

**ENVIRONMENTAL IMPACT
STATEMENT GUIDELINES**
for the
KEYYASK GENERATION PROJECT
proposed by the **Keeyask Hydropower Limited
Partnership**

Prepared by:
Canadian Environmental Assessment Agency

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List of Acronyms and Definitions

<u>Acronym</u>	<u>Meaning</u>
Agency, the	Canadian Environmental Assessment Agency
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSR	Comprehensive Study Report (federal)
Cooperative Agreement	<i>Canada-Manitoba Agreement on Environmental Assessment Cooperation</i>
Act, the	<i>Canadian Environmental Assessment Act</i>
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
HSI	Habitat Suitability Indices
PAT	Project Administration Team
Project, the	Keeyask Generation Project
Proponent	Keeyask Hydropower Limited Partnership
Provincial Act, the	<i>The Environment Act (Manitoba)</i>
SARA	<i>Species at Risk Act</i>
TAC	Federal/Provincial Technical Advisory Committee
TC	Transport Canada
VEC	Valued Ecosystem Component

PART 1 - BACKGROUND

1 Introduction

The Keeyask Hydropower Limited Partnership (the proponent) has submitted a project description and Environment Act Proposal for the development of the Keeyask Generation Project (the Project), a 695-megawatt hydroelectric generation station on the lower Nelson River in northern Manitoba.

The proposed project will be subject to environmental assessment (EA) under both the *Environment Act* (provincial Act) and the *Canadian Environmental Assessment Act* (Act). The Government of Canada and the Government of Manitoba have agreed to review the project cooperatively as per the *Canada-Manitoba Agreement on Environmental Assessment Cooperation* (Cooperative Agreement).

The purpose of this document is to identify for the proponent and interested parties, the information and analysis required by federal government for consideration in an environmental impact statement for the Keeyask Generation Project (the Project).

1.1 Proposed Project

The proponent is proposing to construct and operate a 695-megawatt hydroelectric generation station at Gull Rapids on the lower Nelson River immediately upstream of Stephen's Lake (Reservoir). The site would be approximately 30 kilometres southwest of Gillam, Manitoba. The Project would include a powerhouse complex, a spillway, dams, dykes, a reservoir, and other related infrastructure.

The Project includes all activities and physical works associated with the construction, operation, maintenance, decommissioning and reclamation of the proposed generating station as described in the proponent's Keeyask Generation Project - Project Description (the project description) dated July 6, 2011, and associated addendum dated August 31, 2011, and the Environment Act Proposal and Keeyask Generation Project Scoping Document (the scoping document) dated December 9, 2011.

1.2 Purpose of the Environmental Impact Statement Guidelines

The purpose of this document is to identify for the proponent and the public, the information required by the federal government in the environmental impact statement (EIS) for consideration in the EA for the Project. These guidelines specify the nature, scope and extent of the information required. The proponent will prepare and submit an EIS that: identifies the potential adverse environmental effects of the Project; identifies technically and economically feasible measures to mitigate those effects; and evaluates whether the proposed project will result in any significant adverse environmental effects.

While these guidelines provide a framework for preparing a complete EIS, it is the responsibility of the proponent to provide sufficient data and analysis on potential environmental effects to permit proper evaluation by the Canadian Environmental Assessment Agency (the Agency), technical and regulatory agencies, Aboriginal groups and the public.

EIS Guidelines for the Keeyask Generation Project

These guidelines outline the minimum information requirements while providing the proponent with flexibility in selecting methods to compile data for the EIS. These guidelines have been prepared following consideration of information submitted by the proponent and other interested parties. From February 29, 2012 to March 28, 2012, the Agency invited comments from Aboriginal groups the public and the proponent on the draft environmental impact statement document. During this time the Agency also solicited comments from the federal review team which comprises of Fisheries and Oceans Canada, Transport Canada, Environment Canada, Health Canada and Natural Resources Canada. After consideration of all comments received these guidelines were finalized.

These guidelines should not be regarded as either restrictive or exhaustive, as concerns other than those identified in the document could arise during the investigations associated with the EA. In addition to the information required by these guidelines, the elements presented within the proponent's the scoping document are expected to be included within the EIS document.

1.3 Federal EA Requirement

The Project is a "project" as defined in section 2 of the *Canadian Environmental Assessment Act*.

Fisheries and Oceans Canada (DFO) may be required to issue one or more authorizations under section 32 and subsection 35(2) of the *Fisheries Act* with respect to the Project. Transport Canada (TC) may also be required to issue one or more approvals under section 5 of the *Navigable Waters Protection Act*. The authorizations and approvals are described in the Law List Regulations under the Act. DFO and TC are responsible authorities as defined in section 2 of the Act and therefore must ensure that an EA of the Project is carried out before any *Fisheries Act* authorizations and *Navigable Waters Protection Act* approvals are issued. In addition, DFO, with EC, will be required to determine if the proposed work can be carried out in compliance with the prohibition on the deposit of deleterious substances into waters frequented by fish (s.36 of the *Fisheries Act*).

Submission of regulatory and technical information necessary for DFO, TC, and EC to make their regulatory decisions during the conduct of the EA is at the discretion of the Proponent. Although this information is not necessary for the EA decision, the Proponent is expected to submit it concurrent with the EIA, for the RAs to meet the regulatory timelines.

The Project is subject to a comprehensive study under the Act pursuant to paragraph 4(b) of the *Comprehensive Study List Regulations* (SOR/94-638), given that it would be a hydroelectric generation station with a production capacity in excess of 200 megawatts. The Agency will exercise the powers and perform the duties and functions of the responsible authorities during the environmental assessment until the comprehensive study report is submitted to the Minister of Environment. Following the Minister of Environment's decision, DFO and TC will assume their roles as responsible authorities in relation to the Project.

Information on the federal EA may be obtained from:

EIS Guidelines for the Keeyask Generation Project

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1.4 Scope of Project for the Purposes of the EA

The scope of the Project for the purpose of the cooperative EA will include all activities and physical works associated with the construction, operation, maintenance, decommissioning and reclamation of the proposed Keeyask Generation Project as described in the proponent's Keeyask Generation Project – Project Description and the Keeyask Generation Project Scoping Document.

The EIS shall include a description of all components of the Project and any associated physical works and activities to support its construction, operation, maintenance, decommissioning and reclamation.

Manitoba Hydro, as the sole owner and proponent of the Keeyask Transmission Project, has advised that it intends to submit a separate project description and related EIS for the Keeyask Transmission Project. The Agency has determined that the Project, as proposed by the proponent, is closely related to the Keeyask Transmission Project being proposed by Manitoba Hydro. Therefore, in accordance with subsection 15(1) of the Act, the Keeyask Generation Project and the Keeyask Transmission Project will be considered to form a single project for the purpose of completing the comprehensive study.

Part 2: Content and Structure of the EIS

2 Preparation and Presentation of the EIS

The EIS will be a statement of the proponent's conclusions and commitments related to the environmental effects of the Project. The conclusions and commitments to mitigation and follow up the EIS must be explicitly endorsed. The proponent's EIS will be made available for Aboriginal consultation and public review. To the extent possible, the EIS must be written in a manner that can be understood by non-specialists. Acronyms and a glossary of technical terms must be provided.

The sections that follow elaborate on the information to be documented in each section of the EIS. Sufficient information needs to be provided for each section so that informed conclusions can be reached regarding the potential for impacts on the various components of the environment. The greatest time and effort are to be applied to data collection and interpretation related to the valued environmental components (VECs) as identified as by the proponent and through these guidelines. The proponent must provide a rationale if issues identified in the guidelines are not fully addressed in the EIS. Key impacts that are identified for more intensive investigation must be highlighted.

Where external sources of information or data are used, the proponent shall reference the information within the text of the EIS in addition to providing a complete reference list at the end of the document. Where conclusions that are critical to the assessment of environmental impacts are cited from other reports, the proponent shall provide, subject to copyright restrictions, sufficient detail of the originating data and analysis so as to enable a critical review of that material. Such detailed reference material, where practical, could be submitted as an appendix to the EIS or if impractical, provided upon request. The EIS shall be a stand-alone document upon which a critical review can be undertaken.

Please note that the information included in this document is not intended to be exhaustive and additional detail, studies and components may require examination.

