Birtle Transmission Project

Appendix I

Draft Environmental Monitoring Plan

Prepared by Manitoba Hydro

Transmission Planning & Design Division

Licensing & Environmental Assessment

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Prepared for:

Environmental Approvals Branch

Manitoba Hydro

Birtle Transmission Project
Environmental Monitoring Plan

Draft

12/7/2017

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ACRONYMS

AC	Alternating Current
BTP	Birtle Transmission Project
EMP	Environmental Monitoring Plan
CEAA	Canadian Environmental Assessment Agency
CEAA 2012	Canadian Environmental Assessment Act 2012
CEnvPP	Construction Environmental Protection Plan
DFO	Department of Fisheries and Oceans
EA	Environmental Assessment
EPIMS	Environmental Protection Information Management System
EPP	Environmental Protection Program
ESS	Environmentally Sensitive Site
FRI	Forest Resource Inventory
GPS	Global Positioning System Unit
km	Kilometre
kV	Kilovolt
LAA	Local Assessment Area
MBCA	Migratory Birds Convention Act
MBCDC	Manitoba Conservation Data Centre
SD	Manitoba Sustainable Development
MESEA	Manitoba Endangered Species and Ecosystems Act
MMF	Manitoba Metis Federation
PFA	Project Footprint Area
PEP	Public Engagement Process
RAA	Regional Assessment Area
ROW	Right-of-way
SARA	Species at Risk Act
SOCC	Species of Conservation Concern
TSS	Total Suspended Solids
VC	Valued Component
VES	Visual Encounter Surveys

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

Manitoba Hydro is proposing to construct and operate a 230 kilovolt (kV) alternating current (AC) transmission line to the Manitoba-Saskatchewan border, and some modification/upgrades to the Birtle South Station (e.g., replacement of transformer). It will include activities associated with construction, operation and maintenance and decommissioning (Map 1-1). The proposed Project is called the Birtle Transmission Project (the Project). Further information can be found in the environmental assessment for the Project.

1.1.1 Regulatory Requirement

The Project is subject to environmental regulatory review and approval. The Project is defined as a Class 2 Development (under the Classes of Development Regulation) that will be reviewed by Manitoba Sustainable Development (SD) and require an Environment Act License under *The Environment Act* (Manitoba). Some environmental monitoring activities may require additional permits from SD.

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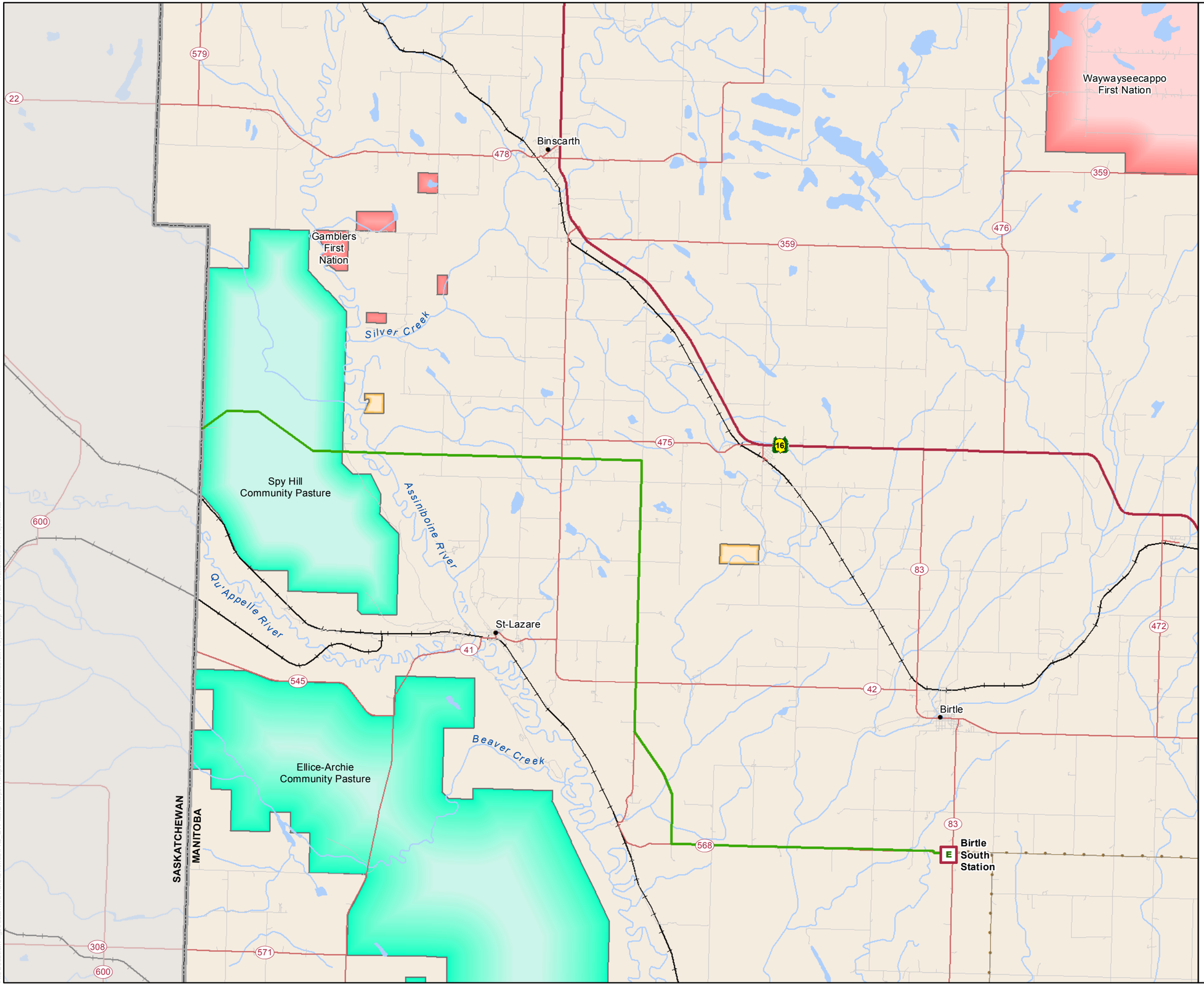

Manitoba Hydro

Birtle Transmission Project

Project Infrastructure

- Birtle South Station
- Final Preferred Route

Infrastructure

- Transmission Line

Landbase

- Community
- Yellowhead Highway
- Road
- Municipal Road
- Railway Line
- First Nation
- Wildlife Management Area
- Community Pasture
- Province of Manitoba Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date: December 15, 2017
Available in accessible formats upon request.

N

0 4 8 Kilometres

0 2 4 Miles

1:150,000

Birtle Transmission Project

Map 1-1

1.2 ENVIRONMENTAL PROTECTION PROGRAM

Part of Manitoba Hydro's commitment to environmental protection includes the development of a comprehensive Environmental Protection Program (EPP), further described in Chapter 10 of the EA. The purpose of the EPP is to provide the framework for implementing, managing, monitoring and evaluating environmental protection measures that are consistent with regulatory requirements and environmental guidelines. This Environmental Monitoring Plan (EMP) is a component of the EPP as illustrated in Figure 1-1.

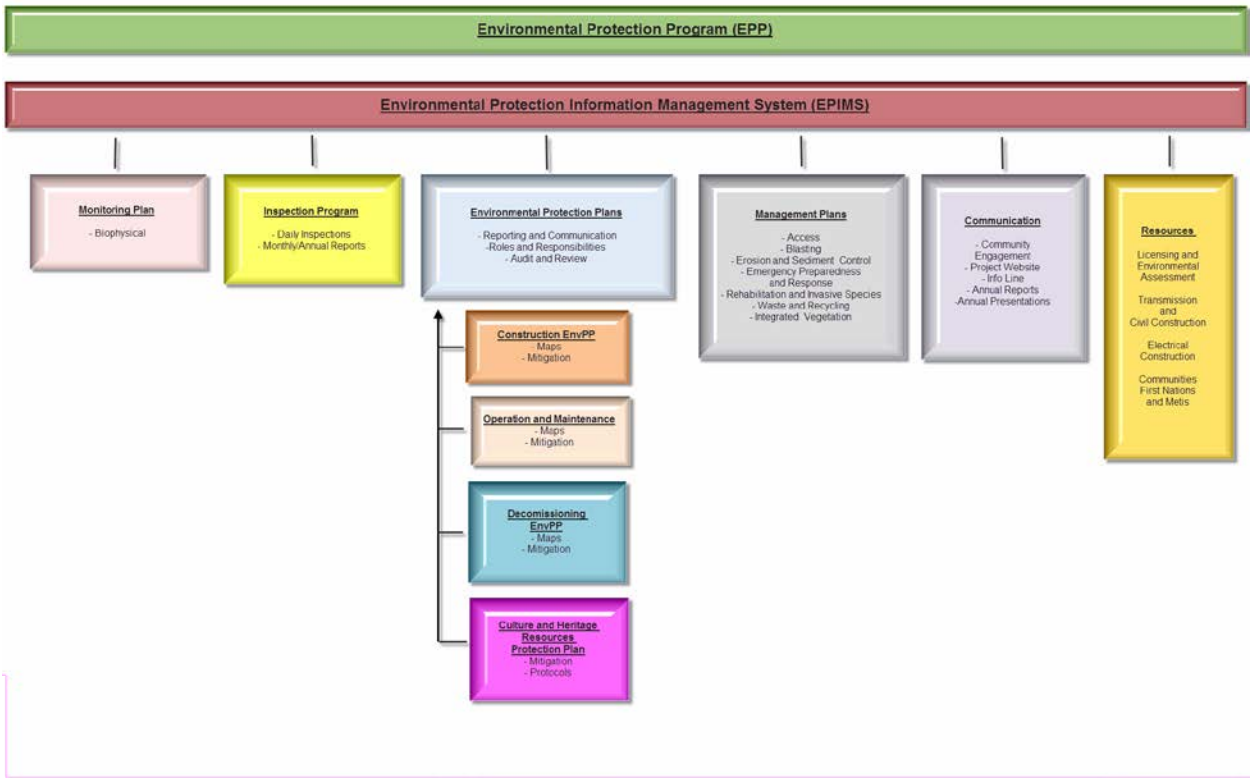

Figure 1-1 Transmission Environmental Protection Program

2.0 ENVIRONMENTAL MONITORING

This document describes the Environmental Monitoring Plan (EMP), which outlines the various monitoring activities that will occur to address follow-up requirements identified for the valued components included in the environmental assessment. Monitoring activities will be considered during all phases of Project development (i.e. pre-construction, construction and post construction). The intended goal of this plan is to provide details on monitoring activities and how monitoring results will be used within an adaptive management cycle to make decisions and trigger actions to further minimize the effects of the Project on the environment. Follow-up requirements include actions implemented to assess the effectiveness of the environmental assessment and to confirm compliance with regulatory requirements.

