a) to ensure the protection and to enhance the survival of endangered and threatened species in the province
b) to enable the reintroduction of extirpated species into the province
c) to designate species as endangered, threatened, extinct or extirpated.

The Threatened, Endangered and Extirpated Species Regulation (M.R. 25/98) lists plants and wildlife considered threatened, endangered and extirpated in the province. The mapleleaf (*Quadrula quadrula*) has been classified as Endangered under this regulation.

8.1.1.4 The Canadian Council of the Ministers of the Environment (1999) and The Water Protection Act (2005)

Surface-water quality is managed through federal guidelines and provincial standards, objectives and guidelines. The Canadian Council of the Ministers of the Environment maintains guidelines for the protection of aquatic life for many water quality parameters. These guidelines are generally accepted in environmental assessment to mitigate project activities such that the guidelines (Canadian Council of Ministers of the Environment 2001) are not exceeded, where it is considered technically and economically feasible to do so. The water quality of watercourses in Manitoba is protected under *The Water Protection Act (2005)* through the Manitoba Water Quality Standards, Objectives, and Guidelines (Manitoba Water Stewardship 2011).

8.1.1.5 Summary

A significant adverse residual environmental effect on fish and fish habitat is defined as one that results in the harmful alteration, disruption or destruction of fish habitat. Significant adverse effects may include:

- Permanent alteration to fish habitat of a spatial scale, duration or intensity that limits or diminishes the ability of fish to use sensitive habitats, including spawning grounds, nursery, rearing, or food supply areas, or as a migration corridor, in order to carry out one or more of their life processes
- Fish mortality (including eggs) or reductions in fish health at a level that reduces the productivity of a fishery, particularly species at risk
- Water quality parameters not returning to within the limits of natural variation of baseline conditions or exceeding CCME Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment 2001) and Manitoba Water Quality Standards (Manitoba Water Stewardship 2011).

The thresholds are regulatory-based requirements and derived from guidance provided by Fisheries and Oceans Canada related to the federal *Fisheries Act (1985)* and *Species at Risk Act (2002)*.

8.1.2 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas. Valued component specific details are described below:

Project development area: Footprint of the proposed project including the transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area for the Assiniboine River extends 100 m upstream and 300 m downstream from the closest point of the transmission line centreline to the river (Map 8-1), and 30 m upbank from the high water mark (HWM). For the two Crescent Lake crossings, the local assessment area extends 100 m in either direction of the centreline and 30 m up bank from the HWM (Map 8-1). The 30 m distance is listed in Table A-1 of the Canada Energy Regulator Filing Manual (Canada Energy Regulator 2020) and is recommended as an acceptable distance to protect the riparian area and to buffer effects that construction could have on fish and fish habitat (Alberta Environment and Sustainable Resource Development 2012).

The local assessment area represents the area where direct effects on fish and fish habitat are likely to be most pronounced or identifiable.

The Government of Manitoba does not provide guidance on the spatial study area boundaries related to transmission line construction. Therefore, the boundaries for the project were derived from the Alberta Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body (Alberta Environment 2001); (Alberta Environment and Sustainable Resource Development 2013). The Code of Practice guidelines establish an expected zone of impact for watercourse crossings. The zone of impact is the area of direct disturbance at the watercourse crossing site (i.e., the project development area) plus the area where 90% of the sediment potentially generated during construction would be expected to be deposited.

Regional assessment area encompasses the boundaries of the Central Assiniboine River sub-watershed (Map 8-1). The sub-watershed based regional assessment area boundary was selected to encompass regional aquatic health.

The regional assessment area is the area where any cumulative environmental effects for fish and fish habitat relevant to the project are likely to occur. This includes portions of a watercourse or waterbody where the zone of influence of other projects within the watershed could interact with the project or where population effects could be seen.

8.1.3 Effects pathways

There are two main pathways that can lead to affects to fish and fish habitat:

- Change in fish habitat
- Change in fish mortality or health

The final preferred route will create one overhead line water crossing (across Crescent Lake) and one area of riparian clearing along the Assiniboine River.

8.1.3.1 Change in fish habitat

Vegetation clearing

One crossing of Crescent Lake is along the existing right-of-way; therefore, there is no new vegetation clearing required. The other crossing is along a road through a wetland area (Map 8-1) that will require minimal clearing.

Along the Assiniboine River, the edge of the right-of-way is greater than 30 m from the edge of the water (Figure 8-1); therefore there should be minimal potential impact to fish and fish habitat.

The right-of-way is cleared to accommodate the transmission line. Trees and understory vegetation are cleared to allow for the safe and reliable operation of the transmission line. Clearing requirements may also require selective clearing of danger trees beyond the right-of-way.

Clearing of riparian vegetation, particularly the tree canopy that overhangs watercourses, could reduce cover for fish, reduce shade, which moderates water temperature, and reduce habitat for insects, which can be a food source for fish (Manitoba Water Stewardship 2021); (Manitoba Riparian Health 2015). Increases in water temperature can diminish egg survival in species with lower thermal thresholds, as well as increasing fungal growth on eggs of summer spawning species (Carter 2005). Increases in water temperature can encourage the microbial breakdown of organic matter, leading to a depletion of dissolved oxygen in the watercourse, which is essential for sustaining aquatic life.

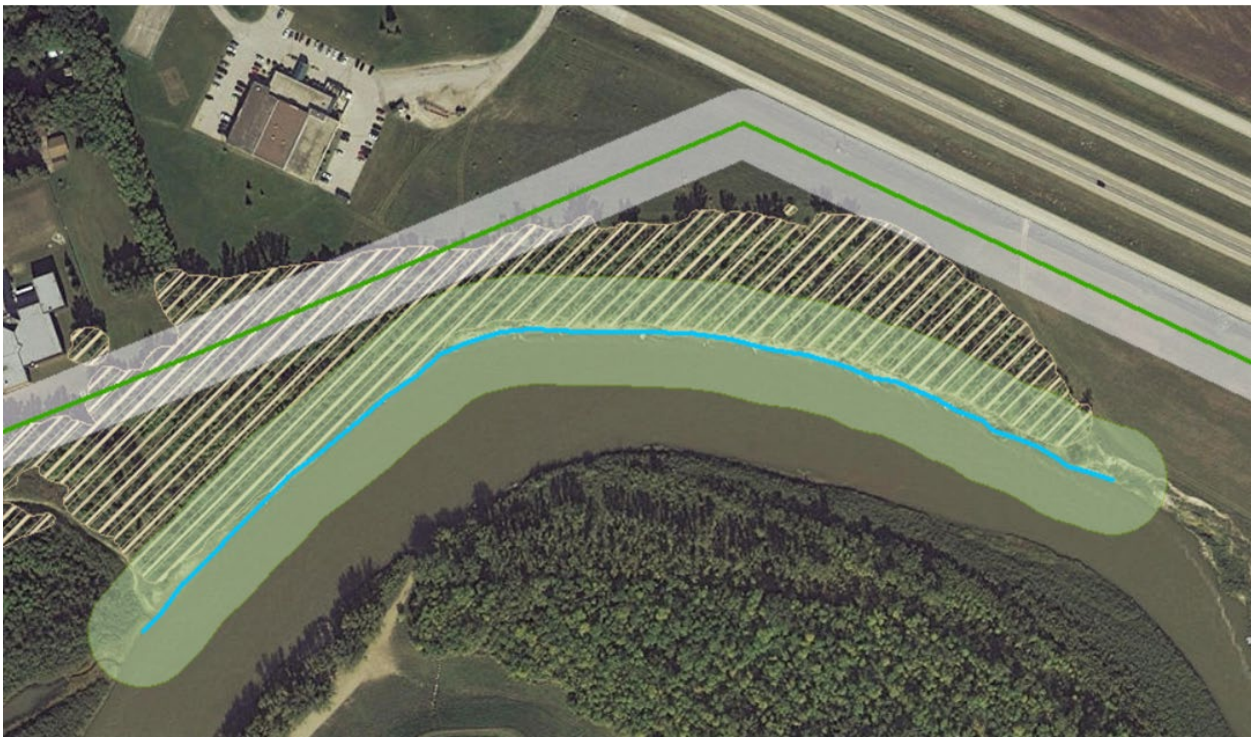


Figure 8-1: Riparian area along the Assiniboine River[2].

Low order stream communities in deciduous woodlands are energetically dependent upon litter materials (e.g. leaves and branches) contributed by riparian vegetation (Vannote, et al. 1980); (Benfield and Webster 1985); (Malmqvist and Oberle n.d.). Changes in litter inputs can have effects on invertebrate abundance, and in turn decrease food availability for fish. The potential effects of tree clearing will decrease with increasing stream size. As stream size increases, the reduced importance of terrestrial organic input coincides with enhanced importance of primary production within the waterbody and organic transport from upstream (Vannote, et al. 1980). As the Assiniboine River is quite large, the input of terrestrial organic matter would not be important.

The loss of riparian vegetation can also increase erosion and sedimentation, resulting in a change in substrate composition, and altering food supply through turbidity-related reductions in algae and aquatic insect production (Studinksi, et al. 2012).

[2] A 30 m buffer was placed around the edge of the water. The hatched area shows required forested area.

Increased siltation can also damage spawning grounds for species that require cobble substrate for spawning (Fudge, Wautier and Palace 2008). Increased turbidity can decrease light transmission through the water column, decreasing in-water vegetation growth, which is habitat for young fish.

High sediment concentrations may cause fish mortality as a result of heavy gill abrasion ((Herbert and Merkins 1961); (Robertson, et al. 2006). At lower suspended sediment concentrations, the effects could include subtle behavioral changes in fish, such as avoidance reactions. These reactions could lead to higher energy expenditures by individual fish and affect territorial responses in some species (Newcombe and Jensen 1996); (Robertson, et al. 2006)). At higher sublethal concentrations, the introduction of fine suspended sediment, such as silts and clays that increase turbidity, could induce effects such as reduced feeding efficiency, sense of smell in fish, decreased visual acuity and predator/prey interactions (Newcombe and Jensen 1996). Silts and clay from erosion can carry contaminants such as pesticides into watercourses increasing fish exposure and causing harm to fish (increased mortality, reduced physiological function in adult fish and reduced egg survival (Levasseur, et al. 2006).

Increased sedimentation could also change the availability of invertebrates needed as food sources for fish (Suttle, et al. 2004); (Ramezani, et al. 2014). The reduced food source for fish due to sedimentation can affect fish mortality and health by reducing their growth (Harvey, White and Nakamoto 2009); (Sullivan and Watzin 2010); (Kemp, et al. 2011).

Herbicide treatment, during operations, in areas close to water could result in accidental (through spills) or unintentional (through aerial drift or runoff) entry into watercourses. Once in a waterbody, herbicides can reduce photosynthesis or other processes in primary producers (e.g., algae, macrophytes), thereby reducing biomass and distribution.

Vehicle / equipment use

Machinery operating near watercourses can also create ruts and compact soils, especially in saturated, floodplain areas next to watercourses. Compacted soils can channelize water flow, leading to less infiltration and greater surface erosion (erosion effects discussed above).

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 a

watercourse, these deleterious substances can enter a watercourse and directly or indirectly affect aquatic organisms (including fish).

Effects from deleterious substances entering the watercourse can range from lethal to sub-lethal, depending on the volume, concentration and substance in question. Many hydrocarbon products are also persistent and will remain in sediments for long periods of time and accumulate in higher organisms in the aquatic food web.

During the operational phase of the project, effects relate to herbicides entering the watercourse from vegetation management activities. Vegetation management within the right-of-way is required for public and employee safety, as well as the reliable operation of the line. The right-of-way will be maintained on an ongoing basis throughout the life cycle of operation. The use of herbicides, if not applied according to label and pesticide use permit instructions, could lead to release of contaminants to adjacent waterways.

8.1.3.2 Change in fish mortality or health

Vegetation management

During operation and maintenance, the primary activity that could interact with fish and fish habitat is vegetation management within the transmission line right-of-way.

Riparian vegetation management and potential use of herbicides to control noxious or invasive riparian vegetation species could affect fish health and mortality if the chemicals were sprayed, rinsed or carried by sediment into a watercourse. The pH of watercourses may also be altered if contaminated sediments are washed into the watercourse. A change in watercourse pH can affect fish mortality and health.

8.1.3.3 Decommissioning

Project decommissioning will likely have a positive overall effect. Should the project be decommissioned, the right-of-way would be allowed to revegetate, which would improve fish habitat overall. The effects of riparian clearing would be reversed and the site would return to a somewhat natural state.

8.1.4 Species at risk

Threats to species at risk include increased siltation and decreased water quality. Without adequate mitigation the above changes to fish habitat could lead to these effects. In Manitoba mapleleaf are threatened by habitat loss and degradation and the effects of invasive species, particularly zebra mussel (COSEWIC 2016). Habitat changes associated with zebra mussels and modifications to the banks of the

Assiniboine River (e.g., rip-rap and dikes) that alter the flow hydrology of these rivers are also threats (COSEWIC 2016).

Bigmouth buffalo are secure in Manitoba, however, major threats include loss of / access to spawning / rearing habitat, habitat fragmentation (Fisheries and Oceans Canada 2019), (COSEWIC 2009).

Potential threats to the chestnut lamprey include destruction of spawning habitat through soil erosion and siltation; eutrophication through runoff of fertilizers; pesticide and herbicide pollution ((Lanteigne 1991) in (COSEWIC 2010)); and dams, locks, and stream crossings that inhibit its spawning migration (Government of Manitoba 2002).

8.1.5 Mitigation measures

Selection of the final preferred route took a balanced approach to minimize overall project effects. In addition to routing, standard industry practices and avoidance measures, along with project-specific mitigation as summarized in Chapter 9.0 will be implemented during project construction and operation. This section highlights the key mitigation measures to be implemented during construction and operation to limit effects to riparian areas and riparian habitat.

Application of proven and effective mitigation measures will be implemented as part of the project to avoid or minimize the environmental effects on fish and fish habitat. Project-specific mitigation measures with respect to aquatic resources will be outlined in detail in the construction environmental protection plan, which will form part of the construction contract. Mitigation will include, but not be limited to:

- Designating of a buffer zone (30 m from OHWM minimum) around all waterbodies, which limits riparian vegetation removal to trees and tall shrubs (Figure 8-2)
- Designating machine-free zones (7 m OHWM minimum) in riparian areas
- Marking sensitive areas prior to construction, and clearing
- Clearing of tree species in the riparian area, leaving shrub, forbs and grasses to colonize the riparian area
- Maintaining or promoting the growth of shrub species in riparian areas
- Keeping root systems intact during tree removal (thereby not disturbing the soil)
- Implementing erosion and sediment control measures where required for sensitive sites
- Training work crews in spill prevention

- Ensuring all petroleum and allied products will be handled in compliance with the requirements of Manitoba Regulation 188/2001
- Storing petroleum and other products more than 100m from the ordinary highwater mark of watercourses
- Ensuring machinery is in good working order and free of leaks
- Having emergency spill kits on site
- Using only licensed applicators when herbicides are used
- Siting marshalling yards and borrow sites at least 30 m[3] from watercourses to avoid interaction with fish and fish habitat.

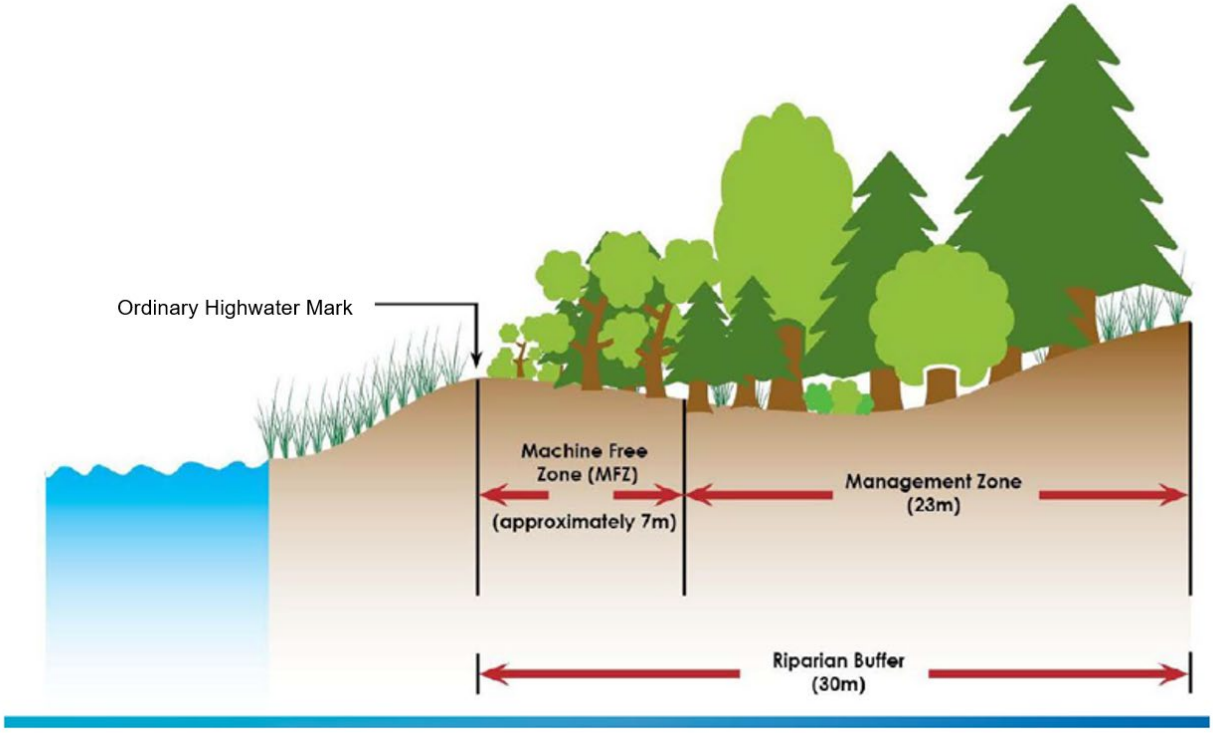


Figure 8-2: Riparian buffers and machine free zones

[3] A 30 m setback from a watercourse is recommended as an acceptable distance to protect the riparian vegetation area and buffer overland effects that construction could have on fish and fish habitat (Canada Energy Regulator 2020).

8.1.6 Characterizing residual effects

Table 6-3 describes the factors used to characterize the interactions among the project and fish and fish habitat.

Existing land use in the local assessment area can be characterized as disturbed because in many areas it is dominated by agricultural development. Activities associated with this land use can increase suspended sediments and sediment in the bedload of adjacent watercourses.

Fish, particularly priority species, could potentially have life processes affected by increased sedimentation, particularly sensitive early life stages.

With the implementation of mitigation measures, such as leaving a 30 m vegetated buffer, project-related construction activities are not expected to increase sedimentation within the watercourses.

Along the Assiniboine River, clearing required will be greater than 30 m from the water's edge (Figure 8-1) which will minimize impacts. The expected change in riparian vegetation is minimal because equivalent riparian vegetation was abundant all along the river, upstream and downstream of the project.

This assessment considers residual effects on fish and fish habitat after mitigation is implemented. There will be no harmful alteration, disruption or destruction of fish habitat. There is no net change in fish habitat availability because similar habitat is available within and beyond the local assessment area. For change in fish and fish habitat, the residual environmental effects have been characterized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Local
- Duration: Long term
- Frequency: Regular
- Reversibility: Permanent

Due to the small area of riparian vegetation clearing along the Assiniboine River, the use of the existing crossing of Crescent Lake, and well tested mitigation measures, the residual effects for fish and fish habitat are not anticipated to be significant.

8.1.7 Follow-up and monitoring

Due to limited project interactions and well-established mitigation measures, monitoring related to fish and fish habitat concerns is not proposed for the project. If significant damage is observed, remediation efforts will be implemented, and a

monitoring plan developed to address concerns at each site. Protections for fish and fish habitat will be implemented as part of the environmental protection program.

8.1.8 Cumulative effects

Table 6-5 lists the interactions between current and future projects/activities and fish and fish habitat. Three of these have potential interactions including agriculture, the upgrades to the water treatment facility and the Crescent Lake Causeway. Ongoing agriculture has the potential for inputs into the adjacent waterbodies including the Assiniboine River, decreasing water quality. However, these inputs have been ongoing for decades or more and therefore would be considered part of the baseline conditions.

The upgrades to the water treatment facility should improve water quality overall as part of the upgrades include improved nutrient removal.

The Crescent Lake Causeway will alter habitat in Crescent Lake and may also temporarily increase sedimentation. This could act cumulatively with transmission line construction as they are both under construction at the same time. However, with mitigation potential sedimentation will be minimal and short term.

8.1.9 Sensitivity to future climate change scenarios

Effects of climate change on fish and fish habitat are expected to relate to the anticipated increase in temperature and associated extreme weather events (e.g., flooding). Resulting effects on fish and fish habitat in the regional assessment area may result in substantial change, from increases in maximum water temperatures that could exceed the lethal threshold for some species to species shifts. Subtle changes in flow and temperature will alter thresholds of susceptibility; however, the predicted climate change scenarios would not change the significance determinations for fish and fish habitat, as they are not anticipated to measurably increase the magnitude of Project-related effects on fish habitat availability or fish health and mortality.

8.2 Vegetation

8.2.1 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas (Map 8-2). Valued component specific details are described below:

Project development area: Footprint of the proposed project including the transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area is 1 kilometer from either side of the project centreline (Map 8-2). This buffer is consistent with that used in previous assessments and with the wildlife and wildlife habitat assessment (Section 8.3).

It represents the area where indirect or secondary effects of construction and operation and maintenance are likely to be most pronounced or identifiable.

Regional assessment area: The regional assessment area is defined as 15 kilometers from either side of the project centreline (Map 8-2). This area considered large enough to appropriately characterize regional vegetation and land use patterns.

It encompasses the area where project-specific environmental effects overlap with those of past, present, and reasonably foreseeable future projects and activities. It is used to provide regional context and is therefore generally the area for which the project's contribution to cumulative effects is assessed.

8.2.2 Significance thresholds

An overall determination of significance is made for the project's residual effects and the cumulative residual effects on vegetation after mitigation measures are implemented. There are no specific provincial or federal regulations that set thresholds for determining the significance of environmental effects on vegetation within the regional assessment area.

Significance was determined using qualitative and quantitative approaches, through professional judgment and previous experience assessing project effects on natural vegetation.

Significant effects on natural vegetation are those that meet any of the following criteria:

- An effect that threatens the long-term persistence or viability, including effects that are contrary to, or inconsistent with, federal (including recovery strategies and critical habitat) and provincial management objectives in the regional assessment area of:
  - native vegetation cover classes
  - rare plant species (including species at risk)
  - traditional use plant species

8.2.3 Effects pathway

There are four main pathways that can lead to affects to vegetation in the project area:

- Change to native vegetation
- Change in invasive / non-native species
- Change in rare plant species (including species at risk) abundance / distribution
- Change in traditional plant species abundance / distribution

8.2.3.1 Change to native vegetation

As outlined in Table 7-2 the project is predicted to interact with vegetation during the project construction activities of right of way clearing and marshalling yards. The project is predicted to interact with natural vegetation during operation and maintenance activities of inspection patrols, and vegetation management.

The loss of natural vegetation and habitat in the region was identified as a concern within both the Indigenous and public engagement processes.

The loss of natural vegetation is a concern for maintaining biodiversity and wildlife habitat. Changes in plant community structure (e.g., loss of trees or shrubs) can also affect plant community composition and wildlife habitat suitability.

Most of the project footprint is located in previously developed lands; therefore, potential effects to natural vegetation and native vegetation cover classes are limited; however, effects to 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.

Clearing within the right-of-way will remove all treed vegetation, contributing to potential direct mortality and habitat loss. A total of 5.1 hectares will be cleared including natural areas near Crescent Lake and the north shore of the Assiniboine River. Forested lands will be converted to shrubland or grasslands. Classification for other portions of the project footprint (e.g. shrubland, grassland, pasture) will not be changed as a result of the project.

8.2.3.2 Change in invasive/non-native species

Invasive plant species are a subset of weedy plant species that require control or eradication based on provincial or federal legislation. These species are of concern because they can cause economic losses, damage to native plant communities, or human illness or injury (Royer and Dickinson 1999).

Clearing can 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. 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.

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, vegetation management, and decommissioning 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.

Project decommissioning at future date, would have a similar effect on vegetation as tower construction and stringing of conductors, including the potential to change vegetation distribution and for the spread of non-native/invasive plant species.

8.2.3.3 Change in rare plant species (including SAR) abundance / distribution

Rare plant species are vulnerable to disturbance and are protected by provincial and federal legislation. Threats to rare plant species include trampling, invasive plant species encroachment, soil compaction from vehicle use, and habitat loss (Henderson 2011). Loss of native vegetation areas is correlated with increases in the number of endangered species (Kerr and Deguise 2004) and is considered the greatest threat to endangered species in Canada (Venter, et al. 2006).

Some rare plants were identified in the study area. Construction of the transmission line could change the abundance and distribution of rare plant species as a result of right-of-way clearing, vehicle / heavy equipment use, tower construction or vegetation management. Clearing within the right-of-way to remove treed vegetation and ongoing maintenance activities may result in the loss of some rare plants. Heavy equipment and vehicle use on access trails and temporary workspaces could remove or crush rare plant species or affect them through soil compaction and rutting. Tower construction requires the removal of vegetation at tower footprints and at foundation excavations at some locations. Vegetation management activities such as herbicide application or mowing could kill or remove rare plants. However, since most of the project development area is in previously developed lands, potential effects to rare plants is limited.

8.2.3.4 Change in traditional plant species abundance / distribution

Long Plain First Nation has identified the potential for their four Sacred Medicines (Sage, Cedar, Sweetgrass and Tobacco) to be in abundance in some areas of the project, which could be affected by project activities (Appendix C). Dakota Tipi First Nation had shared concerns that the line placement may reduce medicinal vegetation such as sage, sweet grass, cedar, Seneca root and bear root in the study area. With announcement of the preferred route, Dakota Tipi First Nation shared that the route avoids most plant gathering areas but that willow harvesting near the Assiniboine River might be affected by the project. The MMF identified one potential plant gathering area to the south of the Portage diversion, which should not be affected by the line being located on the north side of the Portage diversion.

8.2.4 Mitigation

Selection of the final preferred route took a balanced approach to minimize overall project effects. In addition to routing, standard industry practices and avoidance measures, along with project-specific mitigation as summarized in Chapter 9.0 will be implemented during project construction and operation. This section highlights the key mitigation measures to be implemented during construction and operation to limit effects to vegetation.

