6.0 Environmental assessment

6.1 Introduction

In addition to being a requirement in support of a licence under *The Environment Act*, the effects assessment for the Project addresses a number of important objectives, as follows:

- To assist in the planning and design of the Project by identifying and assessing potential environmental effects, identifying specific measures to mitigate adverse effects, and maximizing positive effects to the degree practicable;
- To address concerns and issues identified by Indigenous peoples, local residents, and other stakeholders with respect to the Project; and
- To provide sufficient information about the existing environment, so that any necessary follow-up activities can be planned.

The effects assessment included consideration of the following:

- Existing biophysical and socio-economic environments in the Project area;
- Project scope and the potential interactions between the Project and the environment;
- Scientific study and analysis, local knowledge, and Indigenous/stakeholder perspectives, issues and concerns;
- Past and potential anthropogenic activities that may have affected the environment and how the results of these activities may interact with the Project;
- Avoidance or mitigation of adverse effects and enhancing positive effects to the extent practicable; and
- Implementation of follow-up activities, where necessary.

The environmental effects assessment included identifying the appropriate environmental and socioeconomic components and then identifying and assessing the interactions between the various Project components and the various environmental and socioeconomic components. The components were used to provide a focus to the assessment, and to characterize the nature and extent of the potential environmental effects, as well as identifying technically and economically feasible measures to mitigate any adverse effects and any measures to enhance positive effects.

6.2 Scope of the assessment

6.2.1 General

The scope of the assessment defines what is being assessed, as well as where and when the Project components and activities will be interacting with the biophysical and socioeconomic environment. In order to examine the effects in a way that can be more readily understood, both the Project and the environment were divided into components so that the various interactions could be examined in a systematic way. This process began early in the planning phases, so that an awareness of potential effects could be used to influence the design to mitigate adverse effects and enhance any positive effects where possible.

The scope of the assessment was designed to meet the requirements of the December 2015 EAPF Report Guidelines: (http://www.gov.mb.ca/conservation/eal/publs/info_eap.pdf).

The assessment of the Project involved the following steps:

1) Define spatial and temporal assessment boundaries;
2) Organize the Project and environment into assessable components within the assessment boundaries;
3) Prioritize any biophysical and socioeconomic environment subcomponents based on scientific, regulatory, or stakeholder values and/or concerns;
4) Examine the potential interactions among the Project components and environmental components;
5) Where interactions are likely to occur, examine them in a systematic way to characterize the effects;
6) Develop measures to address any adverse effects, where required; and
7) Summarize the examination to demonstrate the overall conclusion and characterize any residual effects.

This section describes the various steps in the assessment process. The environmental protection program is discussed in Section 9.0.

6.2.2 Assessment boundaries

6.2.2.1 Spatial boundaries

Spatial boundaries for the assessment were established to support the evaluation of alternative routes as well as the assessment of Project environmental effects. Boundaries were selected taking into account the geographic range of the anticipated environmental effects of the Project and ecological, technical, and social considerations and included the following:

- **Project Footprint** - includes all areas subject to direct disturbance as a result of the Project, and consisting of the area of physical disturbance associated with the Project facilities – typically the ROW.
- **Local Study Area** – defined as the estimated maximum area within which Project-related environmental effects can be predicted or measured with a reasonable degree of accuracy and confidence. It includes the Project Footprint and any adjacent areas where Project-related environmental effects may reasonably be expected to occur (e.g., noise, dust) and may vary depending on the environmental or socioeconomic component being assessed. Due to the agricultural setting, the default Local Study Area was one mile either side from the proposed centre line of the route.
- **Regional Study Area** – defined initially as the larger data planning area in which alternative routing options were considered, but adjusted where necessary, depending on the environmental component, to provide a broader perspective and context with which to assess effects (e.g., effects to the sustainability of a population of a particular wildlife species). It was developed based on various constraints on the landscape. The eastern boundary was constrained by the Southport Airfield. The southern boundary was constrained by the existing 230 kV P81C transmission line. The western boundary was constrained by Bipole III (to avoid crossing over twice). The northern boundary was constrained by the TransCanada Highway.

It should be noted that consideration was also given to administrative boundaries, as these may influence the assessment for political, socio-cultural, and economic reasons. Examples of administrative boundaries include rural municipalities, wildlife management areas, and land and resource management plan boundaries.

6.2.2.2 Temporal boundaries

The primary temporal boundaries for the assessment are based on the timing and duration of the various Project activities; more detailed temporal boundaries could be established for specific environmental and/or socioeconomic components being assessed, and this will be discussed in the next section. The two primary temporal boundaries are:

- **Construction** – for this Project anticipated to be less than one year; and
- **Operations and maintenance** – extending into the foreseeable future.

It should be noted that decommissioning was not part of the temporal boundaries for this assessment. The Project has been designed to remain in service for several decades and could be operated indefinitely with regular maintenance. It is therefore not possible to predict what specific activities will be undertaken, but if and/or when decommissioning

of all or a portion of the Project is required, it will be completed in accordance with the federal, provincial and municipal regulations in force at the time.

6.2.3 Project-environment interactions

Table 6-1 displays the interactions among the Project components and the biophysical and socioeconomic components. As indicated, this is the first step in focusing the assessment on the important issues.

Table 6-1 Project-environment interactions

	Noise	Air quality and climate	Terrain and soils	Groundwater	Aquatic environment	Vegetation	Wildlife	Population, employment and economy	Public safety /emergency services	designated lands and protected areas	Recreation and tourism	Regional infrastructure	Land tenure and property ownership	Agriculture	Other commercial resource use	Traditional land use	Heritage resources
Construction Activities																	
Mobilization and Access	X	X	X	X	X	X	X	X	X		X	X	X	X		X	
Marshalling yard	X	X	X	X		X	X		X			X	X	X			X
Right-of-way clearing	X	X	X	X	X	X	X		X			X	X	X		X	X
Geotechnical Investigations	X	X	X	X		X	X		X			X	X	X		X	X
Tower assembly and conductor stringing	X	X	X	X	X	X	X		X			X	X	X		X	X
Demobilization	X	X	X	X	X	X	X		X			X		X		X	

	Noise	Air quality and climate	Terrain and soils	Groundwater	Aquatic environment	Vegetation	Wildlife	Population, employment and economy	Public safety /emergency services	designated lands and protected areas	Recreation and tourism	Regional infrastructure	Land tenure and property ownership	Agriculture	Other commercial resource use	Traditional land use	Heritage resources
and clean up																	
Operation and Maintenance Activities																	
Inspection Patrols and workforce	X	X	X	X	X	X	X		X		X	X	X	X		X	
Vegetation Management	X	X	X	X	X	X	X		X		X		X	X		X	

For this Project the components focus on the various activities surrounding installing and maintaining the transmission structures and wires. As described in Section 2.6, construction activities include the following:

- Mobilizing the workforce and equipment (including accommodations in the local community) and developing any necessary access to the work site;
- Establishing and using the marshalling yard;
- Clearing the right-of-way and geotechnical investigations;
- Establishing foundations for the towers;
- Erecting each structure and stringing the wire; and
- Demobilizing after construction and site cleanup.

As described in Section 2.7, operation and maintenance construction activities include the following:

- Visiting the right-of-way for inspections and maintenance; and
- Managing the vegetation in the right-of-way during the life of the Project.