This EMP is intended to describe how and provide assurance to regulators, environmental organizations, Indigenous communities and organizations 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.

An internal Environmental Protection Information Management System (EPIMS) has been developed that will manage, store and facilitate the transfer of Environmental Protection Program data and information amongst the Project team. EPIMS will facilitate the transferring of knowledge and experiences encountered on a daily basis during construction activities from Environmental Inspectors to the Specialists that are responsible for monitoring project effects. EPIMS is an essential tool that manages vast amounts of data and information that will be generated through the implementation of this plan, allowing for Manitoba Hydro to employ an adaptive management approach during this project and apply that experience and knowledge to future developments.

2.1 OBJECTIVES

The objectives of this monitoring plan are to:

- Confirm the nature and magnitude of predicted environmental effects as stated in the EA;
- Assess effectiveness of mitigation measures implemented;
- Establish decision-triggers for action;
- Identify unexpected environmental effects of the Project, if they occur;
- Identify additional mitigation measures to address unanticipated environmental effects, if required;
- Confirm compliance with regulatory requirements including approval terms and conditions; and

- Provide additional information to evaluate long-term changes or trends.

2.2 SCOPE OF WORK

The scope of this EMP includes the biological components of the environment. Throughout the public and Indigenous engagement processes, Manitoba Hydro heard about the value and importance of the biological components within the Spy Hill-Ellice Community Pasture. For this reason the environmental monitoring plan is focused almost entirely within this area. A Cultural and Heritage Resources Protection Plan (CHRPP) has also been developed that outlines Manitoba Hydro's commitment to safeguard cultural and heritage resources and provide information on how to appropriately handle human remains or cultural and heritage resources discovered or disturbed during construction of the Project.

2.3 MANAGEMENT AND COORDINATION

Senior Manitoba Hydro management as well as implementation teams are committed to the implementation of the EMP for the Project. The Environmental Protection Management Team will be responsible for the management of the environmental protection plans including compliance with regulatory and other requirements, quality assurance and control, consultation with regulators and activities related to the Public Engagement Process (PEP) and Indigenous Engagement Process. As described in the Construction Environmental Protection Plan, the Environmental Protection and Implementation Team, which is comprised of Manitoba Hydro operational and office staff, will be responsible for the day to day implementation of environmental protection plans developed for the Project which include monitoring, inspecting and reporting.

Manitoba Hydro will ensure that resources are allocated to the environmental aspects of project planning, development, implementation and operation for the successful implementation of environmental protection measures and follow-up including monitoring. Manitoba Hydro will commit resources early in the planning cycle to ensure effective environmental assessment, mitigation and monitoring including an environmental staff member from the Licensing and Environmental Assessment Department that will lead the field monitoring program during the construction of the Project.

2.4 PUBLIC COMMUNICATIONS AND ENGAGEMENT

In addition to the extensive public engagement efforts that have occurred to date throughout the development of the Project, Manitoba Hydro welcomes all members of the public to contact the corporation with questions or comments throughout the construction process.

Manitoba Hydro's Birtle Transmission Project website will be maintained and updated regularly throughout the Project with the summary of results of this EMP. The link to the site is as follows:

https://www.hydro.mb.ca/projects/expansion/birtle/index.shtml

As noted on the Project website, additional information is always available to the public upon request via a toll-free phone number, dedicated project e-mail address or by mail.

Birtle Transmission Project
C/O Licensing and Environmental Assessment
Manitoba Hydro
820 Taylor Ave (3)
Winnipeg MB R3M 3T1
LEAProjects@hydro.mb.ca

1-877-343-1631 or 204-360-7888

2.5 INDIGENOUS ENGAGEMENT

2.5.1 Overview

Manitoba Hydro funded self-directed studies for Canupawakpa Dakota Nation, Gambler First Nation, Waywayseecappo First Nation and the Manitoba Metis Federation (MMF). Preliminary information shared to date with Manitoba Hydro about the Project area, and which informed this plan, include the importance of various plant species, moose, deer, and fish. Communities that completed self-directed studies in the later stages of the engagement process for the Project will have their information inform the Environmental Protection Program.

More detailed information regarding Indigenous engagement and the self-directed studies completed can be found in Section 4 of the environmental assessment.

3.0 MONITORING PROGRAM

3.1 REQUIREMENTS

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, 2012). Through monitoring and follow up, EA outcomes are realized, communicated and managed through refinement and improvement of mitigation strategies.

This EPP includes two main types of monitoring:

- Environmental monitoring – periodic or continuous surveillance or testing, according to a predetermined schedule, of one or more environmental indicators to establish/enhance knowledge of baseline conditions or to verify the accuracy of an environmental assessment and the effectiveness of mitigation measures. Pre- and post-disturbance and control-impact monitoring are the preferred approaches to monitoring environmental effects.
- Compliance monitoring – observation or testing conducted to verify whether a practice or procedure meets the applicable requirements prescribed by legislation, licence conditions, and/or Environmental Protection Plans.

Environmental monitoring is addressed through this EMP, which includes a commitment to present monitoring results in an annual report Compliance monitoring is accomplished through implementation of the Construction Environmental Protection Plan (CEnvPP), documented separately, which will involve the use of dedicated environmental officers/inspectors to observe and verify the implementation of the environmental protection plans. Information generated from this program will be utilized by an adaptive management approach to improve both mitigation measure effectiveness and monitoring program design. A summary of compliance monitoring results will be presented in an annual report.

3.2 PAST, PRESENT AND FUTURE MONITORING PROGRAMS

One of the key outputs of monitoring programs is a comparison of the effects predicted during environmental assessments and the actual outcome from construction activities. Monitoring and evaluation of projects help in the understanding and learning from past project successes and challenges, which in turn help to inform decision-making so that current and future monitoring programs for projects can be improved.

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In order to facilitate continual improvement of monitoring programs for future projects, information and results from past monitoring programs were reviewed to better understand the effects of transmission line construction on the biophysical and socio-economic components of the environment. This results in a reduction of project-specific residual effects through project-based mitigation which demonstrates a commitment to continual improvement and sustainable development. As indicated, Manitoba Hydro manages all of its project monitoring programs in a coordinated fashion so that knowledge gained from one program is combined with other programs for a more informed understanding of transmission line environmental effects.

3.3 VALUED COMPONENTS

This section identifies the Valued Components (VCs) that were selected for the environmental assessment that will be monitored, including the rationale for their selection. Additional information in this section includes key monitoring activities, task descriptions, duration, frequency and timing of activities, Environmental Monitor input, Manitoba Hydro commitments and specialist and SD roles. Manitoba Hydro has developed the plan to address its own Environmental Management Policy as well as concerns expressed by stakeholders, local communities, Indigenous communities and organizations, and regulators.

Where applicable, Decision Trigger(s)/Threshold(s) for Action have been identified for each VC. These decision triggers or thresholds for action are mechanisms to promote adaptive management that cause Manitoba Hydro and its Specialists to stop and further evaluate the monitoring results and, if required, adapt mitigation measures or monitoring activities. It is difficult to develop decision triggers/thresholds for all situations as there is lack of scientific data for the large number of potential parameters and variables that can be measured. Many government agencies, including Manitoba, have not yet published definitive thresholds for action for different wildlife management scenarios. Manitoba Hydro will continue to fund applicable research and contribute monitoring information from projects to the regulators.

3.3.1 Valued Component Selection

An initial step of the environmental assessment was the identification of VCs that may be adversely affected by the Project, as discussed in EA report (Section 7.0). VCs are environmental elements that have the potential to interact with the Project and that met one or more of the following criteria:

- represent a broad environmental, ecological or human environment component that might be affected by the Project;
- are a part of the heritage of Indigenous communities and organizations, or a part of their current use of lands for traditional purposes;
- are of scientific, historical, archaeological importance; and/or

- Have been identified as important issues or concerns through the Project engagement process, or by other effects assessments in the region.

Ecological VC's that require monitoring and follow-up were identified in each applicable section within the EA report. For each VC, parameters for one or more environmental indicators were selected to focus monitoring and follow up efforts. Table 4-1 below provides a list of valued components and their environmental indicators that will require monitoring as well as the parameters being measured and rationale for their selection. Effects to some valued components of small size or limited interactions, such as aquatic and wetland habitat will be carefully managed through the environmental inspection program.

Table 4-1 Valued Components and Environmental Indicators

Valued Component	Environmental Indicator	Parameter	Rationale
Aquatic Habitat	Stream Crossings	Riparian buffers, ground cover, erosion	Environmental importance; protection of aquatic life; Regulatory importance
Grassland Habitat	Bird Species of Conservation Concern	Presence /Absence; Perching Avian Predators; Brown Headed Cowbirds	Regulatory importance - MESEA; SARA; MB CDC
	Plant Species of Conservation Concern	Species occurrence	Regulatory importance – MESEA and SARA
	Invasive Plant Species	Species occurrence	Environmental importance
	Traditional Use Plant Species	Species occurrence	Cultural and environmental importance
Forest Habitat	Ungulates	Occurrence and/or seasonal distribution; vehicle collision related mortality	Environmental and cultural importance; Regulatory importance
	Plant Species of Conservation Concern	Species occurrence	Regulatory importance – MESEA and SARA
	Invasive Plant Species	Species occurrence	Environmental importance

Table 4-1 Valued Components and Environmental Indicators

Valued Component	Environmental Indicator	Parameter	Rationale
	Traditional Use Plant Species	Species occurrence	Cultural and environmental importance

3.3.2 Valued Component Monitoring Tables and Schedule

Figure 4-1 illustrates the proposed schedule of monitoring activities. The following tables 4-2 through 4-10 summarize the key monitoring activities that will be conducted for each of the valued components and environmental indicators identified in Table 4-1. Detailed methodologies for each key monitoring activity are outlined in Section 7.0 of this plan.

Figure 4-1 Proposed Monitoring Activities Schedule

Valued Component	Key Monitoring Activity	Baseline Surveys	Regulatory Review	Pre-Construction Surveys	Clearing and Construction of the Transmission Line and station modifications	Post-Construction	
		2017	2018	2019 (May-Oct)	2019 (Dec), 2020, 2021 (Jan-March)	2021	2022
Aquatic Habitat	Stream Crossing Assessment	■			■	■	
Grassland Habitat	Bird Species of Conservation Concern Survey	■		■	■	■	■
	Plant Species of Concern Surveys	■		■	■	■	
	Invasive Species Survey	■		■	■	■	
	Traditional Use Plant Species Survey	■		■	■	■	
Forest Habitat	Ungulates	■				■	
	Plant Species of Concern Surveys	■		■	■	■	
	Invasive Species Survey	■		■	■	■	
	Traditional Use Plant Species Survey	■		■	■	■	■

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Valued Component Monitoring Table Description Key

Environmental Indicator

Brief description of the environmental indicator in the context of the Project, and the potential effects of the Project on the environmental indicator.