The EIS that is made publicly available for comment should not contain:

- information that is sensitive or confidential (i.e., financial, commercial, scientific, technical, personal, cultural or other nature), that is treated consistently as confidential, and the person affected has not consented to the disclosure; or,
- information that is likely to endanger the life, liberty or security of a person through its disclosure.

The proponent should consult with the Agency regarding whether specific information requested by these guidelines should be treated as confidential. The Agency is governed by freedom of information and confidentiality legislation.

The proponent shall develop a "Table of Concordance" to be included in the EIS. This table would identify, through cross referencing, where information identified in these EIS guidelines that is required in the EIS can be located by referencing the volume, section and page.

To facilitate the identification of documents and their coding in public registries, the title page of the EIS will contain the name and location of the Project, the title of the document (including the term “environmental impact statement”), subtitle, name of the proponent, date in month and year and the Canadian Environmental Assessment Registry reference number.

The EIS will be provided to regulatory authorities in printed and electronic form.

3 Executive Summary

The EIS will include an executive summary which will provide:

- a concise description of all key components of the Project;
- a succinct description of the consultation conducted with Aboriginal groups, the public, and government agencies, with a summary of the issues raised and solutions found and/or suggested during these consultations;
- a description of the key environmental effects of the Project, as per section 2 of the Act, and proposed technically and economically feasible mitigation measures; and
- the proponent’s conclusions on significance of potential residual environmental effects and significance of cumulative environmental effects.

In order to enhance understanding of the EIS and facilitate consultation activities, the executive summary should be prepared using “plain language” and should serve as a stand-alone document. The executive summary will include maps indicating the locations of the Project and its key components. The proponent will prepare a summary of the environmental effects analyses in a table format to present the information clearly and accurately.

The executive summary must be provided in English and French upon submission.

4 Introduction and Project Background

4.1 The Proponent

The proponent shall:

- identify itself and the name of the legal entity that would develop, manage and operate the Project;
- provide its contact information for the proponent (e.g., name, address, phone, fax, email);
- explain its corporate and management structures;
- specify the mechanism that would be used to ensure that relevant corporate policies and EA commitments will be implemented and respected for the Project;
- identify key personnel, contractors, and/or sub-contractors responsible for preparing the EIS including, if required, identifying qualifications of biologists involved in conducting surveys for migratory birds, species at risk and species of conservation concern, and wetland delineations should be provided in an appendix to the EIS.

4.2 Project Overview

The proponent shall briefly summarize in this section of the EIS, the Project, by describing the project components, associated and ancillary works, activities, scheduling details, timing of each phase of the Project and other key features. If the Project is part of a larger sequence of projects, the proponent shall outline the larger context and present the relevant references, if available. The project location should be described in conjunction with surrounding land uses and infrastructure. The intent of this overview is to provide a summary of the key components of the Project, not a detailed description, which is required in Section 5 of this document.

4.3 Participants in the Environmental Assessment

The EIS shall clearly identify the main participants in the EA, including, Aboriginal groups, community groups, environmental organizations etc.

4.4 Regulatory Framework and the Role of Government

To understand the context of the EA, this section should identify, for each jurisdiction, the government bodies involved in the EA as well as the EA processes. More specifically it shall identify, with references and provide the exact title and relevant section, (if applicable):

- the environmental and other specific regulatory approvals and legislation that are applicable to the Project at the federal, provincial, regional and municipal levels;
- government policies, resource management, planning or study initiatives pertinent to the Project and/or EA, and discuss their implications;
- policies and guidelines of the Aboriginal groups being consulted that are pertinent to the Project and/or EA and discuss their implications;
- any treaty or self government agreements with Aboriginal groups that are pertinent to the Project and/or EA;
- any relevant land use plans, land zoning, or community plans that are pertinent the Project and/or EA; and
- in a summary form, the (national, provincial and / or regional) objectives, standards or guidelines that have been used by the proponent to assist in the evaluation of any predicted environmental effects.

5 Project Description

5.1 Purpose of and Need for the Project

This section of the EIS should describe the “need for” the Project, which is defined as the problem or opportunity that the Project is intending to address, solve or satisfy. A description of the “need for” a project establishes the fundamental justification or rationale for its developing.

In the EIS, the “purpose” and “need for” the Project should be explained from the perspective of the project proponent and in the context that is provided by the proponent for consideration of alternatives to the Project.

EIS Guidelines for the Keeyask Generation Project

The Project will be undertaken to achieve specific objectives established by the proponent. These objectives should be described in this section. The “purpose” of the Project can be described by answering the question: *What is to be achieved by carrying out the Project?*

For the purpose of informing the comprehensive study, the proponent must clearly describe the “need for” the Project. The “need for” the Project can be described by answering the question: *What is the problem or opportunity the project is intended to solve or satisfy?*

Responses to the requirements set out in this section of the guidelines should be established from the perspective of the proponent. The analysis to be documented in the EIS relating to the objectives and “need for” the Project should identify the requirements of the proposed purchaser of the electricity to be produced by the Project. The purchaser’s requirements should be concisely described.

5.2 Project Alternatives

Responses to this section of these guidelines should be established from the perspective of the proponent. The analysis in this section of the EIS should identify requirements of the proposed purchaser of the power to be produced by the Project. These requirements should be concisely described.

5.2.1 Alternatives to the Project

The EIS must include an analysis of alternatives to the Project which describe functionally different ways to meet the project need and achieve the project purpose where analyzed from the perspective of the proponent. Analysis of “alternatives to” a project should validate that the preferred alternative is a reasonable approach to meeting the identified need and purpose.

The proponent will:

- clearly describe its objectives in undertaking the Project;
- identify, from the perspective of the proponent, alternatives to the Project that were considered, including “the No Go” scenario;
- develop criteria to identify the major environmental, economic, social and technical costs and benefits of the alternatives; and
- identify the preferred alternatives based on the relative consideration of the environmental, economic, social and technical costs and benefits.

Analysis of alternatives to the Project should describe the process the proponent used to determine that the Project is viable (technical, social, cultural, economical and environmental). At this stage of the process the level of analysis should reflect the more conceptual nature of the identified alternatives to the Project.

When assessing project alternatives, the proponent is encouraged to take into account the relations and interactions among various components of the ecosystem, including affected Aboriginal and other communities, and any adverse impacts on current use lands and resources for traditional purposes by Aboriginal peoples, including but not limited to

hunting, fishing, trapping and gathering. Further, the proponent is encouraged to demonstrate how the preferred alternative contributes to sustainable development.

5.2.2 Alternative Means of Carrying out the Project

The EIS must identify and describe any alternative means of carrying out the Project that were determined to be technically and economically feasible. The EIS will provide a parameter-based multiple accounts analysis of the alternative means described, including a comparison of the likely environmental effects of each alternative to those of the Project. The analysis must include consideration of each phase of the Project (construction, operation, modification, decommissioning). The analysis will:

- identify the alternative means considered toward carrying out the Project;
- identify, along with other parameters, the likely extent of environmental effects of each alternative; and
- identify the reasoning behind selection of the preferred means.

Identifying the Alternative Means to Carrying out the Project.

The analysis described above will list the criteria used to determine the technical and economic feasibility of the alternative means considered, show the analysis, and list and describe the alternatives that were considered technically and economically feasible. Each alternative means will be described in sufficient detail to facilitate an understanding of the alternative.

Identifying the Environmental Effects of Each Alternative Means

Identification of environmental effects, at a conceptual level, of those elements of each alternative means considered will include sufficient detail to allow a comparison of the effects with the environmental effects of the Project.

Identifying the Reasoning Behind the Selection of the Preferred Means

Identifying the preferred means based on the relative consideration of all parameters will include the technical, environmental and the economic feasibility of each. The analysis will involve applying criteria that will identify each alternative means as acceptable or unacceptable on the basis of likely significant adverse environmental effects, including the potentially adverse environmental effects of the technically and economically feasible alternatives on current use lands and resources for traditional purposes by Aboriginal peoples in areas such as hunting, fishing, trapping and gathering.