Application of proven and effective mitigation measures will be implemented as part of the project to avoid or minimize the environmental effects on vegetation. Project-specific mitigation measures with respect to vegetation will be outlined in detail in the construction environmental protection plan, which will form part of the construction contract. Mitigation will include, but not be limited to:

- Limiting the extent of clearing in important habitats
- 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
- Cleaning equipment before moving from locations with identified invasive weed infestation
- Maintaining vehicles and equipment in designated areas located at least 100m from the ordinary high-water mark of a waterbody, riparian area or wetland
- Performing daily inspections for fuel, oil and fluid leaks on vehicles, equipment and machinery and shutting down and repairing any leaks found
- Protecting plant species at risk and critical habitat in accordance with provincial and federal legislation and provincial and federal guidelines.
- Applying a 10 m buffer to mapped species of conservation concern within the project development area. Setbacks and buffers along the right-of-way will be clearly identified by signage or flagging prior to construction, and signage or flagging will be maintained during construction to alert crews to the presence of the setback or buffer.
- Siting towers to avoid confirmed locations of species of conservation concern, where possible
- Contacting Manitoba Agriculture and Resource Development if avoidance of listed rare plant species is not possible, to determine the most appropriate mitigation action
- Delineating natural low-growing shrub and grass vegetated buffer areas of 30 m or greater around wetlands and riparian areas
- Ensuring windrows of grubbed materials will be piled at least 15 m from standing timber
- Ensuring trees will not be felled into waterbodies
- Flagging danger trees for removal using methods that do not damage soils and adjacent vegetation
- Ensuring contractor erosion protection and sediment control plans will be developed prior to construction and updated annually
- Ensuring all equipment arrives at the right-of-way or project site clean and free of soil or vegetation debris
- Following the biosecurity management plan to prevent the spread of invasive weeds

- Including objectives for restoration of natural conditions, erosion protection, sediment control, non-native and invasive plant species management in the rehabilitation plans
- Conducting weed control along access roads and trails, marshalling yards and borrow sites in accordance with a rehabilitation and weed management plan
- Using methods such as hand cutting, mechanical cutting or winter shearing to clear the transmission line right-of-way and other sites. If herbicides are required to control vegetation growth, such as noxious/invasive weeds during construction, all applicable permits and provincial regulations (*The Noxious Weeds Act*) will be followed.

Long Plain First Nation has recommended additional mitigation measures including: *"Long Plain would like to see an effort made to harvest any sacred medicines that may be disturbed during the project in accordance with our spiritual protocols"* and *"Also, if a rough count of large vegetation removals (trees and native brush etc.) exists we would like to see an effort made to either relocate or plant-new vegetation in accordance with our beliefs that we should live lightly on Mother Nature, take only what we need and replace what we take whenever possible"* (Appendix C).

Manitoba Hydro will work with Long Plain First Nation to discuss the feasibility of these mitigation measures.

8.2.5 Characterizing residual effects

Table 6-3 describes the factors used to characterize the interactions among the project and vegetation.

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

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

In conclusion, due to the small area of vegetation clearing, the use of the existing right of way and previously cleared areas for most of the route, the residual effects for vegetation are not anticipated to be significant.

8.2.6 Follow up and monitoring

Due to limited project interactions and well-established vegetation protections and mitigation measures, natural vegetation monitoring is not proposed for the project. If significant natural vegetation damage is observed, remediation efforts will be implemented, and a monitoring plan developed to address concerns at each site. Protections for natural vegetation will be implemented as part of the environmental protection program. The environmental protection program is a framework for the implementation, management, monitoring and evaluation of protection activities in keeping with environmental effects identified in environmental assessments, regulatory requirements and public expectation. It prescribes measures and practices to avoid and reduce adverse environmental effects on vegetation.

8.2.7 Cumulative effects

Table 6-5 lists the interactions between current and future projects/activities and vegetation. Three of these have potential interactions including agriculture, Portage area capacity enhancement project and the Crescent Lake Causeway.

Ongoing agriculture has the potential for further vegetation clearing; however, this activity has been ongoing for decades and would be considered part of the baseline conditions.

The Portage area capacity enhancement project may result in some vegetation clearing to accommodate a new transmission line project. However, this loss of vegetation likely to be minimal.

The Crescent Lake Causeway will temporarily remove vegetation around Crescent Lake. This could act cumulatively with transmission line construction as they are both under construction at the same time. However, with mitigation, loss of vegetation will be minimal and short term.

8.2.8 Sensitivity to future climate scenarios

Projected climate change will not change the significance determinations for vegetation because the projected changes are not expected to measurably increase the magnitude of Project effects on native vegetation, invasive species introduction, rare or traditional use plant species. Abundance and distribution of native cover classes, rare plants and traditional use plants will likely change, but the project is anticipated to affect a small portion. Some invasive plant species may increase in abundance and established native cover will help reduce spread.

8.3 Wildlife and wildlife habitat

8.3.1 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas (Map 8-2). Valued component specific details are described below:

Project development area: Footprint of the proposed project including the transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area is defined as 1 kilometer from either side of the project centreline (Map 8-2). Benitez-lopez et al. (Benitez-lopez, Alkemade and Verweij 2010) reported that most songbirds and waterbirds have lower abundances within 1 km of infrastructure.

It represents the area where indirect or secondary effects of construction and operation and maintenance are likely to be most pronounced or identifiable.

Regional assessment area: The regional assessment area is defined as 15 kilometers from either side of the project centreline (Map 8-2). It encompasses the home ranges or dispersal distances of the most wide-ranging species in this assessment, including white-tailed deer (89 km^2 (Fisher, et al. 2013) and red-sided garter snake (18 km dispersal (Gregory and Stewart 1975).

It encompasses the area where project-specific environmental effects overlap with those of past, present, and reasonably foreseeable future projects and activities. It is used to provide regional context and is therefore generally the area where the project's contribution to cumulative effects is assessed.

8.3.2 Significance thresholds

An overall determination of significance is made for the project's residual effects and the cumulative residual effects on wildlife and wildlife habitat after mitigation measures are implemented. There are no provincial or federal regulations that set thresholds for determining the significance of environmental effects on wildlife and wildlife habitat found within the regional assessment area.

Significance was determined using qualitative and quantitative approaches, through professional judgment and previous experience assessing effects on wildlife and wildlife habitat.

Significant effects on wildlife and wildlife habitat are those that meet any of the following criteria (based on (Lynch-Stewart 2004)):

- Threaten the long-term persistence or viability of wildlife populations, including any effects that would lead to species extinction, extirpation or up-listing to special concern, threatened or endangered status
- Diminish the potential or prolong threats to species recovery, such as effects that are contrary to or inconsistent with the goals, objectives or activities of federal recovery strategies and action plans
- Diminish the capacity of critical habitat to provide for the recovery and survival of wildlife at risk

8.3.3 Effects pathway

The MMF expressed concerns (Appendix C) that the portion of the existing right-of-way has been rehabilitated over time and that the new line could disturb wildlife that have returned to the area:

"Though there was an existing transmission line, the area was naturalized again to a certain degree and will be disturbed again in the construction of the line"

Peguis First Nation expressed concerns with specific species on Crescent Island including salamanders, frogs and deer.

Long Plain First Nation also expressed concerns with Crescent Island being a nesting and staging area for geese.

As well, Dakota Tipi First Nation shared concerns that the line placement may reduce populations of whitetail deer, porcupine and rabbits.

During public engagement concerns were expressed for wildlife during the construction and operation of the project. Concerns were raised about the potential to disturb nesting and migrating birds, including rare birds such as the Eastern peewee (*Contopus virens).* Concerns were also expressed regarding the potential for bird collisions with the transmission wires as birds move between Crescent Lake and surrounding waterways. The ongoing decline of natural habitat for wildlife in the region was also identified.

Three main pathways were considered, that can lead to affects to wildlife and wildlife habitat, including species of conservation concern:

- Change in habitat availability
- Change in mortality risk
- Change in disturbance/annoyance

8.3.3.1 Change in habitat availability

The project is proposed within a developed environment where much of the land has been modified for agriculture, transportation, and exurban development. Much of the original natural vegetation and wildlife habitat has been converted to other land uses.

Right-of-way clearing is the primary construction activity that may result in a direct and measurable change in wildlife habitat because it involves clearing in treed / forested areas and grubbing at transmission tower sites.

Prior to construction, a 38 m wide right-of-way will be cleared in treed / forested areas. This will convert those areas to open habitat that will eventually be recolonized by grasses, forbs, and shrubs.

Some wildlife habitat will be altered along the north shore of the Assiniboine River and Crescent Lake. These somewhat natural habitats are already limited in availability in the project assessment areas.

Since a portion of the old route will not be re-used, including one crossing of Crescent Lake, these areas will be left to naturalize, providing some wildlife habitat.

The effects of change in habitat availability apply to both construction and operation phases of the project. In addition to direct habitat effects, project-related sensory disturbance such as mobilization, vehicle/equipment use, right of way clearing, marshalling yards, transmission tower construction, implodes, and helicopter use may result in the temporary displacement of mammals and birds. Wildlife, including some species of conservation concern, may also avoid otherwise suitable habitat during construction or inspection patrols and vegetation management during operation. Sensory disturbance could affect wildlife and wildlife habitat during all but one construction stage; no effects are anticipated due to project wrap up and leaving the site. Decommissioning of the project at a future date would also cause sensory disturbance.

8.3.3.2 Change in mortality risk

<u>Construction</u>

Wildlife mortality could increase due to collisions with construction vehicles. These could be mammals, birds, and amphibians, and include species of conservation concern. Wildlife mortality pathways also include nest mortality during clearing.

Behavioural changes related to increased activity, noise and nighttime illumination from construction may cause an indirect increase in mortality risk due to disturbance to wildlife, resulting in behavioural changes and increased chance of predation. Small mammals or birds may move from cover (behavioural change) because of disturbance from noise and vibration, putting them at greater risk of predation and mortality from exposure (Habib, Bayne and Boutin 2007).

Construction activities may also displace wildlife species into areas adjacent to the project that may contain lesser quality habitats depending on a species' habitat requirements and dispersal abilities. This displacement may result in increased energy expenditure potentially reducing an individual's survival and reproduction (Powlesland 2009).

Operation and maintenance

Collisions with transmission lines are among the top causes of human-related bird mortality in Canada (Calvert, et al. 2013). The degree of risk is influenced by several factors relating to transmission line design, location, and mitigation, as well as physical characteristics of the bird (species, size), and flight behaviour (flocking, aerial courtship displays); (Avian Power Line Interaction Committee 2012). Larger-bodied species can have difficulty performing evasive manoeuvres to avoid transmission lines and structures (Bevanger 1998).

The project has the potential to increase bird-wire strikes; particularly where the transmission line is in or adjacent to wetlands (Crescent Lake) or rivers (Assiniboine River) that concentrate large-bodied birds such as geese and ducks.

Transmission lines in areas that concentrate birds, particularly those located between roosting (i.e., resting), foraging, or breeding sites can have higher collision risk for birds (Avian Power Line Interaction Committee 2012). In these areas, waterbirds, especially ducks and geese, are particularly vulnerable to collisions due to their daily movement patterns, which peak during low light periods around sunrise and sunset.

Bird-wire interactions are most associated with the shield wires, a narrow wire that runs above the conductors and serves to dissipate the effects of lightning strikes on transmission equipment (Scott, Roberts and Cadbury 1972); (Faanes 1987) (Savereno, et al. 1996).

A portion of the old route will not be re-used, including one crossing of Crescent Lake. There will still be two crossings of Crescent Lake (Map 8-1). The new crossing of Crescent Lake is along a road right-of-way in an area where there is little to no standing water. This area would not be considered high quality waterfowl habitat and

likely not along a travel route. Overall, there could be a decreased risk of bird-wire collisions due to the change in location of crossing Crescent Lake.

The route parallels the Assiniboine River (Map 8-1) for several hundred meters. This could introduce an increased risk of bird-wire collisions. However, there will be riparian vegetation left intact. This should limit collisions as waterfowl will have to clear the trees and therefore the transmission line as well.

Another pathway for increased mortality could be through nest mortality by equipment used during periodic maintenance of right-of-way vegetation.

The physical presence of the transmission line and vegetation management inspection activities may have minor nuisance effects causing altered movements of wildlife near and across the right-of-way during operation.

8.3.3.3 Change in disturbance/annoyance

Disturbance / annoyance during construction and operation may reduce the effectiveness of existing or remaining habitat for wildlife. This may occur through sensory disturbances (e.g., noise, light) causing temporary displacement of some wildlife from otherwise suitable habitat. Such activity may be associated with right-of-way clearing, mobilizing staff and equipment, transmission tower construction and vegetation maintenance.

8.3.4 Mitigation

Selection of the final preferred route took a balanced approach to minimize overall project effects. In addition to routing, standard industry practices and avoidance measures, along with project-specific mitigation as summarized in Chapter 9.0 will be implemented during project construction and operation. This section highlights the key mitigation measures to be implemented during construction and operation to limit effects to wildlife and wildlife habitat, including species of conservation concern.

Application of proven and effective mitigation measures will be implemented as part of the project to avoid or minimize the environmental effects on wildlife and wildlife habitat. Project-specific mitigation measures with respect to wildlife will be outlined in detail in the construction environmental protection plan, which will form part of the construction contract. Mitigation will include, but not be limited to:

- Conducting clearing activity outside the sensitive timing window for wildlife, including species of conservation concern (Appendix I)
    - If some clearing is required during the sensitive timing window 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 setbacks and buffers (Appendix I) around migratory bird nests or mammal dens
- Installing bird diverters at designated environmentally sensitive sites, including Crescent Lake and near the Assiniboine River and Portage Diversion to reduce the potential for bird collisions with wires
- 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 development area
- Using designated roadways and access roads.
- Cleaning equipment before moving from locations with identified invasive weed infestation
- Maintaining vehicles and equipment in designated areas located at least 100 m from the ordinary high-water mark of a waterbody, riparian area or wetland
- Performing daily inspections for fuel, oil and fluid leaks on vehicles, equipment and machinery and shutting down and repairing any leaks found
- Hunting and harvesting of wildlife or possession of firearms by project staff will not be permitted while working on project sites

8.3.5 Characterizing residual effects

Table 6-3 describes the factors used to characterize the interactions among the project and wildlife and wildlife habitat.

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

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

In conclusion, due to the limited change in wildlife habitat availability and mortality risk, use of previously disturbed areas for part of the route, and consideration of

sensitive wildlife timings windows and buffers, the residual effects for wildlife and wildlife habitat are not anticipated to be significant.

8.3.6 Follow up and monitoring

Due to limited project interactions and well-established wildlife and wildlife habitat protections and mitigation measures, wildlife monitoring is not proposed for the project. If significant wildlife habitat damage is observed, remediation efforts will be implemented, and a monitoring plan developed to address concerns at each site. Protections for wildlife habitat will be implemented as part of the environmental protection program.

The environmental protection program is a framework for implementation, management, monitoring and evaluation of protection activities in keeping with environmental effects identified in environmental assessments, regulatory requirements and public expectation. It prescribes measures and practices to avoid and reduce adverse environmental effects on wildlife habitat (e.g., wildlife reduced risk work windows, setbacks and buffers for sensitive habitat).

8.3.7 Cumulative effects

Table 6-5 lists the interactions between current and future projects/activities and wildlife and wildlife habitat. Four of these have potential interactions including agriculture, domestic resource use, Portage area capacity enhancement project, and the Crescent Lake Causeway.

Ongoing agriculture has the potential for further vegetation clearing, reducing suitable habitat for wildlife. Domestic resource use involves the harvest of wildlife. These activities have a long history and therefore would be considered part of the baseline conditions.

The Portage area capacity enhancement project may result in an additional risk of wildlife mortality, including bird-wire collisions with a new transmission line. However, with the implementation of mitigation, this risk will likely to be minimal.

The Crescent Lake Causeway will alter habitat at Crescent Lake and may also temporarily remove wildlife habitat. This could act cumulatively with transmission line construction as they are both under construction at the same time. However, with mitigation, potential wildlife habitat loss or disturbance will be minimal and short term.

8.3.8 Sensitivity to future climate change scenarios

The predicted climate change scenarios would not change the significance determinations for wildlife, as they are not anticipated to measurably increase the magnitude of effects of the Project on habitat availability, wildlife mortality or disturbance/annoyance to wildlife. Effects of future climate change scenarios on wildlife and wildlife habitat will directly relate to the anticipated increase in temperature and associated extreme weather events (e.g., flooding, fires) and may include change in habitat availability resulting from extreme weather events, reduced food availability (e.g., shifts in the seasonal timing of insect emergence, rotting of food caches due to warmer temperatures) and shifts in species ranges.

8.4 Economic opportunities

8.4.1 Summary of interactions

Effects to population, employment and economy are experienced primarily during construction, with the potential for employment opportunities and presence of the workforce in the regional assessment area. 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). Long Plain First Nation (LPFN) has indicated that economic benefits experienced from the project are a priority. LPFN representatives indicated members want access to employment and contract opportunities throughout all project stages. LPFN is also interested in small business opportunities that may support the project directly or indirectly.

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.

Indigenous communities expressed interest and concerns with economic opportunities related to the project. Dakota Tipi First Nation shared that: "*DTFN often*

seeks to have more involvement in economic development opportunities such as having the ability to bid on various areas of the construction sectors of such projects and being awarded such. DTFN does have some concerns with how development may impact local economic development and markets (businesses within the DTFN)" (Appendix C).

Long Plain First Nation expressed concern regarding impacts to their future economic well being due to potentially removing high quality land from Treaty Land Entitlement selection. LPFN expressed concern regarding decreased property value related to the presence of the line near their current property and concerns regarding the potential implications of the project on their future development plans.

Manitoba Hydro considered identified TLE selections it was aware of and did not route through those areas. The route also considered future development potential in the Keeshkeemaquah reserve area. The route uses a substantial portion of the existing right-of-way and road allowance, reducing the likelihood of traversing an area preferred for future development.

8.4.2 Mitigation measures

Manitoba Hydro will work with interested Indigenous communities to prepare a list of skilled labor, equipment, services and ancillary supports available for use on the project.

8.4.3 Assessment conclusion

The effects of the Project in terms economic opportunities 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.

8.5 Human health and safety

Human health and safety is a valued component because local changes (e.g. construction noise) resulting from the project may have health effects on residents within the local assessment area. Such effects may be manifested as increased stress or annoyance, or as changes in the physical health of some residents.

8.5.1 Significance thresholds

8.5.1.1 Electric and magnetic fields (EMF)

Health Canada recognizes the international exposure guidelines for EMF established by the International Commission on Non-Ionizing Radiation Protection, a group recognized by the World Health Organization as the international independent advisory body for non-ionizing radiation protection.

Government and international medical agencies, including Health Canada, the US National Institute of Health, and the National Institute of Environmental Health Sciences have thoroughly reviewed the available scientific information about EMF, but have not recommended regulatory standards.

8.5.1.2 Noise

Health Canada does not have noise guidelines or enforceable noise thresholds or standards and encourages consultation with provincial and municipal authorities to determine appropriate local standards or regulations for projects. Health Canada does, however, consider the following noise induced endpoints as health effects: noise-induced hearing loss, sleep disturbance, interference with speech comprehension, complaints, and change in the percentage of the population at a receptor location who become highly annoyed. Health Canada advises different assessment approaches depending on project phase, duration of noise-producing activities, and range of noise levels (Health Canada 2017).

Hearing loss impacts are not typically considered in environmental assessments because project-related sound levels rarely reach these high levels at the locations of impacted receptors. However, noise-induced hearing loss may be a concern when project activities such as blasting, pile-driving and jack hammering are expected. When considering impulsive noise, Health Canada suggests following the World Health Organization recommendation to avoid hearing loss resulting from impulsive noise exposure and that peak sound pressures not exceed 140 decibels for adults and 120 decibels for children (World Health Organization 1999).

Implosive sleeves may be used for fusing the conductors. The implodes create a flash and a loud boom similar to the sound of a 12-guage shotgun blast (about 110 decibels; (CapX2020 2012)). As this is below the level for potential hearing loss, this will not be considered further in the assessment.

Manitoba's guidelines for sound pollution specify outdoor environmental sound level objectives for residential, commercial, and industrial areas and include maximum

acceptable noise levels for the protection of human health (Manitoba Department of Mines 1977). These guidelines are applied in the assessment of human health to determine whether predicted levels of noise are above the acceptable thresholds, and to determine whether additional mitigation measures may be needed to reduce or control noise levels.

Manitoba Hydro has received Environment Act licenses for several recent projects. These licenses have included requirements for noise. In these licenses, noise nuisance means an unwanted sound, in an affected area, which is annoying, troublesome, or disagreeable to a person residing, working, or present in an affected area. The Licencee (Manitoba Hydro) shall not cause or permit a noise nuisance to be created as a result of the construction, operation or alteration of the development, and shall take such steps as the Director may require, to eliminate or mitigate a noise nuisance.

8.5.1.3 Summary

Significant effects on human health and safety are those that meet any of the following criteria:

- EMF
  - Estimated exposure of electric or magnetic field in human tissue exceeds the International Commission on Non-Ionizing Radiation Protection or International Committee for Electromagnetic Safety reference levels.
- Noise
  - Creation of a noise nuisance
    - If five complaints have been reported by residents
    - sleep disturbance
  - Interference with speech comprehension
  - Change in the percentage of the population at a receptor location who become highly annoyed

8.5.2 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas. Valued component specific details are described below:

Project development area: Footprint of the proposed project including the transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area is defined as 500 meters from either side of the project centreline (Map 8-3). It represents the area where noise and visual impacts are likely to be most pronounced or identifiable.

Regional assessment area: The boundaries of the Rural Municipality of Portage la Prairie (Map 8-4). Effects of other projects and activities occurring within the regional assessment area that have potential to act cumulatively with the project are assessed based on the regional assessment area

8.5.3 Effects pathways

There are three main pathways that can lead to effects to human health and safety:

- Change to electric and magnetic fields
- Changes to the environment (e.g. noise levels, EMF exposure) leading to stress and annoyance in the local population due to
  - perceived health effects from EMF exposure
  - noise from traffic and construction activities
  - changes in the landscape (visual quality) / changes to property values
- Accidents or other unplanned events

8.5.3.1 Change to electric and magnetic fields

Project-related EMF are only associated with the operation and maintenance phase; therefore, the construction phase is not assessed. The voltage and current carried by the transmission line will generate EMF. The EMF diminishes rapidly with distance from the transmission line. Physical buffers, such as trees and buildings, will reduce the intensity of electric fields but not magnetic fields. The effect of EMF on human receptors depends on the EMF frequency. Extremely low frequency EMF, generated by transmission lines with a frequency of 60 Hertz, have the capacity to induce electric fields in a human body but the levels are extremely small (World Health Organization 2015).

Numerous reviews of research literature on exposure to extremely low frequency EMF and possible adverse health effects have been conducted by national and international scientific and governmental agencies, including Health Canada and the World Health Organization. None of these agencies have concluded that exposure to extremely low frequency EMF is a demonstrated cause of any long-term adverse health effect. Study results are detailed in the EMF health research update report (Exponent 2015b), conducted for the recently constructed Manitoba-Minnesota transmission line.

Canadian (Manitoba Clean Environment Commission 2001) and international studies ((World Health Organization 2007); (International Agency for Research on Cancer 2002)) have concluded that there are no known adverse health consequences of exposure to extremely low frequency EMF at the levels generally found in residential and occupational environments, including proximity to electric transmission and distribution facilities. There is no conclusive evidence of any harm caused by exposures at levels normally found in Canadian living environments (Health Canada 2004).

While Manitoba Hydro is sensitive to public concerns regarding potential health effects from electric and magnetic fields, there is at present no scientific evidence to justify modification of existing practices respecting facilities for the generation, transmission and distribution of electricity.

8.5.3.2 Changes to the environment

The construction and operation of the transmission line may have effects on mental health as a result of perceived EMF exposure, noise and changes in the landscape.

Perceived EMF exposure

Several key studies conducted by the World Health Organization (WHO) and the International Agency for Research on Cancer (IARC) confirm there is no link between exposure to EMF fields and adverse human health outcomes. Despite this, there remains a perception that transmission lines pose health risks ((Furby, et al. 1988); (Devine-Wright 2013); (Cain and Nelson 2013); (Keir, Watts and Inwood 2014)).

The closer individuals live to a transmission line the greater the increase of concerns related to perceived health risks (McMahan and Meyer 1995). Several studies have assessed the link between the exposure of EMF and the perceived health risks that are thought to be associated with the presence of transmission lines ((Linder 1995); (MacGregor 1994); (Morgan, et al. 1985)). While most studies found no definitive health risk, there are often increased levels of stress and anxiety that result from the presence or siting of transmission line development.

Noise

The World Health Organization (World Health Organization 2002) defines health as *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*". This implies that noise-induced annoyance may be considered an adverse effect on health (World Health Organization 2011).

Below the exposure threshold of biological damage to the ear, noise can cause potential health impacts, such as sleep disturbance and/or cause long-term high annoyance, an indicator of potential health impacts, depending on the interference of the noise with what someone is trying to do (e.g. sleep, concentrate or communicate) and the expectation of peace and quiet during such activities (e.g. in a quiet rural area or during Indigenous spiritual ceremonies; (Health Canada 2017).

As construction takes place during the day, effects to sleep, and noise guidelines for night, will not be considered in the assessment. This assessment focusses on annoyance.

Health Canada (Health Canada 2017) developed guidance for evaluating human health impacts of noise in environmental assessment. The main steps in assessing the potential health impacts of changes in noise associated with a project are the following:

1) Identify people (receptors) who may be affected by the project-related noise
2) Determine the existing (baseline) noise levels at representative receptors, by measurement or estimation
3) Predict project-related changes in noise levels for each phase of the project (construction, operation and decommissioning)
4) Compare predicted noise levels to relevant guidelines and/or standards
5) Identify and discuss the potential human health impacts associated with predicted changes in noise levels
6) Consider mitigation measures, their implementation, and any residual effects, after the measures are implemented
7) Consider community consultation and prepare a complaints-resolution plan
8) Consider the need for monitoring of noise levels.

Health Canada (Health Canada 2017) recommends, in some cases, a less extensive assessment may be warranted. If noise levels at all receptors are not expected to approach the US EPA's (US Environmental Protection Agency 1974) mitigation noise levels.

Identify people (receptors) who may be affected by the project-related noise

Noise levels from construction sites range from 90 decibels at 15 m down to less than 60 decibels at 500 m (Bonneville Power Administration 2012). Based on Health Canada guidelines (Health Canada 2017), no effects are anticipated below 60 decibels. which no effect is expected (see below for details). Based on this information a 500 m buffer was drawn around the transmission line right-of-way (Map 8-3) to determine potential receptors.

Potential receptors include over 70 homes and 50 recreational sites, as well as several picnic sites, a school and a church.

Transportation routes are not included as all construction traffic will follow existing high use highways and municipal roads. As described in the traffic section (section 7.12) construction traffic will be insignificant relative to daily public use.

Determine the existing (baseline) noise levels at representative receptors, by measurement or estimation

Health Canada (Health Canada 2017) suggests a conservative approach to estimate a reasonable worst-case scenario and assume baselines of 35 dBA for rural areas and 45 dBA for urban/suburban areas. As the proposed project is in an exurban area, an assumed estimated baseline noise level of 45 dba will be used for most areas. Driving a car on the highway with the windows open is greater than 85 dBA (Health Canada 2016). Therefore, a large portion of the local assessment area would expect noise levels in this range.

