7.0 EFFECTS ASSESSMENT AND MITIGATION

7.1 OVERVIEW

This chapter addresses the environmental effects of the Lake Winnipeg East System Improvement (LWESI) Transmission Project (the Project) and proposed mitigation to reduce or minimize potential adverse environmental effects. A determination of the potential significance of the residual effects is then provided. The chapter is organized into sections addressing the biophysical and socio-economic effects of the project. Predicted biophysical effects were based on the existing information summarized in Chapter 4.0, following the methods outlined in Chapter 3.0, and included the following components:

- soils, hydrogeology, and geology;
- aquatics;
- vegetation;
- forestry; and
- wildlife.

Predicted socio-economic effects were based on the existing information summarized in Chapter 4.0, following the methods outlined in Chapter 3.0, and included consideration of the following components:

- socio-economics and land use;
- heritage resources; and
- cultural resources.

Effects and mitigation measures are considered for the construction, operation and maintenance phases of the Project for Line PQ95 and the Manigotagan Corner Station Site. Residual effects are effects remaining after mitigation. The nature of the residual effects of the Project was assessed according to the following criteria:

- direction (positive, negative or neutral);
- magnitude (negligible, small, moderate, large);
- geographic extent (within the project footprint, local, regional);
- duration (short-term, medium-germ, long-term);
- reversibility (reversible, permanent); and
- frequency (infrequent, sporadic/periodic, regular/continuous).

The significance of the residual effects was based on consideration of the significance evaluation for multiple criteria as described in Chapter 3.0. Table 3-3 describes additional information on the criteria used to assess residual effects summarized above. The magnitude,

duration and geographic extent were considered in concert to determine whether a residual effect was considered significant (see Tables 3-4 and 3-5).

For effects that were short and medium-term in duration, but small in magnitude were not considered significant. Moderate effects were considered significant for local and regional geographic extent. Effects large in magnitude were considered significant, regardless of the geographic extent.

For effects that were long-term in duration, but small in magnitude were not considered significant. Large and moderate effects were considered significant regardless of the geographic extent.

Effects that were considered significant according to the above criteria were further evaluated based on the reversibility and expected frequency. Reversible effects were considered not significant, while permanent effects were deemed significant. Effects that were regular or continuous were considered more significant than those that were sporadic or infrequent, or a one time event.

Public and stakeholder input was considered throughout the environmental assessment as outlined in the Public Engagement Program (PEP) activities described in Chapter 5.0. The environmental assessment included consideration of scientific analyses of ecosystem effects, Aboriginal Traditional Knowledge (ATK) gained through a series of workshops, and local knowledge.

The environmental assessment considered a range of environmental components; however it focused on selected Valued Environmental Components (VECs). The VECs were chosen because of their ecological, scientific, resource, socio-economic, cultural, health, aesthetic, or spiritual importance. To be considered as a VEC, they also had to be potentially affected by the Project (positively or negatively) or have the potential to affect the Project. Twenty-two VECs were selected, which represented biophysical and socioeconomic aspects of the existing environment. The chosen VECs and the rationale for their selection are provided in Chapter 3.0. Biophysical VECs are summarized in Chapter 3.0, Table 3.1 and socio-economic VECs are summarized in Chapter 3.0, Table 3.2.

The potential effects of the environment on the Project are also considered, and summarized in Section 7.4. An assessment of potential cumulative effects of the Project that overlapped with past, ongoing and proposed projects and activities within or near the Project Study Area was undertaken and is described in Section 7.5.

The process to select the Final Preferred Route, described in Chapter 6.0, focused on minimizing potential biophysical and socio-economic effects of the Project, within the context of engineering and cost parameters. The mitigation measures, which are part of Manitoba Hydro's environmental protection practices for construction, operation and maintenance of transmission facilities, are described in a Draft Environmental Protection Plan (Appendix 1) developed for this Project. The EnvPP prescribes practices designed to avoid and minimize potential effects of the Project. These mitigation measures have been based on applicable legislation, standards, guidelines, and best practices. The final EnvPP will be revised, based on license conditions,

and submitted to regulatory authorities prior to Project initiation following the environmental assessment review and approval process

7.2 BIOPHYSICAL EFFECTS ASSESSMENT

The following biophysical components of the environment were considered for the effects assessment:

- soils, hydrogeology, and geology;
- aquatics;
- vegetation;
- forestry; and
- wildlife (mammals, birds, amphibians, and reptiles).

Potential effects of the Project were compared to existing conditions described in Chapter 4.0. Project effects for Line PQ95 and the Manigotagan Corner Station Site were considered by evaluating the linkages between potential changes caused by the Project, and the biophysical environment. A broad range of environmental components were considered in the effects assessment however emphasis was placed on the selected VECs.

Following identification of potential effects, mitigation measures were considered and residual effects that remained after mitigation were assessed for significance. Finally, proposed monitoring and follow-up activities were discussed and identified. More detailed effects assessments are provided in the supporting Technical Reports.

Each biophysical component section is summarized under the following headings:

- overview (including potential Project activities and effects);
- effects assessment and mitigation;
- summary of residual effects (including an assessment of significance); and
- monitoring and follow-up activities.

7.2.1 Soils, Hydrogeology, and Geology

7.2.1.1 Overview

Potential effects resulting from construction, and operation and maintenance of Line PQ95 and Manigotagan Corner Station Site on soils, hydrgology, and geology include:

- soil compaction and rutting from construction of access roads, and vehicle access for clearing of ROW, transportation, and erection of towers;
- loss of soil due to erosion from clearing of vegetation;
- removal of aggregate materials through creation and/or expansion of borrow pits; and

- contamination of soil and groundwater due to spills and application of herbicides to control vegetation growth.

7.2.1.2 Effects Assessment and Migitation

Soil Compaction and Rutting

During construction, soil compaction and rutting can result from the movement of vehicles and equipment, storage of materials, and assembly and erection of towers. Loams, clays and other fine textured soils are most prone to compaction and rutting.

Effects of soil compaction and rutting can be mitigated by managing equipment traffic routes and activities for clearing of the transmission right-of-way (ROW), and installation of transmission towers to minimize the impact. Former access routes from the 66 kV transmission line construction will be followed wherever possible to avoid disturbing new areas. These areas may require new clearing but are expected to recover naturally over time.

Construction of new access roads (if required), clearing of ROW, and erection of towers will be completed under winter conditions when frozen soils are less susceptible to compaction and rutting. Minor and localized soil disturbance is expected to recover naturally.

The footprint for the Manigotagan Corner Station Site is approximately 5.5 ha which will be cleared, covered in granular material, and leveled in preparation for construction of the Manigotagan Corner Station. This will likely result in compaction of sub soils on the site.

Soil Erosion

During construction, erosion of soil can result when vegetation is removed and topsoils or organic surface materials are exposed to wind and water. This can occur from activities associated with construction of access trails, tower assembly and installation, stream and river crossings and general access during construction. To mitigate impacts due to soil erosion, industry best practices will be adopted to avoid or mitigate disturbance to soil, and vegetation, particularly within riparian zones and on steeper slopes. Line PQ95 will be constructed during frozen ground conditions when soils are generally less susceptible to disturbance and the corresponding influence of wind and water erosion.. Riparian bufferes will be marked and selective clearing will occurr along all rivers and streams, minimizing the likelihood of soil eroision in these areas. Localized re-vegetation measures may be required where surface disturbance from equipment traffic or earth work are extensive and unlikely to regenerate on its own or be delayed without some assistance or secondary inputs..

Construction activities will be completed under frozen winter conditions to the extent possible to minimize surface disturbance. This is expected to minimize the potential for exposure of mineral soils to wind and water action that could result in erosion. Surface disturbance is expected to recover naturally.

Soil erosion at the Manigotagan Corner Station Site is expected to be minimal given that the site is relatively flat and will not likely be subject to significant Influences of wind and water erosion.

Loss of Soil and Aggregate Materials

Aggregate materials may be required for upgrading of existing access roads and construction of new access roads (if required), for tower platforms, and for site preparation for the Manigotagan Corner Station Site. This will require removing additional borrow materials from existing pits, and/or creation of new borrow pits for this purpose. Effects may include reconfiguration of terrain, creation of steep and potentially unstable slopes through the creation and expansion of existing borrow pits.

Effects of aggregate removal will be minimized by using existing access roads and trails where possible, and undertaking construction under frozen soil conditions to reduce the amount of aggregate material required. Effects will also be mitigated by using existing borrow pits where possible and implementing appropriate rehabilitation of borrow sites following use, if required.

Contamination of Soils and Groundwater

During the construction and operating phases of the Project, soil and groundwater contamination may occur with accidental spills of fuels and lubricants during construction and operation, and drilling for tower foundations. Construction and maintenance activities will comply with the requirements of Manitoba Regulation 188/2001, respecting Storage and Handling of Petroleum Products and Allied Products, of the *Dangerous Goods Handling and Transportation Act*.

Groundwater resources in the area of the new line are not significant or extensive, and are not considered susceptible to widespread contamination. Construction and operation of the Line PQ95 and Manigotagan Corner Station is not expected to have a negative impact on either the quality of the groundwater or the productivity of water wells as long as standard mitigation measures are followed.

During the operation phase of the Project, management of vegetation on the ROW may require application of herbicides. Manitoba Hydro's vegetation management program will be implemented to ensure operational practices for vegetation control have no unintended or inadvertent environmental effects on soil or groundwater.

7.2.1.3 Summary of Residual Effects

Table 7-1 summarizes the residual effects of the Project on soil, groundwater and geology, and their significance. Residual effects include minor soil compaction and rutting, minor soil disturbance and erosion, removal of aggregate material, release of contaminants to soil and groundwater and migration of herbicides to soil and groundwater. All effects are considered to be small in magnitude, within the Project footprint, and short to long-term in duration. None of the residual effects of the Project on soil, groundwater and geology are considered significant.

