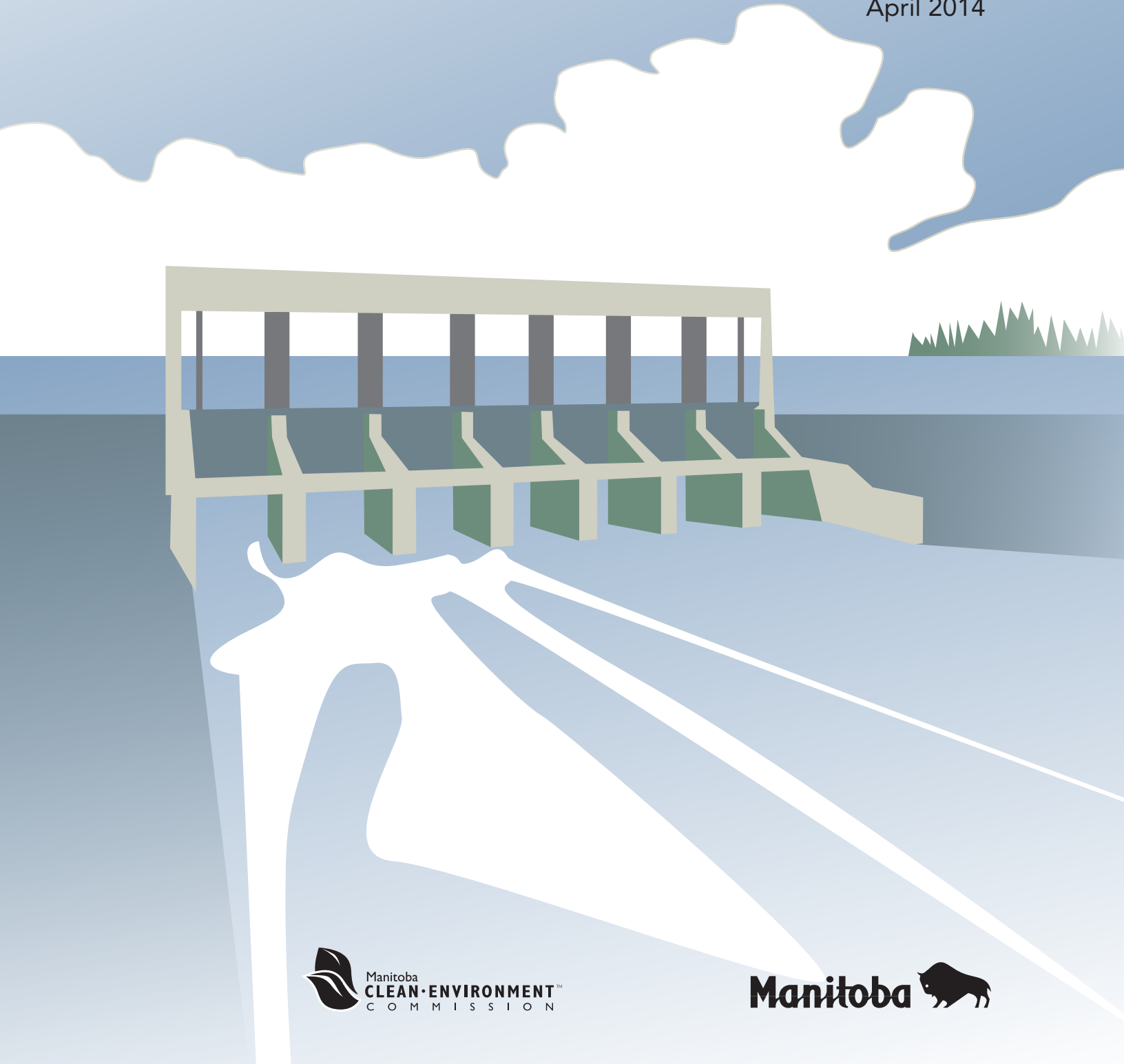


REPORT ON PUBLIC HEARING

Keeyask Generation Project

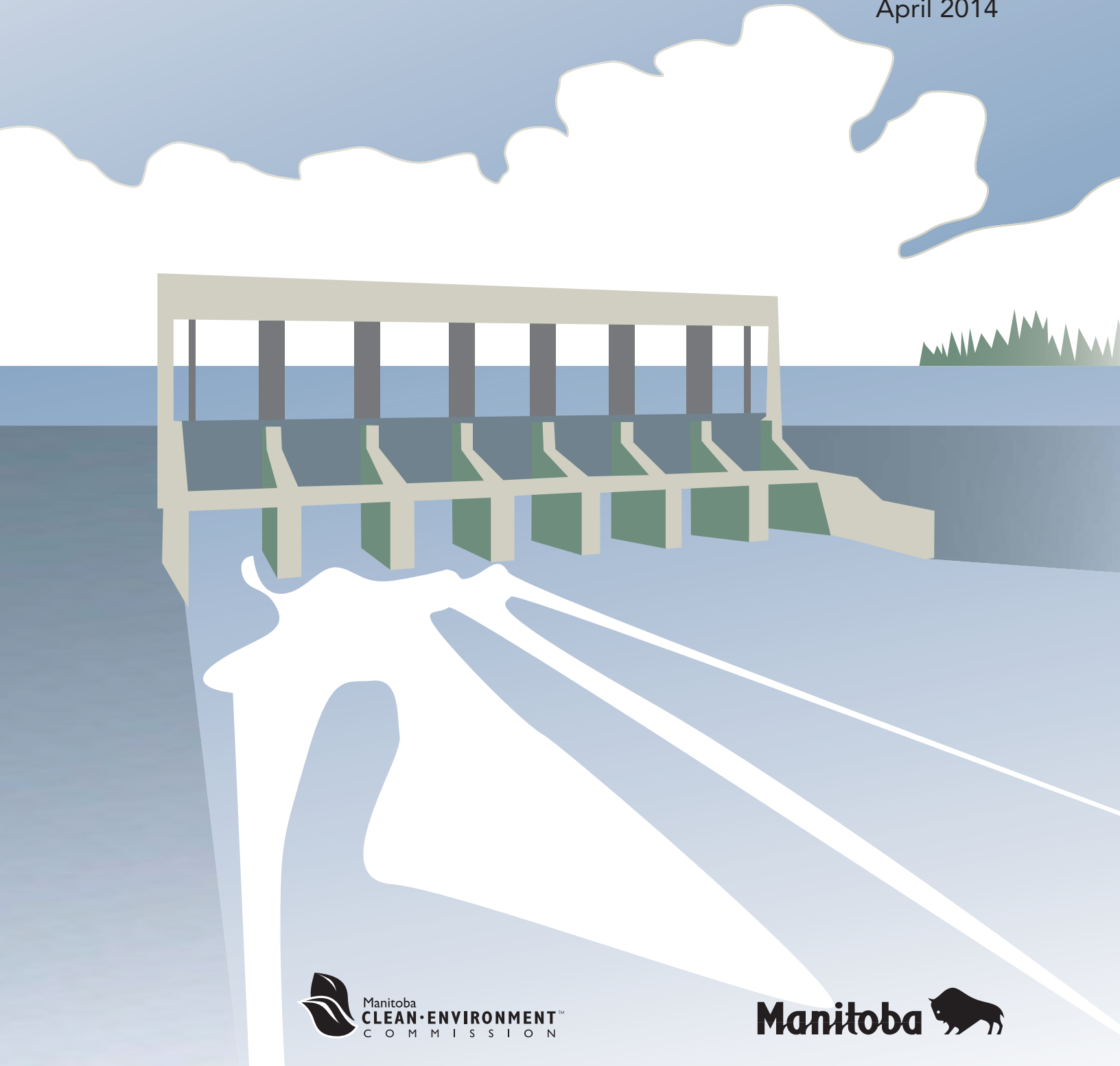
April 2014



REPORT ON PUBLIC HEARING

Keeyask Generation Project

April 2014



April 17, 2014

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Honourable Gord Mackintosh
Minister of Conservation and
Water Stewardship
Room 330 Legislative Building
450 Broadway
Winnipeg, Manitoba R3C 0V8

Re: Keeyask Generation Project

Dear Minister Mackintosh:

The Panel is pleased to submit the Clean Environment Commission's report on the Public hearing with respect to the Keeyask Generation Project.

Sincerely,



Terry Sargeant, Chairperson

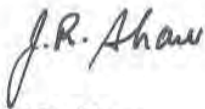


J. Bradley

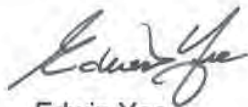


Reg Nepinak

Reg Nepinak



J.R. Shaw



Edwin Yee



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Foreword

The Environment Act of Manitoba states that its intent is to “... ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations”

This Act establishes the Clean Environment Commission, giving it an important role in environmental protection, in particular by developing and maintaining public participation in environmental matters. The Commission – with roots that go back to 1935 – has always taken this role very seriously. In fulfilling this mandate, the Commission seeks to contribute to improving the art and science of environmental assessment.

To that end, in many of its reports, the Commission has offered advice to proponents and to the Province of Manitoba as to how the Commission believes the process can be improved.

In June 2013, in the Report on the Bipole III Transmission Project, the Commission was critical of the quality of the work done by Manitoba Hydro in conducting its environmental assessment of the proposed project. In fairness, in this report, we must compliment Manitoba Hydro, the majority partner in the Keeyask Generation Project, for

a much-improved product. It is not perfect, but still a major improvement.

It must be pointed out that the Commission’s comments, in the Bipole report, did not have any influence in this improvement, as the Keeyask EIS was filed many months before the report became public. Still, we believe that Manitoba Hydro can do even better work than they have for Keeyask. We will discuss this further in this report. Manitoba Hydro has set a goal to become among the Top Employers in its community – a truly admirable goal. With its new headquarters, Manitoba Hydro set out to be a world leader in sustainable building. In like manner, the Commission believes Manitoba Hydro should adopt a goal to become a world leader in environmental assessment.

This environmental assessment was better written; it was better organized; and its much-improved analysis led to conclusions that were understandable and, for the most part, supportable. The Commission does not agree with all of the conclusions. This will be discussed in the report and recommendations will be made.

In one particular area – sturgeon – the Commission does not share the Partnership’s confidence that its mitigative measures will be as successful as predicted. Its plans for habitat

re-creation are optimistic. Having never been done in a similar northern river environment before, these plans are, at best, experimental. While the Commission certainly hopes that they prove to be successful, at this time, there remains too much uncertainty for the Commission to agree with the Partnership that sturgeon will be better off after completion of the Keeyask Generation Project.

The Bipole III report also contained implicit criticism of the Manitoba Government for not having acted on Commission recommendations dating back to 2004 to improve the process of environmental assessment in this province. The Commission was very pleased that the Minister of Conservation and Water Stewardship accepted its recommendations in this regard and that department officials are already working on this matter. In particular, the minister accepted our recommendation that the Manitoba Government and Manitoba Hydro work together to conduct a regional cumulative effects assessment of all of the hydro projects constructed in the Nelson River sub-watershed. This became a key issue, addressed by many of the parties to the Keeyask hearings. What we heard during these hearings reinforces our belief in the importance of this assessment. Work on this is now underway.

Readers of past reports will not be surprised to find that the Commission remains less-than-satisfied with the cumulative effects assessment. To some extent, it remains a difference of opinion: the Proponent does the minimum required for regulatory approval; the Commission would like to see a more comprehensive approach. This will be discussed further in this report.

Subsequent to the hearings, the Commission became aware that the Canadian Council of Ministers of the Environment has

begun a process to develop national standards for cumulative effects assessments. This, in our view, is a very positive step.

The Keeyask Generation Project, while not unique, follows an emerging pattern in which a large public corporation enters into a partnership arrangement with First Nations to construct large infrastructure projects. This was first seen in Manitoba with Manitoba Hydro's partnership, in the early 2000s, with Nisichawayasihk Cree Nation to construct the Wuskwatim Generation Project. Different models of similar arrangements have occurred in other jurisdictions.

For Keeyask, Hydro partnered with four First Nations, all resident in proximity to the proposed generation station. A new twist to the Keeyask process was that the First Nations produced their own environmental assessments, based on their own Cree worldview – not on western science. In addition, the Keeyask Cree Nations (as they are referred to in the documentation) participated in the western scientific environmental assessment, bringing their worldview and Aboriginal traditional knowledge to the table. At the least, this informed the environmental assessment; at its best, it carried the day (in particular, in relation to the summer resident caribou.)

While it is not our position to judge the decision-making process whereby the KCNs became partners, we were particularly impressed by the approach taken by the First Nations. In their presentations, they spoke to the careful and comprehensive community deliberations that led to their joining the Partnership. And, they spoke of this as being a part of a reconciliation process with Manitoba Hydro for the years of development which did not involve them.

Understanding the Cree worldview presented a challenge to the Panel. Only

one of five panel members is Aboriginal, an Anishinabe member of the Pine Creek First Nation. But, the fact that Aboriginal traditional knowledge was incorporated into the environmental assessment was also of considerable benefit. This will be discussed further in the report.

In the end, the Panel is more than satisfied that the record is sufficiently complete for it to offer sound advice to the minister.

The Commission will recommend that an environmental licence be issued to the Keeyask Hydropower Limited Partnership for construction of the Keeyask Generation Project. It will also recommend that certain, specific conditions be attached to the licence to ensure that remaining environmental concerns are addressed.

The Commission remains strongly of the view that the practice of environmental assessment in Manitoba must continue to improve. To that end, in this report, the Commission will again offer advice to the Manitoba Government and to Manitoba Hydro aimed at improving the process.

Acknowledgements

As with any hearing process conducted by the Clean Environment Commission, many people made significant contributions. I would like to acknowledge the great work done by these folks. My co-panelists included Judy Bradley, Jim Shaw and Edwin Yee of Winnipeg and Reg Nepinak of the Pine Creek First Nation. Special thanks are due to the very skilled and dedicated Commission staff: Cathy Johnson, Joyce Mueller and Amy Kagaoan. Our legal advice came from Michael Green and Kelly Dixon. Our report writer was Bob Armstrong. Finally, we were very ably supported by a team of consultants and service providers, without whom we would

have had great difficulty navigating this process.

Terry Sargeant

Chair, The Clean Environment Commission

April 2014



Executive Summary

On November 14, 2012, the Minister of Conservation and Water Stewardship wrote to the Clean Environment Commission to request that the Commission conduct public hearings into the proposal by Keeyask Hydropower Limited Partnership to build the Keeyask Generation Project. The Commission was asked to review the Proponent's environmental impact statement (EIS), including supporting technical documents and details of the Proponent's public consultation program. The Commission was further mandated to provide a recommendation as to whether a licence for the Project should be issued under *The Environment Act*. Should the Commission recommend issuing a licence, the report was also to include recommendations for any appropriate measures to mitigate adverse effects or to monitor the Project's effects.

Public hearings began on September 16, 2013, and ran until January 9, 2014, and took place in locations in northern Manitoba close to the Project site, as well as in Winnipeg. During these hearings, the Commission heard a great deal on behalf of the Proponent, from staff of Manitoba Hydro, representatives of the four First Nations that have joined with Manitoba Hydro to form the Keeyask Hydropower Limited Partnership, and consultants retained to conduct the Proponent's assessment of the Project. The Commission also heard a great deal of evidence presented

by Participants in the hearing process, and their expert witnesses, and by the general public. The Commission has considered this evidence, in combination with the EIS and the supporting technical documents. One unique factor in the Keeyask Generation Project has been that its EIS contains both a traditional, technical evaluation of the potential impact of the Project on 38 valued environmental components (VECs) as well as three evaluations carried out by the First Nations partners in the Project, employing the holistic Cree worldview to consider a very wide array of environmental, social, cultural, economic and spiritual impacts of hydroelectric development.

The EIS and the discussions during the hearings identified four major areas of potential concern arising from the Keeyask Generation Project: the potential impact of changes to habitat for lake sturgeon within the Nelson River and Gull Lake; the potential disturbance to habitat of caribou resident in the Project area; the increase in methylmercury levels in fish in the Project area following creation of the reservoir; and the potential social and public safety impacts arising from the influx of a large number of temporary workers to construct the Keeyask Generation Project.

Mitigation and monitoring measures are planned for all of these four areas of potential impact. During the course of the hearings

and in assessing the technical documents, the Commission came to the conclusion that mitigation measures for the latter two areas of concern – methylmercury and the influx of workers – have been well designed to prevent adverse effects. Regarding the first two areas of concern – lake sturgeon and caribou – additional research will likely be required to provide confidence that the Project will not cause adverse effects. For lake sturgeon in particular, a long-term stocking program will be required to meet the goal of bringing back a self-sustaining population of these iconic, but endangered, fish.

After consideration of the body of evidence, the Commission recommends to the minister that the Keeyask Generation Project be approved for a licence under *The Environment Act*. The Commission recommends that a number of conditions be attached to this licence in order to provide some assurance that the goals of the Keeyask Generation Project can be met without compromising the environment of Manitoba. Some of these recommendations deal with specific ways of mitigating impacts on the environment, by reducing the level of disturbance or replacing habitat, for example. Other recommendations are focused on the need for additional monitoring so that adverse effects can be identified or environmental management measures can be developed.

In addition to these licensing recommendations, the Commission has also made recommendations aimed at improving environmental assessment conducted by Manitoba Hydro and improving the processes and protocols governing environmental assessment generally in Manitoba.

Finally, the Commission has made non-licensing recommendations directed at the Government of Manitoba as well as others focused on encouraging an atmosphere of reconciliation in environmental matters

It is the Commission's hope that these recommendations could help to bring about a spirit of reconciliation between Manitoba Hydro and Manitoba's Aboriginal communities. That Manitoba Hydro and four First Nations worked together to develop the Keeyask Generation Project and brought together technical science and the Cree worldview in their environmental assessment, provides some encouragement that this environmental reconciliation is possible and desired by all.

Chapter One

Introduction

1.1 The Manitoba Clean Environment Commission

The Manitoba Clean Environment Commission (the Commission) is an arm's-length, provincial agency established under the authority of *The Environment Act* of Manitoba (1988). Under the Act, the Commission is mandated to provide advice and recommendations to the Minister of Manitoba Conservation and Water Stewardship and to develop and maintain public participation in environmental matters. In the context of a review process such as that undertaken for the Keeyask Generation Project (the Project), this means holding open hearings to allow members of the public to challenge the environmental assessment conducted by the Project's Proponent, Keeyask Hydropower Limited Partnership (the Proponent), and to state their opinions to the Hearing Panel (the Panel).

1.2 The Project

The Keeyask Generation Project is a system of dams and dykes and an associated power generation facility and spillway to be built on the Nelson River at Gull Rapids, immediately upstream of Stephens Lake. The site is in the boreal forest region, within the Split Lake Resource Management Area, approximately 60 km northeast of Split Lake

and 30 km west of Gillam. (See Fig. 1.1.) At the location of the powerhouse, at the base of the rapids, the Project will raise the water level by 18 metres. Flooding caused by the raising of the water level will inundate 4,500 hectares (45 km²) of land initially, with an additional 700-800 hectares of flooding caused by shoreline erosion over the subsequent 30 years. The Project is designed to produce a maximum of 695 megawatts (MW) of electricity, with an average annual production of 4,800 gigawatt-hours (GWh). The electricity will be sold by the Keeyask Hydropower Limited Partnership to Manitoba Hydro, which will sell it to Manitoba customers and on the export market.

Principal structures to be built as part of the Keeyask Generation Project consist of a powerhouse and service bay complex, spillway, three dams and two dykes. The dams will create a reservoir upstream that will extend 42 km, to three kilometres downstream of Clark Lake. In addition to these principal structures, the Project also includes supporting infrastructure, such as temporary facilities required for the construction of the Project, and some permanent infrastructure, including access roads, a communication tower, safety and security facilities, and boat and barge landings. The access roads for the Project include the 25-km North Access Road, connecting the site with PR 280, which has

already been licensed under *The Environment Act* as part of the Keeyask Infrastructure Project, and the 35-km South Access Road, connecting the Project site with the Town of Gillam, which will be built as part of the infrastructure included with the Keeyask Generation Project. When the Project is completed, PR 280 will be routed along the two access roads, and will cross the Nelson River along the top of the dams.

Although not included as part of the Keeyask Generation Project, a 35-km transmission line will be built as part of the Keeyask Transmission Project (KTP), connecting the generating station with the Radisson Converter Station near Gillam. The KTP will consist of three 138-kilovolt (kV) AC transmission lines running in the same right-of-way south of the Nelson River and Stephens Lake.

1.3 The Proponent

Keeyask Hydropower Limited Partnership is a partnership between Manitoba Hydro and the four First Nations in the immediate area of the Project. Under the terms of the partnership, there is one general partner, 5900345 Manitoba Ltd, which is wholly owned by Manitoba Hydro. This general partner is responsible for the management and operation of the business of the Project and is liable for all the debts of the Project. There are four limited partners, with limited rights in the day-to-day management and operations and limited liability for the debts of the Keeyask Hydropower Limited Partnership. Limited partners are Manitoba Hydro, Cree Nation Partners Limited Partnership, YFFN Limited Partnership, and FLCN Keeyask Investments Inc.

Manitoba Hydro is a provincial Crown corporation, mandated to provide for the power needs of Manitobans. The utility is

Fig. 1.1 Location of the Keeyask Generation Project. (Courtesy of KHLP.)



overseen by the Manitoba Hydro-Electric Board, which is appointed by the Government of Manitoba and reports to the minister responsible for *The Manitoba Hydro Act*.

Cree Nation Partners Limited Partnership is controlled by Tataskweyak Cree Nation (TCN) and War Lake First Nation (WLFN). TCN is located on the north side of Split Lake, and had a population of 3,020 as of 2006. WLFN is located south east of Split Lake, near Ilford on the Hudson Bay Railway line, and had a total population of approximately 235 in 2006, 125 of whom lived on-reserve.

YFFN Limited Partnership is controlled by York Factory First Nation (YFFN). YFFN is located along the southeast shore of Split Lake, accessible by ferry or ice road across Split Lake from TCN. YFFN had a population of approximately 1,070 in 2006.

FLCN Keeyask Investments Inc. is controlled by Fox Lake Cree Nation (FLCN). FLCN has a home reserve in the community of Bird, 53 km northeast of Gillam, near the Limestone Generating Station, and an urban reserve in Gillam. FLCN's total population as of 2006 was approximately 1,020.

Within the context of this Project, the four First Nations that are participating in the partnership are sometimes referred to as the Keeyask Cree Nations (KCNs). Approximately 43 per cent of the population of the KCNs lived off-reserve as of 2006, with the largest portion of the off-reserve population residing elsewhere in northern Manitoba.

Affairs of the general partner, 5900345 Manitoba Ltd., are subject to the direction of its board of directors, which will have two members nominated by TCN, and one each nominated by WLFN, YFFN and FLCN. Board members nominated by Manitoba Hydro have the majority on the Board. The Joint Keeyask Development Agreement,

signed by the four KCNs and Manitoba Hydro in 2009, establishes the legal framework for the partnership. Planning, construction and operation of the Project will be contracted to Manitoba Hydro.

1.4 Terms of Reference

On November 14, 2012, the Minister of Conservation and Water Stewardship wrote to the Commission requesting that the Commission hold public hearings on the proposed Keeyask Generation Project. The minister included the following Terms of Reference for the hearings:

- To review the EIS, including the Proponent's public consultation summary. Note that a detailed technical review will be done by the provincial and federal specialist agencies who are members of the TAC [the Technical Advisory Committee]. As such, documents produced during this assessment should be considered by the Commission as input for the hearings;
- To hold public hearings for the Commission to consider stakeholder and public input; and,
- To prepare and file a report with the Minister of Conservation and Water Stewardship outlining the results of the Commission's review and providing recommendations for the minister's consideration. In the event the Commission recommends that a licence be issued, the report is to include those conditions the Commission feels necessary, including measures to mitigate potential adverse effects as well as future monitoring that may be required. The report should be filed within 90 days from the date of completion of hearing as per Section 7(3) of the Act.

The letter from the minister also specifically stated that: “Hearings should be located in areas that will allow reasonable access to potential stakeholders, including in the project area and Winnipeg.” See Appendix I for the full Terms of Reference.

1.5 The Hearings

Public hearings were held in Gillam, Bird (FLCN), York Landing (YFFN), Thompson, Split Lake (TCN), and Cross Lake (Pimicikamak Okimawin) from September 16 to October 1. Public hearings then resumed in Winnipeg on October 21 and ran until January 9, 2014. During these hearings, testimony was given by representatives of the Proponent and Participants and by members of the public. Interested members of the KCNs, as well as members of Pimicikamak Okimawin, took part in hearings held in the northern First Nations, as well as in the later hearings held in Winnipeg.

1.6 The Report

This report to the Minister of Manitoba Conservation and Water Stewardship presents an overview of the Keeyask Generation Project and a summary of the hearings, and provides comments and recommendations on environmental issues of concern as identified by the public, Participants and the Commission. Through this process, the Commission has developed an understanding of the effects of the Project sufficient to recommend to the minister that the Keeyask Hydropower Limited Partnership receive the development licence required under *The Environment Act* to construct the Project as proposed, subject to specific conditions to be attached to the licence.

These attached conditions address concerns about public health, safety,

monitoring of environmental impacts and on-going monitoring of mitigation measures. These recommendations will be identified as “Licensing Recommendations.”

In addition to these, the Commission is also making a number of “Non-Licensing Recommendations.” In the Commission’s view, these relate to matters that are important and should be addressed, but are not of a nature to be attached as conditions to the licence. Some are directed at the Province of Manitoba in relation to the process and practice of environmental assessment. Some are directed at Manitoba Hydro for use in future environmental assessments. Others are directed at the Keeyask Hydropower Limited Partnership for implementation into its environmental management practices for the Keeyask Generation Project.

This report is divided into 16 chapters, covering the licensing and hearing process, the Keeyask Generation Project, the topics raised in the environmental impact statement (EIS), and the Commission’s recommendations to the minister. Following these chapters will be appendices that include the terms of reference for the hearing process, a list of Presenters and those who provided written submissions, and glossaries.

Because of the great detail in the EIS, the section on environmental effects of the Project will take up a large portion of this report. The section on environmental effects is broken into two chapters, one on aquatic and terrestrial effects and the other on socio-economic effects. Sections of the report will follow a standard format, in which detailed information provided by the Proponent in the EIS, technical reports or testimony in hearings will be presented first. Comments made by Participants and Presenters during the hearings will be summarized under the heading “What we Heard.” The Panel’s own views on many of the subjects will be

described under the heading “Commission Comment,” followed, in many cases, by recommendations.

Licensing Recommendation

The Commission recommends that:

- 1.1 *Keeyask Hydropower Limited Partnership be issued an Environment Act licence for the Keeyask Generation Project, subject to licensing conditions outlined in subsequent recommendations in this report.*



Chapter Two

The Licensing Process

2.1 Needed Licences and Approvals

The Environment Act of Manitoba (1988) sets out the environmental assessment and licensing process for developments such as the Keeyask Generation Project (the Project). The provincial process encourages early consultation by project proponents and provides for public participation at various stages of the Province's review of a project. *The Classes of Development Regulation* classifies projects as Class 1, 2 or 3, generally in accordance with the size and complexity of the project. The Keeyask Generation Project is a Class 3 Development. In order to build the Project, the Proponent requires an *Environment Act* licence. To obtain that licence, the Project must be assessed in accordance with the process outlined in *The Environment Act*.

2.2 Review Process for an *Environment Act* Licence

Keeyask Hydropower Limited Partnership submitted an *Environment Act* Proposal Form (EAPF) together with a draft Environmental Assessment Scoping Document to Manitoba Conservation and Water Stewardship on December 9, 2011. The purpose of the Scoping Document was to suggest an appropriate framework and scope for

conducting the environmental assessment of the Project required by *The Environment Act* and for preparing the environmental impact statement (EIS) for regulatory review.

Staff of the Environmental Approvals Branch of Manitoba Conservation and Water Stewardship, as well as members of a cross-departmental Technical Advisory Committee (TAC), reviewed the Proposal Form and draft Scoping Document and provided comments. Interested members of the public were also invited to provide their comments and concerns about the Project and its supporting documentation, namely the EAPF and the draft Scoping Document. Interested parties had until January 31, 2012, to provide comments.

The Scoping Document stipulated that the EIS was to include, at a minimum: a discussion of the regulatory and policy framework; determination of the scope of the Project, including alternative means of carrying out the Project; information and methodology used in conducting the assessment, including the use of Aboriginal traditional knowledge (ATK) and public consultation; the environmental setting, including the physical, aquatic, terrestrial and socio-economic environments; an assessment of the Project's effects on the environment, including cumulative effects; the Project's effects on sustainable development; and

programs for monitoring, mitigation and follow-up. The Need For and Alternatives To the Project (NFAT) were not within the scope of the EIS. These matters are the focus of a separate hearing being held before the Public Utilities Board (PUB). Certain agreements between the Partners in the Keeyask Project – including the Joint Keeyask Development Agreement (JKDA) and the Adverse Effects Agreements (AEAs) between Manitoba Hydro and the Keeyask Cree Nations (KCNs) – were not within the scope of EIS. However, the EIS was to address the ways in which design criteria and adverse effects programs described in these agreements influenced the Project's effect on the environment. Likewise, the EIS was to include information from the KCNs on their assessment of the Project, but the decisions of the KCNs to participate in the Project were not within the scope of the EIS.

The Proponent filed its EIS on July 6, 2012. Not all developments covered in *The Environment Act* necessarily require an EIS, but the Keeyask Generation Project did, owing to its size and complexity. Upon the filing of the EIS, *The Environment Act* mandates that the EIS be accessible for public review. The Keeyask EIS was available for review for a two-month period, during which time interested parties were able to review the material and provide comment. Following the filing of the EIS, members of the TAC reviewed it and submitted requests for additional information. Responses to these requests were filed by the Proponent on November 19, 2012, and April 26, 2013. Following the second round of replies to Information Requests from the TAC, the Environmental Approvals Branch advised the Clean Environment Commission on June 26, 2013, that sufficient information was now available for hearings to proceed.

The Minister of Conservation and Water Stewardship has the discretion to direct that

there be a public hearing to review the EIS on such terms as the minister determines. If there is to be a public hearing of a project, it will be held before the Clean Environment Commission. The Commission is required to report to the minister following such a public hearing and provide recommendations regarding the Project.

2.3 Federal Regulatory Review and Decision Making

The Keeyask Generation Project requires federal authorization under the *Fisheries Act* and the *Navigable Waters Protection Act* (the latter of which is expected to be renamed in 2014). As a hydroelectric generating station with a production capacity of 200 MW or greater, the Project falls under the Comprehensive Study List Regulations of the *Canadian Environmental Assessment Act*. A comprehensive study is an environmental assessment that considers environmental effects, mitigation measures, public concerns, significance, the purpose of the project, alternative means of carrying out the project, the need for a follow-up program, and sustainability of natural resources.

As expressed in the Canada-Manitoba Agreement on Environmental Assessment Cooperation (2007), Canada and Manitoba have agreed to carry out a co-operative environmental assessment that will generate the type and quality of information and conclusions on environmental effects required by both governments.

2.4 Section 35 of Canada's Constitution

Section 35 of the *Constitution Act* (1982) stipulates that “[t]he existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed.”

While Section 35 is not an “environmental” statute, it does require consultation with Aboriginal peoples whose rights may be impacted in some fashion by a project. The process of consulting with Aboriginal peoples in accordance with Section 35 is not a “regulatory process.” The obligation to initiate and carry out consultations with respect to Section 35 is that of the Province and/or of Canada, depending upon the nature of the project under consideration, its location and its ownership.

In the case of the Keeyask Project, both the Government of Canada and the Government of Manitoba are conducting the Section 35 consultations. The Commission hearings played no role in these consultations.

2.5 Need For and Alternatives To

As mentioned earlier, consideration of the Need For and Alternatives To the Project was not within the scope of the EIS, nor within the Terms of Reference for the Clean Environment Commission’s hearings on the Keeyask Generation Project. At the time of the writing of this report, that subject is being reviewed in a hearing before the PUB, at which the Project is being considered, along with a number of Manitoba Hydro’s plans for fulfilling its mandate of meeting Manitobans’ power needs.

2.6 Role of the Clean Environment Commission

The Commission’s role in this regulatory process is to make recommendations on the granting of a licence under *The Environment Act*. In making its determination as to the effects of the Project and its recommendations, the Panel relied on the EIS, technical experts retained by the Commission,

Participant and public submission and presentations, testimony of expert witnesses, and cross-examination of those experts.

The Commission was required to submit its report within 90 days of the close of the hearings. Should the Commission recommend the granting of a licence, the Minister of Conservation and Water Stewardship must either adopt the Commission’s licensing recommendations or provide written reasons for not doing so.

2.7 The Licensing Decision

Ultimately, it is the Minister of Conservation and Water Stewardship who will decide whether a licence should be issued under *The Environment Act* for the Keeyask Generation Project. His decision will be based, at least in part, upon the advice and recommendations contained in the Commission’s report on the public hearings. In addition, the minister’s decision will be informed by the report of the consultations with Aboriginal communities, required under s. 35 of the *Constitution Act* (1982), the PUB’s NFAT review, and advice from officials in his department.



Chapter Three

The Public Hearing Process

3.1 Clean Environment Commission

The Panel assigned to conduct the public hearings on the Keeyask Generation Project consisted of Terry Sargeant, (Chairperson of the Panel and of the Clean Environment Commission), Judy Bradley, Reg Nepinak, Jim Shaw, and Edwin Yee.

3.2 Public Participation

3.2.1 Participants

This report uses two terms to describe members of the public who took part in the process: Participants and Presenters.

Participants are groups who were substantially involved in the process. Participants took part in the pre-hearing process, during which they reviewed the environmental impact statement (EIS) and sought further information before the beginning of hearings, and many of them brought their own expert witnesses to the hearings. Many Participants were represented by counsel. Participants were able to ask questions of the Proponent or of each other. In turn, they may also have been asked questions by the Proponent. Many of the Participants received funding through the Participant Assistance Program, in order to

help them analyze and assess the impacts of the Keeyask Project and prepare for the hearings. Participants were:

- Concerned Fox Lake Grassroots Citizens
- The Consumers' Association of Canada (Manitoba Branch)
- Kaweechiwasihk Kay-Tay-A-Ti-Suk (York Factory First Nation elders)
- The Manitoba Métis Federation
- Manitoba Wildlands
- Peguis First Nation
- Pimicikamak Okimawin

3.2.2 Participant Assistance Program

Funding for Participants is established by *The Environment Act Participant Assistance Regulation*, which creates a Proponent-funded program that ensures that qualifying public organizations have access to resources to participate effectively in hearings of this nature. Typically, Participants use these funds to hire legal counsel and specialists with experience in conducting assessments of biophysical and socio-economic impacts, and to pay travel and accommodation expenses for representatives making presentations.

3.2.3 Presenters

Presenters are organizations or individuals who attended and spoke only at the formal hearings. Presenters were allowed 15 minutes each in which to present their views or information.

3.3 The Pre-Hearing

Following the filing of the EIS on July 6, 2012, the Commission was issued its Terms of Reference for the Keeyask Generation Project hearings on November 14, 2012. In February 2013, the Commission invited Manitobans to apply for funds, under the Participant Assistance Program, to help them participate in the review of the Project. The Participant Assistance Committee of the Commission reviewed applications for funding and in April 2013, recommended to the Minister of Conservation and Water Stewardship that allocations be made to organizations for their participation in the Keeyask hearings. On the minister's concurrence, the awards were made.

In order to prepare for public hearings into the Project, Participants were able to forward requests for clarification of information in the EIS or for background or pertinent information that had not been included in the EIS and technical reports. The Proponent received and responded to more than 500 such information requests (IRs).

During this pre-hearing period, the Commission held two pre-hearing meetings and one motions hearing with Participants and the Proponent. These meetings were held in order to discuss procedure, timing, and the Terms of Reference for the hearings. Two motions were heard during the motions hearing, in which the Commission was requested to adjourn or delay the hearing in order for a Regional Cumulative Effects

Assessment to be performed on the Nelson River watershed or for additional studies on the Project area to be carried out. A third motion requested that the Commission compel the release of a draft research report on one of the Keeyask Cree Nation communities. The three motions were denied.

3.4 The Hearings

Hearings began on September 16, 2013, and ran until January 9, 2014. Hearings were held in Gillam, Bird, York Landing, Thompson, Split Lake, Cross Lake and Winnipeg. Throughout the hearings, the Panel heard evidence from 43 representatives speaking on behalf of the Proponent, 69 representatives speaking on behalf of the Participants, and 79 Presenters. The Panel also received 28 written submissions. See Appendix II for a full list of all those involved in the hearings.

Clean Environment Commission hearings follow a formal process. Written submissions and supporting materials are filed as exhibits. Witnesses for the Proponent and the Participants make oral presentation, in an agreed-upon order, summarizing their written submissions. Questioning of witnesses for the Proponent or the Participants proceeds formally and is conducted by the representatives of the Proponent and the Participants. Panel members also ask questions of the witnesses. In addition to hearing oral testimony, the Panel also accepted written submissions from the public.

Chapter Four

Manitoba's Electrical Generation and Transmission System

4.1 System Overview

Electricity in Manitoba is generated and transmitted by Manitoba Hydro, which operates a total of 17 generating stations, 15 of which are hydroelectric, and also buys electricity from two wind farms. (See Fig. 4.1) Currently, the Crown corporation's generating capacity is approximately 5,000 megawatts (MW). This power is distributed to more than 550,000 domestic customers over more than 15,000 km of transmission lines, which are also built and operated by Manitoba Hydro.

What is electricity?

Electricity is the result of the movement of free electrons from atom to atom in a substance. When electrons can be made to jump in the same direction at the same time, the result is an electrical current. Electricity, then, is the flow of electrons through material. Some materials, such as the aluminum or copper used in the conductors (wires) in a transmission line, contain a large number of free electrons and are therefore said to be good conductors of electricity. Other materials, such as wood, rubber or glass, have few free electrons and are called insulators.

Manitoba Hydro transmits electricity throughout Manitoba using two systems of power lines. Two high-voltage direct-current (HVDC) lines, called Bipole I and II, transmit electricity from the Lower Nelson River area, where most power generation occurs, to southern Manitoba, where most of the customers are located. These 500 kilovolt (kV) lines use DC transmission because it is more efficient for carrying large amounts of power over long distances. Construction of a third Bipole line was licensed by Manitoba Conservation and Water Stewardship in 2013, in order to provide reliability in the event of extreme weather or equipment failures and to carry electricity to be generated by potential future generating stations. Manitoba Hydro's other lines transmit electricity in the form of alternating current (AC), which is the form in which electricity is generated and the form in which it is used in homes and workplaces. AC lines may be in a wide variety of voltages, including high-voltage lines of 230 or 138 kV and lower-voltage lines to carry power to homes. Lines to transmit electricity from the Keeyask Generating Station to the Radisson Converter Station near Gillam are part of the Keeyask Transmission Project, which is the subject of a separate *Environment Act* licence application.

Manitoba Hydro also has AC transmission lines connecting beyond the province to neighbouring provinces and states, which

Fig. 4.1 Power Generation Facilities in Manitoba. (Courtesy of KHLPL)



How is electricity generated?

Scientists discovered in the early 19th century that, by using a magnet, it is possible to make free electrons flow in the same direction through a wire, creating an electric current. This is essentially what makes hydroelectric generation possible. The force of water being directed through a generating station turns a giant electromagnet weighing hundreds of tonnes, in a cylinder lined with wires, causing free electrons to flow through the wires. One generating station may contain 10 or more of these giant electromagnets.

allow for surplus electricity to be sold for export and, in emergencies, for electricity to be purchased from other utilities. In Manitoba, the time of peak electrical demand is in winter, because of the need for heating. In many American states, the time of peak electrical demand is in summer, because of the demand for air conditioning. As a result, Manitoba has more surplus electricity to sell in the summer when customers in the United States need it more.

When electricity is bought and sold it is referred to in terms such as kilowatt-hours. A kilowatt-hour is 1,000 watts of power flowing for one hour. To visualize this, imagine 17 60-watt lightbulbs left on for one hour. One megawatt-hour is 1,000 kilowatt-hours. As of 2012, in an average year Manitoba Hydro produces about 30 million megawatt-hours of electricity. Domestic consumption within Manitoba uses about 24 million megawatt-hours. Manitoba Hydro sells the remaining 6 million megawatt-hours outside of the province.

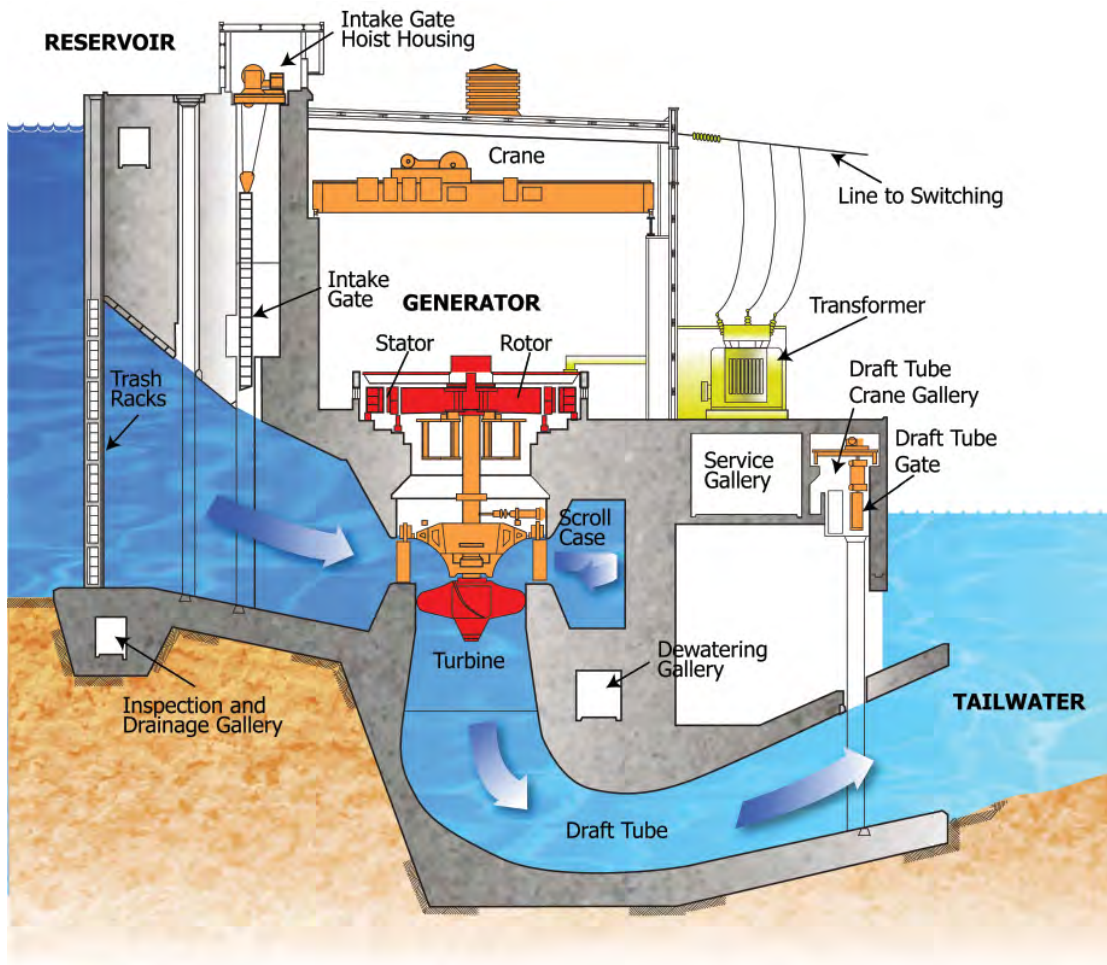
4.2 Generating Stations

Most of Manitoba's Hydro's generating capacity is supplied by northern generating stations on the Nelson River. The Nelson River, the largest in Manitoba, receives water from an area of more than one million square kilometres, extending from the Continental Divide in Alberta to just east of Lake Superior in Ontario and south to the northern portion

View of a typical powerhouse

A typical powerhouse will have several propeller-like turbines, each connected to a generator that produces electricity, which is transmitted to a transformer and from there to transmission lines. Each turbine will have its own intake gate, which can be closed to allow for maintenance, and its own trash racks, which prevent debris from being drawn into the turbine. Once through the intake gate, water flows into the scroll case, an enclosed space directly above the turbine. From there, it flows past the turbine, causing it to turn. The turbine turns the rotor, which is a giant electromagnet, and as it turns past the stator, a series of tightly wound wires, electrons are made to flow as electricity. After passing the turbine, water continues to flow down a large tube known as the draft tube, which empties into the river immediately below the generating station. This area is known as the tailwater. The area of rapidly flowing water downstream of a powerhouse is known as a tailrace. In the event that maintenance is required, the draft tube gate allows the draft tube to be closed off from the tailwater so that the draft tube can be dewatered.

Fig. 4.2 Cross-Section of a Typical Hydroelectric Powerhouse. (Courtesy of KHLP.)



of South Dakota. The power generation potential of a river is a function of the amount of water flowing and distance the water drops (called the hydraulic head) at the generating station. As a result, rapids along the Nelson River – which drops 217 metres between Lake Winnipeg and Hudson Bay – are the locations in Manitoba with the greatest potential for generating hydroelectricity. Three large generating stations on the Nelson River – Kettle, Long Spruce, and Limestone – have a total capacity of more than 3,500 MW. These three stations represent approximately 70 per cent of Manitoba Hydro's generating capacity.

In order to keep these large generating stations supplied with water, Manitoba Hydro

manages the flow of Manitoba's major river systems. Manitoba Hydro regulates water levels on Lake Winnipeg, using the Jenpeg Control Structure, and diverts the Churchill River in order to ensure a steady supply of water throughout the year (see 4.3 below).

Manitoba has a long history of generating power through hydroelectricity. The oldest generating station currently in operation in Manitoba is the Pointe de Bois station on the Winnipeg River, which went into service in 1911. It is one of six generating stations – with a total capacity of approximately 580 MW – on the Winnipeg River in Manitoba.

Development of hydroelectric resources

in the north began in the late 1950s with construction of the Kelsey Generating Station, just upstream of Split Lake. Built to provide power for the city of Thompson and neighbouring nickel mines, Kelsey resulted in the flooding of 5,800 hectares (58 km²) and produces 220 MW of electricity. It recently went through a retrofit known as “re-running” to increase its generating potential without altering water levels.

In the 1960s, Manitoba Hydro built the Grand Rapids Generating Station on the Saskatchewan River, upstream of where it empties into the north basin of Lake Winnipeg. In service in 1968, Grand Rapids raised water levels on Cedar Lake and flooded portions of the Saskatchewan River delta. Its capacity is approximately 480 MW.

Construction of the first major Nelson River station, the Kettle Generating Station, began in 1966 and was completed in 1973. The Kettle Dam flooded 22,000 hectares of land, joining two smaller lakes into the much larger Stephens Lake. Kettle produces 1,200 MW of electricity. The next two major dams – Long Spruce (in-service in 1979) and Limestone (in-service in 1992) caused substantially less flooding because they were built in locations where the Nelson had steep banks (1,300 and 200 hectares respectively). Manitoba Hydro also generates 130 MW of electricity at the Jenpeg Control Structure, although its main function is controlling water levels on Lake Winnipeg.

In 2012, the Wuskwatim Generating Station on the Burntwood River, owned by the Wuskwatim Power Limited Partnership (a partnership of Manitoba Hydro and Nisichawayasihk Cree Nation), went into service, with a capacity of 200 MW. Wuskwatim, built with what is called a low-head design, flooded approximately 37 hectares of land.

In addition to these hydroelectric generating stations, Manitoba Hydro operates thermal generating stations in Selkirk and Brandon that burn natural gas to generate a total of 458 MW of electricity. As well, Manitoba Hydro purchases power from two independently owned windfarms, at St. Leon and St. Joseph, providing a maximum of nearly 240 MW of power.

4.3 Lake Winnipeg Regulation and the Churchill River Diversion

Manitoba Hydro manages power production on the lower Nelson River by regulating the level of Lake Winnipeg and diverting water from the Churchill River into the Nelson via the Rat and Burntwood Rivers. These changes to the waterways of northern Manitoba were undertaken in the 1970s in order to ensure a steady supply of water to generate electricity at the Nelson River stations.

The governments of Canada and Manitoba established the Lake Winnipeg, Churchill and Nelson Rivers Study Board in 1971 to investigate the social, economic and environmental aspects of Lake Winnipeg Regulation (LWR), the Churchill River Diversion (CRD) and the development of the hydroelectric potential of the lower Nelson. In 1970, the Manitoba government issued an interim licence to Manitoba Hydro, under *The Water Power Act*, to proceed with LWR. A supplementary interim licence for CRD was issued in 1972. The level of water in Lake Winnipeg is regulated to provide storage capability and increased flow to the downstream power plants in the winter, when Manitoba Hydro has its peak energy requirements and when ice on Lake Winnipeg limits outflow. Infrastructure for LWR consists of three excavated channels that substantially

increase the outflow capability from the lake, the Jenpeg Control Structure, which regulates the outflow, and a dam at the outlet of Kiskitto Lake to prevent water from backing up into that lake. The interim licence issued to Manitoba Hydro allows it to regulate Lake Winnipeg for power production purposes when the lake level (with the effects of wind eliminated) is between 711 and 715 feet above sea level (asl). Above 715 feet, Manitoba Hydro must operate the Jenpeg Control Structure to allow the maximum discharge possible under the circumstances until the water level recedes to 715 feet. When the lake level falls below 711 feet, Manitoba Hydro is required to operate Jenpeg as ordered by the minister responsible for *The Water Power Act*. This licence uses Imperial measurements, while some other licences and regulations use metric units for water levels.

Manitoba Hydro has been continuing to operate LWR with an interim licence for approximately 40 years. However, the Corporation has applied for a final licence under *The Water Power Act* and this will be the subject of hearings by the Clean Environment Commission in 2014.

The Churchill River was determined to have 3,000 MW of generating potential, but rather than build generating stations there, it was determined to be more economically feasible to divert Churchill water to the Nelson. This is done using a control dam at Missi Falls, the natural outlet of Southern Indian Lake, to control outflow down the Churchill River, raise water levels in the lake by about three metres, and cause the water to flow through an excavated channel into Isset Lake on the Rat River system. A second control dam at Notigi Lake on the Rat River regulates the flow into the Burntwood River system and the lower Nelson River. The Burntwood flows into the Nelson at the northwestern corner of Split Lake.

Construction of the CRD began in 1973 and it became operational in 1977 with flooding of areas around Southern Indian Lake. CRD is operated in accordance with an interim licence dated December 19, 1972, and a second interim licence issued on May 11, 1973. Under the terms of the licence, water is stored in Southern Indian Lake to a maximum level of 847 feet above sea level and may be drawn down over winter to a minimum of 844 feet. The maximum allowable discharge through the Notigi Control Structure is 30,000 cubic feet per second (cfs) and the flow at Thompson must not exceed the average mean flow of the pre-CRD Burntwood River plus the diverted 30,000 cfs. The licence also requires a minimum outflow from the control dam at Missi Falls down the Churchill River of not less than 500 cfs during the open-water season and 1,500 cfs during the ice-covered period. The City of Thompson Agreement stipulates that flows along the Burntwood River must be regulated so that water levels are maintained at or below 188.66 metres above sea level at the Thompson Seaplane Base in summer and 189.88 metres at the Thompson Pumphouse in winter. In 1998, as part of an agreement with the Town of Churchill, Manitoba Hydro built a weir across the Churchill River near the town in accordance with a licence under *The Environment Act*. The purpose of this weir is to raise water levels on the lower Churchill in order to mitigate some of the effects of the diversion. Under terms of the licence, Manitoba Hydro is required to maintain daily releases from Missi Falls no less than those that had been maintained for the period 1986-1998.

The minister responsible for *The Water Power Act* approves an annual Augmented Flow Program (AFP) in response to requests from Manitoba Hydro. This approval permits an expanded range of storage on Southern Indian Lake and changes the flow limits and

levels downstream on the Burntwood River. Under the AFP, Manitoba Hydro is allowed to increase the average weekly summer flow at the Notigi Control Structure from 30,000 to 35,000 cfs and the average weekly winter flow from 30,000 to 34,000 cfs. The maximum permitted level of Southern Indian Lake is increased by 0.5 ft to 847.5 feet asl and the minimum level is decreased one foot to 843 feet. This increases the maximum allowable variation over a 12-month period from 3 to 4.5 feet. Both the CRD and the AFP are currently under review by Manitoba Conservation and Water Stewardship for final licensing.

The AFP allows increased diversion from the Churchill River and storage on Southern Indian Lake in order to allow Manitoba Hydro to meet seasonal and hourly variation in demand for electricity. Under the AFP, Manitoba Hydro is expected to fully mitigate any effects of the altered levels and flows and the maximum draw down on Southern Indian Lake to 4.5 feet is to be staged over a period of time in a manner that minimizes adverse impacts on area residents.

Flooding and changes in water levels associated with LWR, CRD and AFP have had serious long-term effects on local Aboriginal communities and economies. In 1974, the five directly affected First Nations of Nelson House (now Nisichawayasihk Cree Nation), Split Lake (now Tataskweyak Cree Nation), York Landing (now York Factory First Nation), Cross Lake (now Pimicikamak Okimawin), and Norway House formed the Northern Flood Committee (NFC) to facilitate discussion with Manitoba Hydro and the federal and provincial governments. The June 1975 final report of the Lake Winnipeg, Churchill and Nelson Rivers Study Board recommended a number of mitigation measures. In 1977, the five NFC First Nations, the Government of Manitoba,

the Manitoba Hydro-Electric Board, and the Government of Canada signed the Northern Flood Agreement (NFA), which was intended to deal with adverse effects resulting from the modification of the water regime that accompanied the development of hydroelectric power in Northern Manitoba. In the 1990s, Northern Flood Agreement Implementation Agreements were concluded between four of the NFA First Nations, Manitoba Hydro and the governments of Canada and Manitoba to implement the 1977 NFA and to resolve most, although not all, outstanding claims stemming from the CRD and LWR.

