# APPENDIX G

# BIOPHYSICAL MONITORING FRAMEWORK


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# 1.0 Introduction

Part of Manitoba Hydro's commitment to environmental protection includes the development of a comprehensive Environmental Protection Program (EPP) for the Keeyask Transmission Project (the 'Project'). One aspect of this program is monitoring and follow up for biophysical environmental components identified in the Keeyask Transmission Project Environmental Assessment Report (EA Report) and technical reports.

This document provides the Biophysical Monitoring Framework (BMF) which outlines the various monitoring programs that will occur during the phases of Project development (i.e., pre-construction, construction and post construction). It provides the basis for the development of the Biophysical Monitoring Plan that will evolve in greater detail subsequent to regulatory approvals.

The Biophysical Monitoring Framework is intended to provide assurance to regulatory reviewers, environmental organizations, Aboriginal communities and the general public that potential environmental effects caused by the Project will be monitored, evaluated and reported on in a responsible and accountable manner.

# 2.0 Goals, Objectives and Purpose

## 2.1 PURPOSE

During the process of developing the EA Report, several key environmental components that require follow-up monitoring were identified. These include:

- Aquatics
- Soils and Terrain
- Terrestrial Ecosystems and Vegetation
- Reptiles
- Birds
- Mammals

The purpose of the BMF is to provide a conceptual-level overview of the Biophysical Monitoring Plan that will be developed around the abovementioned environmental components and their associated environmental indicators. The intended goal of this framework is to provide confidence that follow-up monitoring associated with the Project will follow best practices for environmental monitoring.

### 2.2 OBJECTIVES

The objectives of the Biophysical Monitoring Framework are as follows:

- To provide a framework for monitoring Project effects and mitigation on biophysical environmental components and their indicators.
- To identify monitoring requirements and a process to develop a Biophysical Monitoring Plan that meets regulatory requirements, industry standards and best practices.

Manitoba Hydro is committed to developing a Biophysical Monitoring Plan that incorporates input from stakeholders including, but not limited to, government agencies and Aboriginal communities. During the process of plan development, opportunities for stakeholder involvement will be identified and described and opportunities that will enable the public to be active participants in the collection and reporting of biological monitoring data will be explored. Biophysical monitoring Information will be shared for learning and improvement through regular reporting to regulators and community presentations.

## 3.0 Monitoring Requirements

### 3.1 OVERVIEW

As defined under Canadian Environmental Assessment Act (CEAA), monitoring and follow up is required to verify the accuracy of the environmental assessment of a project and determine the effectiveness of measures taken to mitigate potential adverse environmental effects (CEAA 2011). Through monitoring and follow up, Environmental Impact Assessment (EIA) outcomes are realized, communicated to stakeholders and managed through refinement and improvement of mitigation strategies.

A number of environmental components were identified in Chapter 7 of the EA Report and associated technical reports as requiring monitoring and follow up. For each environmental component, one or more environmental indicator was selected to focus monitoring and follow up efforts (Table 3-1). Section 3.0 provides the rationale for the inclusion of environmental indicators that will form the basis of the Biophysical Monitoring Plan. General information on how these environmental indicators will be measured is covered in Section 4.

Environmental indicators were selected to represent the five broad environmental components if they had one or more of the following attributes:

- Scientific/regulatory importance (rare/endangered or protected status)
- Cultural importance (important to communities or society as a whole)
- Environmental importance
- Vulnerable and sensitive to change

Table 3-1 provides a list of environmental components and their respective environmental indicators/parameters including the rationale for their inclusion in the Biophysical Monitoring Framework.

**Table 3-1: Environmental Components Requiring Follow-up Monitoring**

| Environmental Component | Environmental Indicator | Parameter | Rationale[1] |
|---|---|---|---|
| Aquatics | Condition of streambeds and banks | Restored to pre-disturbance conditions | Environmental Importance – protection of aquatic life<br>Regulatory Importance – The *Fisheries Act* |
| Terrestrial Ecosystems, Habitat and Plants | Fragmentation | Linear density and core area | Environmental Importance |
| | Ecosystem Diversity | Area of affected habitat | Environmental Importance |
| | Priority Plants | Presence and abundance | Regulatory Importance – MESA; SARA; provincially rare species |
| | Invasive and non-native species | Plant abundance | Environmental Importance |
| Birds | Bird species of concern | Abundance | Regulatory Importance – MESA; SARA; MB CDC |
| | Bird wire collisions | Abundance | Regulatory Importance – MBCA; Manitoba *Wildlife Act* |
| | Colonial bird breeding sites | Colonial bird location and abundance | Regulatory Importance – Manitoba *Wildlife Act* |
| | Raptor nests | Location and abundance | Regulatory Importance – MBCA |
| Mammals | Caribou | Caribou populations and habitat use | Regulatory Importance – SARA |
| | Moose | Mortality | Community Importance |