Table 7-1: Summary of the Significance of Residual Effects of the Project on Soils, Hydrogeology and Geology

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
PQ95 Transmission Line				
Construction/ Upgrading of Access Roads and Trails - vegetation and soil removal, compaction and rutting	Construction	Minor compaction and rutting	**Direction: n**egative **Magnitude: s**mall **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency**: continuous	Not Significant
Clearing of ROW - vegetation and soil disturbance,	Pre-Construction/ Construction	Minor vegetation and soil disturbance	**Direction:** negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency**: continuous	Not Significant
Erosion Protection and Sediment Control - risk of soil erosion and transport of eroded materials	Pre-Construction/ Construction	Minor soil erosion	**Direction:** negative **Magnitude: s**mall **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency**: continuous	Not Significant
Creation/Expansion of borrow pits for aggregate materials – loss of aggregate materials	Pre-Construction/ Construction	Removal of aggregate material	**Direction:** negative **Magnitude: s**mall **Geographic Extent:** project footprint **Duration:** long-term **Reversibility:** permanent **Frequency**: continuous	Not Significant
Release of contaminants to soil and groundwater	Construction	Release of contaminants to the soil and groundwater	**Direction:** negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency**: infrequent	Not Significant
Vegetation Management – use of herbicides on ROW	Operation	Migration of herbicides to soil and groundwater	**Direction:** negative **Magnitude: s**mall **Geographic Extent:** project footprint **Duration:** long-term **Reversibility:** reversible **Frequency**: infrequent	Not Significant
Manigotagan Corner Station				
Soil Compaction	Construction	Soil compaction	**Direction:** negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** long-term: **Reversibilit**y**:** permanent **Frequency:** continuous	Not Significant
Erosion Protection and Sediment Control - risk of soil erosion and transport of eroded materials	Construction	Minor soil erosion	**Direction:** negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** long-term **Reversibility:** permanent **Frequency**: infrequent	Not Significant

Table 7-1: Summary of the Significance of Residual Effects of the Project on Soils, Hydrogeology and Geology

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Creation/Expansion of borrow pits for aggregate materials – loss of aggregate materials	Pre-Construction/ Construction	Removal of aggregate material	**Direction:** negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** long-term **Reversibility:** permanent **Frequency**: continuous	Not Significant
Release of contaminants to soil and groundwater	Construction	Release of contaminants to the soil and groundwater	**Direction:** negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency**: infrequent	Not Significant

7.2.1.4 Follow-up and Monitoring Activities

Follow-up and monitoring activities will be implemented to assess the success of the proposed mitigation measures; and to verify the magnitude and extent of residual effects. This may involve monitoring potential accidental releases to the soil and groundwater environment, and extent and nature of borrow pit expansion and rehabilitation if required.

7.2.2 Aquatics

7.2.2.1 Overview

Potential effects of the construction, and operation and maintenance of the Project on fish habitat include:

- clearing of riparian vegetation at transmission line water crossing locations, leading to soil erosion, sedimentation. increased water yield, and loss of overhead cover in watercourses;
- installation of water crossings at temporary access trails and roads, leading to soil erosion and sedimentation in watercourses;
- accidental spills and leaks of substances that are deleterious to aquatic ecosystems; and
- maintenance of riparian vegetation at watercourse crossings of the transmisison line.

7.2.2.2 Effects Assessment and Migitation

Construction Phase

Loss of Riparian Vegetation at Watercourse Crossings

The Final Preferred Route will create 19 overhead line water crossings, including four watercourses which contain important fish habitat. Clearing of riparian vegetation, and in particular, tree canopy that overhangs watercourses can result in loss of shade (especially for narrow watercourses such as small streams and creeks), increased water temperature and

increased light availability for aquatic photosynthesis. Removal of overhanging canopy will also limit the long-term input of large woody debris (fallen trees which provide for more complex fish habitat) and leaf litter (a source of nutients and food for some aquatic invertebrates) into the watercourse.

Of the 12 shorelines (banks) of watercourses (representing 4 watercourses) containing important fish habitat, and which are crossed by the PQ95 Transmission Line, only 3 contain shorelines with overhanging riparian canopy vegetation. Additionally, only one of these sites contains a significant amount of overhanging canopy. The loss of overhanging canopy will be minimal when the entire length of the watercourse is considered relative to the 60 m wide right-of way (ROW) that will be cleared. In addition, effects will be further mitigated by selective clearing of only tree species in the riparian area, leaving shrub, forbs and grasses to colonize the riparian area.

Bank Erosion and Sedimentation

Vegetation removal and improper construction practices within the ROW in riparian areas at watercourse crossing locations can led to bank instability, bank slumping and exposure of bare soil. This could lead to erosion and subsequent sedimentation into watercourses. 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 effectively, leading to less infiltration and greater surface erosion. Inputs of eroded soil can increase water turbidity, reduce light availability (and aquatic photosynthesis), contribute nutrients, alter benthic invertebrate habitat, and cover fish spawning areas and affect feeding success of fish that rely on clear water to capture prey.

Mitigation measures used to minimize disturbance to riparian areas include:

- scheduling construction activities in the winter only, when soils are frozen;
- designing crossings to be perpendicular to the watercourse where possible (thus minimizing riparian vegetation removal);
- clearly marking sensitive areas prior to construction, and clearing,
- designating machine-free zones in riparian areas;
- designating of a buffer zone around all waterbodies, which limits riparian vegetation removal to large trees;
- maintaining or promoting the growth of shrub species in riparian areas,
- keeping root systems intact during tree removal (thereby not disturbing the soil); and
- ensuring that slash piles are located above the normal high water mark and are secure.

Alteration/Contamination of Habitat from Structures and Foundations

Foundations and installations needed for transmission towers can affect fish habitat if they are located within the normal high water mark of the watercourse or within riparian areas that periodically flood. Clearing and grubbing, required for installation of these structures, would remove riparian vegetation and potentially increase erosion and sedimentation. Contamination

of a watercourse from runoff of concrete wash water during construction, or from constituents containing lime (e.g., Portland cement, mortar, grout) can also be toxic to aquatic life.

Potential effects from structures and foundations will be mitigated by locating such infrastructure above the normal high water mark, outside of riparian areas.

Water Crossings at Transmission Line ROW and Temporary Access Trails and Roads

Water crossings (e.g., snow fills, ice bridges) along temporary access trails and roads, and water crossings (snow fills and ice bridges) at the transmission line ROW are required for the transport of equipment and workers during ROW clearing and construction activitiesThe potential effects from the construction of water crossings at the transmission line ROW and along temporary access trails can be greatly mitigated by using existing crossing locations and structures along existing trails and roads and also by utilizing crossing designs that do not require alteration of the stream bank (such as snow fills and ice bridges). Construction activities for the transmission line will occur in winter, avoiding sensitive time periods for fish, such as fish spawning. Operational Statements for stream crossings, developed by Fisheries and Oceans Canada will be followed, which ensures compliance with the *Fisheries Act*. Where required, erosion control plans will be developed and implemented for sensitive sites.

Manigotagan Corner Station and Pine Falls Generating Station Switchyard

There are no project interactions with the aquatic environment during construction of the Manigotagan Corner Station due to the significant distance (1.8 km) to the nearest water body (Wanipigow River). In addition, there are no water connections (e.g., creeks) between the Manigotagan Corner Station and the Wanipigow River. There are also no interactions with the aquatic environment and the Pine Falls Generating Station Switchyard, as the construction site is enclosed by an earthen berm.

Accidental Spills and Leaks of Substances Harmful to Aquatic Environments

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 can range from acute and severe (e.g., lethal) to chronic and sublethal, 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 trophic levels in the aquatic food web.

Mitigation for accidental spills and leaks will focus on prevention. This includes:

- training of 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 normal high water mark of watercourses;

- ensuring machinery is in good working order and free of leaks; and
- having emergency spill kits on site at all times.

Operations and Maintenance Phase

Vegetation Management in Transmission Right-of-Ways

Vegetation management is used to control vegetation in and adjacent to the ROW that is not compatible with safe and reliable operation of the transmission line. Vegetation management can occur in both non-frozen and frozen (winter) periods. Machinery used in mechanical cutting or shearing can cause soil compaction, erosion and sedimentation if done incorrectly in riparian areas. This can lead to erosion and sedimentation in adjacent watercourses.

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

Mitigation will include following the Operational Statement for Maintenance of Riparian Vegetation in Existing Right-of-Ways (developed by Fisheries and Oceans Canada). This includes:

- maintaining root systems of riparian vegetation intact;
- minimizing removal of riparian vegetation (especially shrub species);
- utilizing hand-clearing methods for vegetation removal in sensitive areas (e.g., in areas of low bank stability); and
- only certified applicators will be used when application of herbicides are used.

Vegetation Management at Manigotagan Corner Station

Vegetation management at the Manigotagan Corner Station could include both mechanical weed control as well as the use of herbicides. Since there are no natural water features (e.g., creeks, rivers) in proximity to the station, there are no potential effects on aquatic resources.

Accidental Spills and Leaks of Substances Harmful to Aquatic Environments

As mentioned above for the construction phase, accidental spills and leaks of petroleum products and other substances can negatively affect fish habitat. Mitigations measures during the operation and maintenance phase will be the same as those identified for the construction phase.

7.2.2.3 Summary of Residual Effects

Table 7-2 summarizes the residual effects of the Project on fish habitat, and their significance. Residual effects include minor increases in TSS, and accidental spills and leaks of deleterious substances. All effects are considered to be negligible to small in magnitude, local in

geographic extent, and largely short-term in duration. None of the residual effects of the Project on fish habitat are considered to be significant.

Table 7-2: Summary of the Significance of Residual Effects of the Project on Fish Habitat

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Loss of riparian vegetation, increased erosion, increased TSS due to transmission line ROW clearing	Construction	Loss of riparian vegetation, minor increase in erosion, minor increase in TSS	**Direction:** negative **Magnitude:** negligible **Geographic Extent:** local **Duration:** short-term **Reversibility**: reversible **Frequency**: infrequent	Not Significant
Encreased bank erosion and downstream TSS due to water crossing construction at ROW location (snow fills, ice bridges)	Construction	Minor bank erosion, minor increase in TSS	**Direction:** negative **Magnitude:** negligible **Geographic Extent:** local **Duration:** short-term **Reversibilit**y: reversible **Frequency:** infrequent	Not Significant
Increased bank erosion and downstream TSS due to water crossing construction at access trails/roads (including culverts, clear span bridges)	Construction	Minor increase in bank erosion, minor increase in TSS, minor effect on migration of fish (culverts only)	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** infrequent	Not Significant
Release of deleterious substances to watercourses due to spills and leaks	Construction	Spills/leaks of deleterious substances into watercourses	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** infrequent	Not Significant
Loss of riparian vegetation, increased erosion, increased TSS due to ROW vegetation management	Operation and Maintenance	Loss of riparian vegetation, minor increase in bank erosion, minor increase in TSS	**Direction:** negative **Magnitude:** negligible **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Release of deleterious substances to watercourses due to spills and leaks	Operation and Maintenance	Spills/leaks of deleterious substances into watercourses	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** permanent **Frequency:** infrequent	Not Significant

7.2.2.4 Follow-up and Monitoring Activities

Transmission line construction and maintenance activities pose a low risk to fish habitat. However, the most direct effects relate to erosion and sedimentation at water crossings, due to removal of riparian vegetation and use of machinery in riparian areas. Mitigation measures

previously identified will greatly reduce or eliminate effects. Therefore, minimal monitoring and follow up is required.