As described in Section 5.1, biophysical environmental components include the following:

- Atmospheric environment, including noise, air quality and climate change;
- Topography and soils;
- Groundwater;
- Surface water;
- Aquatic biota;
- Natural vegetation, including upland vegetation and wetlands;
- Wildlife and habitat, including mammals, birds, amphibians and reptiles; and
- Rare and endangered species.

There were Project interactions with all of these components.

As described in Section 5.2, socioeconomic components include the following:

- Population, employment and economy;
- Public safety and emergency services;
- Designated lands and protected areas;
- Recreation and tourism;
- Regional infrastructure;
- Land tenure and property ownership;
- Agriculture;
- Other commercial resource use;
- Traditional land use; and
- Heritage resources.

Based on the screening matrix there were no other commercial use activities that would interact with the Project; therefore, these components are not brought forward into the assessment. It is also noteworthy that there were no designated lands and protected areas in the RSA.

The list of environmental and socioeconomic components was based on the December 2015 EAPF Report Guidelines: (http://www.gov.mb.ca/conservation/eal/publs/info_eap.pdf). However, the list and the interactions was also shaped through experience gained in previous environmental assessments on transmission lines, consideration of input from the public, stakeholders, and Indigenous groups, and the professional judgment of the assessment team.

6.2.4 Characterizing interactions

Table 6-2 describes the factors used to characterize the interactions among the Project and various environmental components.

Table 6-2 Factors and criteria used to characterize interactions

Factor	Definition	Criteria	Evaluation
Direction	Describes the difference or the trend of the effect on the environment	Positive	Beneficial or desirable change
		Neutral	No expected change
		Adverse	Adverse or undesirable change
Magnitude	The predicted degree or intensity of disturbance of an effect	Small	No definable or measureable effect; or below established thresholds of acceptable change; or within the range of natural variability; or minimum impairment of an ecosystem component's function
		Moderate	Effects that could be measured and could be determined with a well designed monitoring program; or are generally below established thresholds of acceptable change; or are marginally beyond the range of natural variability or marginally beyond minimal impairment of ecosystem component's function
		Large	Effects that are easily observable and described, and well beyond guidelines or established thresholds of acceptable change; are well beyond minimal impairment of an ecosystem component's functions.
Geographic Extent	The spatial boundary within which the residual environmental effect is expected to occur.	Project Footprint	Effects confined to the Project Footprint including the ROW.
		Local	Direct and indirect effects that extend beyond the Project Footprint but remain within the Local Study Area defined for the component for some biophysical disciplines or 1.5 km on either side of the Project Footprint for other disciplines

Factor	Definition	Criteria	Evaluation
		Regional	Direct and indirect effects that extend into the RSA. This may include cumulative effects from other projects.
Duration	The length of time that the predicted residual effect is expected to last.	Short-term	Effects that generally are limited to the construction phase of the project (i.e., less than one year) or recovery cycle of a biological component.
		Medium-term	Effects that extend throughout the construction and into the operation phases of the project or that occur within one or two generations of recovery cycles
		Long-term	High level effects that extend greater than 50 years or are permanent, or that extend for two or more generations or recovery cycles.
Frequency	How often the effect will occur.	Infrequent	Effect may occur once during the life of the project.
		Sporadic/ Intermittent	Effect may occur without predictable pattern during the life of the project.
		Regular/ Continuous	Effect may occur periodically or continuously during the life of the project.
Reversibility	Likelihood and time required for the Project to no longer influence a component. For socio-economic components, the manageability of effects is considered rather than reversibility.	Reversible	Effect is reversible during the life of the project.
		Permanent	Effect is a long-term permanent effect.
Residual Effect	Overall qualitative conclusion, after mitigation measures are applied.	Negligible	Not measurable.
		Minor	Measurable effects but at a level not requiring active management
		Moderate	Effects requiring active management and monitoring.
		Major	Unacceptably high effects.

It is important to note that the net residual effects are based on the implementation of the environmental protection program described in Section 9, and in particular, the specific mitigation measures described in the construction environmental protection plan (CEnvPP - Appendix E) and cultural and heritage resources protection plan (CHRPP - Appendix F).

Specific mitigation measures for each biophysical and socioeconomic component are described in the following two sections.

6.3 Biophysical assessment

6.3.1 Atmospheric environment

6.3.1.1 Noise

Summary of interactions

During construction the Project will generate noise during activities associated with the mobilization to the site, clearing the right-of-way, use of the marshalling yard, establishing tower foundations and erecting/stringing conductors and demobilization. Sources of noise during construction would be typical of heavy equipment such as backhoes and haulage trucks. Construction activities are anticipated to generate intermittent noise over the construction period (approximately 6 months of construction during fall/winter).

Noise is discussed further under wildlife effects (Section 6.3.6), and land tenure and property ownership (Section 6.4.5). During construction, wildlife and homeowners in proximity to the preferred route could experience noise effects. Construction will involve the use of heavy machinery such as drilling rigs, cranes and concrete trucks. It may involve a helicopter for several days, but there is a low risk of this occurring. Furthermore, the use of implosives for splicing conductors is an example of an activity that is also source of noise. The higher sound levels generated during construction will be transient as equipment is moved along the ROW; therefore, nearby residents and wildlife will not be affected for prolonged periods. Noise levels during the night will also remain unchanged from the existing conditions, as construction activities related to the assembly and installation of towers will only occur during the day. Noise generated during construction activities will be temporary and intermittent, and will typically fall within acceptable provincial noise level guidelines or similar to activities already taking place in the area (i.e., agricultural activities).

During operations and maintenance activities noise will be generated during the ROW inspections and managing the vegetation in the right-of-way during the life of the Project. Noise effects during operation and maintenance activities are expected to be minimal, as inspection and maintenance patrols of the ROW, structures and hardware are typically undertaken only two or three times per year. Non-scheduled patrols or maintenance may also be conducted by ground or air should unexpected repairs to the lines be required. Potential effects are not expected to be a concern as the effects will be short-term in duration, intermittent in nature (consistent with fluctuations in construction effort and clearing program intensity), and localized.

Mitigation measures

Specific measures used to mitigate effects of noise during Project construction and operation/maintenance includes the following:

- The contractor will be responsible for following the applicable laws and regulations in relation to workplace safety and health;
- All equipment used on the Project will be effectively “sound-reduced” by means of manufacturer installed equipment such as silencers, mufflers, acoustic linings, or acoustic shields;
- Vehicle and equipment will be properly maintained;
- Hearing protection will be provided to workers as required;
- Noisy construction activities where noise and vibration may cause disturbance and stress in proximity to built-up areas will be limited to daylight hours; and
- Advanced notification will be provided to nearby residences and businesses before the use of implosives.

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project in terms of noise are summarized as follows:

- Direction: Adverse
- Magnitude: Moderate
- Geographic extent: Local
- Duration: Short Term
- Frequency: Sporadic
- Reversibility: Reversible

In conclusion, the residual effects are assessed as being Negligible.