Objectives

- *List of objectives the monitoring program is designed to fulfill.*

Applicable Project Component(s): *List of Project components that are being monitored due to the potential interactions between the Project component and environmental indicators*

Monitoring Activities

Table x-x Name of Environmental Indicator

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurements/Observations
Name of key monitoring activities (i.e. Bird Point Count Survey)	*The phase of the Project the activities will take place (i.e., baseline information, pre-construction construction, post construction)*	*Description of the task being conducted (i.e. upstream/downstream water quality monitoring).*	*Identification of the parameters being measured by the task (i.e. species counts)*	*Location where monitoring is conducted. Regional (RAA), Local (LAA), Project Footprint Area (PFA) or Environmentally Sensitive Site (ESS)*	*How many years the activities will take place (i.e. three years)*	*How many times per year will the activity take place (i.e. annual – once a year)*	*The time of year the activity will take place (i.e. Spring and fall)*	*Units by which the parameters are being measured (e.g. total number of bird species observed) Or qualitative observations of effects (e.g. bird behaviours)*

Manitoba Hydro Commitment:

- *This section will describe the activities the Manitoba Hydro is committed to conducting and resources it will provide to execute the monitoring plan.*

Responsibilities of Environmental Monitor include:

- *This section will describe the activities the Environmental Monitor will conduct and resources they will provide to execute the monitoring plan. The environmental monitor role may be fulfilled be either a Manitoba Hydro staff, a Manitoba Hydro retained consultant, or an Indigenous community member.*

Specialist will:

- *This section describes the activities the Specialist will conduct and resources it will provide to execute the monitoring plan. The specialist may be Manitoba Hydro staff or external consultants.*

Decision Trigger(s)/Threshold(s) for Action:

- *Describes the scenarios which will trigger the requirement for adaptive management to be implemented. This section does not provide how Manitoba Hydro will respond to a particular action as there are an indefinite amount of possible scenarios and responses. Manitoba Hydro is committed to an adaptive management process as described in Section 5 to fully evaluate the options and develop an appropriate response.*

Approach to Adaptive Management

- *This is a summary of how adaptive management will be applied for this valued component.*

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3.4 AQUATIC HABITAT

3.4.1 Steam Crossing Assessments

There are eleven stream crossings along the final preferred route. Five of the stream crossings are potentially fish-bearing. A potential effect of the Project to fish habitat is the loss of riparian vegetation (vegetation along the water's edge) during construction. Riparian vegetation grows along watercourses and functions as fish habitat by providing bank stability, food and nutrient inputs (e.g., leaf litter and insect drop), and shading. The loss of riparian vegetation can result in increased sediment in water due to decreased bank stability, increased water temperature and decreased cover for fish. Increased suspended sediments can decrease light penetration resulting in decreased photosynthesis. Sedimentation of streams can bury or create unsuitable habitats for aquatic invertebrates, infill spawning habitats and reduce the spawning and feeding success of fish. To validate EA predictions environmental monitoring will verify effectiveness of prescribed mitigation and to allow for adaptive management.

Objectives:

- *To verify the implementation and effectiveness of mitigation prescribed for areas adjacent to watercourses including: riparian buffers, erosion control, and temporary stream crossings.*

Applicable Project Component(s): *BTP Transmission Line (B71T)*

Monitoring Activities:

Table 4-2 Aquatic Habitat

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurements/Observations
Stream Crossing Assessment	*Baseline Information*	*Fish Habitat Assessments*	*Water course characterization and sensitivity*	*Five sites in LAA*	*1 field season*	*Once*	*2017*	*Fish Habitat (Channel size), Habitat Sensitivity (High, Medium, Low)*
	Construction	*Stream Crossing Survey*	*Riparian buffers, ground cover and erosion*	*ESS*	*1 field season*	*Annual*	*2020*	*Riparian buffer width (m), Vegetative cover (% cover : % bare ground), Bank stability and erosion (%), Re-vegetation where soil was disturbed (% ground cover: % bare ground.)*
	Post-construction	*Stream Crossing Survey*	*Riparian buffers, ground cover and erosion*	*ESS*	*1 field season*	*Annual*	*2021*	*Riparian buffer width (m), Vegetative cover (% cover : % bare ground), Bank stability and erosion (%), Re-vegetation where soil was disturbed (% ground cover: % bare ground.)*

Manitoba Hydro is committed to:

- *Provide digital ortho-rectified imagery or georeferenced digital video/photo products;*

- *Supply an Environmental Protection Information Management System (EPIMS) that manages all project monitoring data and allows Specialist access to daily inspection and monitoring reports from construction period;*
- *Provide qualified Environmental Inspectors to conduct regular inspections of mitigation measure implementation;*
- *Summarize results of key monitoring activities in an annual monitoring report;*
- *Report immediately to SD any unanticipated project effects on stream crossing and encroachment areas discovered through monitoring activities and consult on any remediation plans; and*
- *Share results of key monitoring activities with interested local stakeholders, First Nations, Metis and Manitoba Sustainable Development.*

Responsibilities of Environmental Monitor include:

- *During construction phase daily activities, record observations of mitigation performance at ESS sites within project footprint or access routes.*
- *Record observations with photo and waypoint and store in EPIMS*
- *Work with Specialist during field visits to assess mitigation effectiveness, and provide first hand overview of site conditions during construction phase.*

Specialist will:

- *Use the digital ortho-rectified imagery and/or georeferenced video/photo products provided by Manitoba Hydro for identification of stream crossing requiring site survey and assessment of ROW effects;*
- *Review Environmental Inspector and Monitor daily reports for the performance and implementation of prescribed mitigation measures at each stream crossing site;*
- *Design and conduct specific survey methods that sample aquatics ESS sites and at sites where documentation by Environmental Inspectors is insufficient or site conditions warrant follow-up to verify accuracy of EA predictions and effectiveness of mitigation measures implemented;*
- *Report immediately to Manitoba Hydro any unanticipated project effects on stream crossings discovered through monitoring activities;*
- *Analyze, evaluate and report on monitoring findings including mitigation effectiveness on an annual basis; and*
- *Through an adaptive management framework, make recommendations for ongoing improvements to the mitigation measures, monitoring plan, methods, analysis and implementation in response to knowledge gained through ongoing monitoring and associated analysis.*

Thresholds for Action/Decision Triggers:

- *Bank stability and erosion not equal to pre-construction stability.*
  - *Action: Implement site specific rehabilitation measures as required.*
- *Insufficient riparian buffer retained.*
  - *Action: Implement site specific rehabilitation measures as required.*

Approach to Adaptive Management:

- *Passive - Implement environmental protection plan measures and apply experience from previous transmission development projects (i.e. implement site-specific buffers and setbacks near watercourses).*

3.5 GRASSLAND HABITAT

3.5.1 Bird Species of Conservation Concern

Species of conservation concern (SOCC) include species of that are protected under MESEA, SARA or are listed as rare by the MBCDC. These species generally exist in low numbers and are sensitive to changes in habitat. Ten bird species of conservation concern were identified in the Regional Assessment Area (RAA) during the 2017 surveys. Of particular concern for this Project are bird species listed as threatened under SARA including the Sprague's Pipit (MESEA listed as threatened) and Chestnut-collared Longspur (MESEA listed as endangered).

Sprague's Pipits and Chestnut-collared Longspurs are common in the Spy Hill-Ellice Community Pasture. Sprague's pipits select native grasslands of moderate height with some litter, typically in areas that are not heavily grazed. Chestnut-collared Longspurs prefer to breed in recently mowed or grazed short- or mixed-grass prairie. Well-managed pasturelands are important for these species, as livestock grazing can maintain suitable grassland habitat (North American Bird Conservation Initiative Canada 2012).

As identified in the assessment, disturbance and displacement of these species may occur due to the operation of this Project within grassland habitats in the Spy Hill-Ellice Community Pasture. Therefore, the monitoring program will validate EA predictions, verify implementation of mitigation measures, and determine project-related effects to Sprague's Pipit and Chestnut-collared Longspur (pre versus post-construction). Analysis will also be undertaken to identify changes in the relative abundance of perching avian predators and avian brood parasites (i.e., brown-headed cowbirds). All monitoring efforts for bird species of conservation concern will be focused in the Spy Hill-Ellice Community Pasture.

Objectives:

- *Identify the location of Sprague's Pipit and Chestnut-collared Longspur within or in close proximity to the Project footprint with the purpose of establishing a Before-After-Control-Impact monitoring program for known individuals and/or groups;*
- *Monitor Sprague's Pipit and Chestnut-collared Longspur in close proximity to the transmission line and compare abundance relative to nearby control sites; and*
- *Determine the effectiveness of mitigation measures and, if appropriate, propose revisions to the existing plans or develop new mitigation options should unexpected impacts to birds occur as a result of construction or operation activities.*

Applicable Project Component(s): *Project Components in Spy Hill-Ellice Community Pasture*

Monitoring Activities:

Table 4-3 Bird Species of Conservation Concern

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurements/Observations
Bird Species of Conservation Concern Survey with a focus on Sprague's Pipit and Chestnut-collared Longspur	*Baseline information*	*Desktop and field surveys, 10- minute point counts*	*Presence/absence*	*RAA, LAA, PFA*	*1 field season*	*Once*	*2017*	*Presence, relative abundance/habitat type*
	Pre-construction	*10- minute point counts*	*Presence/absence*	*RAA, LAA, PFA within Spy Hill-Ellice Community Pasture.*	*1 field season*	*Once*	*2019*	*Presence, relative abundance/habitat type*
	Construction	*10- minute point counts*	*Presence/absence*	*RAA, LAA, PFA within Spy Hill-Ellice Community Pasture.*	*1 field season*	*Once*	*2020*	*Presence, relative abundance/habitat type*

	Post-construction	*10- minute point counts*	*Presence/absence*	*RAA, LAA, PFA within Spy Hill-Ellice Community Pasture.*	*2 field seasons*	*Once*	*2021, 2022*	*Presence, relative abundance/habitat type*

Manitoba Hydro is committed to:

- *Provide digital ortho-rectified imagery or georeferenced digital video/photo products;*
- *Supply an Environmental Protection Information Management System (EPIMS) that manages all Project monitoring data and allows access to daily inspection and monitoring reports from construction period;*
- *Summarize results of key monitoring activities in an annual monitoring report;*
- *Share results of key monitoring activities with interested local stakeholders, First Nations, the MMF, Indigenous organizations; and*
- *Participate as a stakeholder in committees or working groups whose purpose is for the ongoing conservation of wildlife.*

Responsibilities of Environmental Monitor include:

- *During construction phase daily activities, record observations of bird species of concern and mitigation performance at ESS sites within project footprint;*
- *Record observations with photo and waypoint and store in EPIMS; and*
- *Work with Specialist during field visits to assess mitigation effectiveness, and provide first hand overview of site conditions during construction phase*.