[1] Manitoba Water Quality Standards, Objectives, and Guidelines (MWQSOG); *Manitoba Endangered Species Act* (MESA); *Species at Risk Act* (SARA); Manitoba Conservation Data Centre (MB CDC); *Migratory Bird Convention Act* (MBCA)

## 3.2 AQUATICS

Construction has the potential to disturb streambed and stream banks. Mitigation measures will restore all disturbed bed and bank sites to or condition comparable to pre-disturbance condition.

## 3.3 TERRESTRIAL ECOSYSTEMS AND HABITAT

### 3.3.1 Priority Plants

Species of conservation concern include species of plants that are protected under the *Manitoba Endangered Species Act* (MESA), the federal *Species at Risk Act* (SARA) or are listed by the Manitoba Conservation Data Centre (MBCDC). These species have not been found in the Project Study Area but could potentially occur. A number of plants and plant communities have been identified as being particularly important to Aboriginal people. These areas are valued for their provision of resources used by Aboriginals including gathering of food and medicines and harvesting plants and trees.

### 3.3.2 Invasive and Non-Native Species

The abundance of non-native or invasive plant species may increase as a result of the Project. Non-native species are plants that grow outside of their normal range while invasive species are plants that out-compete native species when introduced outside of their natural setting.

## 3.4 BIRDS

### 3.4.1 Bird Species of Concern

Species of conservation concern include species of birds that are protected under MESA, SARA, and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or are listed as rare by the MBCDC. These species generally exist in low numbers and are sensitive to changes in habitat.

As described under SARA (subsection 79(2)), monitoring of potential adverse effects on SARA-listed wildlife species is required (SARA 2011).

### 3.4.2 Bird-Wire Collisions

Very limited numbers of bird-wire collisions are anticipated for this Project, especially where bird deflectors are installed at sensitive sites. However, as there is a paucity of data for Manitoba, and as there is some level of uncertainty with the effects predictions, Manitoba Hydro will monitor and report the number of bird-wire collisions associated with the Project.

### 3.4.3 Active Bird Nests

Land clearing during the breeding bird period (April 1–July 31) has the potential to destroy migratory bird nests, which is a violation of the *Migratory Bird Convention Act* (MBCA) and the

Manitoba *Wildlife Act*. In order to prevent nest loss, pre-clearing nest searches in areas where summer clearing is planned (i.e., April 1-July 31) are necessary to determine locations of active bird nests. For all active nests identified, appropriate buffer sizes would be applied and retained until young fledge and are no longer vulnerable to nest loss. In areas where habitat for species at risk occurs (common nighthawk, olive-sided flycatcher and rusty blackbird), pre-clearing surveys would occur if any clearing is proposed between April 1 and August 31.

### 3.5 MAMMALS

#### 3.5.1 Caribou

Boreal woodland caribou (*Rangifer tarandus caribou*) are listed under SARA and MESA as threatened. Requirements of SARA (subsection 79[2]), indicate that monitoring of potential adverse effects on SARA-listed wildlife species must occur (SARA 2011). Woodland caribou are sensitive to changes in habitat that involve loss or alteration of calving and wintering areas.

#### 3.5.2 Moose

The Project has the potential to increase moose mortality through potential increased access by hunters and predators along transmission line rights-of-way. Moose harvest and predation along the Project rights-of-way will be monitored.

## 4.0 Monitoring Plan Organization

### 4.1 APPROACH

The Biophysical Monitoring Plan that will be developed on the basis of this framework document and will describe the environmental components and indicators that will be monitored, including: sampling methods, timing of activities, quality control and assurance programs, reporting requirements and opportunities for public involvement. Manitoba Hydro will develop the plan with input from stakeholders, and will include Aboriginal Traditional and Local Knowledge where appropriate and applicable. The Plan will be submitted to Manitoba Conservation for review and comment before being implemented, by Manitoba Hydro, prior to Project construction. Results from monitoring will be shared publicly and will be used to adjust mitigation measures and to modify the plan on an ongoing basis.