Monitoring will include a visual inspection of all riparian areas within the ROW and at water crossing locations along temporary access trails and roads for signs of erosion and sedimentation. Any disturbed site will be allowed to naturally re-vegetated. If necessary, more aggressive erosion and revegetation control methods such as erosion control blankets or other means will be used.

No aquatic monitoring is required for construction and maintenance of the Manigotagan Corner station and Pine Falls Generating Station Switchyard.

7.2.3 Vegetation

7.2.3.1 Overview

Potential effects from construction, and operation and maintenance of the PQ95 Transmission Line and Manigotagan Corner Station Site on vegetation include:

- clearing of the ROW will result in a loss of habitat for rare and uncommon plants within the Project Study Area, including bog club moss, Hooker's orchid and checkered rattlesnake plantain;
- clearing of the ROW will result in a loss of ash/elm forest which is a forest type that supports many uncommon plant species;
- accidental spills and fires are detrimental to vegetation and plant habitats; and
- movement of equipment and fill material can potentially introduce inavasive and non-native plant species to the area.

Effects Assessment and Mitigation

Trees and forest habitats will be lost and altered due to clearing of the ROW for the Project. As shrubs and trees are removed the ground vegetation will be disturbed and exposed to different light, temperature and humidity levels. These new conditions will be harmful to plants requiring the microclimates of a shady forest environment and will benefit vegetation that thrives in more exposed conditions. During the maintenance phases of the Project, vegetation will regenerate forming altered habitats with shrubs and young trees as the tallest cover components. Non-treed and sparsely treed areas will likely experience little effect if the vegetation ground cover is not disturbed

Mature forests in the Project Study Area support plants considered rare and uncommon in Manitoba. These forests also support plants gathered by local Aboriginal peoples. These plants may be lost, within the ROW, when the mature forest is cleared.

Clearing for the ROW is estimated to result in the alteration of a total of 16.7 ha of potential habitat for bog club moss. Hooker's orchid potential habitat alteration is estimated to be 11.7 ha and 11.7 ha of potential habitat alteration for checkered rattlesnake plantain. Ash/elm forest transected by the ROW is estimated at 31.5 ha.

These calculations of habitat alteration are based on the ROW only. Clearing and construction activities may result in further alteration of plant habitats if access trails have to be cleared as well. Equipment and fill materials used in construction phases can often be contaminated by seeds from other work sites in other regions. Movement of such contaminated equipment and fill materials during clearing and construction phases has the potential to introduce invasive and non-native plant species into the area. Other effects associated with clearing and construction activities include fuel spills and accidental fires, which may alter existing vegetation and plant habitats.

Winter construction when the ground is frozen and plants are dormant is preferred to minimize damage to vegetation. In wetlands where tree cover is minimal or absent heavy equipment can move with little damage to the ground cover. The use of existing trails is encouraged so that no further clearing is required.

Plants of Conservation Concern

Avoidance or an offset of 30 m should be applied to locations of plants of conservation concern where possible. Known locations of S1 and S2 plants can be located and flagged in pre-construction surveys conducted during the peak of the growing season.

7.2.3.2 Summary of Residual Effects

Table 7-3 summarizes the residual effect of the Project on vegetation, and their significance. Negative residual effects include a loss of ash forest, habitat for species of conservation concern (Hooker's orchid and checkered rattlesnake plantain), potential loss of native species due to spread of invasive species, a positive effect will be the removal of forest canopy resulting in increased habitat for blueberries. These residual effects are considered small in magnitude, within the Project footprint to regional in geographic extent, and reversible upon decomissioing of the project. None of the residual effects of the Project on vegetation are considered to be significant.

Table 7-3: Summary of the Significant of Residual Effects of the Project on Vegetation

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Removal of 31.5 ha of ash forest	Construction	Loss of 31.5 ha of ash forest	**Direction:** negative **Magnitude**: small **Geographic Extent:** project footprint **Duration**: long-term **Reversibility:** reversible **Frequency:** infrequent	Not Significant
Removal of rare Hooker's orchid	Construction	Loss of 11.8 ha of potential habitat	**Direction:** negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** medium-term **Reversibility:** reversible **Frequency:** infrequent	Not Significant

Table 7-3: Summary of the Significant of Residual Effects of the Project on Vegetation

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Removal of checkered rattlesnake plantain	Construction (clearing)	Loss of 11.7 ha of potential habitat	**Direction:** negative **Magnitude:** small **Geographic Extent**: project footprint **Duration:** medium-term **Reversibility:** reversible **Frequency**: infrequent	Not Significant
Introduction of invasive plant species	Construction (clearing) Maintenance	Loss of native plants due to competition with invasive plants	**Direction:** negative **Magnitude:** small **Geographic Extent**: project footprint **Duration:** short-term **Reversibility:** reversible **Frequency:** periodic	Not Significant
Accidental spread of Dutch Elm Disease	Construction (clearing) Maintenance	Loss of elm trees outside Project footprint	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** long-term **Reversibility:** permanent **Frequency:** infrequent	Not Significant
Removal of forest cover in drier habitats	Construction Maintenance	Potential increase in suitable habitat for blueberries	**Direction:** positive **Magnitude:** small **Geographic Extent:** project footprint **Duration:** long-term **Reversibility:** reversible **Frequency:** regular	Not Significant

7.2.3.3 Follow-up and Monitoring Activities

Locations within the Project footprint where plant species of Conservation Concern (S1 and S2 listed species) have been identified for avoidance (within 30m) should be revisited for a period of three to five years to evaluate effects of the Project. Monitoring for incursion of invasive plant species should be conducted at the same time.

Pre-construction surveys for rare plants and sensitive habitats should be undertaken to identify sites for further mitigation.

7.2.4 Wildlife

7.2.4.1 Overview

Potential effects from construction and operation and maintenance of the PQ95 Transmission Line and Manigotagan Corner Station Site to wildlife include:

- habitat loss, alteration, and fragmentation;
- sensory disturbance and disruption of movement; and
- mortality.

7.2.4.2 Effects Assessment and Mitigation

Valued Environmental Components

Moose

Construction

Potential Project effects on moose during construction include habitat loss and alteration. Habitat modeling indicates that 35% of the habitat in the transmission line footprint is primary moose habitat and 31% is secondary moose habitat. Habitat effects will include a small loss of coniferous thermal and escape cover. Less than 1% of primary habitat and secondary habitat in the Project Study Area will be affected when the transmission line right-of-way and the Manigotagan Corner Station site is cleared. Other habitat effects include a small alteration of moose calving habitat near the Wanipigow, Manigotagan, Sandy, and Black rivers, and Duncan Creek (Hollow Water First Nation ATK Workshop Interview August 22, 2012) if trees are removed near river and creek crossings. Although no mineral licks were found incidentally during field studies, and none were identified during the ATK workshops, if present, mitigation involving set-back distances will be required to minimize Project effects.

Sensory disturbances during construction (e.g., traffic, machinery) could result in a loss of effective habitat and disruption of movements. In addition to the physical habitat affected by clearing, the avoidance of construction zones could temporarily reduce the amount of moose habitat located near the transmission line and disrupt their movements through it. However, moose do not easily abandon suitable areas (RRCS 1994) and often return when disturbances end (Colescott and Gillingham 1998). Because moose do not easily abandon habitat and are likely to return when the disturbance ends, the effects of sensory disturbance and disruption of movements on moose in the Project Study Area are expected to be negligible to small and short-term.

Other Project effects on moose could include increased mortality due to collisions with vehicles and to hunting. Traffic on PR 304 will likely increase during construction, increasing the risk of moose-vehicle collisions, which have been reported in the area (Black River First Nation ATK Workshop Meeting August 15, 2012). While vehicles may occasionally collide with moose due to increased local construction traffic, such events are uncommon (Terrestrial & Aquatic Environmental Managers 1993) and will likely have a negligible effect on the moose population. The temporary presence of workers in the area could increase the number of hunters and the number of moose harvested. Because the licensed moose hunting season was closed in 2010 and some areas were closed to all hunting in early 2012 (Government of Manitoba 2012) in Game Hunting Area (GHA 26), no effect on the moose population is anticipated. However, as the moose population is currently low in GHA 26, and although not anticipated, substantial Project-related moose mortality could negatively affect the recovery rate of moose in the Project Study Area.

Recommended mitigation procedures for wildlife are described in Chapter 8.0: Environmental Protection Program and Appendix 1. Important mitigation measures for moose include:

- clearing will occur during late fall and winter to the extent possible to avoid parturition times for moose;
- construction activities will not be carried out within established buffer zones and setback distances for wildlife species, including a 120 m buffer around mineral licks;
- existing access roads, trails, or cut lines will be used to the extent possible and access roads and trails will be kept as short and narrow as possible;
- public use of access roads and trails during construction will be controlled through the Access Management Plans;
- all season access roads will not be permitted within established buffer zones and setback distances from waterbodies, wetlands, and riparian areas;
- hunting and harvesting of wildlife by project staff will not be permitted while working on the project sites; and
- vehicles will not exceed posted speed limits and wildlife warning signs will be installed in high density areas and at known crossings locations.

Operation

Potential Project effects on moose during operation include habitat alteration and fragmentation. No additional loss of moose habitat is anticipated during operation; however, vegetation on the right-of-way is expected to regenerate over time, which will likely provide forage for moose (KBM Forestry Consultants Inc. 2006; Peek 2007). Periodic maintenance will be required to prevent vegetation from reaching heights that could interfere with the function of the transmission line, impede access for maintenance workers, or create a fire hazard (Manitoba Hydro 2007). Vegetation management will likely disturb moose habitat periodically; however, as moose prefer younger vegetation to mature vegetation and regenerating shrub communities for forage, the effect of periodic maintenance on moose habitat will be negligible.