Specialist will:

- *Use the digital ortho-rectified imagery and/or georeferenced video/photo products provided by Manitoba Hydro for identification of potential species of concern habitat;*
- *Review Environmental Inspector and monitor daily reports for identification of bird species of concern, with a focus on Sprague's Pipit and Chestnut-collared Longspur*
- *Design and conduct specific survey methods that sample habitat use and relative abundance;*
- *Report immediately to Manitoba Hydro any unanticipated project effects on species of concern discovered through monitoring activities;*
- *Analyze, evaluate and report on monitoring findings including mitigation effectiveness on an annual basis; and*
- *Through an adaptive management framework, make recommendations for ongoing improvements to the mitigation measures, monitoring plan, methods, analysis and implementation in response to knowledge gained through ongoing monitoring and associated analysis.*

Manitoba Sustainable Development will:

- *Provide updated data of species of concern populations with a focus on Sprague's Pipit and Chestnut-collared Longspur to inform ongoing analyses related to biophysical monitoring (e.g. population survey data, observations, reports); and*
- *Provide guidance regarding mitigation strategies should unanticipated effects occur as a result of the Project.*

Thresholds for Action/Decision Triggers:

- *Species of concern are observed within the Project Footprint and at control locations.*
  - *Action: Report to SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed.*

- *Point count surveys within Project footprint have significant reduction in relative abundance of Sprague's pipit and Chestnut-collared Longspur compared to pre-construction baseline and control point counts away from the Project.*
    - *Action: Report to SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed. After considering ancillary conditions (such as habitat, drought, floods, migratory shifts, livestock stocking rates, disease, or other unforeseen developments etc.) additional mitigation may involve supporting AMCP and/or SD efforts to improve grassland management in nearby suitable areas of the Spy Hill-Ellice Community Pasture through active management (i.e. shrub removal, cross fencing etc.).*
- *Point count surveys within Project footprint have significant increase in relative abundance of perching avian predators or avian brood parasites compared to pre-construction baseline and control point counts away from the Project.*
    - *Action: Report to SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed. Additional mitigation may involve installing predator perch deterrents on key pieces of infrastructure, if conditions warrant.*

Approach to Adaptive Management:

- *Active - Monitor Sprague's pipit and Chestnut-collared Longspur presence/absence and relative abundance in the Project area. Discuss results with SD and consider supporting improved grassland management in nearby suitable areas in Spy Hill-Ellice Community Pasture, through active management (i.e. shrub removal, cross fencing etc.), and/or consider installing avian predator perch deterrents on key pieces of infrastructure, if conditions warrant.*

3.5.2 Plant Species of Conservation Concern

Species of conservation concern include species of plants that are protected under *The Endangered Species and Ecosystems Act* (MESEA) in Manitoba, the federal *Species at Risk Act* (SARA), The Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or are listed by the Manitoba Conservation Data Centre (MBCDC) as plants that are very rare to uncommon. These species generally exist in low numbers, play a role in helping to preserve species diversity, and/or have limited distributions.

Based on records from the MBCDC and existing information sources, several (~46) species of conservation concern are known to occur in the RAA and surroundings, with increased concentrations located in the vicinity of St. Lazare, including the Ellice Archie and Spy Hill-Ellice Community Pastures. The uplands and river valleys in this region support a number of species considered provincially rare in the province (Hamel and Reimer 2004). According to provincial sources and existing literature, there are about 172 species of conservation concern that can be expected to range within the greater Aspen Parkland Ecoregion. Of these, there are eight species at risk listed in the ecoregion. These include rough purple false-foxglove (*Agalinis aspera*), buffalograss (*Bouteloua dactyloides*), hackberry (*Celtis occidentalis*), smooth goosefoot (*Chenopodium subglabrum*), small white lady's-slipper (*Cypripedium candidum*), hairy prairie-clover (*Dalea villosa*), smooth monkeyflower (*Mimulus glabratus*) and western spiderwort (*Tradescantia occidentalis*). Only one of these species is known to occur in the RAA setting, roundleaf monkey-flower (*Mimulus glabratus*) (Reimer and Hamel 2003).

Baseline surveys conducted in 2017 have helped identify locations where species of conservation concern exist. Preconstruction surveys will provide further details for where to apply mitigation measures. Construction activities can potentially negatively affect plant species of conservation concern through the use of heavy equipment (crushing plants) and from clearing and grubbing (removal of roots) of vegetation. Herbicide use during maintenance activities can also negatively affect desirable species. To validate EA predictions, verify implementation of mitigation measures, and to allow for adaptive management, pre-construction, construction and post-construction monitoring will identify any impact to vegetation species of conservation concern in the Spy Hill-Ellice Community Pasture.

Objectives:

- *Pre-construction surveys to identify locations of species of conservation concern;*
- *Monitoring to document presence/absence of species post construction; and*
- *Verify the implementation and effectiveness of protection measures.*

Applicable Project Component(s): *Project Components in Spy Hill-Ellice Community Pasture*

Monitoring Activities:

Table 4-4 Plant Species of Conservation Concern - Grassland

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurements/Observations
Rare Plant Surveys	*Baseline Information*	*Desktop, key person interviews, and field surveys*	*Species names and locations*	*Grassland habitat sites surveyed in Spy Hill-Ellice Community Pasture PFA, LAA*	*1 field season*	*Once*	*2017*	*Species presence/absence*
	Pre-construction	*Ground surveys to record species of concern*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2019*	*Species presence/ absence*
	Construction	*Ground surveys to monitor species of concern and protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2020*	*Species presence/ absence*

	Post-construction	*Ground surveys to monitor species of concern and protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2021*	*Species presence/ absence*

Manitoba Hydro is committed to:

- *Provide digital ortho-rectified imagery or georeferenced digital video/photo products;*
- *Supply an Environmental Protection Information Management System (EPIMS) that manages all project monitoring data and allows Specialist access to daily inspection and monitoring reports from construction period;*
- *Provide qualified Environmental Inspectors to conduct regular inspections of mitigation measure implementation;*
- *Summarize results of key monitoring activities in an annual monitoring report; and*
- *Share results of key monitoring activities with interested local stakeholders, Indigenous communities and organizations, and Manitoba Sustainable Development.*

Responsibilities of Environmental Monitor include:

- *During construction phase daily activities, record observations of rare plants and mitigation performance at ESS sites within project footprint or access routes;*
- *Record observations with photo and waypoint and store in EPIMS; and*
- *Work with Specialist during field visits to assess mitigation effectiveness, and provide first hand overview of site conditions during construction phase.*

Specialist will:

- *Use the digital ortho-rectified imagery and/or georeferenced video/photo products provided by Manitoba Hydro for identification of potential rare plant habitat sampling sites and assessment of ROW effects;*
- *Conduct pre-clearing rare plant surveys for project areas not previously surveyed;*
- *Review Environmental Inspector and Monitor daily reports for identification of potential rare plant sampling sites;*
- *Design and conduct specific survey methods that sample known rare plant sites for presence/absence to verify accuracy of EA predictions and effectiveness of mitigation measures implemented;*
- *Adhere to Manitoba's Hydro's Agricultural Biosecurity procedures;*
- *Report immediately to Manitoba Hydro any unanticipated project effects on rare plants discovered through monitoring activities;*
- *Analyze, evaluate and report on monitoring findings including mitigation effectiveness on an annual basis; and*
- *Through an adaptive management framework, make recommendations for ongoing improvements to the mitigation measures, monitoring plan, methods, analysis and implementation in response to knowledge gained through ongoing monitoring and associated analysis.*

Manitoba Sustainable Development may be requested to:

- *Provide historical and current data of species of concern to inform ongoing analyses related to biophysical monitoring (e.g. population survey data, observations, reports); and*
- *Provide guidance regarding mitigation strategies should unanticipated effects occur as a result of the Project.*

Decision Trigger(s)/Threshold(s) for Action:

- *Species of conservation concern has been disturbed by construction activities.*

- *Action: Report to SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed.*
- *Action: Implement site specific rehabilitation measures as required.*

- *Discovery of new location of species of conservation concern.*
  - *Action: Report locations to Manitoba Conservation Data Center and SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed.*
  - *Action: Develop and maintain a 10 meter vegetated buffer around plant species protected under legislation, and contact Manitoba Sustainable Development for further guidance on necessary mitigation.*

Approach to Adaptive Management:

- *Passive - Implement environmental protection plan measures and apply experience from previous transmission development projects (i.e. implement buffers around identified plants or plant groupings) adjust buffer distance when advised by SD.*

3.5.3 Invasive Plant Species

As outlined in the EA, the prevalence of non-native and invasive plant species (including noxious 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. Noxious plants have the ability to spread rapidly and are designated by regulation, *The Noxious Weed Act* (Manitoba).

Construction equipment and vehicles can introduce non-native and invasive plants during construction activities. During the field assessments in 2017, three non-native or invasive species were recorded from the Spy Hill-Ellice Community Pasture, while eight species were observed at sites on private lands, most of which are under agricultural cultivation or grazing.

Non-native and invasive species are problematic for a number of reasons: these plants are capable of growing under a wide range of climatic and soil conditions; they produce abundant seeds that are easily disseminated and seeds that are long lived or can remain dormant through the winter season; they can continue to persist even after the removal of vegetative portions of the plant, and they often have vigorous growth and produce seeds under conditions adverse for other plants, and can therefore out compete native species. To validate EA predictions, verify implementation of mitigation measures, and to allow for adaptive management, pre-construction, construction and post-construction monitoring will identify changes in baseline composition and abundance of invasive species.