At a minimum, the discussion of alternative means of carrying out the Project will include consideration of the following aspects of the project:

- arrangement of the generation station including locations on the river;
- dyking arrangements;
- reservoir options and generating station size (i.e production capacity);
- hydroelectric technologies considered (i.e. including number and types of turbines);
- fish passage upstream and downstream;
- planning for ancillary features such as access roads, borrow sites, etc;

- operating patterns; and
- reservoir preparation strategies

5.3 Description

5.3.1 Location

Include a description of the Project's site location using maps of appropriate scale. The location map should include the boundaries of the proposed site including, the latitude and longitude coordinates, the major existing infrastructure, adjacent land uses and any important environmental features. In addition, site plans/sketches and photographs showing project location, site features and the intended location of project components should be included.

5.3.2 Components

Major components of the Project should be described under the following headings: Ice Boom Construction, Cofferdams, Generating Station, Spillway, Reservoir/forebay, Quarried and Excavated Construction Materials, Worker Accommodation.

As appropriate to convey the information, the EIS shall present descriptions, locations, plans, figures and/or drawings for each of the components or facilities.

5.3.3 Activities

The EIS shall include expanded descriptions of activities associated with the construction, operation, maintenance, foreseeable modifications, and where relevant, closure, decommissioning and reclamation of sites and facilities associated with the proposed project.

This would include detailed descriptions of the activities to be carried out during each phase, the location of each activity, expected outputs and an indication of the activity's magnitude and scale.

Although a complete list of project activities is required, the emphasis should be on activities with the greatest potential to result in adverse environmental effects. Sufficient information should be included to predict environmental effects and address identified public concerns. Activities should be highlighted that involve periods of increased environmental disturbance or the release of materials into the environment.

Activities and project components associated with fish habitat compensation works must also be detailed.

5.3.4 Schedule

This section shall include a detailed schedule for the Project with the time of year, frequency, and duration for all project activities.

6 Scope of the Assessment

6.1 Factors to be Considered

The proponent will include a consideration of the following factors as per section 16 (1) and 16(2) of the Act:

- the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project;
- for the purpose of the comprehensive study, environmental effects also include any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out;
- the significance of the environmental effects referred to above;
- comments from the public that are received during the EA;
- comments from Aboriginal groups that are received during the EA;
- measures that are technically and economically feasible and are intended to be undertaken to accommodate any adverse impact of the Project on current use of land and resources for traditional use by Aboriginal persons;
- measures that are technically and economically feasible and proposed to mitigate any significant adverse environmental effects of the Project;
- the purpose of the Project;
- alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;
- the need for, and the requirements of, the follow-up program in respect of the Project; and
- the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future; and
- how traditional Aboriginal knowledge has been integrated in the preparation of the EIS.

For the purpose of the comprehensive study, the EIS shall include an assessment of the “need for” the project and “alternatives to” the project (see sections 5.1 and 5.2.1).

6.2 Scope of the Factors

Scoping establishes the boundaries of the EA and focuses the assessment on relevant issues and concerns. By defining the spatial and temporal boundaries, for the collection of assessment information, a frame of reference for identifying and assessing the environmental effects associated with the Project will be established. Different boundaries may be appropriate for each VEC, once identified.

6.2.1 Determination of Valued Ecosystem Components (VECs)

The EIS will describe the process used for identification of Valued Ecosystem Components (“VECs”). VECs will be selected based on professional judgement interests and concerns raised by the public, Aboriginal groups and government.

The EIS will describe how candidate VECs were evaluated to identify whether there would be an interaction or a cause-and-effect pathway, linking the candidate VEC to the Project. A description of the linkage, illustrating the cause-and-effect pathways shall be provided in the EIS.

The EIS will identify concerns specific to any VEC raised during any workshops or meetings held by the proponent or that the proponent considers likely to be affected by the Project. In doing so, the proponent should indicate to whom these concerns, including environmental, social, economic, recreational, and aesthetic considerations, are attributable. The proponent must describe any issues raised or comments noted regarding the nature and sensitivity of environmental components within and surrounding the Project and any planned or existing land and water use in the area. The proponent shall also demonstrate how traditional Aboriginal knowledge has been integrated with western science in the identification and analysis of VECs.

The proponent must also indicate the specific geographical areas or ecosystems that are of particular concern to interested parties, and the relationship of these areas to the broader regional environment and economy.

6.2.2 Spatial Boundaries

Clearly indicate the spatial boundaries (local and regional study areas) that were selected to be examined in order to identify environmental effects. The EIS must contain a justification and rationale for all boundaries chosen including a reference to which models and data are being utilized.

Study boundaries must be defined taking into account (where applicable) the spatial extent of potential environmental effects, traditional and local knowledge, current and proposed land use by Aboriginal groups and ecological, technical and social and cultural considerations. These boundaries must also indicate the range of appropriate scales at which particular baseline descriptions and the Project's assessment of environmental effects are presented. The description of the Project setting must be presented in sufficient detail to address the relevant environmental effects of the Project.

The proponent must take into account public comments when establishing study areas and is advised to consult with federal and provincial departments and agencies, local government and Aboriginal groups to confirm the spatial boundaries used in the studies.

The EIS shall identify the proposed spatial study boundaries for the evaluation of each VEC identified in section 6.2.1.

6.2.3 Temporal Boundaries

The temporal boundaries of the studies should span all components of the Project: construction, operation, maintenance, decommissioning and reclamation of the sites affected by the project. Temporal boundaries shall also consider seasonal and annual variations related to the identified VECs for all phases of the Project, where appropriate.

If the full temporal boundaries are not used, the EIS shall identify the boundaries used and provide a rationale for the temporal boundaries selected.

7 Consultation

7.1 Public Participation

The proponent shall describe in its EIS any project-related consultations undertaken with the general public. The proponent shall also describe planned or on-going public consultations relating to the Project.

This section of the EIS will provide a description of efforts made to distribute project-related information to the public and provide a description of the information and materials that were distributed during the consultation process.

The EIS shall include summaries of discussions with the public, indicating:

- the methods used for the public consultations and relevance to the Project;
- the locations;
- the persons and organizations consulted;
- concerns raised during the consultations;
- the extent to which public concerns were incorporated into the design of the Project or the EIS; and
- the resultant changes.

The EIS shall describe outstanding issues identified by the Public during consultation and describe any means, proposed or employed to address the outstanding issues.

7.2 Aboriginal Consultation

The proponent will actively solicit Aboriginal concerns from groups other than the Keeyask Cree Nations during the course of the EA. The proponent will examine opportunities to mitigate the adverse effects of the Project on Aboriginal groups' current use of lands and resources for traditional purposes and other Aboriginal interests.

This section of the EIS should, for each Aboriginal group consulted by the proponent, include:

- contact information of those groups consulted;
- descriptions of the consultation processes used to identify the factors to be considered in the EIS;
- lists of factors suggested for inclusion in the EIS, whether or not the factors were included, and the rationale for exclusions;
- descriptions of the traditional territories and potential or established Aboriginal and Treaty rights that were asserted by the groups in relation to the assessment area; and
- efforts made to solicit the above information from Aboriginal groups if the proponent is unable to obtain the information.

7.3 Government Agency Consultation

The proponent shall provide a summary of any consultations undertaken with provincial, federal or other government agencies or officials during the project planning or environmental assessment, including:

- contact information of those consulted;
- descriptions of the consultations;
- lists of all factors suggested for inclusion in the EIS, whether or not the factors were included, and the rationale for any exclusions; and
- any issues relevant to the environmental assessment that were raised in the consultations.

8 Existing Environment

The EIS will provide a description of the existing environmental setting of the study area, from a local and regional perspective, to provide context for an understanding of the potential effects of the Project. The EIS will also describe trends and conditions in the current environmental setting. The description shall be in sufficient detail to permit the identification, assessment and a determination of the significance of potentially adverse environmental effects that may be caused by the Project, to adequately identify and characterize the beneficial effects of the Project, and to provide the data necessary to enable effective testing during the follow-up program of predictions made in the EIS.

Information on the environmental setting will be organized into the following broad topics:

- Physical environment
- Biophysical environment (i.e. aquatic and terrestrial);
- Socio-economic environment (including resource use and heritage resources).