The right-of-way could contribute to habitat fragmentation in the Project Study Area. As the preferred route mainly follows existing rights-of-way, the direct effects of habitat fragmentation on moose are expected to be negligible to small. Habitat fragmentation could also indirectly affect moose by attracting white-tailed deer to the right-of-way. As deer prefer edge habitat, increased fragmentation could provide access to the Project Study Area and suitable habitat for deer (Manitoba Model Forest 2011). Deer can transmit the brainworm and liver fluke parasites to moose. The brainworm parasite, which is known to occur in the area, is harmless to deer but fatal to moose (Terrestrial & Aquatic Environmental Managers 1993; Manitoba Model Forest 2011). Liver flukes can also contribute to moose mortality (Manitoba Model Forest 2011), if moose are in a weakened state. The creation of favourable deer habitat (Manitoba Model Forest 1994) and increased white-tailed deer movements in the Project Study Area could result in a greater rate of infection for moose; however, as the preferred route mainly follows existing rights-of-way, the redistribution of deer range, and the potential spread of brainworm or liver flukes, is not anticipated beyond those habitats already impacted by deer range in GHA 26.

Potential Project effects on moose could include sensory disturbance and disruption of movements. Annual inspections of the transmission line could disturb moose; however, such

events will be brief and infrequent. Maintenance activities follow well-established guidelines and the effects of sensory disturbance on moose are expected to be negligible. Intermittent sensory disturbance due to off-road vehicle and snowmobile use on the right-of-way is also possible. As the right-of-way will generally follow PR 304, moose in the area are expected to be accustomed to disturbance from vehicles, and no additional effect is anticipated. Moose in the region follow the same trails and use the same areas as in the past (Manigotagan ATK Workshop Interview September 17, 2012). Moose movements in the area could be disrupted due to habitat fragmentation and the presence of Project infrastructure. Moose are resilient to development features on the landscape (Laurian et al. 2008) and often use edge habitat (Dussault et al. 2005). Local First Nations members indicated that the right-of-way might not change moose habits (Manigotagan ATK Workshop Interview September 17, 2012). As such, disruption of moose movements by the transmission line right-of-way will likely be negligible.

Moose mortality could increase during operation due to hunting and predation. The moose population is currently in decline in GHA 26, and although not anticipated, substantial Project-related moose mortality could negatively affect the recovery rate of moose in the Project Study Area. As moose numbers in GHA 26 are expected to increase with on-going management, harvest effects are still of concern for future moose population management. Local First Nations members are particularly concerned that easier access will be provided for hunters from outside the area to harvest moose (Manigotagan ATK Workshop Interview September 17, 2012). Increased site lines for hunters and predators where the right-of-way follows existing linear features and more efficient movement for predators such as gray wolves could contribute to moose mortality (James and Stuart-Smith 2000). While the moose season is currently closed in the Project Study Area and surrounding region, the illegal harvest of moose is also a concern. Because the transmission line right-of-way generally follows existing linear features, and no new access to unaffected interior core area populations of moose in the Project Study Area is anticipated, and with mitigation, the effects on moose mortality are expected to be small in the Project Study Area.

Recommended mitigation procedures for wildlife are described in Chapter 8.0: Environmental Protection, Follow-up and Monitoring, and Appendix 1: Draft Environmental Protection Plan. Important mitigation measures for moose include:

- rehabilitated access roads and trails will be inspected in accordance with the Site Rehabilitation Plan to assess the success of re-vegetation and to determine if additional rehabilitation is required; and
- at those points where the transmission line right-of-way crosses PR 304 and other roads or trails, vegetation will be managed within safe operating limits to screen the line of sight along the transmission line right-of-way.
- Where possible conduct investigative maintenance surveys by air rather than on-ground.

American Marten

Construction

Potential Project effects on American marten during construction include habitat alteration. Habitat modeling indicates that 45% of the habitat in the transmission line footprint is suitable for American marten. Less than 1% of American marten habitat in the Project Study Area will be affected when the transmission line right-of-way is cleared. There is no American marten habitat in the Manigotagan Corner Station footprint, thus none will be affected by clearing.

Sensory disturbance due to clearing and construction activities could cause American martens to avoid the construction zone, reducing the amount of effective habitat in the Project Study Area and altering their movements throughout their home ranges. American martens appear to tolerate intermittent sensory disturbance due to motorized vehicles (Zielinski et al. 2008). Individuals whose home ranges overlap PR 304 may be accustomed to traffic noise; however, construction noise and the presence of workers will likely be constant for a short period of time as clearing and construction progress along the right-of-way. American martens that avoid the area will likely find suitable habitat elsewhere in their home ranges, and are expected to return to the area after the sensory disturbances end.

Other potential Project effects on American marten include increased mortality due to trapping. As portions of the right-of-way could create new access in the Project Study Area, trapping activity could increase in the area. Because trapping is unlikely to occur in an active construction area, and because trapping success will likely be limited if American marten avoid the area during construction, no effect on mortality is anticipated during construction.

Recommended mitigation procedures for wildlife are described in Chapter 8.0 and Appendix 1. Important mitigation measures for American marten include:

- existing access roads, trails, or cut lines will be used to the extent possible and access roads and trails will be kept as short and narrow as possible;
- trees containing areas where active animal dens or burrows are encountered will be left undisturbed until unoccupied; and
- Manitoba Conservation and Water Stewardship will be notified if animal traps are encountered and must be removed for Project activities.

Operation

Potential Project effects on American marten during operation include habitat alteration and fragmentation. No additional loss of American marten habitat is anticipated during operation; however, vegetation on the right-of-way is expected to regenerate over time and will likely be used by martens, as they may occupy openings narrower than 100 m in summer and winter (Clark et al. 1987). Because there will be a buffer of forested habitat between PR 304 and the transmission line instead of a single wide right-of-way, fragmentation effects that would be associated with the east-west movements of American marten are not expected. Periodic vegetation management could alter useable American marten habitat on the right-of-way. Although marten do not make extensive use of openings (Clark et al. 1987), because of some

vegetation regrowth, the effect of habitat alteration is expected to be small. Overall, the right-of-way could contribute to habitat fragmentation in the Project Study Area, but as the preferred route mainly follows existing rights-of-way, the effects of habitat fragmentation on American marten are expected to be negligible to small.

Project effects on American marten could also include sensory disturbance and disruption of movements. Annual inspections of the transmission line could disturb American marten; however, such events will be brief and infrequent. Maintenance activities follow well-established guidelines and the effects of sensory disturbance on American marten are expected to be negligible. Intermittent sensory disturbance due to off-road vehicle and snowmobile use on the right-of-way is also possible. American martens appear to tolerate intermittent sensory disturbance due to motorized vehicles (Zielinski et al. 2008). Individuals whose home ranges overlap PR 304 may be accustomed to traffic noise, and no additional effect is anticipated. The right-of-way could create a barrier to movements until some vegetation regenerates. The right-of-way will be 60 m in width, which will not likely impede American marten movements (Clark et al. 1987). As such, disruption of American marten movements by the transmission line right-of-way will likely be negligible.

American marten mortality could increase during operation due to trapping. As portions of the right-of-way could create new access in the Project Study Area, trapping activity could increase in the area. If trapping effort surpasses a sustainable level, a corresponding decrease in the American marten population could be expected. As a limited number of traplines overlap the right-of-way, and because trappers are stewards of their traplines (Fur Institute of Canada 2003), and as Manitoba Conservation and Water Stewardship manage and monitor the provincial trapping of fur on a sustainable basis, the American marten harvest will not likely exceed sustainable levels.

Recommended mitigation procedures for wildlife are described in Chapter 8.0 and Appendix 1. Important mitigation measures for American marten include:

- rehabilitated access roads and trails will be inspected in accordance with the Rehabilitation Plan to assess the success of re-vegetation and to determine if additional rehabilitation is required.

Bald Eagle

Construction

Potential Project effects on bald eagle during construction include habitat alteration. Habitat modeling indicates that 12% of the habitat in the transmission line footprint is suitable for bald eagle. Less than 1% of bald eagle habitat in the Project Study Area will be affected when the transmission line right-of-way is cleared. There is no bald eagle habitat in the Manigotagan Corner Station footprint. Bald eagle nests could be damaged or removed during clearing. While some loss of bald eagle habitat is anticipated, transmission towers can provide nesting habitat for bald eagles (Guinn 2004; Gross and Brauning 2011). With mitigation, the overall effect will be negligible.

Sensory disturbance and disruption of movements can affect bald eagles during construction. Bald eagles arrive early in Manitoba (as early as mid-March to late April). Bald eagles are relatively sensitive to sensory disturbance (Buehler 2000) and effective habitat could be reduced in the Project Study Area if clearing and construction occur into early spring. If construction occurs in summer, sensory disturbance could affect breeding and nesting activities and disrupt daily movements in the Project Study Area. As bald eagles are migratory, none are expected to be in the Project Study Area in winter. If construction continues into early spring, the effects of sensory disturbance and disruption of movements will likely be negligible because few bald eagles are anticipated along the transmission line. No effects on seasonal movements are anticipated, as bald eagles migrate long distances with relatively few stopovers (Laing et al. 2005), and they generally fly an estimated minimum of 1 km above the ground (Harmata 1984). As such, construction activities are not expected to affect migration movements over the Project Study Area.

Bald eagles are somewhat susceptible to collisions with vehicles, particularly when scavenging road-killed carcasses (Stinson et al. 2007). Local increases in traffic associated with clearing and construction could temporarily increase the risk of collisions with vehicles, potentially increasing the occurrences of mortality or injury. Collisions with vehicles are infrequent relative to other sources of mortality (Harmata et al. 1999), and with mitigation, the effects on the bald eagle population will likely be negligible.

Recommended mitigation procedures for wildlife are described in Chapter 8.0 and Appendix 1. Important mitigation measures for bald eagle include:

- clearing will occur during late fall and winter to the extent possible to avoid the spring/summer nesting season for birds;
- clearing will not be permitted within established setbacks for bird nesting and brood rearing during established timing windows, including a 200 m buffer around large stick nests from April 1 to July 31;
- trees containing large nests of sticks will be left undisturbed until unoccupied. Artificial structures for nesting may be provided if unoccupied nests must be removed; and,
- any wildlife killed or injured by vehicles will be reported to Manitoba Conservation and Water Stewardship to prevent bald eagle-vehicle collisions.