Predict project-related changes in noise levels for each phase of the project (construction, operation and decommissioning)

The largest source of noise during construction is the combined operation of machinery (i.e., bulldozers, transportation vehicles, clearing equipment, and cranes) and periodic explosive discharges by implosive sleeves during conductor stringing. Use of implosive sleeves will be limited to a short duration of time near the end of construction only. Notifications will be provided to area residents to alert them of exploding discharge noise prior to commencing this work. General construction noise will be 89 dBA at 15 m (Table 8-1) and fall to less than 60 dBA at 500 m (Bonneville Power Administration 2012).

Table 8-1: Typical noise emission rates for construction equipment

Type of equipment	Decibels at 15 metres
Implosive sleeve*	110
Road grader	85
Bulldozers	85
Heavy trucks	88
Backhoe	80
Pneumatic tools	85
Crane	85
Combined equipment**	89
Helicopter	80-100

*CAPX2020 (2012)
**Thalheimer (1996) – does not include helicopters or implosive sleeves

The largest source of noise along the transmission line during operation is associated with corona discharges that result in audible noise typically heard as a hissing or crackling sound (Exponent 2015a). Corona discharges are produced at points along the transmission line conductors and are more common during foul-weather events (Exponent 2015a). Other sources of noise will be produced during maintenance activities that will be conducted using equipment including quads, snowmobiles, and possible infrequent use of helicopters.

Exponent (Exponent 2015a) modeled the electrical and acoustic environment of the Manitoba-Minnesota Transmission Project (500 kV line). During medium-fair weather conditions, maximum audible noise associated with operation of the transmission lines anywhere along the edge of the right-of-way is expected to be approximately 23 dBA (Exponent 2015a), which is below the typical ambient noise typically experienced in quiet rural locations (30-40 dBA). This is a conservative estimate as the audible noise should be lower for this project due to the lower voltage running through the conductor. During periodic foul weather conditions that may cause corona discharges, maximum audible noise at the edge of the right-of-way is expected to be 48 dBA, dissipating to 45 dBA at a location 30 m from the edge-of-right-of-way (Exponent 2015a).

Compare predicted noise levels to relevant guidelines and/or standards

For construction phases less than one year in duration, Health Canada (Health Canada 2017) has set the guideline of 62 dBA average noise level over a 24-hour period. This guideline is based on a previous study conducted by Health Canada that determined the level at which people start to find construction equipment highly annoying. Health Canada guidance including the percent highly annoyed calculation relies on ISO 1996-1:2003 (International Organization for Standardization 2003).

Health Canada uses 62 decibels when it considers effects related to widespread complaints. When project sound levels are greater than 75 dba, complaints can be expected to include strong appeals to authorities to stop noise.

Identify and discuss the potential human health impacts associated with predicted changes in noise levels

Within 500 m of the construction site, construction noise levels will be above the guideline value of 62 dBA and therefore we can expect some effects. The effects relate to nuisance effects that may cause stress (stress discussed below).

During operation, noise levels will be minimal. During inclement weather, there may be some audible noise, but it is below levels that would be considered a nuisance.

Consider mitigation measures, their implementation, and any residual effects, after the measures are implemented

Mitigation is discussed in Section 8.5.4.

Consider community consultation and prepare a complaints-resolution plan

Manitoba Hydro does extensive engagement for upcoming projects. Details of engagement for this project are covered in chapters 4.0 and 5.0. Manitoba Hydro will continue to engage interested parties, will maintain the project communication methods in place (project phone line and email) and work to resolve any issues that arise. Manitoba Hydro uses a SharePoint database to record project communications. This allows tracking of any complaints and maintains accountability.

Consider the need for monitoring of noise levels.

The project area includes both urban, rural residential and rural areas. The noise created by construction will be periodically above ambient but should not cause a level of nuisance and stress that would justify a monitoring program.

Additional stressors

Several studies have linked how power transmission lines have increased levels of stress and annoyance in relation to perceived changes in property values, aesthetic concerns, and health and safety concerns. Furby et al. (Furby, et al. 1988) found that transmission line development resulted in increased concerns about property values and implications of conventional compensation procedures. Thomas and Evans (Thomas and Evans 1996) found residents living near a transmission line reported experiencing moderately negative effects on their health and safety, property values and aesthetics. While most studies found no definitive health risk, there are often increased levels of stress and anxiety that result from the presence or siting of transmission line development.

Stress

Stress and annoyance can be caused by multiple measurable and perceived contributing factors as discussed above. Stress is thought to contribute to the development of many adverse health conditions including heart disease, stroke, high blood pressure, upper respiratory disease and poor immune response (Scneiderman,

Ironson and Siegel 2005). Exposure to stress can also contribute to behaviours such as smoking, over-consumption of alcohol and less-healthy eating habits.

In their BP6/BP7 report the MMF describe some of the fears and uncertainties that the Manitoba Métis community holds about transmission line developments in general. *"We had power lines in the back there. And we never liked to pick berries. You could always hear, and everybody always told us the people who lived in our house along there, none of them ever had any kids. It was because of the hydro lines they said, eh? So who knows whether it was or not, but all those things like that stay in mind, and when I pick berries, I didn't like picking near the hydro lines either. It was just the, they were ugly to look at. They don't represent the sacred, like, peaceful area to gather our stuff. I would never go pick by the hydro lines or hang out. And now they've got a snow route going right down the highway line, hydro lines."* This quote was drawn from a Bipole III interview but applies generally to all transmission lines. The MMF BP6/BP7 report does not indicate that there are plant gathering areas that will be traversed by the proposed BP6/BP7 project.

8.5.3.3 Accidents or other unplanned events

During construction, accidents and / or incidents may occur. The following are most likely to have community-related implications to safety: collisions, spills and leaks of hazardous materials and fire.

The operation of vehicles and heavy equipment on provincial highways, and the right-of-way could result in human collision mortality or injury. Human incidents may involve vehicle-vehicle collisions or vehicle-pedestrian collisions. During construction, the potential for these types of collisions is primarily influenced by traffic volumes.

During construction, environmentally hazardous materials such as petroleum hydrocarbons (e.g., gasoline, diesel and lubricating oils) and hydraulic fluid will be used. Spills or leaks of petroleum hydrocarbons could occur along the right-of-way, as a result of incidents involving heavy equipment, vehicles that contain fuel, oil and lubricants (e.g., excavators and cranes). This could contaminate the air, soil or water and affect the safety of people in the area.

There is also potential for fires during the construction phase, which could be a safety risk for the public.

8.5.4 Mitigation

8.5.4.1 Electric and magnetic fields

Although no mitigation is required, Manitoba Hydro continues to undertake the following actions regarding EMF concerns:

- Designing the transmission line to meet international standards and guidelines set forth by the International Commission on Non-Ionizing Radiation Protection. These guidelines have been adopted by Health Canada and the World Health Organization
- Monitoring of worldwide research programs on electric and magnetic fields for its large-scale projects
- Maintaining communications and provision of technical information to interested parties, including the public and agencies responsible for public and occupational health and the environment

8.5.4.2 Stress and annoyance

To mitigate stress and annoyance caused by real and perceived environmental effects, the route selection process considered several factors, including existing land uses, feedback provided during project engagement and the presence of existing infrastructure. The following measures will be implemented to mitigate the effects of stress and annoyance:

- Manitoba Hydro will enter into easement agreements with private landowners whose land is crossed by the transmission line. The information provided to landowners during this process is expected to alleviate concerns related to project uncertainty
- The final detailed project design will consider standards for setbacks and overhead clearance, including CSA standards such as CAN/CSA-C22.3 No. 1-10 “Overhead Systems” and CAN/CSA 22.3 No. 60826-10 “Design Criteria for Overhead Transmission Lines”
- Manitoba Hydro will continue to share up to date information regarding project activities and timelines and to work to resolve concerns
- Mitigation measures identified in Section 8.7 to reduce adverse effects on visual quality, and associated stress and annoyance related to changes in viewscapes

The following mitigation measures will reduce adverse effects on stress and annoyance related to construction activities:

- Construction activities and equipment will be managed to avoid damage and disturbance to adjacent properties, structures and operations.
- Mud, dust and vehicle emissions will be managed in a manner that considers the safe and continuous public activities near construction sites where applicable.
- Noisy construction activities where noise and vibration may cause disturbance and stress in built-up areas will be limited to daylight hours.
- A communication protocol will be developed to notify affected parties of blasting operations and conductor splicing. Affected parties may include the RCMP, municipalities, landowners and resource users.

Mitigating blasting noise (Health Canada 2017).

Noise due to implosions has unique characteristics. Therefore, Health Canada holds the view that for blasting during short-term construction (< 1 year), limits on the number of blasts should be implemented irrespective of other noise levels due to background sources or construction activities.

Manitoba Hydro will combine blasts to minimize the overall number of blasts.

General mitigation measures for noise (Health Canada 2017)

- Regularly train workers and contractors to use equipment in ways that minimize noise
- Provide notification to the public ahead of implodes related to conductor stringing with contact information
- Ensure that site managers periodically check the site, nearby residences and other sensitive receptors for noise problems so that solutions can be quickly applied
- Include in tenders, employment contracts, subcontractor agreements and work method statements, clauses that assure the minimization of noise and compliance with directions from management to minimize noise
- Avoid the use of radios and stereos outdoors and the overuse of public address systems where neighbours can be affected
- Avoid shouting and minimize talking loudly and slamming vehicle doors
- Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours and other relevant practices (e.g. minimizing the use of engine brakes and periods of engine idling)

8.5.4.3 Safety

The public will be made aware of construction activities though the public engagement process and through the provision of appropriate signage. Standard safety procedures, designated truck routes and signage will also be in place to mitigate potential effects of project traffic.

During construction, the right-of-way will be considered an active construction site. Therefore, access will be limited to only those individuals required to be there and not members of the general public. Standard workplace health and safety measures, including appropriate signage will be applied to work sites.

Construction traffic will be limited to daytime hours. All heavy equipment will be kept within construction areas and traffic signs and barricades will be installed and monitored. All traffic laws and by-laws obeyed. Construction zones and intermittent lane closures can be expected during the construction period on roads / trails / sidewalks adjacent to work activities. Full closures would be in effect for short periods of time during stringing, where the wire crosses overtop roads / sidewalks / trails.

Manitoba Hydro maintains procedures that will include a plan for preventing and combating fires. A fire prevention plan will be implemented and adhered to by Manitoba Hydro and its contractors consisting of fire prevention measures and incident response procedures to address public safety.

8.5.5 Characterizing residual effects

Potential effects to health include electric and magnetic fields, stress and annoyance, decrease in the consumption of subsistence foods and traditional medicines, and safety issues. Given the application of the above-described mitigation measures the effects of the Project in terms of health are summarized as follows:

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Local
- Duration: Medium-term
- Frequency: Regular
- Reversibility: Reversible

Due to the short duration of construction and the well tested mitigation measures, the project should not cause nuisance effects that would increase stress levels that would cause residual health effects; therefore, the residual effects for human health and safety are not anticipated to be significant.

8.5.6 Follow-up and monitoring

Construction monitoring is proposed for an Indigenous monitor. This monitor may consider human health effects of construction during their monitoring. There is no other follow-up monitoring required for the assessment of potential human health risk. In terms of health concerns related to EMF, Manitoba Hydro will continue to monitor studies and make information available to the public.

8.5.7 Cumulative Effects

None of the project listed in Table 6-4 will produce EMF, therefore there will be no overlap. However, several of them may have overlapping construction periods or continue after construction is complete, extending the length of time construction noise is prevalent in the area. This could increase stress and annoyance leading to potential health implications. However, all projects listed (other than the truck and travel center) are greater than 500 m away. The noise and visual intrusion receptors will be different, other than transient receptors.

Increased construction traffic could increase safety risks.

8.6 Parks and recreation

Parks and recreation were selected as a valued component because of regulatory considerations and its importance to communities, property owners, resource users (e.g., hunters and trappers, commercial operators and the general public), and other interested parties.

The transmission line will intersect residential areas and areas used for commercial (e.g., agriculture) and non-commercial (e.g., fishing and recreation) land use. Agriculture, due to its importance in the regional assessment area as a land use, is addressed separately (Section 8.8).

Parks and recreation includes the following topic areas:

- Crown land, designated lands and protected areas
- Recreation and tourism: trails (hiking, snowmobile, all-terrain vehicles [ATVs]), waysides/picnic sites, campgrounds, golf courses, recreational facilities, lodges, attractions/museums and tourism sites, canoeing/navigation

The transmission line routing process considered potential effects on parks and recreation as discussed in Section 3.3.

8.6.1 Significance thresholds

A residual effect on parks and recreation is considered significant if:

- unless addressed through compensation, it widely disrupts, restricts or degrades present recreational use of the area to a point where activities cannot continue at or near baseline levels
- the route crosses an area of crown land that has a designated purpose statement / mandate and that goal or mandate could not be achieved
- any part of the project should contravene any of the legislation described below

Manitoba Parks and Resource Protection (MRPP) staff shared concerns about segments that could affect Yellow Quill Park:

"clearing of the trees in the right-of-way, if a line were to be developed here would be considered by MPRP staff to be a significant impact to the park. The park is heavily used by residents and managed through an agreement with the rural municipality"

8.6.1.1 The Provincial Parks Act

Administered by the Parks and Protected Spaces Branch of Manitoba Conservation and Climate, *The Provincial Parks Act* (C.C.S.M. c. P20) was established to protect natural lands and the quality of life; manage existing and future provincial parks so representative examples of natural and cultural heritage are conserved; and allow economic opportunities to contribute to the protection of the province's natural regions.

The Act provides for the designation and management of provincial parks as part of a system plan. The system plan sets out proposed boundaries, classifications and land use categories of provincial parks.

Provincial park classifications include wilderness park, natural park, recreation park or heritage park. Land in provincial parks is categorized into one or more of the following land use categories: wilderness, backcountry, resource management, recreational development, heritage or access.

The Yellow Quill Provincial Park and Portage Spillway Provincial Park occur within the local assessment area. They are both recreational parks. According to the management plan, Yellow Quill Provincial Park will continue to serve as an off-leash dog park for residents of Portage la Prairie and the surrounding area (Manitoba Sustainable Development 2017). According to the management plan, Portage Spillway Provincial Park will be managed to provide a basic, seasonal site for picnicking and fishing access (Manitoba Conservation and Water Stewardship 2013).

8.6.1.2 The Planning Act and Provincial Planning Regulation

Administered in cooperation with Manitoba Municipal Government and the associated municipal councils, *The Planning Act* provides a framework for land use planning strategies at the provincial, regional and local scale.

Requirements of the Act and its regulations do not apply to the Crown or Crown agencies. Manitoba Hydro notes that, as a Crown Corporation, they are not directly subject to the legislative provisions and are generally exempt from them in terms of development planning. However, land use planning is considered during development of the project primarily during the routing process.

8.6.2 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas. Valued component specific details are described below:

Project development area: Footprint of the proposed project including the transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area is defined as 500 m on either side of the centreline (Map 8-3). This covers an area where effects on parks and recreation are likely to be most prevalent due to noise or visual intrusion.

Regional assessment area: The regional assessment area includes the boundaries of the Rural Municipality of Portage la Prairie (Map 8-4). Effects of other projects and activities occurring within the regional assessment area that have potential to act cumulatively with the project are assessed based on the regional assessment area.

8.6.3 Effects pathways

There are two main pathways that can lead to effects to parks and recreation:

- Change in access to recreational areas
- Changes to the environment (e.g. noise levels, visual intrusion) leading to:
  - A decrease in the ecological integrity of a provincial park
  - Disruption / intrusion to recreational activities, sites and areas

8.6.3.1 Change in access to recreational areas

Land clearing and construction may physically interfere with recreational activities or disrupt recreationalists from accessing preferred areas if there is construction occurring near these areas.

8.6.3.2 Changes to the environment

Project interactions that can affect parks and recreation use include the potential for adversely affecting established recreational activities and visual aesthetic values. The presence of construction equipment or the noise generated during construction and the presence of the line during operation may alter a recreational user's quality of experience. This may cause people to avoid these activities or reduce overall enjoyment.

The final preferred route avoids both provincial parks. There is no direct impact on these; however, it does run within 500 m and therefore there could be nuisance effects due to noise and visual intrusion.

There is potential for visual quality and noise concerns for recreational venues along the project development area, such as baseball diamonds, tennis courts or golf course (Map 8-3).

The Assiniboine River is a scheduled water under the *Canadian Navigation Protection Act*. The proposed project does not affect navigation, but, as it runs parallel to the river for several hundred meters and there will be some riparian vegetation clearing, it may affect a user's experience while navigating the river.

8.6.4 Mitigation measures

During transmission line routing, areas of least preference were identified and considered when developing alternate routes. Areas considered for avoidance included provincial parks, campgrounds, picnic areas and recreational sites/trails (e.g., golf courses, skiing areas). Mitigation measures of potential project effects on designated lands, protected areas, recreational activities and access include the following:

- Clearing and disturbance will be limited to defined rights-of-way and associated access routes
- Existing access roads will be used where available.
- Canadian Standard Association stream crossing clearance guidelines will be adhered to for the construction, operation and maintenance of the transmission lines.

8.6.5 Characterizing residual effects

Potential effects to parks and recreation relate primarily to nuisance effects (noise and visual intrusion). Based on this, a buffer of 500 m was placed around the project footprint as this is where both noise and visual impacts will be most pronounced.

Map 8-3 shows all recreational sites within 500 m of the project. There are over 50 sites shown including tennis courts, baseball diamonds and soccer fields.

During the construction phase, the presence of workers and equipment in the local assessment area will generate noise, dust and a visual presence. This may detract from the recreational experience causing tourists/recreational users to reduce or stop their use of areas near work sites during periods of construction activity. In addition, access to some areas will be restricted at times by the nature of the work undertaken or for safety reasons (e.g., during use of implosives for conductor stringing).

Recreational activities such as walking, biking, tennis or golf or cross-country skiing may be disturbed during construction, but this disruption is expected to be temporary and short term.

With the adoption of mitigation measures, the project will be constructed to limit possible disturbance and disruption to recreational uses and users. In consideration of mitigation measures, the project will have a low disturbance effect on recreational areas and activities. Disturbance or disruption will be temporary and short term during the construction period.

Project operation and maintenance has the potential to affect recreational users through noise generation, disturbance and changes in visual quality. A portion of the line follows the existing corridor and therefore the presence of the line has been part of the landscape for years. Therefore, the potential effects are limited.

Table 6-3 describes the factors used to characterize the interactions among the Project and aquatic resources.

- Direction: Adverse
- Magnitude: Small
- Geographic extent: Local
- Duration: Long term
- Frequency: Regular
- Reversibility: Permanent

With the implementation of mitigation measures, residual effects from the project on parks and recreation are anticipated to be low magnitude. The socio-economic context for the residual effects across the local assessment area is dependent upon

location within the project development area. Designated and is of moderate resilience as designated lands, protected areas and recreation can accommodate some change in the land base. There are numerous recreational opportunities available across the landscape and as such the area is likely adaptable to some change in land use. Effects will be short to medium term and continuous and occur during the construction and operation and maintenance phases.

The routing process avoided provincial parks and other Crown land parcels. Due to the location of the project, within an exurban area, the project should not cause nuisance effects that would decrease the use and enjoyment or increase stress levels that would cause residual health effects. The residual effects for human health and safety are not anticipated to be significant.

8.6.6 Follow up and monitoring

Manitoba Hydro's practice is to develop project-specific environmental protection plans where mitigation measures are stipulated for construction, operation and maintenance activities. These measures are regularly reviewed for their effectiveness as part of a process of adaptive management in project monitoring and follow-up.

Manitoba Hydro has provided and will continue to provide project information to relevant agencies and organizations as required and requested.

Potential follow-up related to parks and recreation may involve flagging environmentally sensitive sites and through construction inspection. Inspection will determine whether the item or activity is in conformance with mitigation requirements.

8.6.7 Cumulative effects

Several projects listed in Table 6-4 may have overlapping construction periods or continue after construction is complete, extending the length of time construction noise is prevalent in the area. This could increase noise and/or visual intrusion. However, all projects listed (other than the truck and travel center) are greater than 500 m away therefore, the receptors will be different than those of the proposed project. . The noise and visual intrusion receptors will be different.

8.7 Property value, residential development and visual quality

Property value and residential development were selected as valued components because of the importance to communities and property owners. Property value and residential development considers land tenure and property ownership, residential

development, proposed residential development (i.e., private subdivisions), and private property value.

Visual quality is a valued component because the transmission line and its associated infrastructure and vegetation clearing have the potential to change the visual quality of the landscape from viewpoints important to residents, First Nations and Métis, recreationalists, tourists and interested parties. An adverse change in the visual landscape can contribute to stress and annoyance; for example, due to the perception that aesthetic quality, recreation values, or property values will be affected.

8.7.1 Significance thresholds

A residual effect on property value or proposed development is considered significant if, unless addressed through compensation, it widely disrupts, restricts or degrades property values or development potential.

The thresholds for assessing the significance of effects on visual quality, defined below, consider the effect of the project within the planning context and intended management vision for the area, as well as the degree of change from current baseline conditions.

The significance of visual effects depends primarily on the anticipated magnitude of the visual alteration created by the project and the visual sensitivity of the landscape, including the anticipated viewer response to the visual alteration.

A residual effect is considered significant if the following three conditions occur:

- The average visual landscape character changes from relatively undisturbed to disturbed
- The closest towers at high value viewpoints are moderately to highly prominent
- Visual quality is an important planning objective by government authorities

The Portage la Prairie development plan (Portage la Prairie Planning District 2018) outlines several common general goals related to visual quality. These include the promotion of development that enhances the aesthetic quality and visual cohesion of residential of commercial developments. The plan recognizes that urban parks and recreation environments have a significant role in defining the character and quality of a community and are experienced by the visual and physical linkages that permit people to interact and move through space.

8.7.2 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas. Valued component specific details are described below. The following areas are based on guidelines for visual assessment ((Palmer 2016); (Driscoll, et al. 1976); (Sullivan, et al. 2014)). As the potential effects to property values and residential development relate to the presence of the towers and visibility, the assessment areas are treated the same for both.

Project development area: Footprint of the proposed project including the transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area corresponds to lands with a potential foreground (0-500 m; Map 8-3) or midground view of the transmission line corridor, 5 km on either side of the final preferred route (Map 8-2).

Regional assessment area: The regional assessment area corresponds to the areas with a potential view of the line, to the maximum extent of visibility, which includes areas within 15 km of the final preferred route; Map 8-2).

8.7.3 Effects pathways

8.7.3.1 Property values and residential development

The assessment of change in property focuses on three effects:

- Change in private property value
- Nuisance effects on residences
- Conflict with land development potential

Private Property Values

The physical presence of transmission line infrastructure could affect the value of residential property near the right-of-way. Factors that can influence property values include change in aesthetics; real or perceived nuisances and health risks; real or perceived change in the use and enjoyment of the property; and distance from the property to the transmission line.

The literature is inconclusive on whether transmission lines affect property values. Some studies show a small, negative effect on property values immediately after construction that diminish over time and distance ((Cowger, Bottemiller and Cahill 1996); (Jackson and Pitts 2010.); (Headwaters Economics 2012)).

In a review of transmission line effects on housing prices, Bottemiller and Wolverton (Bottemiller and Wolverton 2013) found a small, negative effect occurring when rights-of-way abut single-family homes. Effects on property values were more substantive for higher priced homes and negligible for average priced homes.

While transmission line easements were found to have a consistent small negative effect on the value of adjacent affected properties, the statistical significance of this finding has varied (Elliot Grover & Co. Ltd. 2008).

Effects on property value varied depending on the location and visibility of transmission towers to properties ((Colwell 1990); (Cowger, Bottemiller and Cahill 1996); (Bottemiller, Cahill and Cowger 2000); (Elliot Grover & Co. Ltd. 2008); (Chalmers and Voorvart 2009); (Jackson and Pitts 2010.)). Other studies have found no evidence that proximity to, or visibility of, high voltage transmission lines affect property values (Elliot Grover & Co. Ltd. 2008).

Since 2000, Manitoba Hydro has conducted an annual property value-monitoring program in the Birds Hill and Lister Rapids areas in the Rural Municipalities of East and West. St. Paul. The monitoring program was initiated in response to property owner concerns regarding the construction of the Dorsey-St. Vital 230 kV transmission line within an existing right-of-way. Real estate transactions for developed single-family residential properties within the monitoring area were tracked from January 1, 1992 to December 31, 2013 (Manitoba Hydro 2014). The monitoring area was divided into:

- Adjacent – properties located immediately next to the transmission right-of-way without any other properties located in between
- Nearby – properties located between the adjacent property and the next property line
- Other – all other property located within the project development area

The 2014 monitoring report noted that housing prices have fluctuated within range of adjacent, nearby and other properties (Manitoba Hydro 2014).

The findings of an econometric analysis conducted for Manitoba Hydro by Prairie Research Associates (PRA) on the effect of transmission lines on residential property values were consistent with the existing literature. PRA found mixed evidence that transmission lines affect property values. Evidence that pointed to a negative effect suggests that any effect is small and diminishes rapidly as distance to the transmission line increases. While the analysis indicates a small, negative correlation between transmission line proximity and assessed value, no such negative correlation occurs regarding sales price (Prairie Research Associates 2015).

Nuisance effects on residents

Potential effects during transmission line construction include noise disturbance, vibration, dust, damage to property, and interference with roads and community infrastructure.

Noise sources within the project development area will be typical of construction activities for transmission lines (detailed noise levels are described in Section 8.5.1.2). There are 17 residences within 100 m (only 1 along the new portion of the line) and 54 within 400 m (31 along the new portion of the line). Potential effects include disturbance and annoyance to community residents because of heavy equipment operated nearby. For splicing conductors, Manitoba Hydro may use implosive sleeves to join the conductors together. When used, the sound produced constitutes a short very loud bang.

During operation, a transmission line emits audible noise when electrical energy within the conductor interacts with the air surrounding the conductor surface.

The Province of Manitoba's Guidelines for Sound Pollution (Manitoba Department of Mines 1977) in residential areas indicates a maximum desirable sound level objective of 55 dBA (day) and 45 dBA (night). The higher sound levels generated during construction will be transient as equipment is moved along the right-of-way; 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.

Development potential

The development of a cleared right-of-way for a transmission line could reduce development potential due to the fragmentation of lots. The transmission line could also result in less interest in wanting to buy a lot or build a residence near the line, thus lowering the development potential of land or land nearby. These changes could influence development in localized areas adjacent to the project or potentially affect the location of future developments within the local assessment area.

8.7.3.2 Visual quality

The assessment of change in visual quality focuses on:

- Changes to the visual landscape

Vegetation clearing and the construction of project infrastructure, including transmission line towers and conductor wires will create or add to human-caused disturbance at identified viewpoints.

Based on a review of the literature for visual quality, and transmission line visibility (Palmer 2016); (Driscoll, et al. 1976); (Sullivan, et al. 2014)) a 500 m buffer was placed around the centerline. This was considered the area where the transmission towers would be in the foreground view and therefore most intrusive.