Objectives

- *Pre-construction surveys to identify non-native and invasive species;*
- *Monitoring to document the composition and abundance of non-native and invasive plant species at selected sites; and*
- *Recommend appropriate control and eradication measures, if there is a spread of species.*

Applicable Project Component(s): *Project Components in Spy Hill-Ellice Community Pasture*

Monitoring Activities:

Table 4-5 Invasive Plant Species - Grassland

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurable Parameter(s)
Non-native and Invasive Species Survey	*Baseline Information*	*Desktop and field surveys*	*Species names and locations*	*Sites surveyed in PFA, LAA*	*1 field season*	*Once*	*2017*	*Species composition and abundance*
	Pre-construction	*Ground surveys to record non-native and invasive species*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2019*	*Species composition and abundance*
	Construction	*Ground surveys to identify and measure occurrence of invasive species on ROW and monitor protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2020*	*Species composition and abundance*

	Post-construction	*Ground surveys to identify and measure occurrence of invasive species on ROW and monitor protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2021*	*Species composition and abundance*

Manitoba Hydro is committed to:

- *Provide digital ortho-rectified imagery or georeferenced digital video/photo products;*
- *Supply an Environmental Protection Information Management System (EPIMS) that manages all project monitoring data and allows Specialist access to daily inspection and monitoring reports from construction period;*
- *Provide qualified Environmental Inspectors to conduct regular inspections of mitigation measure implementation;*
- *Summarize results of key monitoring activities in an annual monitoring report; and*
- *Share results of key monitoring activities with interested local stakeholders, Indigenous communities and organizations, and Manitoba Sustainable Development.*

Responsibilities of Environmental Monitor include:

- *During construction phase daily activities, record observations of invasive plants within project footprint or access routes, and equipment cleaning stations;*
- *Record observations with photo and waypoint and store in EPIMS; and*
- *Work with Specialist during field visits to assess mitigation effectiveness, and provide first hand overview of site conditions during construction phase.*

Specialist will:

- *Use the digital ortho-rectified imagery and/or georeferenced video/photo products provided by Manitoba Hydro for identification of invasive and non-native species sampling sites and assessment of ROW effects;*
- *Conduct pre-clearing surveys to record invasive and non-native species information;*
- *Review Environmental Inspector and Monitor daily reports for identification of potential invasive and non-native species sampling sites;*
- *Design and conduct specific survey methods that sample invasive and non-native species sites for composition and abundance to verify accuracy of EA predictions and effectiveness of mitigation and control measures implemented;*
- *Adhere to Manitoba's Hydro's Agricultural Biosecurity procedures;*
- *Report immediately to Manitoba Hydro any unanticipated project effects on invasive and non-native species discovered through monitoring activities;*
- *Prescribe vegetation management options for invasive species control where required;*
- *Analyze, evaluate and report on monitoring findings including mitigation effectiveness on an annual basis; and*
- *Through an adaptive management framework, make recommendations for ongoing improvements to the mitigation measures, monitoring plan, methods, analysis and implementation in response to knowledge gained through ongoing monitoring and associated analysis.*

Decision Trigger(s)/Threshold(s) for Action:

- *Establishment and spread of invasive species along ROW in Spy Hill-Ellice Community Pasture.*

- *Action: Report to SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed. Discuss the species, nature of spread and management options.*

Approach to Adaptive Management:

- *Passive - Implement current mitigation measures for existing patches of invasive species and discuss monitoring results with the SD and/or the local weed supervisor regarding the species, nature of spread and management options.*

3.5.4 Traditional Use Plant Species

As outlined in the EA, Project effects to traditional plant species is a concern for Indigenous communities and organizations. These areas are valued for their provision of resources used by Indigenous communities and organizations, including gathering of food and medicines and harvesting plants and trees, particularly in Spy Hill-Ellice Community Pasture. Self-directed studies by Indigenous communities, and baseline vegetation surveys conducted in 2017 identified traditional use plant species and locations where they are found in grassland, forest and wetland habitats.

To validate EA predictions, verify implementation of mitigation measures, and to allow for adaptive management, pre-construction, construction and post-construction monitoring will identify changes in baseline composition and abundance of traditional use plant species.

Objective(s):

- *Document traditional use plant species along the Project footprint;*
- *Confirm actual Project effects on traditional use plant species; and*
- *Verify the implementation and effectiveness of protection measures at known traditional use sites.*

Applicable Project Component(s): *Project Components in Spy Hill-Ellice Community Pasture*

Monitoring Activities:

Table 4-6 Traditional Use Plant Species - Grassland

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurable Parameter(s)
Traditional Use Plant Species Survey	*Baseline Information*	*Desktop, field surveys and reports from Indigenous communities.*	*Species names and locations*	*Sites identified in PFA, LAA. RAA*	*1 field season*	*Once*	*2017*	*Species composition and abundance*
	Pre-construction	*Ground surveys to identify traditional use plant species*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2019*	*Species composition and abundance*
	Construction	*Ground surveys to confirm traditional use plant species presence and monitor protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2020*	*Species composition and abundance*
	Post-construction	*Ground surveys to confirm traditional use plant species presence and monitor protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*2 field seasons*	*Once*	*2021, 2022*	*Species composition and abundance*

Manitoba Hydro will:

- *Provide digital ortho-rectified imagery or georeferenced digital video/photo products;*
- *Supply an Environmental Protection Information Management System (EPIMS) that manages all project monitoring data and allows Specialist access to daily inspection and monitoring reports from construction period;*
- *Provide qualified Environmental Inspectors to conduct regular inspections of mitigation measure implementation;*
- *Summarize results of key monitoring activities in an annual monitoring report;*
- *Share results of key monitoring activities with interested local stakeholders, Indigenous communities and organizations and Manitoba Sustainable Development.*

Responsibilities of Environmental Monitor include:

- *During construction phase daily activities, record observations of traditional use plant species and mitigation performance at ESS sites within project footprint or access routes;*
- *Record observations with photo and waypoint and store in EPIMS; and*
- *Work with Specialist during field visits to assess mitigation effectiveness, and provide first hand overview of site conditions during construction phase.*

Specialist will:

- *Use the digital ortho-rectified imagery and/or georeferenced video/photo products provided by Manitoba Hydro for identification of sampling sites for plant communities important to Indigenous communities and organizations, and assessment of ROW effects;*
- *Conduct pre-clearing vegetation surveys to record baseline information within known plant communities important to Indigenous communities and organizations;*
- *Review Environmental Inspector and Monitor daily reports for identification of potential traditional use plant species sampling sites;*
- *Design and conduct specific survey methods that sample known locations of traditional use plant species for composition and to verify accuracy of EA predictions and effectiveness of mitigation measures implemented;*
- *Report immediately to Manitoba Hydro any unanticipated Project effects on traditional use plant species discovered through monitoring activities;*
- *Analyze, evaluate and report on monitoring findings including mitigation effectiveness on an annual basis; and*
- *Through an adaptive management framework, make recommendations for ongoing improvements to the mitigation measures, monitoring plan, methods, analysis and implementation in response to knowledge gained through ongoing monitoring and associated analysis.*

Indigenous communities and organizations will be invited to:

- *Provide historical and current data of traditional use plant species important to Indigenous communities and organizations to inform ongoing analyses related to biophysical monitoring*
- *Have a member participate in a monitoring field visit; and*
- *Provide guidance regarding mitigation strategies should unanticipated effects occur as a result of the Project.*

Decision Trigger(s)/Threshold(s) for Action:

- *Significant decrease in abundance of traditional use plant species (excluding trees) at locations identified by communities in the PFA.*
    - *Action: Report results to community that identified the traditional use areas and discuss any potential mitigation measures, such as revised vegetation management options.*

Approach to Adaptive Management:

- *Passive - Report results to communities that identified the traditional use areas and discuss any potential mitigation measures such as adjusting vegetation management schedules or prescriptions.*

3.6 FOREST HABITAT

3.6.1 Ungulates

White-tailed deer are the predominate ungulate in the Project area. Transmission line corridors create habitat edges for white-tailed deer that provide an ecotone with high quality forage resources and accessible hiding cover in adjacent forest (Reimers et al. 2000). Disturbed vegetation is favoured by white-tailed deer because of the high diversity of plants in those areas (Stewart et al. 2011). Riparian areas, edge habitats, and linear features function as important habitats for travel and forage. Therefore, white-tailed deer are not particularly susceptible to the effects of habitat fragmentation, but may be susceptible to increased mortality associated with moving through higher risk areas created as a result of disturbance (Stewart et al. 2011).

Moose are also common in the Project area. Moose are found predominantly in the western portions of the RAA, along the Assiniboine River valley and within the community pastures. Moose habitat typically consists of a mixture of early-succession forest, riparian forests, meadows interspersed with waterbodies and late-succession forest (Bowyer et al. 2003). This habitat is generally found within the aspen parkland and boreal forest regions of Manitoba and is strongly influenced by forest fires.

Elk are not very common in the Project area, but are a generalist species that use a wide range of habitats. Typically, deciduous forest is used for cover, while agriculture and haylands are used for foraging (Chranowski 2009). Elk typically avoid areas with human disturbances, such as roads, active forestry cut-blocks, and intense cattle operations (Chranowski 2009).

Mule deer prefer dry, open forest or shrublands associated with rough terrain (Mackie et al. 2003). Mule deer hunting is prohibited in Manitoba, and the species is listed as Threatened by *The Endangered Species and Ecosystems Act*. Small numbers of mule deer have been observed in the RAA. In 2013, as part of Manitoba Sustainable Development's chronic wasting disease monitoring, seven mule deer were observed during an aerial survey that covered 728 km^2 of GHA 22.

The EA identified a potential project effect of increased ungulate mortality risk from hunters in western portion of the Project, however the effect is expected to be minimal with no measurable effect on abundance anticipated. The ungulate population in the area is considered to be stable. Habitat loss and sensory disturbance effects from ROW clearing are considered minimal and short-term, ultimately resulting in a minimal effect due to browse forage and increased edge habitat during the operation phase.

White-tailed deer, elk and moose are highly valued by resource users and Indigenous communities and organizations. Non-resident white-tailed deer hunting provides an important livelihood for local outfitters. There is some public concern that the Project may increase wildlife vulnerability to mortality (hunting and predation) resulting from increased access. Change in habitat availability associated with ROW clearing and mortality resulting from increased access is anticipated to be negligible due to the existing high-level of available access in the region.

Baseline surveys conducted in 2016 and 2017 included a winter ungulate aerial survey of the region, and track counts in late summer. White-tailed deer and moose appeared abundant in the area. Elk and a mule deer were also identified

Monitoring will focus on validating EA predictions, verifying the implementation of mitigation measures, and assist in determining if project-related access has altered distribution and occurrence of ungulates and predators, resulting is altered mortality-risk from hunters and predators, relative to baseline state (pre- versus post-disturbance).