Operation

No additional loss of bald eagle habitat is anticipated during operation. The transmission towers could provide nesting habitat (Guinn 2004; Gross and Brauning 2011), but nests could interrupt power transmission (Steenhoff et al. 1993), necessitating their removal (Manitoba Hydro 2010). Because alternate habitat is available, these effects are considered neutral.

Project effects on bald eagle could include sensory disturbance and disruption of movements. Annual inspections of the transmission line could disturb bald eagles, particularly during the spring nesting season; however, such events will be brief and infrequent. Maintenance activities follow well-established guidelines and the effects of sensory disturbance on bald eagle are expected to be negligible. Intermittent sensory disturbance due to off-road vehicle use on the

right-of-way is also possible. Individuals whose home ranges overlap PR 304 may be accustomed to traffic noise, and no additional effect is anticipated. As bald eagles are known to perch and nest on transmission towers, the transmission line is not expected to affect their daily movements, but could possibly enhance them to a small degree. No effects on seasonal movements are anticipated.

Potential Project effects on bald eagle also include increased mortality. Bald eagles are susceptible to electrocution (Harness and Wilson 2001; Millsap et al. 2004) and the risk of death or injury could increase if they perch or nest on transmission towers. A minimum of 1.5 m, 1.2 m vertical, and 1.5 m diagonal spacing between electrically conductive points on the transmission line is required to prevent most bird of prey electrocutions (APLIC 2006). The wide spacing of the lines between the conductors, and the configuration of the transmission line makes this effect highly unlikely (see Chapter 2 Project Description). Collisions with wires are another source of mortality associated with transmission lines (Mojica et al. 2009). As collisions with wires are more likely over or near open water, the risk of collision would likely be greatest near rivers such as the Manigotagan and the Winnipeg River. No overhead transmission lines will be used at the Winnipeg River crossing (see Project Description). Although other rivers such as the O'Hanly river has suitable forage fish species (e.g., walleye, northern pike, white sucker - see Aquatic Technical Report) for bald eagle, because these rivers are narrow in width and are less suitable for foraging by eagles, bird-wire collisions are not expected at these sites. With mitigation, effects of increased mortality on the bald eagle population are expected to be negligible.

Recommended mitigation procedures for wildlife are described in Chapter 8.0 and Appendix 1. Important mitigation measures for bald eagle include:

- bird diverters or aerial markers may be installed in high bird traffic areas such as at the Manigotagan and Black river crossings.

Spruce Grouse

Construction

Potential Project effects on spruce grouse during construction include habitat loss. Habitat modeling indicates that 40% of the habitat in the transmission line footprint is suitable for spruce grouse. Less than 1% of spruce grouse habitat in the Project Study Area will be affected when the transmission line right-of-way is cleared. There is no spruce grouse habitat in the Manigotagan Corner Station footprint, thus none will be affected by clearing. Spruce grouse are expected to find undisturbed habitat in the Project Study Area (Potvin et al. 1999) and the effects of habitat loss are expected to be small.

Sensory disturbance and disruption of movements can affect spruce grouse during construction. If clearing and construction occur in spring and early summer, sensory disturbance could affect breeding and nesting activities and disrupt daily movements in the Project Study Area. While spruce grouse are tolerant of human presence, males will cease their spring displays when disturbed (Holland and Taylor 2003d). Spruce grouse inhabit the Project Study Area year-round; habitat avoidance and disruption of daily movements are also anticipated for winter. There will

be no effects on seasonal movements as this species does not migrate. Effects will be temporary and limited to the local population, and are expected to be small and short-term.

Project effects on spruce grouse could include increased mortality. As the right-of-way is cleared, opportunities for harvest of spruce grouse could increase. As the season for these species ends in mid-December (Manitoba Conservation and Water Stewardship 2012a), legal harvest will not occur if clearing occurs out of season. Because domestic or illegal harvest is unlikely to occur in an active construction area, and because if it occurs, harvest success would be limited because spruce grouse are expected to avoid the area during construction, no effects are anticipated. Collisions with vehicles, a potential source of spruce grouse mortality due to increased traffic on PR 304 during construction, have been recorded, but do not appear to be common (Clevenger et al. 2003). If clearing and construction occur in spring, spruce grouse nests could be damaged or destroyed. With mitigation, these effects will not occur. Individuals foraging on the cleared right-of-way could be susceptible to collisions with construction machinery, but vehicle speeds are expected to be slow and controlled, reducing the risk of collisions. As the harvest is not expected to increase during construction and collisions with vehicles are unlikely, increased mortality is expected to have a negligible effect on the local spruce grouse population.

Recommended mitigation procedures for wildlife are described in Chapter 8 and Appendix 1. Important mitigation measures for spruce grouse include:

- clearing will occur during late fall and winter to the extent possible to avoid the spring/summer nesting season for birds;
- clearing will not be permitted within established setbacks for bird nesting and brood rearing during established timing windows; and,
- hunting and harvesting of wildlife by project staff will not be permitted while working on the project sites.

Operation

Potential Project effects on spruce grouse during operation include habitat alteration and fragmentation. No additional loss of spruce grouse habitat is anticipated during operation; however, vegetation on the right-of-way is expected to regenerate over time, and is expected to be used by spruce grouse to a small degree. Periodic vegetation management could alter spruce grouse habitat on the right-of-way. Vegetation management is expected to be infrequent, and vegetation will regenerate. The right-of-way would also contribute to habitat fragmentation in the Project Study Area. As the preferred route mainly follows existing rights-of-way, the effects of habitat fragmentation on spruce grouse are expected to be negligible to small.

Project effects on spruce grouse could include sensory disturbance and disruption of movements. Annual inspections of the transmission line could disturb spruce grouse, particularly during the spring nesting season; however, such events will be brief and infrequent. Maintenance activities follow well-established guidelines and the effects of sensory disturbance on spruce grouse are expected to be negligible. Intermittent sensory disturbance due to off-road vehicle and snowmobile use on the right-of-way is also possible. Individuals whose home

ranges overlap PR 304 may be accustomed to traffic noise, and no additional effect is anticipated. Daily movements could be affected, as spruce grouse use open areas less than forested areas (Huggard 2003) and individuals could avoid the right-of-way. No effects on seasonal movements are anticipated, as spruce grouse do not migrate. As sensory disturbance and disruption of movements will affect a limited number of individuals in the immediate area of the transmission line, effects on the spruce grouse population are expected to be negligible.

Spruce grouse mortality could increase during operation. Portions of the right-of-way could provide improved access to hunters in the Project Study Area and increase the spruce grouse harvest. As the right-of-way will generally follow existing linear features, access to the area beyond what is currently available will be limited. Provincial harvest management strategies and regulations are an important consideration in ensuring sustainable spruce grouse populations. Any increased mortality related to domestic or regulated hunting will likely be negligible relative to the spruce grouse population in the Project Study Area. Upland game birds such as spruce grouse are vulnerable to collisions with transmission lines, partially attributed to their somewhat clumsy flying ability (Janss 2000; Bevanger and Brøseth 2001). Transmission lines with ground wires to protect against lightning tend to increase the susceptibility of some bird species to collisions (Bevanger and Brøseth 2001). As the number of levels of wires increases, and where guyed wires are used to support transmission line towers, so does the chance of collision (Bevanger and Brøseth 2001). Because the risk of collisions is very small and they are unlikely to occur, only a small increase in spruce grouse mortality is anticipated during operation. Occasional wire strikes are not expected to have a measureable effect on a healthy local population.

Recommended mitigation procedures for wildlife are described in Chapter 8.0 and Appendix 1.

Olive-sided Flycatcher

Construction

Potential Project effects on olive-sided flycatcher during construction include habitat loss and alteration, which are threats to olive-sided flycatcher populations (COSEWIC 2007b). Habitat modeling indicates that 85% of the habitat in the transmission line footprint is suitable for olive-sided flycatcher. Less than 1% of olive-sided flycatcher habitat in the Project Study Area will be affected when the transmission line right-of-way is cleared. Seventy-four percent of the habitat in the Manigotagan Corner Station footprint is olive-sided flycatcher habitat; less than 1% of olive-sided flycatcher habitat in the Project Study Area will be lost at the Manigotagan Corner Station site. Olive-sided flycatchers occupy the edges of forest openings but require residual live trees and standing dead trees for nesting and foraging (COSEWIC 2007b). As such, habitat alteration due to clearing will likely have a small effect on the local olive-sided flycatcher population.

Project effects could include sensory disturbance and disruption of movements. If clearing and construction occur in spring and early summer, sensory disturbance could affect breeding and nesting activities and temporarily reduce the amount of effective habitat in the Project Study Area, possibly resulting in reduced reproductive success. No effects are anticipated for winter, as this species is migratory and will be absent. With mitigation, these effects are expected to be

neutral for the transmission line and negligible at the Manigotagan Corner Station Site where year-round construction activities are anticipated.

Few direct sources of olive-sided flycatcher morality are anticipated during the construction phase. If clearing and construction occur in spring, nests could be damaged or destroyed. Collisions with vehicles are not reported as a source of mortality in the literature. With mitigation, these effects will be neutral.

Recommended mitigation procedures for wildlife are described in Chapter 8.0 and Appendix 1. Important mitigation measures for olive-sided flycatcher include:

- clearing will occur during late fall and winter to the extent possible to avoid the spring/summer nesting season for birds; and
- clearing will not be permitted within established setbacks for bird nesting and brood rearing during established timing windows.

Operation

No additional loss of olive-sided flycatcher habitat is anticipated during operation, and effects associated with habitat fragmentation are expected to be negligible due to the species' preference for open areas at the edges of forests. Olive-sided flycatchers could benefit from edge habitat created along the right-of-way. However, human disturbances such as forest clearing can mimic more suitable natural habitat, attracting nesting birds and reducing nest success (Robertson and Hutto 2007). Such habitat selection will be local, and will affect few individuals rather than populations (Robertson and Hutto 2006). The removal of standing dead danger trees during operation could marginally reduce the site suitability of habitat adjacent to the right-of-way for olive-sided flycatcher. These habitat effects are considered negligible to small.