The transmission line will be within 500 m of over 70 homes and 50 recreational sites, as well as several picnic sites, a school and a church (Map 8-3).

The aesthetic value of the landscape can vary according to its scenic elements and the perception of the landscape by viewers. Landscapes have scenic value, which may be altered by changes brought on by the project and other future developments.

During construction, crews will move along the transmission line right-of-way completing each component / activity sequentially. Construction activities include: clearing the right-of-way (i.e., removal of vegetation), establishing marshalling yards, drilling foundations, installing towers, stringing conductors and construction site rehabilitation and decommissioning. These activities are expected to result in disturbance to the existing visual landscape by their presence.

Project components will become more visible to varying and different degrees from one location to the next as construction progresses from clearing for the right-of-way, to tower installation and stringing conductors. The effects of the project on visual quality recognizes that there will be increasing levels of alteration to viewsheds from the visibility of the towers and conductors and contrast with the landscape during project construction, but focuses on the final alteration (i.e., during operations and maintenance) when all project components are constructed and operational.

Indigenous communities also shared concerns with the presence of the line affecting the experience of traditional harvesting and important sites. These concerns related to both the visual disturbance of the line and the perceived effects of EMF on medicinal plants. In their report, the MMF expressed that: “Through the survey conducted for this study [MMTP], the Métis respondents reported that they would avoid transmission lines for future harvesting” (Manitoba Métis Federation 2021).

The presence of short-term and intermittent construction activities during this phase of the project is unlikely to affect visual quality, except where the right-of-way or workspace is visible. However, the towers will be visible, once they are erected, from locations outside the right-of-way.

8.7.4 Mitigation measures

8.7.4.1 Property values and residential development

Transmission line routing considered the occurrence of homes within the right-of-way, proximity to homes and the number of proposed subdivisions potentially affected.

During construction, Manitoba Hydro plans to notify landowners, Indigenous communities and interested parties prior to construction start and will share information about planned construction activities.

On a case-by-case basis, a voluntary purchase can be considered for residences where the proximity of the transmission line on new right-of-way is within 75 m of the residence (i.e., to the nearest part of the line such as the conductor/crossarm) at 100% of all reasonable and related relocation costs.

For private land parcels occurring within the project development area that need access for right-of-way purposes, Manitoba Hydro will obtain and easementpay lease payments for easements over private property based on current land values.

The effect of project activities can be reduced through scheduling and logistics planning (e.g., use of implosives during daytime hours during the week). Mitigation measures of potential project effects on property and residential development include the following:

- Construction activities and equipment will be managed to avoid damage and disturbance to adjacent properties, structures and operations
- Mud, dust and vehicle emissions will be managed in a manner that considers the safe and continuous public activities near construction sites
- Noisy construction activities where noise and vibration may cause disturbance and stress in built-up areas will follow local noise by-laws
- A communication protocol will be developed to notify affected parties of blasting operations and conductor splicing (if required)
- Construction, operation and maintenance personnel will undertake activities in such a way to avoid affecting neighbouring properties, structures or operations. In the unlikely event that a landowner incurs damages, they are subject to compensation through Manitoba Hydro's existing compensation policies

8.7.4.2 Visual quality

Visual quality considerations were factored into route selection. In addition to routing considerations, it is recognized that decisions around tower siting/placement could substantially mitigate the visual changes.

Manitoba Hydro has or will use the following mitigation measures to enhance visual screening and reduce visual contrast of the project:

- The transmission line has been routed to consider populated areas, proximity of residences and parks.
- Apart from reflective bird diverters at areas of high bird-wire collision potential, non-reflective galvanized tower materials are used which reduce the visual contrast with background.
- Approved clearing boundaries will be clearly delineated by flagging prior to clearing or equipment will be guided using global positioning systems to keep clearing activities within the project footprint.

Manitoba Hydro will continue to work with a range of interested parties (residents, interested parties, and provincial government agencies as applicable) in development of the proposed transmission lines, including tower placement within the right-of-way, and scheduling of construction activities with the goal to reduce any potential visual or other interactions.

8.7.5 Characterizing residual effects

8.7.5.1 Property values and residential development

The maximum noise level generated during the construction phase from combined construction equipment is anticipated to be 90 dBA at 15 m from noise sources; implosive sleeves (if used) will generate instantaneous discharges expected to generate 110 dBA during splicing of conductors. At 500 m from noise sources within the project development area, construction activities are anticipated to generate les than 62 dBA (below levels expected to cause nuisance effects), exclusive of implosives used for tower stringing activities.

There are over 70 residences within 500 m of the right-of-way. These residences will experience noise generated by construction activities. Noise levels during the night will remain unchanged from the existing conditions, because construction activities related to the assembly and installation of towers will only occur during the day.

Project operation and maintenance has the potential to affect residents and property owners through visual aesthetic changes and noise generation. Residual effects are

expected to be associated with changes in visual quality on residences due to the visibility of the transmission line once it is operational.

The transmission line will generate audible noise at the edge of the transmission line right-of-way at all locations (Exponent 2015a). The audible noise generated by the operation of the transmission in fair-weather conditions would be comparable to a bedroom at night (24 dBA) and quieter than a library (35 dBA) (Exponent 2015a).

Homes within 500 m of the right-of-way will also experience a change in the visual landscape (except those that are along the existing right-of-way, which accounts for over 1/3 of the line; (Map 8-3)). Homes within 500 m of the right-of-way generally have a treed yard and will therefore have visual barriers.

Research is inconclusive as to whether the presence or proximity to transmission lines adversely affects real estate values. Effects that have been observed tend to diminish with distance from the transmission line and disappear with time.

By adopting mitigation measures, the project will be constructed to limit possible disturbance and annoyance to residents and interference with residential development.

Given the low number of residences located near the proposed transmission line right-of-way, in consideration of mitigation measures, the project will have a low to moderate nuisance or disturbance effect on residences or other receptors.

Nuisance or disturbance will be short term over the construction period as equipment is moved along the right-of-way. Therefore, nearby residents will not be affected for prolonged periods.

8.7.5.2 Visual Quality

The local assessment area consists of urban, suburban, industrial and agricultural landscapes.

The final preferred route runs adjacent to several recreational areas including tennis courts, picnic shelters, baseball diamonds and soccer fields (Map 8-3; Figure 8-3; Figure 8-4). These all occur along the existing portion of the line, so there is no change to the visual landscape. The route crosses the highway and runs parallel for over 500 m. The area is developed so the change in landscape will be negligible.

Figure 8-3: Tennis courts within 50 m of the transmission line (blue line)

Figure 8-4: Baseball diamonds and soccer fields adjacent to the transmission line (blue line)

Summary

With the implementation of mitigation measures, residual effects from the project on property values, residential development and visual quality are low to moderate magnitude.

Effects will be long term, continuous and occur during the construction and operation and maintenance phases.

Table 6-3 describes the factors used to characterize the interactions among the Project and property values, residential development and visual quality.

- Direction: Adverse
- Magnitude: Moderate
- Geographic extent: Local
- Duration: Long term
- Frequency: Continuous

- Reversibility: Permanent

Due to the low number of residences (1 within 100 m) close to the line and proposed developments within the right-of-way, the residual effects to property value and proposed developments are not anticipated to be significant.

The exurban setting of the project and the mitigation applied through routing means new towers will not alter the average visual landscape character of the area therefore the residual effects to visual quality are not anticipated to be significant

8.7.6 Follow up and monitoring

Manitoba Hydro's practice is to develop project-specific environmental protection plans where mitigation measures are stipulated for construction, operation and maintenance activities. These measures are regularly reviewed for their effectiveness as part of a process of adaptive management in project monitoring and follow-up.

Manitoba Hydro has provided and will continue to provide project information to relevant agencies and organizations as required and requested.

Potential follow-up related to property value proposed development and visual quality will be through construction inspection. Inspection will determine whether the item or activity is in conformance with mitigation requirements.

8.7.7 Cumulative effects

Several projects listed in Table 6-4 may interact with this project. The truck and travel center and the southwest development project are within 500 m of this project and will therefore increase the overall change in the visual landscape. However, as the average visual landscape character is already disturbed, the overall change is minimal.

8.8 Agriculture

Agriculture was selected as a valued component because of its importance to landowners, agricultural producers, the local community and the economy of the area. Agriculture considers loss of land, inconvenience, effects on livestock and biosecurity.

8.8.1 Significance thresholds

A residual effect on agriculture is considered significant if it:

- results in a loss of agricultural land or degradation of soil quality such that existing agricultural production cannot continue at current levels for extended periods of time (beyond the construction phase) or cannot be adequately compensated
- results in interference with or disruption that restricts agricultural operations and activities such that existing agricultural operations and activities cannot continue at current levels for extended periods of time (beyond construction phase) or cannot be adequately compensated

8.8.2 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local and regional assessment areas. Valued component specific details are described below.

Project development area: footprint of the proposed project including the transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances.

Local assessment area: The local assessment area is defined as 1 kmLocal assessment area: 500 m on either side of the centreline (Map 8-2) This covers an area where effects on agriculture are likely to be most prevalent.

Regional assessment area: The regional assessment area includes the boundaries of the Rural Municipality of Portage la Prairie (Map 8-4). The RM represents the region that encompasses the communities within which changes in socioeconomic parameters attributable to project effects on agriculture might occur.

Effects of other projects and activities occurring within the regional assessment area that have potential to act cumulatively with the project are assessed based on the regional assessment area.

8.8.3 Effects pathways

Transmission lines can have several effects on agricultural operations. The consequences to farm operations and management and potential changes to the land itself can result in increased costs, inconvenience, nuisance and increased effort for operators. Transmission towers and lines can cause effects on the following agricultural operations:

- Loss of land from production due to the transmission line structures

- Inconvenience, nuisance and increased production costs associated with operating farming equipment, aerial spraying and crop production around structures
- Compromised biosecurity for cropping lands and livestock operations

8.8.3.1 Loss of land from production

The presence of transmission line structures will permanently remove the land under the structure area from production while the remainder of the right-of-way can be still be farmed. Approximately 18% of the project development area is under annual production. The project is anticipated to result in approximately two more steel lattice towers and approximately 3 more heavy angle towers on agricultural lands. The tower footprint for the steel lattice towers will range from 5.4m to 7.6m in width and the tower footprint for the angle structure is 10m x 10 m. Total agricultural area lost is estimated to be approximately 416 m^2 (Table 8-2). The number of towers and tower types in the table below do not represent final engineered alignments and are intended to estimation purposes only.

Table 8-2: Agricultural land lost due to tower footprints

Tower type	Footprint	Area lost	Number of towers	Total agricultural area lost
Steel lattice towers	7.6 m x 7.6 m	58 m	2	116 m^2
Heavy angle towers	10 m x 10 m	100 m	3	300 m^2
Total area lost				416 m^2 (0.1 ac)

Manitoba Hydro considers land use impacts during tower placement and works to place towers in a manner that limits disruption to farming activities while meeting infrastructure requirements. Some of these measures may include placing towers on the edge of farmable parcels, within road allowances where possible and working with landowners to limit disturbance to operations. Although tower footprints will result in an area of land removed from production, due to the small size of the project, small footprint of the towers and careful placement considerations, the loss of land from production is anticipated to be low.

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.

Construction activities during the growing season, or spring and fall periods when agricultural producers are conducting field operations such as field preparation, nutrient application and field cleanup will result in the temporary loss of use of affected lands. It is assumed that these temporary losses will extend to the entire right-of-way within fields where construction activities are occurring.

Transmission line construction is scheduled for the winter of 2022/23. Based on this schedule, temporary loss of land during construction will not be an issue. However, if the schedule is altered and construction occurs during the spring / summer seasons, this would affect no more than one growing season as construction is scheduled for four months.

8.8.3.2 Inconvenience, nuisance and costs from structures

Farming around towers presents several 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.

Previous studies have found that approximately 70% of the costs of structures to farmers were the result of the non-productive area or area lost for production around the tower (Gustafson, et al. 1980); the other 30% of the costs were the result of lost time, crop damage and increased input costs from double coverage (W. S. Scott 1981).

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.

8.8.3.3 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 that 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 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.

8.8.4 Mitigation measures

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

- Implementation of Manitoba Hydro Landowner Compensation Program
- Implementation of the Manitoba Hydro Biosecurity Policy and Standard Operating Procedures (Manitoba hydro 2021)

8.8.5 Characterizing residual effects

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

With the implementation of mitigation measures, residual effects from the project on agriculture are anticipated to be of low magnitude.

8.8.6 Follow up and monitoring

Manitoba Hydro's practice is to develop project-specific environmental protection plans where mitigation measures are stipulated for construction, operation and maintenance activities. These measures are regularly reviewed for their effectiveness as part of a process of adaptive management in project monitoring and follow-up.

Manitoba Hydro has provided and will continue to provide project information to relevant agencies and organizations as required and requested.

Potential follow-up related to agriculture may involve flagging environmentally sensitive sites and through construction inspection. Inspection will determine whether the item or activity is in conformance with mitigation requirements.

8.8.7 Cumulative effects

Several projects listed in Table 6-5 may interact with the residual effects of this project. The southeast development Phase I project, organics resource management facility and the Portage area capacity enhancement projects are (or will be) on agricultural land and therefore there will be a cumulative loss of productive agricultural land in the area. The Portage area capacity enhancement project includes a transmission line through agricultural land and will therefore also have similar nuisance effects and biosecurity risks.

8.9 Traditional practices, culture and heritage

8.9.1 Introduction

As described in the Indigenous Engagement Process (IEP; Chapter 5.0), Manitoba Hydro engaged eight First Nations, the MMF and the PUIPC, see Section 5.3 for a summary of discussion. Manitoba Hydro also supported Indigenous Community and Assessment Coordinator (ICAC) positions and Indigenous knowledge input for Long Plain First Nation, Dakota Tipi First Nation and the MMF. This section incorporates the ICAC submissions and feedback from virtual meetings with Manitoba Hydro's understanding of effects. It is clearly indicated when words come directly from the ICAC submissions. The full ICAC studies are included in Appendix C.

Based on experience from past projects, feedback provided in submissions from ICACs, existing literature and interests and concerns identified during virtual meetings with Indigenous communities, Manitoba Hydro identified four valued components that are directly related to matters considered important to rights-bearing communities and are of cultural importance. Manitoba Hydro then asked the three ICACs to review this chapter and provide feedback on the valued components and assessment of effects to those valued components.

The four valued components related to traditional practices, culture and heritage and their pathways of effects identified for this project include:

1. Traditional harvesting (e.g. hunting, fishing, trapping, plant gathering)
    - Changes to available lands in which to harvest
    - Changes to access to those lands

- Changes to knowledge of where and how to harvest

2. Important sites (e.g. cultural, spiritual, historical, heritage, sacred, identified TLE opportunities)
    - Changes to available lands which have important sites
    - Changes to access to those lands
    - Changes to knowledge of those sites
3. Heritage sites / objects
    - Changes to heritage sites / objects
4. Culture
    - Changes to traditional harvesting experience
    - Changes to the experience of important sites

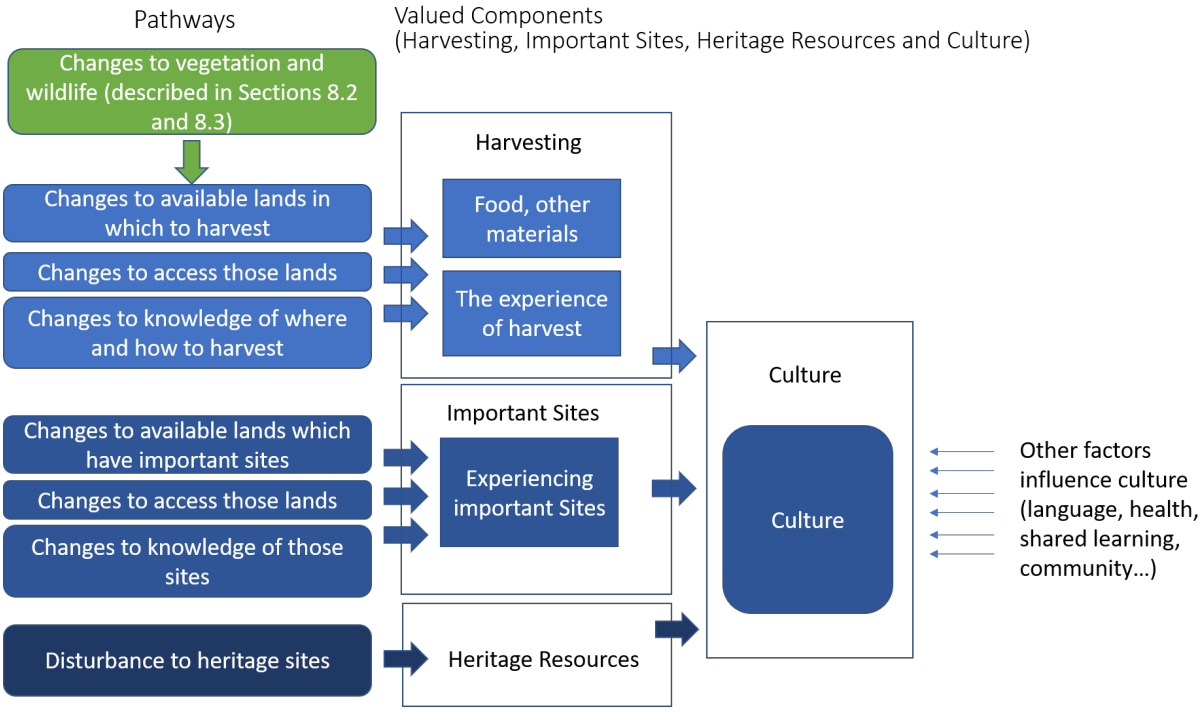


Figure 8-5: Pathways of effects to valued components of importance to Indigenous communities

In the report submitted by the MMF, it is stated that: "*Based on our initial review of the Project Scoping Document for the Manitoba Minnesota Transmission Line Project, we felt that it did not adequately describe the valued components (valued components) necessary to fully identify potential environmental effects to Métis rights, claims and interests… We decided that "Harvesting" and "Available Lands" would be measurable, have available information and potentially be affected by the Project*." (Appendix C).

Manitoba Hydro has included traditional "*Harvesting*" as a valued component in this chapter. The MMF have also put forward "*Available lands*" as a valued component. Manitoba Hydro understands "*Available lands*" to potentially be a pathway of effect to Traditional Harvesting and Important Sites because changes in available lands lead to changes in how traditional harvesting and important sites are experienced, which can lead to effects to culture. For this reason, Manitoba Hydro has included "*Available lands*" as a pathway of effect rather than a distinct valued component to both Traditional Harvesting and Important Sites and has also considered its effect to Culture.

In a letter to Manitoba Hydro, Dakota Tipi First Nation identified concerns, which are encompassed in the selected valued components, including: "*DTFN has concerns with respect to the land area alterations that may occur with the transmission line placement route. This includes concerns that the line placement areas may reduce medicinal vegetation in such areas (sage, sweet grass, cedar, Seneca root, bear root, etc.). This also includes concerns that the line placement areas may be on a former or traditional burial ground or site (such as tobacco flag or tie placement areas). DTFN has concerns with respect to the wildlife population alterations that may occur with the transmission line placement route. This includes concerns that the line placement areas may reduce wildlife population such as whitetail deer, porcupines, and rabbits which are a source for food and traditional use.*" (Appendix C). In their routing brief, Dakota Tipi First Nation identified impacts to culture and heritage findings as their primary concern (Appendix C). Dakota Tipi First Nation indicated that because the project is located within a pre-disturbed area, likely harvesting activities are limited, and interaction with the project are likely limited to the banks of the Assiniboine River. It is Manitoba Hydro's understanding that the concerns expressed by Dakota Tipi First Nation are included in the selected four valued components of importance to Indigenous communities, and other valued components such as fish and fish habitat, wildlife and vegetation.

Long Plain First Nation expressed concerns of heritage and medicinal plants within their Long Plain Reserve No. 6 borders, which would not be affected by the project. Otherwise, their report states that: "*Long Plain is happy to be a part of these discussions and is grateful there is a consultation process with the potentially affected First Nations in the region.*

We are also however reluctant to (and are not in a position to) grant a corporation 'carte blanche' authority for any future infrastructure conflicts that may arise, and they have in the past. The reality is after hundreds of years of socio-economic, spiritual and legal disparity, we simply do not know for certain if these plans are over for instance, a

familial or community burial plot from the 1790's. Perhaps it goes through the old lodging grounds of the regions most respected Medicine Man from an even earlier time which would no doubt be in abundance of our 4 Sacred Medicines (Sage, Cedar, Sweetgrass and Tobacco). Such a plot would no doubt have old ceremonial grounds that would still be respected and protected no matter how old they are, as such sites are identified and do exist within our Long Plain Reserve No. 6 borders today.

I am sure you can see our need to keep communication open and honest so that if and when matters like the examples presented here arise, proper consultation and due diligence can be performed.

That being said, the purposed route is not currently in any conflict therefor should have no adverse effect on current traditional practices and culture of the LPFN Community, outside of perhaps the disturbance of wildlife habitats or migration routes that some families still rely on today as a source of food." (Appendix C).

8.9.2 Overview

This section first describes the spatial boundaries for each valued component of importance to Indigenous communities. It then describes the pathways of effects, mitigation measures, characterization of residual effects, severity of effects, and follow-up and monitoring for each valued component of importance to Indigenous communities.

8.9.3 Spatial boundaries

The spatial boundaries for the environmental assessment consist of the project development area, local assessment area and regional assessment areas. The project development area encompasses the footprint of the project including the transmission line right-of-way, any additional areas such as borrow pits or marshalling yards and access road allowances. The local assessment area represents the area where indirect or secondary effects of construction and operation and maintenance are likely to be most pronounced or identifiable. The regional assessment area encompasses the area where project-specific environmental effects overlap with those of past, present, and reasonably foreseeable future projects and activities. The project development area remains the same for each of the four valued components in this chapter. The local assessment area and regional assessment area remain the same for three of the four valued components. These are described below.

8.9.3.1 Traditional harvesting, important sites and culture

For traditional harvesting, important sites and culture, the local assessment area includes all components of the project development area plus a 2 km buffer surrounding each component to accommodate for the distance at which implodes can be heard during construction activities, which could affect the experience of traditional harvesting, important sites and culture within that 2 km buffer. This local assessment area encompasses the most inclusive biophysical local assessment area. The regional assessment area follows the regional assessment area described for the wildlife and wildlife habitat assessment because it is the most inclusive biophysical assessment boundary and includes all components of the project development area and local assessment area and a 15 km buffer around all components of the project development area.

8.9.3.2 Heritage sites / objects

For heritage sites / objects, the local assessment area includes the project development area plus a 500 m buffer surrounding each component of the project development area. A 500 m buffer was chosen as there is a potential for discrepancies between the precise locations of heritage sites / objects including cart trails, parish buildings and archaeological sites and the location initially recorded in the provincial heritage database. The exact location of Fort la Reine is still unknown. The area has high potential for heritage sites / objects, the lack of recorded archaeological sites does not do that justice. The regional assessment area includes the project development area plus a 1 km buffer surrounding each component of the project development area.

The regional assessment area includes the project development area plus a 1 km buffer surrounding each component of the project development area.

8.9.4 Effects to traditional harvesting

This valued component includes traditional harvesting practices such as hunting, fishing, trapping and plant gathering. First, sections from the ICAC submissions are shared to provide insight on the traditional harvesting practices in the study area.

The MMF report states that: "*the presence of 80 existing features near the BP6/BP7 project area, from past studies that were not focused on this project specifically, is evidence of the potential for impact to the Métis way of life from the BP6/BP7 project. Today, Métis have Constitutionally protected rights to harvest, and any impact on these rights needs to be adequately and appropriately assessed and, if necessary, accommodated and mitigated for*."

In their routing brief, Dakota Tipi First Nation expressed that "*There is no hunting being done in these areas because we're in an urban setting. There is no fishing being done except at the designated area. (see map C;* Appendix C*); Traditional activities occur in the Project area as indicated as D, E and F on the map.*" (Appendix C). Dakota Tipi First Nation expressed concerns over traditional harvesting in their letter: "*DTFN has concerns with respect to the land area alterations that may occur with the transmission line placement route. This includes concerns that the line placement areas may reduce medicinal vegetation in such areas (sage, sweet grass, cedar, Seneca root, bear root, etc.); DTFN has concern with respect to the wildlife population alterations that may occur with the transmission line placement route. This includes concerns that the line placement areas may reduce wildlife populations such as whitetail deer, porcupines, and rabbits which are a source for food and traditional use*." (Appendix C).

8.9.4.1 Pathways of effects

The pathways of effect to traditional harvesting include:

i. Changes to available lands for harvesting
ii. Changes to access to those lands
iii. Changes to knowledge of where and how to harvest

<u>Changes to available lands in which to harvest</u>

Changes in available lands for traditional harvesting refers to a change in the amount of land and more specifically in the amount of contiguous land available for traditional harvesting. Since the project is in an exurban area and on pre-disturbed land, available lands used for traditional harvesting practices are limited. The MMF has identified potential harvesting activities as follows:

"*We have assessed our data and prepared a map in Figure 5 which summarizes previously collected land use, occupancy, and ecological knowledge features in the BP6/BP7 project area. There were ten citizens who had previously mapped some of their knowledge in the area. Collectively these participants recorded over 80 features in the areas overlapping or immediately surrounding the proposed routes. The Métis Knowledge near the BP6/BP7 project routes has been summarized in the following categories:*

•*Reported change to water quality (1participant)*

•*Fishing –walleye, pike, carp, mariah, sturgeon, catfish (8 participants)*

•*Hunting –grouse, waterfowl, turkey, deer (5 participants)*

•*Ecological knowledge –deer birthing area, plant gathering, deer hunting (1participant)*

•*Historic trapping (3 participants)"* (Appendix C).

In the MMF report, information from their Manitoba-Minnesota Transmission Project (MMTP) Métis Land Use and Occupancy Study was included and states that: "*The report goes on to explain how important unoccupied land is to the Manitoba Métis as it represents areas where they have access to exercise their Métis rights that does not require permission. On all other land types, the exercise of Métis rights can be restricted from time to time under certain circumstances. The study pointed out that the Manitoba Minnesota Transmission Project would result in a further reduction of the Manitoba Métis Community's ability to access unoccupied Crown land*" and specified that "*The Manitoba Métis Community would have the same concerns with the potential for loss of access to Unoccupied Crown Land with the BP6/BP7 projects and would request that route selection take in to account the objective to maintain as much contiguous Unoccupied Crown Land as possible*."

Dakota Tipi First Nation has identified the Assiniboine River as an area for willow harvesting. Since most of the project is in pre-disturbed lands, potential effects to natural vegetation are limited. However, clearing of the right-of-way will occur near Crescent Lake and the north shore of the Assiniboine River, which might overlap with willow picking around the Assiniboine River. The MMF also shared concerns about using the existing right-of-way*: "Though there was an existing transmission line, the area was naturalized again to a certain degree and will be disturbed again in the construction of the line. Manitoba Hydro should also examine and address the cumulative effects of this transmission line development on the Manitoba Métis community*."