6.3.1.2 Air quality and climate change

Summary of interactions

The environmental effects of the Project on the atmospheric environment will be greatest during the construction phase and will consist of short-term, local increases in vehicle and equipment emissions, dust, particulates and smoke generated from any burning of cleared material, if this disposal approach is used. Dust and particulate matter have the potential to adversely affect air quality, primarily through use of gravel roads by vehicles during both construction and operation and maintenance, but also potentially during any stockpiling of materials, or construction activities in areas of exposed soil during dry conditions. Higher vehicle emissions can affect local air quality. In addition, air quality can be affected by emissions from engine exhaust and any burning of woody debris during the construction and maintenance activities such as materials and equipment hauling and vegetation management. It is noteworthy that very little woody material is expected as the ROW passes mainly through agricultural fields.

Potential air quality effects relate to vegetation, wildlife and human health. As indicated, due to the routing process the activities should not be close to residences and there are few areas of natural habitat. As the air quality in rural Manitoba is very good and the Project activities are

mostly away from urban areas, there are limited effects on air quality or visibility for workers or any surrounding public, including rural residential inhabitants as well as residents of the towns and villages in the area.

The effects of operation and maintenance activities on the atmospheric environment will be minimal, as inspection and maintenance patrols of the right-of-way, structures and hardware are typically undertaken only two or three times per year. Non-scheduled patrols or maintenance may also be conducted by ground or air should unexpected repairs to the lines be required. Potential effects are not expected to be a concern as the effects will be short-term in duration, intermittent in nature (consistent with fluctuations in construction effort and clearing program intensity), and localized.

Sources of greenhouse gas (GHG) emissions associated with the proposed Project include vehicle exhausts and exhausts from diesel construction equipment (i.e., general vehicle movement on-site, using equipment for clearing, tower erection, etc.). In addition, the removal of vegetation biomass within the ROW will reduce regional carbon stocks and buffering capacity, although it should be noted that very little clearing will be required.

Mitigation measures

Specific measures used to mitigate effects to air quality during Project construction and operation/ maintenance include the following:

- Vehicle and equipment will be properly maintained to emission standards;
- If required, burning will only be carried out under suitable weather conditions, will be confined to the cleared right-of-way, and not occur near any residences;
- If required, burning will be supervised at all times and will be suspended if there is an occurrence of off-site drift of smoke that could cause nuisance or visibility issues for transportation or surrounding activities; and
- Only water or approved dust suppressants will be used for dust control - the use of waste petroleum or petroleum by-products will not be permitted.

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project in terms of air quality and climate are summarized as follows:

- Direction: Adverse
- Magnitude: Minor for dust; Negligible for emissions and climate
- Geographic extent: Local for dust; Regional for emissions and climate change
- Duration: Medium term for dust; Long Term for climate change
- Frequency: Sporadic for dust; Continuous for climate change
- Reversibility: Reversible for dust; Permanent for climate change

In conclusion, the residual effects on air quality are assessed as being Minor when the proximity of the nearby sensitive receptors is considered, and the residual effects of GHG emissions from the proposed Project are assessed to be Negligible.

6.3.2 Terrain and soils

Summary of interactions

Potential effects to terrain and soils can occur during construction as the workforce and equipment mobilize to the site, during the establishment and use of the marshalling yard, clearing the right-of-way, installing the towers and demobilizing from the Project site. Potential effects during operations and maintenance can occur during regular inspections and in managing the vegetation in the right-of-way.

Effects relate to soil compaction and mixing, erosion, and contamination. There is greater potential for effects when vehicles and equipment mobilize to the Project site to conduct clearing, and tower installations. Activities during operations and maintenance are much less frequent but also involve vegetation management measures.

Soil compaction in locations of vehicle traffic, material handling and storage, and construction can result in increased run-off, decreased vegetative growth and reduced crop yields. Soil erosion can occur in situations where soil is exposed to water or wind for extended periods of time or where steep and unstable slopes have been created or traversed. This can lead to sedimentation of waterbodies and a reduction in soil productivity and vegetative growth.

Soil contamination is a potential effect during both construction and operation/maintenance activities due to spills from construction and maintenance vehicles/equipment (e.g., fuel, oil, or hydraulic fluid). Soil contamination can also result from the persistence of herbicide residues, subsequent to the application of vegetation management strategies. The primary effect of both forms of contamination is a reduction in soil productivity.

Mitigation measures

Specific measures used to mitigate effects to terrain and soils during Project construction and operation/maintenance include the following:

- Construction equipment and vehicle movements will be limited to within the ROW and the marshalling yard within agricultural lands;
- Construction activities will target frozen or dry ground conditions and activities during periods of extensive precipitation/runoff will be limited;
- If construction is required during wet ground conditions, additional mitigation measures such as construction matting will be utilized;
- If required, dust suppression activities such as the use of an approved dust control agent and/or water will be undertaken.
- Site restoration will occur as soon as practical, where required, and involve re-vegetation or tillage of affected agricultural land, if/where necessary.
- Soil contamination will be addressed by contractually ensuring that vehicles and equipment are well maintained, and any spills remediated as per Manitoba Hydro Spill Response Plan or equivalent and during the operation and maintenance phase,

adherence to Manitoba Hydro's current herbicide application policies, will result in minimal soil contamination.

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project in terms of on terrain and soil are summarized as follows:

- Direction: Adverse
- Magnitude: Negligible
- Geographic extent: Project Footprint
- Duration: Moderate Term
- Frequency: Infrequent
- Reversibility Reversible

In conclusion, the residual effects from proposed Project are assessed as being Negligible.

6.3.3 Groundwater

Summary of interactions

Potential effects to groundwater can occur during construction as the workforce and equipment mobilize to the site, during the establishment and use of the marshalling yard, and installing the towers and demobilizing from the Project site. Potential effects during operations and maintenance can occur during regular inspections and in managing the vegetation in the ROW.

Groundwater contamination could result from deleterious substance spills or leaks from vehicles or equipment (e.g., fuel, oil, or hydraulic fluid), and from herbicides used for vegetation control during operation. In areas with artesian wells or springs, geotechnical drilling and foundation installation can result in a direct groundwater discharge to the surface and can create the potential for surface and ground water interconnection.

Mitigation measures

In addition to relevant measures described for soil/terrain effects, specific measures used to mitigate effects to groundwater during Project construction and operation/ maintenance include the following:

- Using qualified drillers with appropriate experience to work in areas underlain by artesian aquifers;
- Monitoring water levels during drilling and foundation installation;
- Undertaking follow up inspections of installed foundations to monitor for excess moisture;
- Following all applicable permits and provincial regulations when using herbicides to control vegetation growth; and
- Adherence to *The Groundwater and Water Well and Related Amendments Act (2012)*, which requires "cessation of construction if contamination is found or suspected, sealing

to stop where contamination is found, sealing of flowing artesian, saline, contaminated, and suspected contaminated wells and test holes, and control of flow from a flowing artesian well or test hole during and upon completion of construction."

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project in terms of groundwater are summarized as follows:

- Direction: Adverse
- Magnitude: Negligible
- Geographic extent: Project Footprint
- Duration: Moderate Term
- Frequency: Infrequent
- Reversibility Reversible

In conclusion, the residual effects from proposed Project are assessed as being Negligible.