8.1 Physical Environment

Atmosphere

The EIS will describe the following attributes in the relevant study area:

- precipitation, temperature, and wind speed/direction;
- trends in climate change;
- a description of climate variability and extreme events;
- a description of how on-site data has been utilized in combination with data collected from regional stations to develop the site climatology. This should also include a discussion of uncertainty in the site climatology;
- existing air quality and sources of air contaminants, including greenhouse gas emissions;

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- information regarding the location of the project and the distance to all potential human receptors for different uses (residential, recreational, traditional etc.) within the area affected by the project specific to air quality effects;
- an inventory of all potential sources of air contaminants and emissions from the proposed project: criteria air contaminants, air pollutants on the List of Toxic Substances in Schedule 1 of the *Canadian Environmental Protection Act*, 1999
- existing ambient noise level
- the delineation of the distance of the project to all potential human receptors specific to noise effects;

Land

The EIS will describe the following attributes in the relevant study area(s):

- a description of local and regional physiography, geology and soil conditions. For areas to be flooded and eroded, the level of mercury and other potentially toxic metals in soils, in particular for soils with high organic content and indurated soils;
- chemical characterization of soils, including organic matter content, and nutrients;
- physical and chemical properties of rock and borrow material sources, including the Acid Base Accounting;
- a description of permafrost conditions that includes a description of the distribution of permafrost, thermal conditions, ground ice, thaw sensitivity and active layer thickness;
- regional seismicity and seismic activity*including an estimate of seismic hazards**;
- shoreline characteristic (geologic materials, organic materials, areas of shoreline erosion and recession, locations of instability) and areas of potential reservoir shoreline erosion conditions and the rate of shoreline erosion and recession;
- peatland disintegration along shorelines and inland areas; and
- shoreline debris.

*Implications of Canada's 4th Generation Seismic Hazard Model for Canadian Dams

John Adams and Stephen Halchuk

Canadian Dam Association 2004 Annual Conference (Ottawa, Canada, September 25-30, 2004) pdf document, 10 pages, 750Kb

**Seismic Hazard Calculator Link: <http://www.earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/index-eng.php>”

Surface Water and Groundwater

The EIS will describe the following attributes in the relevant study area(s):

- hydrology and spatial extent of the local and regional watersheds in the Split Lake to Gull Rapids reach, Stephen's Lake (Reservoir);

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- a description of existing water regime, range of flows and water levels shall also include a description of seasonal variability and extreme events;
- existing range of flows and water levels in the context of the operation of the Churchill River Diversion (CRD) and Lake Winnipeg Regulation (LWR);
- longitudinal profiles of water levels and bathymetry of the Nelson River from the outlet of Split Lake to the inlet to Stephens Lake (Reservoir);
- ice conditions, including changes during the winter and variability from year to year;
- dissolved oxygen and temperature conditions;
- groundwater movement, levels and regime;
- nature and extent of suspended sediment transport and deposition; and
- hydrologic and hydraulic models, including a detailed assessment of instream flow needs.

The EIS will provide in detail the hydraulic models that will describe the existing (baseline) hydrological regime and that will be used to predict the potential changes in the hydrological regime as a result of the Project. The EIS will describe the following information for each model used:

- input parameters and assumptions;
- outputs provided by the model;
- basis of the model methodology; and
- purpose for the model

Mean annual flows can be presented for the hydrological regime, but daily, weekly and month flows should be made available upon request. Seasonal flow patterns will be illustrated.

A table of hydraulic models used should be developed and presented in the EIS. This table will have the model name, how the model is used and a description of general purpose.

Unless rationale can be provided, the record of flow for the existing environment, construction phase and operational phase should be the same.

Thermal and Ice Regime

The EIS will include a description of the existing water temperature and ice regimes of the Nelson River. Technical study areas for reservoir and river locations will be described. This section of the EIS will information to support a description of the anticipated predictive changes in these parameters related to the Project and mitigation measures proposed. These analyses will be conducted in the reservoir/forebay and downstream of the proposed generating station. A description of the model, calibration and validation methods and predicted water temperature and ice characteristics in the area of assessment will be provided.

Fluvial Geomorphology and Sediment Transport

The EIS will present information regarding the existing conditions and related changes to fluvial geomorphology and sediment transport in the Nelson River.

The fluvial geomorphology and sediment transport investigations will characterize baseline conditions of the following list of parameters.

- Suspended sediment characteristics and transport rates in the Nelson River in the area of assessment
- Bed material characteristics and bedload transport rates in the Nelson River in the area of assessment
- Historical locations, patterns, and rates of channel erosion and deposition in the area of assessment

8.2 Biophysical Environment

8.2.1 Aquatic Environment

Water Quality and Sediment Quality

The EIS will describe the following attributes in the applicable study area(s):

- description of the limnology, including physical and chemical characteristics of the groundwater and surface water quality, with discussion on seasonal variation;
 - chemical characteristics should include concentrations of water and sediment quality parameters that affect the suitability of the environment for aquatic life;
 - description of the mercury concentrations, mobility and fate within the riparian ecosystem;
 - identify all sources (surface and groundwater) of drinking water, as well as water used for recreational purposes, within the area of influence of the project;
 - the identification of potential human receptors, considering those who may be exposed to contaminants via drinking water sources, and/or recreational waters;
 - an indication of baseline levels of naturally-occurring contaminants in drinking water sources (surface and groundwater) in order to assess impact on drinking water; and
 - susceptibility to erosion and sedimentation.
-
- The EIS will contain details of methodology, modelling, and analysis used to establish existing sediment load in waterbodies in the area of assessment. Point samples will not be sufficient. Total Suspended Solids (TSS) will be used to describe water quality with respect to sediment. The use of surrogates for TSS may be developed using in situ models that are representative of local conditions. Any surrogate developed for TSS will be established using an acceptable and defensible sampling methodology and will be statistically sound. Sample design will also account for physical and temporal variation in the Nelson River. Again, point samples will not be sufficient.

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- The EIS will describe methods/models for describing current levels of sediment deposition within the waterbodies of the study area. A baseline of sediment deposition rates over the area of assessment will be established. Results for sediment loading and sedimentation will be compared to Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (2011) and Manitoba Water Quality Standards, Objectives and Guidelines.
- The EIS will describe existing water quality conditions in the Nelson and its tributaries in the area of assessment. Water quality parameters recorded during baseline studies (e.g., nutrient and metals concentrations, suspended sediment levels, dissolved gas pressure levels, pH, alkalinity, temperature) will be summarized and compared with provincial and federal guidelines, including:
 - Manitoba Water Quality Standards, Objectives and Guidelines
 - Canadian Water Quality Guidelines (CCME 2011)

Aquatic Habitat

The EIS will describe the following attributes in the applicable study area(s):

- data, models, assessment methods and analysis used to describe baseline conditions for fish will be described in the EIS. Sample design, sampling error and sample bias will be described and considered in the reporting of results. Where samples do not meet a statistically valid sample size the results will be reported as descriptive; aquatic habitat based on water depth, velocity, substratum, and presence of cover (e.g., aquatic macrophytes, riparian vegetation);
- aquatic habitat classified into categories relevant to use by aquatic biota;
- quantification of existing habitat, including description of changes due to seasonal and year-to-year variation in water flows;
- description of the biological composition of freshwater aquatic environments, including trophic state and the interactions and relative significance of each trophic level identified in the food chain; and
- characterization of the range of natural variability of populations, including abundance and community composition.

Intactness

The EIS will describe the following attributes in the applicable study area(s):

- fragmentation resulting from human linear features and other human footprints, including dykes and dams throughout the watershed;
- distribution of linear features by feature type; and
- distribution and abundance of core areas.

Algae and Aquatic Plants

The EIS will describe the following attributes in the applicable study area(s):

- species composition and biomass of phytoplankton, including seasonal changes and relation to characteristics of the waterbody;

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- distribution of attached algae in relation to habitat;
- species composition and distribution of aquatic macrophytes, in relation to habitat; and
- distribution, abundance and habitat associations of invasive aquatic plant species.

Aquatic Invertebrates

The EIS will describe the following attributes in the applicable study area(s):

- species composition or major taxa and abundance of zooplankton, including seasonal changes and relation to characteristics of the waterbody;
- species composition and abundance of benthic invertebrates, in relation to habitat; and
- distribution, abundance and habitat associations of invasive aquatic invertebrate species.