<u>Changes to access to those lands</u>

Changes to the accessibility of lands for traditional harvesting has been identified as a concern to some Indigenous communities. Clearing of the right-of-way can cause changes in the accessibility of areas used for traditional harvesting, as can the creation of new temporary and permanent access routes for construction, operations and maintenance activities.

<u>Changes to knowledge of where and how to harvest</u>

Any change in the ability, experience or resources to practice traditional harvesting can result in changes to an individual's or community's collective knowledge of where

and how to harvest. This can lead to changes to an individual or community's connection to the land and to culture, which is further described in the culture valued component.

8.9.4.2 Mitigation

The primary mitigation measure for reducing adverse effects to traditional harvesting practices is the routing process. The routing methodology considers values from multiple perspectives and community groups. Accordingly, the final preferred route is often a balance of those perspectives. Manitoba Hydro included Indigenous community concerns at each stage of routing and included DTFN, LPFN and MMF ICAC representatives within key route decision-making meetings. During the route preference determination stage MMF representatives indicated their preference for Route A rather than Route D, the route selected by the Community team. Acknowledging this distinction, and that the MMF may have specific concerns that require further mitigation, Manitoba Hydro intends to collaborate further with the MMF to discuss relevant, site specific mitigation and monitoring measures at this location.

Manitoba Hydro understands concerns related to Route D related to the vegetation present adjacent the Assiniboine River. Sections 8.1.5 and 8.2.4 describe mitigation measures aimed at protecting fish and fish habitat and vegetation. Manitoba Hydro considered traditional harvesting sites identified by communities in the IEP and in the ICAC submissions during the routing process to avoid these to the extent feasible. The routing process resulted in the elimination of routing a portion of the line across LPFN lands and having the majority of the transmission line to be routed in an exurban area or on pre-disturbed lands where hunting, fishing, trapping and plant gathering are not as commonly practiced when compared to an area with less development. Manitoba Hydro has also routed a portion of the line from the Portage-Saskatchewan Station to the centre of Crescent Island on the existing right-of-way of the original BP6/BP7 line, meaning that no additional impacts to traditional harvesting practices will occur for this portion of the line. Following construction there will be no restrictions on access to traditional use sites or areas within the project easement on Crown lands. Crown lands occupied by the project development area will remain available for traditional harvesting practices after active construction is complete.

As most of the transmission line is routed in an exurban area and/or on pre-disturbed land, changes in the distribution, abundance and health of resources for traditional harvesting is minimal. For measures identified to mitigate potential adverse effects on

natural vegetation, which could impact plant harvesting, see Section 8.2.4. In addition, Indigenous communities will be given opportunities to identify sensitive sites to help inform the environmental protection program for the project. For maintenance of the right-of-way, an integrated vegetation management program will be developed in which Manitoba Hydro will consider non-chemical vegetation management for areas of traditional plant harvesting. For measures identified to mitigate potential adverse effects on wildlife and wildlife habitat, which could impact hunting and trapping see Section 8.3.4. For measures identified to mitigate potential adverse effects on fish and fish habitat which could impact fishing, see Section 8.1.5.

As mentioned above, there will be no change in restrictions to access traditional harvesting areas within the project development area once construction activities are over, meaning that accessibility of traditional harvesting practices will be like those experienced before this project. During construction activities, information signs and warning markers will be used to identify active construction sites.

In their report, Long Plain First Nation expressed that: "*Long Plain First Nation would like to see an effort made to harvest any sacred medicines that may be disturbed during the project in accordance with our spiritual protocols.*" Manitoba Hydro will further discuss this mitigation measure with Long Plain First Nation and develop a plan for the community to harvest sacred medicines identified in the project area.

Recommendation 9 of the MMF report states that: "*The MMF should be engaged by Manitoba Hydro in the mitigation planning process for BP6/BP7. This would focus on mitigations to address the baseline data that is mapped during Métis Knowledge and land use interviews*." The ICACs for the project were asked to share their community's recommendations for mitigation measures to include in the environmental assessment. As well, Manitoba Hydro will continue to work with Indigenous communities to develop appropriate mitigation measures in addition to its standard mitigation measures if required to include in the environmental protection program to reduce adverse effects to traditional harvesting.

8.9.4.3 Characterizing residual effects

Given that the project is routed primarily on exurban and pre-disturbed land and that the above-described mitigation measures are in place, the effects of the project on traditional harvesting practices are as follows:

- Direction: Adverse
- Magnitude: Minor
- Geographic extent: Local

- Duration: Short-Term
- Frequency: Intermittent
- Reversibility: Permanent

The unique nature of traditional harvesting practice makes it inappropriate to determine whether any effects are significant or not significant. A full description of effects to harvesting as a result of the project are provided within each ICAC submission. Manitoba Hydro understands the severity of the residual effects to vary between communities but overall, the project has low impacts due to its presence within a relatively urbanized location. Manitoba Hydro will continue to work with communities to mitigate any adverse effects.

8.9.4.4 Follow up and monitoring

Protections for natural vegetation and wildlife will be implemented as part of the environmental protection program. The environmental protection program is a framework for implementation, management, monitoring and evaluation of protection activities in keeping with environmental effects identified in environmental assessments, regulatory requirements and public expectations. The environmental protection program prescribes measures and practices to avoid and reduce adverse environmental effects on wetlands habitat (e.g., wildlife reduced risk work windows, setbacks and buffers for sensitive habitat).

The MMF report includes concerns shared in the Bipole III Métis Land Occupancy and Use Study about the administration of monitoring programs: "*Several participants in this study suggested that there was an opportunity for Métis citizens to support with 'boots on the ground' monitoring. There were concerns with monitoring programs that are led by people who do not know the area well as described in this quote from a participant:*

> *"And that's how it should be, like some guy sitting in the office in Winnipeg, at Portage and Main, should [not] be making the calls about what's happening right here in our backyard. There should be somebody locally, no matter if there's one from each town, one each district, but there should be somebody there doing the monitoring."*

The *MMF used the study results to identify Environmentally Sensitive Sites (ESS) that required protection during construction, operation, and maintenance of the Bipole III. Additional mitigation, offsetting, or accommodation measures for the ESS were recommended.*

Manitoba Hydro engaged the MMF to discuss these concerns and adjust its Environmental Protection Plans (EPP) based on this input in a series of collaborative workshops, meetings, and communications with the MMF. The MMF would request a similar process be undertaken for the BP6/BP7 process." (Appendix C).

As requested by the MMF, Manitoba Hydro will work with Indigenous communities to develop and adjust the EPP and environmental management plan to implement appropriate mitigation measures and monitoring plans for traditional harvesting practices.

Recommendation 13 of the MMF report states: "*Métis citizens should be included in any environmental monitoring programs for the Project. The MMF has invested in capacity building and is in the process of providing training to Métis citizens on environmental monitoring techniques that are relevant to this and other future transmission line projects (e.g., surface water quality, wetland health, wildlife, species at risk).*"

Manitoba Hydro will engage Indigenous communities in monitoring of the Project whether it be through field tours offered to community members during construction of the Project or through Indigenous monitoring. Manitoba Hydro will further discuss monitoring options with Indigenous communities to identify the preferred and most meaningful option.

8.9.5 Effects to important sites

This valued component includes important sites to Indigenous communities such as sites of cultural, historical and spiritual importance, heritage sites, sacred sites and other sites such as Treaty Land Entitlement opportunities. These include tangible and intangible sites identified by Indigenous communities during the IEP and in the ICAC submissions.

8.9.5.1 Pathways of effects

The pathways of effects to important sites include:

i. changes to available lands, which have important sites
ii. changes to access those lands
iii. changes to knowledge of those sites

<u>Changes to available lands, which have important sites</u>

The project can result in changes to available lands, which have important sites. Crescent Island was identified as a sensitive area by several communities due to

cultural and heritage concerns especially in relation to discovered and undiscovered burials. Peguis First Nation also identified Crescent Island as an important area for families and children in foster care.

In their report, Long Plain First Nation expressed concerns over important sites: "*The reality is after hundreds of years of socio-economic, spiritual and legal disparity, we simply do not know for certain if these plans are over for instance, a familial or community burial plot from the 1790's. Perhaps it goes through the old lodging grounds of the regions most respected Medicine Man from an even earlier time which would no doubt be in abundance of our 4 Sacred Medicines (Sage, Cedar, Sweetgrass and Tobacco). Such a plot would no doubt have old ceremonial grounds that would still be respected and protected no matter how old they are, as such sites are identified and do exist within our Long Plain Reserve No. 6 borders today*."

Long Plain First Nation representatives also expressed concerns about projects that may impact their ability to access land for Treaty Land Entitlement selections. Preserving land parcels for current and future use is a high priority for LPFN. LPFN discussed aspects of future development planning initiatives with Manitoba Hydro and highlighted both the economic and land protection value of maintaining properties for future TLE.

In a letter to Manitoba Hydro, Dakota Tipi First Nation shared concerns regarding important sites including: "*This also includes concerns that the line placement areas may be on a former or traditional burial ground or site (such as tobacco flag or tie placement areas).*" (Appendix C). In the routing brief, Dakota Tipi First Nation identified several important sites along the line including burials, mounds and tipi rings, and stressed the need for Manitoba Hydro to be diligent in its pre-construction heritage surveys and monitoring of construction activities (Appendix C).

Changes to access to those lands

Clearing of the right-of-way can cause changes in the accessibility of important sites, as can the creation of new temporary and permanent access routes for construction, operations and maintenance activities. Such activities can increase access to important sites by both traditional users and others.

Changes to knowledge of those sites

Disturbance of important sites may result from construction activities, including loss or disturbance to site contents and site contexts through clearing and disposal of trees, brush or topsoil removal, compaction, vehicle traffic, grading for access roads, and tower construction. Ground disturbance can affect important sites and areas

especially if these sites are linked to cultural or heritage sites / objects, including burials. Vandalism or alteration of cultural sites is a potential concern if the project creates new human access opportunities. Such changes to important sites can result in changes to knowledge of important sites, which can lead to changes to culture, which is further described in the culture valued component.

8.9.5.2 Mitigation

The primary mitigation measure for reducing adverse effects to important sites is the routing process. Manitoba Hydro considered important sites identified by communities in the ICAC submissions and in the IEP during the routing process to avoid these sites to the extent feasible. Manitoba Hydro has routed a portion of the line from the Portage-Saskatchewan Station to the centre of Crescent Island on the existing right-of-way from the original BP6/BP7 line, meaning that no additional impacts to important sites will occur for this portion of the line. Pre-construction heritage surveys and identification of sensitive sites in the EPP are ways in which adverse effects to important sites will be further mitigated. A Culture and Heritage Resources Protection Plan (CHRPP; Appendix H) that describes the protocols to follow if potential culture or heritage sites /objects are discovered will also be developed and implemented. Indigenous Cultural Awareness Training will be provided for all workers involved in construction, operation and maintenance activities which will include training on the CHRPP.

As mentioned above, there will be no changes inn access to important sites within the project development area once construction activities are over. Following construction, the accessibility of important sites will not be diminished. During construction activities, information signs and warning markers will be used to identify active construction sites.

Sensory disturbances from construction activities are expected to be short-term and notifications will be sent to communities prior to implode use. Manitoba Hydro will continue to work with Indigenous communities to better understand the effects of a transmission line on the experience of important sites to determine additional mitigation measures if required.

In their report, Long Plain First Nation suggested an additional mitigation measure: "*In regard to any spiritual lodgings or landmarks, we would like the opportunity to consult with local Elders and knowledge-keepers on proper protocol if such an issue were to arise. There are many constructs we use on our spiritual journey through this world including but not limited to, Arbours, Ceremonial Lodges, Rock Paintings and formations etc.*" If any spiritual lodgings or landmarks are found within the project

area, Manitoba Hydro will engage with Indigenous communities and provide opportunities to consult with local Elders and knowledge-keepers to find appropriate mitigation measures.

8.9.5.3 Characterizing residual effects

Given that the project is routed primarily on exurban and pre-disturbed land and that the above-described mitigation measures are in place, the effects of the project on important sites are as follows:

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

The unique nature of important sites makes it inappropriate to determine whether any effect is significant or not significant. Therefore, such conclusion will not be made. Manitoba Hydro anticipates the severity of the residual effects to vary between communities and therefore will continue to work with communities to mitigate any adverse effects.

8.9.5.4 Follow up and monitoring

Manitoba Hydro will engage Indigenous communities in monitoring of the Project. Manitoba Hydro will further discuss monitoring options with Indigenous communities to identify the preferred option.

8.9.6 Effects to heritage sites / objects

This valued component includes heritage sites / objects identified by the Province of Manitoba's Heritage Resources Branch. The following describes and summarizes a preliminary screening of the effects of BP6/BP7 on heritage sites / objects. As defined in *The Heritage Resources Act* (Government of Manitoba 1986), heritage resources include, "a heritage site, a heritage object, and any work or assembly of works of nature or of human endeavor that is of value for its archaeological, palaeontological, pre-historic, historic, cultural, natural scientific or aesthetic features, and may be in the form of sites or objects or a combination thereof."

The Province of Manitoba, through the Historic Resources Branch of Sport, Culture and Heritage screens development projects for their impact on heritage resources. If

the potential to adversely affect heritage sites / objects in a project area is identified, further investigation as a Heritage Resource Impact Assessment is usually required.

An evaluation of the project development area identified documented heritage sites / objects and the potential for heritage sites / objects. With the potential loss or damage of heritage sites / objects through the construction of transmission lines, it is recommended that a Heritage Resource Impact Assessment occur.

A Heritage Resource Impact Assessment is defined in *Managing Our Heritage Resources Impact Assessment* (Government of Manitoba 1990) as a "*written evaluation of the effect that a proposed development project may have upon heritage resource is or human remains at a site. The assessment outlines the project, describes the cultural and natural context of the development, identifies the impact of the project, and recommends ways to avoid or lessen its impact on heritage resources or human remains.*"

Summary of current status

The results of the heritage inventory review showed three registered archaeological sites within 500 meters of the final preferred route. The three sites or portions of the sites have been disturbed through construction of the contemporary Yellow Quill Trail and the Portage Diversion (1965-1970); (Table 8-3).

Table 8-3: Registered archaeological sites within 500 metres of the project

Borden No.	Site Type	Period	Description
DlLn-001	Campsite Fur trade post	Historic Fort la Reine	Historic artifacts
DlLn-006	Campsite	Woodland	Prairie side-notched projectile point
DlLn-010	Isolated find	Pre-European contact	Hammerstone

Two of the three sites date to the Pre-European Contact Period. Site DlLn-010 was recorded as an isolated find based on the collection of a single hammerstone while DlLn-006 was recorded as a campsite with a surface collected projectile point. Site DlLn-001 was registered to recognize the location of Fort la Reine (1738-1752). While no physical evidence of the Fort has been documented, a stone cairn and plaque

have been erected by the Historic Sites and Monuments Board of Canada to commemorate the site.

There are three additional plaques recorded within 500 metres of the right-of-way. The plaques were designated to commemorate noteworthy individuals and historic locations, which include Canada's ninth Prime Minister, the Rt. Hon. Arthur Meighen; Wilfred Vopni, who originated Vopni press; and Fort La Reine (Table 8-4).

Table 8-4: Designated buildings and plaques within 500 metres of the project

Plaque ID	Site Name	Designation
P758	Meighen, Rt. Hon. Arthur	National Historic Site of Canada
P2492	Vopni Pocket Park, Memory of Vopni Press Ltd.	City of Portage
P2595	Fort La Reine	National Historic Site of Canada

A review of archival and parish maps indicates that at least 16 buildings once stood within 500 metres of the final preferred route. In addition to the parish buildings, 11 cart trails crisscross the final preferred route including the Carlton Trail and Yellow Quill Trail.

8.9.6.1 Effect pathways

The main pathway that can lead to effects to heritage sites / objects is:

- Changes to heritage sites / objects

There is potential for the project to interact with unknown heritage sites / objects during transmission line construction activities that involve disturbing the ground surface; primarily during construction of the right-of-way, installation of tower foundations, erection of towers and activities such as mobilizing equipment, developing and using access routes, marshalling yards, and conducting geotechnical testing. Furthermore, removal of vegetation may create unstable soil conditions that could result in the displacement of exposed heritage sites / objects.

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 the potential to expose unknown heritage sites / objects.

8.9.6.2 Mitigation

Archaeological sites are non-renewable heritage. Once disturbed there is a loss of tangible evidence of the past. In general, avoidance measures to protect heritage sites / objects is the preferred approach. Steps taken by qualified archaeologists in advance of development to identify and protect heritage sites / objects is essential.

Potential effects can be avoided through implementation of effective mitigation measures including general environmental protection measures, beneficial management practices, standard operating procedures and environmental protection plans. It is standard practice for Manitoba Hydro to implement a CHRPP (Appendix H) as mitigation. Mitigation measures will include the following:

- Project personnel will be made aware of the potential for finding heritage sites / objects in the project footprint.
- Any archaeological finds discovered during the site preparation and construction will be left in their original position until the project archaeologist is contacted and provides instruction.
- Construction activities will be carried out within established buffer zones for heritage sites / objects as approved by the project archaeologist and Historic Resources Branch.
- Environmental protection measures for heritage sites / objects will be reviewed with the contractor and employees prior to the commencement of any construction activities.
- Orientation of project staff working in construction areas will include heritage awareness and training including the nature of heritage sites / objects and management of any heritage sites / objects encountered.
- Orientation information will include typical heritage materials and reporting procedures.
- The contractor will report heritage materials immediately to the construction supervisor and will cease construction activities in the immediate vicinity until the project archaeologist is contacted and prescribes instruction.
- The CHRPP will be adhered to during the preconstruction and construction activities.

8.9.6.3 Characterizing residual effects

Archaeological site data is managed and protected by the Historic Resources Branch. The number of documented sites potentially affected by the project is determined by mapping registered site locations and comparing the project footprint using Geographic Information System (GIS). The results of this qualitative review determined that there are three recorded heritage sites within 500 metres of the Final Preferred Route including historic Fort La Reine. The original placement and extent of the site has never been determined and therefore unidentified archaeological remains of the fort may be encountered during project construction.

Possible effects to potential heritage sites / objects were determined by reviewing archival maps, photos, LiDAR, and mapping potential locations (e.g., types of landforms, nearness to documented heritage sites / objects, proximity water) and comparing the project footprint using GIS. While much of the project area has been impacted previously through settlement, agriculture and moderate and large-scale development, the area is culturally rich and the potential for heritage sites / objects is high.

8.9.6.4 Follow up and monitoring

Manitoba Hydro will be conducting a Heritage Resource Impact Assessment along the final preferred route where new tower locations are to be constructed to determine nature, extent, and significance of any heritage sites including implementing recommendations from the Historic Resources Branch including deep testing, where required.

8.9.6.5 Cumulative effects

Lands cleared of standing vegetation for development, conversion to agriculture, cropping, and land drainage have acted cumulatively in the past to affect heritage sites / objects either by partially disturbing or completely removing the site. Most of these activities was primarily done before heritage legislation was enacted to manage and protect archaeological resources.

A key success factor in terms of mitigation of potential cumulative effects is monitoring, internal coordination and reporting to regulatory agencies such as Manitoba Conservation and Climate and the Historic Resources Branch. Active monitoring of project potential effects on heritage sites / objects will occur during construction, and any effects will be addressed through implementation of the

mitigation measures documented in the project specific construction environmental protection plan and the CHRPP. In addition, other proponents in the project area are also responsible for reporting project activities to Manitoba Conservation and Climate and the Historic Resources Branch, and these regulators can inform Manitoba Hydro if it appears that there are unanticipated adverse cumulative effects occurring. The Historic Resources Branch also reviews land-based developments through the heritage resource impact assessment program as mandated by the *Heritage Resources Act*. Therefore, additional mitigation for cumulative effects is addressed by the provincial regulators as they determine whether future projects will require heritage investigations.

The future projects proposed within the project footprint and the local assessment area are primarily located on lands that have already been altered by agricultural and development activities.

As indicated previously, for all its projects, Manitoba Hydro actively manages effects during construction to further avoid sites or salvage sites if required. Given this, the direction for the cumulative environmental effect within the project is neutral, the magnitude is negligible, and the geographic extent is the local assessment area. The duration is short term, the frequency would be a single event; however, any changes in heritage sites / objects are irreversible. The ecological context is a mix of disturbed and undisturbed lands. With the requirements to report and coordinate with regulators responsible for all projects in the area, the direction of the cumulative environment effect for the contribution from the project to the overall cumulative environmental effect is predicted to remain neutral. The magnitude will remain negligible, and the geographic extent in the local assessment area.

The assessment recognizes that there is a potential for unrecorded heritage sites / objects to be inadvertently exposed during either construction or operation and maintenance. The construction environmental protection plan and the CHRPP will provide a detailed plan for follow up and monitoring of known and discovered heritage sites / objects during the construction phase.

Sensitivity to climate change

According to the climate change information and scenarios presented in Section 8.11.1, temperature and precipitation are expected to increase in the future. While there is uncertainty in predictions several decades into the future, increased precipitation and temperature may serve to expose heritage sites / objects through changes in erosion patterns. This may provide opportunities to identify and salvage new sites but may increase the risks of losing sites adjacent to large water bodies.

Project specific monitoring will identify and manage any resources that are uncovered. In general, future climate change is not anticipated to alter the prediction that the changes of heritage sites / objects will not be significant as a result of the project. Development of the project will not create pathways to change previously recorded heritage sites / objects. Mitigation and environmental protection measures will lessen the potential for disturbance to previously unrecorded heritage sites / objects. If future climate change affects the project footprint or local assessment area of the project after its life cycle, any heritage sites / objects will have been adequately mitigated.

8.9.7 Effects on culture

Changes to the three other valued components of importance to Indigenous communities, which include traditional harvesting, important sites and heritage sites / objects can result in effects to culture. Several other factors can also affect culture such as language, health, shared learning, community and other.

For this project, the pathways of effects to culture have been identified as:

i. effects to spiritual connection/connection with the land
ii. changes to the experience of traditional harvesting
iii. changes to the experience of important sites

Impacts to culture are not necessarily linked to the size of a project. They may include changes to the way of life, the system of knowledge, values, beliefs, and behaviour, and the way that this information is passed down between generations. Culture is reflected and embedded in practices, knowledge, views, the built and natural environment, and the relationships between people and their natural environment. Effects to these tangible and intangible values are community-specific. Given the unique and context-specific nature of culture, this chapter has been provided to Dakota Tipi First Nation, Long Plain First Nation and the MMF for review prior to submission. Their updates have been included in this filing.

8.9.7.1 Pathways of effects

<u>Effects to spiritual connection / connection with the land</u>

Clearing prior to construction of a transmission line has been described on past projects as an activity that can desecrate the spirits of the trees and the forest, which can in turn affect the spiritual connection one has to the land. Other construction

activities such as movement of equipment and use of new and existing access routes that cause damage to plants and the installation and presence of towers can affect one's connection to the land.

Construction activities including clearing, use of heavy machinery and tower foundation installations that have the potential to disturb culture and heritage findings also have the potential to adversely affect the spiritual connection an individual or community might have to the land.

Changes in the land that cause changes to the knowledge of where and how to harvest or of important sites can also cause adverse effects to an individual or community's connection to the land.

Changes to traditional harvesting experience

Changes in available lands for traditional harvesting, access to those lands and knowledge of where and how to harvest can result in changes to the overall experience of traditional harvesting. Changes in the experience of traditional harvesting can then result in changes to culture.

Sensory disturbances during construction, operations and maintenance activities can cause adverse effects to the traditional harvesting experience. It has also been expressed on past projects that the presence of a transmission line can diminish the value or quality of plants used for sustenance or medicine and that the presence of the line itself can diminish the traditional harvesting experience. Such adverse effects to the experience of traditional harvesting can result in effects to culture.

As an example, the MMF shared survey responses from the Bipole III Land and Occupancy Studies, which included concerns over transmission line impacts to the experience of traditional harvesting: "*Through the survey conducted for this study, the Métis respondents reported that they would avoid transmission lines for future harvesting*."

The MMF report also includes information from the MMTP Métis Land and Occupancy Use Study, which describe transmission line effects to the experience of harvesting as: "*Through the survey conducted for this study, the Métis respondents reported that they would avoid transmission lines for future harvesting. They also said that they felt their access to lands for their harvesting would be affected*."

Changes to the experience of important sites

Changes to available lands with important sites, changes to access to those lands and changes in knowledge of important sites can adversely affect the experience of important sites, which can result in effects to culture.

Construction, operation and maintenance activities can cause sensory disturbances, which can diminish the experience of important sites. For example, construction noises or the aesthetic disturbance of the line can impede the ability to practice traditional ceremony and the experience of traditional ceremony. There may be an increase in workers around important sites during construction activities and during operation and maintenance, which can also diminish the experience of important sites. Similarly, an increase in human access opportunities to important sites can result in adverse effects to the experience of important sites. The presence of the line and the beliefs and concerns associated with it can have adverse effects on the experience of important sites and some individuals may chose to no longer frequent these sites. Such changes in the experience of important sites can cause adverse effects to culture.

8.9.7.2 Mitigation

It has been shared by some Indigenous communities on past projects that having the ability to organize traditional ceremonies and make traditional offerings on the Project are ways that the spirits that are being affected by the project can be acknowledged and respected, which can help to mitigate adverse effects to one's connection to the land and culture. Manitoba Hydro will provide Indigenous communities with opportunities to host traditional ceremonies and to offer prayers and make traditional offerings. An opening ceremony and a closing ceremony will be organized in collaboration with interested Indigenous communities on the project.

Having Indigenous community members or monitors present during construction activities can help to mitigate adverse effects to culture. As well, the transmission line has been routed in collaboration with ICACs to consider potential interaction with traditional harvesting and important sites that Indigenous communities have identified. Manitoba Hydro will continue to work with Indigenous communities to further mitigate effects to culture.

8.9.7.3 Follow up and monitoring

As mentioned earlier, Manitoba Hydro will engage Indigenous communities in monitoring of the Project whether it be through field tours offered to community members during construction of the Project or through Indigenous monitoring

positions. As mentioned earlier, Manitoba Hydro will engage Indigenous communities in monitoring of the Project. Having Indigenous community members present during construction will help to ensure the Project is constructed in a way that respects Indigenous culture. Having Indigenous community members present during construction will help the Project be constructed in a way that respects Indigenous culture. Manitoba Hydro will also engage Indigenous communities to assist in organizing ceremonies and offerings on the Project.

This chapter was reviewed by Indigenous Community and Assessment Coordinators. Their feedback was considered and adjustments to the chapter were made in response.

8.10 Cumulative effects

The project is in a region of southern Manitoba where the original native ecology has been substantially affected by more than one hundred years of human development. This change has been dominated by conversion of native prairie to agricultural lands, accompanied by urban and rural settlements, public infrastructure, and various other land uses. As a result, there has been a gradual displacement of natural features. Any remaining natural features are highly valued, including the intact aspen-oak forest on Crescent Island and the mature cottonwood forest observed in the vicinity of the Assiniboine River.