6.3.4 Aquatic environment

Summary of interactions

As indicated in Section 5.1.4, the only watercourse in the vicinity of the Project is an intermittent creek in the southwest corner of the RSA, which flows through a cultivated field. However, as there is the potential for overland flow from the Assiniboine River under certain spring flooding conditions, there is the potential for primary producers, invertebrates, and fish to be present, at least temporarily, during the spring and early summer months. Given this, there a low potential for effects to the aquatic environment during construction, primarily as the workforce and equipment mobilize to and demobilizing from the Project site in the fall and winter, and it is expected that the establishment and use of the marshalling yard will not be near this area, with no ROW clearing and little work in the immediate vicinity relating to installing the towers from the Project site. Potential effects during operations and maintenance can occur during regular inspections and in managing the vegetation in the right-of-way.

Soil erosion near or along the watercourse, especially during periods of precipitation, could lead to sedimentation, and surface water contamination could arise from several sources including deleterious substance spills, herbicides used for vegetation control during operation, and accidental release of concrete or concrete wash water during foundation installation.

Machinery operating near watercourses can create ruts and compact soils, especially in saturated, floodplain areas next to watercourses. Compacted soils can channelize water flow effectively, leading to less infiltration and greater surface erosion. Inputs of eroded soil can increase water turbidity, reduce light availability (and aquatic photosynthesis), contribute nutrients, alter benthic invertebrate habitat, and cover fish spawning areas and affect feeding success of fish that rely on clear water to capture prey.

Petroleum products such as gasoline and diesel fuels, oil, lubricants and hydraulic fluids can leak from machinery, be released through maintenance and refuelling activities, and be released through accidental spills. If these situations occur close to the watercourse, these deleterious substances can enter the watercourse and directly or indirectly affect aquatic organisms (including fish).

As there are no trees surrounding the watercourse it is unlikely that herbicide treatment will be required during the operation and maintenance of the transmission line, and so there should be no risks of accidental (through spills) or unintentional (through aerial drift or runoff) entry into watercourses.

Mitigation measures

Application of proven and effective mitigation measures will be implemented as part of the Project to avoid or minimize the environmental effects on aquatic resources. Project-specific mitigation measures with respect to aquatic resources will be outlined in detail in the environmental protection plan (Appendix E), including, but not limited to, implementation of:

- An effective sediment and erosion control plan identifying practices such as silt fences, filter berms, and erosion control blankets as appropriate;
- Proper storage and use of hazardous materials in proximity to watercourses;
- The removal of any construction debris or other materials that may potentially affect fish and fish habitat;
- Rehabilitation of construction areas will incorporate erosion protection and sediment control measures in accordance with the Erosion and Sediment Control Plan (see Section 9) as required;
- Appropriate precautions so that potentially deleterious substances (such as fuel, hydraulic fluids, oil, sediment, etc.) will not enter watercourses if in-stream work is required;
- Fuel storage and equipment servicing areas located a minimum of 100 m away from the ordinary high water mark of any watercourse (any fuel storage areas will be required to be *Regulation* [M.R. 188/2001]);
- Machinery operation from outside the water in a manner that minimizes disturbance to the watercourse shorelines and riparian vegetation;
- Machinery arrival on-site in a clean condition and maintained free of fluid leaks;
- Machinery servicing, refueling and fuel storage away from watercourses to prevent deleterious substances from entering watercourses (any fuel spills that occur will be reported to Manitoba Conservation and Water Stewardship in accordance with the *Environmental Accident Reporting Regulation* [M.R. 439/87]);
- An emergency spill kit on-site in case of fluid leaks or spills from machinery;
- Appropriate construction timing windows should there be a need for in water or shoreline work (i.e., no in water or shoreline works will occur between April 1 and June 15 of any given year); and
- Minimized disturbance to the bed and banks of the watercourse to the extent possible.

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project in terms of the aquatic environment are summarized as follows:

- Direction: Adverse
- Magnitude: Negligible
- Geographic extent: Local
- Duration: Moderate Term
- Frequency: Infrequent
- Reversibility Reversible

In conclusion, the residual effects from proposed Project on the aquatic environment are assessed as being Negligible.

6.3.5 Natural vegetation

Summary of interactions

Most of the Project Footprint is located in private cultivated agricultural lands; therefore, potential effects to natural vegetation are limited. However, effects to natural vegetation will occur during the clearing activities as part of construction, and during vegetation management activities once the Project is in place. In addition, vegetation effects can occur from soil compaction or dust during operation of vehicles or equipment, as described previously.

Clearing within the ROW will remove all treed vegetation, contributing to potential direct mortality and habitat loss in the RSA. Forested lands will be converted to shrubland or grasslands. Landcover classification for other portions of the Project footprint (e.g. shrubland, grassland, pasture) will not be changed as a result of the Project.

Clearing can also create soil disturbance, which can lead to colonization by invasive/non-native weedy species that can outcompete native plant species and cause changes in vegetation distribution. Vehicle traffic near stream/river crossings may also cause loss of wetland vegetation. Tower installation and stringing conductors also have the potential to change vegetation distribution and for the spread of non-native/invasive plant species. During construction the establishment and use of materials and equipment have the potential to spread non-native/invasive plants, create changes to vegetation distribution and loss of wetland vegetation. In addition, soil compaction that results from the presence of the equipment may affect natural vegetation through direct mortality of native plants, which may allow for the colonization of non-native/invasive species. Increased vehicle traffic, the associated soil compaction and the potential soil contamination from spills/debris may cause direct mortality of natural vegetation, allowing for the colonization of non-native/invasive plant species and changes in vegetation distribution.

Project activities associated with operation and maintenance including Project presence, maintenance of infrastructure and vegetation management will potentially interact with natural

vegetation. The presence of the Project has the potential for the spread of non-native/invasive plants. Vegetation management, which may include mowing, cutting and/or use of herbicides, may cause changes in vegetation distribution. Vegetation maintenance along the right-of-way may act as a barrier for the spread of native prairie plants from one side of the right-of-way to the other. Frequent mowing and cutting may affect slower growing native vegetation species, and allow for the establishment of fast-growing non-native/invasive plant species. Use of herbicides may also allow for fast-growing invasive plants to outcompete native plants. Herbicides may get into adjacent ditches and wetlands, which could cause direct mortality and loss of wetland vegetation.

Mitigation measures

Efforts to minimize adverse effects to vegetation occurred during the route selection process, which considered and avoided (to the extent feasible) sensitive areas, including wetlands (Table 5-2). In general, implementation of effective mitigation measures including general environmental protection measures (Chapter 9), beneficial management practices, standard operating procedures, environmental protection plans and environmental restoration plans are expected to manage residual effects to acceptable standards. Specific measures identified to mitigate potential adverse effects on natural vegetation include:

- Limiting the extent of clearing in important habitats, such as areas near wetlands, when feasible;
- If identified, flagging off environmentally sensitive areas prior to site clearing and construction;
- Limiting Project-related activity outside of the Project Footprint;
- Using designated roadways and access roads;
- Retaining a 30 m vegetated buffer or larger around wetlands and ephemeral streams;
- Limiting clearing to designated areas within the right-of-way and other designated areas;
- Restricting equipment and vehicle use outside the designated cleared areas;
- Limiting soil disturbance by retaining vegetation adjacent to and between worksite locations;
- Restoring ground cover vegetation using natural means with planting and seeding, as required;
- Maintaining treed buffers;
- Mitigation to prevent the introduction of invasive species will include the implementation of Manitoba Hydro's Transmission Biosecurity Standard Operating Procedures (see Appendix F of the CEnvPP, located in Appendix E) ; and
- Undertaking construction activities including burning during winter months to the extent possible.