The changes in water levels and seasonal flows caused by these major developments negatively affected many individuals and communities in northern Manitoba. This experience continues to influence attitudes and relationships throughout the region and casts a shadow over Manitoba Hydro developments today.

Chapter Five

The Keeyask Generation Project

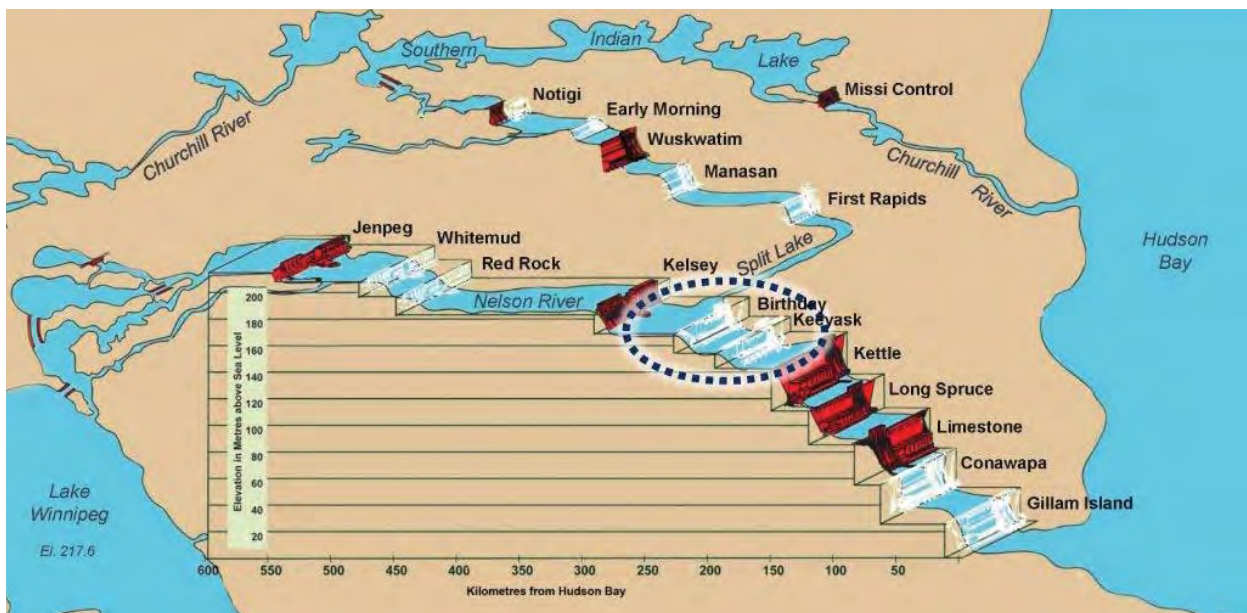
5.1 Overview

Hydroelectric generating stations use the power of running water to turn turbines and, in the process, convert this energy into electrical energy. In essence, two key factors determine how much energy a hydroelectric station can produce: the amount of water flowing and the distance that the water drops, referred to as the hydraulic head. This is why hydroelectric stations are typically located at sites such as rapids, where a river drops a larger amount in a short distance. In the

case of the Nelson River, planners long ago identified a number of locations where a drop in the level of the river created potential locations for generating electricity. Between Lake Winnipeg and Hudson Bay, the Nelson River drops approximately 217 metres of elevation.

In the case of the Keeyask Generating Station, Manitoba Hydro has been investigating ways of exploiting the power generation potential of the reach of the Nelson River between Stephens Lake and

Fig. 5.1 Schematic diagram indicating sites with technical potential to generate hydroelectric power. Developed locations in red. Potential locations (including sites no longer being considered) in white. (Courtesy of KHLPL.)



Split Lake since the 1960s. In this reach, the river drops 27 metres. Long before the negotiations that led to the Joint Keeyask Development Agreement began, a variety of options for exploiting this hydraulic head were identified. Options included a single high-head dam at Gull Rapids using the entire hydraulic head to generate 1,150 MW, a single intermediate-head dam at Gull Rapids with a maximum power generation of 900 MW, a pair of generating stations at Gull Rapids and Birthday Rapids, generating roughly 1,000 MW, and the ultimately selected option of a single intermediate-head generating station at Gull Rapids. The selected option uses roughly 18 metres of the 27 metres of head in the Split Lake to Stephens Lake reach of the river.

Hydroelectric stations are designed in order to direct the flow of water through a powerhouse as efficiently as possible. Hydroelectric generating stations use a dam or dams to raise the level of the river and

typically require some dyking along the sides of the reservoir to prevent the reservoir from flowing around the dam. A spillway is required to allow for the safe discharge of high water flows, above that needed for power generation. Construction typically requires a great deal of excavation to build the foundation of the dam, powerhouse and spillway on solid bedrock. Excavation is also typically required to create channels on the river bottom directing the flow into and out of the powerhouse and into and out of the spillway.

Because hydroelectric stations are major projects involving a large number of workers and several years of construction, they typically require a substantial amount of infrastructure, including access roads, work camps, borrow pits, quarries, construction power transmission, and work and marshalling areas.

Fig. 5.2 Aerial view of Gull Rapids, future site of Keeyask Generating Station, looking northeast, Stephens Lake in background. (Courtesy of KHLPL)



5.2 Major Project Components and Infrastructure

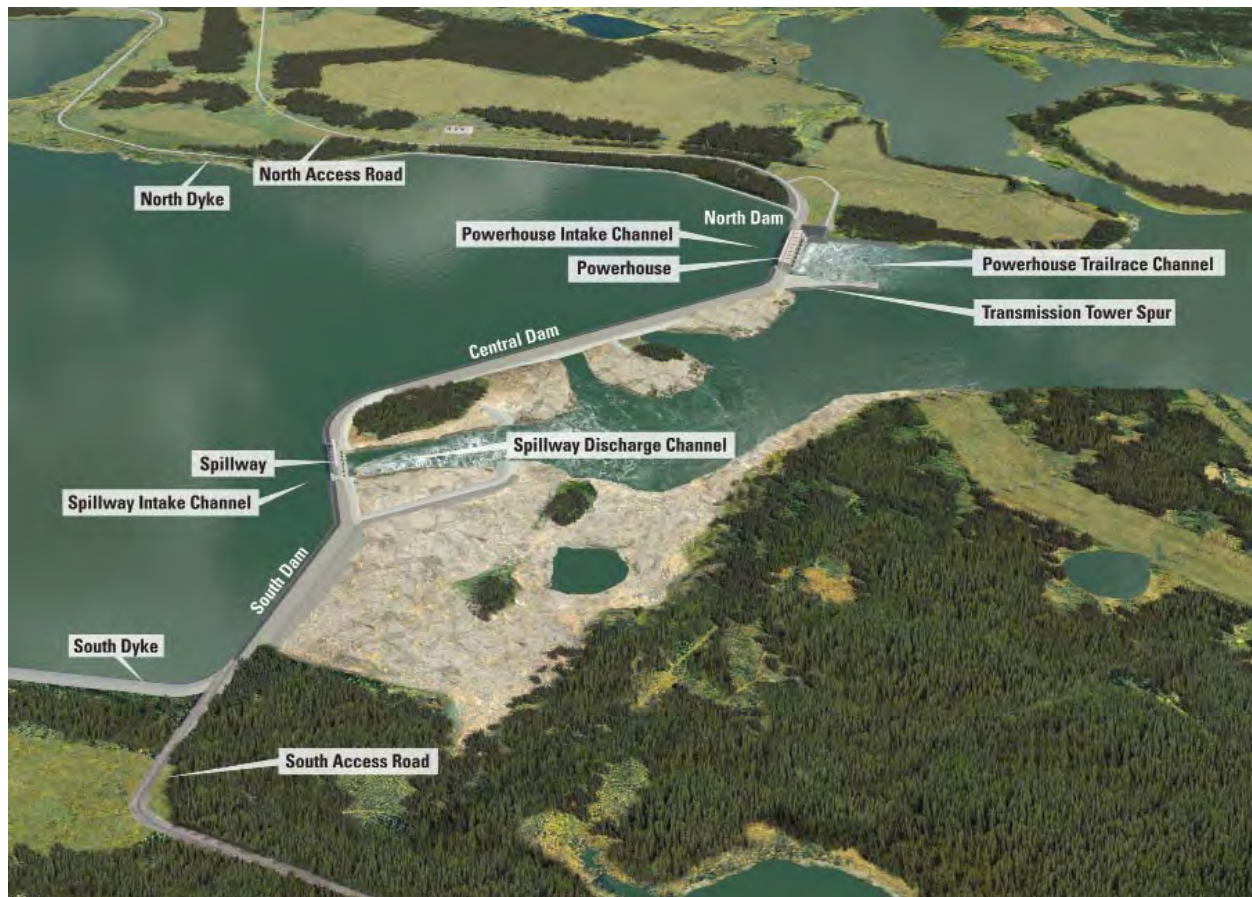
Major structures in the Keeyask Generation Project include the powerhouse, spillway, north, central and south dams, and north and south dykes. Major supporting infrastructure includes the ice boom, cofferdams and rock dams, camp and work areas, sources of rock, granular and soil material, and South Access Road. The North Access Road is already being built as part of the separately licensed Keeyask Infrastructure Project.

5.2.1 Powerhouse

The powerhouse will be built within and adjacent to the north channel of the Nelson

River at Gull Rapids. It will be approximately 248 metres long, 68 metres wide and 62 metres high, measured above the lowest portion of the bedrock. It will contain seven large turbines, each 8.85 metres in diameter, each with intake structures and draft tubes through which water passes going into and out of the turbines. The powerhouse complex includes a service bay, a control room and a transformer for each turbine, surrounded by concrete containment for any spills of transformer oils. Though the turbines are rated to produce 695 MW when the reservoir is at full supply level, power production will be lower when Stephens Lake, immediately downstream, is at full supply level. In such situations, because a higher water level at the downstream side of the powerhouse reduces the hydraulic head available, the Project will produce 630 MW.

Fig. 5.3 Keeyask Generation Project: Principal Structures. (Courtesy of KHLIP)



5.2.2 Spillway

The spillway, which discharges excess water flows above those needed for the production of electricity, will be a concrete structure 119 metres long, 42 metres wide and 28 metres high. It will have seven bays that can be opened or closed to vary the amount of water passing through. The spillway will be built on what is now one of the islands within Gull Rapids, approximately 1.6 km south of the powerhouse. The Project is designed to withstand a flow of water described as the probable maximum flood (PMF). The PMF is estimated using historic precipitation, snowmelt and other factors and has been determined to be 12,700 cubic metres per second. A flood of this magnitude would be more than twice the flow that was experienced in 2005, the highest recorded daily discharge on the river, and is considered to have a frequency of less than once in 10,000 years. In the event of such a flood, the spillway would discharge 11,300 cubic metres per second and the powerhouse would discharge 1,400 cubic metres per second.

5.2.3 Dams

Three earthfill dams will be built to span the Nelson River in order to store water in the reservoir before it can pass through the generating station. The North Dam will be approximately 100 metres long and will connect the North Dyke on the shore with the powerhouse. The Central Dam will be approximately 1,600 metres long and will connect the powerhouse with the spillway. The South Dam will be approximately 565 metres long and will connect the spillway with the South Dyke on the shore. The North and South Dams will both run on a north-south orientation, with the North Dam and powerhouse downstream (northeast) from the South Dam and spillway. The long Central Dam will be built on a southwest-northeast orientation. The dams and structures will link in a long, double-curved span.

The dams will be earth and rock fill embankments with an impervious (water-tight) core and an exterior of rock fill and riprap (loose stone). They will be built on bedrock. The elevations of the dams' crests will range between 162 and 162.6 metres above sea level, and the dams will vary in height from 22 metres for the South Dam to 28 metres for the Central Dam. They will be built high enough to accommodate the Probable Maximum Flood with no turbine load.

5.2.4 Dykes

Dykes will be built along the north and south shore of the Nelson River in order to contain the water in the reservoir and prevent flooding onto adjacent low-lying areas. Along the north shore the dykes will continue in a discontinuous manner for 11.6 km. Along the south shore the dykes will continue for 11.2 km. The dykes will not run continuously, but will be built where the elevation of the ground is low enough to require dyking. Sections of dyke will connect to areas of higher ground. A roadway will run along the tops of the dykes and be built on the sections of higher ground to allow inspection and maintenance. The maximum height of the dykes will be 20 metres on the north side and 13 metres on the south side.

5.2.5 Ice Boom

In order to prevent the creation of an ice dam at the entrance to Stephens Lake, which would raise water levels in Gull Rapids and increase the cost of construction, the Project will require the use of an ice boom three kilometres upstream of the powerhouse. This boom will prevent large quantities of frazil ice (ice floes that become jammed together) from flowing down the open water of the rapids and piling up at the entrance to Stephens Lake and forming an ice dam. Currently, a large ice dam forms at this point every winter, causing

water levels to rise at the site of future Keeyask construction. The ice boom will be a floating structure anchored in the bedrock that will initiate the development of a solid ice cover earlier in the winter on Gull Lake. The boom will consist of five 120-metre-long floating sections in the central part of the river, just upstream of where it splits into north and south channels.

5.2.6 Cofferdams and Rock Groins

Cofferdams and rock groins are temporary rock and earth fill structures built in the river to allow for construction work to be carried out. Cofferdams are constructed around a worksite, such as the spillway or powerhouse, so that the work area can be dewatered. Rock groins are constructed in the river to protect an area from erosion. In the first two years of Keeyask construction, six cofferdams and two rock groins will be built. As the Project is completed, some of the material in the cofferdams and rock groins will be removed and some will be incorporated into permanent structures such as the South and Central Dams, and the transmission tower spur, an artificial peninsula that will extend into the river south of the powerhouse and provide a foundation for transmission towers.

5.2.7 Camp and Work Areas

The first phase of the main work camp is already being constructed under an *Environment Act* Licence as part of the Keeyask Infrastructure Project. This portion of the camp is a 500-person camp on a 120-hectare site, about 1.8 km from the north shore of the Nelson River. Included as part of the KIP are development of wells and a water treatment plant for potable water, a wastewater treatment plant, and diesel generators to provide 2.5 MW of power.

In the second phase of development of the work camp – included as part of the

Keeyask Generation Project – the work camp will be expanded to accommodate up to 2,000 workers. The work camp includes pre-engineered bunkhouses, with private accommodations, a recreation hall and kitchen and dining facilities, as well as buildings for firefighting and first aid. A temporary 100-person work camp will also be established on the south side of the river to accommodate workers involved in building the South Access Road and the South Dyke.

Work areas, located along the North Access Road between the work camp and the powerhouse site, will include storage and field offices, a yard for material storage, a fuel storage facility, vehicle maintenance and refueling facilities, a soils and concrete laboratory, an aggregate processing area, a concrete batch plant, a carpenters' shop and a shop for working with steel. As well, a temporary magazine for storing explosives will be built at a safe distance from the camp and work sites.

5.2.8 Sources of Rock, Granular and Soil Material

The Project will require development of several borrow pits and rock quarries to obtain the impervious fill, granular and crushed rock, rock fill, riprap and concrete aggregates needed for the various components. Current plans call for up to 11 different borrow pits or quarries to be used to provide materials. For the most part, granular material (gravel) will be taken from locations on the north side of the river. Impervious material (clay) will be sourced from locations on both sides of the river. The majority of the rock required for the Project will come from a bedrock quarry within what is now the north channel of the river. In addition to materials from these sources, rock removed during excavation for the principal structures will also be used in construction. Several of the borrow sources will be located on land that will later be

inundated by the flooding of the reservoir, though there will be substantial borrow pits on both sides of the river outside of the reservoir.

5.2.9 North and South Access Roads

Two all-weather gravel roads will be required for the construction of the Project. The North Access Road, which runs for 25 km from Provincial Road 280 to the Project site, has already received an *Environment Act* licence as part of the KIP. Included on this road is a bridge across Looking Back Creek, which has been approved under the federal *Navigable Waters Protection Act*. The North Access Road will be used to transport workers, equipment and materials during construction of the Project. The South Access Road, which will run for 35 km from Gillam to the south side of the Project area, will be built to allow for construction to begin on the South Dyke. During the operation phase of the project, the South Access Road will allow access to Gillam, where it is expected the majority of operating staff will live. The South Access Road includes a 21.5 km section of existing roadway, which will be upgraded to Provincial Road standards, that currently runs from Gillam to the Butnau Dam on the south side of Stephens Lake. From the Butnau Dam to the Project site, 13.5 km of new road will be built. The South Access Road will have four stream crossings – Gull Rapids Creek, Gillrat River, Butnau River and an unnamed tributary of Stephens Lake. The two access roads will be built to a standard eight-metre width, although near the worksites they will be wider to accommodate large construction vehicles. The access roads will be connected by a roadway that will run over the top of the dams, spillway and powerhouse. When the Project is complete, Provincial Road 280 will be rerouted along the two access roads and the Project, with the result that the drive between Gillam and Thompson will be approximately 45 minutes shorter.

5.3 Construction Process and Schedule

Building a generating station on a river as large as the Nelson is a major project, with a complex schedule of components. It is expected to take seven years from the beginning of construction on cofferdams and rock groins to the station being in full service. An additional year of infrastructure decommissioning and site rehabilitation is included in the schedule.

The following are some of the major steps in construction, in order.

A series of cofferdams will be built to isolate the north and central channels of the river, in order to allow them to be dewatered. All of the river's flow will then be directed through the south channel, which already carries approximately 80% of the river's flow. With the north and central channels dewatered, construction can begin on the powerhouse and on the Central Dam, the 1.6 km section of dam running between the powerhouse and the spillway, as well as the much smaller North Dam, which connects the powerhouse to the shore on the north side of the river.

During the first winter after construction begins, clearing trees from the reservoir will begin, and this will continue for four to five years, with 3,600 hectares of vegetation cleared. As well, construction of the South Access Road will also begin in the first winter.

A cofferdam will be built to isolate the site of the spillway from the south channel. Much of the spillway site is currently within a smaller channel adjacent to the main south channel. With the spillway cofferdam complete, this site can also be dewatered and construction can proceed.

When the spillway is complete, portions of the spillway cofferdam will be removed

in order to divert the entire flow of the river through the spillway. At this time, a cofferdam will be built south of the spillway to isolate the portion of the south channel where the South Dam will be built.

A cofferdam will be built downstream of the powerhouse in order to dewater the area immediately downstream so that the tailrace channel can be excavated. Portions of both the upstream cofferdam that isolated the powerhouse area and the downstream cofferdam that isolated the tailrace area will later be removed.

While work is continuing on the dams, powerhouse and spillway, the North and South Dykes will be built, with the North Dyke being built first, over approximately 1.5 years, followed by two years of work on the South Dyke.

Once the intake gates are completed for the powerhouse, they can be closed and reservoir impoundment can begin while work continues inside the powerhouse. Full impoundment of the reservoir to an elevation of 159 metres is expected to take about 14 months. Impoundment of the reservoir will allow for the commissioning of the first unit of the powerhouse. As well, during impoundment, boat patrols will begin monitoring and removing any floating debris that may pose a hazard to navigation or affect operation of the generating station.

5.4 Project Footprint

The Project will directly impact a total area of approximately 13,350 hectares during construction and 13,800 hectares during operation. Of this total area, the reservoir will make up 9,300 hectares, growing by 700-800 hectares as a result of shoreline erosion and peatland disintegration over the first 30 years of the project. The total area of the reservoir

will include 4,800 hectares that is already waterway (the Nelson River, Gull Lake). All the land required is currently Crown land. The Hydraulic Zone of Influence is the term for the portion of the Nelson River where water levels and flows will be affected by the Project. It begins three kilometres downstream from Clark Lake and extends to about three kilometres downstream of the Project.

Areas to be flooded by the reservoir will be cleared prior to impoundment. Sensitive areas, such as culturally significant sites, islands currently or potentially used for caribou calving and areas near tributaries, will be cleared by hand (chainsaw). Most clearing will be by heavy machinery. In total, 3,600 hectares of vegetation will be cleared.

Other major contributors to the Project's footprint include borrow areas, which will add up to approximately 1,300 hectares during construction and 1,000 hectares during operations, and roads and road corridors, which will add up to approximately 750 hectares during both construction and operation. Land required for infrastructure, river management (barge landings and boat ramps for work on the river), camp and work areas, excavated material placement areas (EMPAs), mitigation and compensation areas (including a small engineered wetland), and a 100-hectare area of dewatered river bottom is also included in the total footprint. The EIS for the Project also includes allowances for areas that will possibly be disturbed and for areas that may be required by the contractors but have a low likelihood of being used. (See Fig. 5.4.)

Substantial amounts of excavation will be required to direct water into and out of the powerhouse and spillway. The powerhouse intake channel will be excavated into the bedrock of the riverbed up to 600 metres upstream of the powerhouse. The tailrace channel, which directs the flow of water

Figure 5.4 Keeyask Generation Project Footprint (Courtesy of KHL P.)



back to the surface of the river, will be excavated into the bedrock of the riverbed for approximately 500 metres downstream of the powerhouse.

Building the main structures, as well as the temporary cofferdams and rock groins and the South Access Road, will require a large amount of impervious material, rock and granular material. In all, an estimated 8.4 million cubic metres of material is expected to be used, coming from locations on both sides of the river. The two most heavily used borrow sites are expected to be on the north side of the river. Temporary or permanent access roads will need to be built between these borrow sources and the Project site.

Two borrow areas that will be major sources of material for construction are located on islands on the north shore of the Nelson River. Erosion since 2000 created new channels that caused these deposits to become islands. Causeways will be built across the river channel in order to reach these deposits. After construction, these causeways will be removed.

Excavating for materials used in construction will also produce large amounts of material that cannot be used. In all, it is expected that more than four million cubic metres of these unclassified materials will need to be placed in EMPAs. A large number of EMPAs have been identified on both sides of the river. Many of them are within the area to be flooded. Where necessary, these placement areas will be covered with material to prevent erosion. Those EMPAs that are outside of the flooded area will be graded and covered with soil to promote vegetation growth.

Lines to transmit the electricity from the Project to the Radisson Converter Station near Gillam will form the Keeyask Transmission Project, a separate project not included as part of this EIS. It is expected that electricity will be transmitted on three 138-kV lines, built along a common corridor on the south side of Stephens Lake.

Chapter Six

Consultation

6.1 Requirements and Guidelines for Consultation

Manitoba's *Environment Act* provides for public consultation in environmental decision making and states that when assessing an application for a Class 3 development, such as the Keeyask Generation Project, the Minister of Manitoba Conservation and Water Stewardship may require the Proponent to carry out public consultation.

6.2 Internal Consultation Leading to the Joint Keeyask Development Agreement

Manitoba Hydro and Tataskweyak Cree Nation (TCN) began consultations in the 1990s on potential hydroelectric development of the Gull Rapids site. In 1996, following completion of a series of joint studies on the impact of past projects in the Split Lake area, Manitoba Hydro suggested that the Crown corporation and TCN continue consultations regarding potential development at Gull Rapids. TCN proposed that the parties negotiate a business arrangement in which they would be co-proponents in such a development. Discussions between TCN and Manitoba Hydro between 1998 and 2000 led to the signing in 2000 of the Agreement in Principle Regarding the Potential Future Development of the Gull Rapids Hydro

Electric Generating Station. TCN and its members entered into discussions with Manitoba Hydro with two key principles in mind: that they would not oppose the Project if satisfactory partnership arrangements could be negotiated, and that they would use their own worldview to assess potential environmental effects of the Project.

This agreement provided a framework to guide negotiation of the Joint Keeyask Development Agreement (JKDA) and also made provisions for other First Nations to be involved. In 2000, TCN invited Fox Lake Cree Nation (FLCN), York Factory First Nation (YFFN), and War Lake First Nation (WLFN) to become signatories. In 2001, Manitoba Hydro and the four First Nations signed the Principals' Memorandum setting out negotiating principles, and in 2002, they signed another document laying out principles and processes in more detail. From 2002 to 2008, the parties negotiated the JKDA. As part of the 2001 memorandum, a formal co-ordination team was established with representatives from all the parties. As well, topic-specific working groups were established to focus on issues of particular importance to the partner communities: mercury and human health, aquatics, and mammals. Between 1998 and 2009, when the JKDA was signed, numerous meetings were held with communities or with specialized working groups. Within the Cree Nation

Partners (WLFN and TCN), approximately 2,100 meetings of all kinds were held during these years.

Early in the process, TCN determined that it should conduct its own evaluation of the effects of the Project on its community, incorporating the First Nation's own worldview. Subsequently, a protocol was accepted whereby the four Keeyask Cree Nations (KCNs) would lead their own consultations with their members and prepare their own environmental assessments incorporating their culture, worldview and traditional knowledge. It was also agreed that Manitoba Hydro would take the lead in organizing consultations with other communities. KCN communities held extensive consultations, with community meetings, websites, radio broadcasts, questionnaires, newsletters, and working groups of community members who examined various aspects of the Project. When the negotiations produced a draft agreement, referendums were held in the four KCN communities in 2009. In each of the KCNs, separate referendums on the JKDA and on that First Nation's Adverse Effects Agreement (AEA) were approved by voters. The JKDA describes the legal, governance and financial structures of the partnership between Manitoba Hydro and the KCNs, while the AEAs include agreed-upon mitigation measures to compensate for potential impacts of the project on the rights and interests of members, including such matters as resource use and cultural impacts.

6.3 Changes to Project Planning Resulting from Consultations/Negotiations

Negotiations and consultation between the KCNs and Manitoba Hydro resulted in a number of commitments around the design

and construction of the Keeyask Project. The option of a high-head generating station, which would have affected water levels on Split Lake, was eliminated early in this process. Such a project would have flooded more than 18,000 hectares of land, while generating 1,150 MW of electricity. The Proponent's current plan proposes to flood somewhat less than one quarter as much land. These commitments, including fundamental features of the Project and the decision to change the Project's name from Gull Rapids to Keeyask, were later incorporated into the JKDA.

6.4 The Joint Keeyask Development Agreement

The JKDA, between CNP, YFFN, FLCN and the Manitoba Hydro-Electric Board, was signed May 29, 2009. The lengthy agreement lays out the terms of the Keeyask Partnership, financing arrangements for the First Nation partners, construction, management, power sales, training and employment, business opportunities, dispute resolution and other matters.

The agreement establishes the Keeyask Hydropower Limited Partnership (KHLP), which will be at least 75 per cent owned by Manitoba Hydro. The KCNs will have the right to own up to 25 per cent of the equity through their investment entities. Under the agreement, Manitoba Hydro will act as project manager during construction, operate and maintain the Project during operation and purchase energy produced by the station. Manitoba Hydro will control 75 per cent of the votes in KHLP decision-making.

The KCNs will have access to loans from Manitoba Hydro for their equity stake in the Project. The KCNs, through their investment entities, will decide after the completion of construction whether they wish their equity

participation to be in the form of common shares or preferred shares in the KHLF. Preferred shares specify a fixed rate of return, whereas common shares do not guarantee a return, but offer the potential for higher returns.

The JKDA sets out a number of “fundamental features” of the Keeyask Project, including the location of access roads, intake, powerhouse and spillway, and construction camp. Fundamental operating features described in the JKDA include: that operation of the Keeyask Generating Station not affect water levels on Split Lake during open water conditions, that the full supply level of the reservoir be 159 metres and the minimum be 158 metres, and that no change to the licences for the Churchill River Diversion (CRD) or Lake Winnipeg Regulation (LWR) be required. Special conditions are specified for operation of the Project with water levels outside of the 158 to 159-metre range in the event of an emergency.

The JKDA describes several measures to reduce adverse effects from the Project, including plans for reservoir-clearing and waterways management programs. It also establishes advisory committees dealing with construction and monitoring.

The JKDA contains funding arrangements for training and specifies the portion of the Hydro Northern Training and Employment Initiative that will be designated for the KCNs. The employment section of the JKDA states that employment on the Project will follow the preference provisions in the Burntwood Nelson Agreement. The JKDA sets out a target of 630 person-years of construction employment for KCN members and specifies a process for apportioning packages of work on the Project that can be directly negotiated by the KCNs for businesses they own.

Distributions (profits) to the KCN partners may be used for resource

rehabilitation and development; initiatives to support Aboriginal and treaty rights; cultural support and social development initiatives; business and employment development; community infrastructure and housing development; construction of capital projects and infrastructure; and technical and legal services related to the KCNs’ business and other affairs.

6.5 Adverse Effects Agreements

In the Keeyask planning process, each of the KCNs identified, through its members, the potential adverse effects that could be caused by the impacts of Keeyask on the land, water and socio-economic environment. Manitoba Hydro and the KCNs worked together to develop measures to address adverse effects (such as reduced hunting, fishing and other resource use opportunities in the Project Footprint area) brought about by Keeyask. These measures are intended to prevent or reduce effects and to provide replacements, substitutions and compensations for effects that cannot be prevented. Adverse Effects Agreements were negotiated to set out the terms through which these effects would be addressed. Each of the KCNs negotiated its own AEA to compensate for a variety of cultural, resource use and other potential impacts of the Project. Each AEA includes certain one-time payments, typically for capital costs of mitigation programs, and a guaranteed annual payment for costs of the programs described in the agreement. All the AEAs set out that the priorities for addressing adverse effects from the Keeyask Project are, in order, to prevent or avoid causing adverse effects, to lessen or reduce unavoidable adverse effects, to provide replacements, substitutions or opportunities to offset adverse effects, and to pay fair compensation for loss or damage caused by adverse effects. Each of

the AEAs makes reference to involvement of the relevant Resource Management Board in offsetting programs that will facilitate resource harvesting within each of the KCNs' Resource Management Areas. Under the AEA, each KCN agrees to seek input from the Resource Management Board and provide annual reports to the board regarding offsetting programs that involve resource management, use and harvesting.

6.5.1 Tataskweyak Cree Nation

The TCN AEA provides funding for a variety of offsetting programs designed to provide replacements, substitutions or opportunities that offset unavoidable adverse effects on practices, culture and traditions. The AEA also provides a guaranteed annual payment for the life of the Keeyask Project.

Offsetting programs include:

- Funding for the Keeyask Centre. The centre will accommodate staffing and office functions for managing offsetting programs, as well as space for display cases, storage, education programs, fish processing and other needs.
- Access Programs. These provide transportation for TCN members to hunt, fish and trap within the Split Lake Resource Management Area (SLRMA).
- Land Stewardship Program. Funding is provided through the guaranteed annual payment to monitor land use and care for the land within the SLRMA.
- Healthy Food Fish Program. This program will provide opportunities for TCN members to continue to fish and provide fish to other members, using waters unaffected by the Keeyask Project.

- Traditional Lifestyle Experience Program. Program goal is to provide young adult members with traditional lifestyle experiences on the land.
- Traditional Knowledge Learning Program. Program supports opportunities for traditional learning that can be provided to students primarily at the Keeyask Centre.
- Cree Language Program. Program creates an opportunity for adult members to learn or improve skills in Cree language.
- Traditional Foods Program. In conjunction with Access Program, this creates opportunities to gather and share traditional foods.
- Museum and Oral Histories Program. Program is to provide a substitute for the historical connections to the land that will be affected by Keeyask.
- Compensation for any residual adverse effects not addressed in the offsetting programs.

Under the AEA, TCN may decide to continue the Healthy Food Fish Program after levels of mercury in fish in the Nelson River have returned to their pre-Keeyask levels.

6.5.2 War Lake First Nation

The War Lake First Nation AEA contains programs intended to offset unavoidable effects to culture, practices and lifestyle resulting from Keeyask. It includes program funding and a guaranteed annual amount.

Offsetting programs include:

- Distribution Centre. Manitoba Hydro will provide funds for a Distribution Centre

to be used for storing, processing and distributing fish.

- Community Fish Program. This program will support WLFN members to fish in War and Atkinson Lakes and includes construction of infrastructure and purchase of equipment.
- Improved Access Program. This program will build shelters along the Cyril River and maintain the road from War Lake to Ilford and the winter trail to Atkinson Lake.
- Traditional Learning/Lifestyle Programs. These programs will allow young adult WLFN members to experience the traditional lifestyle at Atkinson Lake.
- Cree Language Program. Adult members will learn or upgrade Cree skills.
- Museums and Oral Histories Program. Display cases will be built in the band hall.
- Compensation for any residual adverse effects not addressed by the offsetting programs.

WLFN will have the option to continue its Community Fish Program after mercury levels in Nelson River fish have returned to pre-Keeyask levels.

6.5.3 York Factory First Nation

YFFN's AEA supports the following offsetting programs:

- Resource Access and Use Program. Funding for flights to the York Factory Resource Management Area along the Hudson Bay coast for resource use and cultural renewal; for the means for storing, processing and distributing country foods; for access to off-system lakes that will

not be affected by mercury, and for other access to resources and harvesting areas.

- Environmental Stewardship Program. Funding for monitoring environment and resources, training members to work in stewardship, supporting participation of elders to provide guidance for stewardship programs.
- Cultural Sustainability Program. Funding for programs that strengthen the cultural identity of YFFN members and support learning and use of Cree language, values, traditional skills and knowledge; seasonal gatherings and celebrations, healing and reconciliation, documentation and communication of YFFN history; and design, construction and maintenance of facilities for such programs.
- Compensation for residual effects.

6.5.4 Fox Lake Cree Nation

The FLCN AEA provides payment for the following offsetting programs:

- A Gathering Centre to administer and implement offsetting programs and provide FLCN with permanent, substantial presence in Gillam.
- A Youth Wilderness Traditions Program to facilitate youth learning of traditional lifestyle.
- A Cree language program for adult members who wish to learn or improve language skills.
- Gravesite Restoration Program to restore, re-consecrate and protect community gravesites in and around the Gillam area.
- Alternative Justice Program that will seek the development of a program for

resolving situations involving the justice system and FLCN members.

- Crisis Centre and Wellness Counselling Program including a crisis shelter.
- Lateral Violence and “Where do we go from here?” Program: a series of discussions and workshops to assist FLCN members to participate in opportunities associated with Keeyask.
- Alternative Resource Use Program to facilitate access to alternate resource areas within the Fox Lake Resource Management Area.
- The AEA also included funds for residual effects that are not addressed in the offsetting programs.

6.6 Consultation with Other Potentially Affected Aboriginal Communities and Groups

6.6.1 Cross Lake First Nation/ Pimicikamak Okimawin

As part of its obligations under the Northern Flood Agreement, Manitoba Hydro notified Pimicikamak Okimawin (at the time known as Cross Lake First Nation) in 2001 regarding its intention to prepare plans for the development of Keeyask. In the early part of that decade, consultations between Manitoba Hydro and the First Nation were largely focused on the Wuskwatim Generation Project. Later in the decade, consultations between the two parties were in abeyance for some time. The two parties have been meeting regularly since February 2009, and presentations have been made on a wide range of topics related to the Project. Manitoba Hydro provided funding for Pimicikamak

to retain an independent technical expert and responded to a variety of requests for information during this process. Pimicikamak raised a number of concerns during this process, including the concern that any effects of the Project be considered cumulatively with LWR and CRD and the concern that the study area is not broad enough and instead should include all of Pimicikamak’s traditional territory.

Manitoba Hydro, on behalf of the Partnership, proposed a resource-use study to Pimicikamak Okimawin, in January 2012. Pimicikamak declined the proposed plan and was provided with funding to prepare its own work plan for a resource use study. That plan was presented to Manitoba Hydro in September, 2013, and was under review at the time of the Keeyask Hearings.

6.6.2 Nisichawayasihk Cree Nation

Nisichawayasihk Cree Nation (NCN) and Manitoba Hydro are partners in the Wuskwatim Generation Project. NCN provided comments and identified issues of particular interest regarding the Keeyask Project.

6.6.3 Manitoba Métis Federation

Since meeting in Round One of the Public Involvement Process, the Manitoba Métis Federation (MMF) and Manitoba Hydro have participated in a series of meetings to discuss the Project and develop a work plan for the MMF to develop and carry out a study of traditional use of the Project area. The MMF was provided with funding to develop a plan and in June 2013 the parties agreed on a plan for the MMF to carry out a traditional land use and knowledge study (TLUKS) of the Keeyask area.

6.6.4 Shamattawa First Nation

A meeting was held with the chief and council of Shamattawa First Nation (SFN) in Round Two of the Public Involvement Process in April, 2012. During this meeting, representatives of SFN stated their belief that they should be included in the Keeyask Partnership and discussed potential effects to sturgeon, caribou and other issues. A meeting with chief and council was held in Round Three in June 2013 and a community information session was held later that month. SFN members raised their concerns that the impact of Keeyask would reach their area, especially if it places pressure on the Pen Island caribou herd.

6.6.5 Manitoba Keewatinowi Okimakanak

A meeting was held with the Manitoba Keewatinowi Okimakanak (MKO) in their Winnipeg office in Round Two of the Public Involvement Program in March 2012 and in their Thompson office in Round Three in May 2013.

6.6.6 Keewatin Tribal Council

Meetings were held with the Keewatin Tribal Council (KTC) in Round One (December 2008), Round Two (March 2012) and Round Three (May 2013) of the Public Involvement Process.

6.6.7 O-Pipon-Na-Piwin Cree Nation

A community meeting was held with O-Pipon-Na-Piwin Cree Nation in July 2013 in Round Three.

6.6.8 Peguis First Nation

Peguis First Nation (PFN) participated in a workshop with community groups and non-

governmental organizations (NGOs) held in Winnipeg in Round Three in May 2013.

6.7 Potentially Affected and Interested Communities and Groups

In addition to the meetings held at First Nations and with First Nations umbrella groups, Public Involvement Program (PIP) meetings were held in Thompson, Churchill, Leaf Rapids, Gillam, the Local Government District of Mystery Lake, Thicket Portage, Pikwitonei, Wabowden, Norway House, Nelson House, Cross Lake, Ilford, Winnipeg, and Brandon. Interest-groups and NGOs that were involved in meetings through the PIP were the Thompson Recreation and Resource User Workshop, the Northern Association of Community Councils, Nature Conservancy of Canada, Norway House Fishermen's Co-op, Canadian Parks and Wilderness Society, International Institute for Sustainable Development, Manitoba Wildlands, Manitoba Federation of Labour, Green Action Centre, Green Action Committee of the Unitarian Church, Consumers' Association of Canada (Manitoba Branch).

6.8 Round One of the Public Involvement Program

Round One of the PIP occurred between June and December 2008 and focused on communities in northern Manitoba and organizations representing communities and individuals who would be potentially affected. The purpose of Round One was to introduce the Project, learn about issues or concerns of the public, and hear how people wished to be consulted in future rounds. More than 350 people participated in 31 Round One events. More than 275 comments and questions were recorded – both from in-person discussions

and from comment cards – at the meetings, concerning a range of topics including employment and business opportunities, resource use, social and cultural effects, the terrestrial environment and the aquatic environment.

6.9 Round Two of the Public Involvement Program

Round Two of the PIP took place between February and early May 2012. It focused on meeting with potentially affected and interested communities and groups that had been contacted in Round One. The emphasis in Round Two was on describing Project changes since Round One, discussing preliminary results of the environmental assessment, obtaining input on possible mitigation measures, and gathering additional public input. Nearly 200 people participated in 26 Round Two events. More than 215 questions and comments were recorded in Round Two events, concerning a wide range of topics including the aquatic environment, employment and business opportunities, social and cultural effects, and the terrestrial environment.

6.10 Round Three of the Public Involvement Program

A third round of PIP meetings was held after the EIS was filed. This round concluded in the summer of 2013 and included meetings in Gillam, Cross Lake, Leaf Rapids, Churchill, Thicket Portage, Shamattawa First Nation, O-Pipon-Na-Piwin Cree Nation, and Pikwitonei; meetings with MKO, KTC and the leadership of the Northern Association of Community Councils; open houses in Winnipeg and Thompson; and a workshop with NGOs in Winnipeg. In addition to follow-up discussions of concerns generated from the earlier rounds, Round Three

meetings also provided an opportunity to discuss the regulatory review.

What we Heard – Consultation

The Panel heard concerns from several Aboriginal organizations whose members believed they were inadequately consulted. The Panel also heard concerns regarding the referendums on the JKDA and AEAs within the KCNs.

Representatives of PFN testified that that they were not invited to attend any public participation events until Round Three in the spring of 2013, when representatives attended an NGO workshop held in Winnipeg. They said the Proponent should have been aware that PFN had expressed an interest in Keeyask, given that in 2011 they made a widely publicized statement to the United Nations General Assembly voicing their concerns.

Pimicikamak Okimawin stated that they were inadequately consulted on the selection of valued environmental components for the Keeyask EIS and, as a result, their concerns were not sufficiently addressed. A representative of Pimicikamak stated that, in his opinion, Manitoba Hydro had not engaged in meaningful consultation with the First Nation as it is obliged to do under the Northern Flood Agreement. Progress in consultations was slow and Manitoba Hydro was not forthcoming with information needed for Pimicikamak to assess its position on the Project. After Pimicikamak proposed a work plan and budget for it to consult its members and hear their concerns, Manitoba Hydro only agreed in the fall of 2013 to fund the work. Until such work is done, Pimicikamak cannot specify its concerns regarding Keeyask, the representative said. Accordingly, the First Nation recommended that the Project not

be approved until a land use and occupancy study is complete.

The MMF stated that progress in consultation was hampered by the Proponent's stated belief that there were few Métis interests potentially affected by the Keeyask Project. In support of their argument that there is a historic Métis community in the Keeyask area, the MMF's representatives stated that Métis scrip applications were taken in Split Lake, York Factory, and Nelson House in 1908-1910. In the 1950s, a Manitoba government study on Métis populations documented Métis populations in Thompson, Gillam, Bird, Ilford, Split Lake, Pikwitonei, Thicket Portage and Wabowden. More recent Canada Census data show approximately 2,000 Métis in the region, including 1,300 in Thompson and 100 in Gillam. Many early meetings between representatives of the Partnership and MMF were unproductive, the MMF said, because the Partnership offered insufficient amounts of funding to assess Métis land use and knowledge in the area. A land use study based on a limited sample of Métis people was presented during the Hearings, but additional work, including a compilation of socio-economic baseline data and community meetings to review the information and discuss effects of the Project, could not be completed until after the Hearings. The MMF's representative recommended that a licensing recommendation be withheld until after this additional information is available (the end of March 2014) and if this indicated possible effects on Métis, there be additional impact assessment and a negotiated agreement between the Partnership and the MMF on mitigation, plus Métis participation in Project monitoring.

The Panel heard a number of statements from members of the KCNs that their participation in the Project was in large part

a result of the perception that the Project would proceed with or without them. Under those circumstances, participation in the Project would give them some opportunity to influence the result and ultimately share in the benefits.

Commission Comment – Consultation

The Public Involvement Process for Keeyask was unique in that the communities most likely to be affected by the Project are all partners. These communities conducted their own very thorough consultations leading to the JKDA and the AEAs. That these consultations were conducted by the communities themselves provides a level of assurance that the communication or cultural gaps that might sometimes exist between a Proponent and the people it consults were likely less of an issue in this case than in other developments.

Efforts were made to consult with other communities beyond the KCNs and they appear to have been relatively thorough. A large number of communities, NGOs, First Nations, Aboriginal organizations and individuals were provided with the opportunity to question the Proponent, raise concerns about the Keeyask Generation Project and have these concerns documented within the supporting material for the EIS. After review of the Proponent's public consultation process, as requested by the minister, the Commission is of the view that the process was comprehensive, inclusive and more than met the requirements for consultation.



Chapter Seven

Keeyask Hydropower Limited Partnership Assessment Approach

7.1 Overview

The Proponent used what it termed a “two-track assessment approach” in preparing its EIS for the Keeyask Generation Project. In one track, the Keeyask Cree Nations (KCNs) conducted their own assessments of the Project based on their Cree worldview and their 50 years of experience with hydroelectric development. The KCNs’ assessment process led to the development of three assessment reports that were distinctive in approach, style and physical format, but included as a part of the environmental impact statement (EIS) for the Project. In the other track, the Partnership, including the KCNs and Manitoba Hydro working with the various consultants hired to conduct technical studies, carried out what was termed a “regulatory assessment.” The regulatory assessment track included preparation of that portion of the final EIS that employed a standard valued environmental component (VEC) approach, and used both technical science and Aboriginal traditional knowledge (ATK) in a manner intended to meet federal and provincial regulatory requirements. This two-track approach was developed through negotiations that led to the 2001 protocol agreement on the Keeyask Project and was formalized in the Joint Keeyask Development Agreement (JKDA) in 2009. These agreements led to a collaborative approach in which information and concerns arising from the

two tracks would be considered throughout the assessment process and throughout the final EIS. The collaborative nature of the two tracks was intended to ensure that concerns and predictions arising from the First Nations’ assessments were employed in the regulatory assessment and in Project planning, mitigation, management and monitoring.

In places, the two assessment processes differed in their conclusions about the likely effects of the Project and these differences were acknowledged in the EIS and typically were identified as subjects that will require a greater level of monitoring and management attention during construction and operation of the Project.

7.2 Keeyask Cree Nations’ Evaluations

Three evaluation reports were prepared by the KCNs and included as part of the Keeyask EIS. Cree Nation Partners, representing Tataskweyak Cree Nation (TCN) and War Lake First Nation (WLFN), prepared the report Keeyask Environmental Evaluation. Fox Lake Cree Nation (FLCN) prepared the Fox Lake Cree Nation Environmental Evaluation Report. York Factory First Nation (YFFN) prepared *Kipekiskwaywinan* (Our Voices). These reports are described in greater detail in Chapter Eight of this report.

7.3 Regulatory Environmental Assessment

In the Proponent's "regulatory assessment," Project effects are assessed by comparing the predicted future conditions with and without the Project for 38 aquatic, terrestrial and socio-economic VECs. The framework for the assessment included a series of nine steps:

Step One – Project Description

This included defining the components and activities required to construct and operate the Project.

Step Two – Scope of Assessment

The scope of assessment referred to the spatial boundaries of the areas where biophysical and socio-economic studies were conducted. Study areas were defined by the geographic extent of direct and indirect effects and, where required, extended beyond the zone of impact in order to provide context. During scoping, the Proponent selected 38 VECs in order to focus the assessment of the significance of project effects. VECs were selected according to several criteria: overall importance or value to people; importance for ecosystem function; ability to act as umbrella indicators; amenability to scientific study; potential for substantial Project effects; and regulatory requirements. Study areas varied in size from VEC to VEC, depending on a variety of factors, including the size of home range of different species of animals.

Step Three – Environmental Setting

The existing environment of the study area was described, including a discussion of physical, aquatic, terrestrial, socio-economic, resource use and heritage environments.

Step Four – Identification of Potential Effects

In this step, the future with and without the Project was compared, with effects of operation and of construction examined separately.

Step Five – Mitigation of Adverse Effects

Measures to avoid, prevent or reduce adverse effects and to enhance positive effects were then considered.

Step Six – Assessment of Residual Effects

Residual adverse effects are those adverse effects that remain after mitigation. Residual adverse effects were assessed in terms of nature, magnitude and spatial and temporal extent. In some cases, benchmarks, such as the percentage of a certain kind of habitat affected, were established to indicate low, moderate or high-magnitude impacts.

Step Seven – Regulatory Significance of Residual Effects

Regulatory significance refers to the significance that government regulators may attach to an effect, such as those effects that may come directly under the authority of provincial or federal legislation. Some of the VEC benchmarks, such as those for boreal woodland caribou regarding the percentage of habitat remaining undisturbed, were developed from regulatory standards, in this case the "Canadian Strategy for the Recovery of Boreal Woodland Caribou" (Environment Canada 2012).

Step Eight – Cumulative Effects

Cumulative effects assessment considers likely adverse effects on VECs caused by the Project that overlap effects of other projects or human activities. After considering mitigation

of these effects, the regulatory significance of cumulative effects was then determined.

Step Nine – Monitoring and Follow-up

The final step was the development of monitoring and management plans for the effects of the Project.

The regulatory assessment of the Project began with field studies that started in 1999. Following the 2001 protocol agreement between Manitoba Hydro and the Keeyask Cree Nations, the partners formed an Environmental Studies Working Group to review study results and three topic-specific working groups to review and discuss issues related to mercury and human health, aquatics, and mammals.

Selection of VECs was based on input from partners, experts, regulators and concerns raised in the opening round of the Public Involvement Program in 2008. Boundaries of study areas depended on the VEC being examined. A series of six study areas were used in the assessment of the terrestrial and aquatic environments. Two other study areas were used in assessment of most socio-economic effects. Effects on heritage resources were assessed using two additional study areas.

The following 38 VECs were selected:

- **Aquatic VECs** – 1) water quality, 2) walleye, 3) pike, 4) lake whitefish, 5) lake sturgeon;
- **Terrestrial VECs** – 6) ecosystem diversity, 7) intactness, 8) wetland function, 9) priority plants, 10) Canada goose, 11) mallard, 12) bald eagle, 13) olive-sided flycatcher, 14) common nighthawk, 15) rusty blackbird, 16) beaver, 17) caribou, 18) moose;

- **Socio-economic VECs** – 19) employment opportunities, 20) business opportunities, 21) income, 22) cost of living, 23) resource economy, 24) housing, 25) infrastructure and services, 26) transportation infrastructure, 27) land, 28) governance, goals and plans, 29) community health, 30) mercury and human health, 31) public safety and worker interaction, 32) travel, access and safety, 33) culture and spirituality, 34) aesthetics, 35) domestic fishing, 36) domestic hunting and gathering, 37) commercial trapping, 38) heritage resources.

7.4 Integration of Cree Worldview, ATK and Technical Science

The Keeyask Environmental and Regulatory Protocol, reached in 2001 between TCN and Manitoba Hydro, established various committees and working groups and laid the groundwork for processes that integrated knowledge and worldviews. The Partners' Regulatory and Licensing Committee (PRLC), with three representatives from Manitoba Hydro and nine from the KCNs, is the overall governing body for the Partnership's environmental activities. The EIS Co-ordination Team, with two voting representatives each from Manitoba Hydro and Cree Nation Partners and one non-voting representative from each of YFFN and FLCN, managed the environmental studies and the final co-ordination and preparation of the EIS. The EIS Co-ordination Team met in 2008 to plan for integrating the Cree Worldview and ATK with technical science. After a workshop with members and advisers from the partner communities and staff and consultants from Manitoba Hydro, a series of principles was decided upon. These principles were: giving equal weight to the two approaches to knowledge, ensuring visibility

of ATK in the EIS, maintaining Aboriginal people's authority over their knowledge and treating the knowledge confidentially, employing documentation and rigorous methods to gather ATK, acknowledging the distinct worldviews of technical science and the Cree partners, building and sustaining respectful relationships, acknowledging the past, reflecting cultural and spiritual values, and addressing uncertainty and employing a precautionary approach.

Within the EIS, there are a number of issues in which the KCNs' assessments and technical science assessments reach different conclusions. For example, a major issue is whether or not there are boreal woodland caribou in the Project area. Evaluations prepared by the KCNs state that caribou in the Keeyask region include boreal woodland caribou, as well as Pen Island (coastal) caribou and, on occasion, barren ground caribou. KCN evaluations state that all caribou types in the region have declined since the beginning of hydro development and that the reach of the Nelson River that was flooded to create Stephens Lake was once an important corridor for caribou. Within the regulatory portion of the EIS, it is stated that the Keeyask area is beyond the area of Manitoba where provincial and federal government agencies recognize a herd of boreal woodland caribou. Caribou in the Keeyask region that remain during the summer, as boreal woodland caribou do, rather than migrating east with the Pen Island caribou or north with the barren ground caribou, are referred to as "summer resident" caribou within the regulatory EIS.

Representatives of the Partnership characterized this difference of opinion regarding caribou as an instance in which the regulatory assessment makes use of the findings of the KCNs' assessments. Regarding caribou, the Partnership has said that it will

proceed using the First Nations' view, and plan avoidance and mitigation of impacts as if the caribou in the Keeyask region do include boreal woodland caribou.

Other differences in opinion described in the EIS include the Project's effects on water levels on Split Lake. The regulatory portion of the EIS states that levels during open water season will not be affected and ice levels may be affected only during rare (once every 20 years) low-water years. KCN assessments reflect the belief that the Project will affect water levels in Split Lake. The EIS acknowledges the difference in opinion and the Proponent has committed to monitoring Split Lake levels.

What we Heard – Assessment Approach

While many Participants and Presenters saw the two-track approach and the involvement of the KCNs in carrying out their own evaluations as a positive step, concerns were expressed that the technical science track ultimately dominated the decision making. Some Participants said that while the worldview of the KCNs was included in planning the Project, that of other Aboriginal people who are not partners in Keeyask was not. This concern was expressed along with the concern that the geographic scoping for the Keeyask assessment was too narrow to capture all potential effects.

An expert witness for the Concerned Fox Lake Grassroots Citizens (CFLGC) recommended a three-track assessment approach, with separate ATK and technical science assessments and a third track combining insights from the other two. The two-track approach allowed the technical science track to dominate the EIS and ensured that ATK only played a minor role in mitigation plans, this witness said. A

more systematic effort to integrate the two approaches would have informed processes such as selection of VECs, perhaps leading to different or additional VECs being selected. Members of the CFLGC group stated that scientific researchers hired to assess the Project undervalued ATK.

The Manitoba Métis Federation (MMF) argued that, while the formation of the Keeyask Partnership and the use of a two-track approach allowed the concerns and knowledge of First Nations in the project area to inform the EIS, the experience of and impact on Métis were excluded.

