:

- A Hazard Quotient value of 1 was assumed to be acceptable; however, all fish less than 0.2 µg/g were classified as acceptably low and no consumption restrictions were recommended;
- Serving sizes are 100 g for toddlers and 400 g for adults;
- The following consumption categories were used:
    - Unrestricted eating;
    - Eat up to 1 meal per week;
    - Avoid consumption.

Using the above approach, Table 5-7 provides the overall consumption recommendations based on predicted post-impoundment conditions. If impoundment were to proceed in the future, it may be possible to develop size-specific recommendations for the various fish. Under such an approach, the consumption recommendations could be refined and it may be possible that certain fish consumption recommendations may be less strict for smaller sizes of fish.

Table 5-7 Overall Recommendations for Consumption Based on Fish Size Class: Post-Impoundment Conditions (based on Predicted Mean Mercury Concentrations and Standard Lengths)

Receptor Group of Concern	Lake Whitefish of Standard Length (i.e., 350 mm)	Northern Pike of Standard Length (i.e., 550 mm)	Walleye of Standard Length (i.e., 400 mm)
Gull Lake			
Women of childbearing age and toddlers	Unrestricted eating	Avoid eating	Avoid eating
Adult men and women past child-bearing age	Unrestricted eating	Avoid eating	Avoid eating
Stephens Lake			
Women of childbearing age and toddlers	Unrestricted eating	Avoid eating	Avoid eating
Adult men and women past child-bearing age	Unrestricted eating	Eat up to 1 meal per week	Eat up to 1 meal per week

Notes:
Based on serving sizes of 400 grams per serving for men and women and 100 grams per serving for toddlers.
A Hazard Quotient value of 1 was assumed to be acceptable; however, all fish with mercury concentrations less than 0.2 µg/g were classified as acceptable mercury concentrations and no consumption restrictions from current frequencies were recommended.

If impoundment occurred, it would be important that fish consumption recommendations for fish be communicated to local First Nations people through community health practitioners.

5.1.3 Health Effects from Consuming Fish at Rates Greater than the RMWI

This section addresses the potential health effects that could be associated with persons who consume fish at rates greater than the RMWIs or have Hazard Quotient values greater than . Both the present and post-impoundment scenarios have estimated fish consumption rates (RMWIs) that may be exceeded.

5.1.3.1 Present Conditions

Under present conditions, it is apparent that persons should take and avoid excessive consumption of certain northern pike and walleye. The key concern is consumption of larger northern pike and walleye by women of childbearing age and young children. Nevertheless, potential unacceptable risks could affect persons of any age if unrestricted consumption of the larger fish occurred on a frequent basis.

Blood and hair measurements are a well known and accurate method for estimating of both exposure and risks from methylmercury in fish. To evaluate potential health risks, the Health Canada approach has been employed whereby mercury hair concentrations less than 5 ppm (or 20 µg/L in blood) are considered to be in the "normal range" while concentrations between 5 and 25 ppm (25 to 100 µg/L in blood) are in the "increasing risk" range and concentrations above 25 ppm (or 100 µg/L in blood) are considered to be "at risk" levels (INAC 2009). In addition, to these broad classifications, the following tissue concentrations would be close to known effects levels from the literature:

- Health Canada (1998) and US EPA (2011) have indicated that maternal mercury concentrations of 10 ppm in hair and/or 58 µg/L in blood are generally equal to the threshold for a 5% increased risk of developmentally delayed children. Although there have been no clearcut clinical abnormalities in children born to mothers with mercury concentrations above 10 ppm in hair or 58 µg/L, there have been effects on language, attention and memory that have been reported to be mercury-related.
- US EPA (2011) has developed a Benchmark Dose Level ($BMDL_{05}$) (the lower 95% confidence limit of the BMD_{05}) of 59 µg/L in maternal blood for neurological effects in children. This blood concentration would result in a doubling of the number of children with a neurological response at the fifth percentile of the population.
- Axelrad *et al.* (2007) has estimated that mercury concentrations of 1 ppm in maternal hair may be associated with a 0.18 IQ point decrement in children (*i.e.*, 10 ppm may be associated with a 1.8 IQ point decrement); however, it is unclear if Axelrad *et al.* (2007) appropriately controlled for other factors and this relationship has not yet been used by any major health agency. It is stressed there can be a great number of everyday factors that can affect IQ at rates much greater than 1.8 IQ (as summarized in Wilson *et al.* [2005][2] a person's

[2] As summarized in Wilson *et al.* (2005), example of factors that may each cause an IQ decrement of three points or more include: socio-economic status (SES); parent's education, family size and child's position in family; enriched pre-school and breast feeding. Furthermore, it is noted that the standard deviation on an IQ test is three points.

environment may affect their IQ by 20 to 25 points) and, thus, the proper context should be provided to a potential 1.8 IQ decrement at 10 ppm.

- In addition to the comparison of these literature-effect levels, it is possible that to compare the exposure to the Inuit in the Canadian Arctic. INAC (2009) data indicate that only 2% of Nunavut/Inuit women sampled between 2005 and 2007 had blood levels of mercury greater than 20 µg/L.

It is beyond the scope of this analysis to attempt to predict the blood and hair levels of mercury that may be currently be present in the communities due to fish consumption. We understand that local First Nation communities have a dialogue with health agency officials regarding such testing but this information is considered to be private medical information that is not to be used in this HHRA. With the above noted, the greatest Hazard Quotient under present conditions was estimated to be 4.7 under present conditions (as shown in Table 5-1). It is not clear that actual adverse health effects would occur at such exposures and, instead, it is only clear that a desired margin of safety would be intruded upon. Nevertheless, it is stressed that Hazard Quotient values of 4.7 are not desirable and would place women and their developing babies in the "increasing risk" that has been defined by Health Canada. Consequently, there is importance to making good decisions regarding fish consumption under the present scenario since there would be much lower risks for women consuming lake whitefish or smaller northern pike and walleye (*i.e.,* fish with mercury concentrations less than 0.2 µg/g).

In addition to the effects on development, there have been concerns regarding cardiovascular effects of mercury. Clinical effects in adults have included increased blood pressure. Roman *et al.* (2011) have indicated that a dose-response relationship could be developed for methylmercury exposure and acute myocardial infarction; however, at the current time, we are not aware of any recognized relationship that can be quantified and applied to the results of this risk assessment. Moreover, in two very large US cohorts, Mozaffarian *et al.* (2011) found no evidence of any clinically relevant adverse effects of mercury exposure on coronary heart disease, stroke, or total

cardiovascular disease. Consequently, at the current time, the effect of mercury on cardiovascular risk remains unclear.

Overall, for persons with Hazard Quotient values up to 4.7, there is a recognized risk of children being born who later do not perform as well as in various mental tasks. In addition, there is the potential for other health effects that may include cardiovascular effects. Ideally, it would be prudent for persons to attempt to lower exposures through good choices of fish consumption (*i.e.*, people should try to consume fish with mercury concentrations less than 0.2 µg/g). On the other hand, there could also be risks from persons not consuming fish (since fish can be such an important source of nutrients and the health effects of not eating fish is not an issue that has been quantified in this report). As a result, it is stressed that this information should be used to make informed choices about fish consumption.

5.1.3.2 Post-Impoundment Conditions

There is potential for unacceptable health risks for persons who decide to frequently consume fish from Gull and Stephens lakes. There would be greater risks associated with the consumption of northern pike and walleye in Gull Lake but consumption recommendations are also recommended for such fish from Stephens Lake to a lesser extent and lake sturgeon from both lakes. On the other hand, there could also be health risks if persons choose to consume fish and instead substitute less healthy foods in their diet. Thus, it is important that persons should be encouraged to use, to the maximum extent possible, the programs that enable use of lakes unaffected by the Project.
Similar to that discussed for present-day conditions, it is beyond the scope of this analysis to attempt to predict the blood and hair levels of mercury that may be present in the communities following impoundment with maximum Hazard Quotient values of 14.2. Future hair and blood concentrations would be expected to follow fish mercury concentrations (for which we have estimated levels) but would also be dependent on how many and which people choose to use the lakes unaffected by the Project versus Gull Lake versus Stephens Lake (all unknown variables). Nevertheless, it should be apparent that for persons frequently consuming fish at mercury concentrations of 1 µg/g (*i.e.*,

Hazard Quotient values up to 14.2), exposures would be classified in the Health Canada "at risk" range. For women who continues to consume Gull Lake northern pike or walleye from Gull Lake at 1.2 kilograms of northern pike or walleye (1.0 ppm for standardized size) per week, it could be expected that hair and blood concentrations exceed the previously described known effects levels from the literature (main concerns would be development effects in children and potential cardiovascular effects in adults). Such populations would be considered to be in the Health Canada "at risk" range. In addition, such concentrations would be greater than the majority of Nunavut/Inuit women sampled between 2005 and 2007 by INAC (2009) (*i.e.*, only two percent had blood levels of mercury greater than 20 µg/L).

It is noted that this Hazard Quotient was estimated by assuming that a 60 kg women consumes 1.2 kg of northern pike or walleye per week on a consistent basis. If a woman consumed less fish, the exposure and risk values would accordingly decrease. For example, if a woman consumed serving sizes of seven ounces rather than 14 ounces (but still at a rate of three meals of northern pike or walleye per week), the Hazard Quotient values would be halved (*i.e.*, Hazard Quotient values of 7.1). Such halving would place women in the "increasing risk" range of exposure (rather than in the "at risk" range).

Although these levels of exposures are of concern, it is important to recognize that these are not estimates of blood and hair concentrations that will occur in the community as a whole. First of all, there are programs in the Adverse Effects Agreements to enable the KCNs to access lakes unaffected by the Project that will provide an alternate source of fish and, thus, if the people use these programs, it should not be a health concern. In addition, these estimates apply to consumption of a 1.2 kg of northern pike or walleye from Gull Lake per week on a consistent basis. Appreciably lower hair and blood levels would be associated with less frequent consumption of the same fish and it is also noted that accumulation of such levels takes several weeks of such consumption such that lower blood and hair concentrations would be associated with lower frequencies of consumption of fish from Gull Lake. As discussed earlier, the rate of compliance with

following the fish consumption recommendations and the use of these programs will be key factors relating to future concentrations of mercury in hair and blood.

Overall, it is considered to be important that persons follow the fish consumption recommendations and utilize the programs to access areas unaffected by the Project under post-impoundment conditions. As is also currently the case under present-day conditions, it will be important that persons do no frequently consume the fish that will have concentrations above 0.2 µg/g under post-impoundment conditions. If persons frequently consume northern pike and walleye from Gull and Stephens lakes following impoundment, individuals could be in the "at risk" range of tissue concentrations. On the other hand, under the programs in the Adverse Effects Agreements to enable the KCNs to access lakes unaffected by the Project, there would be no adverse effects or unacceptable risks if persons follow recommendations. This information should be used to make informed choices about fish consumption with special emphasis on the consumption of fish from unaffected lakes during the post-impoundment elevation in fish concentrations.

5.2 RISKS FROM CONSUMPTION OF WILD GAME

Risks from consumption of wild game (beaver, muskrat, moose and snowshoe hare) were estimated for the present conditions and for the post-impoundment scenario. Based on information provided by local First Nation communities, the following consumption rates of wild game were assumed:

- Moose was assumed to be consumed at a frequency of five meals per week with a serving size of 100 g (3.5 ounces) per meal for toddlers and 400 g (14 ounces) per meal for adults.

- Beaver was assumed to be consumed at a frequency of three meals per week with a serving size of 57 g (two ounces) per meal for toddlers and 200 g (seven ounces) per meal for adults.

- Muskrat and snowshoe hare were assumed to be consumed at a frequency of 1 meal per week with a serving size of 57 g (two ounces) per meal for toddlers and 200 g (seven ounces) per meal for adults.