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project in terms of the natural vegetation are summarized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Project Footprint
- Duration: Medium Term
- Frequency: Infrequent
- Reversibility: Permanent

In conclusion, the residual effects to natural vegetation are assessed as being Minor.

6.3.6 Wildlife and wildlife habitat

Summary of interactions

The Project is proposed within a disturbed environment where land has been modified for agriculture and much of the original natural vegetation and wildlife habitat has been converted to other land uses. Construction and operation activities will result in the conversion of some habitat (forest to shrubland or grassland) that is already limited in availability in the Project assessment areas. Project effects to can be characterized into several types: changes in wildlife habitat, physical/sensory disturbances and wildlife mortality. These types of effects apply to both construction and operation phases of the Project.

Section 6.3.5 discusses effects to and mitigation for vegetation, which provides habitat for wildlife species. As described in Table 6-1, wildlife including reptiles, birds, mammals, may experience change in habitat availability through clearing the ROW, establishing foundations for the towers, and the presence of Project equipment present in the Project area. Mortality may increase by increased vehicular traffic and Project equipment in the Project area, bird wire collisions, and through managing the vegetation in the ROW during the life of the Project.

Mitigation measures

It should be noted that efforts to minimize adverse effects on wildlife habitat occurred during the route selection process, which considered and avoided (to the extent feasible) sensitive areas. Mitigation measures used to mitigate effects on wildlife and wildlife habitat during Project construction and operation include the following:

- Conducting clearing activity outside the Sensitive Timing window for Wildlife (see Section 2.1 of the CEnvPP in Appendix E);
- In the unlikely event that clearing is required during the sensitive breeding period, carrying out pre-construction nest searches in areas having potential to support birds and if nests are found, appropriate buffers recommended by federal or provincial setback guidelines will be applied;
- Establishing set-backs and buffers around migratory bird nests or mammal dens;
- Retaining a 30 m vegetated buffer around the ephemeral stream;
- Keeping litter and garbage contained;
- Limiting the extent of clearing in important habitats, when feasible;

- Flagging off environmentally sensitive areas prior to site clearing and construction;
- Limiting Project-related activity outside of the Project Footprint; and
- Using designated roadways and access roads.

Assessment conclusion

Given the application of the above-described mitigation measures the effects of the Project in terms of wildlife and wildlife habitat are summarized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Project Footprint
- Duration: Medium Term
- Frequency: Infrequent
- Reversibility: Permanent

In conclusion, the residual effects are assessed as Minor.

6.3.6.1 Species of Conservation Concern

Summary of interactions

The Project is proposed within a disturbed environment where land has been modified for agriculture and much of the original natural vegetation and wildlife habitat has been converted to other land uses. Construction and operation activities will result in the change of some habitat types that could support SOCC.

The wildlife described in Section 5.1.7 as species of conservation concern (i.e. Barn Swallow, Chimney Swift, Bobolink, Olive-sided Flycatcher, Prairie Skink and Red-Headed Woodpecker) may experience changes in wildlife habitat availability through clearing the ROW, establishing foundations for the towers, and presence of Project equipment present in the Project Footprint. Mortality may increase by increased vehicular traffic and project equipment in the project area, bird wire collisions, and through managing the vegetation in the ROW during the life of the Project.

Mitigation measures

As indicated, it is important to note that efforts to minimize adverse effects on SOCC occurred during the route selection process, which considered and avoided (to the extent feasible) sensitive areas. Specific mitigation measures used to mitigate effects on species of conservation concern during Project construction and operation include the following:

- Conducting pre-construction surveys at sites with suitable habitat for Prairie Skinks;
- Conducting clearing activity outside the Sensitive Timing window for Wildlife (see Section 2.1 of the CEnvPP in Appendix E);
- If land clearing is required during the sensitive breeding period, pre-construction nest searches will occur in areas having potential to support SOCC;

- Establishing set-backs and buffers around SOCC bird nests or Prairie Skink burrows;
- Retaining a 30 m vegetated buffer around the ephemeral stream;
- Keeping litter and garbage contained;
- Flagging off environmentally sensitive areas prior to site clearing and construction;
- Limiting Project-related activity outside of the Project Footprint; and
- Using designated roadways and access roads.

Assessment conclusion

Given the application of the above-described mitigation measures the effects of the Project in terms of SOCC are summarized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Project Footprint
- Duration: Medium Term
- Frequency: Infrequent
- Reversibility: Permanent

In conclusion, the residual effects are assessed as Minor.

6.4 Socioeconomic assessment

6.4.1 Population, employment and economy

Summary of interactions

Effects to population, employment and economy are experienced primarily during construction, with the potential for limited employment opportunities and presence of the workforce in the RSA. As indicated in Section 2.5.1, each phase of construction will have approximately 30 workers. Potential project effects on the economy are beneficial rather than adverse.

Potential direct benefits from the Project would be associated with construction employment; however, these opportunities will be limited due to the small workforce required. There may also be opportunities for indirect benefits to communities in the vicinity of the Project (City and communities in RM of Portage La Prairie) through the provision of goods and services to the construction workforce (e.g., fuel, food).

During the operations and maintenance phase there will be no employment opportunities since the existing Manitoba Hydro workforce will be used to patrol the transmission line and conduct any maintenance activities. Effects on economy during operations will therefore be negligible as no new operation or maintenance jobs will be created.

Mitigation measures

Since the effects are positive no mitigation measures are proposed.

Assessment conclusion

The effects of the Project in terms Employment and Economy are summarized as follows:

- Direction: Positive
- Magnitude: Small
- Geographic extent: Regional
- Duration: Medium Term
- Frequency: infrequent
- Reversibility: Reversible

In conclusion, the residual effects are assessed as being Minor but Positive.

6.4.2 Public safety and emergency services

Summary of interactions

Public safety and emergencies are Project-based effects that need to be addressed during the construction phase when the majority of workers will be present. Due to the limited number of individuals required for operations and maintenance the effects during this phase are considered negligible. Traffic and transportation effects are discussed under Section 6.4.3 (Regional Infrastructure). Accidents and malfunctions are discussed and assessed in Section 8.0.

During construction there is potential for an increased demand on emergency services by the workforce. Public safety relates primarily to potential risks associated with traffic incidents in the area (employees as well as heavy trucks) as well as worksite accidents. The presence of workers for the Project has the potential to increase demand for community-based services such as emergency and health services.

As indicated in Section 5.2.1, the City of Portage La Prairie provides all emergency services and is in close proximity to the work site. The small workforce that peaks at 30 workers for each of the work phases and short term duration of Project construction (approximately 6 months) should have only a negligible effect on any emergency services provision during the construction phase.

Mitigation measures

Standard Manitoba Hydro and workplace health and safety protocols will be followed on the construction site. In Manitoba, worker protection is provided through legislated standards, procedures and training under *The Workplace Safety and Health Act*.

