KEEYASK TRANSMISSION PROJECT MAMMALS TECHNICAL REPORT

Prepared for
Manitoba Hydro
and
Stantec Inc.

by
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PREFACE

The following is one of several technical reports for Manitoba Hydro's application for environmental licensing of the Keeyask Transmission Project. This technical report has been prepared by an independent technical discipline specialist who is a member of the Environmental Assessment Study Team retained to assist in the environmental assessment of the Project. This report provides detailed information and analyses on the related area of study. The key findings outlined in this technical report are integrated into the Keeyask Transmission Environmental Assessment Report.

Each technical report focuses on a particular biophysical or socio-economic subject area and does not attempt to incorporate information or perspectives from other subject areas with the exception of Aboriginal Traditional Knowledge (ATK). Applicable ATK is incorporated where available at time of submission. Most potentially significant issues identified in the various technical reports are generally avoided through the Site Selection and Environmental Assessment (SSEA) process. Any potentially significant effects not avoided in this process are identified in the Environmental Assessment Report along with various mitigation options that would address those potential effects.

While the format of the technical reports varies between each discipline, the reports generally contain the following:

- Methods and procedures.
- Study Area characterization.
- Description and evaluation of alternative routes and infrastructure sites.
- Review of potential effects associated with the preferred transmission routes and station sites.

Following receipt of the required environmental approvals, an Environmental Protection Plan (EnvPP) will be completed and will outline specific mitigation measures to be applied during construction, operation, and maintenance of the proposed Keeyask Transmission Project. An EnvPP is typically developed from a balance of each specialist's recommendations and external input.

Each of the technical reports is based on fieldwork and analysis undertaken throughout the various stages of the SSEA process for the Project. The technical reports are as follows:

- Technical Report 1: Aquatics Environment
- Technical Report 2: Terrestrial Habitat, Ecosystems and Plants
- Technical Report 3: Amphibians
- Technical Report 4: Avian

- Technical Report 5: Mammals
- Technical Report 6: Forestry
- Technical Report 7: Socio-economic Environment
- Technical Report 8: Heritage Resources
- Technical Report 9: Tataskweyak Cree Nation Report on Keeyask Transmission Project

The technical reports contain more detail on individual subject areas than is provided in the Environmental Assessment Report. The technical reports have been reviewed by Manitoba Hydro, but the content reflects the opinions of the author. They have not been edited for consistency in format, style, and wording with either the Environmental Assessment Report or other technical reports.

ACKNOWLEDGEMENTS

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STUDY TEAM

The study team consisted of personnel from Wildlife Resource Consulting Services MB Inc (WRCS) as well as field assistants from the Tataskweyak Cree First Nation (TCN), Fox Lake Cree Nation (FLCN), War Lake First Nation (WLCN), and York Factory First Nation (YFCN). WRCS personnel who have worked on this field project include Brian Kiss, Jonathan Hopkins, Justin Paillé, Peter Hettinga, Scott Johnstone, and Timothy Kroeker. Technical and research support staff included Jason Kelly and Andrea Ambrose, who are gratefully acknowledged for their support.

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EXECUTIVE SUMMARY

Manitoba Hydro is proposing to develop the Keeyask Transmission Project, hereafter known as 'the Project'. The Project would consist of a new 138 kV Construction Power transmission line and Keeyask Construction Power Station for construction of the Keeyask Generating Station and Generation Outlet Transmission lines and the Keeyask Switching Station, including a 138 kV Unit Transmission line from Radisson Converter Station to the construction power transformer station to be used as a back-up power during construction. Once the Keeyask Generating Station is complete, the Generation Outlet Transmission lines will be partially salvaged and used to tie the Keeyask Generating Station into the Manitoba Hydro Northern Collector System via the proposed Keeyask Switching Station and Radisson Converter Station.