These rates of consumption were used at the request of local First Nations and are considered to represent upper bound exposures. It is recognized that some wild game are only consumed at certain times of the year (*e.g.*, muskrat and beaver are mostly consumed in the colder months). Similar to that discussed for fish consumption, less than continuous exposure was not quantitatively considered in the HHRA because the key concern regarding mercury is developmental toxicity. In addition, although moose are mainly harvested in the fall, the meat is stored in a freezer and can be consumed all year. As a result, the risks from consumption of the various forms of wild game were not adjusted for less than all year round consumption patterns.

5.2.1 Present Conditions

Table 5-8 provides the risk estimates for consumption of wild game under present conditions. Key results of the risk analysis include the following:

- Consumption of wild game at present concentrations of total mercury is not associated with unacceptable risks. The greatest risks were estimated from consumption of moose; however, five times per week consumption of large serving sizes resulted in Hazard Quotient values approximately equal to 0.5.

- Even lower Hazard Quotient values were estimated from consumption of muskrat, beaver and snowshoe hare (due to a combination of lower total mercury concentrations, less consumption frequency and smaller serving sizes).

Based on the results, consumption of large meals of any wild game does not pose unacceptable health risks under present conditions. As noted in Section 3, there is some uncertainty in regard to the moose and snowshoe hare concentrations of mercury and it is

recommended that monitoring of these species be completed to ascertain that the assumed mercury concentrations were reasonable.

Table 5-8 Risk Estimates from Consumption of Wild Game: Present Conditions

Wild Game Species	Assumed Concentration* (µg/g, wet weight)	Hazard Quotient (Acceptable Value = 1)**		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Beaver	0.01	0.03	0.02	0.02
Muskrat	0.02	0.02	0.02	0.01
Moose*	0.07	0.5	0.29	0.24
Snowshoe hare*	0.05	0.04	0.04	0.03

* Mercury concentration in moose and snowshoe hare was only a literature estimate and may have greater uncertainty than other species for which measured values were obtained from the study area
** Hazard Quotient estimated assuming either five meals per week for moose, three meals per week for beaver or 1 meal per week for snowshoe hare/muskrat

Table 5-9 provides the RMWIs that would result in a Hazard Quotient value of 1 for the various wild game species considered in the HHRA. Once again, this RMWI information provides consumption recommendations that are independent of serving size.

Table 5-9 Recommended Maximum Weekly Intakes of Wild Game: Present Conditions

Wild Game Species	Assumed Concentration (µg/g, wet weight)*	Recommended Maximum Weekly Intake (g/week)		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Beaver	0.01	6,600	24,000	28,000
Muskrat	0.02	3,300	12,000	14,000
Moose*	0.07	940	3,400	4,100
Snowshoe hare*	0.05	1,300	4,800	5,700

* Mercury concentration in moose and snowshoe hare were literature estimates and may have greater uncertainty than other species for which measured values were obtained from the study area

Using terminology where frequent consumption refers to three to five meals per week with serving sizes of 100 g for toddlers and 200 g for adults, the following recommendation can be made under the present conditions:

- Beaver, muskrat, moose and snowshoe hare can be frequently consumed by all members of the communities.

5.2.2 Post-Impoundment Scenario

Table 5-10 provides the risk estimates for consumption of wild game that would occur under post-impoundment conditions. In some cases, it is important to realize that these risk estimates are based on very high rates of wild game consumption (*i.e.*, moose was assumed to be consumed at a frequency of five meals per week with a serving size of 100 g per meal for toddlers and 400 g per meal for adults).

Key results of the risk analysis include the following:

- In the case of moose, beaver and snowshoe hare, the concentrations of total mercury in the tissue of these animals would not be expected to change post-impoundment. As a result, there is no change in risk from consumption of these animals and risks are estimated to remain acceptable.

- In the case of muskrat, the risks from consumption were estimated to be acceptable for the post-impoundment scenario (*i.e.*, Hazard Quotient less than 1) even though total mercury concentrations may increase from 0.02 µg/g to 0.04 µg/g.

It is noted that some aquatic mammals such as otter and mink may experience appreciably higher increases in total mercury concentrations than the mammals considered in the HHRA. However, consultation has indicated that these mammals are not consumed by the local First Nation communities. Nevertheless, it should be clear that risks from consumption of such aquatic mammals were not considered in the HHRA.

It is also noted that certain other wild game has not been considered in the HHRA. For example, the HHRA has not evaluated consumption of lynx, bear or caribou. These

animals are not expected to have higher concentrations of mercury than the wild game considered in the HHRA (*i.e.*, the animals considered in the HHRA will have more direct contact with the aquatic ecosystem and/or more potential to accumulate mercury). In addition, these animals are not consumed as frequently as the animals considered in the HHRA. Since risks were acceptable from consumption of the wild game that was more likely to contribute risks from mercury, it can be conservatively concluded that risks would be even lower and, therefore, acceptable for these other animals not formally considered in the HHRA.

Overall, based on the results (see Table 5-10), consumption of large meals of any wild game does not pose unacceptable health risks under post-impoundment conditions. As noted in Section 3, there is some uncertainty in regard to the moose and snowshoe hare concentrations of mercury and it is recommended that monitoring of these species be completed to ascertain that the assumed mercury concentrations were reasonable.

Table 5-10 Risk Estimates from Consumption of Wild Game: Post-Impoundment Conditions

Wild Game Species	Assumed Concentration* (µg/g, wet weight)	Hazard Quotient (Acceptable Value = 1)**		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Beaver	0.01	0.03	0.02	0.02
Muskrat	0.04	0.03	0.03	0.03
Moose*	0.07	0.5	0.29	0.24
Snowshoe hare*	0.05	0.04	0.04	0.03

* Mercury concentration in moose and snowshoe hare were based on a literature estimate and may have greater uncertainty than other species for which measured values were obtained from the study area
** Hazard Quotient estimated assuming either five meals per week for moose, three meals per week for beaver or 1 meal per week for snowshoe hare/muskrat

Table 5-11 provides the post-impoundment RMWIs that would result in a Hazard Quotient value of 1. The RMWIs provided in Table 5-9 all appear to be greater than the typical amounts of country foods that the local First Nation communities have reported to consume. Consequently, it is unlikely that unacceptable risks from consumption of wild game would exist under post-impoundment conditions due to mercury.

Table 5-11 Recommend Maximum Weekly Intakes of Wild Game: Present Conditions

Wild Game Species	Assumed Concentration (µg/g, wet weight)*	Recommended Maximum Weekly Intake (g/week)		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Beaver	0.01	6,600	24,000	28,000
Muskrat	0.04	1,600	6,000	7,100
Moose*	0.07	940	3,400	4,100
Snowshoe hare*	0.05	1,300	4,800	5,700

* Mercury concentration in moose and snowshoe hare were a literature estimate and may have greater uncertainty than other species for which measured values were obtained from the study area

Using terminology where frequent consumption refers to three to five meals per week with serving sizes of 100 g for toddlers and 200 g for adults, the following recommendation can be made under post-impoundment conditions:

- Beaver, muskrat, moose and snowshoe hare can be frequently consumed by all members of the communities.

5.3 RISKS FROM CONSUMPTION OF WATERFOWL

Risks from consumption of waterfowl (*i.e.*, ducks) were estimated for the present conditions and for the post-impoundment scenario. Based on information provided by local First Nation communities, ducks were assumed to be consumed at a frequency of 1 meal per week with a serving size of 57 g (two ounces) per meal for toddlers and 200 g (seven ounces) per meal for adults. These rates of consumption were used at the request of local First Nation communities.

It is recognized that ducks are only consumed at certain times of the year (*i.e.*, mostly in the spring and fall). Similar to that discussed for fish consumption, less than continuous exposure was not quantitatively considered in the HHRA because the key concern regarding mercury is developmental toxicity. In addition, duck meat could be placed in a

freezer and can be consumed all year. As a result, the risks from consumption of waterfowl were not adjusted for less than all year round consumption patterns.

Finally, it is noted that the mercury present in duck tissue was assumed to be methylmercury rather than total mercury. Consequently, the more conservative methylmercury TRV (i.e., 0.2 µg/kg bw/day for sensitive populations) was used rather than the 0.57 µg/kg bw/day that the WHO has recommended for use when mercury is not present in fish and shellfish. Although this is considered to be conservative, the avian experts have indicated that the mercury concentrations in waterfowl are expected to mirror the whitefish concentrations and that no further information on mercury speciation was available. If monitoring of waterfowl indicates that the mercury is not present as methylmercury, it would be possible to adjust these risk estimates (*i.e.,* even lower risks would be predicted).

5.3.1 Present Conditions

Table 5-12 provides the risk estimates for consumption of waterfowl under present conditions. Key results of the risk analysis include the following:

- Consumption of waterfowl at present concentrations of total mercury is not associated with unacceptable risks.

- Even lower Hazard Quotient values would be estimated from consumption of other waterfowl (such as geese) (due to a combination of lower total mercury concentrations and possibly less consumption frequency).

- No risk estimate was available for gull eggs since no estimate of the mercury concentration of these eggs was available. To provide an estimate of risks from eggs, monitoring of gull eggs would likely be required.

Based on the results, consumption of duck and other waterfowl does not pose unacceptable health risks under present conditions. No estimate can be provided on the

risks from consumption of gull eggs. As noted in Section 3, there is some uncertainty in regard to the duck concentrations of mercury and it is recommended that monitoring of these species be completed to ascertain that the assumed mercury concentrations were reasonable.

Table 5-12 Risk Estimates from Consumption of Waterfowl: Present Conditions

Fish Species	Assumed Concentration* (µg/g, wet weight)	Hazard Quotient (Acceptable Value = 1)**		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Gull Lake				
Duck	0.07	0.17	0.17	0.06
Stephens Lake				
Duck	0.09	0.22	0.21	0.08

* Mercury concentration in duck was assumed to be similar to that estimated for lake whitefish
** Hazard Quotient estimated assuming 1 meal per week

Table 5-13 provides the RMWIs that would result in a Hazard Quotient value of 1. Once again, this RMWI information provides consumption recommendations that are independent of serving size. Since geese are expected to have even lower concentrations than ducks, no unacceptable risks would be predicted from goose consumption at these RMWIs for ducks.

Table 5-13 Recommend Maximum Weekly Intakes of Waterfowl: Present Conditions

Fish Species	Assumed Concentration (µg/g, wet weight)*	Recommended Maximum Weekly Intake (g/week)		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Gull Lake				
Duck	0.07	330	1,200	3,400
Stephens Lake				
Duck	0.09	260	940	2,600

* Mercury concentration in duck was assumed to be similar to that estimated for lake whitefish

Consumption recommendations for waterfowl should be communicated to local First Nations people through community health practitioners. Using terminology where frequent consumption refers to two to three meals per week with serving sizes of 100 g for toddlers and 200 g for adults, the following recommendation can be made under present conditions:

- Ducks can be consumed frequently by all members of the communities.

5.3.2 Post-Impoundment Scenario

Table 5-14 provides the risk estimates for consumption of waterfowl that would occur under post-impoundment conditions. Key results of the risk analysis include the following:

- In the case of ducks from Stephens Lake, a small increase in methylmercury concentration predicted. As a result, there is no or little change in risk from consumption of these animals and risks are estimated to remain acceptable.

- In the case of ducks from Gull Lake, the risks from consumption were estimated to be acceptable for the post-impoundment scenario (*i.e.*, Hazard Quotient less than 1) even though total mercury concentrations may increase from 0.07 µg/g to 0.19 µg/g.

It is also noted that certain other waterfowl has not been considered in the HHRA. For example, the HHRA has not evaluated consumption of geese. Geese are not expected to have higher concentrations of mercury than the ducks considered in the HHRA. Since risks were acceptable from consumption of ducks, it can be safely concluded that risks would be even lower and, therefore, acceptable for geese even though it was not formally considered in the HHRA.