The primary mitigation measure will be the Emergency Response Plan (discussed in section 9). Project personnel will be made aware of this plan and designated staff will receive Emergency Response Plan training. Among other elements, the plan will address handling and storage of materials, driving safety, animal encounters, emergency response communications, spill response, personnel injury response and vehicle accidents. The plan will describe response

measures for major medical emergencies and include procedures for emergency response coordination with local emergency response personnel and local medical facilities. Other mitigation measures used to mitigate effects include the following:

- All contractors will be subject to site-specific environmental, health and safety orientation for the construction phase of the proposed Project;
- Provide first aid supplies and facilities and trained first aid personnel to deal with minor injuries; and
- Coordinate with local agencies (including RCMP, Emergency Preparedness, hospitals, and air ambulances) on emergency response plans as necessary.

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project in terms of increased pressure on emergency services are summarized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Regional
- Duration: Short-term
- Frequency: Sporadic
- Reversibility: Reversible

In conclusion, the residual effects are assessed as Minor.

6.4.3 Recreation and tourism

Summary of interactions

There appear to be relatively limited recreation activities occurring in the RSA currently. There are no campgrounds or RV Parks in the RSA, and the Edwin Community Hall, shooting ranges and snowmobile trails on the east side of the RSA are all away from the LSA. The closest recreation site appears to be the Poplar Bluff Gun Club that is situated approximately 1.8 km east of the proposed route. During the construction phase there is the potential for nuisance-based effects (e.g., noise, dust) for individuals who recreate in areas in the LAA; however, the proposed route is situated away from these receptors and they should not experience any material effects.

From a licensed hunting perspective, while the route is located in provincial Game Hunting Area 32 and Game Bird Hunting Zone 4, it is situated in a highly disturbed environment where land has been modified for agriculture and much of the original vegetation and habitat has been converted to other land uses, so effects to license hunting for game species in the RSA will be limited.

The indirect effect of harvest success rate for licensed hunters/trappers can be attributed to a small change in some wildlife habitat as well as sensory disturbance during the construction phase due to the presence of workers and noise which will cease at the end of construction.

Due to limited habitat availability, short-term duration of construction (approximately six months construction), it is anticipated that there will be negligible effects on licensed hunting/trapping. For licensed angling, it is highly unlikely that there are appropriate species present in the drain that could be fished (see Section 5.1.4) and the Assiniboine River is located approximately 5 km due east of the Project at its closest point and there are therefore no anticipated effects to angling activities as a result of the Project.

Mitigation measures

Due to the lack of intensive recreation and tourism activities in the LSA, implementation of effective mitigation measures including general environmental protection measures (Chapter 9), beneficial management practices, standard operating procedures, environmental protection plans are expected to manage residual effects to acceptable standards. Measures to mitigate effects to wildlife are discussed in Section 6.2.6. Other specific measures used to mitigate effects to recreation and tourism during Project construction and operation/maintenance include the following:

- Limiting noise and vibration causing activities to comply with all applicable by-laws; and
- Using only water and approved dust suppression products to control dust.

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project in terms of recreation and tourism are summarized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Regional
- Duration: Short-term
- Frequency: Sporadic
- Reversibility: Reversible

In conclusion, the residual effects are assessed Negligible.

6.4.4 Regional infrastructure

Summary of interactions

Section 5.2.4 outlines the Regional infrastructure in the RSA. During its 15.6 km length the Project does not require any crossings of railways or navigable waters, but it will involve several highway, distribution line and gas line crossings.

Traffic

One effect of the Project will be construction-related traffic on municipal roads and highways in the RSA and LSA. The two primary traffic routes that will be used to access the ROW are Highway 1 and Highway 305. As indicated in Section 5.2.4, based on an analysis of annual

daily and peak seasonal traffic these highways are not operating near capacity during the fall/winter construction period, the Project requires a small workforce and is small scale in nature and, therefore, should not have a material impact on traffic volumes. Project traffic volume during operations and maintenance activities will be minimal.

Electrical Interference

While it did not arise during Project PEP discussions, concerns are sometimes raised public engagement about interference from the Project on local cellular phone, satellite and internet services. Overall, Manitoba Hydro does not anticipate any adverse effects from electrical interference with infrastructure facilities and residences in the vicinity of the transmission line. Manitoba Hydro will meet the requirements of the *Radio Communications Act* and the Radio Communication Regulations, and will also meet the requirements of industry Canada's Interference-Causing Equipment Standard - ICES-004 Issue December 2001 – Alternating Current High Voltage Power System.

Regarding television reception, TVs receiving digital television signals are not susceptible to interference due to the different operating frequencies in comparison to AC transmission lines (Exponent 2013). Furthermore, cell phones and wireless internet operate in a range of 850 MHz to 2400 MHz and radio noise from an AC transmission line does not overlap with these frequencies as well so there are no anticipated effects (Exponent 2013).

Mitigation measures

In general, implementation of effective mitigation measures including general environmental protection measures (Chapter 9), beneficial management practices, standard operating procedures, and the environmental protection plans (Appendix E and F) are expected to manage residual effects to acceptable standards. Measures used to mitigate effects to regional infrastructure during Project construction and operation/ maintenance include the following:

- Where the Project crosses utilities and other infrastructure, affected parties, will be engaged by Manitoba Hydro to identify and address their concerns;
- To access the ROW from the main highways, existing access roads will be used wherever possible;
- All-related movements will be subject to regulations governing load restrictions and transportation of dangerous goods; and
- All traffic operations will be conducted in accordance with provincial legislation, including the (Manitoba) *Highway Traffic Act*, which regulates the weight and dimensions of highway vehicles within the province.

Assessment conclusion

Given the application of the above-described mitigation measures the effects of the Project in terms of regional infrastructure are summarized as follows:

- Direction: Adverse
- Magnitude: Small

- Geographic extent: Regional
- Duration: Medium-term
- Frequency: Sporadic
- Reversibility: Reversible

In conclusion, the residual effects are assessed as being Minor.

6.4.5 Land tenure and property ownership

Summary of interactions

Land tenure and property ownership was selected as a component in recognition of its importance to individuals and communities within the RSA. Potential effects to property and residential development are primarily related to changes to property, including nuisance-based effects (e.g., noise, vibration, dust), concerns about property values, concerns regarding health effects (i.e., electric and magnetic fields), and the physical presence of the transmission line on property.

Nuisance-based effects

Regarding the permissibility of Manitoba Hydro infrastructure on lands, *The Planning Act* (C.C.S.M. c. P80) provides a framework for land use planning strategies at the provincial, regional and local scale. The Provincial Planning Regulation, M.R. 81/2011 provides a framework to guide development planning. Requirements of the Act and its regulations do not apply to the Crown or Crown agencies. Manitoba Hydro notes that, as a Crown Corporation, it is not directly subject to the legislative provisions and is generally exempt from them in terms of development planning. However, it does seek to work cooperatively with the municipalities when planning, designing, constructing and operating and maintaining its Projects to limit the extent of possible interactions with their developments and plans. The RSA is zoned primarily for agricultural activities.

In comparison to the RSA, the Project Footprint represents a small portion of the RSA (0.36 per cent) and is 61.9 hectares in total area. The primary mitigation measure to address potential adverse effects to land tenure and property was the routing process that took into consideration proximity to homes and agricultural effects. The route is located solely on private property; no crown land is affected by the route.