Fish

The EIS will describe the following attributes in the applicable study area(s):

- species composition and relative abundance;
- species of cultural, spiritual, or traditional use importance to Aboriginal peoples and Aboriginal groups
- life history parameters, including spawning and feeding biology;
- habitat use:
 - Baseline information on the a) availability of fish habitat, b) use or suitability of fish habitat and c) description of the physical environment associated with observed habitat (at a minimum depth, velocity and substrate);
 - Where all aquatic habitats cannot be directly assessed the method of extrapolation (modelling) will be described. Extrapolations will be tested for fidelity. Where habitat and their use (suitability) cannot be directly sampled the method of habitat description will be described in detail and extrapolations tested for fidelity. A sensitivity analysis will be conducted on these models to assess strength of the results;
 - Habitat Suitability Indices (HSI) may be used for the description of baseline fish habitat in the Nelson River and its tributaries. The development of Habitat Suitability Indices (HSI) specific to the Nelson River in the area of assessment will be conducted using peer reviewed practices and chosen methods will be described. Modelling of the physical environment and habitat suitability will be described and tested for fidelity; and
 - Aquatic HSI's developed from literature review or professional opinion will be done in consultation with Manitoba Conservation and Water Stewardship and Fisheries and Oceans Canada.
- short-term and long-term patterns of fish movements between and within waterbodies, including spawning migrations and movements over habitat potentially affected by the Project; and

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- distribution, abundance and habitat associations of invasive aquatic fish species.

Mercury Concentrations and Other Characteristics of Fish Quality

The EIS will describe the following attributes in the applicable study area(s):

- mercury levels in key domestic and commercial fish species (e.g., lake sturgeon, walleye, northern pike, and lake whitefish);
- other characteristics of fish quality that affect the commercial sale of fish; and

Aquatic Species of Conservation Concern

The EIS will identify all aquatic species named under the *Species at Risk Act* (SARA) and/or *The Endangered Species Act* (Manitoba), listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and identified as S1 and S2 species by the Manitoba Conservation Data Centre. The EIS will include information on composition, distribution, relative abundance, seasonal movements, movement corridors, habitat requirements, key habitat areas, and general life history for the identified species. Identify all species listed on Schedule 1 of SARA and those recognized as “at risk” by COSEWIC that may occur in the project area, and at any project component, using recognized survey protocols to provide current field data.

8.2.2 Terrestrial Environment

Soil Quantity and Quality

The EIS will describe the following attributes in the applicable study area(s):

- distribution and abundance of soil types classified into soil quality categories;
- parameters that affect the suitability of soils to perform ecosystem functions (e.g., primary productivity); and
- present mercury and methylmercury data and analyses in soil.

Terrestrial Habitat

The EIS will describe the following attributes in the applicable study area(s):

- terrestrial habitat based on vegetation, site conditions, groundwater depth, surface water depth, permafrost, topography and disturbance or instability regime;
- terrestrial habitat classified into upland and wetland categories relevant to use by terrestrial biota; and
- quantification of existing habitat, including description of changes due to temporal variations in water levels and flows, historical human impacts, vegetation succession and large fires.

Fire Regime

The EIS will describe the following attributes in the applicable study area(s):

- fire history; and

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- fire regime parameters relevant for vegetation, wildlife and ecosystem functions.

Ecosystem Diversity

The EIS will describe the following attributes in the applicable study area(s):

- distribution and abundance of stand and landscape level ecosystem types; and
- distribution, abundance and environmental associations of ecosystem types requiring special consideration such as rare or highly diverse types.

Wetlands

The EIS will describe the following attributes in the applicable study area(s):

- mapped wetlands in the project area including riparian wetlands and those that may be affected by ancillary features of the project, indicate direction of inflow/outflow, and describe the location, size of wetlands, wetland type, condition, ecological community types, flora and fauna;
- describe the contribution of the wetland to the quantity and quality of surface water and groundwater;
- describe the terrestrial and aquatic habitat functions;
- describe the ecological function of the wetland in the surrounding ecosystem and adjacent land use;
- distribution, abundance and environmental associations of peatlands and wetland types making disproportionately high contributions to wetland function such as highly productive types or types that provide high quality habitat for waterfowl or aquatic furbearers; and
- parameters that affect wetland functions.

Carbon Storage

The EIS will describe the following attributes in the applicable study area(s):

- carbon stored in terrestrial vegetation and soils; and
- parameters that affect the ability of vegetation and soils to store carbon.

Intactness

The EIS will describe the following attributes in the applicable study area(s):

- fragmentation resulting from human linear features and other human footprints;
- distribution of linear features by feature type; and
- distribution and abundance of core areas.

Terrestrial Plants

The EIS will describe the following attributes in the applicable study area(s):

- species composition, including species of cultural, spiritual, or traditional use importance to Aboriginal peoples and Aboriginal groups, distribution and relative abundance of vascular plants, in relation to habitat;

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- species composition distribution and relative abundance of the common ground mosses and lichens, in relation to habitat; and
- distribution, abundance and habitat associations of invasive plant species.

Terrestrial Invertebrates

The EIS will describe species composition and habitat associations of terrestrial invertebrates (e.g., worms, snails, spiders, insects) in the applicable study area(s).

Amphibians and Reptiles

The EIS will describe the following attributes in the applicable study area(s):

- species composition and distribution of amphibians;
- habitat associations and seasonal use by amphibians; and
- species and presence of reptiles (if applicable).

Birds

The EIS will describe the following attributes in the applicable study area(s):

- species composition, including species of cultural, spiritual, or traditional use importance to Aboriginal peoples and Aboriginal groups, distribution and relative abundance of songbirds, raptors, upland gamebirds and waterbirds, including migratory birds, in relation to habitat including seasonal changes.

Mammals

The EIS will describe the following attributes in the applicable study area(s):

- species composition, including species of cultural, spiritual, or traditional use importance to Aboriginal peoples and Aboriginal groups, distribution and relative abundance of small mammals, furbearers, large carnivores and ungulates, in relation to habitat including seasonal changes; and
- a determination of caribou use of the project and surrounding area, movements through or near the project area, and the seasonality of these movements.

Mercury in Wildlife

The EIS will describe the following attributes in the applicable study area(s):

- mercury levels for key bird species (e.g., Canada goose, mallard); and for key mammal species (e.g., beaver, muskrat, otter and mink).

Species of Conservation Concern

The EIS will identify all plants and animals named under the SARA and/or *The Endangered Species Act* (Manitoba), listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and identified as S1 and S2 species by the Manitoba Conservation Data Centre. The EIS will include information on composition, distribution, relative abundance, seasonal movements, movement corridors, habitat requirements, key habitat areas, and general life history for the identified species. Identify

all species listed on Schedule 1 of SARA and those recognized as “at risk” by COSEWIC that may occur in the project area, and at any other project component, using recognized survey protocols to provide current field data.

8.3 Socio-Economic Environment

8.3.1 Economy

The EIS will describe the following attributes in the relevant study area(s):

- the regional economy, in particular local Aboriginal and non-Aboriginal communities and the regional centre, with an emphasis on the labour force, employment, unemployment, income, and education and training, and with a profile of local business capacity (e.g., goods and services);
- a profile of key resource use sectors potentially affected by the Project (see Land and Resource Use), with an emphasis on the commercial sectors; and
- cost of living.

8.3.2 Population, Infrastructure and Services

The EIS will describe the following attributes in the relevant study area(s):

- existing population distribution and demographics; including for each of the Aboriginal groups, and
- existing infrastructure and services of Aboriginal and other communities, in-vicinity including:
 - housing/accommodation supply;
 - water and sewer infrastructure;
 - transportation infrastructure;
 - education;
 - emergency services;
 - social services; and
 - public health infrastructure and health and social services that may be relied upon during Project construction and operation.

8.3.3 Personal, Family and Community Life

The EIS will describe the following attributes in the relevant study area(s):

- public safety;
- travel, access and safety;
- aesthetics;
- health status and health issues;
- culture and spirituality; including for each of the Aboriginal groups, and
- governance, goals and plans.