Overall, based on the results, consumption of waterfowl would not pose unacceptable health risks under post-impoundment conditions. As noted in Section 3, there is some uncertainty in regard to duck concentrations of mercury and it is recommended that monitoring of these species should be completed to ascertain that the assumed mercury concentrations were reasonable.

Table 5-14 Risk Estimates from Consumption of Waterfowl: Post-Impoundment Conditions

Fish Species	Assumed Concentration* (µg/g, wet weight)	Hazard Quotient (Acceptable Value = 1)**		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Gull Lake				
Duck	0.19	0.47	0.45	0.16
Stephens Lake				
Duck	0.15	0.37	0.35	0.13

* Mercury concentration in duck was assumed to be similar to that predicted for lake whitefish
** Hazard Quotient estimated assuming 1 meal per week

Table 5-15 provides the post-impoundment RMWI that would result in a Hazard Quotient value of 1. The RMWIs provided in Table 5-13 all appear to be greater than the typical amounts of duck that the local First Nation communities have reported to consume. Consequently, it is unlikely that unacceptable risks from consumption of waterfowl would exist under post-impoundment conditions due to mercury.

Table 5-15 Recommend Maximum Weekly Intakes of Waterfowl: Post-Impoundment Conditions

Bird Species	Assumed Concentration (µg/g, wet weight)*	Recommended Maximum Weekly Intake (g/week) for Fish of Standard Length		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Gull Lake				
Duck	0.19	120	440	1,200
Stephens Lake				
Duck	0.15	160	560	1,600

* Mercury concentration in duck was assumed to be similar to that estimated for lake whitefish

Using terminology where frequent consumption refers to three to five meals per week with serving sizes of 100 g for toddlers and 200 g for adults, the following recommendation can be made under post-impoundment conditions:

- Ducks can be consumed frequently by all members of the communities.

Consumption recommendations for waterfowl should be communicated to local First Nations people through community health practitioners.

5.4 RISKS FROM CONSUMPTION OF WILD PLANTS

The local First Nation communities identified the following plants as primary concern:

- Northern tea;
- Blueberries; and
- Seneca root.

As discussed earlier in Section 3.4, no estimates of mercury concentrations in wild plants are available under either present or post-impoundment conditions. Consequently, no risk estimates are available from consumption of wild plants. If risk estimates are required, it will likely be necessary to collect samples from the study area.

5.5 RISK FROM CONTACT WITH SURFACE WATER

The final media of concern that was evaluated in the HHRA was surface water. For the purposes of the HHRA, it was assumed that local First Nation communities would consume surface water as their drinking water source. In addition, it was assumed that the communities would use the water for bathing/swimming. For both the present and post-impoundment scenarios, mercury was assumed to be present in surface water at a concentration equal to the method detection limit of 0.05 µg/L

5.5.1 Present Conditions

Table 5-16 provides the risk estimates from contact with surface water under present conditions. Key results of the risk analysis include the following:

- Present surface water concentrations (less than method detection limit of 0.05 µg/L) are appreciably lower than the Canadian Drinking Water Guideline of 1 µg/L for total mercury.

- Hazard Quotient from ingestion and dermal contact with surface water is not associated with unacceptable risks.

Based on the results, contact with surface water does not pose unacceptable health risks under present conditions.

Table 5-16 Risk Estimates from Contact with Surface Water: Present Conditions

Route of Concern	Assumed Concentration* (µg/L)	Hazard Quotient (Acceptable Value = 1)		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Drinking (direct ingestion)	0.05	0.0032	0.0022	0.0019
Bathing/swimming (dermal)	0.05	0.000032	0.000026	0.000022
Total		0.0032	0.0022	0.0019

* Mercury concentration in surface water was assumed to equal the method detection limit

5.5.2 Post-Impoundment Scenario

Table 5-17 provides the risk estimates from contact with surface water under post-impoundment conditions. Key results of the risk analysis include the following:

- No changes in surface water concentrations of mercury are expected under post-impoundment conditions (*i.e.*, surface water concentrations would be expected to remain less than method detection limit of 0.05 µg/L).

- Hazard Quotient from ingestion and dermal contact with surface water is not associated with unacceptable risks.

Based on the results, contact with surface water would not pose unacceptable health risks under post-impoundment conditions.

Table 5-17 Risk Estimates from Contact with Surface Water: Post-Impoundment Conditions

Route of Concern	Assumed Concentration* (µg/L)	Hazard Quotient (Acceptable Value = 1)		
		Toddlers	Women of Childbearing Age	Adult Males and All Seniors
Drinking (direct ingestion)	0.05	0.0032	0.0022	0.0019
Bathing/swimming (dermal)	0.05	0.000032	0.000026	0.000022
Total		0.0032	0.0022	0.0019

* Mercury concentration in surface water was assumed to equal the method detection limit

5.6 CHEMICAL INTERACTION ASSESSMENT OF VARIOUS FORMS OF MERCURY

A final consideration in the HHRA involves estimation of risks for persons who may be involved in multiple activities. For example, what are the health risks for a person who is exposed to surface water (mercury primarily as inorganic) and also consumes country foods? Or, what are the health risks for a person who consumes multiple types of country foods?

In the case of adding mercury-related risks from surface water exposures to consumption of country foods, the combination of these activities will not change the conclusions or recommendations. As illustrated previously in Tables 5-16 and 5-17, it is expected that risks from mercury due to contact with surface water would be associated with a Hazard Quotient value of 0.0032 for toddlers (and even less for other age groups). When this Hazard Quotient is added to the values associated with consumption of fish, wild game or waterfowl, the sum of the Hazard Quotient values remains essentially unchanged in all cases.

When the Hazard Quotient of 0.0032 from surface water is added to the values associated with consumption of certain fish, the sum of the Hazard Quotient values will remain above 1 for various consumption scenarios; however, there is no reason to recommend that persons consuming fish should avoid using the surface water (and vice versa). In past

guidance from international health agencies (such as Health Canada and the World Health Organization), consumption advice to the general public has typically allowed for exposures from fish to contribute a Hazard Quotient value of 1 from methyl mercury, irrespective of other forms of mercury exposures.

In the case of interactive effects from consumption of multiple country foods, it is clear that fish consumption is the dominant contributor in terms of risks. Although moose consumption also theoretically contributes a Hazard Quotient of 0.5, this is based on a person consuming large amounts of moose on a daily basis and, thus, it is likely that their fish consumption would drop under such circumstances. In addition, it has not been confirmed that the mercury concentrations of 0.07 µg/g for moose muscle tissue would actually occur at the study area. Finally, mercury concentrations in moose tissues was predicted to be essentially unaffected by impoundment. Nevertheless, the possible implications of cumulative exposure is discussed in greater detail below.

There are too many possible combinations to fully evaluate all possible interactions that may occur. As an alternative, the percentage of the TDI that 1 meal per week of each food group would represent was estimated as shown below. In completing these calculations, the meal sizes provided earlier were used:

- Toddler fish and moose meal = 100 g;
- Toddler beaver/muskrat/snowshoe hare/duck meal = 57 g;
- Adult fish and moose meal = 400 g; and
- Adult beaver/muskrat/snowshoe hare/duck meal = 200 g.

Once again, it should be noted that these represent rather large portion sizes for adults and Health Canada often uses a fish serving size of 200 g in most of their evaluation of adults (while in the case of the toddler, the 100 g is similar to Health Canada policy).

5.6.1 Present Conditions

As discussed above, the percentage of the TDI that 1 meal per week of each food would represent was estimated for present conditions and is provided in Table 5-18. As shown in this table, some food combinations would likely result in exposures exceeding the TDI under present conditions and, indeed, some foods by themselves (*i.e.*, northern pike and walleye) could result in exposures exceeding the TDI if consumed on a once per week basis under present conditions. In other words, the recommended fish consumption for certain fish under present conditions is less than a meal per week if people or agencies want exposures less than the TDI for methyl mercury. Nevertheless, it is stressed that people should not be discouraged from consuming such a diet that is based on country foods under present conditions provided in the previous fish consumption recommendations. Rationale that supports the current country foods diet as not requiring further restrictions includes:

- Under present conditions, fish recommended for frequent consumption (*i.e.*, lake whitefish) typically have mercury tissue concentrations less than 0.1 µg/g. Wilson Scientific is not aware of any major health agency that advises against frequent consumption for fish with less than 0.2 µg/g of mercury (especially given the nutritional benefits that such fish also offer). With the above in mind, selecting lake whitefish less than 450 mm in length will ensure the lowest exposures.

- Under present conditions, fish recommended for occasional consumption (*i.e.*, northern pike, walleye and lake sturgeon) typically have mercury tissue concentrations less than 0.3 µg/g. Wilson Scientific is not aware of any major health agency that advises against occasional consumption for fish with less than or equal to 0.5 µg/g of mercury (especially given the nutritional benefits that such fish also offer). With the above in mind, selecting northern pike and walleye less than 400 mm in length will ensure the lowest exposures.

- Under present conditions, all wild game and waterfowl are expected to typically have mercury tissue concentrations less than 0.1 µg/g. We are aware of no major health agency that provides consumption advice for acceptable mercury concentrations in muscle tissue of meat but, nevertheless, wild game with concentrations less than 0.1 µg/g results in quite low exposures and consumption of these foods offers substantial nutritional benefits (especially when compared to many store bought conventional foods).

Consequently, despite numerous combinations where the exposure may exceed the TDI (*i.e.*, Hazard Quotient values greater than 1), the consumption recommendations for present conditions are considered to be appropriate for the study area. Notwithstanding the above, the communities should be aware that excessive consumption of certain fish under present conditions may be a concern and, where possible, steps should be taken to select foods lowest in mercury. In particular, toddlers and women of child-bearing age should not consume the larger predatory fish (northern pike, walleye) or long-lived fish (lake sturgeon) more than once per week due to the higher mercury concentrations. During the week that they consume the fish with higher mercury concentrations, it would be advisable to reduce exposure to other fish. In addition, it should also be clear for everyone that lower mercury exposure are associated with consumption of smaller sizes of any fish species (*e.g.*, northern pike less than 400 mm may have lower concentrations than lake whitefish longer than 450 mm – see Table 5-3).

Table 5-18 Risk Estimates from Mercury for Combined Sources: Present Conditions

Food	% of TDI Used Based on 1 Meal per Week		
	Toddlers	Women of Childbearing Age	Other Members of the General Population
Gull Lake			
Lake whitefish	30	33	12
Northern Pike	94	104	37
Walleye	99	108	39
Lake sturgeon	86	94	34
Duck	17	17	6
Beaver	3	<1	<1
Muskrat	<1	<1	<1
Moose	10	12	10
Snowshoe hare	4	4	3
Stephens Lake			
Lake whitefish	40	42	15
Northern Pike	110	123	44
Walleye	120	137	49
Lake sturgeon	No estimate available	No estimate available	No estimate available
Duck	17	17	6
Beaver	<1	<1	<1
Muskrat	2	2	1
Moose	10	12	10
Snowshoe hare	4	4	3

5.6.2 Post-Impoundment Conditions

Under post-impoundment conditions, the percentage of the TDI that 1 meal per week of each food would represent is provided in Table 5-19. As shown in this table, some food combinations will likely result in exposures exceeding the TDI under present conditions and, indeed, some foods by themselves (*i.e.*, northern pike and walleye) could result in exposures exceeding the TDI if consumed on a once per week basis from either Gull Lake or Stephens Lake under post-impoundment conditions. Nevertheless, it is stressed that people should not be discouraged from consuming such a diet that is based on certain country foods and follows the previously provided fish consumption recommendations. Rationale that supports the country foods diet as not requiring further restrictions includes:

- Under post-impoundment conditions, fish recommended for frequent consumption (*i.e.*, lake whitefish from either Gull Lake or Stephens Lake) would typically have mercury tissue concentrations less than 0.2 µg/g. Wilson Scientific is not aware of any major health agency that advises against frequent consumption for fish with less than 0.2 µg/g of mercury (especially given the nutritional benefits that such fish also offer). With the above in mind, selecting lake whitefish less than 450 mm in length would ensure the lowest exposures.