Objective(s):

- *Expanding the baseline knowledge of occurrence and distribution of ungulates within the Project area;*
- *Investigate the possible effect of the Project on ungulate occurrence and distribution.*

Applicable Project Component(s): *BTP Transmission Line (B71T)*

Monitoring Activities:

Table 4-7 Ungulates

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurements/Observations
Distribution / Occurrence Mapping Surveys	*Baseline Information*	*Desktop, winter aerial survey, summer track survey*	*Occurrence and / or seasonal distribution of ungulates relative to Project infrastructure*	*Survey block in GHA 22*	*1 field season*	*Annual (aerial component)*	*2016*	*Change in population occurrence and seasonal distribution in the LAA and/or RAA*
	Post-construction	*Winter aerial survey*	*Change in occurrence and / or seasonal distribution of ungulates relative to Project infrastructure*	*Survey block in GHA 22*	*1 field season*	*Annual*	*2021*	*Change in population occurrence and seasonal distribution in the LAA and/or RAA*
Vehicle Collision Statistic Gathering	*Construction*	*Gather statistics on project-related vehicle collisions*	*White-tailed deer/mule deer/elk/moose vehicle collisions*	*RAA*	*During construction*	*Continuous*	*Year-round*	*Number of project related ungulate vehicle collisions*

Manitoba Hydro is committed to:

- *Provide digital ortho-rectified imagery or georeferenced digital video/photo products;*
- *Supply an Environmental Protection Information Management System (EPIMS) that manages all project monitoring data and allows Specialist access to daily inspection and monitoring reports from construction period;*
- *Provide qualified Environmental Inspectors to conduct regular inspections of mitigation measure implementation;*
- *Summarize results of key monitoring activities in an annual monitoring report;*
- *Share results of key monitoring activities with interested local stakeholders, Indigenous communities and organizations; and*
- *Participate as a stakeholder in relevant committees or working groups whose purpose is for the ongoing conservation of wildlife.*

Responsibilities of Environmental Monitor include:

- *During construction phase daily activities, record observations of ungulates and tracks, and mortality sites within project footprint or access routes;*
- *Record observations with photo and waypoint and store in EPIMS; and*
- *Work with Specialist during field visits to assess mitigation effectiveness, and provide first hand overview of site conditions during construction phase.*

Specialist will:

- *Design and conduct specific survey methods to collect ungulate occurrence and distribution data during the disturbance and post-disturbance project phases;*

- *Collect and analyze ungulate and predator data to assess project-related effects at the local (LAA) or landscape (RAA) scale on occurrence or seasonal distribution;*
- *Report on monitoring efforts, including identification to Manitoba Hydro of any unanticipated effects on ungulates discovered through monitoring activities; and*
- *Through an adaptive management process, make recommendations for ongoing improvements to the monitoring plan, methods, analysis and implementation in response to knowledge gained through ongoing monitoring and associated analyses.*

Manitoba Sustainable Development may be requested to:

- *Provide guidance regarding mitigation strategies should unexpected impacts occur as a result of the transmission line. Provide information from any aerial surveys of the area that may be relevant to the Project.*

Decision Trigger(s)/Threshold(s) for Action

- *More than five ungulate project related vehicle collisions per year.*
  - *Action: Provide SD Conservation Officer with GPS location and circumstances as incidents are detected.*
- *Significant change in ungulate occurrence or, distribution relative to baseline data.*
  - *Action: Report to SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed. Consider altering, changing or removing human access points, adjusting vegetation management schedules or prescriptions, adjusting transmission line inspection and maintenance schedule.*

Approach to Adaptive Management:

- *Active - Monitor ungulate distribution/occurrence in the Project area. Discuss results with SD and consider altering, changing or removing human access points, adjusting vegetation management schedules or prescriptions, adjusting transmission line inspection and maintenance schedules and adjustments to ungulate monitoring activities.*

3.6.2 Plant Species of Conservation Concern

Equivalent to what was described in Section 4.3.2, with a focus on plant species of conservation concern in forest habitats.

Objectives:

- *Pre-construction surveys to identify species of conservation concern;*
- *Monitoring to document presence/absence of species post construction; and*
- *Verify the implementation and effectiveness of protection measures.*

Applicable Project Component(s): *Project Components in Spy Hill-Ellice Community Pasture*

Monitoring Activities:

Table 4-8 Plant Species of Conservation Concern - Forest

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurements/Observations
Rare Plant Surveys	*Baseline Information*	*Desktop, key person interviews, and field surveys*	*Species names and locations*	*Forest habitat sites in Spy Hill-Ellice Community Pasture PFA, LAA*	*1 field season*	*Once*	*2017*	*Species presence/absence*
	Pre-construction	*Ground surveys to record species of concern*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2019*	*Species presence/ absence*
	Construction	*Ground surveys to monitor species of concern and protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2020*	*Species presence/ absence*
	Post-construction	*Ground surveys to monitor species of concern and protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2021*	*Species presence/ absence*

Manitoba Hydro is committed to:

- *Provide digital ortho-rectified imagery or georeferenced digital video/photo products;*
- *Supply an Environmental Protection Information Management System (EPIMS) that manages all project monitoring data and allows Specialist access to daily inspection and monitoring reports from construction period;*
- *Provide qualified Environmental Inspectors to conduct regular inspections of mitigation measure implementation;*
- *Summarize results of key monitoring activities in an annual monitoring report; and*
- *Share results of key monitoring activities with interested local stakeholders, Indigenous communities and organizations, and Manitoba Sustainable Development.*

Responsibilities of Environmental Monitor include:

- *During construction phase daily activities, record observations of rare plants and mitigation performance at ESS sites within project footprint or access routes;*
- *Record observations with photo and waypoint and store in EPIMS; and*
- *Work with Specialist during field visits to assess mitigation effectiveness, and provide first hand overview of site conditions during construction phase.*

Specialist will:

- *Use the digital ortho-rectified imagery and/or georeferenced video/photo products provided by Manitoba Hydro for identification of potential rare plant habitat sampling sites and assessment of ROW effects;*
- *Conduct pre-clearing rare plant surveys for project areas not previously surveyed;*
- *Review Environmental Inspector and Monitor daily reports for identification of potential rare plant sampling sites;*
- *Design and conduct specific survey methods that sample known rare plant sites for presence/absence to verify accuracy of EA predictions and effectiveness of mitigation measures implemented;*
- *Adhere to Manitoba's Hydro's Agricultural Biosecurity procedures;*
- *Report immediately to Manitoba Hydro any unanticipated project effects on rare plants discovered through monitoring activities;*
- *Analyze, evaluate and report on monitoring findings including mitigation effectiveness on an annual basis; and*
- *Through an adaptive management framework, make recommendations for ongoing improvements to the mitigation measures, monitoring plan, methods, analysis and implementation in response to knowledge gained through ongoing monitoring and associated analysis.*

Manitoba Sustainable Development may be requested to:

- *Provide historical and current data of species of concern to inform ongoing analyses related to biophysical monitoring (e.g. population survey data, observations, reports); and*
- *Provide guidance regarding mitigation strategies should unanticipated effects occur as a result of the Project.*

Decision Trigger(s)/Threshold(s) for Action:

- *Species of conservation concern has been disturbed by construction activities.*
  - *Action: Report to SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed.*
  - *Action: Implement site specific rehabilitation measures as required.*
- *Discovery of new location of species of conservation concern.*
  - *Action: Report locations to Manitoba Conservation Data Center and SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed.*
  - *Action: Develop and maintain a 10 meter buffer around plant species protected under legislation, and contact Manitoba Sustainable Development for further guidance on necessary mitigation.*

Approach to Adaptive Management:

- *Passive - Implement environmental protection plan measures and apply experience from previous transmission development projects (i.e. implement buffers around identified plants or plant groupings) adjust buffer distance when advised by SD.*

3.6.3 Invasive Plant Species

Equivalent to what was described in Section 4.3.3, with a focus on invasive plant species in forest habitats.

Objectives

- *Pre-construction surveys to identify non-native and invasive species;*
- *Monitoring to document the composition and abundance of non-native and invasive plant species at selected sites; and*
- *Recommend appropriate control and eradication measures, if there is a spread of species.*

Applicable Project Component(s): *Project Components in Spy Hill-Ellice Community Pasture*

Monitoring Activities:

Table 4-9 Invasive Plant Species - Forest

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurable Parameter(s)
Non-native and Invasive Species Survey	*Baseline Information*	*Desktop and field surveys*	*Species names and locations*	*Sites surveyed in PFA, LAA*	*1 field season*	*Once*	*2017*	*Species composition and abundance*
	Pre-construction	*Ground surveys to record non-native and invasive species*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2019*	*Species composition and abundance*
	Construction	*Ground surveys to identify and measure occurrence of invasive species on ROW and monitor protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2020*	*Species composition and abundance*
	Post-construction	*Ground surveys to identify and measure occurrence of invasive species on ROW and monitor protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2021*	*Species composition and abundance*

Manitoba Hydro is committed to:

- *Provide digital ortho-rectified imagery or georeferenced digital video/photo products;*
- *Supply an Environmental Protection Information Management System (EPIMS) that manages all project monitoring data and allows Specialist access to daily inspection and monitoring reports from construction period;*
- *Provide qualified Environmental Inspectors to conduct regular inspections of mitigation measure implementation;*
- *Summarize results of key monitoring activities in an annual monitoring report; and*

- *Share results of key monitoring activities with interested local stakeholders, Indigenous communities and organizations, and Manitoba Sustainable Development.*

Responsibilities of Environmental Monitor include:

- *During construction phase daily activities, record observations of invasive plants within project footprint or access routes, and equipment cleaning stations;*
- *Record observations with photo and waypoint and store in EPIMS; and*
- *Work with Specialist during field visits to assess mitigation effectiveness, and provide first hand overview of site conditions during construction phase.*

Specialist will:

- *Use the digital ortho-rectified imagery and/or georeferenced video/photo products provided by Manitoba Hydro for identification of invasive and non-native species sampling sites and assessment of ROW effects;*
- *Conduct pre-clearing surveys to record invasive and non-native species information;*
- *Review Environmental Inspector and Monitor daily reports for identification of potential invasive and non-native species sampling sites;*
- *Design and conduct specific survey methods that sample invasive and non-native species sites for composition and abundance to verify accuracy of EA predictions and effectiveness of mitigation and control measures implemented;*
- *Adhere to Manitoba's Hydro's Agricultural Biosecurity procedures;*
- *Report immediately to Manitoba Hydro any unanticipated Project effects on invasive and non-native species discovered through monitoring activities;*
- *Prescribe vegetation management options for invasive species control where required;*
- *Analyze, evaluate and report on monitoring findings including mitigation effectiveness on an annual basis; and*
- *Through an adaptive management framework, make recommendations for ongoing improvements to the mitigation measures, monitoring plan, methods, analysis and implementation in response to knowledge gained through ongoing monitoring and associated analysis.*

Decision Trigger(s)/Threshold(s) for Action:

- *Establishment and spread of invasive species along ROW.*
  - *Action: Report to SD regional wildlife biologist/manager through annual meetings where reports are presented and results are discussed. Discuss the species, nature of spread and management options.*

Approach to Adaptive Management:

- *Passive - Implement current mitigation measures for existing patches of invasive species and discuss monitoring results with the Regulator and or the local weed supervisor regarding the species, nature of spread and management options.*

3.6.4 Traditional Use Plant Species

Equivalent to what was described in Section 4.3.4, with a focus on traditional use plant species in forest habitats.