Many of the proposed future projects planned in the area (Table 6-4) will be built upon this previously disturbed environment, converting agricultural lands to industrial, utility or transportation infrastructure. Small pockets of remaining intact vegetation may also be impacted.

Construction related effects on vegetation as a result of BP6/BP7 (Section 8.2) include clearing, the potential to spread non-native/invasive plants and loss of wetland vegetation. These are also likely to occur on other foreseeable future projects, including the Crescent lake causeway and Manitoba Hydro's planned Portage Area Capacity Enhancement 230 kV transmission line project.

First Nation representatives in the area have indicated that riparian areas are important for gathering willow, an important traditional plant. Recognizing the importance of these remaining pockets of intact natural vegetation along the Assiniboine River and Crescent Lake, residual effects related to vegetation loss along these waterways will act cumulatively with riparian habitat loss of these future projects. Manitoba Hydro is the proponent for the PACE transmission project and proposes the following cumulative mitigation measure:

- Value the natural perspective during preference determination process at high level (>5%) for the PACE transmission project.

Figure 8-6. Example of vegetation by segment 11, near the Assiniboine River

Any impacts to riparian habitat have potential to increase erosion to adjacent waterbodies, reduce cover and potentially impact fish habitat. With the mitigation measures in place it is unlikely that changes occurring to riparian vegetation as a result of the project will affect fish habitat. The Crescent Lake Causeway will alter habitat in Crescent Lake and may also temporarily increase sedimentation. This could act cumulatively with planned future transmission line construction as they are both under construction at the same time; however, the risk of erosion related to BP6/BP7 is very low with mitigation in place. Manitoba Hydro undertakes a full suite of riparian protection mitigation measures when constructing transmission lines near water and

will consider river crossings in this region to align with areas of low potential impact (areas with already impacted riparian habitat or schedule work around water crossings during frozen ground conditions).There is no further mitigation proposed to protect fish and fish habitat due to the anticipated low impact and success of mitigation.

The proposed Crescent Lake Causeway project will alter habitat at Crescent Lake and may also temporarily remove wildlife habitat. This could act cumulatively with transmission line construction as they are both under construction at the same time. Noise, traffic and road closures may create a cumulative disturbance to humans and wildlife. The BP6/BP7 routing process resulted in reusing a substantial portion of the existing right-of-way, including a portion of the final preferred route located on Crescent Island. This will reduce the amount of construction activity taking place on the island, resulting in less overlap with the causeway project.

It is anticipated that the number of bird-strikes due to collisions with transmission lines will remain low and not change from past conditions due to planned installation of bird diverters. Any bird-wire collisions that occur during project operation may act cumulatively with future planned projects. It is estimated that potential wildlife habitat loss or disturbance will be minimal and short term and therefore no further mitigation is proposed to address cumulative effects.

In working with Indigenous Coordinators on the project it is understood that cumulative effects to traditional practices, culture and heritage have extended across a broad span of time, and these effects will continue. All future projects have potential to interact with the effects of the BP6/BP7 project in that the presence of more infrastructure on the landscape may impact harvesting, important sites, and therefore culture.

The area of disturbance associated with BP6/BP7 is small in relation to other projects because of the short length of transmission line requiring a rebuild (just over 5.5 km); however, when considered cumulatively with other infrastructure on the landscape, this project contributes to the loss of available land to both harvest and access important sites. Manitoba Hydro understands that when working with Coordinators on the project this loss is considered with changes that have occurred since settlement. A photo series is provided in Figure 8-7 to show this change over time in the area of Crescent Island. Adopting this pre-disturbance condition as the historical temporal limit, key mitigation to address impacts include hosting ceremonies to pay respect to Mother Earth and supporting Indigenous monitors during construction.

Cumulative effects related to human health, parks and recreation are associated with the potential for increased noise and traffic-related effects. With the information currently available it is anticipated that their may be overlap in noise and traffic-related effects with the Truck and Travel centre planned near the Days Inn. Manitoba Hydro intends to restrict construction activities to within accepted times (after 7 am and before 10 pm) to ensure noise levels for those people who may be staying at the hotel or in nearby residences are protected from excess noise. Notifications will be provided to the hotel and local residences prior to conductor splicing activities. Other planned future projects will not occur within a close enough range to act cumulatively with the BP6/BP7 Project. Although the Crescent Lake Causeway Project is close to the Project, their construction schedules do not overlap.

The southeast development Phase I project, organics resource management facility and the Portage area capacity enhancement projects are (or will be) on agricultural land and therefore there will be a cumulative loss of productive agricultural land in the area. The potential Portage Area Capacity Enhancement project includes a transmission line through agricultural land and may therefore also have similar nuisance effects and biosecurity risks.

This project will use a substantial portion of the existing right-of-way present before the October 2019 storm. Using an existing right-of-way for a portion of the project reduces potential effects in that less land is required for a new right-of-way. The area required for next towers is primarily on developed land, less than one hectare of vegetation requiring clearing. The final route of the Project strikes a balance between competing values in the area, with full involvement from city, municipal and Indigenous community representatives. The Project will facilitate the conveyance of clean, renewable energy to an area with growing energy needs, build reliability within the Manitoba transmission system and contribute to Manitoba's economic future.

After considering Project residual effects, and the overlap with past, present and future projects, Manitoba Hydro concludes that the Project will not result in significant effects to the biophysical or human environment. Manitoba Hydro is committed to continue sharing information with landowners, Indigenous communities, the public and working with interested parties through implementation of the Environmental Protection Program.

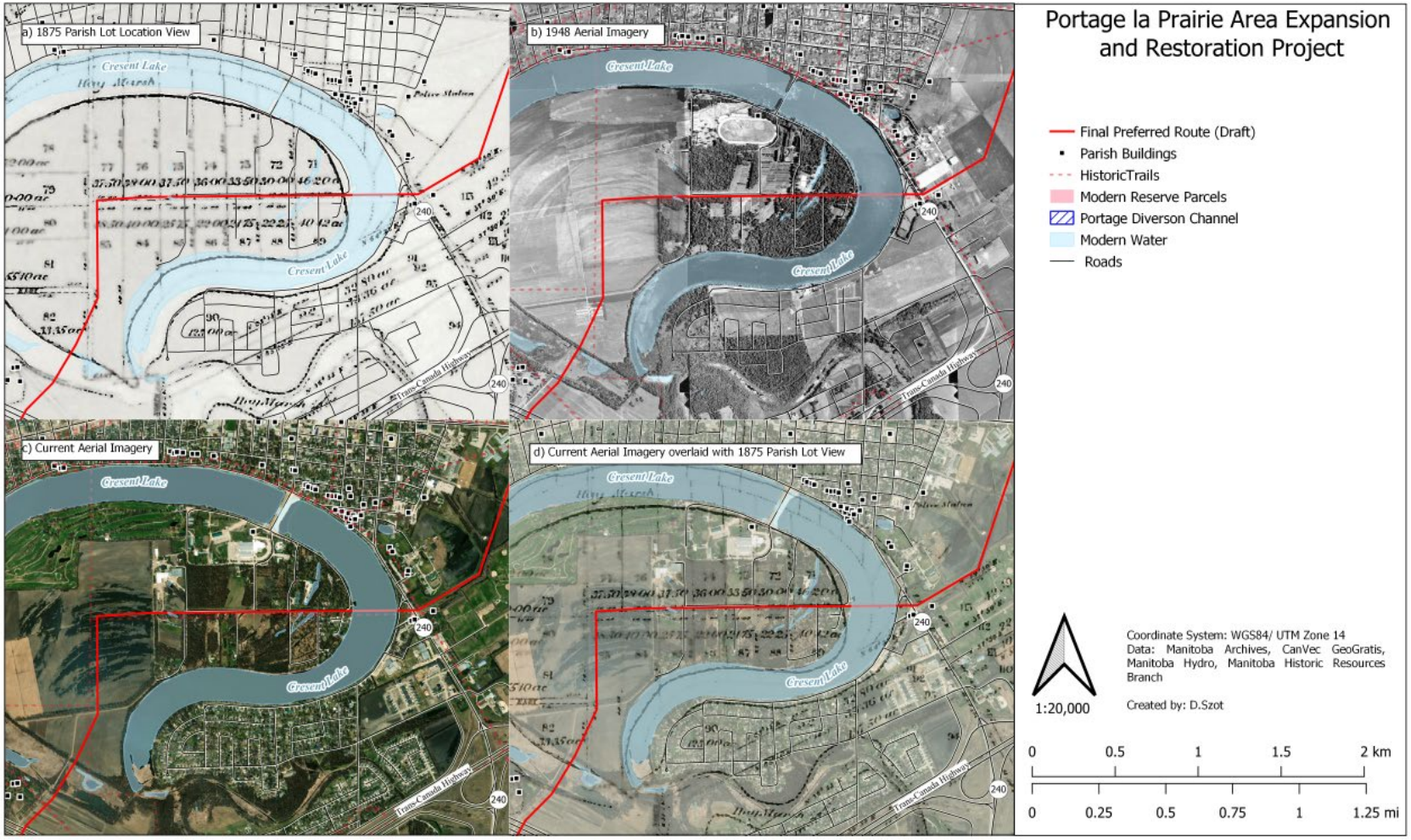


Figure 8-7: Land development change over time in Portage la Prairie

Manitoba Hydro undertook an approach to Indigenous engagement that was structured to understand concerns related to BP6/BP7 and build upon these understandings for upcoming future projects in the Portage la Prairie area. Indigenous Coordinators were supported to conduct interviews, assess effects, sit on decision making teams related to routing the project. Manitoba Hydro intends to work with Coordinators in upcoming future Manitoba Hydro projects, including the potential Portage Area Capacity Enhancement station and transmission line, to build upon understandings from this project.

- Manitoba Hydro will work with Indigenous Coordinators to apply learnings from BP6/BP7 to potential upcoming PACE projects.

8.11 Greenhouse gases and climate change

8.11.1 Climate

Climate plays an important role in multiple aspects of the project. For example, design loads are influenced by ice accumulation and wind, construction planning may use seasonal temperature patterns to favour frozen ground conditions, and conductor clearances are influenced by ambient temperature and wind conditions. Furthermore, the impact of extreme climate events, such as the wet snow event in October 2019 that resulted in damage to the existing infrastructure can result in substantial outages and financial consequences.

At a high level, this section characterizes historic climate conditions and presents projections of how climate in the area may change in the future. The information provided will become foundational for subsequent assessments of climate change impacts and resilience for transmission projects in the Portage la Prairie area.

8.11.1.1 Historic climate

Portage la Prairie is in the Portage Ecodistrict of the Lake Manitoba Plain Ecoregion, which is part of the broader Prairies Ecozone. The climate is generally characterized as subhumid, with mean annual precipitation that varies considerably year-to-year (often falling in the form of local summer storms), high evaporation, short, warm summers and long, cold winters (Smith et al., 1998).

There are nine meteorological stations operated by Environment and Climate Change Canada (ECCC) used for the assessment. Seven are in the Portage area and one at the Richardson International Airport in Winnipeg and one in Brandon are also included. These two are to complement records at Portage la Prairie and extrapolate to southern Manitoba.

Some stations have a long temporal coverage (back to 1886) but many have missing and poor-quality data that limit the suitability of these records for long term climate studies.

8.11.1.2 Climate Normals

Monthly Climate Normals (Environment and Climate Change Canada 2021) are illustrated in Figure 8-8 for temperature, precipitation and wind speed. Also shown are period-of-record extremes at each station, which may extend beyond the 1981-2010 period.

Portage la Prairie is located roughly midway between Winnipeg and Brandon and because of their proximity, normal climatic conditions from Winnipeg and Brandon are indicative of general conditions at Portage la Prairie. This is illustrated in Figure 8-8 for precipitation, which shows similar patterns at all three stations. One notable difference in the precipitation plots is the extreme (period-of-record) daily precipitation in which Portage la Prairie CDA's 137mm event (August 16, 1985; (Environment and Climate Change Canada 2021)) exceeds extreme daily records at Winnipeg Richardson Int'l A and Brandon A. This difference shows the highly variable nature of precipitation compared to temperature.

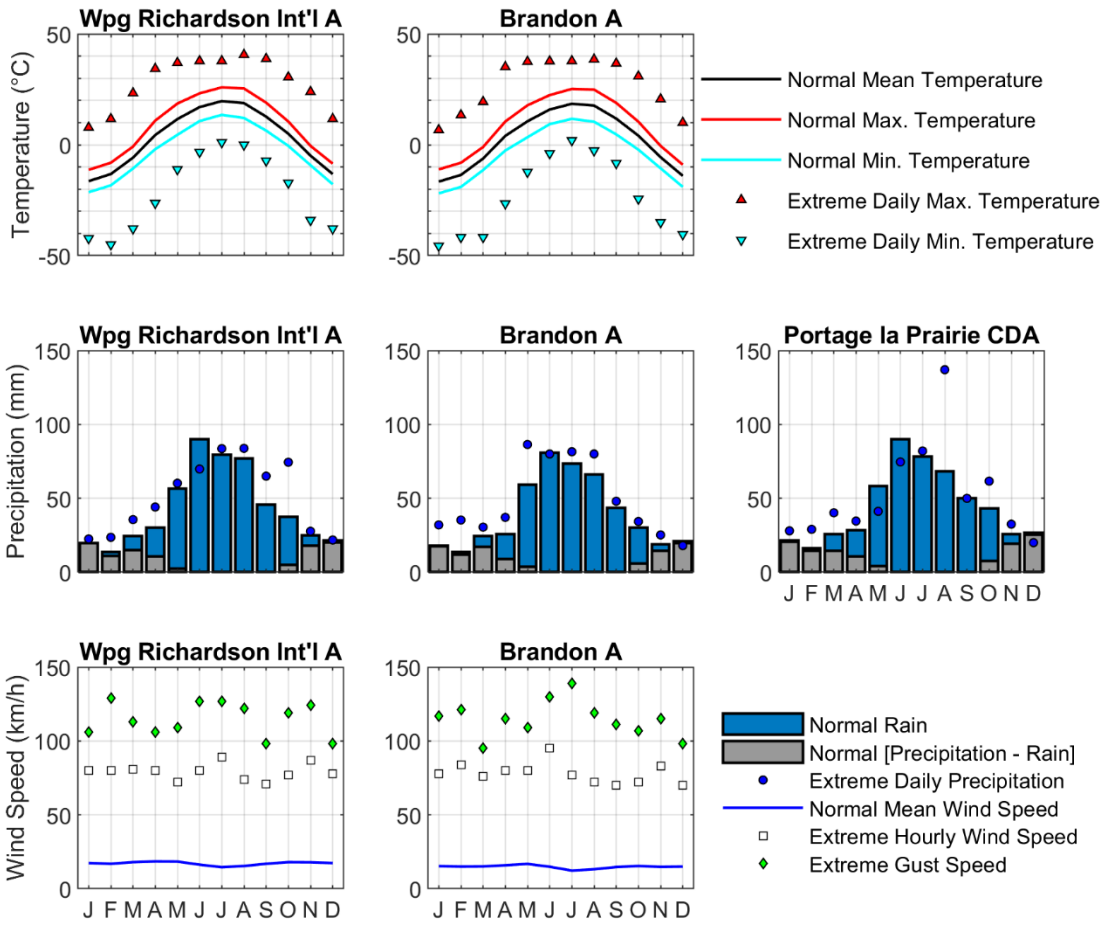


Figure 8-8: 1981-2010 Monthly Climate Normals at Winnipeg, Brandon and Portage la Prairie[4].

8.11.1.3 Trends

Adjusted and Homogenized Canadian Climate Data (AHCCD) from ECCC are developed specifically for purposes of trend analysis (Vincent, Hartwell and Wang 2020); (Mekis and Vincent 2011); (Wan, Wang and Swail 2010). AHCCD includes minimum temperature (Tmin), mean temperature (Tmean), maximum temperature (Tmax), rain (total of daily rainfall) , snow (total of daily snowfall), precipitation (total of daily precipitation), and wind speed (mean of hourly wind speed). Seasonal and

[4]Also shown (points) are period-of-record, sub-monthly, extremes for select variables. Data retrieved from ECCC (2021).

annual time series from AHCCD at select locations in the project area are plotted in Figure 8-9.

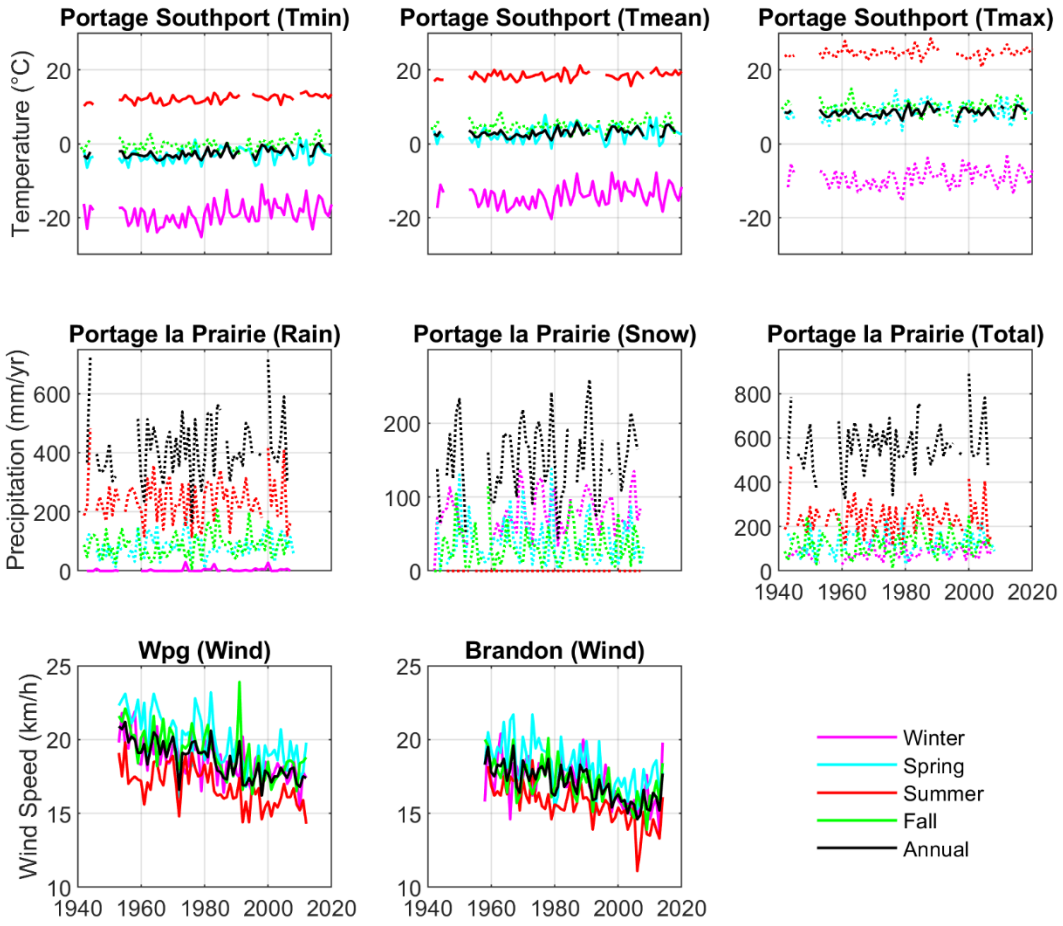


Figure 8-9: Time series of seasonal and annual temperature, precipitation and wind speed[5].

Statistically significant trends are shown in Figure 8-9 as solid lines (dotted lines are not statistically significant). Trends of note include:

[5]Solid lines indicate statistically significant trends and dotted lines indicate time series where no statistically significant trend was detected. Data shown are from the entire period available within ECCC's Adjusted and Homogenized Canadian Climate Data (AHCCD) for select stations of interest.

- Annual temperatures increased by
  - 0.031°C/yr for Tmin
  - 0.026°C/yr for Tmean
  - 0.019°C/yr for Tmax
- In winter
  - minimum temperatures increased by 0.044°C/yr
  - mean temperatures increased by 0.035°C/yr,
- In spring
  - minimum temperatures increased by 0.035°C/yr
  - mean temperatures increased by 0.029°C/yr
- In summer
  - minimum temperatures increased by 0.025°C/yr
  - mean temperatures increased by 0.016°C/yr
- The only significant precipitation trend was for increasing winter rain (0.02mm/yr), which is likely in response to warmer winter temperatures resulting in more precipitation falling as rain instead of snow.
- Annually, wind speeds decreased by 0.055km/h/yr in Winnipeg and 0.056km/h/yr at Brandon. Seasonally, the largest trend occurred in summer at Brandon by 0.057km/h/yr and in spring at Winnipeg 0.071km/h/yr.

It is important to recognize that trend analysis can be sensitive to the start and end dates. For the purposes of this assessment, trends are analyzed for their entire period of record available. Historic trends provide an indication of how the climate has changed in the past but may not be an accurate representation of continued longer-term changes in the climatic system (e.g., through extrapolation of trends).

8.11.1.4 Future Climate

Global climate models driven by future greenhouse gas emission scenarios (van Vuuren, et al. 2011) are used to project how Earth's climate may evolve in the future. Forty simulations from eighteen global climate models and two greenhouse gas emission scenarios provide the basis for this assessment.

The text below characterizes projections specific to the Portage la Prairie area. Based on the design life of the project, projections are presented for the 2050s (2040-2069) and 2080s (2070-2099) future horizons relative to the reference 1981-2010 period. Projected changes (deltas; Δ) indicate how the overall long-term climate may differ from the reference period, so information presented in this section can be complementary to historic climate normal presented in Section 8.11.1.1.

Table 8-5: Projected change for the 2050s future horizon (2040-2069)*

	Tmin (°C)	Tmean (°C)	Tmax (°C)	Precipitation (mm)	Evaporation (mm)	Runoff (mm)	Wind Speed (km/h)
Annual	2.97	2.83	2.60	3.00	3.7	-0.12	-0.12
Winter	4.34	3.73	3.18	2.65	1.81	2.36	-0.06
Spring	2.73	2.43	2.31	6.73	5.75	-2.95	-0.14
Summer	2.55	2.67	2.55	-1.11	2.66	0.2	-0.33
Fall	2.66	2.69	2.72	2.67	2.91	0	-0.17

↑ ↓ Strong agreement

↑ ↓ Moderate agreement

↑ ↓ Weak agreement

↑ ↓ Negligible agreement

*Relative to 1981-2010. Cell colours reflect agreement on the direction of change. Dark green / brown indicates strong agreement that an increase / decrease will occur, medium green / brown indicates moderate agreement that an increase / decrease will occur, light green / brown indicates weak agreement that an increase / decrease will occur, and grey denotes projections where the ensemble agreement is less than 60% on the direction of future change.

Table 8-6: Projected change for the 2080s future horizon (2070-2099)

	Tmin (°C)	Tmean (°C)	Tmax (°C)	Precipitation (mm)	Evaporation (mm)	Runoff (mm)	Wind Speed (km/h)
Annual	4.04	3.83	3.72	4.56	4.76	-0.34	-0.13
Winter	6.11	5.19	4.53	4.11	2.56	3.1	-0.04
Spring	3.85	3.57	3.45	9.72	9.79	-3.92	-0.11
Summer	3.45	3.52	3.69	0.45	4.29	0.2	-0.54
Fall	3.63	3.63	3.59	3.88	4.4	0.07	-0.19

↑ ↓ Strong agreement

↑ ↓ Moderate agreement

↑ ↓ Weak agreement

↑ ↓ Negligible agreement

The model projects average temperatures will increase by 2.83°C in the 2050s and 3.83°C in the 2080s (Table 8-5; Table 8-6). Both future time horizons (Table 8-5; Table 8-6) show strong agreement that temperature will increase into the future in all seasons. Winter is projected to experience the greatest temperature increase.

There is strong agreement that annual and winter precipitation will increase for both future time horizons. Increasing spring and fall precipitation is also projected, although with less agreement. Summer precipitation shows very small changes and is associated with notable uncertainty regarding the direction of change.

As expected, increasing temperature results in increasing evaporation, which may result in dryer summers. Some runoff projections show increasing winter runoff coincident with decreasing spring runoff, which may suggest changes in runoff timing. Increased temperatures result in earlier snowmelt in winter months, leaving less snow to melt in spring. Global climate models suggest that mean wind speed is not expected to drastically change in the future.

8.11.2 Greenhouse gases

The following section documents the predicted construction, operation and maintenance greenhouse gas emissions ('emissions') for the project, including construction activity emissions (including supply-chain emissions), land-use change emissions resulting from permanent disturbances along the right-of-way, and maintenance emissions during operation. A full technical report is provided in Appendix J.

Total aggregated emissions are anticipated to be 2.5 kilotonnes ("kt") of carbon dioxide equivalent ("CO_2e") for the project. While aggregated emissions are presented to the nearest tonne ("t") in Table 8-7, this is only done for comparison purposes; it is not intended to imply that this level of accuracy was achieved in the assessment of emissions.

Table 8-7: Summary of emissions

Activity	t CO_2e	% of total
Construction: Material Supply Chain	1,827	74.1%
Construction: On-Site Energy	231	9.4%
Construction: Labour Transport	5	0.2%

BP6/BP7 Maintenance	200	8.1%
Right-of-Way Land Use Change	202	8.2%
Total	**2,465**	

8.11.2.1 Construction-activity emissions

Emissions will result from the construction of BP6/BP7, including emissions embedded in the materials ("supply-chain emission") used to construct the line. These supply-chain emissions have been estimated to provide a useful point of comparison with direct on-site construction emissions.

Construction related activities for have been broken down into three major activities:

1. Manufacture of components (supply-chain)
2. Transportation of construction materials (supply-chain)
3. Construction

Most construction related emissions are supply-chain emissions embedded in the manufacturing of components (e.g., towers and conductors). Conservative estimates have been made during the calculation of emissions throughout. For example, most metal components will likely be manufactured internationally, but not all. For this assessment, India was selected as the presumed source location because India is one of the furthest locations in which to estimate transport costs, resulting in a conservative estimate of emissions (a higher estimate); but, the actual source location of the units is unknown at this time. A full list of assumptions is provided in the technical report.

While crane erection of the towers is presumed, it has been assumed that all towers are erected via heavy duty helicopter at a rate of 750 L of fuel per tower.

Emissions resulting from on-site energy use during construction are estimated to be 0.2 kt. For comparison, this is less than 1% of the annual emissions from Manitoba Hydro's existing fleet (25 kt of CO_2ein 2019; (Manitoba Hydro 2020)).

8.11.2.2 Land use change emissions

The use of construction vehicles during right-of way clearing will result in direct GHG emissions ("construction-related emissions"). In addition to this GHG impact, BP6/BP7 will also permanently alter the carbon content of a small area of land along the right-of-way.

For estimating land use change impacts, this assessment followed similar methods to those used for the life cycle assessment of the Manitoba-Minnesota Transmission Project (Jeyakumar and Kilpatrick 2015). From a carbon content perspective, only forestland within the project right-of-way footprint is permanently disturbed and assumed it will be converted to "Non-Treed" land (Appendix J).