- Under post-impoundment conditions, fish recommended for occasional consumption (*i.e.*, northern pike and walleye from Stephens Lake and lake sturgeon from Stephens and Gull lakes) typically have mercury tissue concentrations less than or equal to 0.5 µg/g. Wilson Scientific is not aware of any major health agency that advises against occasional consumption for fish with less than 0.5 µg/g of mercury (especially given the nutritional benefits that such fish also offer). With the above in mind, selecting northern pike and walleye less than 400 mm in length will ensure the lowest exposures.

- Under post-impoundment conditions, ducks from either Gull Lake or Stephens Lake would typically have mercury tissue concentrations less than 0.2 µg/g. Wilson Scientific is not aware of any major health agency that advises against frequent consumption for duck with less than 0.2 µg/g of mercury.

- Under post-impound conditions, wild game would not be expected to be appreciably impacted. Aside from muskrat, no wild game consumed by people (*i.e.*, beaver, moose or snowshoe hare) would have increased concentrations of mercury. In the case of muskrat, the estimated increase would be very minor and still result in final typical concentrations of only 0.04 µg/g. Once again, no major health agency provides consumption advice for acceptable mercury concentrations in muscle tissue of meat but, nevertheless, wild game with concentrations less than 0.1 µg/g results in quite low exposures and consumption of these foods offers substantial nutritional benefits.

Consequently, despite numerous combinations where the exposure may exceed the TDI (*i.e.*, Hazard Quotient values greater than 1), the consumption recommendations for post-impoundment conditions would be considered to be appropriate for the study area. Notwithstanding the above, the communities should be aware that excessive consumption of certain fish under present conditions may be a concern and, where possible, steps should be taken to select foods lowest in mercury. In particular, toddlers and women of child-bearing age should not consume the larger predatory fish (northern pike, walleye) and longer-lived fish (lake sturgeon) from Stephens Lake more than once per week due to the higher mercury concentrations. In addition, consumption of northern pike and walleye from Gull Lake should be avoided by these receptors. During the week that a person consumes fish with higher mercury concentration, it would be advisable to reduce exposure to other fish. In addition, it should also be clear for everyone that lower mercury exposure will be associated with consumption of smaller sizes of any fish species (*e.g.*, northern pike less than 400 mm may have lower concentrations than lake whitefish longer than 450 mm – see Table 5-3).

Another alternative to reduce mercury exposures would be consumption of fish from appropriate lakes unaffected by the Project. However, even from pristine lakes unaffected by the Project, it will be necessary to consider size and species of fish for persons desiring to reduce their mercury exposures (*i.e.*, certain fish from these offset lakes may have mercury concentrations that warrant consumption recommendations).

Table 5-19 Risk Estimates from Mercury for Combined Sources: Post-Impoundment Conditions

Food	% of TDI Used Based on 1 Meal per Week		
	Toddlers	Women of Childbearing Age	Other Members of the General Population
Gull Lake			
Lake whitefish	80	90	32
Northern Pike	430	470	170
Walleye	430	470	170
Lake sturgeon	130	140	50
Duck	47	45	16
Beaver	<1	<1	<1
Muskrat	3	3	3
Moose	10	12	10
Snowshoe hare	4	4	3
Stephens Lake			
Lake whitefish	60	71	25
Northern Pike	210	240	85
Walleye	210	240	85
Lake sturgeon	110	118	42
Duck	37	35	13
Beaver	<1	<1	<1
Muskrat	3	3	3
Moose	10	12	10
Snowshoe hare	4	4	3

6.0 DISCUSSION AND UNCERTAINTY ANALYSIS

The HHRA was completed using a series of upper-bound assumptions that are intended to over-estimate actual health risks and thereby ensure a conservative assessment. Given the conservative assumptions used in this assessment, it is quite possible that actual risks may be substantially lower than estimated here. Nevertheless, certain assumptions were key determinants in the acceptability of risks. The following sensitivity analysis discusses some of the most important assumptions that had key influences on the risk assessment.

Mercury Concentrations in the Environment

One source of uncertainty is the concentrations of mercury in surface water and country foods that persons may be exposed to through their typical daily activities. The HHRA relied heavily on present and post-impoundment concentrations that have been measured or predicted by other disciplines. The prediction of the magnitude and extent of the changes in environmental concentrations was considered to be beyond the scope of the HHRA.

In the case of fish concentrations, the largest uncertainty with the most substantial impact on consumption recommendations is for mercury concentrations in pike and walleye (*i.e.*, the NSC modeled post-impoundment estimates range from 0.81-1.33 µg/g and 0.83-1.46 µg/g). In addition, it is noted that there was particular uncertainty reported by the other disciplines in the mercury concentrations in the tissues of the following animals:

- Moose;
- Lake sturgeon;
- Snowshoe hare; and
- Ducks and geese.

It is anticipated that continued monitoring of concentrations can be used as a direct measure of the impact that present conditions and impoundment would have on mercury concentrations. Nevertheless, there remain uncertainties and, in all cases, future

environmental monitoring and risk management should be used to determine if environmental concentrations increase beyond those assumed in the HHRA.

Toxicity Reference Values

The approach that health agencies use to estimate acceptable or "safe" levels of exposure are typically very conservative and employ considerable safety factors to ensure protection of the general population. It is unlikely that such regulatory agency-derived exposure limits would underestimate health risks. Overall, the TRVs for the metals used in this assessment represent dose rates that are unlikely to present unacceptable health risks and may actually overestimate health risks.

Country Foods Consumption Rates

Highly conservative estimates of country foods consumption were assumed for the HHRA. The rate of country foods consumption was provided directly by members of First Nation communities as high-end estimates of food consumption. As a result, it is considered unlikely that these consumption rates underestimate exposures.

Overall Uncertainty in the Risk Assessment

Overall, it is unlikely that human health risks have been underestimated in the risk assessment and it is quite possible that already low risks have been overestimated. The potential combination of upper bound estimates of consumption patterns and conservative TRVs likely resulted in an overestimate of actual risks. Nevertheless, it is still possible (but not likely) that risks may have been underestimated for certain receptors in some cases. The two main conditions where risks may have been underestimated would include:

- Any situations where environmental sampling or modeling has underestimated mercury concentrations either currently or that would occur following impoundment; and

- Any situations where people are not accurately represented by the assumed receptor assumptions.

Risk management measures should be undertaken to ensure that neither of the conditions described above occur. If such conditions do occur, additional risk analysis would be recommended to address potential increases in human health risks.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The HHRA has indicated that under present conditions that most country foods can be consumed frequently (wild game, waterfowl and lake whitefish) except for northern pike, walleye and lake sturgeon which should only be occasionally consumed by young children and women of childbearing age. For fish from Gull and Stephens lakes, the present arithmetic mean mercury concentrations of lake whitefish are less than 0.1 µg/g while northern pike and walleye have an arithmetic mean concentration of approximately 0.3 µg/g. In the case of wild game, moose meat concentrations of mercury are largely unknown for the study area but have been estimated to perhaps be in the range of 0.07 µg/g while muskrat, beaver and snowshoe hare would have concentrations of mercury in muscle tissue in the range of 0.01 to 0.05 µg/g, depending on the species. The present concentrations suggest that lake whitefish and wild game can be frequently consumed. In the case of northern pike, walleye and lake sturgeon, it is considered to be acceptable that these fish can currently be consumed on an occasional basis by young children and women of childbearing age. In all cases, smaller-sized fish will have lower tissue concentrations of mercury.

Under the post-impoundment scenario, the mercury concentrations of fish in Gull Lake and Stephens Lake would increase such that it would be recommended that young children and women of childbearing age should only consume certain fish while avoiding other fish. Specifically, during years of maximum mercury concentrations in fish (perhaps 3 to 7 years post-impoundment; refer to Keeyask Hydropower Limited Partnership [2012a,b] for specific discussion on patterns of variation), the concentrations of mercury in fish and ducks from Gull Lake may increase by 0.5 to five times (smallest increase was in lake sturgeon and lake whitefish while greatest increase was in northern pike and walleye) while the concentrations of mercury from Stephens Lake would be more modest (perhaps 0.3 to 0.7 times increase). In the case of waterfowl, it is possible that fish eating ducks could experience an increase in mercury concentrations; however, the increase is not expected to result in the recommendation of consumption restrictions. The mercury concentrations of wild game tissues consumed by local First Nations (*i.e.,*

beaver, muskrat, moose or snowshoe hare) would be expected to be essentially unaffected by the impoundment.

It is considered to be extremely important that persons follow the fish consumption recommendations provided in this HHRA (especially under the post-impoundment scenario). Individuals could be in the "at risk" range of exposures if consumption recommendations are not followed. The information provided in this evaluation should be used to make informed choices about fish consumption with special emphasis on the consumption of fish from off-set lakes during the post-impoundment elevation in fish concentrations. There could also be very real health risks if persons choose to reduce overall fish consumption (rather than supplementing their fish intake from lakes unaffected by the Project). Thus, every reasonable effort should be made to encourage people to continue eating fish that are low in mercury concentrations under both present and post-impoundment conditions. Table 7-1 provides a summary of the findings while the key conclusions of the HHRA are as follows:

1. Consumption recommendations (*i.e.*, recommendations for consumption restriction) may be required for certain fish under both the present conditions and the proposed post-impoundment conditions. Under post-impoundment conditions, it would still be possible to consume fish (just not as much as before). The fish with greatest predicted increase in mercury concentrations are from Gull Lake and include northern pike (0.22 µg/g to just over 1 µg/g) and walleye (0.23 µg/g to just over 1 µg/g) while the increase in lake whitefish would be less (0.07 µg/g to just below 0.2 µg/g). The same species from Stephens Lake would be impacted less than fish from Gull Lake.

2. Consumption recommendations are not currently required for wild game or waterfowl and would not likely be required following impoundment. Muskrat is the only mammal that was predicted to have increased tissue concentrations of mercury following impoundment; however, the increases are considered to be very minor (*i.e.,* 0.01 µg/g under existing conditions versus 0.02 µg/g

under post-impoundment conditions). No measurable change in mercury tissue concentrations under post-impoundment conditions in moose, beaver and snowshoe hare was predicted by Wildlife Resource Consultants.

3. Mercury concentrations in surface water would not pose unacceptable risks from contact or drinking under present or post-impoundment conditions (*i.e.,* risks are considered to be negligible). Typical surface water concentrations are predicted to remain less than the currently used analytical method detection limit (less than 0.05 µg/L as compared to the Canadian Drinking Water Guideline of 1 µg/L).

4. No conclusions can be provided on consumption of wild plants or gull eggs since discipline experts have not been able to estimate mercury concentrations either presently or under post-impoundment conditions.

The key recommendations of the HHRA are as follows:

1. The fish consumption recommendations based on the current quality of fish and the predicted post-impoundment quality should be communicated to local First Nations and communities through appropriate means (*e.g.,* via community health practitioners). Fish species and size-specific consumption recommendations should be emphasized so that people may make the most informed decisions regarding their consumption of specific species (*i.e.,* smaller and non-predatory fish tend to have lower concentrations of mercury). Mercury concentrations in fish should continue to be monitored throughout the Project life.

2. Options for collection of fish from lakes unaffected by the Project should be offered to the local First Nation communities under the post-impoundment scenario (as is planned in programs included in the KCNs' Adverse Effects Agreements); however, even from pristine lakes, it will be necessary to consider size and species of fish for persons desiring to reduce their mercury

exposures (*i.e.*, certain fish from these offset lakes that were tested may have mercury concentrations that warrant consumption recommendations).