While the entire RSA has a total of 176 occupied homes; there are only 50 homes within the LSA, with no occupied homes within the Project Footprint; the closest home is approximately 134 m away from the route. In this instance, the proposed transmission line is across the road from the property, has an existing 115 kV transmission line on the same side of the property, and the home is sheltered with a screen of trees.

During construction, homeowners in proximity to the Final Preferred Route could experience nuisance based effects from the Project such as noise, dust, and vibration. Construction will involve the use of machinery such as drilling rigs, cranes, concrete trucks, and chippers, mulchers and chainsaws. Furthermore, the use of implosives for splicing conductors is an

example of an activity that is also source of noise. Some of the noise sources will exceed The Province of Manitoba's Guidelines for Sound Pollution in residential areas indicates a maximum desirable sound level objective of 55 dBA (day) and 45 dBA (night). For example, the estimated noise levels for some machinery includes: chainsaws (110 dBA), concrete truck (107 dBA) and excavator/hoe (110 dBA) (Golder Associates 2008). The higher sound levels generated during construction will be transient as equipment is moved along the ROW; therefore, nearby residents will not be affected for prolonged periods. Noise levels during the night will also remain unchanged from the existing conditions, as construction activities related to the assembly and installation of towers will only occur during the day. Noise generated during construction activities will be temporary and intermittent, and will typically fall within acceptable provincial noise level guidelines or similar to activities already taking place in the area (i.e., agricultural activities).

Regarding incidental damage to property during construction, Section 2.4 describes Manitoba Hydro's compensation policy for landowners should physical damages be incurred during construction.

Overall, due to the temporary nature of construction and small scale of the project (total construction period of approximately 6 months) it is anticipated that nuisance effects will be minor during construction.

During operations, the noise anticipated from the transmission line will be below provincial guidelines; there may be elevated noise on occasion if maintenance is required to the transmission line but the effects are negligible.

Since the transmission line will be a net addition to the landscape and will affect the development potential of lands that the infrastructure is situated on Manitoba Hydro has a landowner compensation policy. As described in Section 2.4, it includes land compensation (one-time payment of 150% market value for granting an easement for the right-of-way on private lands), structure impact compensation on agricultural lands (depending on factors such as field placement, structure footprint), ancillary damage compensation (where Manitoba Hydro's use of the right-of-way impacts property use outside of the right-of-way) and construction damage compensation.

Property Values

As noted, proximity to residences and residential development was a key factor in route selection. As indicated in the MMTP Environmental Impact Statement (MMTP 2016), the literature is inconclusive whether transmission lines affect property values. Effects appeared to vary depending on the location and visibility of transmission towers to properties. Some studies showed a small, negative impact on property values immediately after construction that diminished over time and distance, with effects being more substantive for higher-priced homes and negligible for average-priced homes.

Electric and Magnetic fields (EMF)

Regarding concerns about health effects and living in close proximity to transmission lines, Manitoba Hydro's AC transmission lines produce EMF at a low frequency range of approximately 60 Hz. EMF levels associated with an AC transmission line depends upon the configuration of the line's conductors, the line's voltage, the amount of current the line is carrying, and distance from the conductors. Canadian (e.g., Manitoba Clean Environment Commission 2001), and international studies including the World Health Organization (2007) have concluded that there is insufficient scientific evidence to show exposure to EMFs from power lines can cause adverse health effects such as cancer. Health Canada (2004) states that there is no conclusive evidence of any harm caused by exposures at levels normally found in Canadian living environments. Both electric and magnetic fields will be below the recommended reference levels for public exposure (ICNIRP 2010; ICES 2002).

While Manitoba Hydro is sensitive to public concerns regarding potential health effects from EMF, there is at present no scientific evidence to justify modification of existing practices respecting facilities for the generation, transmission, and distribution of electricity. However, Manitoba Hydro continues to provide information to interested parties regarding health effects and EMF.

Mitigation measures

Specific measures used to mitigate effects during Project construction and operation/ maintenance include the following:

- Implement Manitoba Hydro's Landowner Compensation Policy;
- Construction activities and equipment will be managed to avoid damage and disturbance to adjacent properties, structures and operations;
- Appropriate dust suppression will be used as needed;
- Noisy construction activities where noise and vibration may cause disturbance and stress in proximity to built-up areas will be limited to daylight hours;
- Subject to detailed engineering analysis, tower location (tower "spotting") will be used, where feasible, to reduce potential negative effects regarding aesthetics and other concerns;
- Provide advanced notification before use of implosives to nearby residences and businesses and adhere to the implosives schedule; and
- Provide information to interested parties regarding health effects and EMF.

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project in terms of land tenure and property are summarized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Local
- Duration: Short (nuisance/property); Long Term (EMF)

- Frequency: Infrequent (nuisance/property); Regular/continuous (EMF)
- Reversibility: Permanent

In conclusion, the residual effects are assessed as being Minor.

6.4.6 Agriculture

Summary of interactions

Potential effects of the Project on agricultural land use are primarily associated with how construction-related activities and the eventual presence of the transmission system may overlap physically with existing agricultural land uses. These include potential effects of transmission towers and lines on the following agricultural operations:

- Loss of land from production due to the physical presence of the transmission line structures;
- Inconvenience, nuisance and increased production costs associated with operating farming equipment, aerial spraying and crop production around structures;
- Effects on livestock; and
- Compromised biosecurity for cropping lands and livestock operations.

Loss of land from production

The presence of transmission line structures will permanently remove the land under the structure area from production; however, the remainder of the ROW can be still be farmed. Approximately 53% of the Project Footprint is under annual production. Since the total area removed from production generally is smaller compared to farm size, the corresponding effect of having transmission lines is comparatively negligible. In addition, Manitoba Hydro's compensation policy (i.e., the structure impact portion) takes into consideration the lost production underneath and directly adjacent to the towers situated on agricultural land for directly affected landowners (see Manitoba Hydro Compensation Policy in Section 2.4).

Inconvenience, nuisance and costs from structures

Farming around towers presents a number of challenges. Crop production is reduced within the immediate vicinity of the tower due to overlap around each structure (PAMI 2015); there are increased costs associated with the time it takes to farm around transmission towers, the application of seed, fertilizer and chemicals in the area of overlap around each structure, and decreased weed control around the towers. For those property owners directly affected, landowners will be eligible for compensation. The structure impact portion of the compensation policy accounts for reduced productivity in an area of overlap around each structure; the additional time required to maneuver farm machinery around each structure; double application of seed, fertilizer and chemicals in the area of overlap around each structure; and additional weed control around each structure (see Manitoba Hydro Compensation policy in Section 2.4)

Effects on livestock (Stray Voltage and EMF)

During the PEP one landowner raised a concern regarding livestock in close proximity to transmission lines. Stray voltage is one concern often raised as well as concerns about EMF effects. Although through the windshield survey there did not appear to be any dairy or hog facilities in close proximity to the proposed route, beef cattle were seen in the vicinity of the proposed route, the closet agricultural building is approximately 31 m from the FPR on the other side of a road and the closest livestock operation is approximately 205 meters away from the FPR on the other side of a roadway.