8.3.4 Land and Resource Use

In describing the socio-economic environment, the EIS will focus on the following land and resource use attributes in the relevant study area:

- land use context (recreation, navigable waters, etc.)
- description of lands including:
 - land acquisition focusing on Crown land requirements and private land acquisition requirements for the Project;
 - description of Reserve lands and Treaty Land Entitlement; and
 - lands with special designation (proposed and existing), focusing on the following:
 - federal and provincial park lands;
 - Wildlife Management Areas;
 - areas of special interest (Manitoba Protected Areas Initiative);
 - ecological reserve lands; and
 - scientific sites.
- based on information provided by Aboriginal groups or, if Aboriginal groups do not provide this information, on available information from other sources, a description of the following:
 - current and proposed uses of land and resources by each Aboriginal group for traditional purposes, i.e., hunting, fishing, trapping, cultural and other traditional uses of the land (e.g., collection of medicinal plants and uses of sacred sites);
 - land and water access into the area by Aboriginal people;
 - water and ice routes, modes of transportation, and timing of water/ice route usage; and
 - navigation and navigation safety.
- description of commercial resource use and lands including:
 - commercial use of resources by each Aboriginal group and non-Aboriginal groups, focusing on the following:
 - commercial fishing;
 - commercial trapping;
 - resource tourism including lodge and outfitting operations and eco-tourism;
 - navigation and navigation safety;
 - commercial mining activities, leases, licenses and lands; and

- forestry and forested lands.
- description of recreational resource use including:
 - use of lands and waters by non-Aboriginal peoples for the purposes of sports fishing, hunting, recreational cabin uses and associated travel routes and travel safety concerns.
 - navigation and navigation safety.
- description of use of potable water for drinking water purposes.

8.3.5 Heritage Resources

The EIS will require the following heritage resource information relevant to the study area(s).

- Historical land use and occupancy
- Archaeological sites and culturally important sites, focusing on shoreline sites that could potentially be affected by erosion
- Location of known and potential burial sites (if any)
- Structures, sites or things of historical, archaeological, paleontological or architectural significance that will be affected by the Project

8.3.6 Traditional and Local Knowledge

The proponent must incorporate into the EIS the traditional and local knowledge to which it has access or that it may reasonably be expected to acquire through applying the appropriate due diligence, in keeping with appropriate ethical standards and without breaching obligations of confidentiality, as set out in section 2 of this document.

Agreement should be obtained from Aboriginal groups regarding the use, management and protection of their existing Aboriginal traditional knowledge information during and after the EA.

9 Environmental Effects Assessment

This section will describe the potential environmental effects of the Project components. The proponent shall identify the Project's likely adverse environmental effects during construction, operation, maintenance, decommissioning and reclamation of sites and facilities associated with the Project, and describe these effects using appropriate criteria.

This documentation should include, for each potential project-related adverse environmental effect, an indication of the nature of the effect, mechanism, magnitude, direction, duration, frequency and timing, geographic extent, and the degree to which it may be reversible. The proponent shall consider both the direct and indirect, reversible and irreversible, and short-term and long-term of the Project. In predicting and assessing the Project's effects, the proponent shall indicate important details and clearly state the elements and functions of the environment that may be affected, specifying the location, including mapping, extent and duration of these effects and their overall impact.

Consideration can be given to the following documents:

- Health Canada. 2010. *Useful Information for Environmental Assessments*. Environmental Assessment Division, Safe Environments Directorate. Accessible at: http://www.hcsc.gc.ca/ewh-semt/pubs/eval/environ_assess-eval/index-eng.php;
- Health Canada. 2011. *Draft Guidance for Evaluating Human Health Impacts in Environmental Assessment: Drinking and Recreational Water Quality, Fall 2011*. Environmental Assessment Division, Safe Environments Directorate;
- Canadian Wildlife Service, Environment Canada, First Edition: 27 February 2004 *Environmental Assessment Best Practice Guide For Wildlife at Risk in Canada*,
- Environment Canada and Parks Canada, 2010, *Addressing Species at Risk Act Considerations Under the Canadian Environmental Assessment Act for Species Under the Responsibility of the Minister responsible for Environment Canada and Parks Canada*; Environment Canada and Parks Canada, 2010,
- Environment Canada and Parks Canada, 2010, *The Species at Risk Act Environmental Assessment Checklists for Species Under the Responsibility of the Minister responsible for Environment Canada and Parks Canada, Support Tool for the Required Information Elements Under the Species at Risk Act for Environmental Assessments Conducted Under the Canadian Environmental Assessment Act*.

9.1 Assessment Methodology

This section should explain and justify all methods used in the preparation of the effects assessment. In describing the overall approach, the EIS should explain how each of: scientific, engineering, Aboriginal traditional knowledge and community knowledge were employed. All hypotheses and assumptions should be clearly identified and justified. All data collection methods, models and studies should be documented so that the analyses are transparent and reproducible. The degree of uncertainty, reliability and sensitivity of models used to reach conclusions should be indicated. Model calibration information should be available for independent review and assessment. If data have been extrapolated or otherwise manipulated to depict environmental conditions in the study area(s), modelling methods and equations should be described and should include calculations of margins of error and/or confidence limits.

All conclusions regarding the receiving environment and predictions as well as the assessment of environmental effects should be substantiated. The proponent should support all analyses, interpretation of results and conclusions with a review of the appropriate literature, providing all references required and indicating the public availability of all works consulted. Any contribution based on Aboriginal traditional knowledge and community knowledge should be specified and the sources identified.

The EIS should identify all significant gaps in knowledge and explain their relevance to key conclusions drawn. The EIS should indicate the measures applied to address these gaps. Where the conclusions drawn from scientific and technical knowledge are inconsistent with the conclusions drawn from Aboriginal traditional knowledge or

community knowledge, the EIS should present the various points of view as well as a statement outlining the proponent's conclusions.

The consideration of views from the public and Aboriginal groups, including perceived changes attributed to the Project, must be recognized and addressed in the assessment method.

9.1.1 Precautionary Approach

The EIS will demonstrate that the Project has been examined in a careful and precautionary manner. In determining whether the Project is likely to cause significant adverse environmental effects, the proponent shall:

- describe how implementation of the Project components and activities have been planned in a careful and precautionary manner in order to ensure that significantly adverse or unwarranted environmental effects will not occur, especially with respect to environmental functions and integrity, considering system tolerance and resilience, and/or the human health of current or future generations;
- outline and justify the assumptions made about the effects of all project components and activities and the approaches to minimize these effects;
- demonstrate that in designing and operating the Project, priority has been and would be given to strategies that avoid the creation of adverse environmental effects;
- develop contingency plans that explicitly address accidents and malfunctions of the Project;
- identify the proposed follow-up and monitoring activities, particularly in areas where scientific uncertainty exists in the prediction of effects; and,
- present public views on the acceptability of all of the above.

In the implementation of the Project, the proponent shall consider the guiding principles set out in the Government of Canada *Framework for the Application of Precaution in Science-based Decision Making About Risk* (2003).

9.1.2 Impact Matrix

An impact matrix methodology in combination with identification of VECs should be used to evaluate the adverse environmental effects of the Project. The assessment should include the following general steps:

- listing the activities and components of the Project;
- identifying VECs;
- identifying the potential interactions between the project activities and components and the environment during all phases of the project.
- predicting and evaluating the likely effects on identified valued ecosystem components;
- identifying technically and economically feasible mitigation measures for significant adverse environmental effects;
- identifying residual environmental effects;

- ranking of each residual adverse environmental effect based on established criteria; and
- determining the potential significance of residual environmental effect following the implementation of mitigation.

The results of the assessment process should be clearly documented in the text as well as in summary matrices and tables. The analysis must be documented in a manner that readily enables conclusions on the significance of the environmental effects to be drawn.

9.1.3 Potential Effects on Aboriginal Groups

Based on information provided by Aboriginal groups, or, if Aboriginal groups do not provide this information, on available information from other sources, the proponent will identify:

- potential social and/or economic effects to Aboriginal groups that may arise as a result of the Project;
- effects of the Project may have on current use of lands and resource for traditional purposes by Aboriginal peoples, including but not limited to hunting, fishing, navigation, trapping, gathering, cultural and other traditional uses of the land (e.g. collection of medicinal plants, use of sacred sites), as well as related effects on lifestyle, culture and quality of life of Aboriginal groups and measures to avoid, mitigate, compensate or accommodate effects on traditional uses;
- effects of alterations to access into the area on Aboriginal groups, including deactivation or reclamation of access roads;
- effects of the project on heritage and archaeological resources in the project area that are of importance or concern to Aboriginal groups;
- a discussion of any factors that may inhibit or foster the flow of economic and other benefits to Aboriginal communities.