Peguis First Nation (PFN) raised concerns about the scope of the assessment for Keeyask, noting that Manitoba Hydro operates Lake Winnipeg as a reservoir for its entire system of Nelson River generating stations. PFN's representatives argued that upstream water levels should have been a VEC, and that without such a subject as a VEC, it is unclear how the Proponent can conclude that upstream communities will not be affected.

PFN argued that Aboriginal groups should be involved early in the process of assessing a Project. The environmental assessment process, they argued, should reflect the government-to-government relationship between Manitoba and First Nations, by ensuring that there is Aboriginal participation in determining the model to be used in assessment, in developing the scoping and terms of reference, and in other stages of preparing the assessment.

PFN also argued against what it called "project splitting," which, in the case of Keeyask, meant that the North Access Road and start-up camp were assessed and licensed before the Keeyask Generation Project and, as well, the transmission line will be assessed and licensed later as part of the Keeyask Transmission Project.

Pimicikamak Okimawin also raised concerns about VEC selection, inclusion of Aboriginal perspectives and the scope of the assessment. Representatives of Pimicikamak said they were left out of the selection of VECs for the Project. An expert witness for Pimicikamak stated that watersheds are important ecological boundaries and therefore riparian corridors are key landscape features and essential for maintaining regional biodiversity. Given the importance of naturally functioning riparian corridors, the expert suggested that riparian corridors should have been included as a VEC. On the issue of incorporating Aboriginal perspectives, Pimicikamak's representatives said the benchmarks for determining significance were all established from a technical-science perspective. One example of the failure to consider Aboriginal perspectives, they said, was the EIS's conclusion that certain adverse effects are "regionally acceptable" because they only affect a small portion of the region. This conclusion fails to consider the deep attachment of Aboriginal people to specific places and specific wildlife populations. A Pimicikamak expert witness also questioned the description of science and ATK having different worldviews, arguing instead that science is a methodology, rather than a worldview. The conflict of worldviews in this case is not between science and ATK, but rather between an economic growth imperative and a traditional worldview that seeks to protect the land. Pimicikamak found the scope of the EIS too narrow, both in spatial terms and temporal terms, arguing both that it should have included 50 years' worth of hydro developments and that Pimicikamak should have been included within the study area for the Project, as its traditional territories extend north to the area.

Commission Comment – Assessment Approach

Throughout the hearing, a frequent topic of discussion was the Proponent's "two-track approach" of using both technical science and the holistic Cree worldview in the assessment of the Project. Within the KCNs' assessments, it was acknowledged that there was at times a philosophical disagreement between the two approaches. This philosophical disagreement was a frequent subject of discussion by Participant groups, many of whom stated that the Partnership overemphasized technical science. Although differences in approach are significant, it should be acknowledged that there is also significant room for common ground between the Cree worldview and technical science approaches.

It was often suggested in the hearing that the use of VECs in the technical science assessment was in conflict with the Cree worldview and with other Aboriginal worldviews. Aboriginal people, it was said, do not view one species or one aspect of the environment as "more important" than any other. But it should be noted that selection of a species or an aspect of the environment as a VEC does not necessarily mean that the assessment views it as "more important." It is stated frequently in the EIS that in the case of species-specific VECs, one of the grounds for selection is that the species can act as an indicator or umbrella species. That is, monitoring the health of an indicator species can provide a picture of the overall health of the environment. Protecting an umbrella species, typically by ensuring that it has adequate functioning habitat, ensures that many other species of plants and animals are protected. Therefore, while a single species may be identified as a VEC, that does not imply that the other species that share the same habitat are considered to be lacking in "value." Furthermore, it should be noted

that many VECs themselves are not specific species, but are rather measures of habitat health. These VECs include water quality, functional wetland and ecosystem diversity.

It was also often said that the fundamental difference between the Cree worldview and technical science is that, in the Cree worldview (and other Aboriginal worldviews), the environment is viewed holistically, while technical science takes a narrow view. It may be true that many scientists have a very specialized area of individual focus, but good environmental science must be holistic and must view all aspects of the environment as interconnected. And again, many of the VECs were attempts to use technical scientific methods to measure environmental impacts in a holistic way. The VEC of intactness sought to quantify all disturbance of the terrestrial environment. The VEC of wetland function looked at all the important aspects of wetlands, including filtering and storing water, storing carbon, creating biomass, and creating habitat. The VEC of water quality included a wide range of parameters of the health of the aquatic ecosystem. The VEC of ecosystem diversity attempted to measure the effect of the Project on the many different kinds of ecosystems found in the Project area. Using these more ecosystem-related measures in the regulatory portion of an EIS would be an effective way of bridging the gaps between these two approaches to the environment, as the Commission itself recommended in its report on the Bipole III Transmission Project.

An expert witness brought by Pimicikamak Okimawin made the case that there is not actually a clash of worldviews between technical science and the Cree worldview because technical science is not in fact a worldview, but is instead a methodology. This is an important point to remember. Technical science may indeed rely upon narrowly focused collection and analysis

of data. But, when these narrowly focused points of data are assembled, they can create a holistic view.

There may be challenges at times in bringing the Cree worldview and technical science together, and it may be necessary to establish a mechanism for reconciling differences of opinion between practitioners of the two approaches. However, it would be helpful in this to acknowledge that the two approaches are not necessarily in opposition and can often share common ground. In the integration of these two approaches, the Keeyask Project has made positive steps towards an environmental assessment process that benefits from many kinds of knowledge and expertise, is sensitive to community needs and experiences, and inclusive of different ways of understanding the world. To follow through on this progress, it will be important to ensure that the Cree worldview and technical science also are brought together collaboratively in the monitoring and adaptive management of Keeyask, a subject addressed in Chapter Thirteen of this report.

While the Commission commends the Proponent for an innovative approach in bringing the Cree worldview and technical science together, the approach to regulatory environmental assessment was at times plagued by inconsistency and confusion.

The assessment was inconsistent in its use of benchmarks. For some VECs these were clearly stated, while for others, they were not. The use of a large number of study zones made it more difficult to consider the validity of the assessments of Project effects. These concerns will be discussed in more detail in the chapters of this report that focus on the environmental effects of the Project (Chapter Ten and Chapter Eleven). The decision to place the eastern boundary of the largest study zones such that several past, present and future projects were excluded may have

limited the ability to consider cumulative effects on many of the VECs. As well, the approach in cumulative effects was weakened by a lack of quantification of existing effects from past and present projects and a failure to integrate research gathered through the Bipole III Project. The Commission's specific concerns and recommendations regarding cumulative effects are described in Chapter Twelve.

Chapter Eight

Keeyask Cree Nations' Environmental Assessments

8.1 Overview

One of the principles in the assessment of the Keeyask Generation Project was that technical science and Aboriginal traditional knowledge (ATK) would both be employed and their conclusions given equal weight. Each of the Keeyask Cree Nations (KCNs) therefore led its own environmental assessment process, consulting with its own community and forming its own expert groups of elders, resource users and others. The EIS for the Project included three self-contained documents presenting the assessments of the Cree Nation Partners (CNP), a partnership of Tastaskweyak Cree Nation (TCN) and War Lake First Nation (WLFN); York Factory First Nation (YFFN); and Fox Lake Cree Nation (FLCN). These studies expressed the history, worldview, experiences and hopes of the First Nations, as well as documenting the process through which they became involved in the Project and their assessments of the potential environmental effects of the Project.

8.2 Cree Nation Partners

8.2.1 Introduction

Cree Nation Partners is a partnership between Tataskweyak Cree Nation and War Lake First Nation. TCN, located

Aski/Askiy, mino pimatisiwin and oochinewhin/ohcinewin

A number of Cree terms were used extensively in the evaluations prepared by the First Nations partners and in the EIS, as well as by Participants and Presenters. Some of these spellings differ from one community to another. *Aski* (the spelling used by FLCN) and *Askiy* (the spelling used by TCN, WLFN and YFFN) refer to the environment, including the land and water and all the plants and animals. *Mino pimatisiwin* is defined simply as "living a good life," but as a concept it also includes the protection of *Aski/Askiy*, health and social well-being, socio-economic prosperity, integrity of culture and language, integrity of governance and autonomy and healthy ecosystems. It is spelled as a single word in the YFFN evaluation report and as two words elsewhere. The term *oochinewhin* (the spelling used by FLCN) or *ohcinewin* (the spelling used by YFFN) was referenced in the First Nations' environmental evaluations and in some presentations during the hearing and refers to the belief that negative consequences will result from harmful or disrespectful actions, including harming *Aski/Askiy* or other people or treating *Aski/Askiy* or other people with disrespect.

along the north shore of Split Lake, had a total population in April 2011 of 3,392, of whom 2,181 lived on-reserve. WLFN had a population in April 2011 of 269, 75 of whom lived on the reserve at Ilford on the Hudson Bay Railway line. WLFN was recognized as a separate Band in 1980, and most members before then were members of TCN.

CNP's Keeyask Environmental Evaluation outlines the two First Nations' history with Manitoba Hydro leading up to the creation of the Keeyask Hydropower Limited Partnership. As one of the five First Nations that were party to the 1977 Northern Flood Agreement (NFA), TCN negotiated the 1992 NFA Implementation Agreement. Among other things, this agreement led to the creation of the Split Lake Resource Management Area (SLRMA), jointly managed by a board with equal representation from TCN and the Government of Manitoba, and an agreement for a joint examination of the impacts of Hydro projects in the SLRMA. Following this, in 1998 TCN proposed that future Hydro development in the SLRMA should be as a partnership between TCN and Manitoba Hydro. This led to an agreement-in-principle between TCN and Manitoba Hydro, which was signed in 2000. In 2001, TCN and WLFN then formed CNP and in 2003, WLFN signed an agreement-in-principle formally making them a party to the TCN-Manitoba Hydro agreement.

A protocol established between TCN and Manitoba Hydro in 2001 called for the First Nation partners in the Keeyask Project to participate in the assessment of environmental effects and employ their Cree worldview in this process. This led to a long series of consultations and the establishment of a number of committees and working groups to examine many aspects of the Keeyask Project. CNP's evaluation of the Project outlines core Cree beliefs, relationships that are a basis of

Cree culture, and a model for understanding the ecosystem that is based on those beliefs.

8.2.2 Core Beliefs

Core beliefs listed in the CNP evaluation are:

- “We see the earth as the Mother that bears all things as her children.
- All things are related.
- We are part of the natural world.
- There is no separation between living and nonliving parts of the natural world.
- Animals and plants are members of one's family.
- Spiritual, physical and emotional relations with land and water are the essence of our culture.
- The land is validation of our past.
- Land, culture and spirituality cannot be separated.
- We have a responsibility as caregivers for Mother Earth.
- We have a responsibility to share with others, but do not do so out of responsibility but out of our spiritual connection to the Creator, instilled by the teachings of our ancestors.
- Personal and community history are part of the land.
- All things, including inanimate things, have a spirit.
- All things are at the same time spiritual and physical.

- Our relationships with Mother Earth are based on respect.
- Our spiritual, emotional and physical needs can only be met when we live in harmony with Mother Earth.”

8.2.3 Relationships

The evaluation describes the ways in which relationships with Mother Earth are the foundation of many customs, practices and traditions. A wide range of relationships are described: spiritual; historical; life-sustaining; those based on caring for the land; those involved with hunting, fishing, gathering and trapping; educational; physical; emotional; social; socio-political; and more recent relationships based on personal property and community infrastructure. The following quotes from this portion of the evaluation provide a sense of the ideas articulated:

“A hunter in his family’s traditional territory knows that he is walking the same paths and seeing the same sky, water and land that his ancestors saw generations before. He stops at many sites associated with personal family history – here a grandfather was born, there an uncle camped during a great storm many years ago; here a moose was killed when the family had no food, here is the place where many generations have set traps for otter; this is where a great grandmother is buried; here is where families met each summer....Such a hunter is part of the land. He belongs to the land, the land does not belong to him.”

“(T)he products of hunting, fishing, gathering are valuable but the products do not have greater value in terms of our culture and traditions than the hunting, fishing and gathering activities themselves. The primary value of animals killed, fish caught or berries and medicines gathered is the affirmation they provide to the activity.”

8.2.4 CNP Consultation

CNP carried out an extensive consultation program with members from 1998 to 2009, as detailed in the CNP evaluation. Included in this were 1,445 information meetings, 456 negotiation meetings, 134 reference group meetings, 30 general membership meetings, and seven youth meetings. CNP established five groups called Reference Groups that developed negotiating positions and consulted with members on various subjects. These were the Overview of Water and Land; Employment and Training; External Relations; Internal Relations; Business Contracting and Economic Strategy groups. CNP also created websites and newspapers to communicate developments during the long process; TCN published 29 editions of Tataskweyak Journal between 2001 and 2009 and WLFN published six editions of Moosecoot Times from 2001 to 2009. Each of the CNP First Nations established a process for identifying adverse effects. TCN administered 700 community questionnaires and had 535 completed and returned. WLFN did a series of interviews.

8.2.5 Issues Identified

CNP’s evaluation states that, in their experience, science-based environmental impact statements in the past consistently underestimated the effects of hydroelectric development because they failed to consider the Cree worldview. For that reason, they insisted on the twin-track approach of ATK and science-based assessments. A wide range of potential impacts on Cree language, worldview, traditional knowledge, and economic and cultural activities were identified in the CNP process. Specific concerns included:

- Loss of historical and spiritual connection to the land, emotional well-being, harmony and balance among Mother Earth’s beings;

- Loss of opportunity to teach and learn traditional lessons;
- Effects on relationships with other First Nations;
- Self-government affected as a result of Manitoba Hydro being involved in decision making;
- Fiduciary relationships between Crown and First Nations affected;
- Relationship with Manitoba Hydro affected due to different interpretations of NFA, NFA Implementation Agreement and Keeyask Agreement;
- Effects of construction noise and fishing and hunting by construction workers;
- Influx of construction workers creating risk of abuse of women, more drugs and alcohol available, and need for more policing and security;
- Danger on PR 280 due to increased traffic;
- Increased demand for housing as CNP members living elsewhere come home to work;
- Shoreline erosion and fluctuation in water levels;
- Concern that Split Lake may have repeat of 2005 and 1997 flooding;
- Loss of the forests due to flooding;
- Debris, sediment, altered habitat, creation of new reefs and boating conditions will make fishing more difficult;
- Dam will block fish movement;
- Winter water level changes will make travel more difficult due to slush ice and kill muskrats and beavers;

- Increase in mercury levels;
- Loss of traditional hunting, fishing and trapping grounds, loss of trapping revenue and fewer moose, muskrat, beaver and waterfowl for harvest;
- Loss of caribou and waterfowl habitat;
- Loss of sturgeon spawning sites at Keeyask and Birthday Rapids;
- Loss of medicinal plants and traditional food;
- Loss of recreational opportunities, traditional camp sites and trappers' cabins;
- Loss of archaeological, burial and sacred sites due to flooding;
- Stress in community due to uneven distribution of costs and benefits;
- Overcrowding and tension among some resource harvesters;
- Potential increased encroachment by outsiders in WLFN Traditional Use Area; and
- Technical-science based process does not properly consider Cree worldview.

After the issues were identified, TCN members were surveyed to determine which issues they considered most important. The results showed that: "TCN members do not view the potential environmental effects of Keeyask as being primarily related to resources or to particular physical elements of our homeland ecosystem. Rather, our members see them as effects on our customs, practices, traditions and relationships that comprise our distinctive cultural identity." The CNP evaluation report notes, in particular, that the members surveyed were equally concerned about the potential for the death

of beaver and muskrat and the risk to TCN members resulting from increased traffic on PR 280. “This result,” the report notes, “is entirely consistent with our worldview that all beings are equally important parts of Mother Earth.” While this survey was carried out with TCN members, the issues identified were also endorsed by WLFN as representing their views.

Issues were then identified as possible interferences with the exercise of the customs, practices and traditions that define the cultural identity of TCN and WLFN members. The specific issues above created nine different kinds of interference with traditional cultural identity. These were:

- Interference with the right to hunt, trap and fish for food;
- Loss of historical connection to the land that will be flooded;
- Loss of traditional food previously harvested in the area of impact;
- Disrespect and lack of care for Mother Earth;
- Disruption of spiritual relationship with the land;
- Disruption of emotional relationship with the land;
- Reduced opportunities for traditional learning;
- Reduced opportunities to experience traditional living; and
- Reduced opportunities for sharing.

This identification of issues and potential interference with cultural identity then formed the basis for the negotiation of the TCN and WLFN Adverse Effects Agreements

(AEAs). The CNP evaluation states that these interferences have been fully addressed by the AEAs.

8.2.6 Assessing Harmony and Balance

The CNP evaluation introduces an illustration known as the Homeland Ecosystem Model, and uses it to demonstrate how harmony and balance have changed over time since contact with European civilization. This section of the evaluation describes a series of increasing impacts from the creation of the *Indian Act* in 1876 through to the establishment of highway access in the 1980s, including the major hydro developments that began with Kelsey in 1957. This section describes how, as a result of these increasing interferences, vital relationships have been weakened up to the pre-Keeyask present. It then lists ways that, largely as a result of the offsetting and access programs that are part of the Keeyask AEAs, members of TCN and WLFN will have greater opportunity to strengthen spiritual, emotional, educational, historical and other relationships.

8.3 York Factory First Nation

8.3.1 Introduction

York Factory First Nation’s evaluation report, *Kipekiskwaywinan* (Our Voices), tells the story of the people of YFFN, their experience with hydro development and their hopes for the future, using a combination of narrative and oral testimony. The voices of community members are used throughout the report, and offer a view of the doubts, fears and hopes expressed in the community. As *Kipekiskwaywinan* states: “Our voices do not make for a tidy, co-ordinated written account, that tries to make everything sound objective, balanced, certain, predictable and

manageable. Rather, they are full of many contradictions, uneven treatment, bias, fear, anger, wariness, resignation, yet hope.”

8.3.2 Worldview and Values

Kipekiskwaywinan begins with a description of the Cree worldview and values. The following concepts are central ideas that the report seeks to explain to outside society.

- *Askiy* is the whole of the land, water, people, plants, animals and all things. Even a small change to *Askiy* will affect people.
- *Kiskinohamakaywina* (Teachings) have been handed down through the generations and offer daily guidance. These teachings are relevant and applicable to the assessment, planning, construction and operation of Keeyask.
- *Kistaynitamowin* (Respect) is very important when speaking and acting towards *Askiy*. One must understand that everything of *Askiy* has a place and purpose.
- *Kistaynitakosewin* (Honour) – It is important to honour life and *Askiy* through ceremonies.
- *Tapwaywin* (Truth) – It is important that we speak truthfully based on our knowledge and experience.
- *Aspehnmowin* (Trust) is important to our relationships and is developed over time.
- *Ohcinewin* – This hard-to-translate term means that because of the interconnectedness of *Askiy*, if you harm anything, including land, water, people, plants or animals, you will experience harmful repercussions, which may affect your children or grandchildren.

- *Ayakohmisewin* (Caution) is essential so that individuals and the community can avoid disrespectful and harmful actions towards others or towards *Askiy*.

The report explains that traditional knowledge is a dynamic, living process that lives within many aspects of Cree life, including traditions; cultural identity and activities; language; stories, teachings and legends; humility and listening; spirituality; and respect for *Askiy*. Traditional knowledge is maintained by the older generation and taught to younger generations and there is an on-going process of learning and applying traditional knowledge. The report describes the people of YFFN as inherently spiritual and believing that they must respect all things in nature. “To live a good life we respect and care for *Askiy*, other people, and all things in this world for our ancestors and for future generations. We call this *minopimatisiwin*.”

8.3.3 YFFN History and Values

Kipekiskwaywinan outlines the history and traditional movement and resource use of the people of YFFN, going back to pre-contact times when their ancestors followed the migrating caribou to the Hudson Bay coast in the summer and spent winters inland in the forested country. Following the establishment of the European fur trade, the ancestors of today’s YFFN supplied the Hudson Bay Company (HBC) post at York Factory and traded furs trapped throughout their traditional territory, in which they lived in small groups from Churchill to what is now Fort Severn in northern Ontario. The Cree people who lived near the coastal trading posts were known in some fur-trade documents as the Homeguard Cree.

Left out of the adhesion to Treaty Five that was signed in 1908, the York Factory Cree signed an adhesion in 1910. No land was set

aside for a reserve until the establishment of the present reserve at York Landing on Split Lake in 1990, more than 30 years after the people of York Factory had been relocated to York Landing in 1957. YFFN retains unfulfilled treaty land entitlements. Decades after the 1910 signing of the treaty, as traffic and trading declined at York Factory, some of the York Factory Cree moved to Split Lake (Tataskweyak), Churchill, Shamattawa and other locations. In 1947 two groups of York Factory Cree formed the Fox Lake and Shamattawa bands. After the registered trapline system was established in Manitoba, the York Factory registered trapline was established in 1948, taking in a large amount of land roughly from Owl River to the Manitoba-Ontario border. This registered trapline, the report states, is a good proxy for YFFN's traditional territory.

Following the decision by the HBC to close its York Factory fur post, YFFN was relocated by Indian Affairs to the current location on Split Lake in 1957. This move is described through oral history in *Kipekiskwaywinan*: "The relocation disconnected us from the land that our people had been a part of for centuries. We knew this land in intimate detail. It is where we were born, raised and learned to support our families... Though we were able to build houses and find resources to harvest [at York Landing], it was not our homeland."

Kipekiskwaywinan uses narrative and oral history to describe subsequent disruptions to the way of life and culture of YFFN, including residential schools and the hydro developments of the 1960s and 1970s that led to the Northern Flood Agreement.

8.3.4 Changes and Damage to the Water, Land and People

A major portion of *Kipekiskwaywinan* uses narrative and oral history to describe the effects that have been felt as a result of

hydroelectric developments including the Kelsey Generating Station, Lake Winnipeg Regulation (LWR) and Churchill River Diversion (CRD). Described impacts include:

- **Decline in water clarity and quality** – Where once people drank directly from the lakes and rivers, now water must be treated. Sometimes the community is under a boil-water advisory, and swimmers risk getting rashes and sores.
- **Effects on fish and fishing** – Fish are less plentiful in Split Lake and Aiken River, fishing is more difficult because of slime-clogged nets, fish are being caught with tumours and growths and fish have a different taste and texture. Sturgeon have particularly declined in numbers.
- **Effects on birds, mammals and plants** – Loss of habitat has led to fewer ducks, geese, gulls, beaver and muskrat. Caribou harvesting near YFFN has occurred in the last decade, but for many years before that, caribou were not seen in the area.
- **Effects on travel on ice and water** – Without an all-season road, YFFN members cross Split Lake by ice or water. Manitoba Hydro's seasonal reversal of flows caused by LWR and CRD (creating higher flows in winter) has made travel more difficult. Shoreline erosion causes a threat to navigation.
- **Effects on access and community places** – Beaches, boat launches, camps and scenic places have been lost due to shoreline erosion.

These changes are described as on-going. As a result of these effects, YFFN states that members of the community are not comforted by the assurances they were given that Keeyask will not cause flooding upstream of Clark Lake or any further

degradation of water quality. Instead, *Kipekiskwaywinan* notes that members of the community “strongly believe that the effects of the Project will go beyond the predicted “hydraulic zone of influence” and beyond the study areas defined in the Environmental Impact Statement.” Despite the predictions of scientific experts, members of the community are concerned that water quality at York Landing will be made worse, numbers and quality of fish and wildlife will be reduced, ice and open water travel will become more treacherous, and important community places will continue to be lost. YFFN’s negotiating team sought to reflect this perspective in their AEA.

8.3.5 The Way Forward

In a section of *Kipekiskwaywinan* entitled The Way Forward, the report describes the process leading to the signing of the Joint Keeyask Development Agreement and the AEA. It outlines several features of the AEA that represent important YFFN positions. An opening clause of the AEA is described as capturing YFFN’s perspective on adverse effects. The text of the AEA acknowledges that it was completed prior to the EIS and only included those adverse effects that were foreseen at that time. The agreement establishes offsetting programs to support resource access and use, environmental stewardship and cultural sustainability, as well as residual compensation. There is a strong commitment to environmental monitoring and YFFN’s participation and application of traditional knowledge in monitoring. A clause on fundamental features of the Project provides that Keeyask will not alter open water levels on Split Lake. Manitoba Hydro is not released from liability in the event of unknown or unforeseen adverse effects. YFFN states that the AEA protects Aboriginal and treaty rights.

The YFFN report acknowledges that the First Nation is not entirely satisfied with the terms of its agreement, but needed to be able to conclude an AEA in order to participate in the Keeyask Project. To make the Partnership work, YFFN proposes that it will be necessary to address three challenges: building trust and reconciliation among the partners; following cultural values to come to terms with the damage that will be done by the Project; and preparing young people with the values and identity they will need in managing the Project.

8.4 Fox Lake Cree Nation

8.4.1 Introduction

The objectives of the Fox Lake Cree Nation report are to describe how the Keeyask Project fits within FLCN’s overall wellness strategy, define and describe FLCN’s baseline, describe cumulative impacts of hydroelectric projects on people and *Aski*, describe predicted impacts of Keeyask, describe necessary mitigation measures, describe necessary monitoring measures and describe measures necessary to ensure the FLCN members benefit from Keeyask and live “*mino pimatisiwin*.” The report describes *mino pimatisiwin* as relating to “the overall health of our people. *Mino pimatisiwin* includes the protection of *Aski*, our health and social well-being, socio-economic prosperity, integrity of culture and language, integrity of governance and autonomy, and healthy local ecosystems. Health is more broadly defined to include our physical, social, cultural and spiritual well-being.”

The report notes that finding the balance between Cree worldview and technical science has been a continuing challenge. For example, FLCN participated in the process of developing valued environmental components (VECs), but elders and resource

harvesters reminded FLCN's researchers that categorizing species or areas from a technical science perspective created problems. "By its very nature, the VEC approach tends to ignore interrelatedness of people, animals, water, landscape and plants. ... Our people do not place greater importance on certain species and all are valued equally. The entire *Kischi Sipi* [Nelson River] including the *Innuwak* [the Cree people], fish, birds, plants and wildlife, all of whom use, inhabit and benefit from the river would constitute a VEC."

The report summarizes the cumulative impacts of the past 50 years of hydro development.

- The permanent loss of the natural voice of the *Kischi Sipi*, that is, the sound of the rapids, wherever a dam was constructed;
- The permanent increase in turbidity;
- Increase in mercury levels in some fish and aquatic animals;
- Loss of key food sources as a result of mercury levels for at least one generation;
- Permanent loss of *Kischi Sipi* as a source of potable water;
- Permanent and unsightly transformation of shorelines through flooding, erosion, debris;
- Permanent disappearance of aquatic animals and birds from pristine shoreline areas;
- Permanent reversal of natural seasonal flow cycles, so that high flows occur in winter;
- Long-term and permanent creation of unsightly dykes, diversions and impoundments;

- Dams create permanent barriers on the *Kischi Sipi*, rendering traditional travel and upstream fish movement impossible;
- Long-term disappearance of lake sturgeon from some areas as spawning sites, feeding and nursery areas were destroyed or altered;
- Permanent reversal of the Butnau River;
- Decrease of traditional travel;
- Permanent loss of burial sites in flooded areas;
- Permanent loss of biologically unique areas; and
- Disruption to *mino pimatisiwin* due to loss and destruction of many areas used by FLCN, areas that are the foundation of language, culture, values and beliefs and the basis of *Aski Keskentamowin* (traditional knowledge).

8.4.2 FLCN Current and Historical Cultural Environment

Using a variety of sources, including extensive personal interviews with FLCN members drawn from a community history project undertaken between 2004 and 2009, the report presents a summary of FLCN's cultural environment. Identity, language, culture, values and beliefs are described, including *oochinewin* ("the belief that a negative action against an animal, a person or the land could negatively impact the fate of a person, family members of the next generation"), *pastamowin* (making "inappropriate, hateful, untrue comments about someone else") and *mitewewin* (the traditional and spiritual ways of life). Values of self-sufficiency and hard work, sharing and caring and respect are described. In this section of the report, it is mentioned that

today only 15 per cent of FLCN members in Gillam and Bird are fluent in Cree, and an additional six per cent have some understanding of the language.

The report discusses traditional methods of transmitting knowledge from generation to generation and the use of storytelling in sharing teachings. Burial sites and former resource use sites are described and the role of archaeological research and oral tradition in passing on this knowledge is discussed.

A section on human health and wellness describes how a continuing connection to land is critical for the overall well-being of FLCN. Moving with the natural cycle of the environment was traditionally important to survival and maintenance of relationships. Prior to hydro development, there was a strong sense of community cohesion.

A discussion of the concept of *mino pimatisiwin* describes how balanced relationships with one another and with *Aski* allowed for people to live the good life. Oral history stories and narrative sections describe lessons FLCN members learned about treating one another, elders, and the environment with respect. This section of the report describes the importance of relationships with *Aski* and with animals.

This discussion concludes with a list of features described by elders as necessary for the health and well-being of FLCN members. They are:

- Accessible, clear and unpolluted drinking water;
- Accessible and unpolluted plants and medicines;
- Fish and other foods that are accessible and of exceptional taste, texture and smell;
- Wood and other products to build warm and secure homes;
- Natural cycles that are predictable;
- Wilderness that serves as habitat for plants and animals;
- Safe, navigable and barrier-free water bodies;
- Landscape features from which stories and histories can be understood and communicated;
- Natural sounds of rapids, trees and birds; and
- Landscape that is free from the sight of industrial development.

8.4.3 Effects of Hydro Development

In assessing the effects of Keeyask, FLCN asserts that the appropriate baseline is the condition of the lands, waters and people prior to the start of hydroelectric development in the 1960s. Such a baseline provides the best way to determine the measures needed to reduce adverse effects of Keeyask and to compensate for those that cannot be mitigated. In describing pre-development life, the report notes a number of campsites, cabins, portages, and resource use areas that were flooded by the creation of Stephens Lake as the reservoir for the Kettle generating station. Some specific areas that were important habitat included the lower reaches of the Butnau River, which were important for sturgeon spawning and feeding, and the mouth of the Kettle River, which supported large brook trout, as well as sturgeon, in addition to the Kettle Rapids themselves, which were an important spawning site.

FLCN members describe hydroelectric development as beginning rapidly without

the community's knowledge, in the process marginalizing the community socially and politically. The report states that government representatives appear to have made cursory attempts to inform the chief about the Kettle project, but due to language barriers, these were unsuccessful and the chief had no power to stop or alter the project. Likewise, the creation of the Town of Gillam occurred without involvement from the people of FLCN.

Shoreline erosion, sedimentation, loss of habitat, floating debris, the creation of barriers to fish movement and the reversal of seasonal flow cycles followed hydro development. FLCN members recall a variety of effects, including changes in the taste, colour and texture of fish; increasing numbers of fish with growths or tumours; dangerous boating and drowning; inability to drink the water from the river; declines in the number of furbearers; loss of berry patches to flooding, hydro infrastructure and the Town of Gillam; and the decision of many community members to stop eating fish from the Nelson River and instead eat only fish from tributaries.

The report describes a large number of impacts on human health and wellness. Some resulted from racism, violence and social tension that followed the influx of outside workers. A social divide grew and FLCN members felt discrimination in work, school and community lives. Significant health and wellness impacts resulted from the loss of *innado mechim*, or traditional foods, including fish, game and berries.

In a discussion of impacts of hydro development on wildlife, the FLCN report describes the three types of caribou found in the area. *Mistikoskaw utikuk* ("caribou of a wooded area") is resident throughout the year and occasionally joins in one herd in autumn with the Pen island caribou. These

caribou are relatively larger in size than others, with darker hide and more hair. *Puskwaw utikosisak* ("small caribou of a barren land"), also called *askimao utikosisak*, migrate into the area in early winter and are resident on the north side of the Nelson River. Their meat is described as sweeter and they have a more rounded hoof print. *Namowin atikok* ("caribou from the north east") migrate into the area in early winter, are resident on the south side of the Nelson River and occasionally converge into one herd along with barren land caribou. These are the caribou often referred to as Pen Island coastal caribou. They are described as small in size, lighter in colour and having white fur around the neck. FLCN members have indicated that the *mistikoskaw utikuk*, which they also describe as migratory woodland ecotype, are located in the Gillam area year-round. They note that this is well beyond the accepted distribution of boreal woodland caribou reported by the federal and provincial governments. FLCN members believe it is likely that boreal woodland caribou have interbred with Pen Island caribou, creating a hybrid variety. The report states that all caribou types have declined in the region since the 1950s and indicates that the portion of the Nelson River that was inundated to become Stephens Lake was a major corridor for caribou.

The FLCN report states that historically moose were less abundant in the area but have become more common and have been hunted more since the decline in caribou.

8.4.4 Moving Forward

The report describes the evolution of FLCN's relationship with Manitoba Hydro up to and including Keeyask. As previously noted, FLCN was not consulted in the initial development of hydro resources in the region. Nor was FLCN a signatory to the 1977

Northern Flood Agreement. The Limestone project was the first time FLCN was included in discussions with Manitoba Hydro about its activities, but FLCN was only recognized as an interested party in developments after Bird was designated a reserve in the mid 1980s. Negotiations about compensation for past effects began in 1996 and led to the 2004 Impact Settlement Agreement with Manitoba Hydro. In the meantime, discussions began in 2001 on the proposed Keeyask Project, resulting in the ratification of the 2009 JKDA.

Several committees and working groups were established prior to the JKDA so that FLCN could assess the Keeyask Project and provide input into Manitoba Hydro's on-going studies. FLCN's initial assessment of the Keeyask Project raised concerns that their people did not agree with Manitoba Hydro and its consultants on what should be studied and where and on the nature and extent of potential impacts. Many of these criticisms were brought to the Environmental Studies Working Group, created in 2007, with representatives of FLCN and its advisors, as well as Manitoba Hydro and its consultants. Subcommittees then were formed including Mammals, Aquatics, Mercury and Health. The FLCN report states that considerable progress was subsequently made through a collaborative process in which aquatic biologists have consulted with harvesters and elders in the design of their studies. This allowed ATK to inform technical science.

In 2009, the Keeyask Traditional Knowledge Program identified a number of areas used by FLCN members. The program gathered traditional knowledge through 35 map-biography interviews conducted in Bird, Gillam, Winnipeg and Thompson. This study and accompanying ground-truthing identified areas of historical and contemporary significance.

Other initiatives in this period included establishment of the Harmonized Gillam Development framework, which involves FLCN, Manitoba Hydro, the Province of Manitoba and the Town of Gillam in planning for the redevelopment of Gillam; the community history project in which approximately 80 interviews were held with FLCN members; and a historical use study of lake sturgeon on the Nelson River.

Many of these projects informed FLCN in planning for participation in Keeyask. FLCN sees the signing of the JKDA and the AEA as first steps in recovering a healthy and prosperous community. Among the measures for rebuilding from the social, cultural, economic and human impacts of past developments are:

- Inclusion of *Aski Keskentamowin* [knowledge of *Aski*] into resource and environmental management, environmental impact statements and monitoring programs;
- Youth Wilderness Traditions and Cree Language programs to help young people learn Cree ways and language;
- A protocol for use if archaeological or burial sites are unearthed during construction;
- Development of a community wellness strategy, which goes beyond the Keeyask Project, but includes programs supported through the Keeyask AEA, including a crisis centre and wellness counselling program, alternative justice program, lateral violence and "Where do we go from here" programs;
- Programs to encourage employment and retention of FLCN members, including counselling services, cultural workshops, Cree ceremonies and direct negotiated

contracts on Keeyask in the areas of employee retention, camp catering and housekeeping and security; and

- A variety of mitigation and monitoring measures addressing impacts on fish, mammals and birds.

Commission Comment – KCNs' Assessments

The Commission found that the three KCN evaluations added greatly to an understanding of the Keeyask Project and to the environmental, historical, cultural, social and spiritual context of the Project. In addition to documenting the experiences and knowledge of members of the communities that will be most affected by the Project, these three reports provided a better idea of how the KCNs came to their decisions to participate in Keeyask and how they put forward issues of great importance to them. They added immeasurably to the ability of Panel members to consider the holistic nature of impacts to the environment of the Lower Nelson River. The reports presented a range of views regarding the Project – pro and con and mixed – and this helped the Panel to better understand the relationship between hydroelectric development and neighbouring communities. The viewpoint of the three reports, which takes a long view of the region and does not distinguish impacts on a project-by-project basis, is especially worthwhile in understanding the cumulative effects of hydroelectric development in northern Manitoba.



Chapter Nine

Physical Environment

9.1 Overview

The Proponent's assessment of the effects on the physical environment focused on effects that occur to the land, water and air as a result of the Keeyask Generation Project. The various aspects of the environment examined by the Proponent in this section were not considered valued environmental components (VECs) for the purposes of determining the significance of effects. They were, however, pathways by which the Project may have an effect on VECs. For example, shoreline erosion is one of the subjects examined in the Physical Environment section of the environmental impact statement (EIS). Though shorelines are not a VEC, shoreline erosion can influence several of the VECs, by affecting water quality, habitat of the four fish species that were VECs, the safety of water travel, or the appearance of the area. This section of the EIS examined 10 aspects of the physical environment.

9.2 Climate

The effect of the Project on climate is assessed by examining its greenhouse gas (GHG) emissions. In order to assess this, the Proponent contracted an independent agency, the Pembina Institute, to carry out a life cycle assessment, which calculated the amount of greenhouse gases (in equivalent amounts of carbon dioxide) that will be produced during

the life of the Project. The assessment found that the project will produce the equivalent of 979,000 tonnes of carbon dioxide over its lifetime. Of this, approximately 46 per cent will be produced during construction, mostly from the manufacture and transportation of building materials (steel and cement). Another 50 per cent of the total greenhouse gas emissions will come from land use changes, including the burning of slash during clearing of the reservoir and emissions that will be produced by the reservoir itself (through decay of vegetation). The remainder will be produced during operations over the lifetime of the Project.

Throughout the life cycle of the Project, GHG emissions will amount to approximately 2.46 tonnes of carbon dioxide per gigawatt-hour. By way of comparison, natural gas-burning power plants, depending on the type, produce 509-764 tonnes of carbon dioxide equivalent per gigawatt-hour. A comparably sized natural gas plant would produce as much greenhouse gas in 177 days as the Keeyask Generation Project will produce in 100 years.

9.3 Local Air Quality and Noise

Emissions from construction vehicles and from the burning of vegetation during

reservoir clearing will have temporary and localized effects on air quality, as will dust from construction and transportation. The maximum daily emissions from transportation of equipment, materials and personnel is expected to amount to approximately two tonnes per day of nitrogen oxides, 0.4 tonnes per day of sulphur monoxide, and 0.1 tonnes per day each of sulphur dioxide and particulate matter. Total emissions from construction of the dams and generation facilities are expected to amount to 382 tonnes per year of nitrogen oxides, 82 tonnes per year of carbon monoxide, 25 tonnes per year of sulphur oxides, and 27 tonnes per year of particulate matter. These quantities are not expected to be detectable outside the Local Study Area and unlikely to result in exceeding Manitoba's ambient air quality objectives and guidelines within the Local Study Area. Over six years, the Proponent plans to clear approximately 3,600 hectares of vegetation from the future reservoir area, pile it into windrows, and burn it when conditions allow. By way of comparison, in the Regional Study Area approximately 39,000 hectares of forest are subject to forest fires per year on average. Dust-control measures will be employed on roadways, as necessary, to prevent problems resulting from increased traffic during construction.

Noise will be produced by blasting to excavate construction sites and quarries. The closest known trapper's cabin is four kilometres downstream of Gull Rapids, so this noise is not expected to be an issue for residents. At Wuskwatim, the construction camp was 1.5 km from the construction site and no noise-related problems were reported to Manitoba Hydro. Noise is referenced in the discussion of sensory disturbance to wildlife in Chapter Ten. In the discussion of caribou, limiting blasting during the sensitive calving time is discussed.

9.4 Physiography

Effects on the physiography, or physical features, of the area will be felt within the Project Footprint as a result of construction, creation of borrow pits, and the impoundment of the reservoir, which will convert areas of forest and wetland into a lake-like environment. The entire Project Footprint amounts to close to 14,000 hectares. This includes the area of the reservoir, both the existing waterways and the areas that will be flooded, as well as the area of the generating station, spillway, dams, dykes, South Access Road, borrow pits, quarries and excavated materials placement areas (EMPAs). This also includes approximately 100 hectares of Gull Rapids that will be dewatered as a result of changes in the water flow. The initial flooding of the reservoir will affect 4,500 hectares. In total, the reservoir will be approximately 9,300 hectares, and will grow by 700-800 hectares through erosion and peatland disintegration during the first 30 years flooding.

Large amounts of material will be excavated and moved during the Project: 8.4 million cubic metres of earth fill (gravel, clay, etc) and rock that will be used in construction, plus an estimated four million cubic metres of excavated materials that cannot be used in construction and will be placed in EMPAs, largely within the reservoir. Next to the reservoir itself, the largest component of the Project Footprint will be borrow areas, amounting to approximately 1,300 hectares, although only portions of some of the identified borrow areas are expected to be used.

Much of the terrestrial environment in the area consists of peatlands and discontinuous permafrost. Peatlands cover approximately 85 per cent of the Local Study Area, and about 75 per cent of the area is discontinuous permafrost. Permafrost melting will occur

in, and adjacent to, areas where clearing has occurred during construction.

9.5 Surface Water and Ice Regime

Impoundment of the reservoir will raise water levels to 159 metres above sea level, meaning that the water level on Gull Lake will rise by six to seven metres. In the reach of the Nelson River between Portage Creek and Birthday Rapids, the water level will rise by three to five metres. Above Birthday Rapids, changes in water level will be relatively small.

Modeling of the Nelson River from Split Lake to Stephens Lake leads to the prediction that the backwater effect (ie. the raising of water levels caused by the dam) will extend approximately 41 kilometres upstream from the Project site, or three kilometres downstream from Clark Lake. Accordingly, the open water levels on Clark Lake and Split Lake are not expected to be affected by the Project.

Effects on water regime were analyzed for both base-loading and peaking operation. In base-loaded operation, the reservoir is kept at a full supply level. In peaking mode, the reservoir fluctuates up to one metre per day. In peaking mode, the effects of the fluctuation are felt most strongly closer to the generating station and diminish further upstream.

Water velocities will change upstream of the generating station, as Gull Lake becomes a larger water body and further upstream the environment will change from riverine to lake-like. Fast water between what is now Gull Lake and Birthday Rapids will slow and Birthday Rapids will change from rapids to relatively swift water. Many of the new or enlarged bays on the reservoir will have little current.

Ice cover will be different as a result of the Project. Ice will form earlier in the winter between the Project and Portage Creek and the ice cover is expected to be thinner (0.8 to 1.2 metres, which is similar to Stephens Lake). Ice cover is expected to be smoother in much of the area that is now between Gull Lake and Birthday Rapids. Fluctuation of water levels, as a result of the peaking mode of operation, may result in slush ice conditions as water rises above the ice in places.

Under low-flow conditions that may occur once every 20 years, the Proponent forecasts that ice levels on Split Lake could be elevated by up to 0.2 metres above what would be present without the Project.

9.6 Shoreline Erosion Processes

During construction, portions of the shore near the Project site may experience erosion as a result of river diversion during the building of cofferdams. The changes to river flow and water levels may cause this erosion. A larger amount of erosion will be caused by the impoundment of the reservoir. Shoreline erosion was estimated for both base-loaded and peaking operations. Using peaking operation, 10 per cent of shoreline areas are expected to remain stable, 25 per cent are expected to recede by less than 15 metres, 48 per cent are expected to recede by 15 to 50 metres, 12 per cent are expected to recede by 50 to 100 metres and five per cent of shorelines are expected to recede by more than 100 metres. Base-loaded operation is expected to cause a higher rate of shoreline recession because of the greater amount of wave energy. Ultimately, the two modes of operation are forecast to cause similar amounts of shoreline erosion. Wave action and changes in the water levels will cut banks and flatten slopes, causing material to run into the reservoir. Models were developed

to estimate the energy of waves and the erodibility of soils along the future reservoir. A process known as peatland disintegration will cause much of the continued erosion. In peatland disintegration, an area of peat is flooded and, in time, this peat rises and floats away, exposing mineral soil.

Shoreline erosion will cause a very rapid and large increase in the amount of both organic and mineral sediment entering the water system, followed by a decline to a more stable, but still elevated, amount of sediment release. Large amounts of organic sediment and peat will be released into the reservoir in the first years after flooding. Annual organic sediment released into the aquatic system is expected to rise from 1,000 tonnes per year to about 1.3 million tonnes in the first year. In years two to five about 200,000 tonnes per year will be released. Annual releases of organic sediment will decline to about 18,000 tonnes per year by about year 15. Mineral sediment released into the system will increase from the present 56,000 tonnes per year to about 600,000 tonnes in the first year. This will decline to about 230,000 tonnes per year in years two to five and reach about 160,000 tonnes per year by year 15.

9.7 Sedimentation

Construction of the Project will introduce sediment into the system, especially when cofferdams are being built and removed. Several spikes in sediment will be noted, with the greatest being during the construction of the south cofferdam, which will close off the south channel of the river. As this involves depositing rock into the river, it will cause short-term increases in sediment, which will reach concentrations of up to 15 milligrams (mg) per litre of water. Other in-stream construction may cause sediment to increase by one to four milligrams (mg) per litre for months at a time. By way of comparison,

sampling between 2005 and 2007 showed that during open water season, sediment levels in Stephens Lake ranged from three to 15 mg per litre. About 30 per cent of the sediment added to the river during construction is expected to settle to the bottom in Stephens Lake, much of it in the portion of the lake closest to the Project. More fine sediments will be carried past the Kettle generating station and eventually settle to the bottom.

Immediately downstream of the dam, less erosion will occur because of the elimination of Gull Rapids and the large hanging ice dam that currently forms in winter.

Most of the large amount of organic material released into the water after flooding of the reservoir is expected to be deposited in the large sheltered bays that will form on both the south and north sides of the reservoir. In the first year after flooding, these bays will have large increases in the amount of organic suspended solids of up to 21 mg per litre. This will decrease after the first few years. Because the creation of the reservoir will slow down the velocity of the river between the dam and Birthday Rapids, total mineral suspended solids are expected to decrease. Several monitoring locations have been identified within the future Keeyask reservoir, immediately downstream of the dam and in Stephens Lake as part of a Sediment Monitoring Plan.

9.8 Groundwater

Creation of the reservoir will cause groundwater to rise in the immediate area, because of the increase in water levels. Rises in the level of groundwater will be up to seven metres, with the amount of the rise declining with greater distance from the dam.

Some minor changes in the direction of groundwater flow are expected, but generally

groundwater will flow toward the reservoir as it now flows toward the Nelson River and its tributaries.

9.9 Surface Water Temperature and Dissolved Oxygen

Dissolved oxygen levels are a key indicator of the ability of water to support fish and other aquatic life. Creation of the reservoir will affect surface water and temperature and dissolved oxygen, especially in the sheltered bays that have little water velocity. This will be felt most in the early years after the flooding of the reservoir, when there are large amounts of organic material entering the waterway as a result of reservoir-flooding and peatland disintegration. As organisms in the water break down the organic material, they consume dissolved oxygen in the water. In the first year after flooding, along the mainstem of the reservoir, dissolved oxygen concentrations will remain above 6.5 mg per litre, which is within the most stringent standard in the Manitoba Water Quality Standards, Objectives and Guidelines. In sheltered bays in typical summer conditions, concentrations are expected to be reduced by up to 1.5 mg per litre, and in warm conditions with light winds, dissolved oxygen levels in the backbays will be below 6.5 mg per litre. In these conditions, about 1,800 hectares of newly flooded backbays are expected to have oxygen levels in the 4 - 6.5 mg per litre range, while 100 hectares of backbays are expected to have dissolved oxygen levels of 2 - 4 mg per litre. Some of these backbays will experience thermal stratification, resulting in lower levels being poorer in oxygen. As a result, on occasion (an estimated three per cent of the time), small areas in the backbays may have oxygen levels below 2 mg per litre. Areas with low oxygen concentrations in summer

will also be more likely to have low oxygen concentrations in winter. While the mainstem and areas with adequate amounts of water flow will have high dissolved oxygen levels, in some shallow backbay areas, dissolved oxygen will be in the 0 - 2 mg per litre range because the ice cover restricts water flow. In the first year after flooding, approximately five square kilometres of the reservoir are expected to have oxygen levels in the 0 - 2 mg per litre range at the bottom.

9.10 Debris

Debris will enter the waterway as a result of the initial flooding of the reservoir and the subsequent erosion of banks and expansion of the reservoir. During construction, vegetation will be cleared in the area to be flooded by the reservoir. Vegetation greater than 0.15 metres in diameter and/or longer than 1.5 metres will be cleared and disposed of so that it will not enter the waterway. Smaller vegetation will, however, enter the waterway. Smaller vegetation is expected to accumulate on shorelines in backbays or become waterlogged and sink. Smaller vegetation is less of a hazard to navigation and does not persist as long as large debris. Peat areas that are flooded by the reservoir will produce some debris, including floating mats of peat. The EIS estimates that, in the first year of the reservoir, five to six per cent of the flooded peat may rise to the surface and become mobile in the reservoir. Over the next decade, another four to five per cent of the flooded peat may resurface and become mobile. In total, an estimated 10 - 20 per cent of the peat that will be flooded is considered to have the potential to become mobile. Much of the mobile peat will accumulate in backbays, especially on the south side of the reservoir. Some peat and other debris will be able to pass downstream into Stephens Lake, but only when the spillway is in operation.

The reservoir clearing plan is intended to remove standing timber and woody vegetation, both to reduce the potential for the formation of methylmercury as bacteria break down the vegetation (discussed in Chapter Eleven) and to lessen the potential hazards of floating debris. The Waterways Management Program is intended to remove floating debris that might impede navigation. Currently, boat patrols operating through the program travel the length of the Nelson River between Split Lake and Gull Rapids and identify deadheads and other hazards, and gather debris onto shore, where it is burned in the fall after the first snowfall.

9.11 Sensitivity of Project Effects to Climate Change

Physical effects of the Project resulting from changes to the climate were assessed using a range of plus or minus 10 per cent for the flow of water in the Nelson River. Climate change is expected to result in increased precipitation in the Project area, although other parts of the watershed may experience lower precipitation. As well, increased temperature will increase rates of evapotranspiration. Within the range of possible effects, the operating range of the reservoir will remain within the current 158-159 metres and the open water zone of influence will not change. In the event that climate change results in higher flows, the Project will operate more often in the base-loaded mode, in which the reservoir remains constantly at 159 metres, and the spillway will be used more often. In the event that flows in the river are lower, the Project will operate more often in the peaking mode and there will be less spillway use. Climate change is expected to result in a shorter duration of ice cover. Higher flow rates, with more frequent water levels at 159 metres, would be expected to result in higher rates of shoreline recession, but the overall extent of shoreline recession

is not expected to change. More frequent large storms resulting from climate change, may lead to more wave energy on shorelines, which could cause erosion and increase sediment in the water. Overall, however, physical processes are not expected to vary from predicted effects based on climate change. This is, in part, because the Project's greatest effects on the physical environment, through erosion and sedimentation, will be in the early years after the flooding of the reservoir, before the greatest climate change effects are felt. By the time greater effects of climate change have been felt, the reservoir will already have completed most or all of its expansion.

Commission Comment – Physical Environment

The Panel generally considered the Proponent's assessment of physical-environment effects to be thorough and competent. One area of concern, however, was in reference to the modelling of sediment. The Proponent's modelling of sediment may not have been applicable to the range of sediment sizes. As well, the Proponent may have used an inappropriate method to simulate riverbank erosion. During the Information Request (IR) process prior to the hearings, the Proponent appeared to acknowledge the challenges of modelling sediment and argued that their results were conservative. The Commission acknowledges that this kind of modelling is very difficult. While some of the numeric modelling results appeared to be questionable, the estimates of the overall physical change expected as a result of flooding and erosion were in a credible range. The discussion around this issue is well documented in the IRs and the Proponent is urged to consider consulting with other external experts on the sedimentation modelling issue.

The Panel notes that Stephens Lake, created as the reservoir for the Kettle Generating Station, provides a 40-year case study on the effects of reservoir creation in the immediate study area. The Proponent based much of their sediment modelling on this 40-year record. While Stephens Lake can be used effectively as a proxy in many studies, it is worth keeping in mind that Stephens Lake, with a two- to three-metre operating range, represents a greater range of effect than the one-metre range proposed for the Keeyask Project.

Chapter Ten

Aquatic and Terrestrial Environmental Effects

10.1 Overview

The Proponent employed an approach it referred to as a two-track environmental assessment in the Keeyask environmental impact statement (EIS). Information from Aboriginal traditional knowledge (ATK) and local-knowledge-based assessments prepared by the Keeyask Cree Nations (KCNs) was employed along with a technical examination of potential effects of the Project on 18 aquatic and terrestrial valued environmental components (VECs) and a number of supporting topics. Conclusions about effects on the VECs were also based on research and analysis of impacts on a variety of components of the physical environment.

Terrestrial effects were assessed using six study areas, ranging in size from the Project Footprint to a large regional area extending west to Thompson and east to the Long Spruce generating station. Fig. 10.1 shows these study areas, referred to in the following text as Zones 1 through 6. Aquatic effects were assessed for the reach of the Nelson River (including Split Lake and Stephens Lake) from Kelsey Generating Station to Kettle Generating Station, including immediately adjacent waters, such as Assean Lake and portions of the Aiken, Burntwood and Grass Rivers. For water quality, assessment of effects extended downstream to the Nelson River estuary.