The proposed Project will be located in the Split Lake Resource Management Area, about 300 kilometres northeast of Thompson, in northern Manitoba. The Keeyask Transmission Project Study Area, known as the Project Study Area, extends from the Radisson Converter Station (about six kilometres northeast of the town of Gillam), along the south shore of Stephens Lake to the proposed Keeyask Generating Station, and includes the town of Gillam.

Manitoba Hydro's Site Selection and Environmental Assessment process was used to evaluate the suitability of locations for Project routes and infrastructure. Potential constraints and opportunities for the proposed Construction Power transmission line and Generation Outlet Transmission lines route alternative options were identified by using scientific literature, existing data, and professional judgement. Other Project infrastructure that was evaluated included the Keeyask Construction Power Station, Keeyask Switching Station, and Unit Transmission lines. An initial review of available data including hunting and trapping data, local knowledge, and Aboriginal traditional knowledge was conducted to develop a base of knowledge for mammals in the region, and field studies were conducted to collect additional mammal data.

Wildlife use of existing habitats and specific habitat features was measured using techniques conforming to accepted professional standards and practices. A variety of methods, including summer and winter ground tracking surveys, trail camera surveys of potential caribou and moose calving habitat, and aerial surveys for beaver and muskrat were used to improve the characterization of mammal populations and habitat in the Project Study Area. Data and results from other Manitoba Hydro projects including the proposed Keeyask Generation Project and Bipole III Project and literature were used to support the analyses.

Up to 38 mammal species could currently range into the Project Study Area, 15 of which were recorded during field studies. In order to evaluate effects of the Project on mammals, valued environmental components (VECs) were selected from the mammal species in the Project Study Area. Two species, caribou and moose, were selected as mammal VECs. All other mammal species were grouped according to general characteristics. Mammal groups included

small mammals, aquatic furbearers, terrestrial furbearers, large carnivores, and ungulates. Species listed by the federal *Species at Risk Act*, *The Endangered Species Act* of Manitoba, or the Committee on the Status of Endangered Wildlife in Canada included little brown myotis (small mammals) and wolverine (terrestrial furbearers).

Two alternative routes for the proposed Construction Power transmission line and four route alternative options for the proposed Generation Outlet Transmission lines were assessed to determine which of the options would have the fewest potential effects on and the greatest benefit to mammals and habitats in the Project Study Area. The sites of the Unit Transmission lines, Keeyask Construction Power Station, Keeyask Switching Station, and the Radisson Converter Station upgrades were also screened for potential sensitivities. Potential caribou calving and rearing habitat and streams were identified as habitat criteria to be avoided where possible. Differences in habitat loss or alteration as measured by line length, potential caribou migration corridors and proximity to existing and potential future Project linear features were also considered.

The preferred routes for the Construction Power transmission line and the Generation Outlet Transmission lines were determined based on field studies, mapping, literature, and professional judgement. From a mammal's perspective, CP Route 1 is the recommended route for the Construction Power transmission line and GOT Route Alternative Option B or C is the preferred route for the Generation Outlet Transmission lines. After considering the preferred route recommendations from all of the biophysical, social, and technical perspectives, Manitoba Hydro selected an overall preferred routes for the Construction Power and Generation Outlet transmission lines. CP Route 1 was selected for the Keeyask Transmission Project. The preferred route for the Generation Outlet Transmission line followed GOT Route Alternative Option B for most of the approximately 14 km of line extending eastward from the Keeyask Switching Station; the remainder of the line extending to the Radisson Converter Station followed GOT Route Alternative Option C.

Effects of clearing, construction, operation, and maintenance of the Construction Power transmission line, Keeyask Construction Power Station, Unit Transmission lines, Keeyask Switching Station, Generation Outlet Transmission lines, and Radisson Converter Station upgrades on mammals could include habitat loss, alteration, and fragmentation; sensory disturbances; and mortality. Habitat alteration and loss is expected to be small compared to the local and regional availability of mammal habitat. Fragmentation effects are expected to be manageable with other developments proposed in the region. Based on the selected locations for the transmission line rights-of-way and the station sites, the Project is not expected to substantially affect mammals or mammal habitat. Adverse effects will be minimized with mitigation measures, and no significant residual effects are anticipated. In order to assess long-term effects of the Project on caribou and moose, and the effectiveness of mitigation measures, some monitoring will be required.