3. No unacceptable risks were estimated from consumption of wild game or waterfowl. Nevertheless, there could remain a perception among certain people that wild game or waterfowl are not safe to consume. To help address those concerns, it is recommended that samples, voluntarily submitted by hunters, are analyzed for mercury in order to confirm that wild game and/or waterfowl concentrations remain acceptable to consume. This should be coupled with appropriate education (*e.g.*, community presentations, posters, etc.) that clearly states that wildlife is currently safe to eat and mercury concentrations in tissues of these animals are expected to remain acceptable with Project activities.

4. No recommendations are provided on consumption of wild plants or gull eggs. To help address local First Nation concerns regarding consumption of those foods, it is recommended that wild plant samples are voluntarily submitted by gatherers and analyzed for mercury concentrations in order to confirm that wild plants are acceptable to consume. Also, the community should be educated about the findings of this work, so that wild plants can continue to be used by the community. In the case of gull eggs, it appears that collection of this food from the study area is not a common activity but nevertheless, if this were to occur in the future, sampling of this food group could be considered.

Table 7-1 Summary of Risk-Based Conclusions and Recommendations

Exposure	Risk-based Conclusion		Recommendations for Further Action
	Present Conditions	**Post-Impoundment Scenario**	
Fish consumption from Gull Lake and Stephens Lake	Fish that can be consumed without restriction by the entire population from both lakes are lake whitefish (any size), northern pike less than 400 mm, walleye less than 400 mm. Average sized lake sturgeon from Gull Lake can be consumed without restriction by the entire population. No recommendations can currently be provided on lake sturgeon that are larger than average size or from Stephens Lake (due to lack of suitable data). For northern pike and walleye greater than 400 mm from both lakes various consumption recommendations are provided.	Average sized or smaller lake whitefish can be consumed without restriction by the entire population from both lakes. For northern pike, walleye and sturgeon various consumption recommendations are provided. No size-specific recommendations can currently be provided; however, smaller and less predatory fish will have lower concentrations. It is possible that size-specific recommendations will be possible if sampling was completed.	Consult findings and approach with communities, health agencies and stakeholders. Continued monitoring. Appropriate education (e.g., presentations in the community, newsletter, pamphlets, etc.) with emphasis on consumption recommendations for on a fish species and size-specific basis.
Wild game consumption	Beaver, muskrat, moose and snowshoe hare can be consumed at current frequencies by all members of the communities.	Beaver, muskrat, moose and snowshoe hare can be consumed at current frequencies by all members of the communities.	Consult findings and approach with communities, health agencies and stakeholders. Periodic volunteer sampling of wild game submitted by hunters. Appropriate education that clearly states that wildlife is safe to eat.
Waterfowl consumption	Ducks and geese can be consumed at current frequencies by all members of the communities.	Ducks and geese can be consumed at current frequencies by all members of the communities.	Consult findings and approach with communities, health agencies and stakeholders. Periodic volunteer sampling of wild game submitted by hunters. Appropriate education that clearly states that waterfowl is safe to eat.
Wild plant and gull egg consumption	No conclusions possible (no measurements of mercury have been collected).	No conclusions possible (no measurements of mercury have been collected)	Consult findings and approach with health agencies and stakeholders. Monitoring required if risk-based conclusions are desired.
Surface water ingestion and contact from Gull Lake and Stephens Lake.	Surface water can be used as a drinking water and recreational water source by all members of the communities.	Surface water can be used as a drinking water and recreational water source by all members of the communities.	Consult findings and approach with health agencies and stakeholders. Continued monitored and communication with communities.

STATEMENT OF LIMITATIONS

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The information and conclusions contained in this report are based upon work undertaken by trained professional staff in accordance with generally accepted scientific practices current at the time the work was performed.

Any site-specific information provided by InterGroup or other parties has been assumed by Wilson Scientific to be accurate. Conclusions presented in this report should not be construed as legal advice.

This risk assessment was undertaken exclusively for the purpose outlined herein and was limited to those contaminants, exposure pathways, receptors, and related uncertainties specifically referenced in the report. This work was specific to the site conditions and land use considerations described in the report. This report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations.

This report describes only the applicable risks associated with the identified environmental hazards, and is not intended to imply a risk-free site. Should any conditions at the site be observed or discovered that differ from those at the sample locations, or should the land use surrounding the identified hazards change significantly, Wilson Scientific requests that to be notified immediately to reassess the conclusions provided herein.

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APPENDIX 5C-1-1: DETAILED TECHNICAL INFORMATION, WORKED EXAMPLE RISK CALCULATIONS AND DETAILED RISK ESTIMATES

APPENDIX 5C-1-1: DETAILED TECHNICAL INFORMATION, WORKED EXAMPLE RISK CALCULATIONS AND DETAILED RISK ESTIMATES

5C-1-1 Introduction

This appendix provides detailed technical information on the human health risk assessment (HHRA). The appendix includes the following:

- Section 5C-1-2 provides the mathematical equations used to estimate exposures.
- Section 5C-1-3 provides worked examples of the risk calculations for various scenarios.
- Section 5C-1-4 provides information on the toxicological reference values selected for the HHRA.
- Section 5C-1-5 provides the detailed results of the HHRA (results expressed on an exposure pathway basis)

5C-1-2 Mathematical Equations Used to Estimate Exposures

As discussed earlier, the exposures that receptors may receive were estimated for the following pathways:

- Ingestion of surface water.
- Dermal contact with surface water.
- Ingestion of country foods.

The mathematical equations used to estimate exposures from these pathways are discussed in greater detail below.

Estimation of Exposure from Ingestion of Surface Water

In order to estimate exposure from ingestion of surface water, the following Health Canada (2009a; 2010a) equation was applied:

$$EWG = \frac{C_W \times IR_W \times RAF_{Oral} \times D_2 \times D_3}{BW}$$

where:

EWG	=	exposure from the water ingestion pathway (µg/kg body weight/day)
C_W	=	water chemical concentration (µg/L)
IR_W	=	water ingestion rate of person (L/day)
RAF_{Oral}	=	relative bioavailability fraction via the ingestion route (chemical specific)
D_2	=	days per week exposed/7 days (unitless)
D_3	=	weeks per year exposed/52 weeks (unitless)
BW	=	body weight of person (kg)

Estimation of Exposure from Dermal Contact with Drinking Water

Dermal contact with surface water was another pathway of exposure that was quantitatively evaluated in the HHRA. Dermal exposure was estimated according to the following Health Canada (2009a; 2010a) equation:

$$EDW = \frac{C_w \times SA_B \times PC \times D_1 \times D_2 \times D_3}{BW}$$

where:

EDS	=	exposure from the dermal pathway for drinking water (µg/kg/day)
C_W	=	water chemical concentration (µg/L)
SA_B	=	surface area of the entire body (m^2)
PC	=	permeability constant (m/hr) (chemical specific)
D_1	=	hours per day exposed to water (hr/day)
D_2	=	days per week exposed/7 days (unitless)
D_3	=	weeks per year exposed/52 weeks (unitless)
BW	=	body weight of person (kg)
UCF	=	unit correction factor (1,000 L/m^3)

Estimation of Exposure from Ingestion of Country Food

In order to estimate exposure from consumption of country food, the following Health Canada (2009a; 2010a) equation was applied:

$$EFG = \frac{C_F \times IR_F \times RAF_{Oral} \times D_2 \times D_3}{BW}$$

where:

EFG	=	exposure from the country food ingestion pathway (µg/kg body weight/day)
C_F	=	food chemical concentration (µg/g)
IR_F	=	food ingestion rate of person (g/day)
RAF_{Oral}	=	relative bioavailability fraction via the ingestion route (chemical specific)
D_2	=	days per week exposed/7 days (unitless)
D_3	=	weeks per year exposed/52 weeks (unitless)
BW	=	body weight of person (kg)

5C-1-3 Worked Example Risk Calculations

5C-1-3.1 Worked Example #1: Risks Posed to a Person Using Surface Water

In this worked example, risks posed to a woman of child-bearing age using surface water from mercury are estimated. To estimate exposures and risks, a surface water concentration of 0.05 µg/L (equal to the method detection limit) was assumed.

Estimation of Risks from Ingestion of Surface Water

In order to estimate exposure from surface water, the following equation was applied:

$$EWG = \frac{C_W \times IR_W \times RAF_{Oral} \times D_2 \times D_3}{BW}$$

where:

EWG	=	exposure from the water ingestion pathway (µg/kg body weight/day)
C_W	=	water chemical concentration (0.05 µg/L)
IR_W	=	water ingestion rate of person (1.5 L/day)
RAF_{Oral}	=	relative bioavailability fraction via the ingestion route (1.0)
D_2	=	days per week exposed/7 days (1.0)
D_3	=	weeks per year exposed/52 weeks (1.0)
BW	=	body weight of person (60 kg)

Under this scenario, the estimated exposure to mercury from surface water ingestion was estimated to be 0.0012 µg/kg bw/day.

The Hazard Quotient from this route was then estimated as follows:

$$\textit{Hazard Quotient} = \frac{\textit{Estimated Exposure (0.0012 µg/kg bw/day)}}{\textit{Tolerable Daily Intake (0.57 µg/kg bw/day)}}$$

Thus, the Hazard Quotient value from surface water ingestion was estimated to be 0.0021.

Estimation of Risks from Dermal Contact with Drinking Water

Dermal contact with drinking water was another pathway of exposure that was quantitatively evaluated in the HHRA. Dermal exposure was estimated according to the following Health Canada (2009a) equation:

$$EDW = \frac{C_w \times SA_B \times PC \times D_1 \times D_2 \times D_3}{BW}$$

where:

EDS	=	exposure from the dermal pathway for drinking water (µg/kg/day)
C_W	=	water chemical concentration (0.05 µg/L)
SA_B	=	surface area of the entire body (1.8 m^2)
PC	=	permeability constant (1 x 10^{-5} m/hr)
D_1	=	hours per day exposed to water (1 hr/day)
D_2	=	days per week exposed/7 days (1.0)
D_3	=	weeks per year exposed/52 weeks (1.0)
BW	=	body weight of person (60 kg)
UCF	=	unit correction factor (1000 L/m^3)

Under this scenario, the estimated exposure to mercury from dermal contact with surface/drinking water was estimated to be 0.000015 µg/kg bw/day.

The Hazard Quotient from this route was then estimated as follows:

$$\textit{Hazard Quotient} = \frac{\textit{Estimated Exposure (0.000015 µg/kg bw/day)}}{\textit{Tolerable Daily Intake (0.57 µg/kg bw/day)}}$$

Thus, the Hazard Quotient value from dermal contact with drinking water was estimated to be 0.000026.

Estimation of Risks from All Surface Water Exposures

Summing the risks from all exposure routes, the following Hazard Quotient was estimated:

Hazard Quotient from ingestion of drinking water	0.0021
Hazard Quotient from dermal contact with drinking water	0.000026
Sum of all Hazard Quotients	0.0021

5C-1-3.2 Worked Example #2: Risks Posed from Consumption of Walleye

In this worked example, risks posed to the young child receptor from consumption of post-impoundment walleye from Gull Lake are estimated. It was assumed that the young toddler consumed walleye at a rate of one time per week (serving size = 100 g).

To estimate exposures and risks, the following environmental concentrations were assumed:

- Methylmercury concentration in walleye (peak year post-impoundment) = 1.0 µg/g

In order to estimate exposure from consumption of walleye, the following equation was applied:

$$EFG = \frac{C_F \times IR_F \times RAF_{Oral} \times D_2 \times D_3}{BW}$$

where:

EFG	=	exposure from the country food ingestion pathway (µg/kg body weight/day)
C_F	=	food chemical concentration (1.0 µg/g)
IR_F	=	food ingestion rate of person (100 g/week or 14.3 g/day)
RAF_{Oral}	=	relative bioavailability fraction via the ingestion route (1.0)
D_2	=	days per week exposed/7 days (1.0)
D_3	=	weeks per year exposed/52 weeks (1.0)
BW	=	body weight of person (16.5 kg)

Under this scenario, the estimated exposure to methylmercury from consumption of walleye was estimated to be 0.87 µg/kg bw/day.