10.2 Aquatic Environmental Effects

Five VECs were used to assess aquatic effects of the Project: water quality and four specific fish species (walleye, pike, lake whitefish and lake sturgeon). Other components of the aquatic environment were studied and analyzed as indicators of a healthy aquatic ecosystem capable of supporting populations of the fish VECs. These other components of the aquatic environment were aquatic habitat; algae and aquatic plants; aquatic invertebrates; and mercury, palatability and cysts in fish. It should be noted that mercury was included in the “mercury and human health” VEC in the assessment of socio-economic VECs. Palatability of fish was a factor in the “resource use” VEC, also in the socio-economic assessment.

In October 2012, the Fisheries Management Branch of Manitoba Conservation and Water Stewardship prepared fisheries management objectives for the Project in the event that a licence is issued and Keeyask goes ahead. These objectives were:

- maintaining walleye, pike and lake whitefish populations at levels that support a sustainable harvest, including a subsistence harvest for lake whitefish;

Fig. 10.1 Keyyask Generation Project Regional and Local Study Areas. (Courtesy of KHLP.)



- maintaining self-sustaining stocks of these fish, plus forage and other non-target fish, in a similar ecological function and structure;
- maintaining a viable population of lake sturgeon upstream of the generating station; and
- maintaining conditions that support development of a self-sustaining sturgeon population in Stephens Lake.

Mechanisms endorsed by the Fisheries Management Branch to achieve these objectives included mitigation for habitat degradation or destruction both above and below the generating station, using stocking to enhance the natural reproduction of the sturgeon population, various measures around communication and management of sturgeon stocking, and allocating resources for future fish passage (with the determination of the need for fish passage to be based on an assessment in conjunction with provincial management goals and consultation with provincial fisheries managers). The Fisheries Management Branch also addressed the offsetting programs in the Adverse Effects Agreements (AEAs): “Programs that compensate for lost fishing opportunities in the project area with increased fishing opportunities in other areas are considered a project effect and may require additional management or mitigation measures.” (Manitoba Conservation and Water Stewardship 2012a).

VEC – Water Quality

The Proponent has determined that construction of the Project will cause moderate magnitude effects on water quality near the construction site and downstream into Stephens Lake. One of the main sources of construction-related impact on water quality will be the installation and removal

of cofferdams. During the peak times for this work, total suspended solids (TSS) are expected to increase by a maximum of 15 mg per litre for one day or 8 mg per litre averaged for one month. The Proponent expects that these increases in TSS will average less than 3 mg per litre at Kettle Dam during the period in the year when in-stream construction work is carried on (which will last for one to three months per year, depending on the year). The Manitoba water quality guidelines specify short-term and long-term maximum increases of 25 mg per litre (short-term) and 5 mg per litre (long-term). The increase caused by Keeyask construction would be generally below the maximum allowed under Manitoba water quality guidelines for suspended solids. Other potential effects on water quality would come from the sewage treatment plant for the construction camp (licensed separately and designed to meet or exceed provincial standards) and from site run-off and the dewatering of areas behind cofferdams.

Operation of the Project will cause moderate-to-large impacts on water quality in some areas of the reservoir as a result of flooding of terrestrial habitat, changes in the water and ice regime, and erosion and sediment transport and deposition. The most important factors in effects on water quality are flooding of land and erosion of peat and mineral soils. Decomposition of flooded peat and soil is expected to cause an increase in nutrients and TSS and a decrease in dissolved oxygen in sheltered and shallow bays of the reservoir. These changes are expected to last for 10-15 years following impoundment.

VEC – Walleye

VEC – Lake Whitefish

Walleye and whitefish both use Gull Rapids for spawning, and so they will be affected by the loss of spawning habitat

during construction of the Project. Once the construction of the Project is complete, new walleye and whitefish spawning habitat will be available downstream of the powerhouse and at shoals created within the Keeyask reservoir. In the meantime, though, there will be years in which the year class (the number of fish born in a given year) will be reduced in Stephens Lake because of disruption to spawning areas at Gull Rapids. In the long term, the Proponent expects walleye and whitefish populations to benefit from an increased amount of habitat available in the Keeyask reservoir, with both an increase in the total number of these fish and an increase in their population density.

VEC – Pike

Pike are not expected to be as affected as walleye by construction at Gull Rapids as they do not use the rapids as extensively as walleye do. As pike habitat includes shallow areas with plentiful aquatic plants, they will be affected initially by the loss of aquatic plants that follows the flooding of the reservoir. In time, when new areas of aquatic plants are established in the flooded areas, pike habitat will recover. The Keeyask reservoir will result in increased habitat for pike in the long term. Some shallow bays in the reservoir will periodically experience depletion of dissolved oxygen, putting fish that favour shallow, vegetated habitat (such as pike) at risk. The Proponent expects that fish will be able to escape most of these areas when oxygen depletion becomes a problem. One shallow bay, which will be formed over present-day Little Gull Lake, has the potential to be cut off from the rest of the reservoir in winter due to ice freezing to the bottom. To prevent stranding of fish in this bay, the Proponent plans to dig two channels to allow fish to escape to the main reservoir.

VEC – Lake Sturgeon

Lake sturgeon were selected as a VEC because they are culturally and historically important to Aboriginal peoples and because of their assessment by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Endangered. Sturgeon populations are particularly vulnerable and slow to recover because of the long time the species takes to reach maturity (15-30 years) and the long periods between spawning (three to seven years). While they were once a staple part of the diet for many Aboriginal people, sturgeon were depleted or extirpated in many parts of their range in the 19th and 20th centuries. In Manitoba, the Nelson River populations were among the last to be depleted in the early to mid 1960s, and the last commercial fishery for sturgeon was closed in 1992.

According to the 2012 Manitoba Lake Sturgeon Management Strategy (Manitoba Conservation and Water Stewardship 2012b), the commercial fishery for lake sturgeon in the reach of the Nelson River between the present-day Kettle and Kelsey Generating Stations was depleted by the 1950s. Both the Kelsey and Kettle dams were built at sites that were used by sturgeon for spawning. The environmental evaluations prepared by the KCNs note that Kettle Rapids, the Butnau River, and a number of locations flooded by Stephens Lake were formerly important spawning or habitat sites and that the Split Lake population declined following the completion of Churchill River Diversion (CRD) and Lake Winnipeg Regulation (LWR). After commercial sturgeon fishing was reopened in this reach in 1970, it did not produce a significant catch of sturgeon. Today, lake sturgeon exist in low numbers in the Project area. Estimated populations of mature sturgeon are in the range of 600 each for the upper Split Lake area and the reach

of the Nelson River between Birthday and Gull Rapids. Too few sturgeon were captured during Keeyask studies to allow an estimate for the number of sturgeon in Stephens Lake to be calculated. The Proponent has assessed the population in Gull Lake to be declining, while that in Stephens Lake is likely not viable, based on low and erratic recruitment rates and a small proportion of older, mature fish. Split Lake, however, may have an increasing population of lake sturgeon and a greater likelihood of a sustainable population. The Proponent's technical documentation notes that the Clark Lake to Stephens Lake area currently contains habitat required for all life stages of lake sturgeon. In 2010, the federal Department of Fisheries and Oceans (DFO), in an assessment of recovery potential, gave the existing sturgeon population in this reach of the Nelson River a status rating of "cautious," a trend rating of "unknown" and a recovery rating of "moderate."

The Proponent predicts that effects on lake sturgeon will be caused by the loss of spawning habitat at Gull Rapids, the potential loss of spawning habitat at Birthday Rapids and the potential loss of existing young of the year (YOY) habitat in Gull Lake. To mitigate for the loss of spawning at Gull Rapids, the Proponent plans to construct artificial spawning reefs in the fast water below the dam, a mitigation measure that has been done elsewhere with success. To mitigate for possible loss of spawning at Birthday Rapids (which will remain relatively fast but will be partially flooded by the impoundment of the reservoir), the Proponent may need to create modifications in the shoreline upstream at Long Rapids. Mitigating for loss of the YOY habitat will require construction of new YOY habitat within the reservoir in areas with the appropriate depth and current. It is believed that larval sturgeon drift downstream from the rapids where spawning occurred until they reach specific sandy-bottom habitat

areas where they develop as YOY sturgeon. One of these YOY habitat areas, used by sturgeon spawned in Birthday Rapids, will no longer have the right characteristics following impoundment (it will be in deeper, slower-moving water). The Proponent has identified an area where it believes favourable flow characteristics will exist to create new YOY habitat by depositing sand on the reservoir bottom. YOY habitat in Stephens Lake is not expected to be affected by the Project, because depths and velocities in Stephens Lake will not be altered.

The dam itself will be a barrier to passage of sturgeon up and downstream (though there will be some downstream passage through the turbines and spillway). The Proponent committed, in its EIS, to provide upstream fish passage through a "trap and transport" system beginning with the in-service date of the Project. This commitment was made along with a commitment to evaluate alternatives including a fish ladder, "nature-like" bypass channel and a fish lock/lift. The Proponent's preliminary evaluation of these alternatives indicated that "trap and transport" would likely be the preferred method. Following the submission of the EIS, a series of meetings between the Proponent, DFO and Manitoba Conservation and Water Stewardship Fisheries Management Branch led to a modification in the approach to fish passage. As a result of these meetings, instead of commencing trap-and-transport at the in-service date of the Project, research will be carried out to determine the need for fish passage and the best method for carrying it out. DFO, in conjunction with the Fisheries Management Branch, will determine the need for fish passage, based on the results of monitoring and established fisheries management objectives. If it is determined that the fisheries management objectives can be met without installation of fish passage facilities, such facilities will not be required.

The generating station will provide for downstream fish passage by allowing fish to pass through the turbines. The trash racks (screens that prevent debris from passing through the turbines) have been modified to reduce the risk of sturgeon being stuck on them (referred to as impingement) and the Proponent states that the design of the turbines themselves allows for 90 per cent of fish 500 mm and shorter to survive passage through the turbines. The large diameter of the turbines to be used at Keeyask and a relatively slower rotation speed compared to other Manitoba hydroelectric stations are expected to allow for safer passage for fish compared to other dams. However, larger fish, which would include juvenile and adult sturgeon, would have a lower survival rate than smaller fish. The Proponent plans to monitor the survival rate of sturgeon passing through the turbine.

A major part of the mitigation to address the effects of the Project will be a sturgeon stocking program. Using local sturgeon stock to be raised at the Grand Rapids hatchery, which Manitoba Hydro now owns and operates, the Proponent plans to release a range of ages (larvae, fingerlings and yearlings) in the area in order to support the population in Gull Lake, re-establish the population in Stephens Lake and support the recovery of sturgeon populations in Split Lake. The Partnership has committed to continuing with the stocking of sturgeon for as long as it takes to establish self-sustaining populations in Split Lake and the Keeyask reservoir, essentially in perpetuity, if that is necessary. The Proponent provided results from other stocking programs, including those on the Winnipeg River, showing that sturgeon populations can recover through stocking in the absence of harvesting pressure. Assuming the success of stocking and habitat creation measures, the Proponent predicts that, in the long run, there will be more sturgeon in the Project area.

What we Heard – Aquatic Effects

The Panel heard concerns from several expert witnesses, called by Participant groups, who were concerned about the challenges facing the Proponent's plans for mitigation of the Project's effects on sturgeon. A common theme in these concerns was that the Proponent had been excessively optimistic in its assessment of the success of lake sturgeon mitigation measures.

One expert witness testified that survival rates of sturgeon in hatcheries vary greatly and high survival rates are unlikely for fingerling sturgeon stocked into the river in the fall. As a result, the Proponent's goal of 20-40 per cent survival for fall-stocked fingerlings was described as overly optimistic. Such survival rates may be found in stocking programs in warmer, more productive, rivers in the United States. There is little published data on survival rates in northern rivers, but this expert said recent research on the Winnipeg River suggests that there may be little food available for fall-stocked fingerlings and very low survival rates. These same studies suggest that yearling sturgeon stocked in the spring were able to survive and grow. As a result, the witness recommended that only the very largest fingerlings be stocked in the fall, and the majority be kept in the hatchery over the winter and stocked in the spring.

The witness was also concerned about the challenges of creating new YOY sturgeon habitat, which is an important part of the Proponent's mitigation plan for sturgeon. Three key areas of difficulty were identified: technical, engineering challenges related to ensuring that the sand that is deposited to create the YOY habitat is not washed away by the flow of the river; the possibility that the appropriate species of invertebrates will not colonize the newly created habitat to provide food for YOY sturgeon; and the possibility

that YOY sturgeon will not find and use the new habitat. Creation of YOY habitat has never been attempted before, although spawning habitat, which the Proponent plans to create in the tailrace below the generating station, has been successfully created in other locations, the witness said.

Other comments in this witness's testimony concerned methods of monitoring sturgeon mitigation. It was recommended that all stocked sturgeon be marked uniquely with Passive Integrated Transponder (PIT) tags. These tags would allow stocked sturgeon to be differentiated from existing and naturally produced sturgeon and different year classes of stocked sturgeon to be distinguished from one another. These tags would also offer more precise evidence to indicate if stocked sturgeon were either passing through the powerhouse (entrainment) or being stuck on the trash racks protecting the turbines (impingement).

The witness said the Proponent's approach to entrainment and impingement appears to be to facilitate the passage of fish through the powerhouse, with a turbine design that is expected to reduce the risk of fish being harmed during passage. Better protection for larger sturgeon might be provided by a design of the trash racks that allowed fish to avoid impingement or some kind of sensory barrier such as lights or bubbles to keep them away.

The Panel heard another expert witness who spoke about the importance of fish passage. This witness described sturgeon moving up or down a river as a kind of biological bet-hedging strategy, in which large males travel up or down rapids to disperse their genes in a number of different areas. Accordingly, then, this witness argued that fish passage along the Nelson River is important to efforts to facilitate the recovery of sturgeon populations. The Participant group for whom this witness spoke,

Kaweechiwasihk Kay-Tay-A-Ti-Suk (KK), called for fish passage to be installed as part of the Keeyask Generation Project and for flows through the powerhouse and spillway to be managed in a way that supports spawning, juvenile rearing and other habitat needs for sturgeon. The group also made a series of recommendations regarding retrofits for the Kelsey Generating Station, including building fish passage, a structure to deflect flows from the powerhouse and a spawning site, and managing flows through the powerhouse and spillway to support sturgeon. They also called for a hydrological study of the Nelson River that could assess impacts on sturgeon up and down the river.

More than one expert witness discussed the planned peaking mode of operation of the Keeyask Generating Station and implications for sturgeon mitigation measures. One witness cautioned that fluctuating river levels as a result of peaking operations at generating stations may make it more difficult for sturgeon to thrive in a reservoir. In places along the Winnipeg River where sturgeon populations are relatively healthy despite dams, the generating stations are operated in a run-of-the-river way, with less fluctuation of water levels. This is in accordance with testimony from one of the elders of the KK group, who said that the sensitivity of sturgeon to change in the environment has long been known. This elder said that sturgeon will leave an area if their habitat is polluted or changed.

These concerns were supported by those who also argued that the success of fish habitat enhancement is uncertain. Conditions in other rivers and reservoirs, where stocking has been successful, are different from those at the proposed Keeyask reservoir. One difference, in comparison to Lake Winnebago, Wisconsin, where stocking has been successful, is that in the Wisconsin case

water levels fluctuate in a much more natural, seasonal, way. Keeyask, on the other hand, could have daily fluctuations of up to one metre because of the peaking operation of the generating station.

Commission Comment – Aquatic Effects

Walleye, northern pike and lake whitefish all adapt well to lake habitat and have all proven to be generally resilient with respect to the effects of hydroelectric development. Spawning habitat for walleye is usually easily created on the downstream side of generating stations and both walleye and lake whitefish also spawn on shoals or suitable shorelines in lakes and reservoirs. Accordingly, then, the Project is unlikely to have any adverse effect on these three aquatic VECs.

Greater concerns exist regarding the effects of lake sturgeon. The deterioration in lake sturgeon stocks is well described in the EIS and supporting documents, primarily as a result of commercial overharvesting from the 1940s to '70s, with the development of hydroelectric generating stations as an important contributing factor. Even without the development of Keeyask, the status of lake sturgeon in the Kelsey to Kettle reach of the Nelson River has been given a “cautious” rating, “unknown” trend rating and “moderate” recovery potential. Acknowledging this challenging position, the Fisheries Management Branch set post-Keeyask objectives of developing a viable population of lake sturgeon upstream of Keeyask and having conditions to support a viable and self-sustaining population in Stephens Lake.

The Proponent has made stocking the cornerstone of the sturgeon mitigation plan and expressed “moderate to high” certainty that mitigation measures will lead to an increase in regional sturgeon numbers.

The Panel, however, does not believe that such certainty is warranted. Several expert witnesses and advisors have indicated that there are major challenges and uncertainties associated with the development of a self-sustaining population of sturgeon upstream of the Keeyask Generating Station. Key aspects of the sturgeon mitigation plans that leave room for uncertainty are: the ability of the Proponent to acquire gametes, particularly eggs, from the existing populations; the success rate of efforts to rear young sturgeon to the appropriate size for stocking; and the ability to construct ecologically viable habitat that young-of-the-year sturgeon will use.

Regarding the challenge of acquiring gametes, it should be noted that there has been very limited success in capturing ripe female lake sturgeon in the study area (one fish was captured in the Burntwood River in 2013). At the present time, the spawning locations for the Stephens Lake and Gull Lake populations are not known for certain. Given the changes to Birthday Rapids as a result of the Project, it is possible, or even probable, that the areas now used for spawning by the Gull Lake population will no longer be suitable. As a result, locating ripe females will prove to be even more difficult. Even though spawning has been confirmed for at least one location for the Split Lake population, the difficulty of capturing ripe females suggests that acquiring gametes for the stocking program – given that it has been stated that it is desirable to obtain gametes from the local population – will be a great challenge.

Should gametes be obtained for the stocking program, there are also disagreements about the likelihood of successfully rearing lake sturgeon and the age at which reared fish should be stocked. While rearing has its challenges, these challenges are probably not insurmountable. There are numerous examples of lake sturgeon being raised successfully,

though not every year in every facility. In order to ensure that best practices are followed, the Proponent will need to consult broadly with technical experts and holders of Aboriginal traditional knowledge of sturgeon to ensure the success of the hatchery program.

As for the creation of ecologically viable young-of-the-year lake sturgeon habitat, all parties agree that this will be experimental and uncertain. The Proponent has stated that the likelihood of success of this habitat creation is low to moderate, while one expert witness for a Participant group characterized it as low to very low. This habitat, however, will be essential to ensure a self-sustaining population in this reach of the Nelson River. It has been suggested by one Participant that given the uncertainty of this habitat's success, the Proponent should develop plans for alternative approaches. It is not clear what alternative approaches might exist to provide the habitats necessary for a self-sustaining population. It is conceivable, especially given the current low numbers and the fact that Stephens Lake is also thought not to have a self-sustaining population, that neither the Keeyask reservoir nor Stephens Lake will have self-sustaining populations after the spawning and YOY habitat have been provided. During the hearing, the Proponent committed to continuing its stocking program until a self-sustaining population can be established, but, if habitat-creation measures are not successful, that might require stocking to continue indefinitely.

Upstream from Long Rapids there is no change in habitat expected as a result of Keeyask. Stocking of lake sturgeon in Split Lake is intended to help to increase numbers in that reach of the Nelson River, where it is thought that the habitat can currently support a larger number of sturgeon, in order to develop a self-sustaining population. It is possible that a self-sustaining population in Split Lake might already be developing.

Because of the unique nature of the lake sturgeon life history – including their late maturity and the fact that mature fish do not spawn every year – it will take many years of monitoring to determine if the Proponent's mitigation measures have succeeded. It will likely take at least 25 years to determine whether stocking has been successful and perhaps 50 years to determine if the population is sustainable. As a result, though the Panel acknowledges the very substantial effort that has gone into research and development of mitigation plans, it remains cautious about the expected success of these plans. To evaluate the success of the stocking program and assess the relative contributions of stocking and natural reproduction, the recommendation to mark each stocked sturgeon with a unique, recognizable tag is a sound one. Overall, the Panel believes that monitoring of the effects of the Project on sturgeon will be essential. To facilitate adaptive management of the Project, it will be necessary to be able to distinguish stocked sturgeon from naturally reproduced sturgeon, and for stocked sturgeon that are subsequently captured, to determine when and where they were stocked. Therefore, all stocked sturgeon should be marked in a manner that allows these life history parameters to be determined, and the mark should be detectable over the lifetime of the fish. The use of PIT tags, so that individuals can be identified, appears to have significant advantages, but does limit the size of fish that can be released. Technologies that may be available in the future may eliminate this constraint.

The need for fish passage at the Project site is also an area of uncertainty. The dam and generating station will be a complete barrier to upstream fish movement. Because studies have indicated that existing upstream fish passage through Gull Rapids is low, the Proponent has indicated that providing for upstream movement past the Project

is not necessary. However, the Proponent has agreed to provide upstream passage via an experimental catch-and-transport program should it be needed to accord with requirements of the DFO. There is no guarantee that such a program will be successful. Downstream passage will be provided via the spillway, when it is in operation, and through the turbines. The Proponent has said it expects that no other downstream passage alternatives will be needed, but has indicated that should passage through the turbines be less successful than predicted (should the turbines cause unacceptably high injury or mortality rates) other downstream methods will be pursued. It should be noted that effective upstream passage for sturgeon has proven to be challenging at other facilities where it has been attempted.

Licensing Recommendations

The Commission recommends that:

- 10.1 *Keeyask Hydropower Limited Partnership stock lake sturgeon for at least 50 years in order to allow for enough time to determine whether a self-sustaining population can be re-established.*
- 10.2 *Keeyask Hydropower Limited Partnership employ PIT tags, or future best technology, to uniquely identify individual sturgeon and to distinguish natural from stocked individuals. Use this information to evaluate the success of the recovery program.*
- 10.3 *Keeyask Hydropower Limited Partnership consult widely with other facilities to collect and evaluate the most successful techniques in fish culture for rearing and releasing lake sturgeon and apply them to the fish culture and recovery program.*

10.3 Terrestrial Environmental Effects

Construction and operation of the Project will have an impact on the terrestrial environment through activities such as vegetation clearing, soil excavation, flooding, traffic and noise. The Proponent selected 13 terrestrial VECs and nine supporting topics to indicate the impacts of the Project on terrestrial ecosystems. Supporting topics are subjects that were studied and analyzed in the EIS in order to shed light on the effects on VECs, or that provided additional knowledge about other organisms in the Project area that were not considered VECs.

For each VEC, effects were assessed within the Project Footprint, the Local Study Area and the Regional Study Area. (See Fig. 10.1.) The Project Footprint is the area immediately affected by flooding, clearing and building of the Project. The Local Study Area includes areas around the Project Footprint where less direct effects, such as noise, disturbance, increased access or alteration of vegetation may occur. The Regional Study Area was a larger area that was chosen to provide a regional context for effects, indicate the area needed for a self-sustaining population of a given VEC species, and allow for overlap with effects of other projects. While the Project Footprint was the same for all VECs, the size of Local Study Areas and Regional Study Areas varied depending on the VEC being studied. For example, caribou had the largest Regional Study Area because they are a very far-ranging species. In all, the EIS made use of six nested Project Study Areas for the Terrestrial Environment, with the largest extending from just west of Thompson to the Long Spruce generating station and substantially north and south of the Project site.

10.3.1 Terrestrial Ecosystems, Habitat and Plants

Four VECs were selected to assess the impact of the Project on terrestrial ecosystems, habitat and plants: Ecosystem Diversity, Intactness, Wetland Function and Priority Plants. In addition to these VECs, supporting topics in this area were Fire Regime, Terrestrial Habitat, Soil Quantity and Quality, and Invasive Plants.

VEC – Ecosystem Diversity

Ecosystem diversity was assessed by examining habitat types within the Local and Regional Study Areas (Zones 2 and 5, respectively). A total of 53 habitat types – based on dominant vegetation cover and soil type – were identified in the Regional Study Area, with three of these types accounting for approximately 65 per cent of the area. The Proponent developed a list of 43 priority habitat types, representing the less common combinations of dominant vegetation cover and soil type. They then assessed the number of patches of these priority habitat types and the average size of these habitat patches. Of these, the type that will be most affected is white birch mixed woods, with 7.7 per cent of this type of habitat affected.

Reservoir clearing and development of borrow areas will have the largest impacts on priority habitats. Effects of increased access – including greater incidence of fire and road dust from increased traffic – could also have an effect on priority habitat types. Mitigation measures to reduce these impacts include avoiding one area of a potential borrow pit, which is currently a white birch habitat; developing a rehabilitation plan that seeks to rehabilitate priority areas in a natural way; and blocking and revegetating project-related trails and cutlines, except for those that are existing resource-use trails. Other mitigation

measures are planned to prevent the spread of invasive plants into priority habitats. During the operation phase of the Project, additional erosion of the reservoir will have a slight impact on the percentage of some priority habitats affected.

VEC – Intactness

Intactness is the degree to which an ecosystem remains unaltered by human features that remove habitat and increase fragmentation. Fragmentation isolates areas of habitat from one another and increases edge effects. Edge effects can refer to conditions that make some animals avoid what might otherwise be high-quality habitat because of noise or other disturbance or the danger of predation. Greater fragmentation reduces the number or size of core areas, a term the Proponent uses to refer to interior areas of a block of habitat that are far enough from the edges to avoid edge effects. A common measure of fragmentation is road density, indicated as kilometres of road per square kilometre. Linear-feature density includes trails, cutlines and transmission lines as well as roads.

The existing density of linear features in the Regional Study Area is 0.45 km per km², which the Proponent characterizes as at the low end of the moderate magnitude scale for effects (the Proponent's benchmarks for the magnitude of effects were: small magnitude for density lower than 0.4 km per km², moderate for densities between 0.4 and 0.6 km per km², and high for densities greater than 0.6 km per km²). This result is influenced by a higher density of linear features in the Thompson area, so that the Regional Study Area to the east of Thompson would have a lower density than the average for the entire Regional Study Area. Construction of the Keeyask Project will lead to a very slight reduction in linear feature density, as

a number of cutlines that were created in the Project area during the study period will be flooded by the reservoir. Most roads used during construction will either be already existing or built over existing cutlines. There will be some temporary access roads built to connect to borrow areas or excavated material placement areas (EMPAs).

Core area abundance is another indicator of intactness. In assessing the impact of the Project on core area abundance, the Proponent considered core areas that were at least 350 metres wide at their narrowest point and at least 200 hectares in size. The Proponent also assessed the number of core areas 1,000 hectares or larger. Measurements of core areas show that the Regional Study Area currently contains 111 core areas larger than 200 hectares and these core areas account for 84 per cent of the total area. Construction of the Project and flooding of the reservoir will eliminate three core areas, one slightly over 1,000 hectares and the others between 200 and 1,000 hectares. Several larger core areas will be diminished in size because of construction. Overall, core areas 200 hectares or larger will account for 82 per cent of the Regional Study Area after the Project. The benchmarks for the percentage of the regional area within core areas of at least 200 hectares were: 65-100 per cent for small magnitude, 40-65 per cent for moderate magnitude, and less than 40 per cent for high magnitude. The Proponent states that, with 82 per cent of the Regional Study Area accounted for by 200-hectare-plus core areas, the impact on the VEC Intactness is small. The immediate area of the Project, however, will experience a reduction in the size of several core areas, including Caribou Island, the largest core area on an island in this reach of the Nelson River.

Mitigation for Intactness includes rehabilitating the most affected priority

habitat types and blocking and revegetating project-related trails and cutlines, except for those that use pre-existing resource-use trails.

VEC – Wetland Function

Wetland function refers to the natural properties or processes that wetlands provide, including converting sunlight into biomass, storing carbon, creating soil, storing and purifying groundwater, protecting shorelines, contributing to biodiversity and providing habitat for certain plant and animal species. Wetlands make up approximately 90 per cent of the Keeyask Regional Study Area, with most of that (91 per cent) being various kinds of bog, eight per cent being various kinds of fen, and marsh accounting for one per cent. Bogs are wetlands that are dominated by sphagnum mosses that are typically nutrient-poor and acidic. Fens are peatlands that receive nutrients from ground or surface water, are not acidic and are characterized by mosses and sedges. Marshes are wetlands that are periodically inundated and characterized by grasses, sedges, cattails and rushes.

The Proponent assessed wetlands throughout the Regional Study Area for the quality of wetland function, which includes their species diversity and the range of habitats the wetlands contain. Generally, the EIS states that the wetlands along the Nelson River are mostly low quality, as a result of the effects of past hydroelectric development, including CRD and LWR. Fluctuations in water level, ice scouring, erosion and the seasonal reversal of flow patterns have degraded the quality of the shoreline wetlands along the river, and in fact, the EIS characterizes the Nelson River wetlands in the Project area as non-native habitat.

In the supporting technical documentation to the EIS, it is stated that construction is expected to remove or alter

nearly 6,200 hectares of wetland, or 0.6 per cent of the wetland area in the Regional Study Area. An additional 1,600 hectares could be indirectly affected, bringing total affected wetland in the Regional Study Area to 0.7 per cent of the total. In the EIS, it is noted that the majority of the most-affected wetland (76 per cent) is currently scored as low-quality. During the first 30 years of the operation of the Project, shoreline erosion is expected to increase the amount of affected wetland to nearly 8,300 hectares. In time, new shoreline wetlands are predicted to develop along the reservoir shoreline.

Off-system marshes – wetlands that are not directly connected to the Nelson River – are treated in the EIS as high-priority wetlands. The Project will affect approximately 12 hectares of these marshes at various locations north and south of the river. To mitigate for the loss of these off-system marshes, the Proponent will develop 12 hectares of new off-system marsh. To prevent damage to other off-system marshes, the Proponent has avoided some high-quality wetlands in planning the location of the South Access Road, borrow pits and excavated material placement areas. The Proponent also intends to implement measures to protect against erosion, siltation and changes to water flow in construction areas within 50 metres of off-system marshes.

In combination with past developments in the area, the amount of affected wetland in the Regional Study Area will vary from 1.7 to 6.5 per cent of the historical area, depending on the specific type (with some wetland types not affected). The Proponent rated this as a moderate effect, as the residual effect of Keeyask and past developments remains below a benchmark of 10 per cent of total historical area for each wetland type.

VEC – Priority Plants

A list of 101 priority plants includes plant species that are provincially vary rare, rare to uncommon, regionally rare or at the northern limit of their range, or of particular importance to members of the Keeyask Cree Nations (KCNs). Many of the rarest species on the priority plants list were not found in the Regional Study Area during field studies. Priority plants of particular importance to the KCNs were sweet flag (known in Cree as *wekes*, *wekas* or *wihkis*), white birch, strawberry, northern Labrador tea, currant, gooseberry, cloudberry, red raspberry, dewberry, blueberry, and cranberry. With the exception of sweet flag and Labrador tea, they were found to be common in the Regional Study Area.

Four species rated as being provincially rare (small pondweed, oblong-leaved sundew, rock willow, and shrubby willow) were found within the Project Footprint. The Project is expected to affect 0.5 to three per cent of the locations of these four plants in the Regional Study Area. As part of the mitigation for priority plants, surveys for rare plants will be held prior to construction. If any are found, and there are not at least 20 healthy patches of these plants in unaffected areas, the newly discovered location will be avoided, if possible. If the plants cannot be avoided, they will be transplanted to an unaffected location. Other mitigation measures include closing and revegetating cutlines and trails following use in order to minimize new access.

As part of the assessment of priority plants, the Proponent examined invasive plants as a supporting topic. Field studies detected 19 invasive plants in the Regional Study Area, one of which (reed-canary grass) is classified as highly invasive. Reed-canary grass was found at 27 locations in the Regional Study Area, primarily along the Nelson River shoreline. Moderately invasive

species were found in 39 locations, primarily along roadways. Borrow pits and areas along PR 280 were found to be the main locations for invasive plants. Field studies conducted near existing developments in the area indicated that invasive plants were present, but not spreading into adjacent native habitat.

Measures to prevent the spread of invasive plants include ensuring that contractors wash equipment before use if it was brought from a distance of greater than 150 km away, ensuring that no invasive plant seeds are in any seed mixture used in rehabilitation, blocking and revegetating project-related cutlines and trails after construction in order to minimize new access, and implementing containment, eradication and control programs, if monitoring indicates invasive plants along shorelines or near project infrastructure.

What we Heard – Terrestrial Ecosystems, Habitat and Plants

One expert witness noted that, in the EIS, the Proponent acknowledges that riparian wetlands along the Nelson River have already been degraded by erosion and high water levels caused by LWR, CRD, other hydroelectric developments and the unseasonal flow of the river. This witness voiced the concern that, by creating a reservoir along this reach of the Nelson River, the Project will preclude any efforts to mitigate the impacts of past changes to riparian wetlands. Essentially, the expert noted, referring to the existing Nelson River wetlands as non-native and low-quality effectively “writes off” these habitats and any wetland function they currently provide or could provide in the future.

An expert witness for the Concerned Fox Lake Grassroots Citizens (CFLGC) cited interviews with group members that emphasized that many plants used by First

Nations people in the area are becoming harder to find. Because some of these plants, such as sweet flag, are scarce, they rarely show up in the transects used by technical science in vegetation sampling. This fact, the witness said, reflects the need to adopt a different sampling technique and work with elders to map these relatively rare plant populations.

Commission Comment – Terrestrial Ecosystems, Habitat and Plants

The Panel notes that the existing Nelson River wetlands are described in the EIS as “non-native,” since they are “already highly disrupted by water-level regulation.” The Panel considers that this characterization does not reflect their significance, given that wetland function is a VEC and the Nelson River marshes currently provide habitat for other ecologically and culturally significant VECs, such as staging and nesting waterfowl, beaver and other furbearers, and fish. The Proponent states that these wetlands “will likely be replaced by reservoir wetlands during operation.” Although wetland abundance and quality may improve over the long term due to a more stable hydrological regime in the future reservoir, the current value of these wetlands may not be sufficiently reflected in the EIS. Furthermore, it may take 30 years for new wetlands to establish themselves, based on observations from Stephens Lake.

The Panel acknowledges that the Proponent plans to create 12 hectares of engineered wetland as mitigation for loss of high-quality off-system marshes, but whether or not the engineered wetlands will be successful has a fair degree of uncertainty.

Overall, however, the quality of the research in this area was generally thorough and credible and surveys and analyses of vegetation were particularly well done. Changes to wetlands in Gull Lake and along the Nelson River will be caused by the Project,

but the one-metre operating range of the reservoir will minimize the significance of these changes and is therefore an important feature in minimizing the impacts of the Project.

10.3.2 Birds

Selection of bird VECs was based on importance to the KCNs and at-risk status. Three migratory birds were selected on the basis of their being of spiritual importance or a food source for Aboriginal people: Canada goose, mallard and bald eagle. Three birds with at-risk status were also selected on the basis that they have breeding habitat that will be affected by the Project: olive-sided flycatcher, common nighthawk, and rusty blackbird. Five other at-risk birds were assessed as priority birds but weren't included as VECs, on the grounds that they are unlikely to be affected by the Project. Gulls and terns were also the subject of study in the EIS because they will lose breeding habitat at Gull Rapids as a result of the Project. They were not selected as a VEC, but they are included in mitigation plans for the Project.

During the hearing, it was stated that the Partnership established a benchmark of 20 per cent habitat loss for mallard, Canada goose, bald eagle and most other non-VEC birds. For birds at risk, the benchmark was set at 10 per cent habitat loss. These thresholds are described slightly differently in the technical supporting documentation to the EIS. Those levels of habitat loss would correspond to the line between moderate and high impacts.

With the exception of the Canada goose and bald eagle, the assessment of effects on birds was based on the use of Zone 4 (see Fig. 10.1) as the Regional Study Area. The larger Zone 5 was used as the Regional Study Area for Canada goose and bald eagle.

Clearing of the reservoir will result in the displacement or loss of an estimated 45,000 pairs of songbirds as a result of nest loss or "incidental take" during forest clearing. The EIS states that, where practicable, this clearing will occur outside of the key breeding season in order to minimize the effect on these birds.

VEC – Canada Goose

Canada goose will be affected by loss of staging habitat during the spring and fall migration, but will lose little quality breeding habitat, as breeding habitat is mostly found outside the Local Study Area. The flooding of the reservoir will inundate shallow bays and creek mouths along the river and Gull Lake that in some years provide optimal staging habitat. Use of the reservoir during spring migration will not be expected, as reservoirs along the Nelson typically remain frozen longer than other water bodies in the area. Until new shoreline vegetation establishes itself in the reservoir, geese will likely use other stopover locations outside the Local Study Area.

VEC – Mallard

Land clearing and site preparation for the Project will result in the loss of nearly 3,000 hectares of mallard upland nesting cover, representing 4.5 per cent of the available habitat in the Regional Study Area. Sensory disturbance and noise during construction may also temporarily reduce the available habitat for nesting. Mitigation measures to reduce impacts on mallards include retaining a 100-metre buffer around lakes, wetlands and creeks; carrying out clearing outside of the sensitive breeding period in spring and early summer; and establishing mallard nesting platforms.

VEC – Bald Eagle

Bald eagles nest along the Nelson River. This is the area where they are most common within the Regional Study Area. As a result, it is expected that reservoir clearing will involve the removal of up to five bald eagle nests. The nearest identified bald eagle nest is 12 km from the generating station construction site, so construction disturbance is not expected to have a major impact. Bald eagles, which feed on fish, often use rapids or other fast flowing waters as a feeding site. The loss of whitewater at Birthday Rapids will therefore likely affect bald eagles. At other dams, bald eagles have made use of the fast flowing water in the tailrace, so it is possible that eagles will congregate downstream of the generating station after construction. Following inundation of the reservoir, the release of mercury in the soil and vegetation into the water will lead to bioaccumulation of mercury in predators. As fish-eating birds, eagles will bioaccumulate mercury, although the effects of mercury in the reservoir may be limited for them since they are migratory and only in the area during the open-water season.

Proposed mitigation measures for bald eagle include conducting clearing outside of the sensitive breeding period (April 1 to July 31), replacing any eagle nests that are destroyed through reservoir clearing with artificial nesting platforms along the new reservoir shoreline, erecting nesting platforms to replace eagle nests in trees at risk due to shoreline erosion, and removing roadkill along access roads into order to reduce the risk of eagles being hit by vehicles.

VEC – Common Nighthawk

The common nighthawk – listed as Threatened under the federal *Species at Risk Act* – prefers dry mineral sites with bare ground, such as rock outcrops and

gravel areas, for nesting. Clearing of land for dykes, borrow sites, roads and trails will result in a loss of 925 hectares, and clearing of the reservoir and additional shoreline erosion will ultimately lead to a loss of approximately 1,925 hectares of breeding habitat. This amounts to a loss of 10 per cent of the common nighthawk breeding habitat in the Regional Study Area for this VEC (Zone 4). Proposed mitigation measures will include creation of new nesting habitat in decommissioned borrow areas.

VEC – Olive-Sided Flycatcher

The olive-sided flycatcher – listed as Threatened under the federal *Species at Risk Act* – nests in mature spruce trees along forest edges near water and makes use of edges created by wildfire, wetlands and beaver dams. They also perch in standing dead trees in open areas. Construction and operation of the Project are expected to result in the loss of up to 470 hectares of breeding habitat, roughly five per cent of the total in the Regional Study Area. Including secondary habitat, the worst-case scenario is for a loss of nine per cent of breeding habitat in the Regional Study Area.

Proposed mitigation measures will include carrying out clearing outside the sensitive breeding period and creating perching structures in open, decommissioned borrow areas that may serve as suitable foraging habitat.

VEC – Rusty Blackbird

The rusty blackbird – listed as Of Special Concern under the federal *Species at Risk Act* – breeds in shrubs and conifers along the edges of wetlands and feeds on aquatic insects from shallow pools of water and creeks. Construction and reservoir clearing will result in the loss of approximately 920 hectares of breeding habitat, representing about six

per cent of habitat in the Regional Study Area. Proposed mitigation measures include clearing outside the sensitive breeding season, maintaining 100-metre buffers where possible around lakes, wetlands and creeks, and the development of 12 hectares of off-system marsh, which may also provide new habitat for the rusty blackbird.

Priority Birds – Gulls and Terns

Gulls and terns nest on rocky reefs at Gull Rapids and upstream. Many of these sites will be lost as a result of construction and flooding, which will eliminate 2.7 hectares of potential breeding habitat. It is estimated that 800-1,500 breeding pairs of gulls and 30-100 breeding pairs of terns will be displaced from Gull Rapids and seek alternative breeding sites elsewhere. Other breeding and foraging habitat for gulls and terns will be affected at Birthday Rapids and in places along Gull Lake and the Nelson River between Gull and Birthday Rapids. The KCNs report that eggs from the Gull Rapids nesting birds have been a traditional food source. The Proponent has committed to providing alternative nesting habitat for these birds and has been considering using floating artificial nesting sites, creating artificial islands and using rip-rap to enhance existing islands. All of these measures are described in the EIS as having been successful elsewhere in Canada and the U.S.

What we Heard – Birds

A witness for Manitoba Wildlands raised questions about the habitat model used for the olive-sided flycatcher and the credibility of the conclusions based on the data, citing the relatively large percentage of the sightings of flycatchers that were made in areas not rated as primary or secondary habitat. To gain a better understanding of the value of habitat, nest studies would be needed, he said.

Commission Comment – Birds

Regarding the effects of the Project on birds, the Panel considers that further monitoring will be required to fill gaps in information, in part resulting from problems in habitat modelling. The Panel also has some concerns regarding habitat loss and mitigation.

The Proponent has stated that Keeyask, in combination with future projects, is not expected to affect sustainability of regional goose populations, in part because geese breed farther north and so their breeding habitat will not be affected. Use of the reservoir by geese is expected to be minimal, but will increase as aquatic plants re-establish. It is uncertain whether waterbirds will continue to use the Project area for staging in the fall or seek more optimal staging areas outside the Regional Study Area. Based on the evidence presented, however, the conclusion that the Project is not expected to affect sustainability of goose populations appears supported. Follow-up monitoring will be needed to understand how waterbirds respond to changes in bird habitat in the newly created Keeyask reservoir.

Although not clearly quantified in the EIS, it appears at least five of the six bald eagle nests between Split Lake and Gull Rapids in the Local Study Area (Zone 3) will be lost during construction due to the flooding of the reservoir. The proposed mitigation, building artificial nest platforms, has been used successfully in other jurisdictions, so it may work in the Keeyask area. It is unclear what effect, if any, there would be on local and regional bald eagle populations if the artificial structures are not used (that is, if mitigation is unsuccessful), although feeding opportunities below the generating station are predicted to compensate for loss of foraging habitat due to reservoir creation. Monitoring will be required to verify this prediction.

Monitoring the productivity of eagle nests should be conducted annually to verify the prediction that foraging opportunities below the generating station will compensate for loss of foraging upstream. Monitoring data, such as nest productivity, from before and after construction, would then be capable of being compared in order to assess the impact on the local and regional bald eagle population.

The Panel's concerns regarding the three songbirds are largely focused on habitat modelling.

Limited evidence has been provided in the EIS to link habitat effects with population-level impacts for the common nighthawk. One of the challenges is that what is identified as nesting habitat in the EIS, perhaps should be classified as *potential* nesting habitat, as it is not clear that all these areas are actually used by nighthawks. It is unlikely that nesting habitat is a limiting factor in the Regional Study Area, given that the species is declining due to other factors (loss of wintering habitat). Therefore, impacts to habitat in the Keeyask area may be of lower magnitude than the model suggests. Suitability of open habitats in the Project area in the short and long-term is unclear, because disturbance (noise, traffic) may be too great during construction for newly cleared areas to be used by common nighthawk. Despite some of these limitations in the evidence presented, the Panel is of the opinion that Project is not likely to have a significant residual impact on common nighthawk.

There are a number of issues of concern related to habitat modelling and evidence for the olive-sided flycatcher:

- The available habitat model has low predictive power and lacks statistical rigour, in that it does not capture all the habitat attributes that flycatchers select for.

- The habitat model is not linked to population density, so it is unknown how many flycatchers are affected by the Project.
- No evidence was presented on what happens to affected flycatchers in terms of mortality or reproductive success.
- No evidence was presented on how much variation over time there is naturally in the study area in the number of flycatchers or their habitat.

Evidence is limited regarding the certainty of the assessment of the significance of Project effects. However, despite these weaknesses, there appears to be a relative abundance of suitable habitat in the area that is not currently occupied. Breeding habitat is likely not limiting, and birds displaced by the Project will likely find unoccupied habitat, particularly with recent burns in the Keeyask area. This species is not thought to be declining primarily due to factors on breeding grounds in Canada.

There are similar uncertainties regarding quantification and modelling of rusty blackbird habitat.

As will be seen in Chapter 12, cumulative effects of habitat loss at a regional level may be of concern for all three of the at-risk songbirds. Therefore, specific monitoring action will be needed to determine with more certainty the impact of Keeyask on these populations. The preliminary monitoring plan for birds indicates that monitoring for these species will be conducted to assess construction-related disturbances within and adjacent to the Project in the Local Study Area (Study Zone 4), but it appears that analysis will not occur until after the construction is complete. In order to test the prediction that displaced birds will use other unoccupied suitable habitat, a statistically robust sampling

design using controls must be employed for evaluating project impacts, looking at before and after results.

The Commission recognizes that there will be a loss of nesting habitat for gulls and terns associated with the loss of islands in Gull Rapids, as well as the flooding of additional gull and tern nesting habitat at Birthday Rapids and in Gull Lake. All tern colonies at Gull Rapids will be flooded by the Project, and no other tern colonies are identified in the Regional Study Area, nor were any other tern-nesting colonies identified in the wider study area. Gull Rapids are considered unique in the Regional Study Area and other colonial nesting waterbird colonies have likely been lost elsewhere due to the development of previous hydroelectric projects. The Panel was surprised to find that this nesting habitat was not considered a VEC by the Proponent for its inherent ecological value (nor for the fact that gull eggs also have some value as a traditional food source).

Considering what seems a significant number of birds that will be displaced, at least temporarily, and permanent loss of habitat, it is difficult to agree with the conclusion in the EIS that the residual effects on colonial waterbirds “are expected to be adverse but regionally acceptable” based on the evidence presented. There is a high degree of uncertainty about the success of the proposed mitigation measures. In the EIS, long-term changes in the number of gulls and terns are predicted to be within the natural variability of their population, but no data were presented from field studies or other sources on the number of gulls and terns at the nesting colonies annually. Without a baseline, it is difficult to determine if future gull and tern distribution is within natural variation.

The Proponent must undertake a comprehensive pre-construction survey to

determine the current number and location of colonies, as well as the number of nesting pairs and birds that comprise these colonies. An estimate of nesting success would also be helpful for future evaluations. Existing and new colonies should be monitored to determine the effect of the Keeyask Generation Project on these species.

The Proponent has proposed to establish floating artificial islands, but details regarding the design and location of these mitigation measures will not be available until the development of the Terrestrial Environment Mitigation Plan, once construction has begun. It is therefore impossible to assess the potential effectiveness of these measures or to find comparisons from other jurisdictions. Furthermore, the plan does not address nesting habitat loss during the five-year period of construction, before these structures can be put in place.

It is also unclear if the Proponent has seriously considered the possibility of using excess excavated materials to create suitable nesting habitat at existing islands or to create entirely new islands for nesting. The Commission believes creating permanent islands may be more likely to succeed than using floating islands. Alternative nest-site creation could be done early in the construction process and facilitate the continued use of the Project area by these species, instead of having a gap or five or more years until after construction is completed.

Licensing Recommendations

The Commission recommends that:

- 10.4 *Keeyask Hydropower Limited Partnership monitor the location, number and productivity of bald eagle nests in the vicinity of the Keeyask project area prior to construction and annually for a*

minimum of five years after operation begins to verify the impact of the Project on the local and regional population.

- 10.5 *Keeyask Hydropower Limited Partnership develop and apply a statistically robust sampling system to monitor olive-sided flycatcher and rusty blackbird, that will confirm whether displaced birds are using alternate habitat or whether the project effects are impacting the regional population.*
- 10.6 *Keeyask Hydropower Limited Partnership undertake a comprehensive pre-construction survey to determine the current number and location of gull and tern colonies and their nesting success in the Project area. During and following construction, establishment of new colonies or the expansion of existing colonies should be monitored to determine the effect of Keeyask on the local and regional population.*
- 10.7 *Keeyask Hydropower Limited Partnership investigate the feasibility of creating replacement gull and tern nesting habitat by modifying existing islands or creating new ones in the Project area using the placement of excavated materials. If feasible, these areas should be created as soon as possible after construction-related activities begin.*

10.3.3 Mammals

In assessing the effects on mammals, the Proponent selected three VECs based on ATK and local knowledge, social significance, conservation status and their ability to be indicators of ecological health. The three VECs selected were beaver, caribou and moose. Most other mammals that use the Project area were also assessed as “priority mammals.” These other mammals include small mammals, furbearers, large carnivores, and rare or regionally rare species.

In assessing the impacts on mammals, different study zones were selected. The Regional Study Area for beaver is Zone 4, for moose is Zone 5, and for caribou two Regional Study Areas were used: Zone 6 for most caribou, and Zone 5 for a population of caribou that have been variously identified as summer resident or boreal woodland caribou. (See Fig. 10.1) The Local Study Area for caribou and moose is Zone 4. For some smaller, non-VEC mammals, smaller study areas were chosen. The use of multiple study zones is based in part on the variation in size of the range of these animals, from a few hectares for small mammals to thousands of square kilometres for caribou. The large Regional Study Area was also intended to capture ecological processes, such as wildfires, at the level of the regional ecosystem.

VEC – Beaver

Beaver will be affected in the Project Footprint during construction and reservoir clearing, with an estimated 20 to 30 colonies affected by the Project. Access roads and trails created during construction could also increase access by predators of beaver, such as wolves. Once construction is completed, flooding of the reservoir will result in the loss of beaver habitat as creeks, tributaries and small ponds and lakes adjacent to the Nelson River are flooded. The fluctuating water level of the reservoir during operations will make portions of the reservoir closest to the dam unsuitable for beaver, as winter fluctuations greater than 0.7 metres can kill beavers in their lodges or cause them to abandon an area. These fluctuations will be less pronounced further upstream along the reservoir. Within the Regional Study Area for beaver, approximately five per cent of beaver habitat will be affected. As beaver are plentiful and capable of populating other areas after being impacted, the residual effects on beaver populations are considered small. Mitigation

measures include trapping beavers prior to reservoir clearing and periodically until the reservoir is at capacity in order to prevent winter mortality.

VEC – Moose

The Project will cause habitat loss as a result of flooding, shoreline erosion, peatland disintegration and increasing traffic, which could also result in vehicle-moose collisions. Lost habitat for moose amounts to about one per cent of the Regional Study Area (Zone 5). With future projects added, the total lost habitat will be slightly over one per cent, which the EIS characterizes as at the low end of moderate. Moose in the Project area are near the northern fringe of their range and are widespread. According to 2010 data, there are about 125 moose in the Local Study Area (Zone 4), 950 moose in the Regional Study Area (Zone 5) and 2,600 in the Split Lake Resource Management Area (SLRMA). One effect of the Project will be a broader distribution of harvest of moose through the Adverse Effects Agreement (AEA) offsetting programs, which provide opportunities for members of the KCNs to harvest resources in areas unaffected by the Project. Proposed mitigation measures for moose include closing and revegetating access roads and trails after use, the prohibition on firearms in construction camps, communication efforts to reduce collisions on roads, and development by the Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation) of a moose harvest sustainability plan to ensure that moose populations remain sustainable within the SLRMA.

VEC – Caribou

Four caribou populations are reported in the Keeyask area, though some only appear occasionally. Barren-ground caribou from the Qamanirjuaq herd sometimes travel as

far south in the winter as the Project area and on occasion have been seen in large numbers. Caribou from two herds of coastal migratory caribou are reported as infrequent winter visitors. These herds are the Pen Islands herd, which has a large range that extends to Hudson Bay around the mouth of the Nelson River and into northern Ontario, and the Cape Churchill herd, which has a range that extends north to Churchill. Migratory coastal caribou typically travel toward the Hudson Bay coast in summer and in winter travel inland to forested areas. The fourth population is characterized as boreal woodland caribou or as “summer resident” caribou. These are caribou that may mingle with the migratory coastal herds in winter but which remain in the Keeyask area for calving and throughout the summer. Manitoba Conservation and Water Stewardship does not currently recognize a known boreal woodland caribou range as far north as Keeyask, but the summer resident caribou exhibit the characteristics of boreal woodland caribou. While the populations of the coastal caribou herds are healthier, boreal woodland caribou are listed as Threatened under the federal *Species at Risk Act* and *The Manitoba Endangered Species Act*. Approximately 20-50 animals are estimated to be in the Local Study Area and 128 to 320 in the Regional Study Area (Zone 5) for summer resident/boreal woodland caribou.