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

The primary function of the Keeyask Transmission Project (the Project) is to provide construction power and generation outlet transmission capacity for the Keeyask Generating Station. The Project will consist of a Construction Power transmission line, Keeyask Construction Power Station, and four Unit Transmission lines originating at the Keeyask Generating Station and terminating at the Keeyask Switching Station. Three Generation Outlet Transmission lines will link the Keeyask Switching Station to the northern collector system, terminating at the Radisson Converter Station. Project components are described below.

1.1.1 Construction Power Transmission Line and Station

A new Construction Power transmission line (138 kilovolts (kV) and approximately 22 kilometres (km) long) from the existing 138 kV KN 36 transmission line to a new 138 kV to 12.47 kV construction power station to be located north of the proposed Keeyask Generating Station will be needed for construction power. The new wood-pole/steel transformer station will be built on a 2.25 hectare (ha) site that will be developed to accommodate three transformer banks T1-3 and will supply the necessary power (22 megavolt amperes (MVA)) for the construction of the generating station.

The purpose of the Construction Power transmission line and Keeyask Construction Power Station is to provide power for the construction activities of the generating station. After operation, the Construction Power transmission line will be left in place, as will a portion of the construction power station, to provide a contingency function for a “black start” emergency backup to diesel generation units at the generating station. Two alternative Construction Power transmission line routes (CP Route 1 and CP Route 2) were assessed, which begin on the north side of the Nelson River at Gull Rapids (at the Keeyask Generating Station site) and run south to an existing Manitoba Hydro transmission line (KN 36), situated between the Butnau and Kettle rivers.

1.1.2 Unit Transmission Lines

Four 138 kV alternating current (ac) Unit Transmission lines (KE1 to 4) will transmit power from the seven generators located at the Keeyask Generating Station to the new Keeyask Switching Station. Three lines will be double circuit and one line single circuit to accept power from the seven generating station turbines. The four lines, each approximately 4 km long, will be located in a single corridor.

1.1.3 Keeyask Switching Station

A new Keeyask Switching Station will accept power from the generating station via four Unit Transmission lines from the generating station transformers and switch that power to three Generation Outlet Transmission lines. The switching station will be located on the south side of the Nelson River. The purpose of the switching station is to provide the terminal facilities for the electrical connection to the generating station, and to provide flexibility for accommodating power transmission from the generating station to the Radisson Converter Station. The proposed Keeyask Switching Station will require 13 ha of land for Project development and another 22 ha will be acquired for possible future expansion for a total site area of 35 ha.

Six alternative sites were identified for the switching station (SS Sites 1, 3, 4, 5, 6, and 7), however all sites on the north side of the river were ruled out due to the increased transmission line distance, one site was within the flood area of the Keeyask Generating Station, and one site was within a rock quarry. Due to these considerations Site 3 is the preferred switching station site and was the site assessed within this report.

1.1.4 Generation Outlet Transmission Lines

Three 138 kV AC Generation Outlet Transmission lines will transmit power from the Keeyask Switching Station to the existing Radisson Converter Station 138 kV AC switchyard. The three lines, each approximately 38 km long, will be located in a single 200 m-wide corridor. Manitoba Hydro plans to build one of these Generation Outlet Transmission lines to serve as a backup construction power line during construction and will be partially salvaged back to the Keeyask Switching Station and utilized as a generation outlet transmission line.

Four GOT Route Alternative Options (A, B, C, and D) were assessed, which begin on the north side of the Nelson River at Gull Rapids and run parallel to the south shore of Stephens Lake to the Radisson Converter Station (about 6 km northeast of the town of Gillam).