The Hazard Quotient from this route was then estimated as follows:

$$\text{Hazard Quotient} = \frac{\text{Estimated Exposure (0.87 µg/kg bw/day)}}{\text{Tolerable Daily Intake (0.2 µg/kg bw/day)}}$$

Thus, the Hazard Quotient value from consumption of walleye at a rate of once per week during the peak year following impoundment was estimated to be 4.3 for the young toddler.

5C-1-4 Toxicological Reference Values Used in the HHRA

As discussed in the Main Report, toxicological reference values were selected using Health Canada guidance. The rationale for the selected TRVs is provided below.

Mercury, Methyl

Health Canada (2010b) recommends the following TDIs for methyl mercury:

- 0.2 μg/kg body weight/day for sensitive members of the general population (i.e., pregnant women, women of child-bearing age, infants and young children)

- 0.47 μg/kg body weight/day for non-sensitive member of the general population

Health Canada (1998; 2002) proposed an interim revised TDI of 0.2 μg/kg body weight/day for sensitive members of the population. The proposed interim revision of the TDI was based on a studies completed in human populations consuming fish in New Zealand, Republic of Seychelles and the Faroe Islands. The endpoint of primary concern was related to neurological development of children born to women consuming large amounts of fish with elevated methyl mercury concentrations. Based on these studies, Health Canada (1998) developed a benchmark dose of dietary intake equal to 1 μg/kg body weight/day that was felt to represent a dose where no adverse effects were observed. With the application of a 5-fold uncertainty factor to this benchmark dose, Health Canada then proposed an interim TDI for pregnant women, women of child-bearing age, and infants of 0.20 μg/kg body weight/day. Health Canada (1998; 2002) advised that this should be regarded as a temporary measure only and revised guidance may still be developed. For non-sensitive members of the general population, Health Canada (2010) cited a TDI of 0.47 μg/kg body weight per day. These TDIs were assumed to be protective of adverse health effects from methyl mercury.

Mercury, Inorganic

For evaluation of mercury when it is not present in fish, the human health risk assessment has relied on the recommendations of WHO (2010). WHO (2010) Committee established a provisional tolerable weekly intake (PTWI) for inorganic mercury of 4 μg/kg bw. WHO (2010)

indicated that this PTWI for inorganic mercury was considered applicable to dietary exposure to total mercury from foods other than fish and shellfish. WHO (2010) also indicated that this was applicable to the whole population and did not indicate that risks would be additive with methylmercury exposures (i.e., WHO [2010] concluded that the upper limits of estimates of average dietary exposure to total mercury from foods other than fish and shellfish for adults (1 µg/kg bw per week) and for children (4 µg/kg bw per week) were at or below the PTWI for inorganic mercury and did not indicated a requirement to sum the methylmercury exposures). Consequently, this PTWI was used as the source of the TDI. To estimate a TDI, the PTWI was simply divided by 7 days. Consequently, a TDI of 0.57 µg/kg bw/day was estimated. This value was used to estimate risks from total mercury present in foods other than fish and shellfish and from mercury present in surface water.

In summary, the following Tolerable Daily Intakes were used to evaluate the neurological potential of inorganic of mercury:

- Total mercury TDI of 0.57 µg/kg bw/day for young children and women of child-bearing age;
- Total mercury TDI of 0.57 µg/kg bw/day for the rest of the population.

5C-1-5 Detailed Risk Estimates

The risk estimates for the various receptors and issues of concern are provided in Tables 5C-1-1 to 5C-1-7.

Table 5C-1-1 Preliminary Risk Estimates from Mercury Due to Consumption of Country Foods: Baseline Conditions at Gull Lak

Food Item	Assumed Concentration (ug/g wet weight)	Proposed Consumption Frequency (meals per week)	Serving Size for Toddler (ounces)	Serving Size for Adult (ounces)	HQ for Toddlers	HQ for Women of Childbearing Age	HQ for Adult Males and All Seniors
Fish							
Lake Whitefish	0.07	3	3.5	14	0.9	1.0	0.4
Jackfish (pike)	0.22	3	3.5	14	2.8	3.1	1.1
Pickerel (walleye)	0.23	3	3.5	14	3.0	3.3	1.2
Lake Sturgeon	0.2	3	3.5	14	2.6	2.8	1.0
Birds							
Duck	0.07	1	2	7	0.17	0.17	0.06

HQ = Hazard Quotient

Table 5C-1-2 Preliminary Risk Estimates from Mercury Due to Consumption of Country Foods: Baseline Conditions at Stephens Lake

Food Item	Assumed Concentration of Mercury (ug/g wet weight)	Assumed Consumption Frequency (meals per week)	Serving Size for Toddler (ounces per meal)	Serving Size for Adult (ounces per meal)	HQ for Toddlers	HQ for Women of Childbearing Age	HQ for Adult Males and All Seniors
Fish							
Lake Whitefish	0.09	3	3.5	14	1.2	1.3	0.5
Jackfish (pike)	0.26	3	3.5	14	3.3	3.7	1.3
Pickerel (walleye)	0.29	3	3.5	14	3.7	4.1	1.5
Birds							
Duck	0.09	1	2	7	0.22	0.21	0.08

HQ = Hazard Quotient

Table 5C-1-3 Preliminary Risk Estimates from Mercury Due to Consumption of Country Foods: Post-Impoundment Conditions at Gull Lake

Food Item	Assumed Concentration of Mercury (ug/g wet weight)	Assumed Consumption Frequency (meals per week)	Serving Size for Toddler (ounces per meal)	Serving Size for Adult (ounces per meal)	HQ for Toddlers	HQ for Women of Childbearing Age	HQ for Adult Males and All Seniors
Fish							
Lake Whitefish	0.19	3	3.5	14	2.4	2.7	1.0
Jackfish (pike)	1.0	3	3.5	14	12.9	14.2	5.1
Pickerel (walleye)	1.0	3	3.5	14	12.9	14.2	5.1
Lake Sturgeon	0.3	3	3.5	14	3.9	4.2	1.5
Birds							
Duck	0.19	1	2	7	0.47	0.45	0.16

HQ = Hazard Quotient

Table 5C-1-4 Preliminary Risk Estimates from Mercury Due to Consumption of Country Foods: Post-Impoundment Conditions at Stephens Lake

Food Item	Assumed Concentration of Mercury (ug/g wet weight)	Assumed Consumption Frequency (meals per week)	Serving Size for Toddler (ounces per meal)	Serving Size for Adult (ounces per meal)	HQ for Toddlers	HQ for Women of Childbearing Age	HQ for Adult Males and All Seniors
Fish							
Lake Whitefish	0.15	3	3.5	14	1.9	2.1	0.8
Jackfish (pike)	0.5	3	3.5	14	6.4	7.1	2.5
Pickerel (walleye)	0.5	3	3.5	14	6.4	7.1	2.5
Lake Sturgeon	0.25	3	3.5	14	3.2	3.5	1.3
Birds							
Duck	0.15	1	2	7	0.37	0.35	0.13

HQ = Hazard Quotient

Table 5C-1-5 Preliminary Risk Estimates from Mercury Due to Consumption of Country Foods: Baseline Conditions

Food Item	Assumed Concentration of Mercury (ug/g wet weight)	Assumed Consumption Frequency (meals per week)	Serving Size for Toddler (ounces per meal)	Serving Size for Adult (ounces per meal)	HQ for Toddlers	HQ for Women of Childbearing Age	HQ for Adult Males and All Seniors
Mammals							
Beaver	0.01	3	2	7	0.03	0.02	0.02
Muskrat	0.02	1	2	7	0.02	0.02	0.01
Moose	0.07	5	3.5	14	0.53	0.58	0.49
Rabbit*	0.05	1	2	7	0.04	0.04	0.03

* Concentrations of mercury in rabbit have only been evaluated semi-quantitatively at the current time

HQ = Hazard Quotient

Table 5C-1-6 Preliminary Risk Estimates from Mercury Due to Consumption of Country Foods: Future Conditions

Food Item	Assumed Concentration of Mercury (ug/g wet weight)	Assumed Consumption Frequency (meals per week)	Serving Size for Toddler (ounces per meal)	Serving Size for Adult (ounces per meal)	HQ for Toddlers	HQ for Women of Childbearing Age	HQ for Adult Males and All Seniors
Mammals							
Beaver	0.01	3	2	7	0.03	0.02	0.02
Muskrat	0.04	1	2	7	0.03	0.03	0.03
Moose	0.07	5	4	14	0.53	0.58	0.49
Rabbit*	0.05	1	2	7	0.04	0.04	0.03

* Concentrations of mercury in rabbit have only been evaluated semi-quantitatively at the current time

HQ = Hazard Quotient

Table 5C-1-7 Risk Estimates for Traditional Land Use - Based on Total Mercury Surface Water Concentrations (Present and Future Assumed to Equal 0. 05 ug/L)

Receptor of Concern	Assumed Surface Water Conc (ug/L)	HQ dermal - surface water	HQ - ingestion of drinking water	HQ all routes of surface water contact
Toddler	5.0E-02	0.000032	0.0032	0.0032
Woman of Childbearing Age	5.0E-02	0.000026	0.0022	0.0022
Adult Male	5.0E-02	0.000022	0.0019	0.0019

HQ = Hazard Quotient

APPENDIX 5D

CULTURE AND SPIRITUALITY DATA SOURCES

KEEYASK
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LIST OF FIGURES

Page

5D.0 CULTURE AND SPIRITUALITY DATA SOURCES

5D.1 TATASKWEYAK CREE NATION DATA SOURCES

As part of a Project environmental review process (Article 2.8.3 (b), NFA Implementation Agreement 1992), TCN developed a volume of research called Analysis of Change: Split Lake Cree Post Project Environmental Review and designed the Mother Earth Ecosystem model to conduct research. The research conducted documents the community's perspective on past events and influences that affected environmental and cultural changes that touched the community. Discussions included a range of factors including hydroelectric development, trapping and fishing changes, the emergence of the wage economy, population movement and growth, community characteristics, diet/health, transportation, education, social issues, and other outside development pressures. Interviews were conducted using the Mother Earth Ecosystem Model with a total of 30 Split Lake Cree Elders and 15 other adult community members. A flexible, thematic approach was adopted for the interview process, contributing to the free flow of information while maintaining some structure. Indicator measures were not initially considered in the development of the research. As such, a qualitative content review of TCN's Analysis of Change and Overview of Water and Land (OWL) Summary Report (2002), was summarized and applied to the indicator measure discussion.

The Mother Earth Ecosystem Model represented in Figure 5D-1 below was designed by the TCN and its community researchers.