The Biophysical Monitoring Plan will include two main types of monitoring: environmental monitoring and compliance monitoring. Information generated from these programs will be used to improve and adapt management strategies as required.

- Environmental monitoring – periodic or continuous surveillance or testing, according to a predetermined schedule, of one or more environmental indicators to establish baseline conditions or to verify the accuracy of an environmental assessment and the effectiveness of mitigation measures.

- Compliance monitoring – conducted to verify whether a practice or procedure meets the applicable requirements prescribed by legislation, guidelines, industry standards or specific terms and conditions (e.g., in an agreement, lease, permit, license or authorization).

The following environmental components will form the basis of the Biophysical Monitoring Plan. Monitoring efforts will focus on the environmental indicators, with a general overview of anticipated activities by Project phase. Where possible, the Plan will consider opportunities to build efficiencies by combining monitoring tasks that have overlapping sampling periods (e.g., plant species of concern surveys and investigations of plants/communities important to Aboriginal communities).

## 4.2 AQUATICS

### 4.2.1 Construction

All stream crossing sites will be inspected following construction to document compliance with prescribed mitigation and recommend additional remediation where deemed necessary.

### 4.2.2 Post-Construction

Monitoring of stream crossings affected by Project components will be carried out during the post-construction phase to ensure that rehabilitation works and stability of the watercourse is at least equal to the pre-construction condition.

## 4.3 TERRESTRIAL ECOSYSTEMS AND HABITAT

### 4.3.1 Priority Plants

#### *4.3.1.1 Pre-Construction*

Pre-clearing surveys for priority plants will be focused in areas of the Project footprint likely to support species of conservation concern but not previously assessed. A representative number of sample plots will be established during pre-construction surveys for follow up during the post-construction phase.

#### *4.3.1.2 Post-Construction*

Areas previously identified as requiring mitigation (i.e., minimization of shrub and herb disturbance) will be investigated to determine success of measures used to minimize Project effects on priority plants.

### 4.3.2 Ecosystem Diversity

#### *4.3.2.1 Post-Construction*

Monitoring ecosystem diversity will occur to verify the predicted amounts and composition of direct and indirect habitat loss, alteration and disturbance during construction. Post construction the Project Footprint will be delineated and spatial analysis of direct and indirect habitat loss will be conducted.

### 4.3.3 Fragmentation

#### *4.3.3.1 Post-Construction*

Monitoring of fragmentation will occur to verify the Project effects on linear feature density and core area abundance. Post construction Project linear features will be measured along with the final Project footprint relative to core areas.

### 4.3.4 Invasive and Non-Native Species

#### *4.3.4.1 Post-Construction*

Permanently located sampling units located at representative sites will be used to record any changes in vegetation resulting from Project construction (i.e., introduction of non-native and invasive species). The collection of vegetation information will occur at a similar time during the growing season to maximize the comparability of data.

## 4.4 BIRDS

### 4.4.1 Bird Species of Concern

#### *4.4.1.1 Pre-Construction*

In accordance to Environment Canada guidelines, pre-construction surveys will identify the location of active nests and any additional sensitive sites or habitats that may require the implementation of mitigation measures including species-appropriate set-back distances or buffers.

#### *4.4.1.2 Construction*

Manitoba Hydro will monitor threatened and endangered species occurrences at locations where species at risk were observed. Evaluation of the effectiveness of buffer zones and set-back distances for species at risk will be assessed where construction occurs during the breeding season (April1-August 31). If suggested sizes of buffer zones or set-back distances are determined to be inadequate, and measureable effects are found, or where unanticipated effects have occurred, adaptive management will be employed to modify their sizes to eliminate any nest abandonment and to minimize potential effects to fledging success.

### 4.4.2 Bird-Wire Collisions

#### *4.4.2.1 Post-Construction*

Searches for dead or injured birds will be performed at selection of representative sites during peak periods of bird activity in order to determine the efficacy of bird deflectors in higher risk-of-collision habitats. Searches will also occur at a select number of sites where effects were not anticipated and bird deflectors were not implemented. If unanticipated effects are encountered such as high numbers of bird-wire strikes, or collisions involving listed species, appropriate mitigation measures will be implemented and add follow up monitoring will occur.

### 4.4.3 Active Bird Nests

#### *4.4.3.1 Pre-Construction*

Pre-Project nest searches are required in areas where summer construction (April 1-July 31) is anticipated (i.e., in the southern portion of the Project footprint). In accordance to Environment Canada guidance, pre-construction surveys will identify the location of active nests and any additional sensitive sites or habitats that may require the implementation of mitigation measures including species-appropriate setback distances or buffers. In areas where habitat for species at risk occurs (common nighthawk, olive-sided flycatcher and rusty blackbird), pre-clearing surveys would occur if any clearing is proposed between April 1 and August 31.