9.2 Mitigation Measures

The EIS must consider measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project.

As a first step, the proponent is encouraged to use an approach based on the avoidance and reduction of the effects at the source. Such an approach may include modification of the design of the Project or relocation of project components.

The proponent shall describe the technically and economically feasible mitigation measures and that will be applied throughout the implementation of the Project. The proponent shall describe its environmental protection plan and its environmental management system, through which it will deliver the plan. This section of the EIS describe how potentially adverse environmental effects would be minimized and managed over time. As well, the proponent shall describe its commitments, policies and arrangements directed at promoting beneficial or mitigating adverse socioeconomic effects. The proponent shall discuss the mechanisms it would use to require its contractors and sub-contractors to comply with these commitments and policies and with auditing and enforcement programs.

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The EIS shall specify the actions to be employed during implementation of the Project including all project components (construction, operation, maintenance, decommissioning, reclamation or other undertaking related to the project) to eliminate or reduce the significance of adverse effects. This should include monitoring activities that will be undertaken to evaluate the effectiveness of mitigation and the need for management response (adaptive management). The EIS shall provide an analysis of the likely efficacy of the proposed technically and economically feasible mitigation measures, drawing where relevant on experience gained from employing the measures on other similar projects. The reasons for determining whether the mitigation measure reduces the significance of an adverse environmental effect shall be made explicit.

The proponent must identify who is responsible for the implementation of these measures and a system to ensure accountability.

Pursuant to subsection 79(1) of the SARA, RAs must notify the appropriate federal Minister if any listed wildlife species, its critical habitat or the residences of individuals of that species may be adversely impacted by the Project. Pursuant to subsection 79(2) of the SARA, RAs must also ensure that measures are taken to avoid or lessen those effects and to monitor them. These measures must be taken in a way that is consistent with any applicable recovery strategy and action plans. Therefore, the proponent must include information in the EIS that will allow the Agency, (performing the duties of the RA) to meet these requirements.

9.3 Residual Effects

After having established the technically and economically feasible mitigation measures, the EIS should present the residual adverse environmental effects of the Project on the physical, biophysical and socio-economic environments after these mitigation measures have been taken into account. The residual effects, even if very small or deemed insignificant should be described.

The EIS shall include a summary of the Project's residual effects, including the temporal and spatial extent of those effects, so that the reader clearly understands the real consequences of the Project, the degree to which adverse environmental effects can be mitigated and which adverse environmental effects cannot be mitigated or compensated.

9.4 Determination of the Significance of Residual Effects

The EIS must identify the criteria used to assign significance ratings to predicted adverse environmental effects. The EIS must contain a detailed analysis of the significance of the predicted potential residual adverse environmental effects. It must contain clear and sufficient information to enable the Agency, technical and regulatory agencies, Aboriginal groups and the public to understand and review the proponent's judgment of the significance of the environmental effects. The proponent must define the terms used to describe the level of significance.

The following criteria should be used in determining the significance of residual effects:

- magnitude;
- geographic extent;

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- timing, duration and frequency;
- reversibility;
- ecological and social context;
- level of confidence and probability; and
- existence of environmental standards, guidelines or objectives for assessing the impact.

In assessing significance against these criteria, the EIS must, where possible, employ relevant regulatory documents, environmental standards, guidelines, or objectives such as prescribed maximum levels of emissions or discharges of specific hazardous agents into the environment or maximum acceptable levels of specific hazardous agents in the environment. The EIS should contain a section which explains the assumptions, definitions and limits to the criteria mentioned above in order to maintain consistency between the environmental effects.

The analysis of the significance of the effects shall contain sufficient information to allow the Agency, technical and regulatory agencies, Aboriginal groups and the public to understand and evaluate the reasoning of the proponent. The proponent will provide a summary of the regional, provincial, Aboriginal or national objectives, standards or guidelines that have been used to assist in the evaluation of the significance of the identified adverse environmental effects.

For identified significant adverse environmental effects, the proponent shall determine the probability (likelihood) that they will occur. The proponent shall also address the degree of scientific uncertainty related to the data and methods used within the framework of its environmental analysis.

The EIS must clearly explain the method and definitions used to describe the level of the adverse environmental effect (e.g. low, moderate, and high) for each of the above categories and how these levels were combined to produce an overall conclusion on the significance of adverse environmental effects. This method must be transparent and reproducible.

The EIS will contain a summary of the significance of the residual environmental effects in tabular form.

9.5 Effects of the Environment on the Project

The EIS must predict how local conditions and natural hazards, such as severe and/or extreme weather conditions and external events (e.g., flooding, ice jams, rock slides, landslides, fire, outflow conditions and seismic events) could adversely affect the Project and how this in turn could result in impacts to the environment (e.g., extreme environmental conditions result in malfunctions and accidental events). These events should be considered in different probability patterns (i.e. 5 year flood vs. 100 year flood). Longer-term effects of climate change must also be discussed up to the projected post-closure phase of the Project. This discussion should include a description of climate data used.

The sensitivity of the Project to long-term climate variability and effects must be identified and discussed.

The EIS must provide details of a number of planning, design and construction strategies intended to minimize the potential adverse environmental effects of the environment on the Project. Potential impacts should be mitigated, as appropriate and/or feasible.

9.6 Effects of Potential Accidents and Malfunctions

The proponent must identify a list of, and the probability of potential accidents and malfunctions related to the Project, including an explanation of how those events were identified, potential consequences including the environmental effects, the worst case scenarios and the effects of these scenarios. Examples of events that should be considered include events such as failure of dams and dykes.

The geographical and temporal boundaries for the assessment of malfunctions and accidents may be different than those in the scope of factors for each VEC. This analysis must include, at a conceptual level, an identification of the magnitude of an accident and/or malfunction, including the quantity, mechanism, rate, form and characteristics of the contaminants and other materials likely to be released into the environment during the accident and malfunction events.

The EIS must also describe the safeguards that have been established to protect against such occurrences and the contingency and emergency response procedures in place if an accident or malfunction does occur. The EIS must include a list of emergency response plans to be developed and implemented during the life of the project.

9.7 Capacity of Renewable Resources

The EIS must describe the effects of the Project on the capacity of renewable resources to meet the needs of the present and those of the future. The EIS must identify those resources likely to be significantly affected by the Project, and describe how the Project could affect their sustainable use. The EIS must also identify and describe criteria used in considering sustainable use. Sustainable use may be based on ecological considerations such as integrity, productivity, and carrying capacity.

9.8 Cumulative Environmental Effects

The proponent shall identify and assess the cumulative environmental effects of the Project.

Cumulative environmental effects are defined as environmental effects of a project, when considered in combination with the environmental effects of other past, present and reasonably foreseeable future projects or activities.

Cumulative environmental effects of the Project may result if:

- implementation of the Project results in likely, direct residual adverse environmental effects on valued environmental components after taking into consideration the implementation of technically and economically feasible mitigation measures; and
- a likely, adverse residual environmental effect of the Project that would be magnified or otherwise exacerbated by the effects of any past, present or reasonably foreseeable future projects or activities.

Scope of the Cumulative Environmental Effects Assessment

Valued environmental components (VECs) specific to the residual adverse environmental effects of the Project shall be identified and described at the outset of the cumulative environmental effects assessment. VECs that would not be affected by the residual adverse environmental effects of the Project can be omitted from the cumulative environmental effects assessment. A cumulative environmental effect on a VEC may be important even if the assessment of the Project's environmental effects on this component reveals that the adverse residual environmental effect is insignificant.

The proponent shall discuss the data and methodology to be used in the scoping phase of the cumulative environmental effects assessment, including a list of other projects to be considered, a list of the residual adverse environmental effects of the Project to be considered in the assessment, the temporal and spatial boundaries specific to those effects, to ensure that the assessment will meet the needs of the analysis. The proponent shall provide a map showing all past, present and future projects it has considered to be included in the cumulative environmental effects assessment.