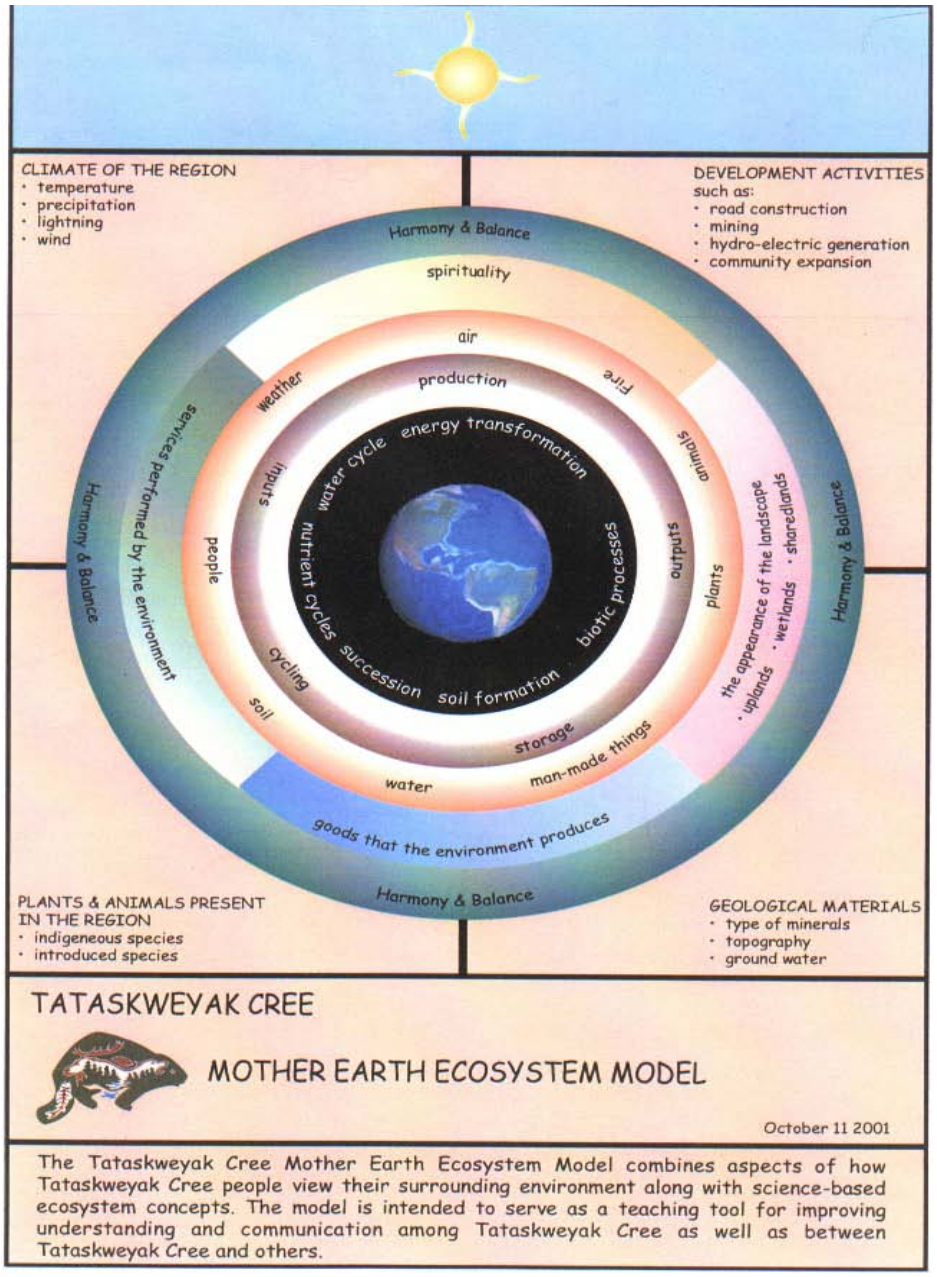

Figure 5D-1: Mother Earth Ecosystem Model (Copied from TCN OWL Document 2002)

5D.2 WAR LAKE FIRST NATION DATA SOURCES

A total of 44 interviews were conducted and categorized as 1) Elders 50 years of age or older, 2) adults 35-49 years old, 3) adults 21-34 years old, and 4) youth 16-20 years old. An additional 13 interviews with children from the band, ranging from grades one through four were conducted by WLFN and published for the Keeyask Generation Project as the War Lake OWL (Overview of Water and Land) Process

(2002). Prior to each interview, potential respondents were shown maps of the area to be affected by the project and were asked if they would consent to be interviewed. Each interview was approximately 30-60 minutes in length and consisted of 14 questions. In order to prepare the interviewees for the next phase of the OWL project, photographs of specific landscapes within the project area were shown and the various kinds of relationships were discussed.

The questions developed for this project allowed people to express their values, beliefs and aspirations regarding how the construction of a generating station at Keeyask Rapids would affect their way of life.

5D.3 FOX LAKE CREE NATION DATA SOURCES

The historic changes and impacts that have affected FLCN have been chronicled by community researchers in two documents called Forgotten Nation in the Shadow of the Dams and Ninan: Our Story (draft), in which 75 primary source interviews, conversations and workshops were compiled. A preliminary primary source document titled Fox Lake Cree Nation Preliminary Sturgeon TK Study (draft) discussing the cultural utilization of Sturgeon was also utilized. This research presented the current challenges the community faces. The research in the community history notes that:

> The losses that these Elders describe represent much more than an inability to obtain wild foods: and other products from the environment. They reflect fundamental changes in how the people provide for their families; making a living off the land; move and travel on the land to renew family and other relationships; obtain solace and emotional and spiritual well-being from the environment; live cohesively as a community without incidents of violence and racism; form trusting and respectful relationships with governments and corporate employers...; and most importantly, live empowered lives that in turn will nurture, support, and inspire the next generation (FLCN 2009a Draft).

For this component, indicator measures were not initially considered by FLCN community researchers in the development of the research and as such, a qualitative content review of the research was conducted, summarized and applied to the indicator measures.

In order to address gaps in primary source information of local women's perspectives, a Fox Lake Cree Nation (FLCN) Culture and Spirituality Workshop was held at the Gillam Recreation Centre on April 20, 2011 at which time four (4) female KPIs were conducted. This research was qualitatively and quantitatively reviewed, summarized and applied to the indicator measures.

5D.4 YORK FACTORY FIRST NATION DATA SOURCES

Twelve oral history interviews were conducted by York Factory First Nation (YFFN) community researchers at York Landing (*Kawechiwasik*), Thompson, Churchill and Nelson House for the book Voices from Hudson Bay; Cree Stories from York Factory (Beardy and Coutts 1996). These interviews were utilized for content analysis. Three additional culture and spirituality workshops for women, youth and families and one informal key person interview with an Elder were conducted in York Landing (*Kawechiwasik*) under the blanket of a Socio-Economic Impact Assessment in 2009. That work produced further shared knowledge that was similarly coded and analyzed. In 2010, YFFN provided Our Voices:

York Factory First Nation Speaks About the Keeyask Generating Station Project for additional consideration. Transcribed interviews were forwarded to Northern Lights Heritage Services Inc. for data management. The following is an account based on the methods that were employed to code, sort and measure the cultural record as described in the oral histories and other supplied documentation of YFFN.

The oral narratives provided by YFFN focused on the key elements which reflected worldviews, spiritual understandings, historical accounts and hopes for the future.

5D.5 YOUTH OBSERVATIONS FROM YORK LANDING

York Landing (*Kawechiwasik*) was generally described by the youth as being a small, safe community with Members sharing a synergy directed at the overall health and wellbeing of the community. The daily activities and cultural practices they are involved in are manifested as leisure and traditional components of their worldview. The leisure and traditional components discussed by the youth are intertwined and reflect the communities' efforts to maintain a balance of traditional and spiritual understanding.

Activities described by the youth illustrated this connection between leisure and tradition and focused on the natural environment and how it is shared as a group. These activities include skating, swimming and sledding, with traditional activities described as hunting, fishing and trapping. Other activities that featured prominently in their discussion were cultural practices that involved shared experiences with Elders of the community, sweat lodges, traditional craft making and cultural events. The youth descriptions were always in context of a shared experience with friends or a family kinship.

The youth who participated were also given the opportunity to provide insight into their perceptions and hopes for the future of York Landing (*Kawechiwasik*) with or without the proposed Keeyask Generation Project. The comments provided by youth participants were focused on the relationship between the natural and cultural environment, with community wellbeing as a central concept. The youth primarily discussed the need for more leisure and traditional activities. Environmental concerns were mentioned and a need to introduce activities like tree planting for the community and a concerted effort to keep the community clean and free of pollutants with the introduction of a recycling program. The youth also felt that the community would need an increase in housing, public facilities such as a new civic arena, and infrastructure development that could connect the community on a year round basis.

Youth concerns involving the presence of the Keeyask Generation Project focused on a perceived fear of flooding and pollution as an effect on the environment and the community. Another fear expressed was the perceived negative effects on animals and resources utilized by the community. The need for a community grocery store was discussed to offset diminished access to country food sources.

The positive perceptions discussed by the youth reflect the understanding that the Project presents an opportunity for the community to gain employment, education and the infrastructure needs that community will need in the future to flourish and maintain the balance of community well being.

APPENDIX 5E

POLICING INDICATORS IN THE LOCAL STUDY AREA

KEEYASK
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LIST OF TABLES

5E.0 POLICY INDICATORS IN THE LOCAL STUDY AREA

Policing statistics were gathered from the RCMP detachments in Thompson and Gillam, in addition to a policing report specific to the City of Thompson (prepared by the RCMP) for the five year period between 2005 and 2009. The data were aggregated based on each community's RCMP detachment and size, so as to ensure the confidentiality of the smaller communities. As such, the data is presented for the City of Thompson, Split Lake (TCN) and York Landing (YFFN) combined, and Gillam, Fox Lake (Bird) and Ilford (WLFN) combined.

Table 5E-1: Policing Statistics Thompson

Criminal Statutes	**Number of Reported Infractions**				
	2009	2008	2007	2006	2005
Total Assaults	760	780	816	826	873
Total Breaking and Entering - Business	35	21	43	42	52
Total Breaking and Entering - Residential	86	84	125	91	168
Total Theft Motor Vehicle	86	60	59	51	54
Total Theft Over $5000	8	6	4	12	22
Total Theft Under $5000	368	293	355	459	570
Total Frauds	45	47	65	71	83
Total Drugs	86	133	90	95	91
Total Other Criminal Code	3,279	3799	3991	4127	4073
Criminal Code Traffic	216	228	205	164	192
Provincial Statutes					
Intoxicated Persons Detention Act	3,875	3019	3400	3003	2941
Total Liquor	115	174	111	117	138
Provincial Traffic	1,038	1701	1281	825	512
Collision	496	668	505	486	525

Source: Thompson Municipal Policing Reports.

Table 5E-2: Policing Statistics TCN at Split Lake and YFFN at York Landing

Type of Crime	2009	2008	2007	2006	2005
Criminal Statutes:	**Number of Reported Infractions**				
Total Assaults	82	81	83	94	49
Total Breaking and Entering – Business	5	2	8	6	6
Total Breaking and Entering – Residential	22	11	6	10	7
Total Theft Motor Vehicles	6	7	3	10	8
Total Theft Over $5000	0	0	0	1	0
Total Theft Under $5000	8	1	1	2	0
Total Frauds	3	1	1	4	0
Total Drugs	0	1	0	1	1
Total Other Criminal Code	49	37	40	39	31
Criminal Code Traffic	4	8	7	5	5
Provincial Statutes :	**Number of Reported Infractions**				
Intoxicated Persons Detention Act	0	0	0	0	0
Total Liquor	5	1	1	1	0
Provincial Traffic	11	7	11	10	6
Collision	10	14	12	2	16

Source: Shelly Watt, Thompson RCMP December 21, 2009.

Table 5E-3: Policing Statistics Gillam[1] RCMP Detachment

	2009	2008	2007	2006	2005
Criminal Statutes	**Number of Reported Infractions**				
Total Crime vs. Person[2]	42	62	49	82	51
Total Crime vs. Property[3]	66	53	68	108	49
Common Police Activities - Assist General Public[4]	129	172	172	154	96
Firearms Act & Offensive Weapons	6	17	6	13	10
Total Theft Over $5000	7	1	6	1	0
Total Theft Under $5000	15	13	8	13	12
Major Fraud & Theft	0	0	0	0	1
Total Drugs [5]	3	7	8	8	14
Total Other Criminal Code	175	222	182	149	108
Criminal Code - Traffic [6]	21	11	7	5	11
Provincial Statutes	**Number of Reported Infractions**				
Intoxicated Persons Detention Act	26	9	10	20	5
Total Liquor	33	23	24	24	15
Provincial Traffic	102	122	225	86	13
Collision	26	37	26	32	25
Child Welfare Act & Family Relations Act	3	6	3	14	8
Mental Health Act	19	8	25	22	23
Total Provincial Statutes	209	205	313	198	89

Source: Gillam RCMP Detachment.