Project effects on olive-sided flycatcher could also include sensory disturbance and disruption of movements. Annual inspections of the transmission line could disturb olive-sided flycatchers in the vicinity of the right-of-way, particularly during the spring nesting season. Such events will be brief and infrequent. Maintenance activities follow well-established guidelines and the effects of sensory disturbance on olive-sided flycatcher are expected to be negligible. Intermittent sensory disturbance due to off-road vehicle use on the right-of-way is also possible. Although excessive noise can affect breeding bird communications (e.g., Brumm 2004; Habib et al. 2007; Goodwin and Shriver 2011), no additional effect is anticipated because of the intermittent nature of the noise. No effects are anticipated for winter, as this species is migratory and will be absent. No disruption of movements are anticipated because olive-sided flycatchers favour openings as habitat.

Few sources of Project-related olive-sided flycatcher mortality are anticipated during operation. As olive-sided flycatchers are relatively small and mobile, no collisions with the transmission line are expected. Vegetation management conducted in spring could result in damage or destruction of nests, reducing the population's nesting success. Human activities that create edge areas have been identified as potential 'ecological traps' where predation by squirrels and corvids causes increased mortality (Altman and Sallabanks 2000). Although the loss of

individual birds or eggs could have a negative effect on the local population, these effects are expected to be negligible to small.

Recommended mitigation procedures for wildlife are described in Chapter 8.0 and Appendix 1.

Canada Warbler

Construction

Potential Project effects on Canada warbler during construction include habitat alteration, which is a threat to Canada warbler populations (COSEWIC 2008c). Habitat modeling indicates that 10% of the habitat in the transmission line footprint is suitable for Canada warbler. In all, less than 1% of Canada warbler habitat in the Project Study Area will be affected when the transmission line right-of-way is cleared. There is no Canada warbler habitat in the Manigotagan Corner Station footprint. Small habitat alterations and losses may affect a few individuals but are not expected to have a measureable effect on the local Canada warbler population or on breeding and nesting habitat availability. As a small loss of habitat is expected, effects on the local Canada warbler population will likely be small.

Project effects could also include sensory disturbance and disruption of movements. If clearing and construction occur in spring and early summer, sensory disturbance could affect breeding and nesting activities and temporarily reduce the amount of effective habitat in the Project Study Area, possibly resulting in reduced reproductive success. No effects are anticipated for winter, as this species is migratory and will be absent. With mitigation, including the avoidance of clearing and construction during the breeding and nesting season, no Project effects are anticipated during construction.

Few direct sources of Canada warbler mortality are anticipated during construction. If clearing and construction occur in spring, nests could be damaged or destroyed. Collisions with vehicles are not reported as a source of mortality in the literature, but there is a very small chance for such accidents to occur. With mitigation, these effects will be neutral.

Recommended mitigation procedures for wildlife are described in Chapter 8.0 and Appendix 1. Important mitigation measures for Canada warbler include:

- clearing will occur during late fall and winter to the extent possible to avoid the spring/summer nesting season for birds; and
- clearing will not be permitted within established setbacks for bird nesting and brood rearing during established timing windows.

Operation

Potential Project effects on Canada warbler during operation could include habitat alteration and fragmentation. No additional loss of Canada warbler habitat is anticipated during operation. The Canada warbler is relatively resilient to some levels of human-caused disturbance (Cooper et al. 1997) but could be vulnerable to brown-headed cowbird brood parasitism, which is much greater in habitat edges associated with fragmentation than in interior forests (Chace et al. 2005; Tewksbury et al. 2006). Few brown-headed cowbirds are expected in forested habitats in

the Project Study Area because they are associated with forest openings near agricultural land (Coker and Capen 1995), which generally occur in the south. Overall, the effects of habitat alteration and fragmentation are expected to be negligible to small.

Project effects on Canada warbler could also include sensory disturbance and disruption of movements. Annual inspections of the transmission line could disturb Canada warblers in the vicinity of the right-of-way, particularly during the spring nesting season. Such events will be brief and infrequent. Maintenance activities follow well-established guidelines and the effects of sensory disturbance on Canada warbler are expected to be negligible. Intermittent sensory disturbance due to off-road vehicle use on the right-of-way is also possible. Although excessive noise can affect breeding bird communications (e.g., Brumm 2004; Habib et al. 2007; Goodwin et al. 2011), no additional effect is anticipated because of the intermittent nature of the noise. No effects are anticipated for winter, as this species is migratory and will be absent. The presence of the right-of-way could affect the daily or seasonal migratory movements of Canada warblers in the Project Study Area. As this species migrates long distances and would encounter many natural and anthropogenic obstacles, and because it is somewhat tolerant of human disturbances, effects on daily or seasonal movements will likely be negligible.

Few sources of Project-related Canada warbler mortality are anticipated during operation. As Canada warblers are relatively small and mobile, no collisions with the transmission line are expected. Vegetation management conducted in spring could result in damage or destruction of nests, reducing the population's nesting success. Although the loss of individual birds or eggs could have a negative effect on the local population, these effects are expected to be negligible to small.

Recommended mitigation procedures for wildlife are described in Chapter 8.0 and Appendix 1.

Species of Conservation Concern

Species of conservation concern are listed by the Committee on the Status of Endangered Wildlife in Canada, the federal *Species at Risk Act,* and/or *The Endangered Species Act* of Manitoba. Those most likely to be found in the Project Study Area include:

- little brown myotis;
- northern myotis;
- wolverine;
- yellow rail;
- least bittern;
- short-eared owl;
- common nighthawk;
- whip-poor-will;
- rusty blackbird;
- northern leopard frog; and
- common snapping turtle.

Boreal woodland caribou are unlikely to be found in the Project Study Area. A small portion of Owl-Flintstone boreal woodland caribou range is found within the eastern edge of the Project Study Area (Manitoba Conservation 2011). The Project is not expected to affect this population as its western-most range is more than 4.5 km away from the transmission line or station, and human-caused disturbance is typically assessed within 500 m of the disturbance (Environment Canada 2012). The core range of the Owl-Flintstone population is also located entirely outside the Project Study Area (Schindler 2005). ATK from Hollow Water First Nation members also indicates that caribou are found further away from the Project Study Area (Hollow Water First Nation ATK Workshop Interview August 22, 2012). As such, the boreal woodland caribou is excluded from this effects assessment, as any interaction with caribou (including access) is not expected to overlap with the Project. However, potential Project effects on boreal woodland caribou were considered in Section 5.2.1.7 of the Wildlife Technical Report. Potential Project effects are outlined below for all other mammal, bird, amphibian, and reptile species of conservation concern.

Mammals

Construction

Potential Project effects on mammal species of conservation concern (little brown myotis, northern myotis, and wolverine) during construction include habitat loss and alteration. Because less than 1% of bat habitat and no known hibernacula will be affected by the Project, the effects on listed bat species including northern myotis and little brown myotis will likely be negligible. Given the large home range of a single wolverine, and because only one wolverine has been trapped in the area between 1996 and 2011, it is highly unlikely that habitat alteration will have a measurable effect on the wolverine population.

For wolverine, sensory disturbance during construction could result in a loss of effective habitat and disruption of movements. Individuals whose home ranges overlap PR 304 may be accustomed to traffic noise; however, construction noise and the presence of workers will likely persist for a short period of time. Individuals may temporarily avoid the construction zone, but are expected to find suitable habitat elsewhere in the Project Study Area. No effects on bats are expected for the winter, as they will be in hibernation. There are no known hibernacula in the area.

Other potential Project effects on mammals of conservation concern include increased mortality due to trapping. As portions of the right-of-way could create new access in the Project Study Area, the harvest of wolverine could increase. Because trapping is unlikely to occur in an active construction area, and because trapping success will likely be limited if wolverine avoid the area during construction, no effect on mortality is anticipated during construction.

Recommended mitigation procedures for wildlife are described in Appendix 1. Important mitigation measures for mammal species of conservation concern include:

- maintain a 200 m buffer around bat hibernacula year-round to protect from disturbance (Manitoba Conservation 2010).

Operation

Potential Project effects on mammal species of conservation concern include habitat alteration and fragmentation. No additional habitat loss is anticipated. The right-of-way could contribute to habitat fragmentation in the Project Study Area. As the transmission line generally follows existing rights-of-way, the effects of habitat fragmentation on mammal species of conservation concern such as wolverine are expected to be negligible. Because bats often prefer openings in the forest for feeding, habitat fragmentation effects for listed bat species are not expected.

Project effects could include sensory disturbance and disruption of movements. Annual inspections of the transmission line could disturb mammal species of conservation concern; however, such events will be brief and infrequent. Maintenance activities follow well-established guidelines and the effects of sensory disturbance on these species are expected to be negligible. Intermittent sensory disturbance due to off-road vehicle and snowmobile use on the right-of-way is also possible. Individuals whose home ranges overlap PR 304 may be accustomed to traffic noise, and no additional effect is anticipated. Although the ROW could create a barrier to movements, because bats and wolverines can be found in a range of habitats, including openings in forests and along edges. As such, these species are not expected to avoid the ROW.

Mammal species of conservation concern mortality could increase during operation. As portions of the right-of-way could create new access in the Project Study Area, trapping activity could increase. As a limited number of traplines overlap the ROW, and because trappers are stewards of their traplines (Fur Institute of Canada 2003), and as Manitoba Conservation and Water Stewardship manage and monitor the provincial trapping of fur on a sustainable basis, the wolverine harvest will not likely exceed sustainable levels.

Recommended mitigation procedures for wildlife are described in Appendix 1.

Birds

Construction

Potential Project effects on bird species of conservation concern (yellow rail, least bittern, short-eared owl, common nighthawk, whip-poor-will, and rusty blackbird) include habitat loss and alteration, which are threats to these species. There does not appear to be suitable yellow rail habitat in the transmission line and Manigotagan Corner Station footprints. No effects on this species are anticipated.

Less than 1% of habitat for least bittern, short-eared owl, common nighthawk, whip-poor-will, and rusty blackbird will be affected by the PQ95 Transmission Line and by the Manigotagan Corner Station. Small habitat alterations and losses may affect a few individuals but are expected to have a negligible to small effect on local populations or on breeding and nesting habitat availability.

Project effects could also include sensory disturbance and disruption of movements. No effects are anticipated for winter, as these species are migratory and will be absent. With mitigation,

including the avoidance of the breeding and nesting season, no Project effects are anticipated during construction.