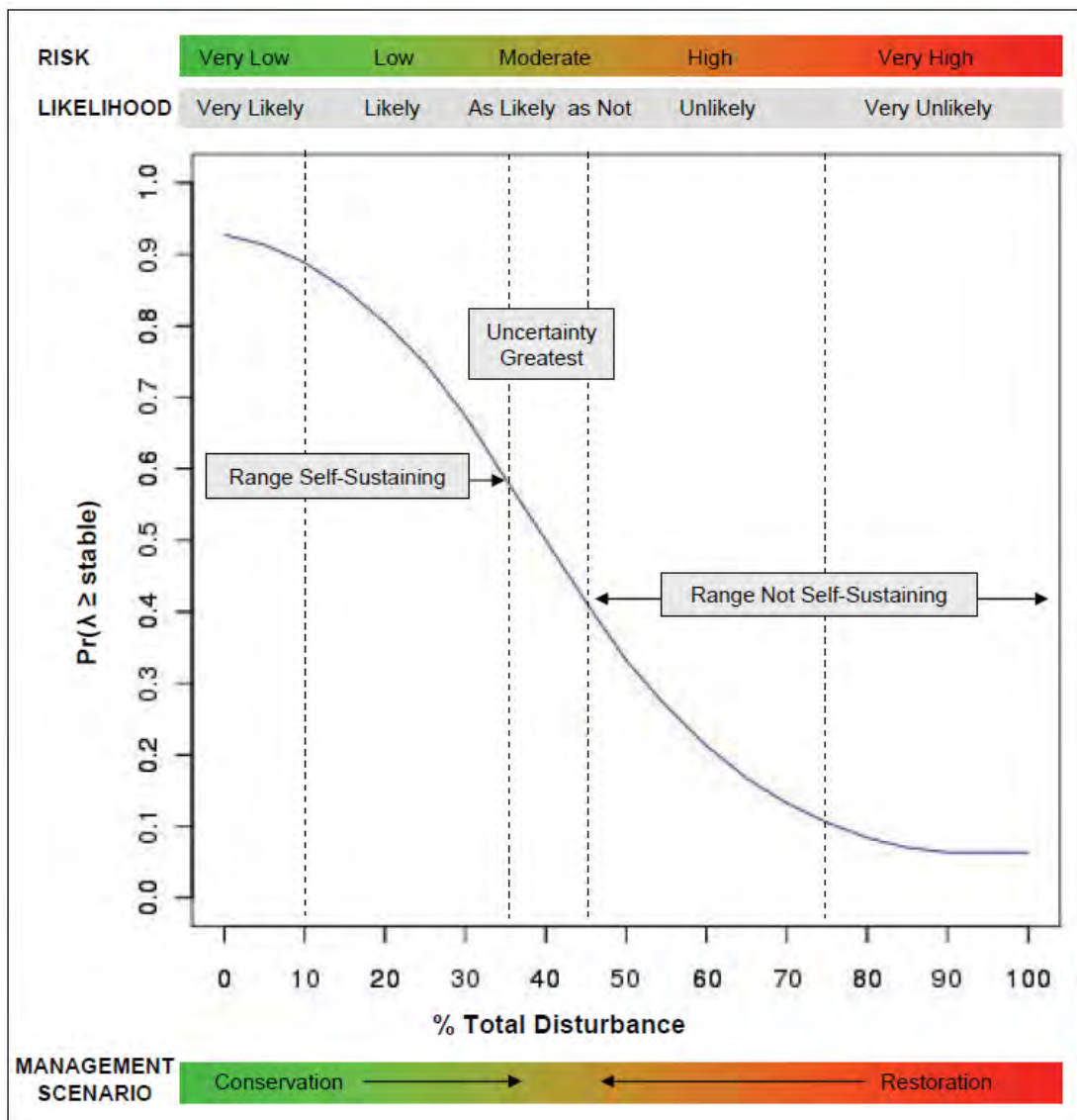
Four benchmarks were used by the Proponent to assess effects on caribou. These benchmarks measured total physical habitat lost, intactness, linear feature density, and grey wolf density. For physical habitat loss, the benchmark for a moderate effect was one to 10 per cent of habitat in the Regional Study Area. For intactness, effects would be considered moderate if 65 to 55 per cent of the Regional Study Area remained unaffected by disturbances, including both wildfire and human-caused disturbance. For linear feature

density, a density of 0.6 to 1.2 km per km² would be considered moderate. For grey wolf density, a population density of four to six wolves per 1,000 km² would be considered moderate.

Summer resident/boreal woodland caribou will be affected by habitat loss as a result of the construction of the Project and the flooding of land currently used for winter habitat and for calving. They will also be affected by sensory disturbance and traffic during construction and operations.

About six per cent of winter habitat within the Local Study Area (Zone 4) will be completely lost due to construction and an additional 12 per cent of effective habitat will be lost during construction due to disturbance such as blasting, traffic and machinery noise. Within the Regional Study Area, this amounts to a loss of one per cent. Summer resident/boreal woodland caribou will also be affected by the loss of some islands at Gull Rapids and the reduction in size of Caribou Island in Gull Lake, which will reduce available island calving habitat. New islands will be formed

Fig. 10.2 Habitat Disturbance and Probability of Self-Sustaining Caribou Population. (Environment Canada 2012)



by the flooding of the reservoir, however, and some of them may in time become calving habitat, as has happened with islands formed by the flooding of Stephens Lake. Construction-related disturbance will also cause caribou to avoid some calving habitat close to the generating station site. Less than one per cent of the potential calving habitat in the Regional Study Area, as modelled by the Proponent, will be lost as a result of the Project.

Benchmarks on fragmentation and intactness indicate that the Project area has a moderately high amount of disturbance, when wildfire is included along with human-caused disturbance. According to Environment Canada (2012), boreal woodland caribou populations are more likely than not to be self-sustaining if at least 65 per cent of their range remains unaffected by disturbance, including fires. Based on the evidence presented in the hearing and in the EIS, it is unclear how much this threshold is exceeded by Keeyask. The Proponent's representative testified that the Regional Study Area (Zone 5) is currently 65 per cent intact, and this intactness will drop to about 63 per cent with Keeyask and future projects. However, both the EIS and supporting documentation state that because of the large number of forest fires in recent years only 48 per cent of caribou range in Zone 5 is intact. The Proponent states in the EIS that, based on the disturbance levels, Zone 5 would already be too disturbed for a self-sustaining population of boreal woodland caribou. It is further stated that, based on collaring data that show some summer resident caribou have spent one summer in the Keeyask area and then joined the coastal caribou migration the next year, it is possible that these animals are not boreal woodland caribou. In that case, their range would be assessed based on a larger area and the percentage of disturbance would be lower as a result.

The other intactness benchmark for caribou, linear feature density, indicates an existing density of linear features of 0.45 km per km². This density would decline slightly as a result of Keeyask, as it would result in some cutlines and trails being eliminated, and then would rise to over 0.45 km per km² after Keeyask and future projects. As the greatest density of linear features is closer to Thompson, the northern and eastern portions of the Regional Study Area, near Keeyask, have a lower linear feature density.

Grey wolf density is not expected to change with the Project or with the addition of future projects. According to the EIS benchmark for grey wolf density, fewer than four wolves per 1,000 km² is a low impact. Density is currently reported to be lower than two per 1,000 km².

Proposed mitigation measures for caribou include marking future islands within the reservoir so that they won't be cleared of vegetation, avoiding caribou calving areas, minimizing blasting as much as possible during calving season, reducing increased access to caribou habitat, taking steps to avoid vehicle collisions with caribou, such as posting warning signs, and prohibiting firearms in work camps in order to minimize additional hunting.

What we Heard – Mammals

The Panel heard some concerns about Project effects, such as habitat loss, on beaver and moose, but the bulk of the discussion regarding mammals focused on caribou.

A witness for CFLGC questioned the decision not to make furbearers (other than beaver) a VEC. The EIS acknowledges adverse effects on furbearers and members of the CLFGC group spoke of the impact of past hydroelectric development on muskrats,

yet these animals were not chosen as a VEC and so were not examined in the cumulative effects portion of the EIS. Another expert witness, called by Manitoba Wildlands, raised a variety of questions about the model used to assess habitat for beaver.

The North Access Road appears to be within the largest concentration of primary moose habitat in the Local Study Area, suggesting a need for additional mitigation (signage, lower night-time speed limits) to prevent moose mortality from collisions, as well as monitoring of moose sightings and collisions. An expert witness for the Manitoba Métis Federation (MMF) stated that the Moose Harvest Sustainability Plan may be flawed because it does not incorporate Métis hunting of moose and so may under-estimate moose harvest. However, it was noted in cross-examination by the Proponent that, in this region of Manitoba, Métis hunters are required to buy a provincial hunting licence, which means that their harvest of moose should already be accounted for in development of the moose harvest plan.

Representatives of Peguis First Nation (PFN) predicted that because of the collapse of moose populations in many places in southern Manitoba, more moose harvesters will be travelling to northern Manitoba, including areas affected by the Keeyask Project.

The Consumers' Association of Canada (CAC) presented evidence that called into question the Proponent's description of caribou in the Project area as "summer resident" coastal caribou. The expert called by the CAC said caribou are classified largely by their behaviour into one of two "ecotypes." Migratory caribou, often referred to as barren ground or coastal caribou, migrate over long distances and the females gather together during calving. Sedentary caribou, often referred to as boreal woodland

caribou, migrate over smaller distances and the females disperse widely and calve alone. Sedentary caribou show great "site fidelity," meaning that the females will come back to the same island, peat island or isolated forest for calving. Their low population density (approximately 0.06 to 0.07 animals per square kilometre) is thought to be an adaptation to reduce the risk of predation, by making it more difficult for wolves or bears to find caribou. The CAC's expert said he does not believe there is evidence of a female caribou switching from one calving behaviour to another; that is, caribou do not behave like the sedentary ecotype and then behave like the migratory ecotype or vice versa.

Because of the site fidelity displayed by the "summer resident" caribou in the Project area, and for other reasons, the expert witness argued that they are likely to be sedentary ecotype caribou, also known as boreal woodland caribou. Currently, the northernmost identified boreal woodland caribou range in Manitoba is 100 kilometres from the Project area, but the witness presented several other factors supporting his hypothesis. These included: recent scientific hypotheses that the presence of open water in large lakes by mid-June represents the northern limit of boreal woodland caribou; telemetry tracking in Ontario showing sedentary females as far north as the southern edge of the Hudson Bay Lowlands; a remote camera photo of a male caribou in the Project area with antlers matching the size and shape of the sedentary ecotype; the historic existence of the Nelson-Hayes herd of boreal woodland caribou; and ATK conclusions that distinguish a small number of "local caribou" from the migratory caribou that use the Project area.

If some of the caribou in the Project area are sedentary ecotype (or boreal woodland), the conclusions in the EIS about the

significance of loss of habitat may be called into question. One of these conclusions is that there will be alternative habitat available for any caribou that are displaced by construction or reservoir flooding. It was argued that such a conclusion understates the need of caribou for large amounts of space, which keeps their population density low and reduces the risk of predation. The witness called for radio telemetry studies running for at least two years to confirm whether or not the female “summer resident” caribou are in fact exhibiting the calving behavior (isolated and with great site fidelity) of sedentary caribou.

In addition to the uncertainty over the ecotype of the summer resident caribou, the expert said the effect of future forest fires represents an additional uncertainty, especially given the possibility of climate change resulting in more frequent or larger fires. As well, a growing moose population could lead to an increase in the population of predators. Experience in other locations indicates that when the moose population density exceeds 0.1 animals per square kilometre, caribou are in danger of being extirpated (eliminated from the area). The expert witness also said the Proponent’s conclusions about caribou were questionable because of a lack of recruitment and mortality data (numbers of births and deaths).

The Panel also heard from area residents who considered the local resident population to be boreal woodland caribou. One of the CFLGC witnesses, a trapper and resource harvester, testified that he had hunted caribou in the Project area that matched the description of boreal woodland caribou, rather than coastal caribou. Other witnesses for CFLGC also stated that boreal woodland caribou are found in the area, but not as abundantly as in the past.

Representatives of the KK elders’ group spoke about ATK of caribou in the Keeyask

region and said that four kinds of caribou are known in the area. *Wapanok atikok* are the “comes from the east caribou.” *Mantayosipi neyahk atikok* are “caribou from the point of land of the River of Strangers.” *Pasko atikok* are “no tree caribou.” The fourth kind of caribou are *Noschimik atikok*, of “caribou that stay in the bush.” The KK group recommended that *Noschimik atikok* be recognized as a distinct group of resident caribou that are near the Keeyask Project.

An expert witness for the MMF questioned the Proponent’s assertion that the Keeyask area likely has more habitat available than there are caribou. Concerns about the development and validation of the caribou habitat model raise the possibility that the Proponent overestimated the amount of habitat available. The Proponent’s assessment of no significant effect on summer resident/boreal woodland caribou relies on the assumption that they will cross transmission lines, but the MMF expert pointed out that the Proponent acknowledges that the extent of avoidance of such linear features is not known. As well, the MMF expert testified that it is unclear what level of mortality the summer resident/boreal woodland population can tolerate, given that the herd’s status is not certain. Expectations that the caribou will in time return to the area are not well supported, the MMF expert stated, given that it is still not certain to what extent pre-Kettle caribou populations have returned.

One of the specific concerns was the statement in the EIS that evidence of calving was documented on only 10 per cent of islands in Gull and Stephens Lakes and five per cent of peat complexes. This fact may not mean that there is ample unused calving habitat, as the EIS suggests, but may be an indicator that the unused areas have some other factor that makes them less suitable. The Proponent found that neither

area nor distance to the mainland was a reliable indicator of island use, but did find the probability of use of islands and peat complexes increased with size. This suggested to the MMF's expert that additional study and model validation is required.

Commission Comment – Mammals

The Commission considers that several factors support the conclusion that the “summer resident” caribou in the Project area are more likely to be boreal woodland caribou. Evidence for this includes: behavioural and demographic traits that are consistent with boreal woodland caribou (isolated calving, harem breeding, low population density); telemetry data from Bipole III that show at least some radio-collared cows residing year-round near Stephens Lake; traditional knowledge presented by elders and resource harvesters; a trail-camera photograph presented at the hearing that resembles a boreal woodland caribou; caribou distribution data from Ontario that show boreal woodland caribou as far north as the southern edge of the Hudson Bay Lowlands; the association between spring ice-break-up date and northern limits of boreal woodland caribou; and the previously known range of the Nelson-Hayes boreal woodland population. The Commission believes that until genetic testing can confirm their lineage, summer resident caribou should be assumed to be boreal woodland caribou. The Commission encourages both the Proponent and Manitoba Hydro to support research leading to this scientific confirmation.

The Commission has reached the conclusion that Manitoba Conservation and Water Stewardship must take leadership and immediate action in determining the status of these animals. If they are determined to be “woodland caribou” then provisions in *The Manitoba Endangered Species Act* should be

applied. If not, consideration should be given to protecting the critical calving areas of the herd to which they belong.

The Panel has concerns with the lack of data on population size, recruitment and mortality of the summer resident/boreal woodland caribou. There is a lack of solid evidence to support the population estimates provided. The primary field methods, including use of trail cameras, track/sign transects, and winter aerial surveys, are unable to provide data that would allow for certainty in these estimates. As well, these information-gathering techniques do not provide the data needed to have reasonable confidence in the boundaries of the caribou range. As a result, it is uncertain if the Proponent used the appropriate study zones to assess impacts on caribou. Given that there is uncertainty about the actual boundaries of the caribou range, predictions based on calculations of the degree of disturbance to the range will inevitably be uncertain. In calculating disturbance to the caribou range, the Proponent did not originally consider the large area burned in forest fires in the summer of 2013, although this was considered later in the hearing process. There is also uncertainty as to whether the Proponent fully incorporated the potential for disturbance caused by future forest fires in the area. During the hearing, the Panel heard of one relatively simple statistical technique for estimating the likely area of future forest fire disturbance. Some such calculation would have greatly added to the evaluation in the EIS.

The Panel also heard from at least one KCN member, and resource user, who said his personal observations of caribou in the Keeyask region, and those of his friends and fellow resource users, could have helped to clarify the issue regarding summer resident/boreal woodland caribou. Elders who gave testimony at the hearing have provided

personal observations and history on the distribution and abundance of these animals. The Province and the Proponent should take more notice of these observations and the Cree worldview and incorporate them to a greater degree where possible.

As a result of all of these knowledge gaps, it is difficult to share the “moderate to high degree of certainty” that the Proponent expresses for the conclusion that impacts on caribou are likely to be small in magnitude.

Additional research, employing radio collaring of caribou, is required for at least three years to have greater confidence and to better plan for the management and mitigation of the Project effects. While there is a concern among First Nations about radio collaring of caribou, especially if carried out during the sensitive calving season, it would be useful to have the kind of data on animal movements made possible by collaring. If collaring could be done at a less sensitive time of year and in a respectful matter, it would assist greatly in evidence-based monitoring of the Project’s effects and be helpful in future management and mitigation.

A long-term co-ordinated monitoring study for boreal woodland/summer resident caribou in the Keeyask area, which includes the Keeyask Generation Project, Keeyask Transmission Project, Bipole III, any new developments, and the effects of any expansion or alteration of existing developments, needs to be undertaken. In effect, a regional caribou management plan is required and should be facilitated by Manitoba Conservation and Water Stewardship. Given the large ranges of all caribou, it is important to have a better picture of the entire regional population, especially given the regional scale of impacts.

Fragmentation, human disturbance and access for hunters and predators can cause

significant negative impacts for woodland caribou. In order to avoid creating more access for hunters and predators, roads and access trails constructed for the Project will need to be access-controlled during construction and made impassable once they are no longer in use. In the larger regional area, fragmentation and disturbance should be limited where possible through retirement of roads, rehabilitation of past disturbances, limits on human disturbances (such actions would include controlling access to calving islands), and restrictions on recreational trails. In order to reduce the risk of collisions with vehicles, the Proponent may need to post warning signs for drivers on PR 280 or the access roads.

The Proponent has stated that it plans to minimize blasting to the extent practicable during caribou calving (May 15 to June 30). However, some year-round blasting will be required. Therefore, a plan must be developed to address where blasting is to occur during calving season.

Regarding moose, the Panel agrees that habitat loss and disturbance are not likely a significant concern. Flooding of the reservoir will result in some short-term loss of habitat, but stabilization of water levels will likely be beneficial in the long term by providing aquatic vegetation. Moose populations are likely driven more by predation by wolves and human hunting than by habitat. Therefore, adaptive management of moose will be required, especially if the offsetting programs included in the Adverse Effects Agreements encourage more harvest in areas that are previously difficult to reach. It will be necessary to monitor access and effects on moose around any new roads and trails in the Project area, including any new access for moose hunting created by the North and South Access Roads.

Licensing Recommendations

The Commission recommends that:

- 10.8 *Keeyask Hydropower Limited Partnership conduct a three- to five-year telemetry study with at least 10 (preferably 15) "summer-resident" caribou radio-collared during the snow-free season to delineate their current range and facilitate the collection of population parameters.*
- 10.9 *Keeyask Hydropower Limited Partnership limit fragmentation of habitat and disturbance of "summer resident" caribou where possible through the retirement of roads and trails required for construction.*
- 10.10 *Keeyask Hydropower Limited Partnership place signage along roadways alerting drivers to the potential for collision with caribou and moose.*
- 10.11 *Keeyask Hydropower Limited Partnership, in co-operation with Manitoba Conservation and Water Stewardship, develop a public information program that encourages the reporting of sightings of "summer resident" caribou, and moose and caribou road kills.*

Non-Licensing Recommendations

The Commission recommends that:

- 10.12 *Beyond the immediate Keeyask area, Manitoba Hydro and the Manitoba Government limit fragmentation of habitat, facilitate the rehabilitation of habitat, and limit human disturbance of "summer resident" caribou. Such actions could include, but are not limited to, the retirement and re-vegetation of roads, trails and cutlines, rehabilitation of borrow areas, limiting access on existing roads and trails, controlling access to*

calving islands, and limiting or restricting recreational trails.

- 10.13 *Keeyask Hydropower Limited Partnership and the Manitoba Government further investigate and incorporate ATK and local knowledge of historical "summer resident caribou" distributions and populations to inform current status and their management.*
- 10.14 *Manitoba Conservation and Water Stewardship determine the status of the "summer resident" caribou and apply the appropriate protections depending upon the determination.*
- 10.15 *Manitoba Conservation and Water Stewardship lead a long-term co-ordinated monitoring study of caribou in the Gillam area that includes the Keeyask Generation Project, the Keeyask Transmission Project, Bipole III Transmission Project, Conawapa, expansion of and alterations to existing Manitoba Hydro facilities and any other impacts on the landscape.*

Chapter Eleven

Socio-Economic Effects

11.1 Overview

The Proponent grouped measurements of socio-economic effects into five categories: Economy; Population, Infrastructure and Services; Personal, Family and Community Life; Resource Use; and Heritage Resources. Study areas for socio-economic effects were larger than those for aquatic and terrestrial effects. The Local Study Area for socio-economic effects included the four Keeyask Cree Nations (KCNs), plus the Town of Gillam and the City of Thompson (Fig. 11.1). The Regional Study Area included Preference Zones 1 and 2 in the Burntwood Nelson Agreement (BNA), the collective agreement between the Hydro Project Management Association and the unions of the Allied Hydro Council. Preference Zone 1 takes in all communities along the Nelson, Burntwood and Churchill Rivers. Preference Zone 2 encompasses a vast area of northern Manitoba, including communities such as The Pas, Flin Flon, Lynn Lake and Shamattawa.

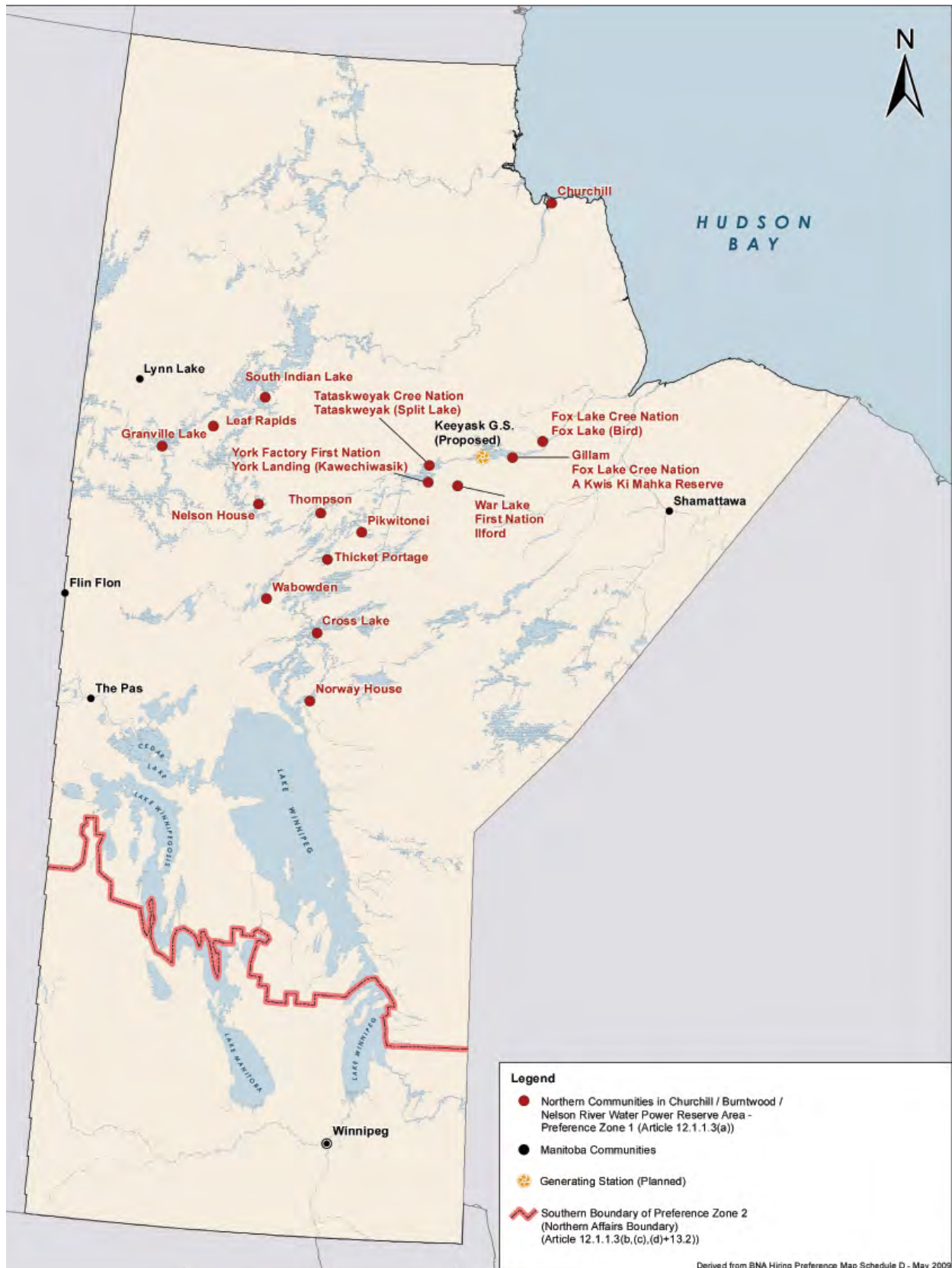
11.2 Economy

VEC – Employment and Training Opportunities

Construction of the Project is expected to generate approximately 4,200 person-years of direct employment (one person-year is defined in the environmental

impact statement as 2,090 to 2,295 hours of employment, corresponding to 52 weeks of work at 40 to 45 hours per week). Estimates for the share of jobs to be filled by members of the KCNs range from a low of 235 person-years to a high of 600 person-years. The Joint Keeyask Development Agreement (JKDA) sets out a target of 630 person-years for employment by KCN members, with a financial penalty to be paid by the Keeyask Hydropower Limited Partnership if the target is not met. This target includes employment in the Keeyask Infrastructure Project (building of the North Access Road and the camp) as well as approximately 257 person-years of employment that had already gone into planning the first Nations' participation in the Keeyask Generation Project from the signing of the JKDA in 2009 to the fall of 2013. Estimates for the overall northern Manitoba Aboriginal population range from 550 to 1,700 person-years. These communities have unemployment rates far higher than that of the overall Manitoba population. According to 2002 figures presented by the Proponent, the unemployment rate in the KCNs was 40 per cent, while for northern Aboriginal residents as a whole it was 27.7 per cent and for Manitoba it was six per cent. Following construction, a target has been set for KCN members to hold 182 operational jobs across Manitoba. The Project itself is expected to create 46 operational jobs: 37 at the Keeyask site and nine in Gillam.

Fig. 11.1: Regional Study Area for Socio-Economic Effects. (Courtesy of KHLPL)



The bulk of construction employment for Aboriginal employees on Keeyask is expected to come via employment in construction support and non-designated trades. Construction support jobs are those needed during construction, such as clerical, camp services and catering, that do not actually involve building the Project. Non-designated trades are construction jobs that do not have an apprenticeship program, including heavy equipment operator, vehicle driver, labourer, rebar worker and cement mason. The upper forecast of 600 person-years of KCN employment includes 325 person-years of construction support and 170 of non-designated trade employment. Most of the employment for members of the KCNs is expected to come through working on direct negotiated contracts (DNCs), contracts negotiated between the Keeyask Hydropower Limited Partnership and businesses owned by the KCNs. Among these DNCs will be contracts for camp services, security and catering, as well as reservoir clearing and construction of the South Access Road.

A variety of measures have been and will be taken to enhance the participation of Aboriginal and KCN workers on the Project. The Burntwood Nelson Agreement contains preferences for qualified Aboriginal and northern workers. Two of the KCNs – Fox Lake Cree Nation (FLCN) and York Factory First Nation (YFFN) – have negotiated a contract to provide employee retention and support services, which includes cultural training and on-site counselling to help retain Aboriginal workers. Funding will be provided for the Allied Hydro Council to hire an Aboriginal union representative to assist Aboriginal workers with workplace issues.

The Hydro Northern Employment and Training Initiative (HNTEI), funded by the Governments of Manitoba and Canada and Manitoba Hydro from 2001 to 2010, was

carried out to prepare workers for jobs on the Wuskwatim and Keeyask Projects. In addition to the four KCNs, participants in the HNTEI were Nisichawayasihk Cree Nation (NCN), the Manitoba Métis Federation (MMF) and Manitoba Keewatinowi Okimakanak. In all 2,670 people completed at least one course as part of the HNTEI, 595 participants completed training in job categories that will be required for Keeyask construction and 242 KCN members completed Keeyask-related training.

An assessment of the HNTEI, completed by the consulting firm Deloitte, concluded that the Initiative faced some challenges. Working out agreements between the participants and establishing goals for the training was relatively time consuming. Many members of the target population required educational upgrading before they were eligible for career-specific training, given that, according to the 2001 Census, among people age 20 and over, approximately 60 per cent of KCN members and the northern Aboriginal population as a whole had less than a high school certificate. Ultimately, by the end of HNTEI, 27 participants had completed trades training to reach journeyman status, and 140 participants were active apprentices working toward designated trades (most of whom were at the earlier stages of a four-level apprenticeship). As of October 2013, 172 HNTEI participants had found employment related to Keeyask (through the Keeyask Infrastructure Project or through planning and licensing activities). During construction of Wuskwatim, 189 HNTEI participants found employment. Overall, Wuskwatim had a slightly higher Aboriginal employment rate than the Limestone Generating Station had (28 per cent compared to 25 per cent) and a lower turnover rate among Aboriginal workers (41 per cent compared to 50 per cent).

VEC – Business Opportunities

Businesses owned by the KCNs will work on direct negotiated contracts during Keeyask construction, creating both employment and business revenue. These DNCs will be carried out by businesses owned by the KCNs or joint ventures between KCN businesses and other firms. The four KCNs are involved in a number of such businesses in construction, engineering, building materials, equipment leasing, catering and camp services. FLCN and YFFN will have service contracts in catering, security and employee retention and support services. The Cree Nation Partners (CNP), a partnership of Tataskweyak Cree Nation and War Lake First Nation, will have service contracts in camp maintenance and first aid and construction contracts in camp development, camp decommissioning, South Access Road construction, forebay clearing, painting and architectural finishing, and excavation.

VEC – Income

Members of the KCNs are expected to earn \$21 to \$62 million working on the Project. The majority of this income (\$17.7 to \$47.5 million) is expected to come about through work on DNCs. For Aboriginal workers from the entire Churchill, Burntwood, Nelson area (including the KCNs), employment income through construction of the Project is estimated at \$36 to \$128 million. For Aboriginal workers from all of northern Manitoba, construction employment income is estimated at \$49 to \$180 million.

The KCNs will also derive business income from the DNCs. The share of profits accruing to the KCN-owned businesses involved in joint ventures in the Project could be as high as \$7.5 million.

The Partnership has also set a target of 182 operational jobs across Manitoba Hydro's

system for the four KCNs. This is a 20-year target. If that target is reached, income for members of these First Nations would be approximately \$20 million per year. Income from the operating jobs at the Keeyask generating station would be concentrated in Gillam.

In addition to employment and business income, the KCNs will be eligible to receive dividends from the sale of power produced by the generating station. Under the terms of the JKDA, the KCNs will elect to invest in the Project in one of two ways: through a common equity option, which requires a higher level of investment and generates a proportionate share of distributions from the Project, or through a preferred equity option, which has a lower investment and a guaranteed return on investment. Actual profits will depend on the final cost of construction and the sales of power. Under the JKDA, the KCNs have the option of acquiring up to 25 per cent equity in the Project: 15 per cent owned by CNP and five per cent each owned by FLCN and YFFN. Under the JKDA, distributions to each of the First Nation partners may be used for:

- measures to support the viability of resource harvesting;
- initiatives to support Aboriginal or treaty rights;
- cultural and social development;
- business and employment development;
- infrastructure and housing development;
- construction and operation of capital projects; and
- technical and legal services related to business and other affairs.

VEC – Cost of Living

Northern Manitoba has a higher cost of living than other parts of the province as a result of the cost of transporting goods long distances to small markets. The cost differential is greatest in communities without four-season road access. In the EIS, the Proponent compared the price for a “revised northern food basket for a family of four” in Winnipeg and in four communities in the Local Study Area. Based on 2009 prices, a food basket costing \$207 in Winnipeg would cost \$225 in Thompson, \$251 in Gillam, \$264 in Split Lake (TCN) and \$288 in York Landing (YFFN). Costs of housing (discussed in more detail as a separate VEC) vary for populations across the area. The highest housing costs in the area are in Thompson, which has been undergoing a housing shortage in recent years, driving up the price of houses and apartments and encouraging some owners of apartment building to convert them into condominiums. The Proponent predicts that this situation in Thompson is likely to change given the proposed shutdown of the Vale smelter and refinery.

The Proponent predicts that the Project is unlikely to have an effect on the cost of living. The increase in purchasing power resulting from employment on the Project may encourage businesses to bring a wider selection of goods into some communities. Pressure on housing costs is not expected, as housing in the KCNs, is owned and controlled by the First Nations themselves, and Manitoba Hydro plans to build new housing in Gillam to accommodate new employees.

VEC – Resource Economy

The VEC Resource Economy refers to commercial use of natural resources. Resource use for personal and community consumption and cultural reasons is described under the VEC Resource Use.

The Project will have an effect on commercial fishing in Stephens Lake due to mercury bioaccumulation in fish. There is currently one commercial fishing licence on Stephens Lake, held by an individual who sells fish directly to customers and to restaurants. This licence will be bought out by the Proponent. Gull Lake and the reach of the Nelson River that will be flooded are not currently fished commercially. The commercial fishery on Split Lake is not expected to be affected by the Project. However, the creation of the Keeyask Reservoir will largely flood Birthday Rapids, making it easier for fish to swim from the reservoir to Split Lake. As mercury levels in the Keeyask Reservoir will be elevated, there is the potential for some fish with elevated mercury levels to enter into the Split Lake commercial fishery. The Proponent has indicated that this is possible, but expects that this is unlikely, and will monitor for such occurrences. The only other lake in the immediate area with commercial fishing is Assean Lake, near TCN, which will not be affected.

The Project has the potential to cause indirect effects to tourist fishing lodges as resource users from the KCNs travel to remote lakes to fish as part of the Adverse Effects Agreement (AEA) offsetting programs. Through TCN’s AEA offsetting program, five lakes north of the Nelson River in the Split Lake Resource Management Area (SLRMA) will be subject to a combined harvest of up to 62,000 kg of fish per year. One of these lakes currently has a commercial fishing lodge on it. This lodge also has a smaller outcamp on another of the lakes. The Proponent acknowledges the possible effect of the offsetting program on this fishing lodge, stating in the EIS that “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

Lake lodge clientele if the designated harvest level is achieved from these lakes.” TCN has established a set of guidelines for members making use of this program that includes respecting others and private property, keeping areas clean and practising selective harvest. The EIS states that this policy will minimize effects to lodges and outfitters.

The Project also overlaps four traplines: traplines 07, 09, 15 and 25 (a TCN community trapline). Access roads, which will eventually become the new PR 280, will pass through Traplines 09 and 15. Traplines 07, 15 and 25 will be affected by flooding, with about five per cent of Trapline 15 flooded. Flooding on Trapline 07 will amount to just over one per cent of the area, while less than one per cent of Trapline 25 will be flooded. In addition to the South Access Road, Trapline 09 will be crossed by the transmission line right-of-way to be built as part of the Keeyask Transmission Project. Manitoba Hydro plans to conclude agreements with all affected trapline holders to cover any loss of buildings or equipment and lost revenue. Manitoba Hydro has already concluded a disturbance agreement with the holder of Trapline 09, including a monetary settlement to cover the years 2010-2015, and had a disturbance agreement (which expired December 31, 2013) with the holder of Trapline 15. Manitoba Hydro also plans to negotiate similar agreements with the individual holder of trapline 07 and the local fur council for the community trapline 25.

Since 1996, the average annual revenue of all traplines in the Split Lake Section has been \$2,125. Marten is the most frequently trapped species in the Regional Study Area, accounting for 68 per cent of trapping. Beaver is the second-most frequently trapped species, accounting for 13 per cent of the harvest.

Some traplines throughout the region will be visited more often by people other than the trapline licence holder as a result of

the AEA offsetting programs. The Proponent states that this is not expected to cause a substantive effect on trapping, because these resource-harvesting visits will typically occur in the spring and fall rather than in the winter, which is the peak time for trapping activity. As well, the AEA offsetting programs are for fishing and hunting and therefore target different species of wildlife than the trapping of furbearers.

What we Heard – Economy

The Panel heard a number of perspectives on the potential impact of the Project on the Economy VECs, including employment, training, income, and the resource economy.

Expert witnesses for the Manitoba Branch of the Consumers’ Association of Canada (CAC) assessed the Keeyask Project’s economic impacts from a community economic development perspective and found that, while the partnership model is a substantial improvement over past hydroelectric development in northern Manitoba, there are still concerns. Specific concerns they outlined were that the Project may: cause harm that is not compensated; disrupt traditional livelihoods; limit participation in decision-making by the KCNs; and fail to foster the building of capacity in the communities. The witnesses examined the Proponent’s forecasts of employment income for members of the KCN communities, as well as forecasts for profits for KCN-owned businesses and for eventual income resulting from KCN investment in Keeyask.

Given that the Proponent predicts that the majority of KCN employment during construction will be generated by direct negotiated contracts with the KCN businesses – which include work such as catering and security – the witnesses said it is likely that

most construction employment in the KCN communities generated by Keeyask will be in relatively lower paid jobs. As a result, they expect annual construction employment income during the Project to be closer to the lower end of the Proponent's predicted range of \$3.97 to \$9.7 million. They were concerned about the ability of local residents to benefit from employment, as a result of the short-term nature of many construction jobs, relatively high turnover rates for Aboriginal workers on the Wuskwatim project, requirements of the Burntwood Nelson Agreement and the fact that the HNTEI ended in 2010. While the CAC's experts judged the HNTEI to be a significant achievement, they were concerned about the continuing need for education to build the capacity of KCN communities to manage their own economic development.

During hearings held at the KCNs, the Panel heard from community members who said it was difficult for individuals who had had job training to find employment that could count toward their apprenticeship. Contractors seek a level of experience that many newly trained community members do not have. As well, Presenters said much of the employment on the Project will likely go to workers from out of province, including workers from Quebec with dam-building experience. Others spoke of the need to continue training along the lines of the HNTEI. Others said workplace racism is still a problem that makes it difficult for many First Nations people to remain at work. The Panel also heard from representatives of Participant groups who raised concerns about predominance of construction support and non-designated trades jobs for Aboriginal workers, including members of the KCNs. Concern was expressed that relatively few Aboriginal workers are expected to fill positions for designated trades or professional/managerial positions. References were made to

the turnover rate on the Wuskwatim project, with the concern raised that Keeyask might also have a high turnover rate.

The Panel heard many concerns about the cost and standard of living in northern and First Nations communities. Items of concern included the cost of food, especially in communities without four-season road access, the cost of heating homes, and the quality of homes and community infrastructure.

Several witnesses and Presenters from the KCNs were concerned about the impact on trapping, especially the impact on Trapline 09. Trapping is much more than an economic activity, and plays a vital cultural role in many First Nations communities. The Panel heard testimony that trapping families are often leaders of a community, as holders of knowledge, strong voices and a "moral compass." A representative of the Concerned Fox Lake Grassroots Citizens (CFLGC) testified that the four traplines to be affected by the Project are among the last traplines in close proximity to Bird and Gillam and so have an even greater value to the community.

Commission Comment – Economy

The Panel believes that the Project has the potential to be an economic benefit to the KCNs, although the magnitude of the benefit is not entirely clear. It is not clear how much profit the KCNs will make from their equity participation in the Project, given that profits will be influenced by the final costs, the selling price of electricity in the future, and which kind of shares the KCNs opt for. There is also a large variation between the high and low estimates of the income to be made by members during the construction period. The amount of labour income will depend greatly on the success of recruitment, training and retention efforts.

The HNTEI program, while it had challenges in completion rates, appears to have been a well-intentioned effort to prepare northern Aboriginal workers for employment on both Wuskwatim and Keeyask. That the majority of KCN and other Aboriginal workers are expected to be employed in construction service and non-designated trades jobs does raise some concern that HNTEI was unable to prepare a large workforce for higher-paid positions. It may be that Aboriginal workers in the region are not pursuing the higher-paid skilled trades because, outside of these hydroelectric projects, there is little demand for such workers in the area where they live. For those who begin such training, there may be few opportunities to acquire the on-the-job training necessary to advance. The fact that a preponderance of HNTEI participants in skilled-trades programs only reached the first or second year of their apprenticeship training points out the need to ensure that such workers will have the opportunity to gain on-the-job training through Keeyask and advance through their trades. Concerns about retention rates are also legitimate. For Keeyask to succeed in raising the standard of living in the KCNs, efforts at enhancing retention rates, such as the employee retention and support contract awarded to YFFN and FLCN, will need to be successful. Despite these challenges, it is worth noting that HNTEI and jobs on Wuskwatim (and more recently on the Keeyask Infrastructure Project) have provided a number of KCN members with the opportunity to gain valuable training and work experience in both designated and non-designated trades. The Project has also created the opportunity for KCN members to gain experience in Project planning and management.

Licensing Recommendation

The Commission recommends that:

- 11.1 *Keeyask Hydropower Limited Partnership provide continuing education and training opportunities on the Project for HNTEI-trained workers to advance their employment prospects.*

11.3 Population, Infrastructure and Services

This category of socio-economic effects refers to those that, for the most part, will result from changes in population, typically as a result of people moving permanently or temporarily to the Keeyask area because of the Project. Factors that play a role in this category include: additional demand for infrastructure as a result of increased population, expansion of the Town of Gillam, construction of the South Access Road and the eventual rerouting of PR 280 along the North and South Access Roads, and transportation of equipment, materials, and workers to and from the construction site. The VECs for this category are Housing, Infrastructure and Services, Land, and Transportation Infrastructure. The supporting topic for this category is Population, meaning that population change is not itself a VEC, but will be a key factor that influences the VECs.

Project-related population increase within the four KCNs is expected to be quite small, as a result of housing constraints and the availability of housing at the construction camps. Some short-term population growth may be felt in Gillam during construction as a result of accommodations for senior Manitoba Hydro employees and contractor staff. Operation of the Project is not expected to result in population increases within the KCNs, again because of housing constraints. However, operation will contribute to

population growth in Gillam, where the expected Keeyask operations workforce of 46 people will be housed. The Project is not expected to increase population in Thompson because of its distance from the Keeyask site.

VEC – Housing

Housing is in short supply in all of the KCNs, with growing waiting lists for members wishing for a home. There is a concern, especially in TCN, that the Project will increase demand for housing because members who live elsewhere will come to the region to work on Keeyask. However, the Job Referral System under the Burntwood Nelson Agreement provides KCN members with the same preference for employment on the Project regardless where in Manitoba they live. The KCNs will communicate this to their members, in order to prevent increasing demand for already-scarce housing.

The Proponent expects an increase in demand for temporary accommodation in Thompson from workers who are arriving in or departing from the region or from those visiting Thompson for its amenities. The Proponent notes that since the construction of Wuskwatim, a new extended-stay hotel has been built in Thompson and several apartment-style suites have been built for people staying a week to a month.

Housing for operations workers and their families will be provided in Gillam by Manitoba Hydro. Upgrades to existing housing stock and planned new developments are already under way in Gillam as part of the Harmonized Gillam Development process.

VEC – Infrastructure and Services

Increasing demand for health care resulting from the Project is a pathway of possible effect on Infrastructure and

Services. Likewise, the presence of a large workforce at the camp could result in RCMP travelling from the detachment in Gillam and, therefore, not being available for calls in Gillam or Bird. The Proponent is working with the Northern Regional Health Authority and the RCMP to plan for construction-related staffing needs. As well, the camp will have EMS and ambulance services, which may minimize demand for existing services. KCN communities are expected to experience demands on their infrastructure during construction for a number of reasons. Changes in lifestyle – including increased income from working on the Project and interactions with outside workers – may increase demand for community-run social services, such as counselling. Project-related work may also result in increased demand for daycare services, which are currently at capacity in the KCNs. As of 2012, the daycare in Gillam was building a new facility. Availability of daycare is particularly important to enable women to benefit from employment opportunities on the Project.

The AEAs include provisions to fund several new community infrastructure facilities and programs that address some of these issues. Among them are a crisis centre and wellness counselling program at FLCN and a variety of cultural education programs in all the KCNs. As well, the employee retention contract awarded to FLCN and YFFN includes counselling services for workers and their families.

VEC – Land

The Project site is located on provincial Crown land that will be purchased by the Proponent. It does not encroach upon any reserve land or Treaty Land Entitlement (TLE) selections. The Project is within lands traditionally used by the KCNs and is entirely within the Split Lake Resource Management

Area. The SLRMA was established by agreement between the Province of Manitoba and the Split Lake Cree (Tataskweyak Cree Nation) as part of the Northern Flood Agreement Implementation Agreement for the purposes of integrated land use and resource management.

Operation of the Project will result in an increased demand for land in Gillam to accommodate housing for the operating staff. The development of new land in Gillam is part of the existing land-use planning in the community. Approximately 350 acres of land suitable for development have been identified near Gillam, as well as an additional 130 acres near Stephens Lake. This would be substantially more than would be needed to accommodate a Project-related increase of 120 to 150 in Gillam's population.

VEC – Transportation Infrastructure

Increased road, air and rail transportation will occur as a result of the movement of workers, equipment and material during Keeyask construction. Provincial Road 280 between Thompson and Gillam has been undergoing improvements, including widening and shaving of curves at 45 locations between PR 391 and the new Keeyask North Access Road. By the time Keeyask construction begins, PR 280 is expected to be able to accommodate increased traffic. Concerns exist that increased traffic may lead to an increase in collisions and in minor damage, such as cracked windshields resulting from loose gravel. Manitoba Hydro is managing the upgrading of PR280 in conjunction with Manitoba Infrastructure and Transportation and sharing the costs for the work. Traffic between Thompson and the Project site will be greatest during the first two summers of construction. At this peak time, Project activities are expected to result in approximately 62 and 68 additional vehicles per day using the stretch of road between Split Lake

Junction (TCN) and the North Access Road.

Hauling of goods and materials to the Project site will lead to increased truck traffic on PTH 6, leading to Thompson, and on City of Thompson streets. Some increased rail traffic is likely as it is used to haul goods and materials. Special train cars will be required for some large items, such as the turbines in the generating station.

The Project will also result in increased air traffic at the Gillam and Thompson airports as work crews are flown to and from the Project area. Both airports are considered to have the capacity for increased flights.

The Project will result in new transportation infrastructure, which will reduce the travel time between Thompson and Gillam. When the Project is completed, PR 280 will be rerouted along the North Access Road, across the Nelson River on the dams, and along the South Access Road. When this is done, the portion of the existing PR 280 that runs from the North Access Road to Long Spruce generating station will no longer have provincial road status. However, this portion of the road provides for a shorter drive to Thompson for FLCN residents in the community of Bird. Future plans for maintenance of this portion of the existing PR 280 are not certain at this time.

YFFN members have expressed concern that flooding of the Keeyask reservoir could affect ice and water levels on Split Lake, affecting the ferry that connects the community during open-water season or the winter ice road. The Proponent plans to monitor water and ice levels and Manitoba Infrastructure and Transportation will monitor ferry landing sites and the winter road. However, the Proponent expects that water levels on Split Lake will not be affected during the open-water season and minor effects on ice levels will be felt only during

rare (once every 20 years) winters with very low water levels.

What we Heard – Population, Infrastructure and Services

The Panel heard concerns about potential impacts on housing in Thompson, as well as arguments about traditional land use raised by First Nations other than the KCNs.

Representatives of the Manitoba Métis Federation based in Thompson spoke about the impact construction of the Wuskwatim Generating Station had on housing in the city. While Wuskwatim also had workers staying in an on-site camp, some workers chose to find accommodation in Thompson for their time between work shifts. The influx of workers meant that there were no vacancies for rental accommodation in the city and the price of rent rose in response. The city's hotels were also running at capacity at that time, which created difficulties for northern residents travelling to Thompson for temporary stays, such as for health care.

Representatives of CFLGC spoke about the poor condition of much of their housing and questioned whether Keeyask would result in improvements for FLCN members.

Representatives of Peguis First Nation (PFN) discussed their First Nation's outstanding Treaty Land Entitlements and stated that their TLE agreement allows them to make claims outside their treaty area. Representatives described historic use of the Nelson River by PFN members and argued for an approach of sharing and mutual understanding that underpinned the Selkirk Treaty of 1817 and Treaty One in 1870.

Representatives of Pimicikamak Okimawin testified that their traditional

territories extend north from their current community and include the Keeyask area.

11.4 Personal, Family and Community Life

Many of the most sensitive socio-economic effects caused by the Project are in the area of Personal, Family and Community Life. This category includes a number of potential impacts on the physical and mental health of individuals and communities resulting from the direct effects of the Project or the changes it makes to the natural and cultural environment in the region.

VEC – Governance, Goals and Plans

Participation as equity partners in the Project has resulted in involvement by all the KCNs in extensive consultations, planning and negotiations. This will continue through the construction and operation of the Project, as the KCNs manage a wide range of programs established through the JKDA or the AEAs. The JKDA provides funding for the KCNs during construction for participation in the Project, including their participation on the Keeyask Hydropower Limited Partnership Board and advisory committees established under the JKDA. These groups include an advisory body on employment and a Construction Advisory Committee. Monitoring of the environmental effects of the Project, overseen by a Monitoring Advisory Committee (MAC), with representation from each of the KCNs, will be a continuing task for governance during both construction and operation of Keeyask. Business decisions regarding the KCNs' equity stake in the Project will be an on-going governance responsibility. FLCN is gaining an enhanced role in the community of Gillam, in part as a result of Keeyask, through the Harmonized Gillam Development process, which provides

FLCN with a voice in planning of the town. Creation of a Gathering Centre in Gillam, which is being funded through the AEA, will increase FLCN's presence within Gillam. One of the governance goals of the KCNs has been to increase their influence over decision making within their Resource Management Areas (RMAs). Many of the activities funded through the KCNs' AEAs take place within the RMAs and involve activities such as stewardship of the land and its resources.

What we Heard – Governance, Goals and Plans

Representatives of CFLGC expressed the concern that the Project is an intrusion into local First Nations government. It was argued that confidentiality agreements signed by the KCNs as part of their partnership with Manitoba Hydro have had a negative effect on transparency and accountability. The Panel heard similar concerns from some Presenters, including two council members from KCN communities who said they and other community members felt unable to speak against the Project. The Panel also heard concerns about voting procedures in the referendums on the JKDA and the AEAs.

Commission Comment – Governance, Goals and Plans

The Panel is aware that there is a range of opinion in all four KCNs regarding the Keeyask Project. Representatives of the KCNs, and the KCNs' environmental assessments, acknowledged the very mixed feelings held even by those members who voted in favour of the JKDA. The Panel even heard these mixed feelings expressed by the representatives testifying in support of the Project. It is not surprising, then, that some members of the KCNs feel that involvement in the Partnership will affect the ability of

their leaders to govern and plan for their community's needs.

VEC – Community Health

Possible community health impacts resulting from the Project that were considered in the EIS include the effects of changes to the water in the Nelson River resulting from construction and creation of the reservoir, the potential for injury resulting from increased traffic on roads, and a variety of potential impacts resulting from lifestyle changes brought about by the Project.

Impacts on water quality include increases in turbidity in the river, largely as a result of in-stream construction of the cofferdams, which will be greatest close to the construction site. The Keeyask construction camp will have a separately licensed wastewater treatment plant, which will discharge effluent and which will meet provincial waste treatment regulatory guidelines. Impoundment of water in the reservoir will result in the release of naturally occurring mercury into the aquatic ecosystem. The effects of this phenomenon were assessed separately in the Mercury and Human Health VEC below.

The Project will increase traffic on PR 280 between Thompson and the North Access Road, as described under the VEC Transportation Infrastructure. As a substantial amount of this additional traffic will include large freight-hauling trucks, there will be an increase in vehicles passing on this portion of road. The percentage increase in traffic on more heavily travelled roads and highways, such as PTH 6 leading to Thompson, will be much lower.

Community health factors related to lifestyle change include changes in the consumption of country foods, which could

be brought about as a result of loss of access to resource harvesting areas, disturbance affecting the presence of food animals, and concerns of resource harvesters about contaminants, such as mercury. Reduction in consumption of country foods could lead some residents in the Project area to shift to less healthy diets of processed foods, which is one of the reasons access to country foods will be the focus of several programs supported through the AEAAs.

Lifestyle changes resulting from the Project could also be related to working on the Project and having more disposable income. While increased personal income is usually desirable, new income can also lead to increased spending on alcohol and drugs, with resulting effects on health. This is an additional concern in communities such as Bird and TCN, where there is no alcohol sold legally but where there is road access to communities that do have liquor stores and bars. Past resource development in the Project area and throughout North America has shown that this can be an effect of the rapid infusion of work and income.

Another potential community health effect results from interaction with the large population of temporary project workers who will be attracted to the area. In combination with the increased disposable income in the neighbouring communities themselves, the presence of a large number of outsiders has the potential to further encourage what is described as “binge partying.” These impacts are considered in more detail in the VEC Public Safety and Worker Interaction.

What we Heard – Community Health

An expert in health impact assessment retained by the CAC found that, despite substantial improvements over the health impact assessment (HIA) used for Bipole III, the Keeyask HIA had a number of

information gaps. The Proponent’s assessment benefitted from using a broad definition of health and the determinants of health and from consideration of the Cree concept of *mino pimitasiwin*. It also included many potential pathways through which the Project could affect community health. However, the expert testified that the HIA was lacking in baseline data on community-level indicators of alcohol and drug use, injury, food insecurity, sexually transmitted diseases and other health issues. The expert also testified that the HIA did not address the possible effects of infectious diseases (such as respiratory diseases, influenza, gastrointestinal or food-borne illness) associated with crowded living conditions and work camp settings, and so did not explore mitigation measures for these health impacts or for the increase in sexually transmitted diseases that often results when a large mobile workforce arrives in an area.

The potential impact of the Project on consumption of country foods was another concern. Representatives from the CAC and CFLGC were concerned that fears of possible contamination might discourage community members from consuming country foods, including those not affected by mercury. As a result, members would lose the health benefits of country foods. While the AEAAs are designed to allow community members to hunt, fish and gather food in alternative locations, it was argued that the fact that the programs depend to a large extent on air transport makes them less likely to provide for a regular source of food, because fishing, hunting or gathering trips will need to be planned in advance. Witnesses also were concerned that the economic impact of the Project could have an effect on community health if it worsens the amount of inequality in the communities. Communities with greater levels of inequality generally have lower levels of community health.