Stray voltage is the voltage different between two animal contact points. A common example is the small voltage differences between the water bowl and floor of a dairy barn or any agricultural buildings that farm animals frequent. This is a concern for dairy operations, for example, where stray (or tingle) voltage can cause current to flow through cows which can create a disturbance in herds and result in reduced milk production. Stray voltage may originate from on-farm or off-farm sources (Manitoba Hydro 2006). The Electric Power Research Institute (EPRI 2012) states that stray voltage on dairy farms is primarily related to electrical current in wiring on the farm and the power distribution system that supplies the farm. Manitoba Hydro (2006) indicates that on-farm sources may include poor wiring, electrical short-circuits, defective underground cables, unbalanced loads, corroded neutral conductor connections, missing or inadequate grounding systems, and corroded or missing bonding connections. Stray voltage is not normally a power transmission issue because transmission line structure grounds are not generally connected to the distribution line grounds, and little current flows in transmission structure grounds except during faults (EPRI 2012). Correcting on-farm deficiencies should be conducted by a qualified electrician and contact information will be available to address any concerns about stray voltage.

Biosecurity

Other Project-related interactions with effects on agricultural activities during construction and operations maintenance activities could relate to compromised biosecurity. Biosecurity refers to a series of management practices and processes designed to reduce the risk of introducing and spreading disease agents (pathogens). The primary concern would be with external biosecurity which focuses on keeping disease agents from getting out and into other farms. The Project has potential for biosecurity concerns due to the transmission line being located in an agricultural area.

To protect the biosecurity of livestock and cultivated areas, Manitoba Hydro has developed an Agricultural Biosecurity Policy to ensure the implementation of biosecurity protocols on their projects. Manitoba Hydro and contractors will follow the biosecurity policy.

Regarding concerns about EMF livestock effects, available literature reports EMF effects as being non-substantive and unlikely to occur during the operation and maintenance phase of the transmission line (Ganskopp *et al.* 1991; Burchard *et al.* 2006; Serecon Valuations Inc. 2010; Exponent Inc. 2011; Exponent 2015). Recent findings (Exponent 2015) on farm animals and

other wildlife ". . . do not suggest that magnetic or electric fields (or any other aspect of high-voltage transmission lines, such as audible noise) result in adverse effects on the health, behavior, or productivity of fauna, including livestock such as dairy cows, sheep, pigs, and a variety of other species, including small mammals, deer, elk, birds, and bees. Studies were also conducted to evaluate whether EMF could affect crops or plants, but did not suggest any adverse effects on growth or viability."

Mitigation measures

Specific measures used to mitigate effects to agriculture during Project construction and operation/maintenance includes the following:

- Implementation of the Manitoba Hydro Biosecurity Policy and Standard Operating Procedures (https://www.hydro.mb.ca/environment/env_management/biosecurity.shtml) and
- Implementation of Manitoba Hydro Landowner Compensation Program.

Assessment conclusion

Given the application of the above-described mitigation measures the effects of the Project in terms of Agriculture are summarized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Project Footprint
- Duration: Long-term
- Frequency: Regular/continuous
- Reversibility: Permanent

In conclusion, the residual effects are assessed as being Minor.

6.4.7 Traditional land use

Summary of interactions

Interactions with potential to affect traditional land use consist of short-term clearing, drilling and tower installation during construction, maintenance of infrastructure, and vegetation management during operations. As the Project is located solely on private, cultivated agricultural land, and construction will be conducted completion prior to any sensitive spring (e.g., breeding/rearing) environmental timing windows, Manitoba Hydro does not anticipate the Project reducing the ability to practice traditional harvesting. Traditional land use activities can continue into operation and Manitoba Hydro anticipates that there would be limited potential for adverse effects.

The effects of operation and maintenance activities on traditional land use would be minimal, as the primary effect is vegetation control. Potential effects are not expected to be a concern as the

effects will be short-term in duration, intermittent in nature (consistent with fluctuations in construction effort and clearing program intensity), and localized.

Mitigation measures

Measures identified to mitigate potential adverse effects on traditional land use include:

- Limiting the extent of clearing in important habitats, such as riparian areas and wetlands, when feasible;
- Flagging off environmentally sensitive areas prior to site clearing and construction;
- Limiting Project-related activity outside of the Project Footprint;
- Using designated roadways and access roads;
- Limiting clearing to designated areas within the right-of-way and other designated areas;
- Restricting equipment and vehicle use outside the designated cleared areas;
- Conducting clearing activity under frozen ground conditions to the extent possible;
- During operation and maintenance, controlling herbicide use, including incorporation of non-herbicide based control measures (e.g., hand cutting) into the vegetation management plan, where feasible, and monitoring for species of concern and limiting herbicide use in their vicinity;
- Conducting clearing activity outside the Sensitive Timing window for Wildlife (see Section 2.1 of the CEnvPP in Appendix E)

Assessment conclusion

Given the application of the above-described mitigation measures the effects of the Project in terms of Traditional Land use are summarized as follows:

- Direction: Adverse
- Magnitude: Minor
- Geographic extent: Local
- Duration: Short Term
- Frequency: Intermittent
- Reversibility: Permanent

In conclusion, the residual effects are assessed as being Negligible.

6.4.8 Heritage resources

Summary of interactions

The pathways of effect during construction primarily relates to disturbing unknown heritage resources; the route selection process sought to avoid all previously recorded heritage sites, and the Final referred Route is located in an already disturbed agricultural environment with approximately 53 % of the route being under annual crop production.

Regarding the potential for the Project to interact with unknown heritage resources, ROW clearing and geotechnical testing has the potential to disturb the ground sub-surface and any intact heritage resources. Furthermore, removal of vegetation may create unstable soil conditions that could result in displacement of exposed heritage objects. ROW clearing will be subject to standard environmental protection measures that have been established in association with Manitoba Hydro transmission line construction practices, as well as the environmental protection plan (Appendix E).

The operation and maintenance phase also has the potential to disturb previously unknown sites; additional vegetation clearing in areas previously not disturbed by construction that may be required for maintenance of tower sites have a potential to expose unknown heritage resources.

In the event that an unknown site is discovered during construction or operations and maintenance activities, work will stop and the provincial Heritage Resources Branch contacted.

Mitigation measures

In addition to the measures developed in the environmental protection plan (Appendix E), a Cultural and Heritage Resources Protection Plan (Appendix F) has been developed to specifically deal with potential effects. It includes the following measures:

- All archaeological finds discovered during site preparation and construction will be left in their original position until the Project Archaeologist is contacted and provides instruction;
- Orientation for Project staff working in construction areas will include heritage resource awareness and training including the nature of heritage resources and the management of any resources encountered;
- Orientation information will include typical heritage resource materials and reporting procedures;
- The Contractor will report heritage resource materials immediately to the Construction Supervisor will cease construction activities in the immediate vicinity until the Project Archaeologist is contacted and prescribes instruction; and
- The Culture and Heritage Resource Protection Plan will be adhered to during construction and operations phases of the project.

Assessment conclusion

Given the application of the above-described mitigation measures, the effects of the Project on heritage resources are summarized as follows:

- Direction: Adverse
- Magnitude: Moderate
- Geographic extent: Project Footprint
- Duration: Short-term
- Frequency: Infrequent

- Reversibility: Permanent

In conclusion, the residual effects are assessed as being Minor.