For the purposes of this assessment we have assumed 1 ha (Table 8-8) of forestland will be permanently disturbed. This is a conservative assumption as it is likely less than 1 ha will be cleared. It is also assumed that a very small amount of land (less than 0.1 ha) will be permanently converted to concrete for tower foundations and have no carbon content remaining. Combined, these assumptions result in an average modified state of 13.8 tonne C/ha from an original state of 69 tonne C/ha for 1 ha of land (Table 8-8)

Land use change emissions as a result of the construction are estimated to be 0.2 kt of CO_2e. Table 8-8 summarizes the key inputs assumed for that estimate.

Table 8-8: Right-of-way land use change summary

Land use change component	Value	Unit
Area affected (ha)	1	Ha
Carbon content - original state	69.0	tonne C/ha
Carbon content - modified state	13.8	tonne C/ha
Permanent carbon change	55.2	tonne C/ha
Total GHG released	202.4	tonne CO_2e/ha
Total GHG Released	**0.20**	**kt CO_2e**

8.11.2.3 Line maintenance emissions

Emissions will result from the ongoing operation due to maintenance activities. It is assumed inspections may use air patrols (helicopter), flex track type or road vehicles. Regular inspections will occur by ground and by air.

Vegetation management within the right-of-way is required for public and employee safety, as well as the reliable operation of the line. An integrated vegetation management approach will be undertaken to address undesirable and non-compatible vegetation issues within the right-of-way. Vegetation control methods on Manitoba Hydro's rights-of-way are achieved primarily through mechanical control

(wheeled or tracked prime movers with drum or rotary cutters, mulcher, feller-bunchers, bulldozers with modified brush blades, etc.), herbicides, and manual control (chain saws, brush saws, and brush axes).

Based on emissions from Manitoba Hydro's entire vehicle fleet (25 kt of CO_2e; (Manitoba Hydro 2020a) and the size of Manitoba Hydro's existing transmission (13,800 km) and distribution (75,500 km) infrastructure (Manitoba Hydro 2020b), at a high level additional operating and maintenance emissions due to BP6/BP7 are expected to be in the 0 to 5 tonnes of CO_2e per year range (including air patrols).

At a high level, additional operating and maintenance emissions are expected to be less than 0.005 kt of CO_2e per year; a conservative upper limit of 0.2 kt will be assumed for the entire life of BP6/BP7.

8.12 Effects of the environment on the project

8.12.1 Overview

Effects of the environment on the project refer to the forces of nature that could affect the project physically or hamper the ability to carry out activities in their normal, planned manner. Typically, potential effects of the environment on any project are a function of project or infrastructure design and the risks of natural hazards and influences of nature. These effects may result from physical conditions, landforms and general site characteristics that may act on the project such that project components, schedule and/or costs could be substantively and adversely changed.

While environmental forces (e.g., severe weather, climate change) have the potential to adversely affect the project, good engineering design considers and accounts for these effects and the associated loadings or stresses on the project that may be caused by these environmental forces. The methodologies used for mitigating potential effects of the environment on the project are inherent in the planning, engineering design, construction, and planned operation of a well-designed project expected to be in service for several decades or longer.

The potential effects of the environment on the project is focused on the following effects:

- Delays in construction and/or operation and maintenance
- Damage to infrastructure
- Reduced visibility impacting public health and safety

8.12.2 Effects analysis

The assessment of the effects of the environment on the project considers potential changes to the project that may be caused by the environment. The project will be designed, constructed, and operated in compliance with various codes, standards, beneficial practices, acts, and regulations that govern the required structural integrity, safety, reliability, and environmental and operating performance of the project to minimize the potential for adverse effects of the environment on the project.

There are no environmental factors that are expected to interact substantially with the construction of the project. While some weather-related delays are possible, they are not likely to adversely affect the project construction, schedule, or cost.

During operation and maintenance, the transmission line could be subject to severe weather events. Manitoba Hydro designs its infrastructure to withstand extreme weather; however, it is not possible to design for all eventualities. Severe weather that has negatively affected the Manitoba Hydro system in the past includes tornados, ice storms and floods. There is potential for any of these to occur in the regional assessment area. Mitigation measures include, applying engineering practices and scheduling of activities to account for possible weather disruptions.

Over the next 100 years, Manitoba will likely experience warmer temperatures, a greater frequency of storm events, increasing storm intensity and an increase in annual precipitation. Potential effects of climate change on operation and maintenance of the project would be related to increases in the frequency of severe weather events, changes in temperature and changes in precipitation. It is expected that increases in extreme weather events would potentially affect operation and maintenance of the project by increasing unexpected maintenance due to storm damage. Changes in temperature could affect the freeze/thaw cycle, which will result in decreased foundation stability and potentially increased maintenance.

Mitigation measures include applying engineering practices and scheduling of activities to account for possible weather disruptions. Based on the above, the residual effects of the environment on the project during all phases of the project assessed as minor, with a moderate level of confidence because of the uncertainty in the potential changes to local, regional, and global climate that could occur over the life of the project.

8.12.3 Assessment conclusions

The most likely effect of the environment on the project is a short-term disruption in service and the economic costs of repair. The project will be designed to meet

applicable CSA standards. Design will be subject to two general design standards and the structural design loads will be based on a 150-year return period. Despite these measures, it is likely that extreme weather events can still result in outages and the requirement for repair of lines, conductors or towers. While this can result in socio-economic effects and potential public safety hazards, potential effects on the biophysical environment would be limited and associated mainly with an increased risk of an accidental release of hydrocarbons in the event of a flood or fire.

The project is being designed, and will be constructed and operated with regard for health, safety, and environmental protection to minimize potential environmental effects that could result during the normal course of construction, operation and maintenance as well as those that could result from forces of nature that could affect the project physically or hamper the ability to carry out activities in their normal, planned manner.

The careful planning and design of the project will minimize the potential for damage from extreme weather events. The effects of an individual event could have significant effects on a localized extent. However, the potential for these events to occur, given the measures that will be undertaken to prevent their occurrence, is low.

In the very unlikely and improbable event that damage to the line were to occur, it would be of a short duration, low frequency, or limited geographic extent such that major residual adverse environmental effects will not likely occur.

Overall, given the nature of the project, proposed mitigation, the potential residual environmental effects, extreme weather events on all valued components during all phases of the project, are assessed as not significant.

8.13 Accidents and malfunctions

8.13.1 Overview

In the context of environmental assessment, a malfunction is a failure of a piece of equipment, a device, or a system to operate as intended and an accident is an unexpected and unintended interaction of a project component or activity with environmental, health-related, social, or economic conditions (Impact Assessment Agency 2021).

These could occur as a result of abnormal operating conditions, wear and tear, human error, equipment failure, or other possible causes. Many accidents or malfunctions are preventable and can be readily addressed or prevented by good

planning, design, equipment selection, hazards analysis and corrective action, emergency response planning, and mitigation.

In this section, potential accidents and malfunctions that could result in significant adverse environmental effects are described, discussed, and assessed. The focus is on credible accidents that have a reasonable probability of occurrence, and where the resulting residual environmental effects could be major without careful management.

It is noted that accidents and malfunctions are evaluated individually, in isolation of each other, as the probability of a series of accidental events occurring in combination with each other is very minimal. These possible events, on their own, generally have a very low probability of occurrence and thus their environmental effects are of low likelihood. They have an even lower probability or likelihood of occurring together – thus their combination is not considered credible, nor of any measurable likelihood of occurrence.

Accident and malfunction event scenarios have been conservatively selected that represent higher consequence events that would also address the consequences of less likely or lower consequence scenarios.

The accidents, malfunctions, and unplanned events that have been selected based on experience and professional judgment are as follows:

- Worker accident
- Fire
- Power outages
- Tower collapse (weather, sabotage or force majeure)
- Failure of erosion protection and sediment control measures
- Spill of hazardous materials
- Collisions
- Discovery of a heritage site / object

Table 8-9 presents the potential interactions between the valued components and potential accidents or malfunctions. Project and cumulative effects of the accident or malfunction event on each valued component with a potential interaction are described, and the significance of the effect is determined using the same thresholds as those for the project environmental effects. Any event that results in human mortality is considered significant. The potential for, and consequence of, accidents and malfunctions were assessed considering historical risk information from Manitoba Hydro's experience and for other similar projects.

Table 8-9: Project-accident / malfunction interactions

Accident /malfunction	Valued components									
	Human health and safety	Wildlife and wildlife habitat	Property value, planned development and visual quality	Parks and recreation	Heritage	Traditional practices and culture	Fish and fish habitat	Vegetation	Economic opportunities	Agriculture
Worker accident	X									
Fire	X	X	X	X	X	X	X	X	X	X
Power outages	X								X	X
Tower collapse (weather, sabotage or force majeure)	X		X							
Failure of erosion protection and sediment control measures	X	X					X	X		
Spill of hazardous materials	X	X	X	X	X	X	X	X		X
Collisions	X	X								
Discovery of a heritage site / object					X					

8.13.2 Effects assessment

8.13.2.1 Worker accident

A worker accident has the potential to interact with human health and safety as it may result in harm, injury, or death to workers. All workers will be properly trained in practices to prevent workplace accidents including Workplace Hazardous Materials Information System (WHMIS), first aid, and other applicable training programs. These procedures are designed to prevent serious injury to staff and the general public as well as to minimize the occurrence of unplanned events and minimize any potential damage to the environment.

Interactions between a worker accident and communities will be mitigated by compliance with health and safety legislation, safety by design, and implementation of environmental management measures aimed at protecting human health. Safety risks to workers will be reduced by complying with the requirements of various governing standards including the federal *Canada Labor Code*, the federal *Transportation of Dangerous Goods Act*, the *Manitoba Workplace Health and Safety Act* and all associated regulations. Adherence to public safety codes and regulations will help the project to be carried out in a safe manner to protect workers and the public.

With the application of, and compliance with, these acts, regulations, and standards, including the application of safety and security measures that are known to effectively mitigate the potential environmental effects, the potential environmental effects of a worker accident on communities during construction and operation and maintenance of the project are considered not significant.

8.13.2.2 Fire

Potential effects caused by a fire include:

- Smoke emissions (GHG / climate)
- Safety risks to workers and the public (human health and safety)
- Loss or damage to property or resources (property value planned development and visual quality)
- Direct crop loss (agriculture)
- Contamination with sediment-laden water used in extinguishing the fire (fish and fish habitat, wildlife and wildlife habitat, vegetation, agriculture)
- Damage to infrastructure or heritage sites / objects (parks and recreations, heritage sites / objects, traditional practices and culture)

A fire may arise from heavy equipment or from natural causes such as a lightning strike.

Manitoba Hydro will ensure that personnel are trained in the use of fire-extinguishing equipment. In the unlikely event of a fire, local emergency response will be able to reduce the severity and extent of damage.

A large fire could create particulate matter levels greater than the ambient air quality standard over distances of several kilometers or damage vegetation or infrastructure in the area, but such situations would be of short duration, infrequent, and are not expected to occur because of planned mitigation and prevention measures. The potential residual environmental effects of a fire are therefore considered not significant.

8.13.2.3 Hazardous materials spill

Hazardous materials could be released into the air, soils, surface water or groundwater as a result of an accidental spill during construction or operation and maintenance activities.

In general, hazardous materials spills have the potential to:

- Contaminate surface and groundwater (human health and safety, fish and fish habitat, traditional practices and culture, wildlife and wildlife habitat)
- Contaminate soil (vegetation, agriculture, traditional practices and culture, wildlife and wildlife habitat)
- Increase harmful emissions (GHG / climate)

Spills are usually highly localized and easily cleaned up by on-site crews using standard equipment. Large quantities of hazardous materials will not be used by or stored as part of the project; therefore, a large spill is not possible.

Implementation of a detailed spill response plan and a well-designed construction environmental protection plan will result in ensure minimal potential effects through accidental releases. The contractor will be required to provide environmental training, as well as training in spill prevention and response, to construction personnel. Prior to the commencement of construction activities, Manitoba Hydro will ensure that spill response equipment is readily available. All spills will be contained, cleaned, and reported to applicable authorities as follows:

- Contaminated material or potentially hazardous material will be contained
- Proper safety precautions (e.g., protective clothing and footwear) will be taken

- The contractor will follow their spill response policy and will ensure that the provinces spill reporting line is notified for reportable spills
- Contaminated wastes, such as used cleaning cloths, absorbents, and pads, will be stored in proper waste containers
- Waste material will be disposed of at approved disposal facilities

Construction equipment will be cleaned and maintained in good working condition, with visual inspections of equipment performed on a regular basis. Petroleum products such as gasoline, diesel fuel, and oil will be properly labeled in accordance with the appropriate legislation and regulations. Refueling, oiling, and maintenance of equipment, as well as storage of hazardous materials, will be conducted in a designated and contained area(s). Servicing of equipment (e.g., oil changes and hydraulic repairs) will be completed off-site when possible. Vehicles will be equipped with spill containment and cleanup materials.

Personnel handling fuels and hazardous wastes will have WHMIS training and will be qualified to handle these materials in accordance with the manufacturer's instructions and applicable regulations. Hazardous waste and storage area(s) will be clearly marked and secured. Industrial waste will be reused or recycled on a priority basis. Where reuse or recycling opportunities are not available, industrial waste will be collected and disposed of at an approved facility. Garbage receptacles for solid non-hazardous wastes will be available. These wastes will be collected on a regular basis or as they are generated and will be disposed of at approved locations. With these mitigation measures and emergency response procedures implemented, and because of the low likelihood of such events, the potential residual environmental effects of a hazardous material spill on groundwater resources, aquatic environment, and terrestrial environment during construction and operation and maintenance of the project are considered not significant.

8.13.2.4 Vehicle accidents

A vehicle accident arising from project-related activities could cause injury or death to workers or the public (human health and safety; note that the potential for a fire or hazardous material spill, which could be associated with a vehicle accident or other means has been addressed above).

The potential for a vehicle accident exists during construction and operation and maintenance phase of the project. Worker traffic and truck traffic to and from the site, and the operation of heavy equipment on-site during construction have the potential to result in a vehicle accident during construction. Project-related vehicles will observe all traffic rules and provincial and federal highway regulations. Trucking

activity will observe speed limits and weight restrictions. Because the project will comply with all applicable traffic rules and regulations, the nominal increase in traffic volumes as a result of the project along with safety precautions, the potential residual environmental effects of a vehicle accident are considered not significant.

8.13.2.5 Tower collapse

While considered unlikely given the applied design standards, it is possible for a transmission tower to collapse during construction and operation as a result of extreme weather, mechanical failure, or intentional or unintentional human interaction.

Tower collapse has the potential to:

- Cause injury or death (human health and safety)
- Cause fires (effects and mitigation discussed above)
- Damage other infrastructure, heritage / cultural sites, crops, rare plant locations either directly due to tower collapse or as a result of emergency repair activities (vegetation, agriculture property values, proposed development and visual quality, parks and recreation, traditional practices and culture, agriculture)
- Impede access / movement (traditional practices and culture wildlife and wildlife habitat)

The risk of tower failure will be reduced through the application of sound engineering practice in the design of the towers and transmission lines for extreme loadings, the use of qualified construction contractors, and regular maintenance.

Engineering design will adhere to industry standards and reflect Manitoba Hydro's experience with similar projects. Design will follow the Canadian Standards Association (CSA) C22.3 No. 1-10 "Overhead Systems" standard. The reliability-based design method will be used for designing the structural components following the CAN/CSA-C22.3 No. 60826-10 "Design Criteria of Overhead Transmission Lines" standard.

In addition, consequences are managed through mitigation. Line maintenance crews will address damage to personal property, vegetation or soils. Soil contamination issues will be addressed following spill response planning.

The effects of a tower collapse would be localized and short term. The viability of wildlife populations or the capacity of critical habitat for wildlife species of conservation concern would not be jeopardized. The long-term persistence of vegetation communities and viability of vegetation species at risk will not be contrary to federal or provincial management objectives. Disruption of infrastructure or

agriculture is short term and minimal. Given the localized extent of the effects on wildlife habitat, effects on land use activities are not expected to extend beyond the actual collapsed structures. The likelihood of injury to or death of, humans or wildlife is low given the limited area affected by a tower collapse and the rarity of such an occurrence. As a result, while the magnitude of the effect of tower collapse on the affected valued component could be moderate to high, given the low likelihood and array of mitigation measures the effect is assessed as being not significant.

8.13.2.6 Erosion / sediment control failure

Erosion protection and sediment control measures will be implemented in areas near waterways (i.e. Crescent Lake and Assiniboine River) and other erosion-prone slopes, as required. Failure of erosion and sediment control measures is possible during construction due to extreme precipitation events. Failures could result in the release of sediment-laden runoff to receiving watercourses and the surrounding area.

The failure of an erosion and sediment control structure could directly affect water quality and indirectly effect fish and fish habitat.

Failure could also result in sediment covering adjacent vegetation, wildlife habitat or heritage sites / objects. The covering of heritage sites / objects could be a positive effect, since it would preserve the resource.

Traditional land and resource use by First Nations and Métis could be disrupted through the restriction of access to streams. Other land users, including recreational boaters, could experience restricted access to sites.

During construction, an erosion protection and sediment control framework will be provided to guide each contractor (where applicable) in preparing an erosion protection and sediment control plan. The plan will be in accordance with Canadian professional erosion and sediment control standards and guidelines. The plan will include inspection requirements to help minimize failures by ensuring erosion and sediment control measures are designed, installed and maintained properly, which limits the possibility of failure.

The extent of a failure would be small and the effects on fish and fish habitat, vegetation, wildlife habitat, heritage sites / objects, traditional land and resource use and other land uses are expected to be of a low magnitude. While failure of an erosion and sediment control measure could occur over the course of project construction, routine monitoring and inspection will aid in the rapid identification of such failure. Implementation of remedial action as required will limit environmental effects. Failure of erosion and sediment control measures are not a concern during

long-term operation because erosion and sediment will be controlled by vegetative cover and possibly other permanent measures such as riprap, gabions and other treatments.

In summary, the magnitude of the effects is low and there are monitoring and follow-up procedures to prevent extensive damage. The likelihood of the occurrence is low to moderate and the environmental effects on the affected valued component are assessed as being not significant.

8.13.2.7 Discovery of a heritage site / object

Cultural or heritage sites / objects may be discovered during activities involving ground disturbance such as construction related excavation. It is unlikely that a heritage sites / objects will be discovered during operation.

The discovery of a heritage site / object has the potential to affect heritage sites / objects and traditional practices and culture.

Heritage potential is determined during the environmental assessment. In areas of high potential, a preconstruction archaeological survey may be conducted.

Mitigation for the protection of heritage sites / objects is outlined in the cultural and heritage resources protection plan (Appendix H).

The CHRPP will provide clear instructions if Manitoba Hydro, its contractors and/or consultants, discover or disturb a cultural or heritage sites / objects and will determine the ongoing protection measures for the resources through processes outlined in this document.

If a heritage site / object is discovered, project work will cease in the area of the discovery and the project archaeologist will be contacted. Work in the area will continue only if approval is received from the archaeologist or the Historic Resources Branch.

With the low probability of encountering heritage sites / objects during project-related activities, and in consideration of the nature of the project and planned mitigation, the potential residual effects are considered not significant.

8.13.3 Assessment conclusion

The project is being designed, and will be constructed and operated with regard for health, safety, and environmental protection to minimize potential environmental effects that could result during the normal course of construction, operation and maintenance as well as those that could result from accidents and malfunctions.

The careful planning of the project and the implementation of proven and effective mitigation will minimize the potential for accidents and malfunctions. The effects of an individual accident or unplanned event could have significant effects on a localized extent. However, the potential for these events to occur, given the measures that will be undertaken to prevent their occurrence, is low. In the very unlikely and improbable event that an accidents or malfunctions were to occur, it would be of a short duration, low frequency, or limited geographic extent such that major residual adverse environmental effects will not likely occur.

Overall, given the nature of the project, credible accidents and malfunctions considered, proposed mitigation, the potential residual environmental effects of all project-related accidents and malfunctions on all valued components during all phases of the Project, are assessed as not significant.

Shoal Lakes/
Delta Marsh
Sub-Watershed

Lower
Assiniboine River
Sub-Watershed

Whitemud River
Sub-Watershed

Central Assiniboine
Sub-Watershed

La Salle River
Sub-Watershed

Portage -
Saskatchewan
Station

Crescent Lake

Portage Diversion

Assiniboine River

Site 1

Site 2

Site 3

240

1A

1

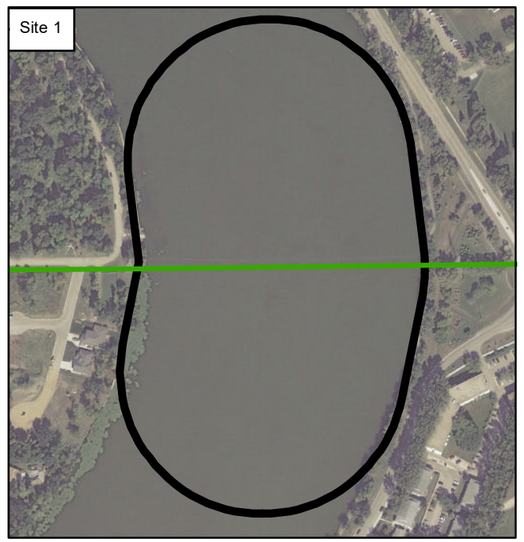
Site 3

Site 3 - The local assessment area for the Assiniboine River extends 100m upstream and 300m downstream from the closest point of transmission line centerline to the river.

Site 2

Site 2 - The local assessment area for Crescent Lake extends 100m in either direction of the centerline and 30m up bank from the HWM.

Site 1



Site 1 - The local assessment area for Crescent Lake extends 100m in either direction of the centerline and 30m up bank from the HWM.

Manitoba Hydro

BP6 / BP7 Transmission Lines Replacement Project

Project Infrastructure

- Portage - Saskatchewan Station
- BP6/7 Final Preferred Route

Local Assessment Area

- Fish and Habitat Local Assessment Area

Soil Water Erosion Risk Class

- Not available in dataset
- M - Moderate (11-22 t/h/y)

Gross Sub-Watersheds

- Central Assiniboine
- La Salle River
- Lower Assiniboine
- Shoal Lakes/Delta Marsh
- Whitemud River

Existing Infrastructure

- Transmission Line

Landbase

- TransCanada Highway
- Provincial Road

Entire map area falls within Metis Natural Resource Harvesting Zone

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: April 13, 2021

N

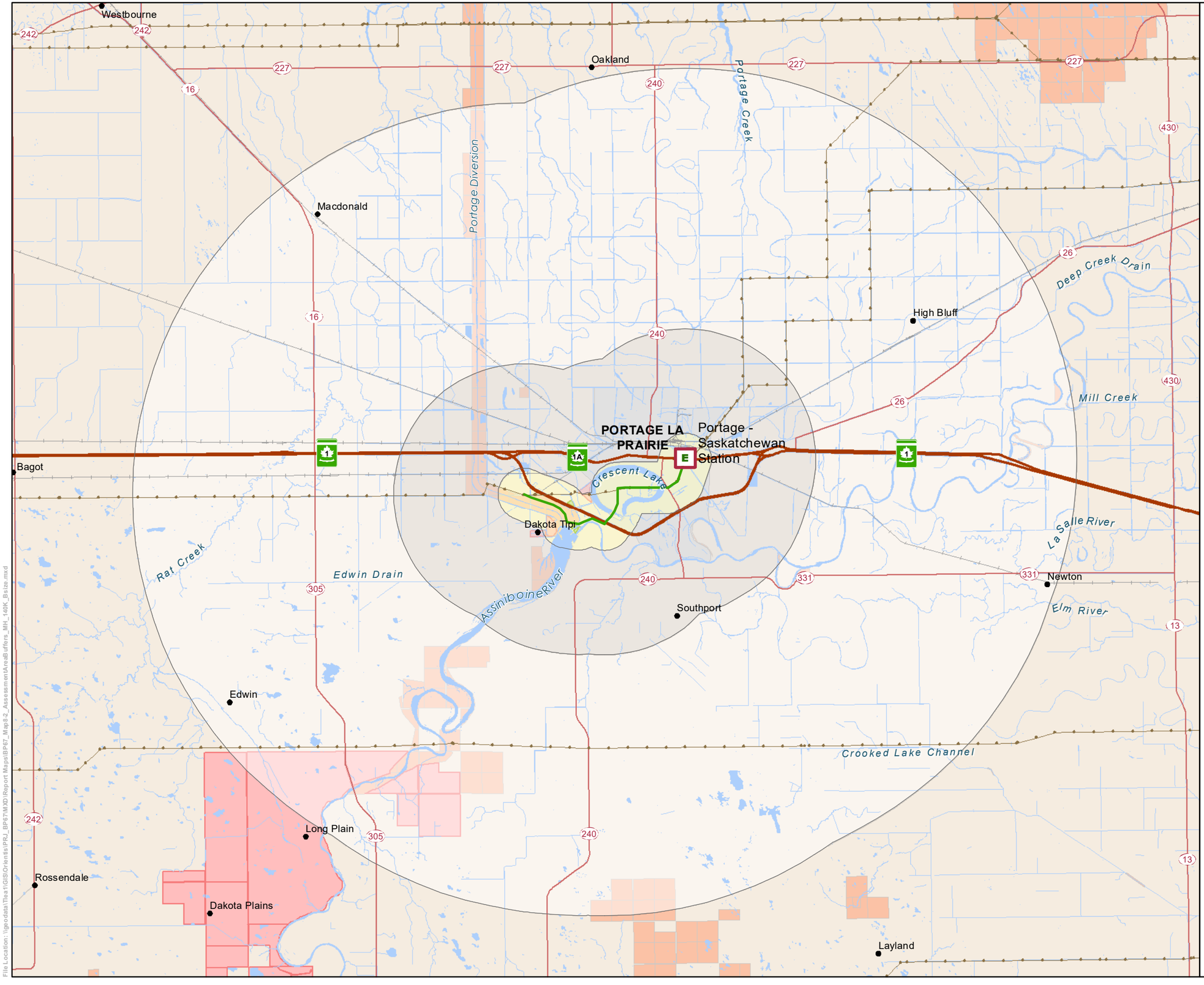
0 0.5 1 Kilometre
0 0.25 0.5 Mile

1:30,000

Project Development Area, Local and Regional Assessment Areas for Fish and Fish Habitat

Map 8-1

File Location: \\gio\data\Tlea1\GIS\Orients\PRJ_BP67MXD\Report Maps\BP67_Map8-1_FishHabitatAssessmentArea_MH_30K_Bsize.mxd



Manitoba Hydro

BP6 / BP7 Transmission Lines Replacement Project

Project Infrastructure

- Portage - Saskatchewan Station
- BP6/7 Final Preferred Route

Assessment Area Buffers

- 1 km
- 5 km
- 15 km

Existing Infrastructure

- Transmission Line

Landbase

- TransCanada Highway
- Provincial Road
- Railway
- First Nation
- Crown Land
- Provincial Park
- City/Town