The Panel also heard more than one witness raise concerns about stress and mental health resulting from rapid change. It was noted that the Proponent did not consider the mental health consequences of changes to the appearance of the region, the loss of the sound of the rapids, and other changes that were considered under the VEC Aesthetics.

VEC – Mercury and Human Health

Mercury is naturally found in soil and vegetation and has always been present in very small amounts in food. Most mercury in the soil is inorganic, but some is converted into an organic form, methylmercury, as a result of activity of bacteria. It is this methylmercury that is consumed by organisms at the bottom of the food chain. Methylmercury then accumulates in the flesh of organisms and becomes increasingly concentrated higher up the food chain. The highest mercury levels accumulate in larger, predatory fish such as pike and walleye, which eat mid-level predatory fish. Recently flooded reservoirs have higher levels of mercury than natural lakes because the flooding of soil and vegetation causes organic material to be consumed by bacteria, which creates methylmercury. Once the easily degradable material has been consumed, bacterial activity declines, and as a result, mercury levels in reservoirs decline gradually toward the natural, background levels. The period of elevated mercury in boreal forest reservoirs typically lasts two to three decades. The concentration of mercury in the flesh of fish in reservoirs is primarily dependent on factors that include the amount of flooding, the kind of terrain that was flooded and the rate of water flow through the reservoir. Reservoirs with more flooded area, relative to total area, will generally have fish with higher concentrations of mercury, and flooded wetlands produce higher concentrations of mercury than flooded uplands.

The Proponent sampled the three most commonly consumed fish (pike, walleye and lake whitefish) as well as the smaller fish consumed by pike and walleye. More than 3,000 fish were analyzed for mercury. Most of the sampling was done from 2001 to 2006 in the reach of the Nelson River from just below Gull Rapids to just below Clark Lake, as well as in Split Lake, Stephens Lake, Assean Lake, and 12 lakes that will not be affected by the Project, where fishing will take place through the AEA offsetting programs. Concentrations of mercury in the sampled fish were compared to two Health Canada standards: a concentration of 0.5 parts per million (ppm), which is the maximum acceptable concentration in commercially sold fish, and 0.2 ppm, which is the recommended maximum concentration for people who consume a large amount of fish. Analysis of the data shows that mercury levels in the Nelson River are now comparable to levels in the fish from the AEA offsetting lakes. The average mercury concentration of whitefish sampled from the waterbodies never exceeded the 0.2 ppm guideline for people who consume large quantities of fish. Averages for walleye and pike exceeded the 0.2 ppm guideline in some years, but were always below, and in some years substantially below, the 0.5 ppm guideline for commercial sale. The Proponent's research demonstrated that, as a result of the creation of the Stephens Lake reservoir, mercury levels in pike and walleye initially increased, but have since declined to levels found in other waterbodies in the region. Mercury levels in whitefish increased slightly to approximately 0.2 ppm, but then also declined.

The Proponent predicts that mercury concentrations in fish as a result of Keeyask will peak three to seven years after flooding of the reservoir and return to background levels after 20 to 30 years. During this time, mercury concentrations in walleye and pike

in Gull Lake are expected to be at or in excess of 1.0 part per million (ppm), with maximum concentrations of 1.3 to 1.4 ppm. This is well above the maximum level allowed for commercial sale of fish (0.5 ppm) in Canada. Health Canada guidelines call for all people to avoid eating fish with such a concentration of mercury. Lake whitefish, on the other hand, are lower on the food chain, mostly eating benthic invertebrates (such as bottom-dwelling insect larvae, worms, and snails), and do not bioaccumulate mercury to the same extent. While their mercury concentration will increase, it is not expected to rise above 0.2 ppm, and so whitefish are expected to remain safe for all populations to eat with no restrictions.

The Project will also result in some increase in mercury levels in the fish in Stephens Lake, where average concentrations are expected to peak at approximately 0.41 ppm in pike and 0.43 ppm in walleye. At this level, women of childbearing age and young children would be advised to avoid eating pike and walleye from Stephens Lake, while less vulnerable populations would be advised to limit their consumption to one meal per week. Lake whitefish from Stephens Lake would remain safe for all consumers with no restrictions, with forecast mercury levels of 0.12 ppm.

The Proponent plans to monitor mercury levels in fish in the Keeyask reservoir, Stephens Lake, Split Lake and the Aiken River. If monitoring indicates substantial increases in mercury levels in Stephens Lake, it will be extended further downstream into the Long Spruce forebay. Studies of fish movement have indicated that there has been little movement of fish upstream through Birthday Rapids and Long Rapids and into Split Lake.

Project-related increases in mercury in aquatic mammals such as otter and mink,

which eat fish, are expected, but their tissues will remain low in mercury (increasing from 0.02 to 0.04 ppm). No change is expected to game animals such as moose and caribou.

Increased mercury levels in this reach of the Nelson River as a result of impoundment will not impair the ability of people to drink the water, because levels remain extremely low. Mercury levels in the water are forecast to remain within Manitoba's drinking water guidelines. Likewise, the level of mercury in the water will not pose a risk to swimmers.

As a mitigation measure, the KCN AEA's include offsetting programs to support fishing in more remote lakes that are not connected to the Project area. The TCN Healthy Food Fish program, which provides funds for transportation to more remote lakes for resource harvesters to catch fish, is intended to continue for the life of the Project, even after mercury levels return to present levels. Fish in the lakes that will be used during the offsetting programs have varying amounts of mercury in their flesh as a result of natural sources. Based on sampling in the offsetting lakes that was carried out in 2005, mercury concentrations in fish from offsetting lakes north of the Nelson River, including Pelletier, Recluse, Waskaiowaka, Christie and Caldwell, were comparable to the concentrations in fish from Stephens Lake and Gull Lake and considerably higher than fish in Clark Lake or Split Lake. The mean mercury concentration in fish caught in Pelletier and Christie Lake was noticeably higher than in fish caught in the Project waterbodies (including Stephens and Gull Lakes).

The Proponent will carry out a fish-consumption survey and human health risk assessment every five years once peak mercury levels have been reached after impoundment of the reservoir. The survey and assessment will continue to be carried out

until mercury concentrations have stabilized. The Proponent will also offer mercury testing of samples of meat submitted by resource harvesters during the operation period of the Project.

Clearing the reservoir prior to impoundment – which was not done with the Kettle reservoir – will reduce the amount of methylmercury produced through bacterial processes.

What we Heard – Mercury and Human Health

An expert witness for the CAC analyzed the data on mercury in fish and on fish consumption contained in the EIS and compared mercury levels of fish in the Keeyask area to those in lakes elsewhere in Canada and in retail stores. The witness expressed the concern that the Human Health Risk Assessment in the EIS overstated the risk of mercury and could lead to individuals avoiding fish and thereby missing the valuable nutrients, such as polyunsaturated fatty acids, that they contain. The witness reported that, under current conditions, the average mercury levels in whitefish, walleye and pike in Gull Lake are substantially lower than the average for Canadian lakes and lower than the average found in commercial outlets in Canada or the U.S. The expert noted that according to the mercury guidelines in the Manitoba Recreational Fishing Guidelines, if mercury levels in Gull Lake whitefish rise to their predicted level after impoundment, the general population will still be able to eat up to 19 meals per month and women of childbearing age and children will be able to eat up to eight meals per month. Considering the nutritional benefits of eating fish, and especially the fact that whitefish are better sources of polyunsaturated fatty acids and are expected to remain at safe mercury levels, it is particularly important that the

risk communication measures used by the Proponent do not result in community members avoiding this important part of their diet.

Plans for monitoring of mercury levels in wild game, waterfowl and plants were a concern for the CFLGC. A representative of the group, citing a community-based mercury monitoring program elsewhere, was concerned that participation rates in a voluntary monitoring program could be low. This witness argued that it would be more appropriate to use systematic sampling of fish, game, waterfowl and plants in the Keeyask mercury monitoring program than to rely on community members to voluntarily submit samples, as is the current plan.

Commission Comment – Mercury and Human Health

Because of the well-known health problems caused by methylmercury, this is a subject that understandably raises fears. However, it must be kept in mind that this is not a result of additional mercury being added to the system, as in the case of point-source industrial contamination, and the rise in methylmercury is a temporary effect that will occur over a period of two to three decades, with mercury levels peaking in three to seven years. This is important to remember because fear of mercury can have a health impact of its own. Continued monitoring for mercury will be necessary not just to ensure the health of community members but to ensure that individuals continue to benefit from a healthy diet. The Panel has heard from many sources that country foods, including fish, are both culturally important and an important source of nutrients. Uncertainty about the health of fish from local lakes and rivers could lead individuals to avoid fish that are, in fact, safe to eat. As an alternative, they may end up eating less healthy, nutrient-

poor processed foods. It is important that monitoring and communication programs be led by members of the community in order to build credibility and ensure that the message reaches its audience in the most effective way. There is already some distrust of Nelson River fish in the KCN communities. We heard during the hearings and read in the KCN environmental assessments that many people today find that fish from the Nelson River do not taste as good as in the past or have a different texture. People have also said that the fish are less healthy or more likely to be deformed. These changes may have led some people to view the Nelson River with suspicion. In order to encourage a healthy diet, it is necessary to rebuild trust in the health of the waters.

The Proponent has proposed a detailed reservoir-clearing plan, which will help to reduce the potential increased levels of mercury in fish, but it is recognized that this will only have a limited mitigating effect.

Existing observations from other boreal reservoirs suggest that increased mercury concentrations can occur in fish downstream of the reservoir. These increases may be present along a river until it reaches a large water body, where dilution and natural processes such as sedimentation and photochemical degradation reduce levels of methylmercury. The Proponent has suggested that Stephens Lake will perform some of this function and thereby have some mitigating effect. If substantial increases in mercury are observed in Stephens Lake (above 0.5 ppm), the monitoring program will be extended further downstream. The Commission would also note that fish mercury monitoring is also conducted by Manitoba Conservation and Water Stewardship and Manitoba Hydro under the Co-ordinated Aquatic Monitoring Program at several sites in the region, including the Limestone forebay. The

Commission believes that monitoring in this forebay will be important to assist in assessing how far downstream and for how long elevated levels of mercury in fish will persist. Such monitoring should be done on the same schedule as sampling in the Keeyask reservoir and Stephens Lake, until it is established that downstream concentrations are not affected by the Project or have returned to background concentrations in the region.

With the flow of water through Birthday Rapids changed by the creation of the Keeyask reservoir, it is possible that some fish from the reservoir that have elevated levels of mercury will move upstream into Split Lake. The Proponent has committed to monitoring mercury levels in fish in Split Lake.

Given the year-to-year natural variability in fish mercury concentrations, additional pre-flood fish mercury data would be useful to help quantify existing concentrations. The Commission therefore believes it would be useful to carry out pre-flood monitoring of fish mercury concentrations in more than one year. Water column sampling of total mercury and methylmercury is planned in the Keeyask reservoir and in Stephens Lake after flooding. Post-flood monitoring of mercury in the sediments in the Keeyask reservoir and Stephens Lake and in the water column downstream to the Limestone forebay would also assist in confirming the predictions based on models.

Licensing Recommendations

The Commission recommends that:

- 11.2 *Keeyask Hydropower Limited Partnership carry out mercury monitoring in the Long Spruce and Limestone forebays on the same schedule as for Stephens Lake and the Keeyask reservoir until it can be determined that there is no effect.*

11.3 *Keeyask Hydropower Limited Partnership carry out pre-flood monitoring of fish mercury in Gull Lake and Stephens Lake until flooding.*

Non-Licensing Recommendation

The Commission recommends that:

11.4 *Keeyask Hydropower Limited Partnership carry out post-flood monitoring of mercury in sediments and in the water column in the Keeyask reservoir and Stephens Lake to inform the effects of future projects.*

VEC – Public Safety and Worker Interaction

At peak capacity, during portions of 2016-18, the construction work camp on the north side of the Nelson River at the Keeyask site will accommodate approximately 1,600 workers, mostly from outside the region. As well, during an earlier stage in construction, approximately 100 workers will be housed at a camp on the south side of the river to build the South Access Road. Members of the KCNs, and especially members of FLCN, are concerned about the large influx of workers near their home community. This concern grows out of the history of interactions between FLCN members and the large workforce that was brought to the area beginning with the construction of the Kettle dam in the 1960s. FLCN members have identified harassment, racist comments, sale of drugs, violence (including sexual assault), pregnancy and paternal abandonment as consequences of these previous projects.

The main construction camp will be 208 km by road from Thompson and 140 km from Gillam, until the new road running along the top of the dam and powerhouse

is completed. The camp will have amenities including a lounge and recreation centre. Construction workers' rotations will be somewhat dependent on the arrangements of the contractor. Under the Burntwood Nelson Agreement, most workers will work 10 to 12 hours per day and have one day per week off.

Planned mitigation measures to prevent problems related to interactions between workers and the community include having recreational amenities at the camp to reduce off-site visits, providing mandatory cultural training for workers, establishing a camp committee to oversee rules for appropriate camp behaviour, restrictions on unauthorized visits to the camp and use of company vehicles for personal use, operating a shuttle service to transport incoming and outgoing workers to the airports in Gillam and Thompson, establishment of a Worker Interaction Committee as part of the Harmonized Gillam Development initiative, and ongoing liaison with the RCMP.

What we Heard – Public Safety and Worker Interaction

Representatives of CFLGC said the issue of Public Safety and Worker Interaction is particularly important for the protection of First Nations' women in the Project area. They cited occurrences of harassment, abuse and sexual assault that occurred at the time of the construction of the Kettle and Long Spruce dams and recommended that steps need to be taken to prevent abusive actions and a hostile environment for women. The Panel also heard concerns about the potential for the Project to affect road safety. Community members said impaired driving and hit-and-run accidents occurred during previous projects in the area.

Representatives from the MMF spoke about the potential impact of the Project on public safety in Thompson, given that

contractors may travel through the city and spend time there before or after periods of work. Two witnesses from Thompson spoke about the city's problems with violence and substance abuse and said that these had been fueled by an influx of money and workers during the construction of Wuskwatim. They noted that Thompson is the centre for many activities in northern Manitoba and all traffic going to Keeyask and the other major Manitoba Hydro projects in the north must travel through the city. Contractors travelling to the region may spend time in Thompson before moving on to the Project sites, they said. The witnesses also spoke about the potential for increased discretionary income in the region to create a larger market for drugs, thereby attracting more gangs.

Commission Comment – Public Safety and Worker Interaction

The Panel has heard the concerns of KCN members, particularly those expressed by FLCN, regarding the issue of Public Safety and Worker Interaction. The “boom town” atmosphere of the 1960s and 1970s is not healthy for anybody, least of all families in communities overwhelmed by a massive influx of outsiders. However, Keeyask is not Kettle. In the case of Kettle, the dam was built just a few kilometres outside of Gillam. In the case of Keeyask, workers would need to drive 140 km on gravel roads to visit Gillam from the main work camp. It is unlikely that large numbers of workers would opt for such a long drive, given the limited amenities and nightlife Gillam has to offer. Thompson, 208 km away, would be a more likely destination for workers with a day off, but would still be a considerable distance. Except for the one day off per week, there will be relatively little opportunity for workers to go anywhere off site and the camp is intended to have recreational facilities for workers. In the case of Kettle, workers remained in the project area

for up to three months at a time. In the case of Keeyask, workers from outside the region will be brought by shuttle bus from Thompson or Gillam, and then returned to these locations by shuttle for their return home after a 21-day period of work. These steps and others are meant to ensure that workers from outside the region do not have their own vehicles on site, so they will have few opportunities to visit any off-site communities. It is expected that only workers from northern Manitoba will have their own vehicles.

That said, it is inevitable that the Project will lead to some increase in visits to Gillam and Thompson. Cultural training is a positive step to encourage responsible and respectful behaviour. Other measures, designed to prevent or punish irresponsible and non-respectful behaviour, may also be required. The Panel encourages the Proponent to follow through on stated plans for preventing worker-interaction problems. Monitoring of worker interactions will be required throughout the construction.

Panel members noted that there is still some uncertainty regarding the question of workers having a day off while at the camp. In many other locations in Canada, workers are flown to the work site and work continuously for a certain number of days before being flown home for their days off. This approach provides the workers themselves with an extra day at their homes during the time off and also results in their having no free time in the project area when they could interact with the local community or have an impact on local resources. The Panel understands that the intended approach, with a day off at the camp, is in keeping with earlier hydroelectric projects in northern Manitoba, but thinks this is a practice worth reconsidering. The Panel has heard that having a day off during a long work rotation may be beneficial for workers from the Keeyask area, who would then be

able to visit their families more regularly. For those direct negotiated contracts that will employ the largest number of KCN members, this arrangement may have value. Overall, the Panel urges the Proponent to work with its contractors to ensure that work scheduling has the least impact on the local community.

VEC – Travel, Access and Safety

The VEC Travel, Access and Safety considers both road travel and water and ice travel. In assessing road travel, the Proponent examined traffic volumes and collision data from Manitoba Infrastructure and Transportation and the RCMP, as well as forecasts of traffic that will be generated by workers and the transportation of materials and equipment. Project-related travel will result in noticeable traffic increases along PR 280 between Thompson and the Project site. Freight transport is expected to be the most significant concern for existing users of the road, both regarding traffic safety and the effect of the trucks on road conditions. The KCNs have expressed concerns about dust, loose rock and safety along PR 280 in the past. Manitoba Infrastructure and Transportation has carried out a program of improvements to PR 280, including widening and shaving corners to make them less sharp.

The Project will affect water and ice travel in the Gull Lake area by blocking access to some areas during the construction period. It has the potential to affect water and ice travel as a result of shoreline erosion, which will cause debris and floating peat to get into the water, and the daily fluctuations of water levels in winter as a result of operating the powerhouse in the peaking mode. By reducing the velocity of the river flow between the generating station and Long Rapids, creation of the reservoir may also create safer boating conditions and a smoother ice surface for winter travel. Water and ice travel

is addressed through several provisions in the JKDA. The operating conditions agreed to in the JKDA are intended to have no effect on water levels on Split Lake and may only affect ice levels in rare (once every 20 years) low-water years. However, monitoring will be carried out to determine whether the ferry and ice road to YFFN are affected. Existing waterways management programs, under the Comprehensive Implementation Agreements with YFFN and TCN, are intended to keep debris out of the Split Lake. A Waterways Management Program will be created under the JKDA in which patrols will remove debris in the water. As well, safe ice routes will be maintained and marked along the reservoir. Pre-clearing of vegetation in the reservoir area will be carried out to decrease the problem of flooded vegetation rising to the surface.

What we Heard – Travel, Access and Safety

Representatives of Pimicikamak Okimawin spoke about the impact of hydro development on water and ice travel in their community as a result of fluctuating water levels and erosion. Fluctuating water levels and debris have damaged many boats and motors. Winter travel has been affected by fluctuating water levels, which cause the ice to crack and allow water to come to the surface and create slush, resulting in ice roads covered in water or snowmobiles stuck in slush.

Commission Comment – Travel, Access and Safety

The Panel is aware that community members are concerned about traffic, and remember past impacts that included impaired driving, hit-and-run accidents and road fatalities. Measures mentioned previously in the discussion of the VEC Public Safety and Worker Interaction (including liaison with RCMP and a variety of policies

to reduce driving by workers) are intended to reduce the risks associated with road travel. The Proponent should monitor the number of workers coming to the site in private vehicles. If the number proves to be significant, it may be necessary to take additional steps to reduce the use of private vehicles.

The narrow one-metre fluctuation in water levels on the Keeyask reservoir will prevent some of the extremes of erosion and slush ice that have occurred in areas with greater reservoir fluctuation. As with road transportation, a continuing monitoring program relying on the experiences and observations of the KCN communities will help to ensure that adverse effects are quickly identified and mitigated.

Licensing Recommendation

The Commission recommends that:

11.5 *Keeyask Hydropower Limited Partnership monitor the number of workers coming to the site in private vehicles, and if the number proves to be significant and of concern, take steps to reduce the number of private vehicles on site.*

VEC – Culture and Spirituality

Nine cultural indicators were selected to facilitate the description and analysis of effects of the Project on culture and spirituality: worldview, language, traditional knowledge, cultural practices, health and wellness, kinship, leisure, law and order, and cultural products. Potential impacts on these nine cultural indicators can come from working on the Project, the Project's impact on activities such as resource use, or other factors. A variety of mitigation measures, especially those outlined in the AEAs, address these potential impacts.

The KCNs described aspects of the Cree worldview, including the close spiritual connection to all aspects of *Aski/Askiy*, in their environmental assessments. Those individuals who work on the Project may feel a conflict between their worldview and non-Aboriginal worldviews. Changes in the landscape may alter or remove parts of the cultural landscape or decrease understanding of the spiritual connection to the landscape. The involvement of the KCNs as partners in project planning, assessment and monitoring, plus ongoing ceremonies during construction, are intended to mitigate these impacts.

As English will be the working language on the Project, individuals who work on Keeyask may have reduced opportunities to speak the Cree language. As well, loss of some specific places with Cree-language names may have an impact on language and culture. Cree language programs identified in the AEAs, ceremonies conducted in the Cree language, and cultural centres funded through the AEAs are intended to mitigate the impact of an influx of English language into the region.

Rapid change to the environment, including the clearing and flooding of the reservoir, may accelerate a process of loss of traditional knowledge. Again, involvement of the KCNs as partners in the planning, assessment and monitoring of the Project is intended as mitigation for this effect. ATK monitoring programs are intended to provide opportunities for elders, resource users and youth to visit sites and participate in monitoring using traditional knowledge.

Cultural practices will be affected by changes to the physical environment and loss of access to some places where individuals have gathered medicinal and edible plants or harvested animals and fish. The immediate Project area will not be accessible during construction and much of it will be permanently altered. Traditional camping

locations will be lost to flooding or erosion. The AEA offsetting programs are intended to provide access to alternative locations for these practices.

Health and wellness could be affected both by loss of traditional resources (including medicinal and edible plants and country food resources) in the Project area and by stress resulting from the destruction of *Aski/Askiy*.

Kinship could be affected by long absences of family members working on the Project. Monitoring of effects during the construction of Wuskwatim determined that some Nisichawayasihk Cree Nation families felt negative impacts from members being away on the job site for long periods of time.

Working on cultural products may be affected both by changes to the environment that reduce the availability of materials and by Project employment, which will result in people not having enough time to work on traditional cultural products. Individuals will be able to collect materials for creation of cultural products from the offsetting areas.

Counselling at the Project site through the Employee Retention and Support program will be intended to help workers and their families adjust to many of these cultural stressors. Cross-cultural training for all Keeyask operation staff will also be held to mitigate cultural conflicts. A video of Gull Rapids and the Nelson River upstream to Clark Lake will be created and shown at a visitor space at the generating station so that individuals and communities can pay their respects to *Aski/Askiy*.

What we Heard – Culture and Spirituality

Representatives of CFLGC spoke at length about the concept of “intangible cultural resources” which include the stories,

performances and practices of a culture, rather than just the physical artifacts. They argued that the Proponent’s assessment of the effects of the Project on culture – and the mitigation measures designed to mitigate these effects – stressed material artifacts and archaeological sites, rather than intangible heritage. The Panel heard a discussion of international efforts by the United Nations Educational, Scientific and Cultural Organization (UNESCO) to recognize and protect these cultural resources around the world. Intangible cultural resources of the nearby communities could be affected by the Project through the shift from a hunting/fishing/gathering economy to an industrial one or by the loss of stories and language associated with particular areas, such as the flooded area of the Nelson River. There was also a concern about the cultural effect of the loss of specific landscape features, such as historically and spiritually significant boulders along the Nelson River.

The role of the AEAs in supporting Cree language and culture was also a subject of some discussion. The Panel heard from a group of Fox Lake youth who had recently taken part in a cultural education program in which they travelled to a distant trout-fishing camp and learned a number of traditional skills. Although representatives of CFLGC said such programs had value, they were concerned about continued support for them in the future and the fact that such educational experiences may require a long journey from the more heavily developed environment near FLCN.

A witness for the KK elders group spoke of Cree customary law and the principle of *Kwayaskonikiwin* (reconciliation.) One of the ways of applying this principle to the Wuskwatim project, on which Manitoba Hydro is partnered with NCN, is to ensure that ceremonies are performed to seek

guidance, demonstrate respect, restore harmony, reverse the potential for misfortune and achieve balance. Members of KK also spoke of the need for a similar approach to heritage resources to that employed on the Wuskwatim Project.

Several witnesses raised the concern that the Proponent addresses many traditional activities, such as trapping, as economic activities that can be compensated for financially. But such activities have a great cultural value that cannot be replaced, it was argued.

Representatives for one of the KCNs responded to concerns about the loss of traditional activity resulting from Project employment by stating that KCN members do not see culture and economy as an either/or choice. They may wish to be both hunters and lawyers, tradespeople and trappers.

Commission Comment – Culture and Spirituality

The Panel considers that the Proponent has demonstrated significant will to reduce the impact of the project on culture and spirituality. Development of the three KCN environmental assessments, created by the communities themselves, allowed members to express their thoughts on the Project in terms of their own culture and worldview. The AEAs that were negotiated by the KCNs contain a large number of programs addressing cultural issues, including language programs, programs for young people to learn traditional skills, centres for ceremonies and the protection or display of artifacts discovered during Project construction. Ultimately, the vote to approve the JKDA and the AEAs must be taken to mean that the cultural aspirations of the KCNs are that they can maintain their culture while participating in the Project.

The Panel heard that place names are an important part of the transmission of knowledge and culture and that resource users in a particular area may have their own names that they have given to an island, a water body or another feature. The Proponent acknowledged the importance of place names when citing the fact that naming the Project Keeyask, rather than using the English words Gull Rapids, was a significant sign of the relationship between the partners. Accordingly, an additional step to acknowledge the culture of the communities where the Project is being built would be to bring back the original names or develop Cree names for other features, following consultation and agreement with the First Nations.

The Panel also considers it a positive step that the Proponent has indicated that it is working to develop a similar heritage resource plan to that described by the representatives of the KK elders group.

VEC – Aesthetics

Aesthetic effects of the Project include the excavation of borrow pits and quarries, building of the South Access Road, the elimination of Gull Rapids and the adjacent islands, flooding of 4,500 hectares of land upstream of the dam, the change from a riverine environment to a reservoir environment, and ongoing shoreline erosion. In the long run, the Keeyask reservoir is expected to be an aesthetically similar environment to Stephens Lake.

A park or rest area with boat launches upstream and downstream of the generating station is planned, along with a commemorative plaque or memorial. The KCNs plan ceremonies in order to help members cope with feelings brought about by the changes to the look (and sound)

of the environment. The Proponent has committed to reclaiming new borrow pits and disturbances created for Keeyask. Details concerning reclamation of disturbed areas are included in the JKDA.

Commission Comment – Aesthetics

Consideration of the appearance of the land is a serious matter, especially for people who live in the region and whose individual, family and community identity is intimately tied to the land. Panel members who visited the Keeyask site at the beginning of the public hearings were struck by the power and beauty of the rapids, and so the Panel is sympathetic to the argument that losing the physical appearance of this area will have a powerful impact on individuals and communities. The Panel has heard concerns about the loss of clear water, the scarring caused by erosion of riverbanks, and unsightly piles of dead trees and other vegetation. The Panel has also heard of, and in some cases witnessed, the long-lasting scars caused by the creation of borrow pits and quarries. Although the Proponent has committed to rehabilitating new borrow pits and quarries when they are no longer needed, in northern Manitoba regeneration of a disturbed site will take many years and so these scars will remain on the land for some time. These scars on the landscape have a regional impact, given that there remain disturbed sites from past developments and that future developments will also require a variety of disturbances. It will be important that there be co-ordination and co-operation between Keeyask and future projects, including Keeyask Transmission, to reduce disturbances and to re-use or re-cycle as much as possible.

While nothing can replace the lost Gull Rapids, it would be a step in the right direction if Manitoba Hydro were to restore some of the earlier borrow pits that remain as

scars on the landscape. Such a step would go a small distance toward making up for some of the additional disturbance to be caused by roads, transmission lines, construction and flooding at Keeyask. Given that the long-term plans of Manitoba Hydro call for the development of the Conawapa dam, acting now to remove additional impacts on the landscape would be proactive.

11.5 Domestic Resource Use

VECs assessed in the area of Domestic Resource Use were domestic fishing and domestic hunting and gathering. Commercial fishing was assessed above under Resource Economy, as was trapping.

Much of the resource harvesting by KCN members takes place within their Resource Management Areas, areas established through the Northern Flood Agreement Implementation Agreements or through FLCN's 2004 Impact Settlement Agreement. These agreements between the First Nations, Manitoba Hydro and the Province of Manitoba establish the RMAs for the purposes of integrated land-use and resource management. They are managed by boards with equal representation from the Province of Manitoba and the First Nation. The boards' powers include assessing the resources in the area, monitoring their use, making management plans, holding public meetings and identifying measures, including quotas and limits, to manage resources. Figure 11.2 shows the location of each of the RMAs.

VEC – Domestic Fishing

Effects on domestic fishing will be caused by changes to navigation on and access to fishing areas, changes to the fish resources resulting from the disturbance to the environment, potentially increased competition for fish resulting from the

Fig. 11.2 Resource Management Areas in the Lower Nelson River Region (Courtesy of KHLP.)



presence of a large workforce, increasing participation in the wage economy resulting in reduced domestic fishing activity, and shifting patterns of resource use due to the offsetting programs facilitating harvest in other lakes.

Some areas near the site will not have access for domestic fishing during construction. At this time as well, the river's flow will change as cofferdams are built and the river is redirected. Later, when the dam is completed and the reservoir is flooded, navigation on the new reservoir will be different. New boat launch areas will be created to provide access up and downstream of the dam. The existence of the ice boom will allow a stable ice cover to form earlier in the winter on the reservoir, although it will form with frazil ice that is difficult to travel on. As a mitigation measure, the Waterways Management Program will install and monitor safe ice trails. The Waterways Management Program will operate boat patrols in summer to remove debris that could form a navigation hazard. Two boat crews and one ice-trail crew will work on these programs.

As discussed in Chapter Ten, the Project will change habitat for the fish species that use the reach of the Nelson River from Stephens Lake to Split Lake. The Proponent will seek to replace existing spawning habitat in Gull Rapids that will be lost, as well as young of the year sturgeon habitat in Gull Lake, and will stock sturgeon in an effort to support a self-sustaining population. As discussed under the VEC Mercury and Human Health, domestic fishing for pike and walleye in the Keeyask reservoir will be affected for at least 20 to 30 years following impoundment of the reservoir.

The presence of a large workforce at Keeyask may cause increased competition for resources. However, only about one per cent of construction workers fished during construction of Wuskwatim. Angling from shore will be permitted, but the Access Management Plan will not permit workers to bring boats to the site. As well, workers without access to vehicles will be limited in their ability to fish off site. Since workers in the camp have no place to store any fish they catch from shore, this fishing will be essentially catch and release, except for the occasional shore lunch. During operations,

the increased population forecast for Gillam may increase competition for fish resources at various popular locations in the region.

Participation in the wage economy may reduce the amount of domestic fishing by KCN members. On the other hand, Project workers may be able to afford new boats and other fishing gear.

The AEA offsetting programs will shift fishing and hunting pressures to other areas throughout the region. The AEAs identify several lakes both north and south of the Nelson River for alternative use. Terms of the AEAs vary, but include support for transportation and equipment to facilitate use of areas other than the Nelson River. A study of comparative abundance of fish in the Keeyask area showed that fish abundance in the offsetting lakes varies, but is generally higher than in Gull Lake, Stephens Lake or Split Lake. Using a measure called “catch per unit of effort” (CPUE), which indicates the number of fish that could be caught with a standard length of gill net over a specified time, the Proponent determined that Gull, Stephens and Split Lakes have CPUE ratings of 24.8, 23.5 and 35, respectively. The two most productive of the offsetting lakes had CPUE scores over 100. The Proponent plans to monitor the sustainability of the fishery in these offsetting lakes.

VEC – Domestic Hunting and Gathering

Impacts on domestic hunting and gathering may be felt through noise and dust and other disturbances caused by construction, limits to hunting in the construction area and near the access roads, changes in access and navigation on waterways near the Project, disturbances that may reduce the availability of wildlife, the presence of a large construction workforce causing increased competition, increases in

the wage economy reducing the amount of time people have for hunting and gathering, shifting patterns of resource use as a result of the AEAs, the loss of habitat resulting from flooding of 4,500 hectares of land, and the expected long-term increase in Gillam’s population leading to increased competition. No gathering activity was documented within the immediate area of the Project, except on Lillian Island, which will be flooded by the reservoir.

For safety reasons and to prevent increased harvesting, construction workers will not be allowed to bring firearms or recreational vehicles to the site.

Cree Nation Partners (TCN and WLFN) have developed a Moose Harvest Sustainability Plan, to assist them in managing the moose population and harvest in the future. The objectives of the Plan are to ensure that CNP members continue to have meaningful opportunities to hunt moose for food, to manage the opportunities for CNP members to hunt moose provided through the AEAs, and to contribute to the long-term sustainability of moose in the SLRMA.

What we Heard – Domestic Resource Use

The Panel heard testimony concerning domestic resource use by non-KCN Aboriginal people in the Keeyask area, as well as concerns about the potential for resource-use conflicts arising out of the AEA offsetting programs.

A traditional use study, carried out by the MMF, showed both hunting and plant gathering carried out by Métis in the Keeyask study area. The 35 respondents who took part in the study indicated plant gathering along PR 280 from Thompson to Stephens Lake. The most frequently cited areas of moose

hunting by Métis indicated in the study were in the Thompson and Thicket Portage areas, although pockets of moose hunting were identified near Stephens Lake. Caribou hunting by Métis was indicated close to the Keeyask site on the south side of the Nelson River and near Split Lake and Stephens Lake adjacent to PR 280. Upland bird harvest was indicated in the study along PR 280 from Thompson to Stephens Lake. The study also demonstrated that food fishing was concentrated in the area around Thompson and Thicket Portage and extended along the Nelson River to the Kelsey Dam.

Representatives of PFN testified that their members have traditionally travelled to northern Manitoba to take part in resource harvesting. They presented a map, based on interviews with members, that indicated some resource use along the Nelson River between Stephens Lake and Split Lake, and a larger amount of resource use near Split Lake and Assen Lake. The map also indicated some resource use by PFN members along some of the lakes that will be affected by the AEA offsetting programs. The same map also indicated broadly dispersed traditional uses by PFN members throughout northern Manitoba. The survey on which the map was based indicated that one individual from among those surveyed had travelled on Gull Lake.

A delegation of speakers from Shamattawa First Nation raised the concern that YFFN's Resource Access and Use Program, one of the AEA offsetting programs, could create conflict with Shamattawa resource users. This program will fund YFFN members to travel to the York Factory Resource Management Area, located along the Hudson Bay shore around the mouth of Hayes River and further east toward the Ontario border, for resource harvesting. YFRMA overlaps a number of registered traplines used by Shamattawa members and many of these individuals

visit their trapping areas for other resource harvesting. Shamattawa representatives referred to an annual spring goose hunt that takes place at Kaska, within the area that could be affected by the York Factory AEA. They also stated that they believe hunting has already increased along the Shamattawa winter road.

The Panel also heard a presentation from several members of a family that has traditionally hunted and fished at Gull Lake and trapped on Trapline 15. The family members described their connection to the land and water, through harvesting of resources, recreation, and family history, and said that the Keeyask Project will affect them physically, mentally, socially and spiritually. Financial compensation for effects on the trapline will not make up for these other effects, they said. They said they had had discussions about the Proponent finding them another trapline, but that would never replace their family's long connection with the trapline at Gull Lake.

Commission Comment – Domestic Resource Use

The Panel agrees that the Project will have impacts on domestic resource use through increased access to some areas for resource users, increased disturbance, and the creation of the reservoir, which will affect fishing on this reach of the Nelson River for at least 20 to 30 years and flood an initial 4,500 hectares of land. It appears, however, that the most directly affected portions of the Nelson River are currently not heavily used for domestic fishing.

The Panel heard that there is some other use of the Project area by other groups, including Métis people and members of PFN. The Panel is also aware that a more detailed Métis traditional use study is intended to be

submitted to the Proponent in the spring of 2014. While indications so far are that neither of these groups makes a substantial amount of use of the directly affected area, it will be necessary for monitoring and management of the Keeyask Project to be aware of use by non-KCN members. As well, even if there are relatively few non-KCN resource users hunting, fishing or gathering in the Keeyask area, for those individuals this loss of resource-use opportunities in this area may be an important impact. The Panel has also heard the concerns of Shamattawa First Nation regarding resource use on traplines of Shamattawa members located within the York Factory Resource Management Area. Again, it will be necessary to monitor this situation carefully.

Offsetting Programs

One of the largest impacts on domestic resource use resulting from the Project is an indirect effect: the creation of the offsetting programs through the Adverse Effects Agreements (AEAs).

The AEAs are agreements signed between Manitoba Hydro and each of the four KCNs to mitigate any adverse effects caused by the Project in their territories. These agreements arose out of the JKDA and preceded the completion of the environmental assessment. Like the JKDA, the AEAs were subject to approval by referendum in the respective communities.

The AEAs are intended to benefit the future socio-economic and cultural well-being of the communities. Among other things, the AEAs will: provide substitute opportunities for members of the KCNs to conduct domestic resource use in areas unaffected by the Keeyask Generation Project; increase opportunities to practise traditional pursuits on the land; and increase the availability of healthy country foods to community

members. The AEAs are flexible enough to be able to adapt to future changes in community needs. They are described in greater detail in Chapter Six.

It is not the Commission's intent to pass judgment on these agreements. Given how they came into existence and the fact they were supported by community members through a formal process, this would be beyond our mandate.

Throughout its presentations in the hearings, the Proponent often noted that specific adverse effects would be addressed, moderated, offset or, even, resolved through the AEAs. Despite this stated importance, the agreements received little attention from other parties to the hearings. However, as the hearings progressed, it became clear to the Panel that some elements of these agreements would result in environmental effects and that these would be effects that arise out of the Project. These effects do fall under the mandate of the Commission.

The Commission sees the potential for some concern with the Access programs, designed to provide KCN members with substitute opportunities to hunt, fish and trap for food in their respective Resource Management Areas. The specific concern is with the ongoing management of the resources in the areas where these substitute opportunities will occur.

These offsetting programs have the potential to impact an area in the vicinity of Keeyask by spreading harvest to a number of other lakes and hunting areas. There may be a requirement for increased access through the creation or improvement of portages and trails. These programs may be in place for a very long time because they are not tied to any end date. Given that the amount of fish and other resources that could be harvested

through these programs may be substantial (the TCN program specifies up to 62,000 kg of fish per year), it will be necessary to monitor these programs and to consider the sustainability of these resources.

The use of air travel to remote lakes and harvesting areas used in the offsetting programs presents less of a potential adverse effect than increasing surface access. Creating new roads or trails allows other users to access areas and may also create a pathway for invasive species. Where road or trail access has been created or improved through the offsetting programs, monitoring will be needed to determine to what extent this new access is used by other harvesters.

The Commission notes that the Proponent did state that “offsetting programs will be operated in a manner that conserves resources, considers safety of participants and others, and is respectful to other resource users.”

The responsibility for resource management in the RMAs is set out in the NFA Implementation Agreements and Fox Lake Cree Nation’s Impact Settlement Agreement. These provide for resource management to be the responsibility of Resource Management Boards, comprised of equal numbers of provincial and First Nation representatives.

It is not readily apparent how the RMBs were involved in the discussions/negotiations that led to the offsetting programs, nor how the Province directly, or indirectly through the RMBs, was advised of these intentions. The Province has the ultimate responsibility to manage Manitoba’s resources.

In considering this matter, the Commission notes:

- In each of the four agreements, one article grants the First Nation “**sole** responsibility for the management, implementation and operation of each Offsetting Program” (emphasis added)
- Each agreement commits the First Nation “to seek input from the Resource Management Board and to provide Annual Program Reports to the Resource Management Board with respect to the management and administration of Offsetting Programs that involve resource management, resource harvesting and resource use activities ...” The nature and extent of “input” has not been defined.
- Each agreement contains a commitment to monitoring, including requirements relevant to adverse effects. It is left to Manitoba Hydro and the First Nation to determine the nature, scope and duration of monitoring of adverse effects. In this regard, dispute resolution is left to an independent arbitrator.

As noted above, these agreements were subjected to very little scrutiny during the hearings. Therefore, a full understanding of the intent of the agreement is not on the record and the Panel can only make the following observations:

- If there is a significant uptake in participating in these offsetting resource-use opportunities, it is possible there could be adverse effects on the sustainability of certain species and populations, in particular fish, moose and, perhaps, caribou.
- The Province of Manitoba must fulfill its obligations in managing Manitoba’s resources. This may be as simple as continuing to play an active role on the existing RMBs and the offsetting programs being addressed as part of the

RMB responsibilities. This would involve the First Nation, the RMB and Manitoba Conservation and Water Stewardship working co-operatively in managing the resources.

The monitoring commitment in the agreements appears to exclude any involvement of the Province of Manitoba. There is a possibility that these commitments may override such conditions that might be contained in the regulatory licence.

The Commission's intent is to ensure that the resources in the region remain sustainable, that Keeyask Project effects are fully considered, and that sufficient and appropriate oversight is provided to accomplish that goal.

To that end, the Commission makes the following suggestions to help minimize any negative impacts:

- The KCNs, as much as possible, consider the use of air travel rather than the creation of new roads or trails for the offsetting programs.
- Should roads or trails be developed, careful planning and site selection be used to limit the potential for others to use these access points. This includes consideration of access controls.
- Should roads or trails be developed as part of the offsetting programs, a monitoring program be put in place to assess use by non-KCN members.
- KCNs, RMBs, and Manitoba Conservation and Water Stewardship work together on licences and permits associated with the offsetting programs, including those required for the cabins, docks, ice houses, and storage sheds. These facilities should be located so that they do not assist non-KCN members to exploit resources,

limit effects on tourist operations, and minimize effects on the natural environment.

- KCNs report to the RMBs annually on road/trail construction, harvest from the offsetting lakes, harvest of large mammals, access by other parties, conflicts between user groups, and the overall success of the offsetting programs.

Licensing Recommendation

The Commission recommends that:

11.6 Keeyask Hydropower Limited Partnership, for the life of the Project, monitor and report to Manitoba Conservation and Water Stewardship on the effects of the offsetting programs on:

- *fish populations in lakes used in the offsetting programs;*
- *moose and caribou populations in areas that fall under the offsetting programs; and*
- *any other impacts on local resources as a result of offsetting programs.*

11.6 Heritage Resources

Heritage Resources was a single VEC in the EIS. The effect of the Project on heritage resources was assessed using three study areas: a Core Study Area, a Local Study Area and a Regional Study Area. The Core Study Area is the area of the Project Footprint, plus a buffer zone, including the North and South Access Roads, the main construction sites, the reservoir area and the Nelson River from Gull Rapids to Clark Lake. The Local Study Area includes the Core Study Area, as well as an area north to PR 280 (plus a small portion north of PR 280) and south to include the

area around War and Fox Lakes, and east to the Kettle dam. The Regional Study Area extended east to include the Long Spruce dam and west to a point approximately mid-way between Split Lake and Thompson. The Core Study Area is where the majority of the effects of the Project on heritage resources will be felt. Heritage resources within the Core Study Area will be permanently lost due to flooding of the reservoir.

Archaeological field investigations for the Project were carried out between 2001 and 2010. Work was carried out by the Project consultants, working with members of the KCNs, and as well through archaeological programs established in TCN, WLFN and FLCN that involved elders and youth. In total, research carried out for the Project identified 114 new archaeological sites, bringing the total in the Regional Study Area to 176 heritage resource sites located throughout the Core, Local and Regional Study Areas. A total of more than 30,000 artifacts were recovered during field investigations related to the Project, including items from the pre-European contact period, including fish and animal bones, stone tools, stone flakes and pre-contact ceramics. A smaller number of artifacts were found from the post-contact period, including nails, ammunition, buttons, glass and post-contact ceramics. The largest portion of the artifacts included animal bones, providing an understanding of the diet of past inhabitants of the area.

At the time of the hearings, artifacts that had been discovered were being stored, pending being turned over to the Manitoba Historic Resources Branch, with plans for their repatriation to TCN for eventual storage and display at the Keeyask Centre museum.

Construction of the Project and flooding of the reservoir will result in the loss of 67 of these heritage resource sites located within

the Core Study Area. Ten will be affected during construction by creation of borrow areas and construction of Project facilities. These include campsites, tool-making sites and one burial site. All but one of these date to pre-European contact times. Most of the heritage resources that will be affected by the flooding of the reservoir are along Gull Lake, although some are further upstream on the Nelson River or on creeks flowing into the Nelson River. These include a large number of campsites and tool-making sites, in addition to two portages and three burial sites. Of the sites that have been dated to a specific period, three within the Core Study Area have been dated to the Archaic period (2,000 to 6,000 years ago). One of the sites on Gull Lake contained human remains dated to 4,300 years ago.

KCN members have expressed concern that any effect on water and ice levels on Clark Lake could harm heritage resources, such as campsites, located close to the water. Ongoing shoreline monitoring is planned to determine if any heritage resources have been disturbed by water level changes. During operation of the Project, the Waterways Management Program, which will patrol the reservoir to clear debris, will provide support services for periodic shoreline surveys.

As part of TCN's AEA, display and interpretation of heritage resources found within the areas will be part of the Keeyask Cultural Centre Museum and Oral Histories program. A cemetery and memorial marker will be developed for any human remains found in the core study area during construction or impoundment.

As part of the Environmental Protection Program, a Heritage Resource Protection Plan, drafted with core Cree concepts and *The Manitoba Heritage Resources Act* as the foundation, will provide measures to be

employed in the event that heritage resources or human remains are discovered during construction or operation of the Project. Development of a plan similar to that employed for construction of the Wuskwatim Generating Station is currently underway.

Commission Comment – Heritage Resources

The Commission believes that the very substantial involvement of the KCNs in the Project has gone a long way to mitigating impacts to heritage resources. The Commission believes that the development of a Heritage Resources Protection Plan that integrates core concepts of the Cree worldview with *The Manitoba Heritage Resources Act* was a positive step.

Chapter Twelve

Cumulative Effects

12.1 Overview

The Proponent's EIS employed an approach to cumulative effects assessment (CEA) in which effects of past, present and future projects on each valued environmental component (VEC) were assessed within the discussion of that VEC. The past, present and future projects considered were not the same for every VEC. This is because the spatial boundaries of the study areas varied from one VEC to another. Six different study areas were used in assessing aquatic and terrestrial effects. Two additional study areas were used in assessing most socio-economic effects. Three different study areas were used in assessing effects on heritage resources.

Generally speaking, the spatial boundary for the study areas was described as the point at which the effects of the Keeyask Project would be no longer discernible. In practice, this meant that study areas were smaller for aquatic and terrestrial VECs with a very localized range, and larger for VECs, such as caribou, that travel farther. For socio-economic effects, the boundaries were larger still, because impacts such as job creation and increased traffic could be felt over a much larger region of northern Manitoba.

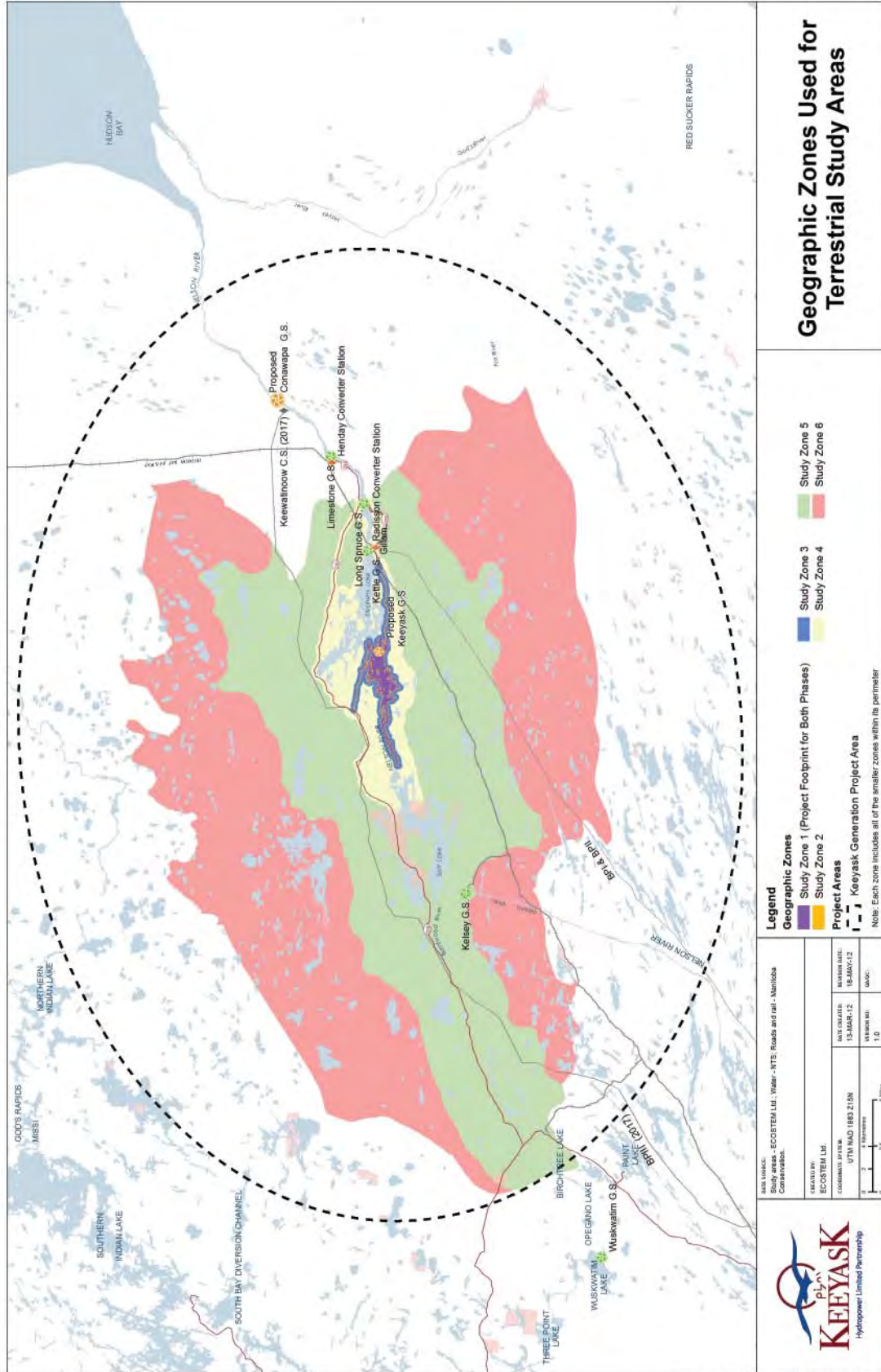
The Proponent established a variety of benchmarks for some VECs to indicate at which point the cumulative impacts of past,

present and future projects could be said to make the transition from low magnitude to moderate or high magnitude.

Only VECs that were expected to have a residual negative impact from the Project were assessed for cumulative effects. As VECs related to the economy (such as employment and business opportunities) were assessed to have a positive effect from the Project, they were not considered in the cumulative effects assessment. Resource use VECs such as domestic hunting and gathering, domestic fishing and commercial trapping were considered to have a neutral effect from the Project as a result of mitigation measures and the Adverse Effects Agreements (AEAs), and so they were not given a cumulative effects assessment either.

For many terrestrial environment VECs, the Regional Study Area for the assessment of cumulative effects was Zone 5. The eastern boundary for Study Zones 5 and 6 (the Regional Study Area used for caribou) was the boundary between two distinct ecoregions: the Hayes River Upland to the west and the Hudson Bay Lowland to the east. As this eastern boundary was near the Long Spruce Generating Station, several past and future impacts were not within the Regional Study Area. Some projects outside the Regional Study Area would have impacts that would be assessed within the Regional Study Area. For example, the

Fig. 12.1 Keyask Generation Project Study Areas, plus Existing and Proposed Projects. (Courtesy of KHLP.)



Keewatinoow Converter Station (part of the Bipole III Transmission Project) is outside the Regional Study Area, but the cumulative effects assessment considered that construction of Keewatinoow will generate traffic on PR 280 within the study area (Figure 12.1).

12.1.1 Past and Current Projects Considered in the Keeyask CEA

- Churchill River Diversion (CRD), Lake Winnipeg Regulation (LWR), Jenpeg, Kelsey, Kettle, Long Spruce, Limestone, Wuskwatim, Kelsey re-running, Keeyask Infrastructure Project
- Transmission lines, rail lines, highways, including upgrading of PR 280
- Mining and mineral exploration, commercial forestry, commercial fishing

12.1.2 Future Projects Considered in the Keeyask CEA

- Bipole III Transmission Project (including Keewatinoow Converter Station and other facilities)
- Keeyask Transmission Project (which includes three new transmission lines running from the Keeyask generating station to the Radisson Converter Station near Gillam)
- Gillam Redevelopment
- Conawapa Generation Project

12.2 Cumulative Effects Assessment

12.2.1 Water Quality

The CEA notes that the Keeyask Cree Nations (KCNs) have observed a decline in

water quality on Split, Clark and Gull Lake and the Nelson River since the beginning of hydro development. Results of technical analyses of water quality vary, but in the CEA it is stated that, by the 1990s, conditions in Split Lake appeared to have stabilized. Currently, water in the river and lake sections of the Nelson River is described as moderately nutrient rich and well oxygenated. Construction of Keeyask will result in increases in nutrient concentrations near the outlet of the construction camp sewage treatment plant and more widespread increases in total suspended solids (TSS) during times of in-stream construction work. Following construction, sheltered backbays in the reservoir will experience elevated TSS and nutrient levels and, on occasion, depletion of dissolved oxygen. These effects are expected to diminish after 10-15 years. Most future projects in the area (Bipole III, Gillam Redevelopment, Keeyask Transmission) are land-based and are not expected to have an impact on water, so they do not overlap the effects of Keeyask on water quality. There is the potential for overlap with Conawapa construction, as the increase in TSS will extend downstream to the Conawapa site. This effect (less than five mg per litre) is predicted to have no measurable harmful effect on aquatic life.