Few direct sources of bird species of conservation concern mortality are anticipated during construction. If clearing and construction occur in spring, nests could be damaged or destroyed. Collisions with vehicles are a source of least bittern (COSEWIC 2009b), short-eared owl (COSEWIC 2008a), and common nighthawk (COSEWIC 2007a) mortality. No effects are anticipated for winter, as these species are migratory and will be absent. With mitigation, including the avoidance of the breeding and nesting season, no Project effects are anticipated during construction.

Recommended mitigation procedures for wildlife are described in Appendix 1. Important mitigation measures for bird species of conservation concern include:

- clearing will occur during late fall and winter to the extent possible to avoid the spring/summer nesting season for birds; and
- clearing will not be permitted within established setbacks for bird nesting and brood rearing during established timing windows.

Operation

Potential Project effects on bird species of conservation concern include habitat alteration and fragmentation. No habitat loss is anticipated during operation. Vegetation management will periodically alter habitat on the right-of-way. Because the preferred route generally follows existing linear features, and because least bittern, short-eared owl, common nighthawk, whip-poor-will, and rusty blackbird can be found in a range of open habitat types or along forest edges, habitat fragmentation is expected to have a negligible effect on bird species of conservation concern populations.

Project effects could also include sensory disturbance and disruption of movements. Annual inspections of the transmission line could disturb individuals in the vicinity of the right-of-way. Such events will be brief and infrequent. Maintenance activities follow well-established guidelines and the effects of sensory disturbance are expected to be negligible. Intermittent sensory disturbance due to off-road vehicle use on the right-of-way is also possible. Although excessive noise can affect breeding bird communications (e.g., Brumm 2004; Habib et al. 2007; Goodwin et al. 2011), no additional effect is anticipated because of the intermittent nature of the noise. No effects are anticipated for winter, as these species are migratory and will be absent. No disruption of movements due to the presence of the ROW are anticipated as these species are associated with open habitat or openings in forest habitat.

Few sources of bird species of conservation concern are anticipated during operation. Yellow rail (Goldade et al. 2002), least bittern (COSEWIC 2009b), and short-eared owl (COSEWIC 2008a) are susceptible to collisions with transmission wires. Although yellow rail, least bittern and short-eared owl range occurs in the Project Study Area, and some potential habitats were identified, it is unlikely that many (if any) individuals of these species are present in a boreal forest-dominated environment. As such, the risk of potential bird-wire collisions, or potential

vegetation management actions conducted in spring that could result in damage or destruction of nests, is highly unlikely to occur. Although the loss of individual birds or eggs could have a negative effect on local populations, the effect is considered negligible.

Recommended mitigation procedures for wildlife are described in Appendix 1.

Amphibians and Reptiles

Construction

Potential Project effects on northern leopard frog and common snapping turtle during construction include habitat loss and alteration, which are threats to these populations (COSEWIC 2009d; COSEWIC 2008b). As these species are mainly found in riparian areas near large rivers, bodies of water or productive marshes, no habitat effects are anticipated with mitigation.

Mortality could increase in the Project Study Area during construction due to increased traffic on PR 304. Northern leopard frogs are particularly susceptible to road mortality during migration and dispersal (Linck 2000). Because clearing and construction will occur in winter, no mortality effects are anticipated.

Recommended mitigation procedures for wildlife are described in Appendix 1. Important mitigation measures for amphibians and reptiles included:

- clearing will occur during late fall and winter to the extent possible; and
- construction activities will not be carried out within established buffer zones and setback distances for wildlife species, including a 200 m year-round buffer around garter snake hibernacula.

Operation

No loss of northern leopard frog or common snapping turtle habitat is anticipated during operation. Potential Project effects mainly include increased mortality, as transmission towers near waterbodies could provide perching and hunting opportunities for birds. Use of the transmission line right-of-way for hunting by predators such as raccoon and red fox could result in an incrementally small increase in northern leopard frog mortality or result in the depredation of common snapping turtle eggs or young in the Project Study Area. However, northern leopard frog and common snapping turtle habitats are unlikely to occur where the transmission line crosses creeks or rivers in the Project Study Area, and therefore these effects are most likely to be likely negligible.

Recommended mitigation procedures for wildlife are described in Appendix 1.

Other Wildlife

Mammals

During construction, some forested mammal habitat will be altered due to clearing on the PQ95 Transmission Line and some habitat will be lost in the Manigotagan Corner Station footprint. As

described for mammal VECs, other mammal species are expected to find suitable habitat elsewhere in the Project Study Area. Sensory disturbance from construction activity could result in a temporary loss of effective habitat and disruption of movement, as individuals will likely avoid the construction zone. Some small mammal mortality could occur during clearing of the right-of-way and in the Manigotagan Corner Station footprint. Should black bear dens occur in the construction zone, they will be disturbed during winter clearing and construction. Species such as red fox, coyote, and black bear could become habituated to people if food and garbage are not properly managed. The risk of wildlife-vehicle collisions could increase due to a greater volume of traffic on PR 304, increasing mortality of some mammal species, particularly larger ones such as white-tailed deer. As other mammal species' populations are generally common, widespread and secure, potential Project effects will likely be negligible.

No additional habitat loss is expected during operation, but some habitat fragmentation is anticipated. As vegetation regenerates on the right-of-way, new habitats will be created and used by species such as small mammals. As new mammal communities will likely develop on the right-of-way and along its edges. Limited new access to the area will likely be created by the right-of-way and access trails, but trapping pressure is not expected to increase substantially, as a limited number of registered traplines overlap the Project Study Area. The right-of-way and access trails could facilitate movement and increase hunting efficiency for gray wolves and for other predators. White-tailed deer are expected to browse on regenerating vegetation on the right-of-way, but may experience increased predation by predators moving along the linear corridor. The density of gray wolves in the Project Study Area is not expected to change given the small scale of the disturbance, and minimal effects on gray wolves and white-tailed deer are expected.

Recommended mitigation procedures for wildlife are described in Appendix 1. Important mitigation measures for other mammals include:

- boundaries of important wildlife habitats will be flagged by prior to commencement of construction;
- construction activities will not be carried out within established buffer zones and setback distances for wildlife species, including a 50 m buffer around occupied black bear dens;
- wildlife will not be fed, befriended, or harassed at construction areas;
- construction camps will be kept clean, food will be kept in sealed storage areas, and kitchen wastes will be stored in bear-proof containers in northern and rural areas;
- problem wildlife will be reported immediately to Manitoba Conservation and Water Stewardship; and
- rehabilitated access roads and trails will be inspected in accordance with the Site Rehabilitation Plan to assess the success of re-vegetation and to determine if additional rehabilitation is required.

Birds

During construction, some bird habitat will be altered due to clearing on the PQ95 Transmission Line and some will be lost in the Manigotagan Corner Station Site footprint. Because clearing

and construction on the transmission line will occur in winter, nesting habitat will not be affected. No effects on migratory species are anticipated in winter, as they will not be in the Project Study Area. Birds are expected to find suitable habitat throughout the Project Study Area when they return.

No additional habitat loss is expected during operation, but some habitat fragmentation is anticipated. Periodic vegetation management will likely alter habitat and could result in damage or destruction of nests in spring. As vegetation regenerates along the right-of-way, new nesting habitat could be created for grassland and shrubland species. Annual inspections of the transmission line could disturb birds in the vicinity of the ROW, particularly during the spring nesting season. Intermittent sensory disturbance due to off-road vehicle and snowmobile and snowmobile use on the right-of-way is possible; however, no effects of sensory disturbance are anticipated for migratory species in winter. Disruption of bird movements is generally not expected, as some species are associated with open habitats and some are long-distance migrants who would be expected to encounter a range of conditions along their migration routes. Some mortality due to bird-wire collisions is anticipated, particularly for larger species such as waterfowl and upland game birds. While individual birds may collide with wires, otherwise healthy populations are not expected to be affected such incidents.

Recommended mitigation procedures for wildlife are described in Appendix 1.

Amphibians and Reptiles

During construction, some frog species' habitat will be altered due to clearing on the PQ95 Transmission Line and some could be lost in the Manigotagan Corner Station Site footprint. Although mortality could result from increased traffic along PR 304 in areas where frogs and snakes cross the road or where turtles bask in the sun, no effect is anticipated with winter clearing and construction. Although there is a small potential for red-sided garter snake hibernacula to occur, Project effects are not anticipated because hibernacula are unlikely to occur in the Project Study Area. Mitigation would be required if red-sided garter snake hibernacula are found.

No additional habitat loss is expected during operation.

Accidental Effects on Wildlife and Habitat

Petroleum products such as gasoline and other potentially harmful products used during the construction and operation of a transmission line could be released into the environment accidentally. Depending on the volume released, these substances could have deleterious effects on wildlife and habitat. Accidental fires that could occur during construction or operation could also have a negative effect on wildlife and habitat, depending on the size and severity of the fire.

Manitoba Hydro has extensive policies and practices regarding requirements to meet or exceed legislation and regulations associated with the prevention and/or handling of potentially harmful substances, fire prevention measures and other emergency procedures. As such, measureable effects on wildlife and habitat are not anticipated. Refer to Chapter 8.0 and Appendix 1 for a

detailed description Manitoba Hydro's policies and practices concerning prevention measures, accidental release of harmful substances, and fire.

7.2.4.3 Summary of Residual Effects

Table 7-4 summarizes the residual effects of the Project on wildlife. Residual effects include habitat loss and alternation, senory disturbance and disruption of movement and increased mortality for moose, American marten, spruce grouse, olive-sided flycatcher, and Canada warbler. The residual effects on wildlife are considered to be negligible to small in magnitude, within the Project footprint to local in geographic extent, and short to medium-term in duration. None of the residual effects of the Project on wildlife are considered to be significant.