Objective(s):

- *Document the composition of vegetation at known traditional use sites;*
- *Confirm actual Project effects on vegetation at known traditional use sites; and*
- *Verify the implementation and effectiveness of protection measures at known traditional use sites.*

Applicable Project Component(s): *Project Components in Spy Hill-Ellice Community Pasture*

Monitoring Activities:

Table 4-10 Traditional Use Plant Species - Forest

Key Monitoring Activity	Phase	Task Description	Parameter(s)	Site Location	Duration	Frequency	Timing	Measurable Parameter(s)
Traditional Use Plant Species Survey	*Baseline Information*	*Desktop, field surveys and reports from Indigenous communities*	*Species names and locations*	*Sites identified in PFA, LAA*	*1 field season*	*Once*	*2017*	*Species composition and abundance*
	Pre-construction	*Ground surveys to identify traditional use plant species*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2019*	*Species composition and abundance*
	Construction	*Ground surveys to confirm traditional use plant species presence and monitor protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*1 field season*	*Once*	*2020*	*Species composition and abundance*
	Post-construction	*Ground surveys to confirm traditional use plant species presence and monitor protection measures*	*Species occurrence*	*PFA in Spy Hill-Ellice Community Pasture*	*2 field season*	*Annual*	*2021, 2022*	*Species composition and abundance*

Manitoba Hydro will:

- *Provide digital ortho-rectified imagery or georeferenced digital video/photo products;*
- *Supply an Environmental Protection Information Management System (EPIMS) that manages all project monitoring data and allows Specialist access to daily inspection and monitoring reports from construction period;*
- *Provide qualified Environmental Inspectors to conduct regular inspections of mitigation measure implementation;*
- *Summarize results of key monitoring activities in an annual monitoring report;*
- *Share results of key monitoring activities with interested local stakeholders, Indigenous communities and organizations, and Manitoba Sustainable Development.*

Responsibilities of Environmental Monitor include:

- *During construction phase daily activities, record observations of tradition use plant species and mitigation performance at ESS sites within project footprint or access routes;*
- *Record observations with photo and waypoint and store in EPIMS; and*
- *Work with Specialist during field visits to assess mitigation effectiveness, and provide first hand overview of site conditions during construction phase.*

Specialist will:

- *Use the digital ortho-rectified imagery and/or georeferenced video/photo products provided by Manitoba Hydro for identification of sampling sites for plant communities important to Indigenous communities and organizations;*
- *Conduct pre-clearing vegetation surveys to record baseline information within known plant communities important to Indigenous communities and organizations;*
- *Review Environmental Inspector and Monitor daily reports for identification of potential traditional use plant species sampling sites;*
- *Design and conduct specific survey methods that sample known locations of traditional use plant species for composition and to verify accuracy of EA predictions and effectiveness of mitigation measures implemented;*
- *Report immediately to Manitoba Hydro any unanticipated project effects on traditional use plant species discovered through monitoring activities;*
- *Analyze, evaluate and report on monitoring findings including mitigation effectiveness on an annual basis; and*
- *Through an adaptive management framework, make recommendations for ongoing improvements to the mitigation measures, monitoring plan, methods, analysis and implementation in response to knowledge gained through ongoing monitoring and associated analysis.*

Indigenous communities and organizations will be invited to:

- *Provide historical and current data of traditional use plant species important to Indigenous communities and organizations to inform ongoing analyses related to biophysical monitoring; and*
- *Provide guidance regarding mitigation strategies should unanticipated effects occur as a result of the Project.*

Decision Trigger(s)/Threshold(s) for Action:

- *Significant decrease in abundance of traditional use plant species (excluding trees) at locations identified by communities in the PFA.*
    - *Action: Report results to community that identified the traditional use areas and discuss any potential mitigation measures, such as revised vegetation management options.*

Approach to Adaptive Management:

- *Passive - Report results to communities that identified the traditional use areas and discuss any potential mitigation measures such as adjusting vegetation management schedules or prescriptions.*

4.0 ADAPTIVE MANAGEMENT

Adaptive management is defined as “the implementation of new or modified processes, procedures and or mitigation measures over the construction and operation phases of a project to address unanticipated environmental effects” (CEAA, 2015). Adaptive management is considered a planned and systematic process used to continuously improve environmental management practices by learning about their outcomes. The use of an adaptive management process allows for the flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project (CEAA, 2015). Although definitions of adaptive management vary depending on the source, there are fundamental concepts of adaptive management that are universal and fundamental (British Columbia Ministry for Forests and Range, 2015) which include the following:

- Learning and reducing key uncertainties;
- Using what is learned to change policy and practice;
- Focus is on improving management; and
- Adaptive management is formal, structured and systematic.

Manitoba Hydro has accumulated information and lessons learned from previous monitoring programs. The successes of those programs have been reviewed and considered in the development of this plan. Previous weaknesses have been adapted and improved upon to further enhance this plan’s approach, methods and key environmental monitoring activities.

The Environmental Protection Program has been designed to be adaptive and responsive throughout the Project lifecycle. The management of any low to moderate levels of uncertainty can be achieved for the proposed project by the implementation of a passive adaptive management process that will help to facilitate actions if any unforeseen effects occur and will result in the identification of new or modified mitigation (British Columbia Environmental Assessment Office, 2013). Active adaptive management measures will be employed to manage areas of high (and some moderate) levels of uncertainty and involve further development of mitigation measures and environmental protection activities.

Program documents, processes, procedures and mitigation measures will be continuously evaluated by inspection, monitoring and communication programs. Audits and reviews will be conducted to facilitate updates to the program through an adaptive management process (Manitoba Hydro, 2013). Within the Environmental Protection Program, adaptive management will take place in two primary areas: at the management level, involving changes with the program structure itself; and at the implementation level, which will involve individual mitigation measures as management and implementation teams evaluate the on-site effectiveness of mitigation strategies or the program as a whole. Scheduled update meetings between

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departments, annual reviews of the program and its effectiveness will take place to foster the adaptive management process.

Annual reviews will be conducted by Licensing and Environmental Assessment in consultation with Transmission Line and Civil Construction, the contractor, regulators and stakeholders. The results of each annual season review will be summarized in a report that documents the issues addressed and provides recommended updates to applicable components of the Environmental Protection Program.

5.0 REPORTING

Reports will be generated annually and provided to Manitoba Sustainable Development. In addition to annual reports summarizing activities and general findings, technical reports will be prepared at appropriate intervals during the construction and post construction phases of the Project. These reports will on a cumulative basis compile and analyze monitoring results during the relevant period, and based on those results, make recommendations concerning the need for any changes to the mitigation or monitoring approach. Manitoba Hydro will present and discuss monitoring results with SD, interested parties, Indigenous communities and organizations as the Project proceeds, upon request.

Any significant unanticipated project effects discovered through monitoring activities or where regulations dictate will be reported immediately to SD.

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6.0 MONITORING METHODS

This section provides detailed information on the methods to be used to monitor the Valued Components and environmental indicators identified in Section 4.0.

6.1 AQUATIC HABITAT

6.1.1 Stream Crossing Assessments

Stream crossing sites will be evaluated for adherence to prescribed mitigation and effectiveness of mitigation. Field studies will be undertaken at all stream crossings assessed as fish bearing during active construction and in the first spring following construction. Riparian buffers will be evaluated by measuring their width from the stream or floodplain and comparing to the width prescribed, as well as evaluating the amount of vegetation left in the buffer and the clearing method used. Stability of stream banks and floodplain will be evaluated visually and rutting, slumping, or other damage to the ground noted. The presence of slash or disturbed sediment within the buffer will be recorded, as well as any evidence of erosion. Trail crossings will be evaluated for appropriate grade and angle across the stream, and the presence of any organic debris remaining from a temporary snow bridge. If any erosion control measures were in place (blankets, silt fences) their effectiveness will be evaluated. Tower locations will be assessed to determine if they adhered to prescribed mitigation. Any further erosion control measures and reclamation needed to meet the prescribed mitigation will be recommended.

6.2 GRASSLAND HABITAT

Monitoring wildlife and wildlife habitat will aim to track vital measures of populations (e.g., presence, distribution, abundance, and movement) that are associated with (i.e., linked) potential Project effects. In some cases, changes in habitat quality will be used to help determine the potential response. Determining the basis of causality in complex biological systems can be difficult. When analysing the results of hypothesis testing, considerations will be given for the most influential factors which drive wildlife populations (e.g., habitat, drought, floods, migratory shifts, predators, disease, winter severity) and other lesser factors (e.g., accidents) when practicable. As with most complex biological systems, some assumptions regarding the response will have to be made through but will be supported with peer-reviewed literature and professional opinion to provide the most accurate explanation possible in annual reporting.

6.2.1 Birds of Species of Conservation Concern

Species of conservation concern, which includes SAR and provincially rare species, have the

potential to be adversely affected by the construction of the transmission line. In particular, the Chestnut-collared Longspur and Sprague's Pipit are listed as "threatened" under Schedule 1 of the *Species at Risk Act* and in Manitoba's *The Endangered Species and Ecosystems Act*. Baseline data for these species and other SAR were gathered in the summer of 2017 using a three or ten minute point count method, generally following Ralph et al. (1995). Visual and auditory detections were recorded for each point count site. Location data for Chestnut-collared Longspur and Sprague's Pipit were mapped within the RAA during field surveys.

Potential adverse effects to Chestnut-collared Longspur and Sprague's Pipit during construction may include displacement of birds and/or decreased nesting success due to habitat disturbance, and long-term loss of habitat during operations. Bird species of conservation concern monitoring will test the hypothesis that the development of the transmission line adversely affects the abundance of Chestnut-collared Longspur and Sprague's Pipit. During construction and maintenance, continued livestock grazing may convert forested habitat into a modified shrubland/grassland.

Hypothesis 1:

- H_0 (null): The construction and operation of the transmission line does not affect the abundance of Chestnut-collared Longspur and Sprague's Pipit.
- H_1 (alternate): The construction and operation of the transmission line does affect the abundance of Chestnut-collared Longspur and Sprague's Pipit.