12.2.2 Fish

KCN members have reported declines in the number of fish, changes in species composition and reduction in quality of fish from the Nelson River since the beginning of hydro development. Technical studies have found that walleye, pike and lake whitefish are found in comparable numbers in Split, Gull and Stephens Lakes to many off-system lakes. Construction of the Keeyask Generation Project will eliminate or negatively impact spawning habitat for lake whitefish and walleye at Gull Rapids, but spawning habitat

will be replaced with newly constructed spawning shoals. During operation, walleye populations are expected to increase due to an increase in foraging habitat in the Keeyask reservoir. Pike will lose foraging habitat initially due to the flooding of the reservoir. As vegetation and aquatic organisms become established in the newly flooded shoreline areas, they will gain new habitat. The CEA indicates minimal potential for overlap of Keeyask effects with future projects, with only Conawapa involving in-stream work. There is, however, the potential for increased fish harvest in the Conawapa area as an indirect effect of Keeyask.

Sturgeon populations were affected by commercial harvest from the 1940s to '80s and have since then been affected by hydro development, including CRD and LWR. Dam construction on the Nelson River has eliminated critical sturgeon habitat. Keeyask will eliminate sturgeon spawning habitat at Gull Rapids, which will affect sturgeon populations in Stephens Lake. Changes to water levels and flows after the creation of the reservoir will disrupt young-of-the-year habitat for sturgeon and may also disrupt spawning habitat in Birthday Rapids. Constructed spawning habitat in the tailrace of the Keeyask Generating Station is expected to replace the spawning habitat in Gull Rapids. The Proponent also has plans to construct young-of-the-year habitat in the Keeyask Reservoir and carry out a stocking program for as long as it takes to establish a self-sustaining population. The Proponent states that these programs will result in an overall increase in sturgeon populations. As well, the Partnership states that the Lower Nelson River Sturgeon Stewardship Agreement focuses on enhancing the overall population.

12.2.3 Habitat, Ecosystems and Plants

The Proponent stated that the physical footprints of past and existing projects have removed about five per cent of historical terrestrial habitat. Losses have been higher for habitat types that occur on mineral sites, as these are the typical locations for roads, settlements and other developments. Wetland function and composition along the Nelson River have been substantially changed by past hydro developments, including CRD and LWR, to the extent that all Nelson River shoreline wetlands have either been lost or modified. Total core area intactness (a VEC referring to the amount of the area that is within intact parcels of land at least 200 hectares in size that are not bisected by any linear disturbances) has been reduced in the Regional Study Area to about 83 per cent of the pre-development total. Along with these changes, there has been a corresponding loss of priority plants associated with Nelson River shorelines and with mineral sites.

Taking Keeyask and future projects into account, the Proponent estimated that the Regional Study Area would have 94 per cent of terrestrial habitat remaining, compared to the pre-development state. Total core area intactness would decline from the present 83 per cent to 81 per cent after Keeyask and future projects. Benchmarks for these VECs were set such that effects would be considered small if 90 per cent or more of terrestrial habitat remained and if intact core areas still made up at least 65 per cent of the Regional Study Area. The Proponent stated that the 90 per cent benchmark was based on a precautionary approach, as studies show that biodiversity and ecosystem function may be affected when the amount of terrestrial habitat remaining falls below 80 per cent. Wetland function is not expected to be affected by future projects beyond Keeyask,

as future projects are not expected to overlap any high-quality wetlands. Future projects will remove some individual occurrences of priority plants, but the Proponent predicts these impacts to be non-existent to moderate, depending on the species. The Project will not eliminate any of 42 less-common habitat types described in the discussion of the VEC Ecosystem Diversity. Of these less-common habitat types, the type most affected by Keeyask and future projects will be reduced to 90 per cent of its pre-development total.

12.2.4 Birds

Cumulative effects for bald eagles and Canada geese were assessed using the larger Zone 5 as the Regional Study Area, while other birds were assessed using Zone 4. Benchmarks for assessing cumulative impacts on birds were set at 20 per cent habitat loss (80 per cent of pre-development habitat remaining) for mallard, Canada goose and bald eagle, and 10 per cent loss for the three species at risk considered as VECs (common nighthawk, olive-sided flycatcher, and rusty blackbird). The Proponent stated that there is no defined regulatory threshold or benchmark for birds.

As Canada goose breeding habitat will not be affected by Keeyask, the Project, in conjunction with future projects, is not expected to affect population sustainability. Immediately after impoundment, there will be little use of the reservoir by geese, but as aquatic vegetation becomes established in the reservoir, they are expected to return. Breeding habitat for mallard is also not expected to be substantially affected, as they are more likely to breed in marshes and lakes further inland from the Nelson River. Total mallard habitat affected by past, present and future projects in the Regional Study Area was calculated at five per cent. Cumulative effects on bald eagle are not quantified in

the EIS, although it does note that there will be overlap with Conawapa. The Proponent stated that, following the Project, eagles will likely congregate in the area near the tailrace. Sustainability of regional populations is not expected to be affected.

For the three at-risk songbirds that were assessed as VECs, the total amount of habitat that has been affected by past and existing projects is not quantified in the EIS. According to the calculation in the EIS, the Project will result in a five per cent loss of olive-sided flycatcher habitat within the Regional Study Area (Zone 4), six per cent loss for rusty blackbird and up to 10 per cent loss for common nighthawk. Using a formula suggested by the Clean Environment Commission to attempt to quantify the effects of habitat loss from past and existing projects in the Regional Study Area, the cumulative effects of habitat loss on these three songbird VECs could be 17.7 per cent, 20.2 per cent and 24.7 per cent, respectively.

12.2.5 Mammals

The EIS employed different study areas for the three mammal VECs (caribou, moose and beaver), with caribou having the largest study area: Zone 6. The EIS considered cumulative impacts on caribou in the context of the needs of four different populations known to spend time in the Project area: barren ground caribou, two herds of coastal caribou and the population identified in the EIS as summer resident caribou. Using a benchmark for woodland caribou established by Environment Canada (2012), the benchmark for low impact on caribou was set at 65 per cent of total habitat in the area being undisturbed, both by human causes and by wildfire. If 55 to 65 per cent of habitat is undisturbed, the impact would be moderate, and if less than 55 per cent is undisturbed, the impact would be high.

Within Study Zone 6, habitat is already at the 65 per cent undisturbed level. Keeyask and future projects would lower that to 63 per cent undisturbed. When considering a larger area to take in the range of the Pen Island caribou, approximately 73 per cent of habitat is undisturbed and Keeyask and future projects will reduce that to 71 per cent. During the hearing, the Proponent also presented calculations of the cumulative effects of loss of islands and peatland complexes used for calving and rearing and of winter habitat. Keeyask and past projects together will affect caribou movements by reducing intactness and causing sensory disturbance and will remove some calving habitat. These effects will overlap with the foreseeable effects of the Keeyask Transmission, Bipole III and Conawapa projects.

Moose have been affected by past and existing projects that have altered habitat along the Nelson River. The cumulative effect of habitat loss on moose was not quantified in the EIS, but using a formula provided by the Clean Environment Commission, cumulative habitat loss for moose, including Keeyask and future projects, was estimated at less than five per cent. Effects on moose are expected to overlap with foreseeable effects of Keeyask Transmission, Bipole III, Conawapa and Gillam redevelopment projects. Current moose populations in the Split Lake Resource Management Area appear secure, but increases in harvesting and access could cause concern.

Cumulative effects on beaver were assessed using Zone 4. The EIS notes that habitat effects on beaver from past projects have been large. The EIS predicts that 20 to 30 active beaver colonies will be impacted during clearing and flooding of the Keeyask reservoir, and states that this is less than 10 per cent of the estimated population in Zone 4. The EIS also states that Keeyask will affect approximately five per cent of the beaver

habitat in this zone. Although the cumulative effect of past, present and future projects is not quantified in the EIS, the Partnership says it is considered not significant because there is plentiful habitat in the region and beavers can reproduce quickly. Using the formula provided by the Commission for calculating past, present and future habitat loss, the cumulative effects on beaver habitat in Zone 4 would be approximately 20 per cent.

12.2.6 Infrastructure and Services

Effects of Keeyask on these VECs, including housing, transportation infrastructure and community infrastructure and services, are expected to overlap with the effects of the construction of Bipole III and the Keewatinoow Converter Station and will potentially overlap with Conawapa. There will be increases in traffic on PR 280 from these projects, which will require monitoring and may require special measures such as more frequent dust control. Construction activity in the region may increase the demand for temporary accommodation in Thompson, although the Proponent notes that the planned closing of the nickel smelting and refining operation in Thompson and the recent opening of new hotel capacity in the city may alleviate some of these effects. Monitoring of population change in Gillam will be needed and there may be a need to increase the amount of housing in the community.

12.2.7 Personal, Family and Community Life

Construction of Keeyask will overlap with construction of Bipole III (including the Keewatinoow Converter Station), Keeyask Transmission and Gillam redevelopment and the potential impact of Conawapa. Final stages of Keeyask construction could coincide with the peak construction years of Conawapa. The influx of construction

workers, cash and rapid change could impact several VECs in this category, including community health, public safety and worker interaction, travel, access and safety, culture and spirituality, and aesthetics. Additional monitoring of community health (by the appropriate branches of the federal and provincial governments) may be required to assess the potential for increases in communicable diseases, substance abuse, injury and harmful interactions, especially with vulnerable people. Mitigation measures to reduce the potential for negative interactions between communities and Keeyask Project workers will also need to be undertaken for future projects in the area. Mitigation measures, such as Adverse Effects Agreement programs that are designed to mitigate the impact of the Keeyask Generation Project on culture and spirituality, would be negotiated prior to any future project in the area. The aesthetic impact of the Keeyask Generation Project is expected to overlap with the Keeyask Transmission Project.

12.2.8 Heritage Resources

The EIS notes that there will be overlap between the Keeyask Generation Project and the Keeyask Transmission Project, as the transmission project will require additional clearing and disturbance. The Keeyask Transmission Project has gone through a heritage resources impact assessment undertaken under *The Heritage Resources Act* to identify and address known heritage resources. The Keeyask Transmission Project will have a Heritage Resources Protection Plan to address any heritage resources that are discovered during construction.

What we Heard – Cumulative Effects Assessment

The Manitoba Branch of the Consumers' Association of Canada (CAC) presented a

team of expert witnesses who assessed the cumulative effects methodology employed in the EIS. Their assessment looked at four basic stages of CEA methodology: the adequacy of scoping practices, the retrospective analysis of baseline conditions and cumulative effects, the prospective analysis of potential cumulative effects, and management measures for cumulative effects. These witnesses also provided a list of points where the EIS did “reasonably well” in considering cumulative effects and a list of points where improvements were needed. The following were key points on the four basic stages of CEA methodology:

- Scoping. Good-practice elements included relatively broad regional boundaries that were ecologically based, consideration of a broad range of past, present and future projects, and consideration of VECs that would experience adverse direct effects. Concerns about scoping included: not considering future effects of the existing Bipole I and II transmission lines, identifying Wuskwatim as a past or current project and not considering it under future projects, and not considering Conawapa in the cumulative effects analysis for fish. They were also concerned that the EIS did not specify how far into the future the CEA projected future impacts. The witnesses also argued that the EIS used spatial limits designed to capture VEC populations directly affected by the Keeyask Project. Spatial boundaries in CEA should be broader, they said.
- Retrospective analysis. Good aspects of the retrospective analysis included providing spatial data for terrestrial habitat for historical, existing and future activities and presenting measurements of linear disturbance and core area changes for past, present and future. However, they noted that there were few thresholds

or targets used against which cumulative change could be measured, aside from the benchmarks used for linear features and disturbance of caribou habitat. The witnesses noted that the Proponent stated that technical information on Nelson River water quality in the pre-Hydro period is lacking, limiting the ability to provide a retrospective analysis. They noted as well that the EIS describes some benchmarks, such as those mentioned for the VEC Priority Plants, in the Environmental Effects section. But these benchmarks were not carried forward into the cumulative effects section.

- Prospective analysis. The witnesses found that the Keeyask CEA demonstrated modest improvement over the Bipole III CEA with regard to future effects. They agreed in principle with a statement by the Proponent that the focus of cumulative effects assessment is on the vulnerability of each VEC in the future. They said the CEA analysis for the VEC Intactness was an example of good practice CEA, while those for VECs Water Quality, Wetlands and Priority Plants were examples of weak practice. For some VECs, they found a lack of models and analysis of likely future trends. For others, they stated that the Keeyask CEA assumed a higher degree of certainty about future effects and the success of mitigation measures than the existing information supports.
- Cumulative effects management. The witnesses noted that the Proponent concluded that there would be no cumulative effects from the Project following the proposed mitigation. This prompted them to ask if too much confidence was being placed in the proposed mitigation measures. They noted that, within the Environmental Effects section of the EIS, it is acknowledged

that some of the effects of the Project will be moderate. As well, the KCNs' environmental assessments predicted a greater spatial and temporal extent to the Project's effects, one example being that the KCNs expect the Project to affect water levels and quality on Split Lake, while the technical assessment states that this will not be the case. The CAC witnesses noted that the advice in the Cumulative Effects Practitioners' Guide is to make conservative assumptions about cumulative effects, that is, to assume that an affect will be more rather than less adverse. The witnesses also stated that the Keeyask CEA masked or minimized cumulative effects by comparing disturbances in the Local Study Area to a larger Regional Study Area.

Ultimately, the two CAC witnesses said that the EIS itself makes the case that the Project may cause significant adverse cumulative effects, given that Keeyask is being built within a region that has already been significantly impacted – environmentally and socio-economically – by past projects. They presented two conflicting ways of looking at the impact of Keeyask when added to past developments. From one perspective, the incremental effect of future development on the Nelson River is insignificant because of the magnitude of past effects: in effect, because the environment has already been so substantially altered that further change doesn't matter. From the other perspective, the fact that the environment has already been substantially altered means that any future alteration must be seen as cumulatively significant and therefore any future development must not proceed until a net positive contribution to sustainability of the sub-watershed and its communities can be demonstrated.

Several Participants and Presenters spoke about the need to view all cumulative effects

of hydroelectric development regionally. Representatives of Peguis First Nation (PFN) stated that the Keeyask CEA should have considered all the connected waterways that are managed for electrical production by Manitoba Hydro, including Lake Winnipeg. An expert witness testifying for PFN demonstrated a technique for visualizing and estimating the historic impact on waterways throughout northern Manitoba as a result of CRD, LWR, the Nelson River dams and the Grand Rapids dam on the Saskatchewan River. The process involves collecting historical maps from before hydroelectric development, scanning the maps, correcting for inaccuracies, and comparing them to scanned versions of contemporary maps of the same area. The data from the scanned maps are turned into a kind of computer file called a shapefile, which then allows the computer to calculate the area flooded (or dewatered) in each area by the various developments. Adding up all the flooding from all the projects, the expert witness found that approximately 135,000 hectares (1,350 square kilometres) had been flooded in northern Manitoba as a result of hydro development.

Representatives of Pimicikamak Okimawin stated that the scoping of the Keeyak EIS failed to consider cumulative effects of all the hydroelectric projects that have affected their community. Community members and representatives spoke extensively of the impacts they have felt as a result of the regulation of Lake Winnipeg water levels, including shoreline erosion, debris, damage to fishing, unpredictable ice levels, and impacts on ice travel. They argued that Aboriginal people in the region do not see each hydro development as an individual project, but as part of one large project.

An expert witness testifying for Pimicikamak suggested that one way to

better consider the cumulative effect of all the hydro projects might have been to designate as a VEC “the naturally functioning riparian corridor of the Nelson River.” Such an approach would have considered the existence, or not, of a naturally functioning riparian corridor all along the Nelson. Another alternative suggested by this expert witness would have been to designate “the natural hydrological regime” as a VEC. Doing so would have allowed the EIS to consider the existence, or not, of natural flow conditions all along the Nelson River, and the impact they have on habitat and other aspects of the environment. The expert witness also argued that one cumulative effect of an additional generating station on the Nelson River is that, with more money invested on the river in power generation, there will be more incentive to manage water flows on the river only for power generation, at the expense of the environment.

Individual Presenters, both during the hearings held in northern Manitoba and in Winnipeg, spoke frequently about cumulative effects. Many presenters said that, from their point of view, all the hydroelectric developments in the north are part of a single on-going project and so they cannot be separated. The point was frequently made that the water that will turn the turbines at Keeyask flows past other communities as it makes its way down the watershed. Many presenters spoke about effects on fishing, navigation, water quality, recreation, aesthetics, culture and spirituality resulting from LWR, CRD, Kettle, and other major projects.

Commission Comment – Cumulative Effects Assessment

The Panel recognizes the great deal of effort put into the assessment of Project effects. The direct effects assessment was

very well done and the cumulative effects assessment was a great improvement over past project assessments. However, the Panel still has some concerns about the CEA, specifically, regarding the delineation of the study area and the quantification of cumulative effects for the terrestrial environment. As well, conclusions regarding the lack of adverse cumulative effects in the aquatic environment and in the socio-economic environment appear to be based on optimistic assumptions about the success of mitigation measures.

The Proponent's use of an ecological boundary for the terrestrial environment study area resulted in the exclusion of a number of past and future projects. Study Zones 5 and 6, which were used for cumulative effects assessment for many VECs, extended only as far east as the Long Spruce Generating Station, excluding the Henday Converter Station, Limestone Generating Station, the future Keewatinoow Converter Station, part of the Bipole III transmission line and the proposed Conawapa Generating Station from the study areas for these VECs. When asked to assess impacts of disruptions in an extension area that included these projects, the Proponent indicated that various aspects of Bipole III (including Keewatinoow) and Conawapa will affect an additional 3,174 hectares of land, while existing projects in this extension area impact 1,297 hectares, for a total of 4,471 hectares.

One of the significant questions, raised by the witnesses for the CAC, was whether, in assessing cumulative effects, we should consider that new impacts are minor in comparison to past impacts, or consider that, since past impacts were significant, any new impact will add to that significant disruption. The Commission agrees that for most VECs, Keeyask will not add substantially to what has occurred over the past 50 years. For sturgeon

and woodland caribou, however, there is the potential for the combination of past, present and future projects to have a significant cumulative effect. This is especially the case if the mitigation measures for sturgeon are not successful. For caribou, until the "summer resident" herd and its range can be better defined, the degree of uncertainty about effects or mitigation will be great.

The Keeyask EIS would have benefited if the Proponent could have made use of data collected in research for the Bipole III Transmission Project. Through a series of requests for information regarding cumulative effects boundaries, VECs and habitat modelling, it was discovered that there was an incompatibility in data collection and analytical methodologies between the Bipole III and Keeyask Generation Projects. Vegetation cover data that had been classified in a Bipole III-specific database would have been useful in delineating and confirming the distribution of vegetation cover classes in the Keeyask area. The Commission also pointed out to the Proponent that there were areas of overlapping impact between the two projects where there would be effects on VECs that were assessed in one or both of the project environmental impact statements, including beaver, moose, caribou, American marten, mallard, bald eagle, olive-sided flycatcher, rusty blackbird and common nighthawk. The Proponent responded that, given the time available, it would be impossible to meld the data sets from the two EISs in order to add information on Bipole III impacts to the Keeyask CEA, as different data collection and analysis methodologies had been used. The Panel considers this a great loss of valuable information that could have better informed the Keeyask assessment.

Another important question raised in the critique of the Proponent's CEA practice concerned the decision not to conduct a

cumulative effects assessment for VECs that are not expected to have a negative impact from the Project. There would be less possibility of small impacts adding up to something substantial (the oft-stated “death by a thousand cuts”) if all VECs, regardless of the assessment of individual impacts, were considered in the CEA.

The Panel also found that the Keeyask EIS lacked quantification of the cumulative effects of past, present and future projects for many VECs. When asked in an Information Request to quantify the effects of past and existing projects, the Proponent responded that data are not available to determine the specific habitats that might have existed prior to the beginning of industrial development in the region. The CEC suggested an approach for quantifying the effects of past and present projects on many VECs. This approach was based on determining the ratio of current habitat for a given VEC species relative to all current habitat in the area and then multiplying that by the total pre-development habitat. While it may not be exact, it provides some illustration of how much habitat has been lost. The ratio is below:

Using this formula, it becomes possible to have at least some understanding of the cumulative effects of past developments in the study area on various VECs. When asked to employ this formula, the Proponent found that cumulative effects on several VECs exceeded their own benchmarks. Specifically, olive-sided flycatcher, rusty blackbird, common nighthawk and beaver had all lost amounts of habitat within their Regional Study Areas in excess of the Proponent’s benchmark.

$$\frac{\text{VEC current habitat}}{\text{Total habitat available}} \times \text{Total pre-development habitat} = \text{Total VEC Habitat Lost}$$

In response to questions about the cumulative loss of habitat, especially for the three songbirds that are species at risk, the Proponent stated that the displaced animals would be able to find other available habitat in the larger region. Along these same lines, the Panel considered that the Proponent did not make sufficiently consistent use of benchmarks for all VECs.

Ultimately, the Panel agrees that the threats to these three songbirds are not a result of habitat loss in northern Manitoba, but threats to habitat elsewhere in their range. The Panel also agrees that beaver populations are not under threat in Manitoba and will not be affected by a larger-than-originally-stated loss of habitat in the immediate area of the Project. However, a more rigorous evaluation would provide greater confidence in the conclusions, and it is essential that monitoring be done to confirm these conclusions or undertake further mitigation measures should significant negative impacts be identified.

Like many Participants and Presenters, the Panel believes that the Proponent has placed a great deal of confidence in its mitigation measures. This is particularly the case with regard to the habitat construction and stocking measures planned for lake sturgeon. The assumption that these measures will be successful has allowed the Proponent to judge that there will be no adverse cumulative effects from Keeyask and, in fact, a positive impact. In the same way, the Proponent has placed confidence in its mitigation measures for social impacts, such as those intended to prevent negative interactions between community members and Project workers. In these areas, monitoring will be extremely

important in order to determine if these optimistic assumptions are misplaced and to determine if adaptive management measures are needed to respond to unexpected problems.

The Panel heard many Participants and Presenters refer to the need for a Regional Cumulative Effects Assessment, which would consider all of the effects of hydro development along the Nelson and Churchill Rivers. It was frequently pointed out that the Commission had made a recommendation for such an assessment in its report on the Bipole III Transmission Project, and it was recommended that a licence for Keeyask be withheld until such an assessment is completed. The Panel has heard that Manitoba Hydro is working with Manitoba Conservation and Water Stewardship on defining such a study and expects to have it completed in 2015. The Panel is aware that a great deal of research has been undertaken on the environment in the Churchill-Nelson region and believes that much baseline information for a Regional CEA is already available. The Keeyask hearing reinforces the conclusion that a Regional CEA needs to be carried out.

In many of our reports, over the past decade, the Commission has made specific recommendations to both the Manitoba Government and to proponents aimed at improving the practice of cumulative effects assessments in Manitoba. We continue to stand by those recommendations and believe that a similar recommendation is, again, warranted.

Non-Licensing Recommendation

The Commission recommends that:

- 12.1 *The Manitoba Government establish provincial guidelines for cumulative effects assessment best practices and include specific direction for proponents in project guidelines.*

Chapter Thirteen

Monitoring and Follow-up

13.1 Overview

Protection of the environment in both the construction and operation phases of the Keeyask Project, including monitoring, management and mitigation of impacts, will be carried out under the Keeyask Environmental Protection Program. The Environmental Protection Program is also intended to test the predictions made in the environmental impact statement (EIS), identify unanticipated effects, and outline a process for developing responses to unanticipated effects. Within this Program are three types of plans for protecting various aspects of the environment during both the construction and operation phases of the Project. These are Environmental Protection Plans, Environmental Management Plans, and Environmental Monitoring Plans. Drafts of these three plans were included in the EIS, but the final plans are intended to be drawn up after an *Environment Act* licence has been issued, incorporating any conditions that are attached to such a licence.

The Environmental Protection Program makes use of collaboration between Manitoba Hydro and the Keeyask Cree Nations (KCNs). Just as the Project was assessed using a two-track approach employing technical science and the Cree worldview and Aboriginal traditional knowledge (ATK), monitoring will be conducted using parallel streams of

technical science and ATK. A Monitoring Advisory Committee (MAC), with representation from Manitoba Hydro and the KCNs, will provide oversight for monitoring and management during construction and operations.

13.2 Environmental Protection Plans

An Environmental Protection Plan provides detailed site-specific protection procedures for use during various stages of construction of the Project. Two Environmental Protection Plans are being developed: one for construction of the generating station and one for construction of the South Access Road. These plans will be used to guide contractors and other workers to have the least adverse effect on the environment and to remain within specific guidelines or regulations. They are organized by specific construction activity, such as clearing of trees or construction of cofferdams, and contain a variety of specific measures, such as:

- Specific mitigation measures outlined in the Environmental Effects section of the EIS;
- Erosion and sediment control measures;

- Timing restrictions such as avoiding blasting or other kinds of work during spawning, calving or bird-breeding seasons;
- Environmental sensitivity maps, such as maps showing the setback distances required for work around caribou calving areas or rare plant areas;
- Emergency response plans, such as those for spill containment and clean-up;
- Regulatory documents that outline federal or provincial guidelines for work being done;
- Permits, licences and authorizations; and
- Inspection sheets for use by an environmental officer who monitors contractor compliance.

13.3 Environmental Management Plans

Environmental Management Plans focus on minimizing effects on a specific aspect of the aquatic, terrestrial or socio-economic environment. They outline specific actions to be taken during construction and/or operation and often also include provision for monitoring to determine the success of these actions or whether additional actions are needed. Eight Environmental Management Plans will be developed:

- Sediment Management Plan – developed to minimize the impact of in-stream sediment from construction activities in the Nelson River and actions to be taken if total suspended solids (TSS) exceed specified limits. This plan is focused on the in-stream construction of cofferdams, which will be the largest contributor to TSS.

- Fish Habitat Compensation Plan – describes structures to be installed (such as artificial spawning reefs and young-of-the-year sturgeon habitat) to compensate for loss of fish habitat and follow-up activities to determine the success of these structures or needed modifications. This is a plan that is required by Fisheries and Oceans Canada.
- Construction Access Management Plan – describes measures to control access to construction areas and ensure safe access for authorized users. This plan is designed for public safety and to protect resources by not creating new public access on roads and trails created during construction.
- Heritage Resource Protection Plan – describes procedures to be taken for responding to heritage resources or human remains found during construction and operation of the Project.
- Vegetation Rehabilitation Plan – describes where and how construction areas such as borrow pits that are not needed for operation will be decommissioned and rehabilitated, giving preference to rehabilitating the most-affected priority habitat types.
- Terrestrial Mitigation Implementation Plan – describes implementation of measures to mitigate terrestrial impacts, including the development of new wetland and the placement of bird-nesting structures.
- Waterways Management Plan – describes measures to contribute to safe use of the waterway from Split Lake to Stephens Lake, including a boat patrol that will monitor shorelines and manage debris pre- and post-impoundment.

- Reservoir Clearing Plan – describes methods of clearing the future reservoir, including which areas are to be cleared by hand.

13.4 Environmental Monitoring Plans

There are two kinds of Environmental Monitoring Plans: technical science plans and ATK plans. Each of the four KCNs will have its own ATK monitoring plan and will involve elders, resource users and others in the community in monitoring the effects of the Project. Technical science Environmental Monitoring Plans monitor the effects on the VECs that were described in the EIS. The five technical science plans are Physical Environment, Aquatic Effects, Terrestrial Effects, Socio-Economic Effects and Resource Use. These plans identify specific kinds of follow-up sampling, testing and observation that will be made on topics such as water regime, erosion, sedimentation, water quality, aquatic habitat, lower trophic levels, fish habitat, wildlife, plants, terrestrial habitat, employment, business opportunities, traffic, safety and resource use. In addition to verifying predictions in the EIS, monitoring is intended to address areas where there is a difference between the predictions made by technical science and ATK.

The Keeyask Monitoring Advisory Committee will review outcomes of the activities in the Environmental Protection Program and, if necessary, make recommendations for additional mitigation measures. The MAC will make use of results of both the technical science and ATK monitoring activities in its discussions. It will also ensure that the outcomes of the Environmental Protection Program are communicated to members of the KCNs and to the general public.

13.4.1 Specific Technical Monitoring Activities

Planned monitoring activities are focused on specific VECs or supporting topics as assessed in the EIS. Some monitoring is planned for the construction or initial operating period, while other parameters will be monitored for 20-30 years after impoundment, and a few for the life of the Project. Many of the specific monitoring activities were mentioned previously in the discussion of each of the VECs in the EIS. Among the many technical monitoring activities will be: testing water at a variety of locations, conducting plant surveys, mercury testing, monitoring populations and movements of a large number of VEC and non-VEC animals, and tracking employment, population and other socio-economic indicators.

13.4.2 ATK Monitoring Programs

Each of the KCNs is developing a community-specific monitoring program that will involve planning and implementation of monitoring activities based on construction or operational activities and community concerns. These programs will build community experience and capacity in socio-economic and environmental monitoring and provide employment and training opportunities for members. Activities that are anticipated include:

- Site visits by elders, resource users, youth and other community members before, during and after key construction milestones to observe conditions;
- Community-based activities, such as workshops and key person interviews;
- Involvement of community members in technical science-based monitoring; and

- Communication activities and events, such as forums and open houses.

13.5 Environmental Management Approach

The Proponent intends to employ an adaptive management approach, which is a planned process for responding to unanticipated effects or uncertainty. Adaptive management is based on a cycle of planning and action described as “Plan – Do – Evaluate – Adjust (as necessary).” Adaptive management will be applied when monitoring demonstrates that there is a difference between the predicted effects of the Project and the actual effects and there is an opportunity for additional improvement in protection or mitigation. In some cases, there will be pre-determined adaptive measures that can be used, while in other cases new measures will need to be designed and evaluated. Examples are cited in the EIS of what this might entail. If the lake sturgeon spawning structure is not as effective as anticipated, alternative measures might entail redesigning the structure or providing additional spawning areas. If TSS levels rise above specified limits, it may be necessary to modify construction activities that are causing the increase in sediment or to temporarily halt the activity. If concerns arise about project employment – such as KCN members not being hired or not being retained – these concerns will be reviewed by the Advisory Group on Employment, which may make recommendations to the Project Manager (Manitoba Hydro) for new measures.

13.6 Implementation of the Environmental Protection Program

The Proponent proposes that Manitoba Hydro, as the project manager for Keeyask, will submit reports to Manitoba Conservation and Water Stewardship to fulfill whatever reporting conditions are attached to a licence issued under *The Environment Act*. The Proponent proposes that Manitoba Hydro will also submit reports to Fisheries and Oceans Canada under the *Fisheries Act*. It is proposed that these reports will include both compliance monitoring and reports on the outcomes of the technical science and ATK monitoring programs. As well, a report summarizing monitoring will be prepared annually for both the KCNs and the general public. The Proponent has also committed to posting reports on a publicly available Keeyask website.

All environmental requirements, including the Environmental Protection Program, will be included in tender documents for construction of the Project and all contractors will be required to comply with these plans. A training program will be delivered to contractors and Manitoba Hydro personnel so that they will be aware of the Environmental Protection Program and, particularly, the two Environmental Protection Plans and their requirements. Inspection will be a regular feature of the Environmental Protection Plans, and the Project Environmental Officer will inspect worksites daily and record any incidents or cases of non-compliance. Meetings to discuss environmental issues will be held regularly with the Project Manager, Resident Engineer, Environmental Officer and contractors. The Project Manager, Resident Engineer and Environmental Officer will have the authority to issue stop-work orders to prevent environmental damage or damage to heritage resources.

What we Heard – Monitoring and Follow-up

Representatives for Participant groups commented on a variety of strengths and weaknesses in the Environmental Protection Program and raised concerns about the role of the Monitoring Advisory Committee, the relationship between ATK and technical science, and the overall level of transparency and oversight contained within the various components of the Program.

A witness for the Concerned Fox Lake Grassroots Citizens (CFLGC) spoke about the Proponent's commitments to mitigation and rehabilitation. He said the Proponent's efforts in this area appear to be directed toward preventing further harm to the ecosystem or increasing ecological integrity in a degraded, post-Project ecosystem. He said he did not see an effort toward the highest level of rehabilitation: re-creation of the pre-development ecosystem.

The witness said mitigation and rehabilitation efforts are often used to justify causing a disturbance in the environment. However, not enough attention is paid to occasions when attempts to mitigate or rehabilitate fail. Sometimes, such efforts can even do further damage. The witness said that the draft plans for rehabilitation seem ad-hoc and inadequate to prevent these kinds of harm and do not make adequate use of ATK and community knowledge.

A team of expert witnesses for the Consumers' Association of Canada (CAC) analyzed adaptive management in the Keeyask EIS, including the KCN environmental assessments and the components of the draft Environmental Protection Program. They presented their analysis in accordance with the Plan, Do, Evaluate, Adjust framework of adaptive management.

- **Plan.** The CAC experts considered that the Proponent's Environmental Protection Program recognized the need to plan for uncertainty. They considered that some components of the adaptive management strategy for Keeyask use suitably long-term (20- to 30-year) timeframes, and found that the Proponent appears to use an ecosystem-based approach, with integration between the various monitoring and management plans. As well, they found evidence of steps to integrate or co-ordinate technical science and ATK monitoring. They found some commitment to experimentation, some examples of flexibility in mitigation measures, and considered that the Project benefitted from the inclusion of various working groups representing the KCNs.
- **Do.** The CAC witnesses believed that the creation of the MAC to be a positive step in encouraging the use of ATK in adaptive management. However, they noted that decisions on management will be made in consultation with MAC and the government, but without the public at large. Some timelines were specified for monitoring, reporting and evaluation, but they were unable to assess if timelines are appropriate. They found that in a number of places, the EIS cited uncertainty about a potential effect from the Project and referred to the need for monitoring. In many of these places, though, the witness team felt that the EIS should have described potential adaptations in the event of adverse effects. They also stated that there should have been a separate cumulative effects monitoring plan.
- **Evaluate.** The witnesses noted that Manitoba Hydro's environmental management system is registered to the ISO 14001 standard, which requires that it be geared toward continuous

improvement, but said they were not able to obtain further details on the system and its performance. Generally, the witnesses reported favourably on the approaches and indicators to be used in evaluation.

- **Adjust.** The CAC witnesses said they were unable to see details about future commitments to verify the Proponent's statement that it has committed appropriate resources to adaptive management. They found evidence of the Proponent's intention to make adjustments to monitoring and management as needed, but specific examples of adjustment processes and external audits of the environmental management system were not made available. One of their major concerns focused on the role of the MAC in adjusting monitoring and management. Though in principle they supported the MAC, they described several "missed opportunities" that might prevent it from playing a more effective role in monitoring and management. They were concerned that the MAC will not have an externally funded budget, be able to conduct independent studies, or have access to dispute resolution in the event that the Keeyask Hydropower Limited Partnership Board of Directors does not follow its advice. Ultimately, the witnesses said they were not convinced that the MAC can serve its independent oversight function.

Overall, the CAC team found the Keeyask adaptive management plan to be a marked improvement over the adaptive management plan for the Bipole III Transmission Project. However, they found lack of transparency, lack of ability for the MAC to serve as an oversight body, and uncertainty regarding some issues, such as processes, timelines, commitment to research and development and implementation of experimentation.

A witness for the Kaweechiwasihk Kay-Tay-A-Ti-Suk (KK) elders discussed the ways in which the customary law principles of the Nisichawayasihk Cree were incorporated into the environmental protection, monitoring, management and heritage resource protection plans for the Wuskwatim Generating Station. These principles include the use of the customary law principle of *Kwayaskonikiwin*, or reconciliation, and the importance of ceremonies to establish harmony whenever there is disturbance created by the project. As part of incorporating customary law into the project, the agreement determined appropriate seasons and times for various project activities. As well, it established roles for the Nisichawayasihk Cree and their representatives in all the construction, operation and monitoring activities. The witness also spoke about a heritage resources agreement for the Wuskwatim project to ensure that human remains and artifacts discovered during the project remain the property of the Nisichawayasihk Cree.

Commission Comment – Monitoring and Follow-up

The Commission believes that the Proponent has given substantial thought to plans for protection of the environment and mitigation of effects. A large number of mitigation measures have been listed. If followed rigorously, these measures will minimize impacts on many of the VECs listed in the EIS, and consequently on the environment on which they depend. Since most of the construction work will be performed by contractors, ensuring that contracting firms are aware of and abide by the measures in the Environmental Protection Plans will be essential.

Monitoring and management of a project as large as Keeyask will require a great deal

of communication, information sharing and discussion. The Monitoring Advisory Committee is a positive step in ensuring community oversight of the Project's effects. It would be more effective if there were a formal dispute resolution system in place for occasions when the representatives of the KCNs and Manitoba Hydro on the MAC do not agree on the results or interpretation of monitoring or the action to take regarding these results.

Greater transparency and opportunities for public input would increase confidence further. Transparency and input require substantial two-way communication that goes beyond a traditional annual report to the regulator. The already-established Keeyask website should be used consistently and frequently to achieve this goal. Updates, community bulletins and project results should be posted as they become available. Consideration should be given to posting committee minutes as appropriate. Two-way communication could be achieved through a function allowing for comments, concerns and observations. The following are the Commission's recommended guidelines for using the website:

- The website must be updated as soon as new information becomes available, and at least quarterly for the life of the Project.
- Information must be based on the actions and progress outlined in the Environmental Protection Plans and the various Environmental Management Plans.
- Categories of information must be easily discernible either by topic or community area and be cross-referenced where there is overlap. Examples of information that could be included are water quality monitoring results, employment statistics, water level monitoring results (at the

Project, upstream and downstream), mercury monitoring results, sturgeon recovery results, minutes of community and/or committee meetings, and caribou and moose population statistics.

- Information must be in plain language, with minimal use of jargon, and address the interests and concerns of the communities affected by the Project.
- Data sets and descriptions of analyses and their results must be linked and available, where applicable.
- The website must include a feedback function that allows users to post questions to be answered by the Proponent and to report problems or perceived infractions.

In on-going management of the Keeyask Generation Project, the Commission agrees that an active adaptive management approach is most desirable. Using such an approach, the Proponent would not only continue to adapt its management techniques in order to minimize environmental impacts, but would actively experiment with different ways of managing issues. The assumptions and results of such experiments would be publicly reported through the website and kept on file for future reference. Annual reports from the Proponent to Manitoba Conservation and Water Stewardship must contain such details, including quantitative measures, tests, modelling or other testable verification of results. This would allow Manitoba Conservation and Water Stewardship to verify the Proponent's assumptions and predictions regarding environmental impacts and mitigation and to compare results of adaptive management to previous conditions of the environment. Annual reports to Manitoba Conservation and Water Stewardship must also contain reporting on the effects of the offsetting program on the

regional environment. Any trends that are apparent over the years of reporting should be identified and addressed.

The essence of active adaptive management is learning. The Proponent and Manitoba Conservation and Water Stewardship should ensure continued learning from the Project. Once construction is completed, an in-depth review of procedures and fulfillment of commitments is needed. Under the direction of Manitoba Conservation and Water Stewardship, an environmental audit should be carried out by an independent third party to assess the success of the Environmental Protection Plans for construction and the accuracy of predictions and assumptions about environmental effects. The results of this audit must be reported back to Manitoba Conservation and Water Stewardship and made public through the website. Ten years after submission of the construction audit, a follow-up review of commitments and predictions made regarding the operational phase should also be conducted by an independent third party and reported to Manitoba Conservation and Water Stewardship and the public.

Licensing Recommendations

The Commission recommends that:

- 13.1 *Keeyask Hydropower Limited Partnership, under the direction of Manitoba Water Conservation and Water Stewardship, on completion of the construction of the Keeyask Generation Project, undertake a third-party environmental audit to assess whether commitments were met and to assess the accuracy of assumptions and predictions. The results of this audit will be made public. This is to be repeated ten years after the first environmental audit.*
- 13.2 *Keeyask Hydropower Limited Partnership maintain, for the life of the Project, its Keeyask website, containing all the information the Proponent has already committed to in the EIS and Keeyask hearings related to monitoring and assessing environmental impacts, mitigation and management. This information is to be easily retrievable and updated frequently.*
- 13.3 *Keeyask Hydropower Limited Partnership provide to the Manitoba Government an annual report on the Keeyask Generation Project containing sufficient detail that assessments can be made as to the accuracy of predictions, success of mitigation actions and commitment to future actions. These reports will provide assessment of any trends detected over the entire reporting period. These reports are to be made public.*

Chapter Fourteen

Sustainable Development

14.1 Overview

The Keeyask Project was assessed in terms of its contribution to sustainable development, a concept popularized by the 1987 report of the World Commission on Environment and Development, better known as the Brundtland Commission. According to the definition used in that report, “sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Key concepts within the definition are that priority should be given to addressing needs, particularly the needs of the poor, and that there are limitations on the environment’s ability to meet present and future needs. The Brundtland Commission report specifically noted that empowerment of indigenous people is an essential part of sustainable development. The governments of Canada and Manitoba have sustainable development policy goals embedded in legislation: the federal *Sustainable Development Act* (2008) and Manitoba’s *Sustainable Development Act* (1998). Manitoba Hydro also has a sustainable development policy and a set of principles and guidelines. The Keeyask environmental impact statement (EIS) evaluated the Project in light of the eight goals in the federal sustainable development strategy, the seven principles and six guidelines in Manitoba’s *Sustainable Development Act*, the 13 sustainable development principles adopted

by Manitoba Hydro in 1993, and the Keeyask Cree Nations’ (KCNs) desire to restore harmony and balance, enhance well-being, protect the environment and provide greater opportunities and hope for their people.

During the public hearing for the Project, the chair of the Keeyask Hydropower Limited Partnership said the Keeyask Generation Project has been assessed under a sustainability assessment protocol developed by the International Hydropower Association using values and practices recommended by the World Bank’s World Commission on Dams. This protocol is endorsed by international environmental and social organizations including the World Wildlife Fund, the Nature Conservancy and Oxfam. Under this assessment, Keeyask was rated as meeting international best practices on three quarters of the applicable criteria and at least proven international good practice on the remainder.

14.2 Keeyask and the Federal Sustainable Development Goals

1) Reduce greenhouse gas emissions to mitigate climate change. A life-cycle assessment was conducted by the Pembina Institute to assess greenhouse gas production resulting from all aspects of the Project,

including manufacture of materials, construction, land-use changes, operations and eventual decommissioning. According to this study, a natural gas plant producing the same amount of electricity would produce twice as much greenhouse gas in one year as Keeyask in its 100-year lifespan. Electricity exported to the U.S. Midwest will displace gas and/or coal generation.

2) Minimize threats to air quality.

A hydroelectric station has very low air emissions, especially when compared to coal or gas-fired plants.

3) Protect and enhance water quality.

Creation of the reservoir will result in some long-term effects on water quality, but the area will generally remain suitable for aquatic life. Good construction measures will help to minimize effects on aquatic life.

4) Enhance information to ensure sustainable use and management of water.

The Proponent has been conducting studies on rivers and streams for more than a decade to assist in management, and Manitoba Hydro has been studying northern rivers and streams for more than 40 years.

5) Maintain or restore wildlife populations to healthy levels. Habitat replacement and stocking are intended to mitigate effects on fish populations. Cree Nation Partners (CNP) are developing moose and fish sustainability plans for the Split Lake Resource Management Area (SLRMA). Monitoring of caribou populations will guide programs to maintain sustainability of populations.

6) Maintain productive and resilient ecosystems. The Project was planned to avoid sensitive habitat as much as possible in routing roads and planning borrow pits and excavated materials placement areas. Cumulative losses, including past, present and

future projects, for priority habitat types in the area remain below 10 per cent.

7) Production and consumption of biological resources are within ecosystem limits. Sustainable harvest plans are being developed by CNP for moose and fish within the SLRMA.

8) Minimize environmental footprint of government operations. Efforts to minimize footprint of Keeyask include the original decision to change from a high-head dam flooding 18,000 hectares of land to the current plan, with 4,500 hectares of initial flooding.

14.3 Keeyask and Manitoba's Sustainable Development Principles and Guidelines

14.3.1 Manitoba's Sustainable Development Principles

1) Integration of Environmental and Economic Decisions. The Proponent cites the involvement of KCNs, the training and employment opportunities, and the programs in the Adverse Effects Agreements (AEAs) that pay attention to potential social consequences of the Project as examples of environmental and economic decisions being integrated.

2) Stewardship. In analyzing this principle, which stresses that today's decisions need to be balanced with tomorrow's needs, the Proponent cites the partnership with the KCNs, in which they will have a long-term role in monitoring effects as well as long-term benefits. As well, the Project will provide energy for several generations of Manitobans.

3) Shared Responsibility and Understanding. The Proponent cites the creation of the partnership with the KCNs,

including the Partnership's commitment to meeting the social, cultural, economic and employment hopes of the KCNs, and a growing understanding of the different values and worldviews of the KCNs and Manitoba Hydro.

4) Prevention. The Proponent cites the design parameters that were established early in negotiations, as well as the AEs and the commitment to monitoring and follow-up.

5) Conservation and Enhancement. In analyzing how Keeyask fits within this principle, which includes maintaining ecological processes and biodiversity, the Proponent cites plans to develop new wetlands and rehabilitate some habitat types. This principle has been a primary focus in planning and design of the Project.

6) Rehabilitation and Reclamation. The Proponent states that once the Project is built, areas no longer needed for operation will be decommissioned and rehabilitated.

7) Global Responsibility. By displacing fuel used for generating electricity in gas or coal-fired power plants, the Proponent says the Project will contribute to a substantial reduction in greenhouse gas emissions.

14.3.2 Manitoba's Sustainable Development Guidelines

1) Efficient Use of Resources. The Proponent notes that in comparison to earlier hydroelectric developments in northern Manitoba, Keeyask was planned and designed with mitigation, compensation and enhancement measures to reduce impacts on the environment. By incorporating these measures into the Project's cost, Keeyask's budget more closely reflects the full societal cost of the Project. The integration of environmental and social costs of a project is a critical element in full-cost accounting.

2) Public Participation. The Proponent notes that discussions began with Tataskweyak Cree Nation in the 1990s, and were later expanded to all four of the KCNs, leading to establishment of the Partnership. Three rounds of the Public Involvement Program (PIP) brought other views into the Project.

3) Access to Information. The KCNs' own internal consultations brought more information to their communities. The PIP and the regulatory review process provided more information to the public.

4) Integrated Decision Making and Planning. The Proponent cites the governance structure of the Partnership, in which the partners have had a strong role in assessment and planning and will continue to have a role in monitoring and follow-up.

5) Waste Minimization and Substitution. The Proponent acknowledges that opportunities to recycle are limited in remote northern areas.

6) Research and Innovation. The Proponent cites the many technical and Aboriginal traditional knowledge (ATK) studies related to wildlife, fish, social and economic conditions, heritage resources, history and culture that were carried out to plan and assess the Project.

14.4 Manitoba Hydro's Sustainable Development Principles

An analysis of the Keeyask Project using Manitoba Hydro's sustainable development principles provided examples of the approach, methods, and specific modifications or mitigation measures incorporated into the Project similar to those for the federal and Manitoba sustainable development goals,

principles and guidelines. Manitoba Hydro's principles are:

- Stewardship of the Economy and the Environment
- Shared Responsibility
- Integration of Environmental and Economic Decisions
- Economic Enhancement
- Efficient Use of Resources
- Prevention and Remedy
- Conservation
- Waste Minimization
- Access to Adequate Information
- Public Participation
- Understanding and Respect
- Scientific and Technological Innovation
- Global Responsibility

14.5 EIS Conclusions on Sustainable Development

The Proponent concludes that the Project is consistent with federal, provincial, corporate and KCN approaches to sustainable development. Social and economic aspects of sustainable development are addressed through aspects of the Project including employment, training, business opportunities, participation of the KCNs in planning and governance, the KCNs' development of their own environmental assessments, and the measures included in the AEAs. Sustainable development principles related to environmental stewardship are addressed

through Project planning, attention paid to sensitive species and habitats, mitigation and monitoring measures, and the substantial greenhouse-gas advantage of hydroelectricity in comparison to fossil-fuel generated electricity.

What we Heard – Sustainable Development

The Panel heard several expert witnesses who discussed alternative approaches to assessing the overall sustainability of the Keeyask Project.

An expert witness for the Consumers' Association of Canada (CAC) reviewed the Keeyask EIS and prepared a "Framework for Sustainability-Based Assessment for the Keeyask Hydro Project." This witness proposed several basic considerations in conducting a sustainability assessment: that the basic criterion for evaluation and decision-making should be whether or not a project makes a "positive contribution to sustainability;" that the assessment should compare options and identify the one with the best, lasting and fairly distributed gains; that all core issues should be considered; and that a project should avoid doing lasting damage and all trade-offs must be identified and justified. The witness stressed that mitigation does not replace the concept of making a positive contribution to sustainability. Mitigating damage, he said, "is only helping the ship sink more slowly."

The witness listed eight evaluation and decision criteria for sustainability:

- Socio-ecological system integrity;
- Livelihood sufficiency and opportunity;
- Intragenerational equity;

- Intergenerational equity;
- Resource maintenance and efficiency;
- Socio-ecological and democratic governance;
- Precaution and adaptation; and
- Immediate and long-term integration.

In reviewing the Keeyask EIS, the witness concluded that the EIS is unsatisfactory as a way of assessing progress toward sustainability, in part because the need for the project has not been established and there is no comparative assessment of alternatives and no explicit set of sustainability-based decision criteria. He also cited uncertainty about the potential impact of the project on sturgeon, boreal woodland caribou and the potential boom-and-bust economic cycle as preventing a full assessment of the Project's sustainability. Accordingly, he recommended that the Clean Environment Commission defer its decision until these deficiencies have been addressed. He also recommended that future proponents be required to adopt a sustainability framework that includes a full justification of project need and an assessment of alternatives.

Manitoba Wildlands brought in three expert witnesses, or teams of expert witnesses, who spoke on methodologies for assessing project sustainability. One team of expert witnesses made a presentation on sustainability and sustainable development and critiqued aspects of the Keeyask EIS related to sustainability.

Among other things, this team made note of the number of times the EIS used the words and phrases 'sustainability' and 'sustainable development.' They noted that, while the terms were used a total of 148 times in the EIS, they do not appear at all in

the Joint Keeyask Development Agreement (JKDA), causing them to question whether sustainability is truly a core value of the Project. The witnesses assessed the Sustainable Development section of the EIS and raised the concern that the focus of this section suggested that sustainability was considered primarily from an environmental point of view and less from a socio-economic point of view. They also asked if the EIS had adequately considered the sustainability goals of the City of Thompson and the Town of Gillam and found the references to waste management, green procurement and green design to be weak. They said that, instead of developing solutions to recycling and waste problems in the north, the EIS acknowledges limited opportunities to recycle and commits to disposing of waste in accordance with requirements. They described a continuum of approaches to sustainability in business. At the low end of the continuum is an approach of "compliance" that seeks to do less harm to the environment. At the high end is a truly sustainable approach that seeks to "do more good." In this team's view, some aspects of the EIS fall at the low "compliance" end of sustainability, including the plan for waste management, while other aspects, such as the partnership between Manitoba Hydro and the KCNs, are at the higher "sustainable development" end of the continuum.

Manitoba Wildlands also presented two expert witnesses who practise in the field of life-cycle assessment. They made a presentation on the development of international standards for carrying out a life-cycle assessment that allows impacts of a project to be assessed throughout its life, from the manufacture of materials through to eventual decommissioning. They did not actually carry out a review of the life-cycle assessment of the Keeyask Project that was done by the Pembina Institute.

Manitoba Wildlands had another expert witness who prepared a presentation on “The need to monitor and report ecosystem service change for the Keeyask Generation Project.” This concept is based on the idea of valuing the goods and services that ecosystems provide in their natural state. The witness described four categories of ecosystem services:

- Provisioning services – these include food, raw materials such as wood fibre, freshwater, biological resources such as biochemicals with pharmaceutical uses, and materials such as metals and rock;
- Regulating services – these are ecosystem processes that provide a benefit to society, such as air and water filtration, water treatment and regulation, climate regulation, buffering of flood flows, and erosion control;
- Cultural services – these include non-material benefits obtained from ecosystems, including cultural heritage, spiritual and religious value, aesthetics, education and recreation; and
- Supporting services – these are natural processes that enable ecosystems to flourish, support resilience and biodiversity, and thereby provide for all the other ecosystem services. These services include soil formation, nutrient cycling and primary production.

This witness expressed the concern that ecosystem services were not specifically considered in the EIS. The EIS did not include a cost-benefit analysis of degrading ecosystem services. Although it is common in environmental impact assessments not to have indicators that capture effects on ecosystem services, the witness said this makes it difficult to “scale up” and consider the effects of multiple projects on a watershed or in a

region and results in a lack of information that impedes informed decision making. She said there is a critical need to report ecosystem services impacts at the project level and at the regional level over time, and to make this reporting transparent.

Assessment of ecosystem services provides an opportunity to assess the health of the ecosystem in response to cumulative impacts. The witness said the Project requires baseline data on ecosystem services, prior to hydro development, in order to assess the impact of Keeyask added to previous projects. Manitoba Hydro and the Keeyask Partnership have an excellent opportunity, the witness said, to assess the impact of cumulative projects on ecosystem services throughout the Nelson and Churchill watershed.