## 4.5 MAMMALS

### 4.5.1 Caribou

#### *4.5.1.1 Pre/Post-Construction*

Currently, collaborative research and monitoring between Manitoba Hydro, Manitoba Conservation and the Split Lake, York Factory and Fox Lake Resource Management Boards is ongoing. Monitoring and research include ongoing collaring of caribou and specific research assessing caribou persistence in relation to linear development. Monitoring of caribou populations will continue through to the post construction stage, with the purpose of assessing the effects of linear features on caribou populations and caribou use of habitat.

### 4.5.2 Moose

#### *4.5.2.1 Construction/Post Construction*

Moose mortality will be monitored by surveying for kill sites and determining cause of death within the Project Footprint during and post construction.

## 5.0 Anticipated Project Timelines and Key Monitoring Activities

The following table provides an overview of the timing of key monitoring activities identified in the EA Report and supporting technical reports.

**Table 5-1: Anticipated Project Timeline for Key Monitoring Activities**

| Environmental Component | Key Monitoring Activity | Pre-construction Phase | Construction Phase | Post-construction Phase |
|---|---|---|---|---|
| Aquatics | Inspect stream crossing sites | - | - | Yes |
| Terrestrial Ecosystems and Vegetation | Fragmentation | - | - | Yes |
| | Ecosystem Diversity | - | - | Yes |
| | Priority Plants | Yes | - | Yes |
| | Invasive and non-native species | - | - | Yes |
| Birds | Bird species of concern | Yes | Yes | - |
| | Bird-wire collisions | - | - | Yes |
| | Active bird nests | Yes | - | - |
| Mammals | Caribou | Yes | Yes | Yes |
| | Moose | | Yes | Yes |

## 6.0 Stakeholders, Roles and Responsibilities

The following Table 6-1 provides an overview of the roles and responsibilities of the Project stakeholders.

| Table 6-1: Overview of Stakeholder Roles and Responsibilities | | |
|---|---|---|
| **Stakeholder** | **Role** | **Responsibilities** |
| Manitoba Hydro | Proponent | • Design and implementation of Biophysical Monitoring Plan<br>• Collaboration with stakeholders in development and implementation of various aspects of the monitoring plan<br>• Management of monitoring plan activities<br>• Development of monitoring reports<br>• Regular reporting and sharing of information with stakeholders (e.g., open house) |
| Manitoba Conservation | Regulator | • Review and provide input into the monitoring plan<br>• Approve monitoring plan<br>• Collaborate on research and monitoring initiatives with Manitoba Hydro (e.g., caribou)<br>• Jurisdictional responsibilities related to wildlife, and species at risk, as mandated by the Manitoba Wildlife Act and MESA |
| Department of Fisheries and Oceans | Regulator | • Jurisdictional responsibilities relate to the protection of fish and fish habitat as mandated by the Fisheries Act |
| Environment Canada | Regulator | • Jurisdictional responsibilities relate to the protection of migratory birds and species at risk as mandated by the Migratory Birds Convention Act, 1994, and the Species at Risk Act. |
| Aboriginal Communities | Active participant | • Provide input into the monitoring plan design<br>• Active role in the implementation of the monitoring plan |
| Private Landowners | Active participant | • Active contributors of any biophysical-related monitoring information opportunistically encountered<br>• Communicate with proponent regarding unanticipated Project effects |
| Public | Active participant | • Active contributors of any biophysical-related monitoring information opportunistically encountered |

# 7.0 Reporting

The Biophysical Monitoring Plan will be developed by Manitoba Hydro and submitted to Manitoba Conservation for review and approval prior to the commencement of the Project construction phase. The monitoring plan and subsequent monitoring reports will be shared with regulators, stakeholders, aboriginal communities and the public. Monitoring plans and reports from monitoring programs will also be made available to all stakeholders on the Project website.

## 8.0 References

CEAA 2011. Canadian Environmental Assessment Agency. Accessed at: http://www.ceaa.gc.ca/default.asp?lang=En&n=081671C7-1&offset=7&toc=show

SARA 2011. Government of Canada's Species at Risk Act registry. Accessed at: http://www.sararegistry.gc.ca/approach/act/sara_e.pdf