1.1.5 Radisson Converter Station Upgrades

The existing Radisson Converter Station will be upgraded in two stages, as follows:

- Stage I: Radisson Converter Station will require the addition of a 138 kV breaker to accommodate the initial new 138 kV transmission line KR1 from Keeyask Switching Station.

- Stage II: Station equipment will include the addition of a 138 kV bay (Bay 1) complete with four 138 kV breakers and associated equipment for the termination of two additional lines (KR2 and KR3) from Keeyask Switching Station. KR2 and KR3 will enter the west side of the station utilizing dead-ended steel structure with line switches. KR2 and KR3 lines will proceed to underground around the station and finally terminate to Bay 1. This is done to

avoid complex line crossings into the station. Thirty-one 138 kV AC breakers will also need to be replaced due to fault levels exceeding existing breaker ratings.

1.2 PROJECT STUDY AREA

The Keeyask Transmission Project Study Area, referred to as the Project Study Area, is approximately 600 square kilometres (km^2) in size, and is located in northern Manitoba. It falls entirely within the Split Lake Resource Management Area and includes the town of Gillam (Map 1-1). Project footprints that are in the Project Study Area are described in Section 1.1. For the alternative route selection process (see Section 4.0), a 1,150 m buffer of the rights-of-way (ROWs) was selected for all six proposed alternative routes (see Terrestrial Habitat Ecosystem and Plants Technical Report). For the effects assessment (see Section 5.0) of the Construction Power and Generation Outlet transmission line ROWs a buffer of 400 m was used to determine the direct and indirect effects on mammals. For the caribou habitat fragmentation analysis, a buffer of 500 m was selected. The nested design of these features allowed for the assessment of the direct and indirect Project effects on mammal populations and their **habitats**, and as may be compared to a larger regional study area.

Five Regional Study Areas were selected for mammals from the Keeyask Generation Project Environmental Impact Assessment (Keeyask Hydropower Limited Partnership 2012) (Table 1-1 and Map 1-2). The need for multiple zones that describe the size of a study area is based, in part, on the relative size required to maintain a minimum resident mammal species population in the order of 100 to 500 individuals or more. Home ranges large enough to maintain mammal populations in a community were considered in the development and selection of study areas. When the general area of the Keeyask Generation Project is referred to rather than a specific study area or zone, the term “Keeyask region” is used.

Table 1-1: Regional Study Areas from the Keeyask Generation Project Environmental Impact Statement

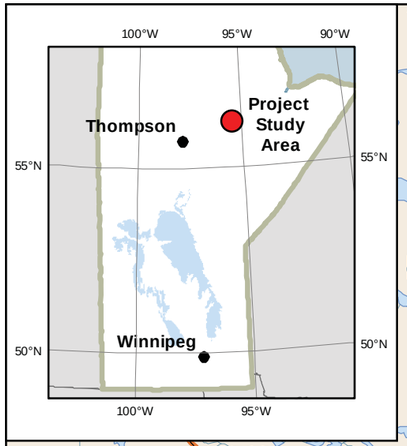
Mammal Group or VEC	Regional Study Area Zone
Small mammals	3
Furbearers (aquatic and terrestrial)	4
Large carnivores	6
Caribou	5 or 6[1]
Moose	5

1. Summer resident caribou habitat and fragmentation effects are considered in Zone 5; effects on all caribou, including barren-ground and coastal caribou, are considered in Zone 6.

The Regional Study Area is in the Boreal Shield Ecozone, which stretches across most of north-central and eastern Manitoba, and is dominated by the metamorphic gneiss bedrock of the Canadian Shield, broad expanses of coniferous dominated **boreal forest**, and numerous lakes. The Project Study Area is located in the Hayes River Upland Ecoregion of the Boreal Shield Ecozone. Surficial materials in the Gillam area consist of organic deposits and lacustrine mineral deposits. Peatlands dominate the area, and veneer bogs and blanket bogs are the most common peatland types. Surface permafrost is widespread and discontinuous. Climate parameters vary, with mean annual temperatures ranging from about -2.4 to -4.9 degrees Celsius, with growing seasons ranging from 124 days to 149 days. Total annual precipitation averages about 499.4 millimetres. Refer to Terrestrial Habitat Ecosystem and Plants Technical Report for additional detail concerning the Project Study Area.