Entire map area falls within Metis Natural Resource Harvesting Zone

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: April 13, 2021

N

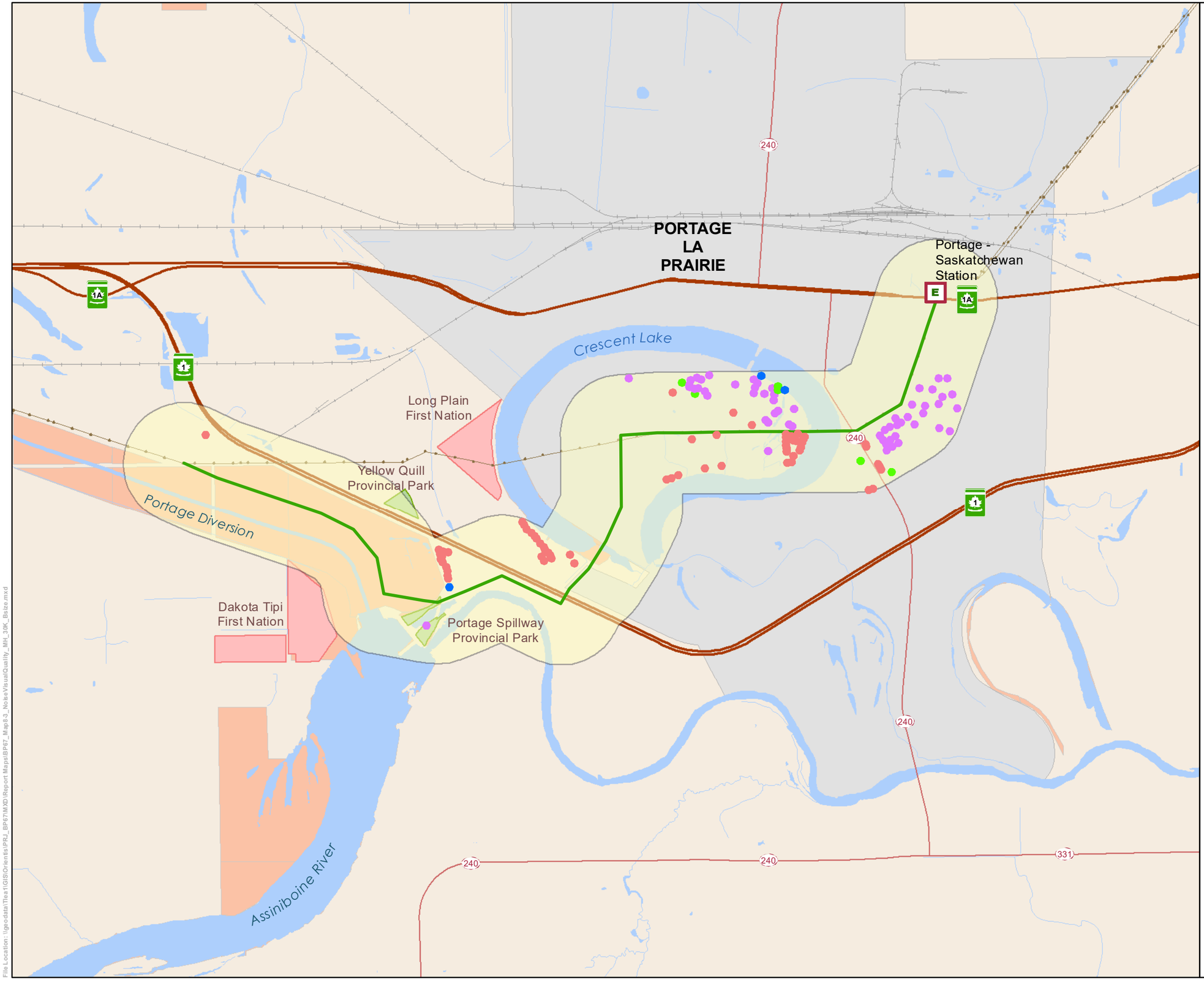
0 2 4 Kilometre
0 2 4 Mile

1:140,000

Assessment Area Buffers

Map 8-2

File Location: \\gwdata\Tles11\GIS\Orientis\PRJ_BP67\MXD\Report Maps\BP67_Map8-2_AssessmentAreaBuffers_MH_140K_BsIze.mxd



Manitoba Hydro

BP6 / BP7 Transmission Lines Replacement Project

Project Infrastructure

- Portage - Saskatchewan Station
- BP6/7 Final Preferred Route

Building Survey

- Special Features
- Historical/Cultural Resources
- Occupied House
- Recreational Bldg/Site

Study Area

- Noise and Visual Quality Study Area

Existing Infrastructure

- Transmission Line

Landbase

- TransCanada Highway
- Provincial Road
- Railway
- First Nation
- Crown Land
- Provincial Park
- City/Town

Entire map area falls within Metis Natural Resource Harvesting Zone

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: April 13, 2021

N

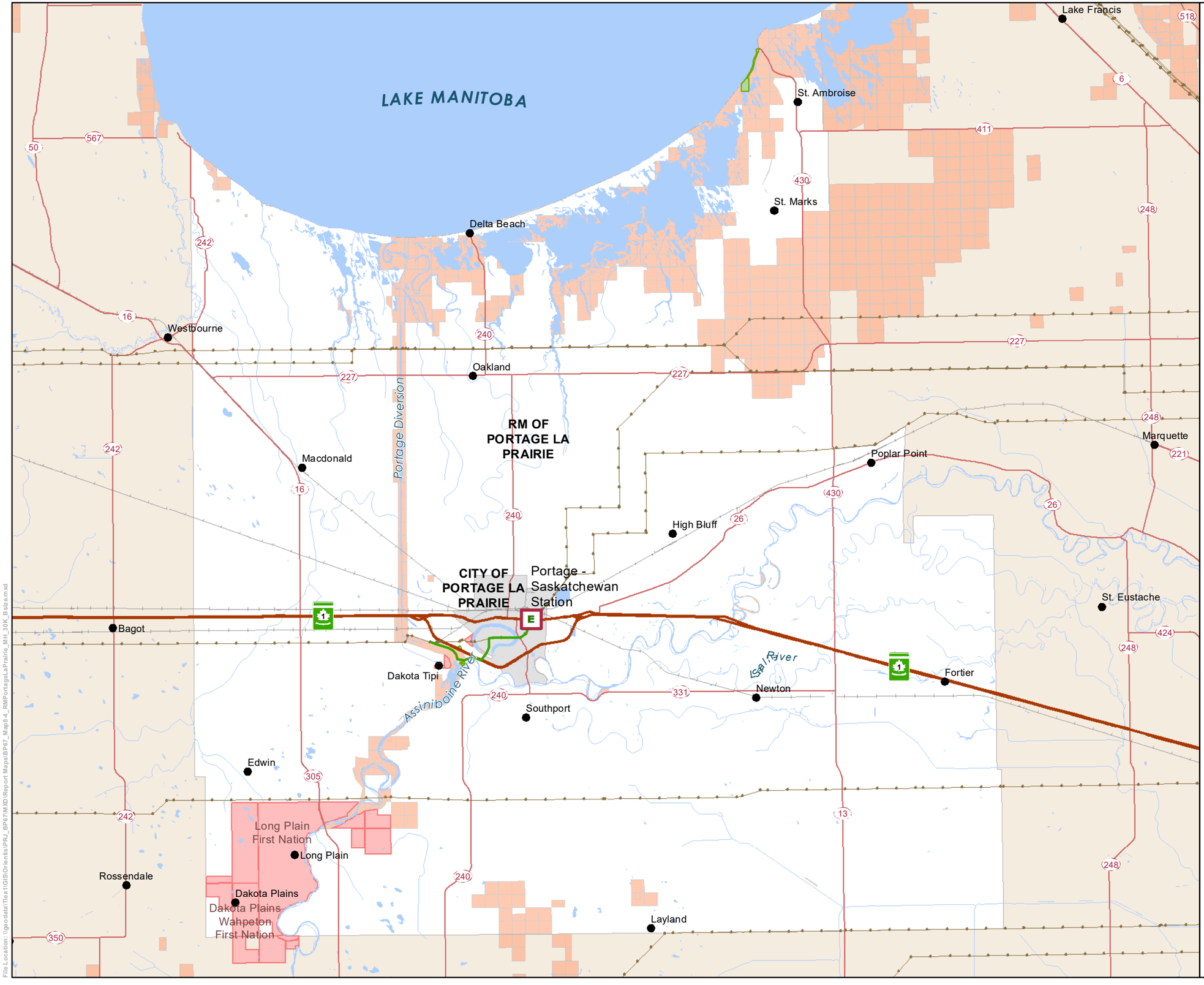
0 0.5 1 Kilometre
0 0.25 0.5 Mile

1:30,000

Noise and Visual Quality Receptors

Map 8-3

File Location: \\gcdata\Tlea11GIS\Orienta\PRJ_BP67\MXD\Report Maps\BP67_Map8-3_NoiseVisualQuality_MH_30K_8size.mxd



Manitoba Hydro

BP6 / BP7 Transmission Lines Replacement Project

Project Infrastructure

- Portage - Saskatchewan Station
- BP6/7 Final Preferred Route

Existing Infrastructure

- Transmission Line

Regional Assessment Area

- RM of Portage la Prairie

Landbase

- TransCanada Highway
- Provincial Road
- Railway
- First Nation
- Crown Land
- Provincial Park
- City/Town

Entire map area falls within Metis Natural Resource Harvesting Zone

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: April 14, 2021

N

0 2 4 Kilometre
0 2 4 Mile

1:225,000

Regional Assessment Area for Human Health and Safety

Map 8-4

File Location: \\gcdata\Tea11GIS\Orients\PRJ_BP67MXD\Report Maps\BP67_Map8-4_RMPortageLaPrairie_MH_30K_Bsize.mxd

9.0 Environmental protection program

9.1 Introduction

Manitoba Hydro will implement the mitigation measures, monitoring and other follow-up actions identified during the assessment through an Environmental Protection Program (EPP). The EPP provides the framework for implementing, managing, monitoring and evaluating environmental protection measures consistent with regulatory requirements, corporate commitments, beneficial practices and public expectations. Environmental protection, management and monitoring plans will be prepared and implemented under the EPP to address environmental protection requirements in a responsible manner.

The purpose of this chapter is to outline how Manitoba Hydro will implement, manage and report on environmental protection measures, monitoring and other follow-up actions as well as regulatory requirements and other commitments identified in this environmental assessment report.

Manitoba Hydro developed the environmental protection program in accordance with its environmental policy.

Manitoba Hydro's Corporate Environmental Management Policy states the corporation is committed to protecting the environment by:

- ensuring that work performed by its employees and contractors meets environmental, regulatory, contractual, and voluntary commitments
- recognizing the needs and views of its interested parties and ensuring that relevant information is communicated
- continuously assessing its environmental risks to ensure they are managed effectively
- reviewing its environmental objectives regularly, seeking opportunities to improve its environmental performance
- considering the life cycle impacts of its products and services
- ensuring that its employees and contractors receive relevant environmental training, and
- fostering an environment of continual improvement

9.2 Environmental management

Manitoba Hydro is seeking recertification under the International Organization for Standardization (ISO) 14001 Environmental Management System standard and is

subject to requirements of the standard, including annual audits to verify its environmental performance. An environmental management system is a framework for developing and applying its environmental policy and includes articulation of organizational structure, responsibilities, practices, processes and resources at all levels of the corporation. The environmental management system includes commitments to comply with legislation, licenses, permits and guidelines, conduct inspections and monitoring, and review the results for adherence to requirements. The ISO standard ensures quality, performance and continual improvement in the delivery of Manitoba Hydro's environmental protection program.

9.3 Adaptive management

Adaptive management is a planned systematic process employed with the goal of continually improving environmental management practices by learning from their outcomes. The environmental protection program for the project has established the principles of adaptive management allowing for flexibility in the mitigation of adverse environmental effects that may result from the project. Manitoba Hydro will use the information gathered during follow up and monitoring activities to verify the accuracy of the environmental assessment effects predictions and the effectiveness of implemented mitigation measures.

Manitoba Hydro designed the EPP to be adaptive and responsive throughout the project lifecycle by evaluating program documents, processes, procedures and mitigation measures through inspection, monitoring and communication programs and conducting reviews to facilitate updates to the program.

Within the EPP, adaptive management will take place in two primary areas:

- At the management level, involving changes with the program structure itself
- At the implementation level, involving individual mitigation measures as management and implementation teams evaluate the onsite effectiveness of mitigation strategies or the program.

Scheduled update meetings between departments, annual reviews of the program and its effectiveness will take place to foster the process.

9.4 Experience from previous projects

Manitoba Hydro has extensive experience in the development of environmental protection, monitoring and follow-up plans for all sizes of projects in many different environments, from small electrical stations, to transmission lines that span over half of Manitoba.

The development of the EPP has allowed the standardization and consistent approach to environmental protection, monitoring and follow-up. The EPP improves through the experiences from past and current projects (e.g., monitoring and inspection results, documentation format changes).

9.5 Indigenous engagement

As a component of the Indigenous engagement process, Manitoba Hydro offered the ICACs the opportunity to review the IEP and traditional practice, culture and heritage chapters of the environmental assessment. Feedback shared during by Indigenous communities during the IEP helped inform the environmental assessment report and EPP.

The knowledge that was shared through the IEPassisted Manitoba Hydro with:

- Developing a greater understanding of the project development area
- Identifying key concerns in the project development area
- Identifying potential project effects
- Planning and designing the project
- Developing potential mitigation measures

Manitoba Hydro recognizes the unique relationship that Indigenous communities and organizations have with their areas of land use and appreciates sharing of information about their history and culture, and perspective on the project.

9.6 Environmental protection program

9.6.1 Overview

Manitoba Hydro's Environmental Protection Program (EPP) provides the framework for the delivery, management and monitoring of environmental and socio-economic protection measures that satisfy corporate policies and commitments, regulatory requirements, environmental protection guidelines and beneficial practices, and input during the public engagement process and Indigenous engagement process. The EPP:

- Describes how Manitoba Hydro is organized
- Functions to deliver timely, effective, comprehensive solutions and mitigation measures to address potential environmental effects
- Defines roles and responsibilities for Manitoba Hydro employees and contractors
- Outlines management, communication and reporting structures.

The EPP includes the what, where and how aspects of protecting the environment during the pre-construction, construction, operation and decommissioning of the project. Figure 9-1 illustrates the components of the EPP. The following sections describe each component in further detail.

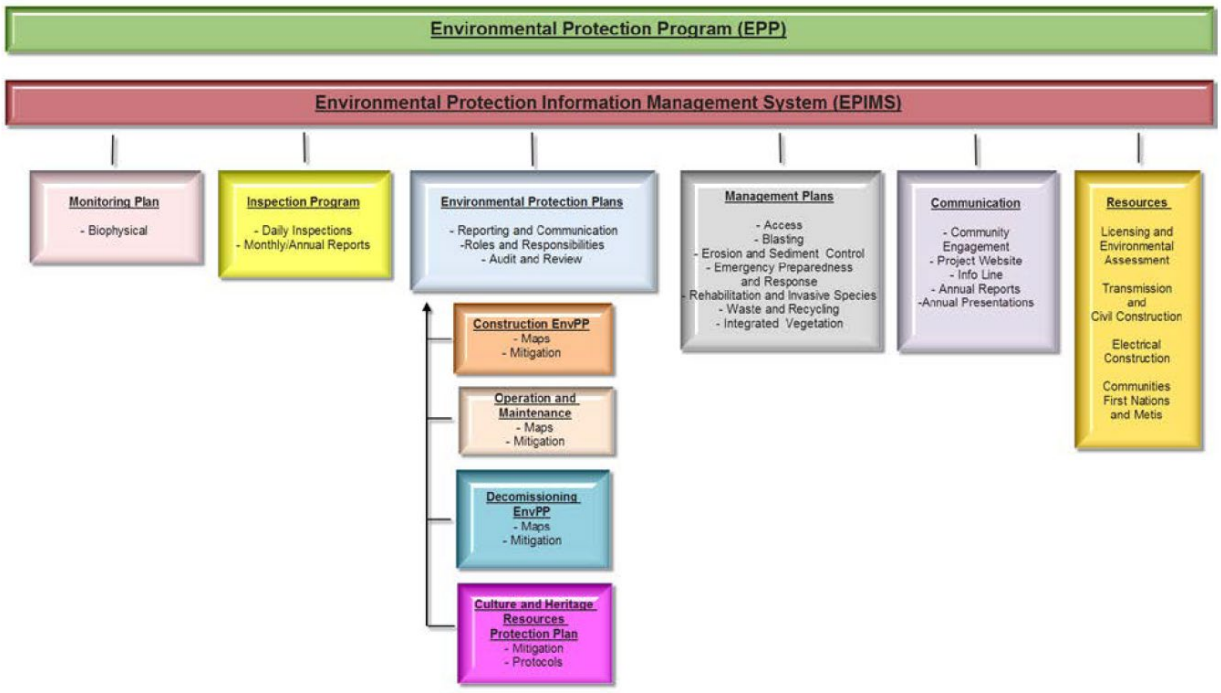


Figure 9-1: Environmental protection program components

9.6.2 Organization

The organizational structure of the EPP includes senior Manitoba Hydro management, project management and implementation teams that work together to provide timely and effective implementation of environmental protection measures identified in environmental protection plans (Figure 9-2). Manitoba Hydro senior management is responsible for the overall EPP, including resourcing, management and performance, and is accountable for regulatory compliance, policy adherence and interested party satisfaction.

The environmental protection management team is composed of senior Manitoba Hydro staff and is responsible for the management of environmental protection plans, including compliance with regulatory and other requirements, quality assurance and control, consultation with regulators, and related public and

Indigenous engagement activities. Environmental consultants and advisors support the management team.

The environmental protection implementation team is composed of Manitoba Hydro operational field and office staff and is responsible for the day-to-day implementation of environmental protection plans, including monitoring, inspecting and reporting. The implementation team works closely with other Manitoba Hydro staff as required.

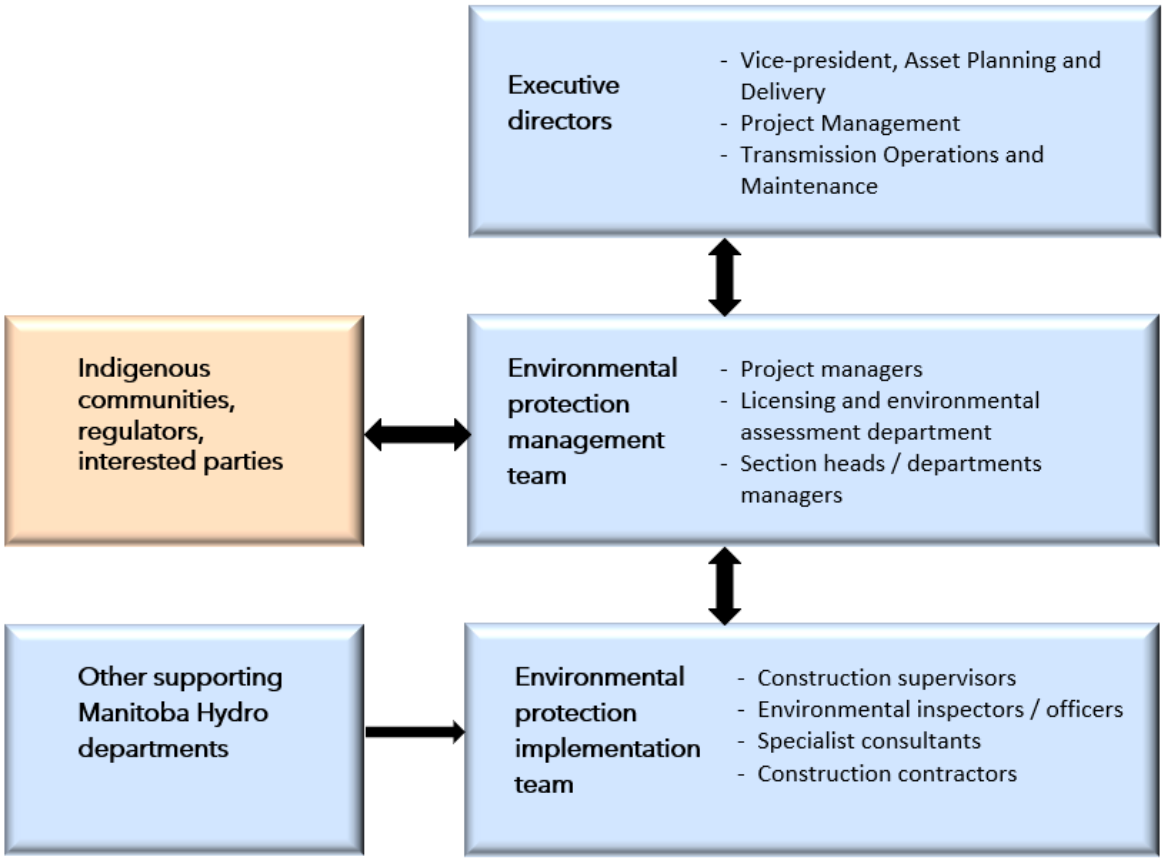


Figure 9-2: Environmental protection organizational structure

9.6.3 Resources

Manitoba Hydro commits resources early in the planning cycle to provide effective environmental assessment, mitigation and monitoring. Teams of engineers and environmental professionals develop preventative or avoidance mitigation measures

that include design and routing alternatives. In addition, there are resource allocations for the delivery and implementation of environmental protection measures to meet corporate policy and government regulatory requirements.

Manitoba Hydro is committed to staffing the environmental protection program with environmental inspectors and providing required support, including training, financial resources and equipment.

9.6.4 Roles and responsibilities

Figure 9-3 illustrates the typical organizational lines of reporting and communications. The roles and responsibilities for delivery of the project and implementation of environmental protection measures are as follows:

- The construction supervisor has overall responsibility for the implementation of the environmental protection plans and reports to a section head or department manager.
- The Licensing and Environmental Assessment Department oversees the development of environmental protection documents and associated inspection and monitoring programs, including ongoing public and Indigenous engagement activities.
- The construction contractor is responsible for ensuring work adheres to the environmental protection plans and reports to the construction supervisor.
- Environmental inspectors / officers have the primary responsibility to confirm that environmental protection measures and specifications are implemented per the environmental protection plans as well as provide information and advice to the construction supervisor.
- Manitoba Hydro field safety, health and emergency response officers are responsible for the development and execution of the safety program and occupational health and safety practices at the various construction sites.

Other Manitoba Hydro employees, including engineers and technicians, provide information and advice to the construction supervisor.

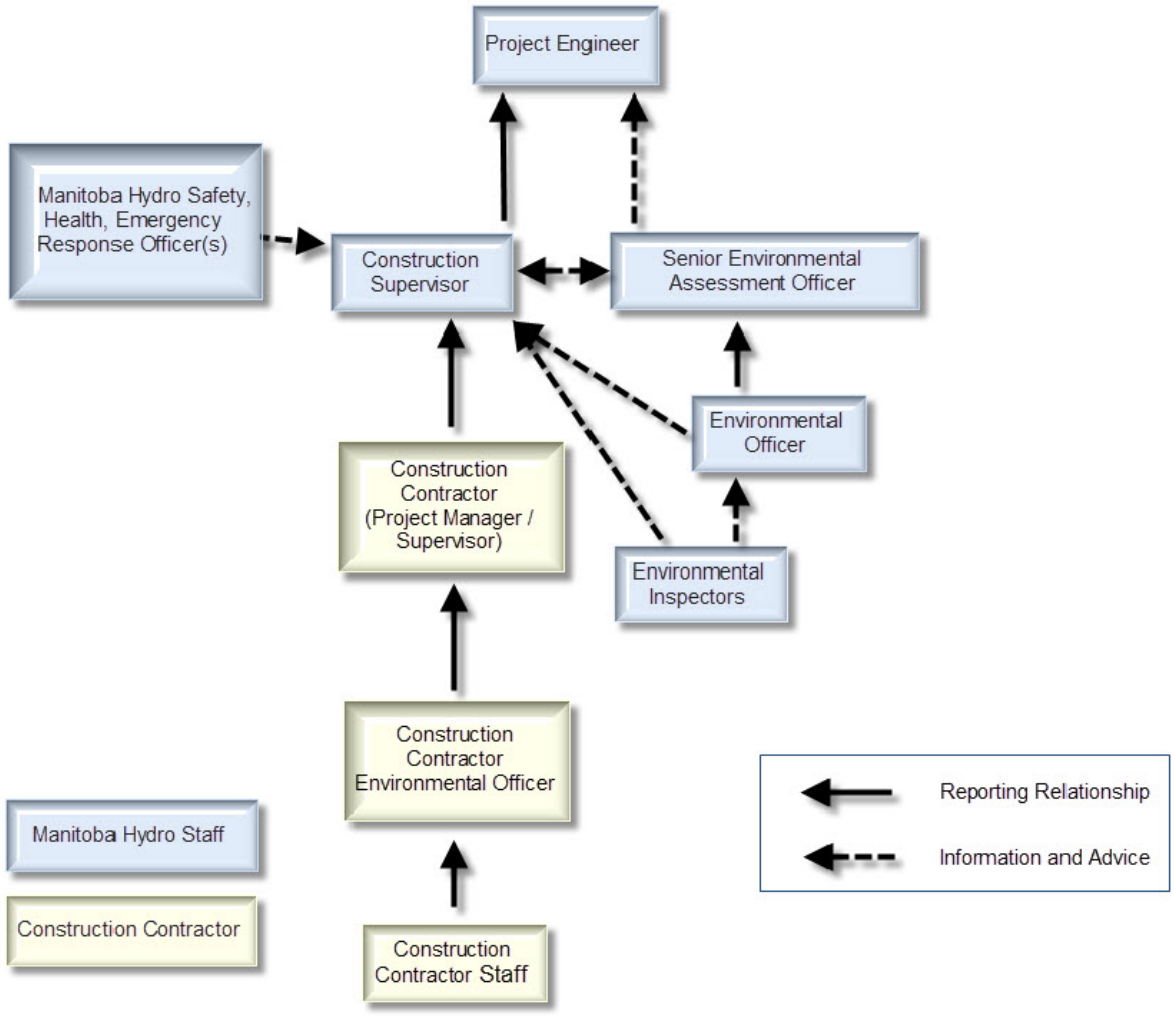


Figure 9-3: Typical organizational lines of reporting and communications

9.6.5 Communication and reporting

Manitoba Hydro personnel will maintain ongoing communications with Manitoba Conservation and Climate, other provincial and federal departments, and Indigenous communities and organizations regarding implementation of the environmental protection plan. The construction supervisor and environmental inspectors will maintain ongoing communications with the contractor and contract staff through daily tailboard meetings and weekly or otherwise scheduled construction meetings at the worksite. Inspection reports as well as incident, monitoring and other reports will be prepared and available on site for the regulators, contractors and Manitoba Hydro staff.