Notes:

1. Totals calculated by InterGroup Consultants.
2. Crimes vs. person include sexual, assaults, robbery/threats, kidnapping/hostage, and related to death.
3. Crimes vs. property include mischief, fraud, arson, and breaking and entering. (A large majority of crimes vs. property in each year was mischief).
4. This includes common activities such as index check, animal calls, false alarms, assisting the general public.
5. Includes trafficking and possession.
6. Included impaired operation related offences, dangerous operation, and other traffic offences (a large majority consists of impaired driving).

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GLOSSARY

KEEYASK
Hydropower Limited Partnership

Aboriginal Traditional Knowledge (ATK): Aboriginal traditional knowledge is knowledge that is held by, and unique to, Aboriginal peoples. It is a living bit of knowledge that is cumulative and dynamic and adapted over time to reflect changes in the social, economic, environmental, spiritual and political spheres of the Aboriginal knowledge holders. It often includes knowledge about the land and its resources, spiritual beliefs, language, mythology, culture, laws, customs and medicines (Canadian Environmental Assessment Act).

Analytical Detection Limit: The lowest concentration of a substance that can be confidently measured using a particular analytical procedure.

Agreement-in-Principle (AIP): The agreement in principle made between Manitoba Hydro and TCN dated October 17, 2000.

Anchor ice: Ice that forms below the surface of a body of water that attaches either to a submerged object or to the bed of the waterbody bottom.

Apprenticeship: Apprenticeship is a system of training and certification in established trades—a way for people to obtain the credentials required for work in many important skilled trades. Apprenticeship is also a training model that combines on-the-job training with the learning of theory.

Area of Special Interest (ASI): An official designation of the Province of Manitoba that identifies "candidate sites" which have not been protected in any formal manner but have a high potential to protect groupings of enduring features and associated natural and cultural values.

Bioaccumulate: The accumulation of substances, such as methylmercury, in an organism or part of an organism. Bioaccumulation occurs when a substance is absorbed by an organism at a greater rate than it is lost.

Biomagnification: The increasing concentration of a substance, such as a toxic chemical, in the tissues of organisms at successively higher levels in a food chain.

Border ice: Ice that forms along the bank or shoreline where velocities are low (also referred to as shore ice).

Burntwood Nelson Agreement (BNA): The Burntwood Nelson Agreement (BNA) is the collective agreement between the Hydro Project Management Association (HPMA), representing Manitoba Hydro management, and the unions of the Allied Hydro Council (AHC), representing workers, that will be in effect during the construction of the Project.

Churchill River Diversion (CRD): The diversion of water from the Churchill River to the Nelson River via the Rat River and the impoundment in Southern Indian Lake as authorized by the CRD licence.

Construction Support: Jobs that are needed during the Project construction, but do not involve actually building the Project. Catering and clerical staff are examples of construction support positions. Training and work experience requirements can range from on-the-job training for entry level positions to more than 3 years of formal training and professional experience for the most highly-skilled positions.

Cost of living: The amount of money needed to sustain a certain level of living, including basic expenses such as housing, food, taxes, and healthcare.

Deleterious: Harmful often in a subtle or an unexpected way.

Designated Trade: Occupations that have formal apprenticeship programs that provide supervised training leading to certification as a fully-qualified journeyperson in the trade. Apprenticeships in the designated trades typically entail four or more years of in-class technical training and on-the-job work experience. Carpenters and electricians are examples of occupations in the designated trades.

Direct Negotiated Contract (DNC): A type of contract that is non-tendered and directly negotiated between parties of interest.

Employment Rate: The percentage of the total population 15 years of age and over that was employed in the week (Sunday to Saturday) prior to Census Day (June 4, 1991; May 15, 2001; May 16, 2006).

Environmental assessment (EA): Process for identifying project and environment interactions, predicting environmental effects, identifying mitigation measures, evaluating significance, reporting and following-up to verify accuracy and effectiveness leading to the production of an Environmental Assessment report. EA is used as a planning tool to help guide decision-making, as well as project design and implementation.

Fictive kinship: People who are regarded as being part of a family even though they are not related by either blood or marriage bonds. Fictive kinship may bind people together in ties of affection, concern, obligation, and responsibility.

Frazil ice: Fine, small, needle-like structures of thin, flat circular plates of ice formed in super-cooled, turbulent water.

Furbearer: Refers to those mammal species that are trapped (*e.g.*, marten, fox) for the useful or economic value of their fur.

Gathering: Collecting plants for medicinal and dietary purposes and other natural products such as firewood, driftwood or feathers for cultural purposes.

Gross Domestic Product: The gross national product excluding the value of net income earned abroad.

Hanging ice dam: A deposit of ice, typically at the downstream end of rapids that builds up through the winter by accumulating frazil ice, which then partially blocks the flow of water and causes water levels upstream to rise.

Hydraulic Zone of Influence: Reach of the river over which water levels and water level fluctuations caused by the operation of a particular project are measureable within the accuracy required for operation and licence compliance.

Ice Boom: A floating structure, anchored at opposite shorelines and/or the river bottom, designed to help form and hold an ice cover in place.

Ice Regime: A description of ice on a water body (*i.e.,* river or lake) with respect to formation, movement, scouring, melting, daily fluctuations, seasonal variations etc.

Impoundment: The containment of a body of water by a dam, dyke, powerhouse, spillway or other artificial barrier.

In situ: In place; undisturbed. An *in situ* environmental measurement is one that is taken in the field, without removal of a sample to the laboratory.

Joint Keeyask Development Agreement (JKDA): An agreement between Tataskweyak Cree Nation and War Lake First Nation operating as Cree Nation Partners, and York Factory First Nation, and Fox Lake Cree Nation, and the Manitoba Hydro-Electric Board regarding the partnership, ownership, development and operation of the Keeyask Project.

Journeyperson: Someone who has completed an apprenticeship and is fully educated in a trade or craft, but not yet a master.

Keeyask Environmental and Regulatory Protocol (the Protocol): The environmental and regulatory protocol for the finalization of the Environmental Impact Assessment and the EIS and the submission of the EIS to Regulatory Authorities, substantially in the form attached as Schedule 3-1 to the JKDA**.**

Key Person Interview (KPI): Interview with an individual whose knowledge, creativity, inspiration, reputation, and/or skills are critical to the viability of a study.

Labour Force: The employed are persons having a job or business, whereas the unemployed are without work, are available for work, and are actively seeking work. Together the unemployed and the employed constitute the labour force. Persons not in the labour force are those who, during the reference week, were unwilling or unable to offer or supply labour services under conditions existing in their labour markets (this includes persons who were full-time students currently attending school).

Lake Winnipeg Regulation (LWR): The Lake Winnipeg Regulation project to regulate outflow from Lake Winnipeg to the Nelson River, including three excavated channels, and the Jenpeg generating station and control structure, as authorized by the LWF Licence.

Limited Partnership: The Keeyask Hydropower Limited Partnership to be created pursuant to the Joint Keeyask Development Agreement for the purposes of carrying on the business and affairs of the Limited Partnership.

Methylmercury: An organic form of mercury that is able to concentrate in animal (including fish) tissue.

Migration: The movement of an individual or group of individuals from one area to another.

Mitigation: In respect of a project, the elimination, reduction or control of the adverse environmental effects of the project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means (*Canadian Environmental Assessment Act*).

Mitigation monitoring: A type of monitoring program that may be used to verify that mitigation measures were properly implemented and that such measures effectively mitigate the predicted adverse environmental effects.

Monitoring: Continuing assessment of conditions at and surrounding an activity. This determines if effects occur as predicted or if operations remain within acceptable limits and if mitigation measures are as effective as predicted.

Non-Designated Trade: Jobs that are directly involved with the construction of the Project, but do not have formal apprenticeship programs leading to a Journeyperson certification. Examples of non-designated trades are labourers, heavy equipment operators, vehicle drivers (teamsters), rebar workers and cement masons. Training and work experience requirements can range from basic on-the-job training for entry level positions to more than 3 years of formal training and professional experience to be fully qualified for the most highly-skilled positions.

Northern Aboriginal Residents: Is a defined term in the Burntwood Nelson Agreement (BNA) generally referring to status Indians, Métis, non-status Indians and Inuit who qualify as **Northern Residents**. Northern Residents are defined as a person who has resided in northern Manitoba (north of the boundary set out in Schedule 12-5 to the BNA for (a) a period of five years accumulatively or more; and (b) a period of six consecutive months or more, immediately prior to being referred to employment or re-employment.

Northern Flood Agreement (NFA): An agreement signed in 1977 by Manitoba Hydro, the governments of Canada and Manitoba, and the Northern Flood Committee on behalf of five affected Cree Nations regarding the effects of the Churchill River Diversion and Lake Winnipeg Regulation.

Off-system: Water body or waterway outside of the Nelson River hydraulic zone of influence.

Participation Rate: For the purposes of the EIS**,** the percentage of the potential labour force that was in the labour force in the week (Sunday to Saturday) prior to Census Day (June 4, 1991; May 15, 2001; May 16, 2006).

Percentage Point: the unit for the arithmetic difference of two percentages (i.e., there is a 5 percentage point difference between 5% and 10%).

Person-years: A person-year is a measure of the amount of work that could be available during a specific time period or for a specific type of work. One person-year approximates the amount of work that one worker could complete during twelve months of full-time employment.

Potential Labour Force: in general, the number of individuals in a population 15 years of age and older.

Public Involvement Plan (PIP): A plan developed by Manitoba Hydro and the KCNs that outlines their approach to public involvement for the Keeyask Generation Project. The purpose of the PIP is to provide the public, particularly those who may potentially be affected by the Project, with early and ongoing opportunities to review information about the Project and to provide it with subsequent input.

Registered Trapline (RTL): In the 1940s, the Province of Manitoba developed the registered trapline system which divides most of the province into relatively large RTL Districts that are subdivided into individual registered traplines. Manitoba Conservation allocates registered traplines to specific trappers who maintain an individual right to trap within the designated boundary of the trapline. Where Registered Trapline Districts are operated as community trapping blocks (such as at Nelson House), a local fur council recommends to Manitoba Conservation the allocation of specific trapping areas to members of the local trapping community. The RTL system makes each RTL trapper responsible for managing the harvest of all fu-bearers in the trapper's trapline area to ensure sustained production over the years.

Resident: For the purposes of the EIS, a person living in Manitoba for the last consecutive six months (BNA).

Residual effect: An actual or anticipated Project effect that remains after considering mitigation and the combined effects of other past and existing developments and activities.

Resource management area (RMA): An area to be jointly managed by a Resource Management Board established by agreement between Manitoba and a First Nation or a local Aboriginal community.

Riverine: Along the banks of rivers or streams.

Socio-economic impact assessment (SEIA): Provides detailed information about effects, both positive and negative, that a proposed project may have on people, their lifestyles and their communities.

In particular, effects that flow from biophysical effects are included. Often, effects that flow from other aspects of a project (e.g., employment and business opportunities) are also discussed. An SEIA also provides ways to address effects that are likely to be adverse, from the point of view of an affected population, and to enhance those effects perceived to be positive. Residual effects, cumulative effects and monitoring are also included. An SEIA is often part of the environmental impact assessment (EIA) for a proposed project.

Study area: The geographic limits within which effects on a VEC (valued environmental component) or key topic is assessed.

Subcutaneous tissue: Subcutaneous tissue, or hypodermis, is the innermost layer of skin which consists primarily of fat. It lies between the dermis and muscles or bones, containing blood vessels which help to maintain the body's temperature at constant rate. The subcutaneous tissue also provides protection to the body's vital inner organs.

Tendering: Providing different groups and companies with an opportunity to bid on a job. "Open tendering" means that anyone can bid. "Restricted tendering" means that select companies can bid.

Unemployment Rate: The percentage of the labour force in the week (Sunday to Saturday) prior to Census Day (June 4, 1991; May 15, 2001; May 16, 2006) that was unemployed.

Wage Economy: Portion of the economy dominated by the monetary flows and the exchange of money for labour and good and services.