Commission Comment – Sustainable Development

The Panel heard specifically about three different environmental management tools or decision-making frameworks: sustainability assessment, life-cycle assessment, and ecological goods and services. While it is recognized that all three of these tools or frameworks have some environmental or resource-management applications, none of the three is required for an environmental assessment in Manitoba or Canada. They have also rarely, if ever, been used on hydroelectric projects.

The three tools offer different paradigms from which to consider and assess projects and activities and have been promoted in some academic and professional circles. Sustainability assessment seeks to offer a more comprehensive and integrated approach to decision-making, in which social, economic, and environmental considerations are assessed together in a format similar to a societal cost-benefit analysis. Life-cycle

assessment is a tool that takes a “cradle-to-grave” approach for quantifying and interpreting environmental impacts associated with a product or service. Ecological goods and services seeks to quantify and assess the value of ecological functions and features that nature supplies.

While these tools can assist individuals or society in examining a project, many aspects of them have been considered directly or indirectly within the Keeyask Project. Some aspects of the tools have been directly considered by the Proponent, such as the life-cycle assessment conducted by the Pembina Institute. Others have been considered, albeit under the guise of some other planning or management tool. As well, the totality of decision making around Keeyask (including the environmental hearing process as well as the Need For and Alternatives To hearing conducted by the Public Utilities Board and the Crown consultations under Section 35 of the Constitution) addresses other aspects of these proposed tools. Some of these tools or aspects of them have not advanced far enough in their science or application for it to be clear how they would offer any new or valuable insights on Keeyask.

One subject that the Proponent could have addressed more fully is waste management. The Proponent has stated that all supplies will be shipped from outside the region and that waste will be burned or dealt with through the municipal waste management process. The Commission is of the opinion that more could be done in this regard by reducing the potential for waste material in the first place, developing a more comprehensive recycling plan (perhaps in conjunction with the Town of Gillam) or finding innovative ways to reuse materials.



Chapter Fifteen

Into the Future

15.1 Environmental Assessment

For at least the last decade, in all of its reports in regard to major project proposals, the Commission has offered some of our thinking on the process of environmental assessment (EA). This might be referred to as “off-the-record,” as it is not based on anything specific that we heard, or that was debated or discussed, during the hearings. Rather, it is based on our extensive experience gained through a number of proceedings, and, most importantly, is advice that the Commission believes will improve the practice of environmental assessment.

Whether due to our past advice or not, the Commission is of the view that EA practice is getting better – slowly. We see both positive and negative signs on the horizon: positive in that the Government of Manitoba is undertaking a comprehensive review of its environmental legislation; negative in that the federal government appears to have taken a backwards step with significant amendments to the *Canadian Environmental Assessment Act* in 2012.

The Commission continues this practice by, once again, offering some advice that we believe will continue the improvement of EA practice in Manitoba. Some of this advice is repetitive, having been offered in previous reports; some is new.

15.1.1 Manitoba Hydro

As noted in the *Foreword* to this report, the environmental assessment conducted by Manitoba Hydro on behalf of the Keeyask Hydropower Limited Partnership, in conjunction with the three assessments conducted by the Keeyask Cree Nations, represented a considerable improvement from the Bipole III assessment. Still, there is room for improvement.

Manitoba Hydro is a large corporation with plans for many developments over the next number of years. These developments will range from relatively small to very large. All will require some degree of environmental assessment before being granted a licence to commence a new project or make alterations to existing facilities. Within the Corporation are a number of large divisions, some of which are responsible for their own developments, including responsibility for the attendant environmental assessments.

The Commission is of the view that this can lead to inconsistency in standards and practice. For example, it was experienced in this project, that a good deal of important information gathered for the Bipole III Transmission Project environmental assessment could not be, easily and in a timely manner, incorporated into the Keeyask Generation Project because of differing

standards and methodologies. To address such concerns, Manitoba Hydro should establish a centralized environmental assessment process to set standards, and to guide, manage and co-ordinate all environmental assessment and monitoring processes conducted by the Corporation. While each project team would continue to carry out the necessary assessments based on their priorities, they would be guided by consistent corporate environmental assessment standards and procedures.

The Commission is also of the view that it would benefit the environmental assessment process if there were peer review of materials to ensure that the best and most appropriate techniques for analysis are used and that results are interpreted and presented appropriately.

15.1.2 Government of Manitoba

As noted above, the Minister of Conservation and Water Stewardship has committed to advancing the timing of a review of *The Environment Act* as part of “Tomorrow Now,” the Manitoba government’s strategic plan for protecting the environment while ensuring a prosperous and environmentally conscious economy. At the same time, the Manitoba Law Reform Commission is conducting a review of environmental assessment, the report of which will certainly inform the province’s statutory review. The Commission views these as very positive steps.

The Commission reiterates the concerns regarding the environmental assessment process in Manitoba raised in previous Commission reports. Our intent in offering the following is that this advice will inform and, ultimately, be incorporated into the resulting statutory regime.

It has long been common practice, in much of Canada, that provincial

environmental assessment has been conducted under guidelines and practices established by the federal Canadian Environmental Assessment Agency (CEAA). Until very recently, this has been of little or no concern. However, federal regulatory responsibilities have decreased markedly with the passage of a new governing statute in 2012. As a result, the Commission questions whether environmental assessments developed under the new Canadian *Environmental Assessment Act* guidelines still meet the needs of Manitobans in protecting the environment. We believe that they will not.

In its statutory review, the Manitoba government must address this and establish protocols and set specific standards that do meet Manitoba’s needs. Among the issues that Manitoba should consider are:

- Environmental Assessment – When is it required; and to what degree?
- Environmental Impact Statement – What triggers the requirement for an EIS? What are the minimum requirements of an EIS?
- Provincial Guidelines – The current legislation states that guidelines or instructions may be provided, but there is no regulation or policy that defines how this action will be implemented.
- Scoping Document – In current practice, proponent-generated scoping documents have replaced government-issued guidelines. Is this effective? What is the role of the scoping document?
- VECs – Develop criteria to guide the selection of VECs.
- Sustainability Assessment – During the Keeyask and recent hearings, it was recommended by Participants that the Commission require the proponent to

conduct a sustainability assessment of the Project. This was beyond the scope of our review. But the concept is one that the Commission believes to be worthy of further consideration for future environmental assessment. This process could well go beyond just getting project approval to looking at the sustainability of the project, the tradeoffs and the balance on the socioeconomic-environmental ledger sheet.

- Cumulative Effects Assessment – The Commission continues to be of the opinion that the process and practice for Cumulative Effects Assessment needs to be defined and prescribed in Manitoba’s context. Chapter 12 of this report contains some specifics that the Commission believes need to be addressed in this regard. The Commission also welcomes the endeavour by the Canadian Council of Ministers of the Environment to determine national standards for CEA.
- Staged Licensing – There were at least two other parts of the Keeyask Project that were not subject to the Commission’s review, which made it difficult for the Panel to be confident about the cumulative effects of Keeyask. The Keeyask Infrastructure Project was underway before the Keeyask Generation Project was being reviewed and the Keeyask Transmission Project is awaiting licensing. Aspects of each of these other projects were referenced in regard to the effects of the Keeyask Generation Project. Taken together, all these are necessary parts of the electrical generation from the Keeyask dam. In fact, one cannot proceed without the other. It would have been more favourable if at least these three projects could have been considered at the same time. In such a case, the overall impacts could be better balanced. For example:

a small adjustment in one element of a project may lead to a decrease in negative impacts or a positive impact on the environment in combination with the associated projects. Consideration should be given to how interrelated projects can be assessed as one or in tandem.

15.2 Public Consultations

These comments are directed at both levels of government, as well as the Proponent.

Communities in the geographical area where hydroelectric development occurs have been subject to an inordinate number of meetings, workshops, negotiating sessions, etc., sometimes for more than one project, at much the same time. (Cree Nation Partners representatives reported that, between TCN and WLFN, there were more than 2,000 meetings over an eight year period.) All of these sessions come with documentation to be reviewed.

These interactions have been generated by:

- the Proponent – consultation, information-sharing, negotiation, etc.;
- the federal government – environmental review and Section 35 consultations;
- the provincial government – environmental assessment and Section 35 consultations; and
- the Clean Environment Commission hearings.

Needless to say, this can lead to much confusion and frustration among the various parties. For many in the communities, there is consultation fatigue, which, in turn, may result in individuals tuning out even though

they may have valid concerns, or missing an opportunity to participate because they do not understand the various processes.

Governments and proponents need to be cognizant of the impacts of so much consultation on the communities and their leadership. The current protocols should be reviewed to establish a streamlined communication process that is effective but less of a burden on the communities.

15.3 Regional Cumulative Effects Assessment

During the Commission's hearings on Bipole III, it became apparent that there was a need for a Regional Cumulative Effects Assessment on the Nelson River system, to address past, current and future impacts of hydro development. We made a recommendation to that end, which was accepted by the Minister of Conservation and Water Stewardship.

The Keeyask hearings underlined for the Panel that this was of the utmost importance. The Panel is pleased that this activity is underway. The Panel encourages both the Province and Manitoba Hydro to allocate all necessary resources to ensure that this is completed as soon as possible.

15.4 Aboriginal Worldviews

The Panel found the inclusion of the Cree worldview and Aboriginal Technical Knowledge (ATK) to be a very positive and critical part of the information, providing a context for much of the scientific studies.

In doing this, the Partnership has taken a very big and positive step. This demonstrates good faith in making strides to understand and incorporate ATK into a process which has typically ignored it, relying, in the past, solely on Western Scientific Knowledge (WSK). But, in the Commission's view, this is only a first step; it is still very much a work in progress. Manitoba Hydro – and its partners – and the Government of Manitoba need to continue to develop this. A narrow approach to doing this will not succeed. The work must be collaborative with Aboriginal communities, with academics and with groups across country who are also pursuing respect for and incorporation of ATK and Aboriginal worldviews into environmental decision-making. A wealth of historical information is available, as well as advice on the consequences of particular management actions. The Commission encourages Manitoba Conservation and Water Stewardship to take into greater consideration Aboriginal worldviews and ATK in resource and environmental management.

Given that a WSK environmental assessment seeks to find no residual effects after mitigation on individual VECs, when viewed from a global ecosystem perspective, this can be seen as a flawed process. ATK, on the other hand, places paramount importance on protecting the whole of the ecosystem. Incorporating the two approaches could well provide great benefits to our environment.

One method of facilitating these interactions could be through a "Grandmothers Circle". This concept was presented to the Panel by its one Aboriginal member, Reg Nepinak, an Anishinabe member of the Pine Creek First Nation, who was raised in a traditional family with its values and respect for *Askiy*. It is described in the accompanying text-box, written by Mr. Nepinak. The Panel believes this is worth sharing.

***Ke nocominanak* (Our Grandmothers)**

In his testimony, Elder Joe Keeper talked about Archeologists finding that indigenous people had already established themselves in this area for at least 5,000 years. The people lived in harmony with nature; they understood not to mistreat *Askiy* or any part of it. Ceremony was done when *Askiy* was asked to provide for the people, prayers were made to the resource for giving its life, tobacco was given as a sign of respect.

Manitoba became a province in 1870. One hundred and forty four years later the environment is in jeopardy or nearly destroyed surrounding the Churchill, Burntwood and Nelson Rivers, including Cedar Lake.

In these hearings, it has been maintained that the Cree worldview is equal to Western science. However, the Cree are still not given credit for maintaining the environment for 5,000 years. We are aware that Manitoba Hydro is not the only contributor to the condition of the water; still, it has contributed a major portion to its condition and continues to do so.

The indigenous people did have a governance structure that was unlike the western model and if the Europeans recognised it, it was dismissed, much the same way the indigenous worldview is dismissed today.

In order for our two societies to come together, the whole of immigrant societies need to recognize that the indigenous people understood and managed the concept of a sustainable environment. Learn who we are, why our ceremonies are so important, learn about our languages, about making bannock, etc.

The late Elder Floyd Red Crow Westerman wrote: "Before the white man came to our land, our women made all the major decisions for our clans. The European came here to our land and could not believe what they saw in the strong hearts and minds of our women. This is our Grandmother, and her Grandmother, and so on. This is the same Spirit which survives within us today."

Final decisions in governing our indigenous societies were made by our grandmothers – *Ke nocominanak*.

The minister should support these long-standing and successful methods of the Cree/ indigenous worldview by incorporating a circle of *Ke nocominanak* with a mission to oversee safeguarding the environment.

The *Ke nocominanak* terms of reference would be the teachings of Honesty, Respect, Courage and Truth. These four are engrained with Wisdom, Humility and Love. Elders of today do say these were all we were taught as children.

Similar circles have been adopted or convened by international groups and the UN in recent years. Three are listed below:

1. The UN Elders
2. The International Council of the 13 Indigenous Grandmothers
3. The Global Alliance for the Rights of Nature.

15.5 Rebuilding the Relationship

In the past decade, the Commission has conducted hearings to review three major hydro projects in northern Manitoba – Wuskwatim, Bipole III and Keeyask. Inevitably, in each case, the hearings have – to some extent – become a review of the entire history of development on the Nelson, Burntwood and Churchill rivers.

While such a review is clearly beyond the terms of reference of any of these projects, the Commission has taken the position that – given the statutory mandate of engaging the public – the Commission will hear such concerns, report on them and provide advice to the Proponent and/or the Government – often in the form of Non-Licensing Recommendations.

Keeyask was no different in this regard. In fact, global, or historic, issues may have played a greater role in these hearings, due, in no small part, to the fact that the partner First Nations have a long history of having been affected by past development. In each of the three hydro proceedings, we have heard of a 50-plus year history of pain and suffering.

Among the specific issues the Commission heard during these hearings were:

- That the entire hydro development in northern Manitoba be considered one project with 35-plus parts to it;
- That Manitoba Hydro should concede that all of this development has compromised all of the Nelson River;
- That the First Nations in the immediate area of this development have received few, if any, tangible benefits; that First Nations' lands and waters have been used

to generate wealth for all Manitobans, while the wealth all goes south;

- There are very few full-time, meaningful jobs for First Nations residents beyond the construction period;
- That many First Nations believed that the Northern Flood Agreement promised prosperity, which they have yet to see.

In more than one community, the Commission heard that Manitoba Hydro still needs to work on regaining the trust and respect of northerners. One presenter described a continuum of oppression: from the fur trade to the construction of the Hudson Bay railroad to residential schools to hydro development. Others spoke of racism and bullying on the part of Manitoba Hydro employees. Still others lamented that their once-beautiful home territories had been left looking very unattractive (like a dump, in the words of one.)

From a number of presenters, we heard that, while Manitoba Hydro has provided much compensation, it has never apologized for the past wrongs.

The Commission heard about these issues from a number of individuals in a number of communities that will be affected by Keeyask. They added to what was heard during the Wuskwatim and Bipole hearings. Indeed, these matters are widely accepted as common knowledge. While these issues were not canvassed in depth, the Commission had no reason not to accept them as accurate. It was not at all difficult for anyone to understand their feelings about this history.

The Commission believes it has had sufficient experience over the past decade to offer some advice to address some of the hurt and pain still existent in northern communities.

First, the Commission does not expect Manitoba Hydro to solve all of the problems existing in northern Manitoba. They are hardly responsible for all of them. We believe that today's Manitoba Hydro is truly committed to avoid repeating the mistakes of the past in regard to the Aboriginal people and communities in northern Manitoba. And, Manitoba Hydro is sincere in its efforts to address these past concerns. But the Commission believes that more must be done; and it need not be overly costly or complex.

The Commission is well aware that – under the Northern Flood Agreement and other similar agreements – Manitoba Hydro has contributed a very significant amount of money in compensation. And, it is recognized that Manitoba Hydro is not in the business of community development.

Still, the Commission is of the view that there is a need for a more formal process of reconciliation. We hasten to add that we are not suggesting a long and complex process similar to the residential schools process.

The Commission recommends a process to rebuild trust and respect, for what was lost, what remains and what may be in the future. The process must be designed in collaboration with all of the First Nations impacted by all hydro development in northern Manitoba. The governments of Canada and Manitoba should be parties to this process.

As part of this reconciliation process, Manitoba Hydro needs to rehabilitate the landscape, including: the Sundance townsite, unused borrow pits, storage yards, dumps, etc. The Commission realizes that this could be a major undertaking – but it doesn't need to be done all at once.

In fact, it would be better to take the time to do it right, in consultation with the affected First Nations. Establish priorities and then

chip away at it, a little bit each year, engaging a local workforce to do much of the work.

Another positive step in this process of reconciliation would be to use Aboriginal names wherever possible. The Partnership has taken the first step in this regard by naming Keeyask in consultation with the First Nations. This should continue, again in consultation with the local First Nations, perhaps re-naming or assigning dual names to some of the existing sites and structures.

The Regional Cumulative Effects Assessment may also identify more opportunities to improve the relationship with First Nations and address past and on-going impacts in a more holistic manner.

We encourage the Manitoba government and Manitoba Hydro to seize these opportunities as we all move forward.

Chapter Sixteen

Recommendations

Licensing recommendations to build and operate the Keeyask Generation Project

The Commission recommends that:

- 1.1 *Keeyask Hydropower Limited Partnership be issued an Environment Act licence for the Keeyask Generation Project, subject to licensing conditions outlined in subsequent recommendations in this report.*
- 10.1 *Keeyask Hydropower Limited Partnership stock lake sturgeon for at least 50 years in order to allow for enough time to determine whether a self-sustaining population can be re-established.*
- 10.2 *Keeyask Hydropower Limited Partnership employ PIT tags or future best technology to uniquely identify individual sturgeon and to distinguish natural from stocked individuals. Use this information to evaluate the success of the recovery program.*
- 10.3 *Keeyask Hydropower Limited Partnership consult widely with other facilities to collect and evaluate the most successful techniques in fish culture for rearing and releasing lake sturgeon and apply them to the fish culture and recovery program.*
- 10.4 *Keeyask Hydropower Limited Partnership monitor the location, number and productivity of bald eagle nests in the vicinity of the Keeyask project area prior to construction and annually for a minimum of five years after operation begins to verify the impact of the Project on the local and regional population.*
- 10.5 *Keeyask Hydropower Limited Partnership develop and apply a statistically robust sampling system to monitor olive-sided flycatcher and rusty blackbird, that will confirm whether displaced birds are using alternate habitat or whether the project effects are impacting the regional population.*
- 10.6 *Keeyask Hydropower Limited Partnership undertake a comprehensive pre-construction survey to determine the current number and location of gull and tern colonies and their nesting success in the Project area. During and following construction, establishment of new colonies or the expansion of existing colonies should be monitored to determine the effect of Keeyask on the local and regional population.*
- 10.7 *Keeyask Hydropower Limited Partnership investigate the feasibility of creating replacement gull and tern nesting habitat by modifying existing islands or creating new ones in the Project area using the placement of excavated materials. If feasible, these areas should be created as soon as possible after construction-related activities begin.*

- 10.8 Keeyask Hydropower Limited Partnership conduct a three- to five-year telemetry study with at least 10 (preferably 15) "summer-resident" caribou radio-collared during the snow-free season to delineate their current range and facilitate the collection of population parameters.
- 10.9 Keeyask Hydropower Limited Partnership limit fragmentation of habitat and disturbance of "summer resident" caribou where possible through the retirement of roads and trails required for construction.
- 10.10 Keeyask Hydropower Limited Partnership place signage along roadways alerting drivers to the potential for collision with caribou and moose.
- 10.11 Keeyask Hydropower Limited Partnership, in co-operation with Manitoba Conservation and Water Stewardship, develop a public information program that encourages the reporting of sightings of "summer resident" caribou, and moose and caribou road kills.
- 11.1 Keeyask Hydropower Limited Partnership provide continuing education and training opportunities on the Project for HNTEI-trained workers to advance their employment prospects.
- 11.2 Keeyask Hydropower Limited Partnership carry out mercury monitoring in the Long Spruce and Limestone forebays on the same schedule as for Stephens Lake and the Keeyask reservoir until it can be determined that there is no effect.
- 11.3 Keeyask Hydropower Limited Partnership carry out pre-flood monitoring of fish mercury in Gull Lake and Stephens Lake until flooding of the reservoir.
- 11.5 Keeyask Hydropower Limited Partnership monitor the number of workers coming to the site in private vehicles, and if the number proves to be significant and of concern, take steps to reduce the number of private vehicles on site.
- 11.6 Keeyask Hydropower Limited Partnership, for the life of the Project, monitor and report to Manitoba Conservation and Water Stewardship on the effects of the offsetting programs on:
- fish populations in lakes used in the offsetting programs;
 - moose and caribou populations in areas that fall under the offsetting programs;
 - any other impacts on local resources as a result of offsetting programs.
- 13.1 Keeyask Hydropower Limited Partnership, under the direction of Manitoba Water Conservation and Water Stewardship, on completion of the construction of the Keeyask Generation Project, undertake a third-party environmental audit to assess whether commitments were met and to assess the accuracy of assumptions and predictions. The results of this audit will be made public. This is to be repeated ten years after the first environmental audit.
- 13.2 Keeyask Hydropower Limited Partnership maintain its Keeyask website for the life of the Project, containing all the information the Proponent has already committed to in the EIS and Keeyask hearings related to monitoring and assessing environmental impacts, mitigation and management. This information is to be easily retrievable and updated frequently.
- 13.3 Keeyask Hydropower Limited Partnership provide to Manitoba Conservation and Water Stewardship an annual report on the Keeyask Generation Project containing sufficient detail that assessments can be made as to the accuracy of predictions, success of mitigation actions and commitment to future actions. These reports will provide assessment of any trends detected over the entire reporting period. These reports are to be made public.

Non-Licensing Recommendations

The Commission recommends that:

- 10.12 *Beyond the immediate Keeyask area, Manitoba Hydro and the Manitoba Government limit fragmentation of habitat, facilitate the rehabilitation of habitat, and limit human disturbance of "summer resident" caribou. Such actions could include, but are not limited, to the retirement and re-vegetation of roads, trails and cutlines, rehabilitation of borrow areas, limiting access on existing roads and trails, controlling access to calving islands, and limiting or restricting recreational trails.*
- 10.13 *Keeyask Hydropower Limited Partnership and the Manitoba Government further investigate and incorporate ATK and local knowledge of historical "summer resident caribou" distributions and populations to inform current status and their management.*
- 10.14 *Manitoba Conservation and Water Stewardship determine the status of the "summer resident" caribou and apply the appropriate protections depending upon the determination.*
- 10.15 *Manitoba Conservation and Water Stewardship lead a long-term co-ordinated monitoring study of caribou in the Gillam area that includes the Keeyask Generation Project, the Keeyask Transmission Project, Bipole III Transmission Project, Conawapa, expansion of and alterations to existing Manitoba Hydro facilities and any other impacts on the landscape.*
- 11.4 *Keeyask Hydropower Limited Partnership carry out post-flood monitoring of mercury in sediments and in the water column in the Keeyask reservoir and Stephens Lake to inform the effects of future projects.*
- 12.1 *The Manitoba Government establish provincial guidelines for cumulative effects assessment best practices and include specific direction for proponents in project guidelines.*



Works Cited

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Appendix I

Terms of Reference



NOV 16 2012

MINISTER OF
CONSERVATION AND WATER STEWARDSHIP

Legislative Building
Winnipeg, Manitoba, CANADA
R3C 0V8

NOV 14 2012

Mr. Terry Sargeant
Chair
Clean Environment Commission
Room 305 – 155 Carlton Street
Winnipeg MB R3C 3H8

Dear Mr. Sargeant:

Pursuant to Section 6 *The Environment Act* (the Act), I hereby request the Clean Environment Commission to hold public hearings on the proposed Keeyask Generation Project. I have enclosed Terms of Reference specifying the scope of your review.

In accordance with Section 7 of the Act, please provide me with a report containing the Commission's advice and recommendations on the proposed project following the completion of the hearings.

You may contact Tracey Braun of the Environmental Approvals Branch regarding information obtained through the environmental assessment process. The Keeyask Generation Project is also subject to the federal Canadian Environmental Assessment Act. As such, the regulatory process was done in accordance the Canada-Manitoba Agreement on Environmental Assessment Cooperation.

Yours sincerely,



Gord Mackintosh
Minister

Enclosure

cc: Tracey Braun

Terms of Reference
Clean Environment Commission
Keeyask Generation Project (the Project)

Background

On December 9, 2011, the Keeyask Hydropower Limited Partnership (the Partnership) filed an Environment Act Proposal (EAP) for the Keeyask Generation Project with the Environmental Approvals Branch (EAB) of Conservation and Water Stewardship. In addition to the EAP, the Partnership provided a draft scoping document outlining their proposed scope for the Environmental Impact Statement (EIS). The scoping document was subjected to a Technical Advisory Committee (TAC) and public review period. Subsequently, the Environmental Impact Statement (EIS) was submitted on July 6, 2012.

As authorized under *The Environment Act* (the Act), the Minister of Conservation and Water Stewardship has decided that the assessment of the Keeyask Generation Project will include a review by the Clean Environment Commission (the Commission).

In accordance with the Canada/Manitoba Agreement on Environmental Assessment Cooperation, a cooperative federal-provincial environmental assessment is being conducted for the project, with environmental assessment information being shared by both Canada and Manitoba in support of each government's respective regulatory requirements.

Terms of Reference

Pursuant to Section 6 (5.1) of the Act, the Minister has determined that the Terms of Reference the Commission is to follow are:

- To review the EIS, including the proponent's public consultation summary. Note that a detailed technical review will be done by the provincial and federal specialist agencies who are members of the TAC. As such, documents produced during this assessment should be considered by the Commission as input for the hearings;
- To hold public hearings for the Commission to consider stakeholder and public input; and,
- To prepare and file a report with the Minister of Conservation and Water Stewardship outlining the results of the Commission's review and providing recommendations for the Minister's consideration. The report should be filed within ninety (90) days from the date of completion of hearings as per Section 7(3) of the Act.

Mandate of the Hearings

The Commission shall conduct the hearings in general accordance with its Process Guidelines Respecting Public Hearings.

The Commission may, at any time, request that the Minister of Conservation and Water Stewardship review or clarify these Terms of Reference.

Hearings should be located in areas that will allow reasonable access to potential stakeholders, including in the project area and Winnipeg.

The Commission shall, within the mandate of the hearing and the Terms of Reference provided by the Minister as noted above, provide a report recommending:

- Whether an Environment Act licence should be issued to Keeyask Hydropower Limited Partnership for the Keeyask Generation Project.
- Should the Commission recommend issuance of a licence, any conditions should be included in the recommendation.

The Commission's recommendation shall incorporate, where appropriate, the Principles of Sustainable Development and Guidelines for Sustainable Development as contained in *Sustainable Development Strategy for Manitoba*.

Manitoba's licensing process will provide an opportunity for First Nations, Metis and other Aboriginal communities to advise of any concerns about potential adverse effects of the project on the exercise of Aboriginal or treaty rights. While the eventual licensing decision pursuant to The Act will consider the results of the consultation process, Crown-Aboriginal consultation is a distinct process from the public review process, including hearings to be conducted by the Commission. As such, the Commission is not being called on to conduct a Crown-Aboriginal consultation process or to consider the appropriateness or adequacy of the consultation process for the Project. The Commission also need not assess whether identified impacts may constitute an effect on the exercise of Aboriginal or treaty rights.

In the near future, government plans to conduct a detailed and comprehensive Needs For and Alternatives To (NFAAT) assessment of Manitoba Hydro's preferred development plan, including the proposed Keeyask Generation Station. As such, the NFAAT, as it relates to Keeyask, should not form part of this Commission's review because it will be assessed separately as part of a larger NFAAT assessment.

November 14, 2012



Appendix II

List of Presenters

Presenter	Affiliation
Adams, Ken	Keeyask Hydropower Limited Partnership
Agger, Leslie	Keeyask Hydropower Limited Partnership
Anderson, Karen	Keeyask Hydropower Limited Partnership
Arthurson, Conway	Private
Beardy, Abraham	Fox Lake Cree Nation Youth Group
Beardy, Brandon	Private, York Factory First nation
Beardy, Edwin	Kaweechiwasihk Kay-tay-a-ti-suk
Beardy, Elizabeth	Kaweechiwasihk Kay-tay-a-ti-suk
Beardy, Eunice	Private, Tataskweyak Cree Nation
Beardy, Flora	Kaweechiwasihk Kay-tay-a-ti-suk
Beardy, Freddy	Private, Tataskweyak Cree Nation
Beardy, George	Private, York Factory First Nation
Beardy, Georgina	Private, York Factory First Nation
Beardy, Jeff	Private, York Factory First Nation
Beardy, Joyce	Private, Tataskweyak Cree Nation
Beardy, Nancy	Kaweechiwasihk Kay-tay-a-ti-suk
Beardy, Pearce	Private, York Factory First Nation
Beardy, Roy	Private, York Factory First Nation
Bedford, Doug	Keeyask Hydropower Limited Partnership
Benoit, Al	Manitoba Métis Federation
Berger, Robert	Keeyask Hydropower Limited Partnership
Birnie, Meghan	Manitoba Métis Federation
Blacksmith, Andrina	Private, Pimicikamak Cree Nation
Bland, Ted	Keeyask Hydropower Limited Partnership
Bowick, Matt	Manitoba Wildlands

Presenter	Affiliation
Braun, Tracey	Manitoba Conservation and Water Stewardship
Braun, Will	Interchurch Council on Hydropower
Bresee, Karl	Consumers' Association of Canada (MB) Inc.
Brightnose, Bobby	Private, Pimicikamak Cree Nation
Brown, Gordon	Consumers' Association of Canada (MB) Inc.
Buckland, Jerry	Consumers' Association of Canada (MB) Inc.
Campbell, Anita	Manitoba Métis Federation
Campbell, Norman	Manitoba Métis Federation
Canibie, Malcolm	Shamattawa First Nation
Canibie, Sidney	Shamattawa First Nation
Chapman, Stella	Kaweechiwasihk Kay-tay-a-ti-suk
Chartrand, David	Manitoba Métis Federation
Chornoby, Len	Manitoba Métis Federation
Ciekiewicz, Allan	Private
Clarke, Amelia	Manitoba Wildlands
Cleveland, Robert	Manitoba Métis Federation
Cole, Vicky	Keeyask Hydropower Limited Partnership
Constant, Louisa	Keeyask Hydropower Limited Partnership
Cook, Melvin	Private, Tataskweyak Cree Nation
Cook, Sam	Private, York Factory First Nation
Craft, Aimee	Consumers' Association of Canada (MB) Inc.
Da Silva, Judy	Concerned Fox Lake Grassroots Citizens
Davies, Stuart	Keeyask Hydropower Limited Partnership
DeWit, William	Keeyask Hydropower Limited Partnership
Dick, Samson	Private
Dick, Terry	Kaweechiwasihk Kay-tay-a-ti-suk
Diduck, Alan	Consumers' Association of Canada (MB) Inc.
Disbrowe, Illa	Private, Tataskweyak Cree Nation
Dolinsky, Kenneth	Kaweechiwasihk Kay-tay-a-ti-suk
Ehnes, James	Keeyask Hydropower Limited Partnership
Fitzpatrick, Patricia	Consumers' Association of Canada (MB) Inc.
Flanders, David	Peguis First Nation
Flett, Cheryl	Private, York Factory First Nation
Flett, Dawson	Private, York Factory First Nation
Flett, Robert	Keeyask Hydropower Limited Partnership

Presenter	Affiliation
Garson, Joe	Private, Tataskweyak Cree Nation
Garson, Michael	Keeyask Hydropower Limited Partnership
Garson, Solange	Private, Tataskweyak Cree Nation
Gibson, Robert	Consumers' Association of Canada (MB) Inc.
Guirguis, Cathy	Peguis First Nation
Gunn, Jill	Consumers' Association of Canada (MB) Inc.
Head, Walter	Manitoba Métis Federation
Henley, Thomas	Shamattawa First Nation
Hicks, Elisabeth	Keeyask Hydropower Limited Partnership
Hill, Jordan,	Shamattawa First Nation
Hudson, Glenn	Peguis First Nation
Kearns, Stephanie	Pimicikamak Okimawin
Keeper, Alan	Private, Tataskweyak Cree Nation
Keeper, Joe	Keeyask Hydropower Limited Partnership
Kempton, Kate	Pimicikamak Okimawin
Kennedy, Betsy	Keeyask Hydropower Limited Partnership
Kennedy Courcelles, Cheryl	Private
Kidd Hantscher, Jane	Keeyask Hydropower Limited Partnership
Kinley, Janet	Keeyask Hydropower Limited Partnership
Kitchekeesik, Gloria	Private
Kitchekeesik, Jonathan	Private
Kitchekeesik, Dana	Private, Tataskweyak Cree Nation
Knudsen, Brian	Keeyask Hydropower Limited Partnership
Koenig, Kristina	Keeyask Hydropower Limited Partnership
Kulchyski, Peter	Concerned Fox Lake Grassroots Citizens
Lagimodiere, Julyda	Manitoba Métis Federation
Land, Lorraine	Peguis First Nation
Larcombe, Patt	Manitoba Métis Federation
Lee, Murray	Consumers' Association of Canada (MB) Inc.
Linklater, D'Arcy	Kaweechiwasihk Kay-tay-a-ti-suk
London, Jack	Keeyask Hydropower Limited Partnership
Luttermann, Annette	Pimicikamak Okimawin
MacDonell, Don	Keeyask Hydropower Limited Partnership
Madden, Jason	Manitoba Métis Federation
Malenchak, Jerry	Keeyask Hydropower Limited Partnership
Manzer, Mark	Keeyask Hydropower Limited Partnership
Massan, Christina	Concerned Fox Lake Grassroots Citizens

Presenter	Affiliation
Massan, Jack	Private
Massan, Khrystyna	Fox Lake Cree Nation Youth Group
Massan, Noah	Concerned Fox Lake Grassroots Citizens
Massan, Paddy	Shamattawa First Nation
Matkowski, Shelley	Keeyask Hydropower Limited Partnership
Mayor, Janet	Keeyask Hydropower Limited Partnership
Mazurat, Marilyn and Xavier	Private, Tataskweyak Cree Nation
McCorrister, Nathan	Peguis First Nation
McHugh, Alyson	Manitoba Wildlands
McIvor, Janet	Private, Tataskweyak Cree Nation
McIvor, Norma	Private, Tataskweyak Cree Nation
McIvor, Norman	Private, Tataskweyak Cree Nation
McKay, Edith Grace	Private, Pimicikamak Cree Nation
McKay, Donald Senior	Private, Pimicikamak Cree Nation
McKay, Katherine Elder	Private, Pimicikamak Cree Nation
McKay, Violet	Private, Pimicikamak Cree Nation
McLachlan, Stephane	Concerned Fox Lake Grassroots Citizens
McLeod, Nicholas	Private, Tataskweyak Cree Nation
Miles, Kerry	Shamattawa First Nation
Miles, Sam	Shamattawa First Nation
Miles, William	Shamattawa First Nation
Miller, Charles	Private, Pimicikamak Cree Nation
Monias, Rita F.	Private, Pimicikamak Cree Nation
Monias, Tommy	Pimicikamak Cree Nation
Moose, Andrew	Private, York Factory First Nation
Moose, Ivan	Concerned Fox Lake Grassroots Citizens
Muswaggon, David	Pimicikamak Okimawin
Nabiss, Sandra	Private, Fox Lake Cree Nation
Napoakesik, Brittany	Shamattawa First Nation
Neckoway, Ramona	Concerned Fox Lake Grassroots Citizens
Neepin, George	Keeyask Hydropower Limited Partnership
Nelson, Baldur	Private
Nepetaypo, Thomas	Concerned Fox Lake Grassroots Citizens
Nepitabo, Tom	Private
Neville, Elissa	Keeyask Hydropower Limited Partnership
Noble, Bram	Consumers' Association of Canada (MB) Inc.
North, Ettienne	Private, Pimicikamak Cree Nation

Presenter	Affiliation
Northover, Carolyne	Keeyask Hydropower Limited Partnership
O’Gorman, Melanie	Consumers’ Association of Canada (MB) Inc.
Osborne, Jackson	Private, Pimicikamak Cree Nation
Pachal, Shawna	Keeyask Hydropower Limited Partnership
Pantel, Phillip	Keeyask Hydropower Limited Partnership
Parenteau, Solomon	Manitoba Métis Federation
Park, Jack	Manitoba Métis Federation
Paupanakis, Darwin	Pimicikamak Okimawin
Pawlowska-Mainville, Agnieszka	Concerned Fox Lake Grassroots Citizens
Peake, Stephan	Consumers’ Association of Canada (MB) Inc.
Petch, Virginia	Keeyask Hydropower Limited Partnership
Redhead, Daniel	Shamattawa First Nation
Redhead, Liberty	Shamattawa First Nation
Redhead, Roy	Private, York Factory First Nation
Redhead, Wayne	Private, York Factory First Nation
Regehr, Brad	Keeyask Hydropower Limited Partnership
Rempel, George	Keeyask Hydropower Limited Partnership
Riel, Marci	Manitoba Métis Federation
Robinson, Shirley	Pimicikamak Okimawin
Roddick, Bob	Keeyask Hydropower Limited Partnership
Rosenberg, Sheryl	Keeyask Hydropower Limited Partnership
Salazar, James	Manitoba Wildlands
Saunders, Doreen	Kaweechiwasihk Kay-tay-a-ti-suk
Saunders, Martina	Keeyask Hydropower Limited Partnership
Saunders, Selina	Private
Schaefer, James	Consumers’ Association of Canada (MB) Inc.
Schick, Glen	Keeyask Hydropower Limited Partnership
Schneider-Viera, Friederike	Keeyask Hydropower Limited Partnership
Scott, Eleanor	Private, Pimicikamak Cree Nation
Settee, Darrell	Pimicikamak Okimawin
Sinclair, Joe	Private, York Factory First Nation
Sinclair, Niigaanwewidam James	Peguis First Nation
Soprovich, Dan	Manitoba Wildlands
Spence, Aubergine	Private, Tataskweyak Cree Nation
Spence, John	Private
Spence, Martha	Private, Tataskweyak Cree Nation

Presenter	Affiliation
Spence, Rita	Fox Lake Cree Nation Youth Group
Spence, Robert	Private
Spence, Victor	Keeyask Hydropower Limited Partnership
Spence, Walter	Keeyask Hydropower Limited Partnership
St. Laurent, Marc	Keeyask Hydropower Limited Partnership
Stewart, Abbie	Manitoba Métis Federation
Sutherland, Mike	Peguis First Nation
Wastesicoot, Charlotte	Private
Wastesicoot, Frank	Private, York Factory First Nation
Wastesicoot, George	Private, York Factory First Nation
Wavey, Jim	Private, Tataskweyak Cree Nation
Wavey, Keanna	Private, Tataskweyak Cree Nation
Wavey, Mary	Private, Tataskweyak Cree Nation
Wavey, Shannise	Fox Lake Cree Nation Youth Group
Whelan Enns, Gaile	Manitoba Wildlands
Whelan, Jared	Peguis First Nation
Wilke, Aavory	Fox Lake Cree Nation Youth Group
Williams, Byron	Consumers' Association of Canada (MB) Inc.
Williams, Nancy	Private, York Factory First Nation
Wilson, Ross	Keeyask Hydropower Limited Partnership
Wyenberg, Leane	Keeyask Hydropower Limited Partnership

Presenters of written submissions

Presenter	Affiliation
Anton	Private (Pimicikamak Cree Nation)
Campbell, Neil H.P.	Private (Pimicikamak Cree Nation)
Chesney, Garrett	Private (Pimicikamak Cree Nation)
Dauida	Private (Pimicikamak Cree Nation)
Garson, Solange	Private (Tataskweyak Cree Nation)
Halcrow, Nick Sr.	Private (Pimicikamak Cree Nation)
McKay, Edith	Private (Pimicikamak Cree Nation)
McKay, Tony K.S.	Private (Pimicikamak Cree Nation)
Monias, Shevon	Private (Pimicikamak Cree Nation)
Orborne, Lindsay	Private (Pimicikamak Cree Nation)
Pearson, Kori	Private (Pimicikamak Cree Nation)
Robinson, Rae	Private (Pimicikamak Cree Nation)
Ross, Braden	Private (Pimicikamak Cree Nation)
Ross, Colan	Private (Pimicikamak Cree Nation)
Ross, Daralee	Private (Pimicikamak Cree Nation)
Ross, Davey	Private (Pimicikamak Cree Nation)
Ross, Jordyne	Private (Pimicikamak Cree Nation)
Ross, Kaylin	Private (Pimicikamak Cree Nation)
Ross, Mary Verna	Private (Pimicikamak Cree Nation)
Ross, Pierce	Private (Pimicikamak Cree Nation)
Ross, Tammy	Private (Pimicikamak Cree Nation)
Ross, Taylor	Private (Pimicikamak Cree Nation)
Scott, Skyler	Private (Pimicikamak Cree Nation)
Scott, Vince Gill	Private (Pimicikamak Cree Nation)
Spence, Jodie	Private (Pimicikamak Cree Nation)
Trout, Jo Dee	Private (Pimicikamak Cree Nation)
Umpherville, Delfina	Private (Pimicikamak Cree Nation)
Umpherville, Konroy	Private (Pimicikamak Cree Nation)



Appendix III

Glossary of Acronyms

asl	Above sea level
AC	Alternating current
AEA	Adverse Effects Agreement
AFP	Augmented Flow Program
ATK	Aboriginal Traditional Knowledge
CAC	Consumers' Association of Canada (Manitoba) Inc.
CEA	Cumulative effects assessment
CEC	Clean Environment Commission
CFLGC	Concerned Fox Lake Grassroots Citizens
cfs	Cubic feet per second
CLFN	Cross Lake First Nation/Pimicikamak Okimawin
CNP	Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation)
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPUE	Catch per unit of effort
CRD	Churchill River Diversion
DC	Direct current
DFO	Department of Fisheries and Oceans
DNC	Direct Negotiated Contract
EAPF	<i>Environmental Act Proposal Form</i>
EIS	Environmental Impact Statement
EMPAs	Excavated material placement areas
EMS	Emergency Medical Services
FLCN	Fox Lake Cree Nation
GHG	Greenhouse Gas
GW	Gigawatt
HNTEI	Hydro Northern Employment and Training Initiative
IR	Information Request

JKDA	Joint Keeyask Development Agreement
KCN	Keeyask Cree Nations
KHLP	Keeyask Hydropower Limited Partnership
KIP	Keeyask Infrastructure Project
KK	Kaweechiasihk Kay-Tay-A-Ti-Suk
KTC	Keewatin Tribal Council
KTP	Keeyask Transmission Project
LWR	Lake Winnipeg Regulation
MAC	Monitoring Advisory Committee
MKO	Manitoba Keewatinowi Okimakanak
MMF	Manitoba Métis Federation
MW	Megawatt
NCN	Nisichawayasihk Cree Nation
NFAT	Need For and Alternatives To
NFA	Northern Flood Agreement
NFC	Northern Flood Committee
PFN	Peguis First Nation
PIP	Public Involvement Program
PIT	Passive Integrated Transponder
PMF	Probable Maximum Flood
RCEA	Regional Cumulative Effects Assessment
RMB	Resource Management Board
SFN	Shamattawa First Nation
SLRMA	Split Lake Resource Management Area
TAC	Technical Advisory Committee
TCN	Tataskweyak First Nation
TLE	Treaty Land Entitlement
TSS	Total suspended solids
UNESCO	United Nations Educational, Scientific and Cultural Organization
VEC	Valued Environmental Component
WLFN	War Lake First Nation
WSK	Western Scientific Knowledge
YFFN	York Factory First Nation
YFRMA	York Factory Resource Management Area
YOY	Young of the year

Appendix IV

Glossary of Technical Terms

Adverse Effects Agreement	Agreements between Manitoba Hydro and the four Keeyask Cree Nations that include agreed-upon mitigation measures to compensate for potential impacts of the project on the rights and interests of partners' members, including such matters as resource use and cultural impacts.
Benthic	Occurring at or related to the bottom of a body of water.
Bioaccumulation	The accumulation of substances or other organic chemicals such as methylmercury in an organism. It occurs when an organism absorbs a toxic substance at a rate greater than that at which the substance is lost.
Biological oxygen demand	(BOD) is the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period.
Bog	Wetland dominated by sphagnum mosses and typically nutrient-poor and acidic.
Borrow pit	Area where material (usually soil, gravel or sand) has been dug for use at another location.
Cofferdams and rock groins	Temporary rock and earth fill structures built in the river to allow for construction work to be carried out. Cofferdams are constructed around a worksite, such as the spillway or powerhouse, so that the work area can be dewatered.
Conductor	Object or type of material that permits the flow of electric charges in one or more directions. For example, a wire is an electrical conductor that can carry electricity along its length.

Core area	The interior area of a block of habitat that is far enough from the edge to avoid edge effects.
COSEWIC Status Categories	The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was established by the <i>Species at Risk Act</i> as the authority for assessing the conservation status of species that may be at risk of extinction in Canada. COSEWIC's categories for the status of wildlife species are: Endangered – A wildlife species facing imminent extirpation or extinction. Threatened – A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. Of Special Concern – A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.
CPUE	“Catch per unit of effort:” the number of fish that could be caught over a specified time.
Discontinuous permafrost	Permafrost located, somewhat sporadically, across the subarctic. Unlike arctic permafrost, which is more or less continuous across the arctic, discontinuous permafrost is located sporadically and exists due to soil conditions, geography, moisture content, and other factors.
Edge effects	The effect caused by the transition between two distinct ecological communities (for example, forest and grass-covered clearing).
Environmental Management Plan	A plan containing measures focused on minimizing effects on a specific aspect of the aquatic, terrestrial or socio-economic environment.
Environmental Protection Plan	A plan providing detailed site-specific protection procedures for use during various stages of construction of the Project.
Evapotranspiration	The movement of water into the air from waterbodies, soil and plants.
Fen	Peatland that receives nutrients from ground or surface water, is not acidic and is characterized by mosses and sedges.
Fire regime	The pattern, frequency and intensity of the wildfires in an area.

Fish passage	A structure, such as a series of pools arranged like ascending steps at the side of a stream, enabling fish to swim upstream around a dam or other obstruction, or a program of trapping and transporting fish by vehicle.
Fragmentation	The breaking up of continuous blocks of habitat into smaller blocks, as a result of human disturbances.
Frazil Ice	Loose, randomly oriented needle-shaped ice crystals in water. It resembles slush and forms in super-cooled turbulent water.
Gamete	A mature sexual reproductive cell, such as a sperm or egg, that unites with another cell to form a new organism.
Granular fill	Any type of small grain-like filler that get poured in between large rock to fill the gaps, gravel.
Hydraulic head	The distance or height that the water drops at a generating station.
Hydraulic Zone of Influence	The portion of the Nelson River where water levels and flows will be affected by the Project.
Ice boom	A floating structure anchored in the bedrock that will initiate the development of a solid ice cover earlier in the winter.
Indicator species	Species whose presence, absence, or relative well-being in a given environment is a sign of the overall health of its ecosystem. By monitoring the condition and behavior of an indicator species, scientists can determine how changes in the environment are likely to affect other species that are more difficult to study.
Inorganic	Not consisting of or deriving from living matter.
Insulators	Materials whose internal electric charges do not flow freely, and therefore make it very hard to conduct an electric current.
Intactness	The degree to which an ecosystem remains unaltered by human features that remove habitat and increase fragmentation.

Invasive Plants	(Also called “non-indigenous” or “non-native” plants.) Those species of plants that grow outside of their region of origin and can out-compete species native to the region, often with adverse economic or ecological effects.
Life-cycle assessment	A tool that takes a “cradle-to-grave” approach for quantifying and interpreting environmental impacts associated with a product or service.
Linear feature density	Measure of the impact of linear features, such as roads, power lines, trails and cutlines, in an area, typically expressed as kilometres of linear features per square kilometre.
Marsh	Wetland that is periodically inundated, and characterized by grasses, sedges, cattails and rushes.
Methylmercury	An organic form of mercury, produced by the action of anaerobic organisms that live in aquatic systems, that can become concentrated in animal tissues.
Organic	Of, relating to, or derived from living matter.
Peaking mode	In hydropower generation, this mode allows water to be stored in the reservoir and then released to generate electricity during peak demand periods.
Person-year	Estimated to be equivalent 2,090 to 2,295 hours of employment, corresponding to 52 weeks of work at 40 to 45 hours per week.
Photochemical degradation	Damage caused or increased by exposure to light.
PIT tags	Passive Integrated Transponder tags, consisting of an integrated circuit chip, capacitor, and an encased antenna coil, help scientists track individual organisms by providing a reliable lifetime “barcode.” PIT tags are dormant until activated; they therefore do not require any internal source of power throughout their lifespan.
ppm	Parts per million, commonly used as a measure of small levels of pollutants in air, water, body fluids, etc.
Quarry	An excavation or pit, usually open to the air, from which building stone, slate, or the like, is obtained by cutting, blasting, etc.

Radio telemetry studies	Studies in which animals are equipped with electronic tags so that their movements can be tracked.
Recruitment	Recruitment occurs when juvenile animals survive and are added to the population. Recruitment is a measurement of both birth and survival to the first fall.
Re-runnering	A method of upgrading the turbines to increase generating capacity in a hydroelectric generating station.
Riprap	A layer of large stones used for purposes such as preventing erosion.
Spillway	A structure that discharges excess water flows above those needed for the production of electricity.
Staging area	Area used by birds for feeding and roosting during migration.
Tailrace	The path through which water flows out of the hydroelectric power plant after power generation.
Tailwater	Waters located immediately downstream from a hydroelectric structure, such as a dam.
Thermal stratification	The phenomenon in which lakes develop two or more different layers of water of different temperatures: warm on top and cold below.
Trash rack	Screen that prevents debris from passing through the turbines at a hydroelectric generating station.
Trophic level	An organism's feeding position in a food chain, such as primary producer, herbivore, primary carnivore, etc.
Umbrella species	Species selected for making conservation-related decisions, typically because protecting these species indirectly protects the many other species that make up the ecological community of its habitat.
Volt	The unit of measure of electric pressure which causes current to flow.
Watt	The unit of measurement of electric power.
Weir	A barrier across a river designed to alter its flow characteristics, typically to raise upstream water levels.

Wetland function

The natural properties or processes that wetlands provide, including converting sunlight into biomass, storing carbon, creating soil, storing and purifying groundwater, protecting shorelines, contributing to biodiversity and providing habitat for certain plant and animal species.

Year class

The number of fish born in a given year.

Appendix V

Glossary of Cree Terms Cited in the Report

<i>Aski/Askiy</i>	<i>Aski</i> (the spelling used by FLCN) and <i>Askiy</i> (the spelling used by TCN, WLFN and YFFN) refer to the environment, including the land and water and all the plants and animals.
<i>Aski Keskentamowin</i>	Traditional knowledge, knowledge of <i>Aski/Askiy</i> .
<i>Aspehnimowin</i>	Trust: important to relationships and developed over time.
<i>Ayakohmisewin</i>	Caution: essential so that individuals and the community can avoid disrespectful and harmful actions towards others or towards <i>Askiy</i> .
<i>Innado mechim</i>	Traditional foods.
<i>Inninuwak</i>	The Cree people.
<i>Ke nocominanak</i>	Grandmothers Circle: proposed as an advisory group of elders whose mission would be to oversee safeguarding the environment. The group would provide advice and its terms of reference would be the teachings of Honesty, Respect, Courage and Truth.
<i>Kischi Sipi</i>	The Nelson River.
<i>Kiskinohamakaywina</i>	Teachings: handed down through the generations, offering daily guidance, and relevant and applicable to the assessment, planning, construction and operation of Keeyask.
<i>Kistaynitakosewin</i>	Honour: as in, to honour life and <i>Askiy</i> through ceremonies.
<i>Kistaynitamowin</i>	Respect: very important when speaking and acting towards <i>Askiy</i> .
<i>Kwayaskonikiwin</i>	Reconciliation.

<i>Mantayosipi neyahk</i>	Caribou from the point of land of the River of Strangers. (York Factory First Nation).
<i>Mino pimatisiwin</i>	Living a good life: also including the protection of <i>Aski/Askiy</i> , health and social well-being, socio-economic prosperity, integrity of culture and language, integrity of governance and autonomy and healthy ecosystems. It is spelled as a single word in the YFFN evaluation report and as two words elsewhere.
<i>Mistikoskaw utikuk</i>	Caribou of a wooded area: resident throughout the year and occasionally joining in one herd in autumn with the Pen island caribou. These caribou are relatively larger in size than others, with darker hide and more hair. (Fox Lake Cree Nation)
<i>Mitewewin</i>	The traditional and spiritual ways of life.
<i>Namowin atikok</i>	Caribou from the north east. These caribou migrate into the area in early winter, are resident on the south side of the Nelson River and occasionally converge into one herd along with barren land caribou. These are the caribou often referred to as Pen Island coastal caribou. They are described as small in size, lighter in colour and having white fur around the neck. (Fox Lake Cree Nation)
<i>Noschimik atikok</i>	Caribou that stay in the bush. (York Factory First Nation)
<i>Oochinewhin/ohcinewin</i>	The belief that negative consequences will result from harmful or disrespectful actions, including harming <i>Aski/Askiy</i> or other people or treating <i>Aski/Askiy</i> or other people with disrespect.
<i>Pasko atikok</i>	No tree caribou (barren ground). (York Factory First Nation)
<i>Pastamowin</i>	Making inappropriate, hateful, untrue comments about someone else.
<i>Puskwaw utikosisak</i>	Small caribou of a barren land. These caribou migrate into the Keeyask area in early winter and are resident on the north side of the Nelson River. Their meat is described as sweeter and they have a more rounded hoof print. (Fox Lake Cree Nation)
<i>Tapwaywin</i>	Truth.
<i>Wapanok atikok</i>	Caribou that come from the east. (York Factory First Nation)