Cumulative Environmental Effect Assessment

The EIS must describe the analysis of cumulative effects on identified VECs over the life of the Project, including the incremental contribution of all identified past, current and proposed projects and activities, in addition to that of the Project. The EIS must include different forms of the cumulative environmental effects (e.g. synergistic, additive, induced) and identify impact pathways and trends.

The EIS shall explain the approach and methods used to identify and assess the cumulative adverse environmental effects and provide a record of all assumptions and analysis that support the conclusions, including the level of confidence in the data used in the analysis. The Agency guidance documents *Operational Policy Statement OPS-EPO/3-1999 Addressing Cumulative Environmental Effects Under the Canadian Environmental Assessment Act*, and *Cumulative Effects Assessment Practitioners Guide* should also be consulted regarding the scope of cumulative adverse environmental effects to be evaluated in the EIS. The general framework for the assessment should comprise scoping, data gathering, analysis, proposing mitigation, determining the significance of the residual cumulative adverse environmental effects, and follow-up.

9.9 Summary

For all key VECs that were assessed, the EIS should contain a table summarizing the following key information:

- concise summary of potential adverse environmental effects;
- summary of proposed mitigation and compensation measures;
- a brief description of potential residual adverse environmental effects;
- a brief description of potential cumulative adverse environmental effects;
- applicable standards or guidelines;
- comments from the public and responses;
- comments from Aboriginal groups and individuals and responses;

- relationship of the VEC to a identified Aboriginal group's access to lands and resources for traditional purposes; and
- a list of proposed commitments, summarizing the timing and responsibility of each of the actions for which a commitment (including special management practices or design features) has been made by the proponent.

10 Economic and Social Benefits of the Project

Information on the predicted economic and social benefits of the Project should be presented, including a discussion of any factors that may inhibit or foster the flow of economic and other benefits to Aboriginal communities. This information will be considered by the Agency, technical and regulatory agencies in assessing the justifiability of any significant adverse environmental effects, if necessary.

11 Benefits to Canadians

For the purpose of the comprehensive study, the proponent will describe how Canadians benefit from the information gathering process undertaken by the proponent as part of the environmental assessment. Factors to be considered may include:

- maximized environmental benefits
 - Describe the environmental benefits created as a result of the Project going through the EA process
- contribution of the EA to support sustainable development
 - Describe how the EA process for the Project contributed to the concept of sustainable development for a healthy environment and economy.
- public participation
 - Describe how public participation in the EA influenced the Project design and the environmental effects analysis.
- technological innovations
 - Identify technologies that were developed to address environmental impacts that could be used for other projects.
- increases in scientific knowledge
 - Describe scientific information collected through the EA that could benefit the assessment of other projects.
- community and social benefits
 - Describe changes in project design that resulted in indirect benefits to communities and/or social benefits (e.g., enhanced access to wilderness areas for recreation).

12 Environmental Management

12.1 Planning

The purpose of developing environmental management plans (EMPs) is to ensure that proper measures and controls are in place in order to decrease the potential for environmental degradation during implementation of all project components and activities, and to provide clearly defined action plans and emergency response procedures to account for human and environmental health and safety. Furthermore, analysis of the data obtained as a result of enacting the EMPs can be used to confirm project specific assumptions and make corrective plans where necessary. The EMPs will serve to provide guidance on specific actions and activities that will be implemented to decrease the potential for environmental degradation during construction and operation, and to clearly define the proponent's ongoing environmental commitment.

The EIS shall describe the proposed EMPs for all stages of the Project and include a commitment by the proponent to implement the EMPs should the Project proceed. In accordance with the proposed EMP, monitoring and mitigation plans should be developed, specific to various aspects of the Project and the environment to be incorporated into all project components and activities. These plans would outline how results from monitoring will be used to refine or modify the design and implementation of mitigation measures and management plans. The finalization of detailed EMPs will occur through consultation with federal and provincial government agencies, Aboriginal groups, the public and other stakeholders. This may occur after the EA but must be consistent with the information presented in the EIS.

EMPs for each specific phase of the Project will be finalized prior to undertaking activities associated with that phase.

Pertinent legislation, regulations, industry standards, documents and legislative guides shall be used in the development of the EMPs.

12.1.1 Decommissioning and Reclamation Plan

The EIS shall provide a preliminary outline of a decommissioning and reclamation plan for any components associated with the Project. This shall include ownership, transfer and control of the different project components as well as the responsibility for monitoring and maintaining the integrity of some of the structures. The full preparation and submission of the plan to appropriate authorities will occur prior to the decommissioning of the temporary components of the Project. The plan would serve to provide guidance on specific actions and activities to be implemented to decrease the potential for environmental degradation in the long-term during decommissioning and abandonment activities for temporary facilities, and to clearly define the proponent's ongoing environmental commitments. A conceptual discussion on how decommissioning may occur shall be provided for permanent facilities.

12.2 Follow-Up Program

The EIS shall describe the proposed follow-up program plan in sufficient detail to allow independent judgment as to the likelihood that it will deliver the type, quantity and

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quality of information required to reliably verify predicted effects (or absence of them), and to confirm both the EA assumptions and the effectiveness of mitigation.

The follow-up program must be designed to incorporate baseline data, compliance data (such as established benchmarks, regulatory documents, standards or guidelines) and real time data (such as observed data gathered in the field). The proponent must describe the compliance reporting methods to be used, including reporting frequency, methods and format.

Environmental assessment effects predictions, assumptions and mitigation actions that are to be tested in the follow-up monitoring program must be converted into field-testable monitoring objectives. The conceptual-level monitoring design must include a statistical evaluation of the adequacy of existing baseline data to provide a benchmark against which to test for project effects, and the need for any additional pre-construction or pre-operational monitoring to establish a firmer project baseline.

The follow-up program shall include, at a conceptual level, a schedule indicating the frequency and duration of effects monitoring. This schedule is to be developed after an evaluation of the length of time needed to detect effects given estimated baseline variability, likely magnitude of environmental effect and desired level of statistical confidence in the results (Type 1 and Type 2 errors).

The description of the follow-up program must include, at a conceptual level, contingency procedures/plans or other adaptive management provisions as a means of addressing unforeseen effects or for correcting exceedances as required to comply or to conform to benchmarks, regulatory standards or guidelines.

The EIS must provide the following:

- a discussion of the proposed follow-up program and its objectives;
- a description of the main components of the program and each monitoring activity under that component;
- a discussion of the objectives the monitoring activity is fulfilling (i.e. confirmation of mitigation, confirmation of assumptions; verification of predicted effects);
- the structure of the program;
- a schedule for the finalization and implementation of the follow-up program;
- a description of the roles and responsibilities for the program and its review process, by both peers, Aboriginal groups, and the public;
- possible involvement of independent researchers;
- the sources of funding for the program; and
- information management and reporting.

Follow up programs provide an excellent opportunity to monitor the implementation of commitments made as part of the Aboriginal consultation process. RAs may include conditions in authorizations, permits, contracts, leases or other binding documents that relate to specific mitigation and follow-up measures related to the approval meant to accommodate adverse impacts to Aboriginal rights.

Aboriginal consultation can be incorporated into the EA follow-up program and can be used to:

- verify predictions of environmental effects identified in the EA and residual impacts that could not be accommodated on Aboriginal rights;
- determine the effectiveness of mitigation measures as they relate to environmental effects and accommodation measures in order to modify or implement new measures where required;
- support the implementation of adaptive management measures to address previously unanticipated adverse environmental effects or unanticipated adverse impacts to Aboriginal rights; and,
- provide information on environmental effects and mitigation and accommodation measures/impacts on Aboriginal rights that can be used to improve and/or support future EAs and Aboriginal Crown-Consultation processes, including cumulative environmental effects assessments.

13 Summary and Conclusions

The EIS must summarize the overall findings of the EA with emphasis on the main environmental issues identified. It should provide a summary on the significance of adverse environmental effects and cumulative environmental effects likely to occur as a result of the implementation of the Project.

14 References

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John Adams and Stephen Halchuk, September 25-30, 2004, Ottawa, Canada, Implications of Canada's 4th Generation Seismic Hazard Model for Canadian Dams, Canadian Dam Association 2004 Annual Conference [pdf document](#), 10 pages, 750Kb

Natural Resources Canada, Seismic Hazard Calculator Link:
<http://www.earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/index-eng.php>"