Land cover is dominated by sparsely to densely treed needleleaf vegetation on thin or shallow peatlands. Black spruce (*Picea mariana*) on thin peatlands and black spruce on shallow peatlands are the two most abundant coarse habitat types. The other needleleaf coarse habitat types are jack pine (*Pinus banksiana*) and tamarack (*Larix laricina*) types. Less common broadleaf treed and mixedwood coarse habitat types include trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), and white birch (*Betula papyrifera*). Large fires occur frequently in the Keeyask region, and approximately one-quarter of inland **terrestrial** habitat is less than 50 years old. Shoreline wetland coarse habitat types comprise only a small fraction of land area. Refer to the Terrestrial Habitat Ecosystem and Plants Technical Report for additional detail concerning the Project Study Area.

Common mammals expected in the Hayes River Upland Ecoregion include moose (*Alces alces*), black bear (*Ursus americanus*), caribou (*Rangifer tarandus*), lynx (*Lynx lynx*), gray wolf (*Canis lupus*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and snowshoe hare (*Lepus americanus*) (Smith *et al.* 1998; Environment Canada 2000).



Nelson House RMA

Split Lake RMA

Fox Lake RMA

York Factory RMA

Nelson River

Stephen's Lake

Split Lake

Tataskweyak Cree Nation

Split Lake

York Factory First Nation

York Landing

Ilford

Kelsey G.S.

War Lake First Nation

Fox Lake Cree Nation

Fox Lake (Bird)

Limestone G.S.

Henday C.S.

Kettle G.S.

Gillam

Long Spruce G.S.

Keeyask G.S.

Radisson C.S.

Fox Lake Cree Nation A Kwis Ki Mahka Reserve

KN36

Bipole I and II (Existing 500 kV DC Line)

Keeyask Transmission Project Study Area

Thompson

Pikwitonei

Thicket Portage

Cross Lake Registered Trapline Zone

Sipiwesk Lake

Bunibonibee Cree Nation

Manto

280

290

6

Manitoba Hydro

Keeyask Transmission Project

Project Infrastructure

- Project Study Area

Infrastructure

- Converter Station
- Generating Station (Proposed)
- Generating Station
- Bipole I and II (Existing 500 kV DC Line)
- Transmission Line

Landbase

- Community
- Provincial Highway
- Provincial Road
- Active Railway
- Abandoned Railway
- Resource Management Area
- First Nation
- Watercourse
- Waterbody

Coordinate System: UTM Zone 15N NAD83
Data Source: MBHydro, Stantec, ProvMB, NRCAN
Date Created: September 26, 2012

N

0 10 20 Kilometres
0 10 20 Miles

1:1,000,000

Project Study Area in Northern Manitoba

Map 1-1

Manitoba Hydro

Keeyask Transmission Project

Project Infrastructure

- Project Study Area

Infrastructure

- Converter Station
- Generating Station (Proposed)
- Generating Station
- Bipole I and II (Existing 500 kV DC Line)
- Transmission Line

Geographic Zones

- Study Zone 1 (Project Footprint Both Phases)
- Study Zone 2
- Study Zone 3
- Study Zone 4
- Study Zone 5
- Study Zone 6

Landbase

- Provincial Road
- Municipal Road
- Active Railway
- Abandoned Railway
- Watercourse
- Waterbody

Coordinate System: UTM Zone 15N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: September 10, 2012

N

0 2 4 Kilometres
0 2 4 Miles

1:250,000

Keeyask Generation Project Study Areas

Map 1-2