To test these hypotheses, a Before-After-Control-Impact (BACI) study design will be implemented to evaluate Project-related effects on Chestnut-collared Longspur and Sprague's Pipit. Permanent monitoring plots will be developed within the transmission line ROW and areas that are predicted to not be affected by the Project (control areas). Chestnut-collared Longspur and Sprague's Pipit monitoring sites will be established within the areas of the ROW that intersect grassland habitats shown to support these two bird species in pre-construction surveys.

Surveys for Chestnut-collared Longspur and Sprague's Pipit will occur at the peak of the breeding season depending on local climatic conditions. Qualified biologists will map the occurrences of Chestnut-collared Longspur and Sprague's Pipit. At each stop, the survey protocol will consist of ten minute point counts, generally following the protocols of Ralph et al. (1995). Each point count will be spaced a minimum of 250 meters apart. Other data collected during these surveys or during plant surveys will include measures of habitat quality (e.g., grass height, proximity to shrubs or trees).

The first and second year of the study will provide baseline data of Chestnut-collared Longspur and Sprague's Pipits in the proposed ROW and control areas. During construction and operation, a statistical comparison of Chestnut-collared Longspur and Sprague's Pipit

abundance between survey points can be conducted to determine the effects of the Project using Generalized Linear Models and/or non-parametric techniques.

As similar analysis will be conducted of the point count data results to test for changes in abundance of perching avian predators and avian brood parasites. Perching avian predators will include species such as magpies, crows, ravens, and other birds of prey. Avian brood parasites will include species such as brown-headed cowbirds.

Hypothesis 2:

- H_0 (null): The construction and operation of the transmission line does not affect the abundance of perching avian predators.
- H_1 (alternate): The construction and operation of the transmission line does affect the abundance of perching avian predators.

Hypothesis 3:

- H_0 (null): The construction and operation of the transmission line does not affect the abundance of avian brood parasites (i.e. brown-headed cowbirds).
- H_1 (alternate): The construction and operation of the transmission line does affect the abundance of avian brood parasites (i.e. brown-headed cowbirds).

6.2.2 Plant Species of Conservation Concern

Surveys for species of conservation concern, and the accuracy of EA predictions and effectiveness of mitigation measures implemented will be verified. Pre-construction surveys for species of conservation concern will be conducted in portions of the Project footprint that were not previously surveyed and have the greatest potential for supporting these plants along the transmission line ROW. Digital ortho-rectified imagery will be used for the identification of potential survey sites and assessment of ROW effects.

Rare plant surveys initially will involve the review of species observed previously along the transmission line ROW, as well as the database compiled by the Manitoba Conservation Data Centre for species of conservation concern, which includes species that are rare, disjunct, or at risk throughout their range or in Manitoba.

In the field, a combination of meander and transect searches will be used. Parallel transects are favoured in more open and homogenous landscapes, while meander searches are conducted in areas of difficult terrain, unique habitats, and where unusual landscape features occur. Rare plant locations will be recorded using a GPS receiver. Rare plant individuals will be counted,

phenology will be recorded and population extent will be estimated. Additional information collected will include associated plants observed. Photographs will be captured in the field.

Environmental monitoring for species of conservation concern will occur after clearing of the ROW. Monitoring for species of conservation concern will involve the review of species previously observed during pre-construction surveys. Monitoring will occur at selected sites along the ROW to investigate the presence/absence of the plants which were observed prior to clearing and construction. Plant species of conservation concern observed during invasive plant, and traditional plant surveys will also be recorded. Species of concern observed in the field will have the following information recorded: GPS coordinates verification, individuals counted, population extent estimated, phenology recorded, and associated plants recorded. Photographs will be captured in the field.

6.2.3 Invasive Plant Species

Sampling will occur for invasive plant species introduction, and the accuracy of EA predictions and effectiveness of mitigation measures implemented will be verified. Initially, digital ortho-rectified imagery will be used for identification of potential sampling sites and assessment of ROW effects. Pre-construction surveys will involve quantitative vegetation surveys at selected sites along the transmission line ROW.

Sites selected for vegetation surveys will have plots established for future vegetation monitoring. The vegetation survey will consist of establishing sample plots on sites which may provide pathways for these species (e.g. near trails). Vegetation will be sampled for composition, abundance and structure. Sampling of selected sites will follow methods outlined by Redburn and Strong (2008) and involve the establishment of five 2.5 m by 2.5 m quadrats with a 1 m by 1 m nested quadrat spaced at 5 m increments along a 30 m transect for shrubs 1 - 2.5 m tall and herbs and low shrubs ≤1 m tall, respectively. The first quadrat will be placed at the 5 m mark. The composition of tree cover >2.5 m tall will be estimated using a 20 m by 30 m plot centered on each transect. Transects will be permanently located along the transmission line ROW, longitudinally, and approximately in the centre of the ROW, but off the equipment path. Plant cover will be estimated to the nearest 1% for species <15% cover and nearest 5% for those with higher cover. Other incidentally observed species will be recorded. Ground cover estimates (%) will be recorded and include exposed soil, litter, rock, water and wood. Site condition measurements will include slope and aspect. GPS coordinates and photographs will be taken at each sampling site.

Environmental monitoring will occur after clearing, and along the ROW. Environmental monitoring will involve vegetation monitoring using the identical quantitative methods described above (vegetation survey). Vegetation will be sampled for herbaceous and shrub cover along the ROW. Incidental species observations will be recorded. All sites will be photographed.

Permanently located sampling areas will be used to record the change in vegetation species that can be systematically monitored through time. The collection of vegetation information will occur at a similar time during the growing season to maximize the comparability of data. After field sampling, the data will be digitized and mean values for vegetation cover will be calculated. For each plot, species measures will be determined (e.g., total species cover, richness, diversity). Statistical testing may be used to determine if differences occur between baseline sampling and post-clearing.

6.2.4 Traditional Use Plant Species

Vegetation will be sampled for traditional use plant species important to Indigenous communities and organizations based on information provided through the ongoing Indigenous engagement process. The accuracy of EA predictions and effectiveness of mitigation measures implemented will be verified. Digital ortho-rectified imagery will be used for identification of potential sampling sites for assessment of ROW effects. Pre-construction surveys will involve native vegetation surveys at selected sites along the transmission line ROW, at known traditional use sites.

Sites selected for surveys will have plots established for future vegetation monitoring. Vegetation will be sampled for composition, abundance and structure. Sampling of selected sites will involve the establishment of quadrats spaced at 5 m increments along a 30 m transect for shrubs and herbs. The composition of tree cover will be estimated using a plot centered on each transect. Transects will be permanently located along the transmission line ROW, longitudinally, and approximately in the centre of the ROW, but off the equipment path. Plant cover will be estimated to the nearest 1% for species <15% cover and nearest 5% for those with higher cover. Other incidentally observed species will be recorded. Ground cover estimates (%) will be recorded and include exposed soil, litter, rock, water and wood. Site condition measurements will include slope and aspect. GPS coordinates and photographs will be taken at each sampling site.

Environmental monitoring will occur after clearing, and along the ROW. Environmental monitoring will involve vegetation monitoring using the identical methods described above. Vegetation will be sampled for herbaceous and shrub cover along the ROW. Incidental species observations will be recorded. All sites will be photographed.

Permanently located sampling areas will be used to record the change in vegetation that can be systematically monitored through time. The collection of vegetation information will occur at a similar time during the growing season to maximize the comparability of data. The data will be digitized and mean plant values will be calculated, after sampling. Species measures will be determined and assessed for each plot.

6.3 FOREST HABITAT

6.3.1 Ungulates

Baseline data for ungulates were gathered using a combination of methods described in the EA: aerial winter and ground track surveys. Both of these survey programs, yielded data on white-tailed deer, elk and moose.

As described in the EA, clearing of the new ROW during construction may cause temporary avoidance by ungulates due to sensory disturbance. However, as vegetation re-establishes along the ROW during operation, ungulates may be attracted to the edge habitat that forms along parts of the ROW, particularly in areas previously forested. The use of the ROW by ungulates and the access it creates for hunters may elevate mortality risk during operation. As such, ungulate monitoring will test the following null and alternate hypotheses:

Hypothesis 1:

- H_0 (null): The construction of the transmission line does not affect the distribution of ungulates.
- H_1 (alternate): The construction of the transmission line does affect the distribution of ungulates.

To test these hypotheses, a Before-After-Control-Impact (BACI) study will be utilized using methods applied during baseline mammal surveys. Distribution mapping of ungulates will involve a winter aerial surveys of a monitoring block along the Project ROW to assess change in seasonal distribution relative to project infrastructure. Monitoring will focus on established ungulate monitoring block in the western portion of the RAA. The survey block will be consistent with those used in 2016 and before so that direct comparisons can be made between baseline state and project disturbance states (construction and initial operation phases) (pre- versus post-disturbance).

Mortality-risk will primarily be assessed by monitoring incidents of ungulate-vehicle collisions (construction phase) related to project access and activities. Change in hunter accessibility to suitable ungulate habitat will be assessed by comparing winter ungulate occurrence (pre- versus post-disturbance) relative to project-related access.

Aerial Winter Ungulate Population Survey

Aerial ungulate population surveys will be conducted in a survey block located in the western portion of the RAA.

Surveys are conducted along 500-m-wide, north-south transects spaced using a Bell 206 Jet Ranger helicopter and three observers: the front-left and rear-right observers act as primary observers on their respective sides while the data recorder in the rear-left acts as a secondary observer. Surveys are conducted at approximately 120 m above ground level at speeds between 90-110 km/hr during periods of good environmental conditions:

- wind <30 km/h;
- cloud ceiling >150 m;
- precipitation not exceeding a light, intermittent snowfall;
- absence of fog;
- during periods of adequate daylight (from one half hour after sunrise to one half hour before sunset); and
- with a snow base of ≥25 cm (SD 2017, unpublished).

A handheld GPS will be used to collect the location of individual ungulates detected and a track log will be recorded at one-second intervals to document the survey route. Upon observation of a individual, the data recorder will record the species, and number of individuals. Sex, age, other mammal species (e.g., coyote, wolf) and mammal track observations will be recorded incidentally. The georeferenced data will be summarized and mapped using ArcGIS®.

Logistic regression will be used to relate individual densities and distribution to the ROW and reference areas while accounting for variation in underlying habitat data.

6.3.2 Plant Species of Conservation Concern

Equivalent to what was described in Section 7.2.1, with a focus on forest habitats.

6.3.3 Invasive Plant Species

Equivalent to what was described in Section 7.2.2, with a focus on forest habitats.

6.3.4 Traditional Plant Species.

Equivalent to what was described in Section 7.2.3, with a focus on forest habitats.

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