Table 7-4: Summary of the Significance of Residual Effects of the Project on Wildlife

Species	Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Moose	• Habitat loss and alteration • Sensory disturbance and disruption of movement • Increased mortality due to predation, wildlife-vehicle collisions	Construction	Decreased local moose abundance due to reduced habitat, sensory disturbance, and increased mortality	**Direction:** negative **Magnitude:** small **Geographic extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
	• Habitat alteration and fragmentation • Sensory disturbance and disruption of movement • Increased mortality due to hunting and predation	Operation	Decreased local moose abundance due to increased mortality	**Direction:** negative **Magnitude:** small **Geographic extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
American marten	• Habitat alteration • Sensory disturbance	Construction	Decreased local American marten abundance due to habitat alteration and avoidance of construction zones	**Direction:** negative **Magnitude:** negligible to small **Geographic extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
	• Habitat alteration and fragmentation • Sensory disturbance and disruption of movement • Increased mortality due to trapping	Operation	Decreased local American marten abundance due to habitat fragmentation and increased mortality	**Direction:** negative **Magnitude:** negligible to small **Geographic extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant

Table 7-4: Summary of the Significance of Residual Effects of the Project on Wildlife

Species	Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Spruce grouse	• Habitat alteration • Sensory disturbance and disruption of movement • Increased mortality due to collisions with vehicles, and nest destruction	Construction	Decreased local spruce grouse abundance due to sensory disturbance and increased mortality	**Direction:** negative **Magnitude:** small **Geographic extent:** -local **Duration:** short-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
	• Habitat alteration and fragmentation • Sensory disturbance and disruption of movement • Increased mortality due to harvest and bird-wire collisions	Operation	Decreased local spruce grouse abundance due to increased mortality	**Direction:** negative **Magnitude:** negligible **Geographic extent:** project footprint **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Olive-sided flycatcher	• Habitat loss and alteration • Sensory disturbance and disruption of movement • Increased mortality due to nest damage or destruction	Construction	Decreased local olive-sided flycatcher abundance due to habitat loss and alteration, sensory disturbance, and increased mortality	**Direction:** negative **Magnitude:** small **Geographic extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
	• Habitat alteration due to the removal of standing dead danger trees • Sensory disturbance • Increased mortality due to nest damage or destruction during vegetation management in spring and nest predation	Operation	Decreased local olive-sided flycatcher abundance due to habitat alteration and increased mortality	**Direction:** negative **Magnitude:** small **Geographic extent:** project footprint **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Canada warbler	• Habitat alteration • Sensory disturbance and disruption of movement • Increased mortality due to nest damage or destruction	Construction	Decreased local Canada warbler abundance due to habitat alteration, sensory disturbance, and increased mortality	**Direction:** negative **Magnitude:** small **Geographic extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
	• Habitat alteration and fragmentation • Sensory disturbance • Increased mortality due to nest damage or destruction during vegetation management in spring and brood parasitism	Operation	Decreased local Canada warbler abundance due to habitat alteration and increased mortality	**Direction:** negative **Magnitude:** small **Geographic extent**: project footprint **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant

7.2.4.4 Follow-up and Monitoring Activities

Standard inspection and effects monitoring are recommended for amphibians and reptiles to ensure that wetland mitigation measures are followed, such as the retention of riparian buffers.

A pre-construction aerial survey will be conducted to identify large stick nests for birds of prey and colonial waterbirds. Standard inspection and effects monitoring will be completed if nests are found on or within 200 m of the ROW. Follow-up monitoring will be conducted to ensure that mitigation measures are adhered to, such as the retention of buffers, the use of bird diverters, and the application of timing restrictions.

Yellow rail and least bittern follow-up will be conducted to verify the presence or absence of populations in suitable habitats along the right-of-way. Because these listed waterbird species are more susceptible to mortality associated with wire collisions, follow-up will include the installation of bird diverters and protective sleeves on guy wires if birds are found. Monitoring the effectiveness of bird diverters will then be conducted at these sensitive sites.

A pre-construction aerial survey will be conducted to identify mineral licks and heavy use game trails that may lead to mineral licks. If mineral licks are found buffers will be applied as per the EnvPP to protect against habitat disturbance.. Follow-up monitoring will occur to ensure that mitigation measures are effective to, such as the retention of buffers.

A pre-construction ground survey will be conducted to identify the presence/absence of black bear dens. If active black bear dens are found buffers will be applied as per the EnvPP to protect against habitat disturbance.Follow-up monitoring will occur to ensure that mitigation measures are effective , such as the application of buffers to prevent disturbance during clearing and construction.

7.2.5 Forestry

7.2.5.1 Overview

Potential effects from construction of the PQ95 Transmission Line and Manigotagan Corner Station on forestry resources include clearing of standing timber from the ROW resulting in:

- a loss of productive forestland;
- reduction in sustainable annual allowable cut (AAC) for FML01;
- loss of crown land standing timber;
- loss of area in high value reforestation sites;
- loss of private land and natural forest area;
- damage to tress adjacent to ROW from slash burning or from heavy equipment; wounds can provide access points for insects and disease;
- increased risk of forest fire from slash burning, and increased access to ROW;
- private land forest values; and
- the potential opportunity to provide fuelwood to communities in proximity to the Project footprint.

7.2.5.2 Effects Assessment and Mitigation

Productive Forestlands

The measurable parameters defined for the effects assessment of this VEC include annual allowable cut levels, Forest Management Licence area and volume of standing timber.

Annual Allowable Cut

The effect of the Project on AAC is summarized in Table 7-5. The effect of the LWESI Transmission Project on the FML 01 AAC is very small and amounts to 0.12%. As the commercial timber harvesting rights for FML 01 are about to be returned to the Province of Manitoba, the Project effect on AAC can be accounted for by MCWS, when seeking new proposals for FML 01.

Table 7-5: Effect on Annual Allowable Cut Levels

Species Cover Type	Total Harvest Scenario AAC[1] (m^3/yr)	Project Effect[2] (m^3/yr)	Project Effect (%)
Softwood	**302,242**	**294**	**0.10**
Hardwood	**114,446**	**196**	**0.17**
Total	**416,688**	**490**	**0.12**

[1] – Source: Manitoba Conservation, 2010

[2] – Appendix K

Forest Management Licence Area

The effect of the LWESI Transmission Project on FML 01, regarding the withdrawal of productive forestland, is provided in Appendix L and summarized in Table 7-6. As the commercial timber harvesting rights for FML 01 are about to be returned to the Province of Manitoba, MCWS will not be liable for any land withdrawal limits contained within the current FML 01 Agreement with Tembec Industries Inc. The effects on the productive forestlands for FML 01 are minimal and amount to 0.07% of the total.

Table 7-6: Effect on FML 01 Area

Classification	**Pre-Project Productive Forestland[1] (ha)**	**Productive Forestland Withdrawal[2] (ha)**	**Productive Forestland Withdrawal (%)**
Productive Forest	482,364	345.5	0.07

[1] – Source: Manitoba Conservation, 2010

[2] – Appendix L

Standing Timber

The effect of the Project on crown land standing timber is summarized in Table 7-7. There were large forest fires in 1989 and 1999 that occurred between the Black River and the Manigotagan Corner Station, resulting in currently young, low volume areas. Merchantable timber only accounts for 45% of the total volume within the Project footprint, when minimum harvest ages are considered. The project effects on standing timber are minimal and account for 0.04% of the total growing stock on FML 01.

Table 7-7: Effect on Crown Land Standing Timber

Pre-Project Standing Timber Total Growing Stock[1] (m^3)			Project Effect on Standing Timber Total Volume[2] (m^3)			Project Effect (%)		
Softwood	**Hardwood**	**Total**	**Softwood**	**Hardwood**	**Total**	**Softwood**	**Hardwood**	**Total**
23,000,000	8,000,000	31,000,000	6,488	4,851	11,339	0.03	0.06	0.04

1 – Manitoba Conservation, 2006A; Appendix C

2 – Appendix L

The effects on standing timber are limited to the construction phase of the Project and will be limited to the extent of the Project footprint. The projected losses and the permanency of the effects are also accounted for in the Forest Damage Appraisal and Valuation process.

High Value Forest Sites

The measurable parameters defined for the effects assessment of this VEC include high value reforestation sites, research and monitoring sites and private land enhancements.

High Value Reforestation Sites

The effect of the Project on high value reforestation sites is summarized in Table 7-8. Of the 3,434 ha of reforestation sites found within the Project Study Area, 24 ha will be permanently lost. In the last 25 years, there were a total of 2,013 ha (37%) of reforestation sites destroyed by forest fires within the Project Study Area. In comparison, the project effects on high value reforestation sites are minimal and accounted for 0.44% of the total reforestation area and 0.70% of the reforestation sites remaining after forest fires.

Table 7-8: Effect on High Value Reforestation Sites

Project Study Area (ha)		Project Effect[3] (ha)	% Affected by Project[4]
Total Area[1]	**Remaining after Fire[2]**		
5,447	3,434	23.4	0.7

[1] – Manitoba Conservation, 2011

[2] – Golder Associates, 2012

[3] – Maskwa Ecological Services (2012) - Appendix M

[4] – Based on area remaining after fire

The effects on high value reforestation sites are limited to the construction phase of the Project and will be limited to the extent of the Project footprint. The projected losses and the permanency of the effects are also accounted for in the Forest Damage Appraisal and Valuation process.

In addition to the direct effects of the Project on high value reforestation sites, the potential exists for damage to adjacent sites from errant equipment.

Research and Monitoring Sites

There were no research and monitoring sites affected by the Project footprint.

Private Land Forest Values

The effect of the Project on private land forest values is provided in Table 7-9. The Project does not affect any woodlot management areas, agricultural shelterbelts or residential tree planting projects. There are natural forest areas affected on two private properties within the Project footprint.

The effects on private land forest values are minimal as the Project avoids all residential properties and their related forest values, and no private land forest management projects will be affected. A minimal amount of private land natural forest area was affected by the project as summarized in Table 7-9.

Table 7-9: Effect on Private Land Natural Forest Areas

RM Roll No.	Area (ha)	Softwood Volume (m^3)	Hardwood Volume (m^3)	Total Volume (m^3)
130920	0.23	5.7	6.2	11.9
146400	0.03	0.7	0.8	1.5
Total	0.26	6.4	7.0	13.4

Source: Maskwa 2012

Timber volumes determined from FRIs are designed for forest management planning at a landscape level and may not be representative at a stand level. Actual Project effects on private land natural forest areas will need to be determined during the construction phase.

Project Footprint

Damage and decline of trees adjacent to transmission line ROWs is often the result of scorching from slash burning during clearing or mechanical damage to tree roots and trunks from heavy equipment. Such damage usually does not kill the tree(s) directly, but the wounds can act as access points for insects and disease (Clatterbuck, 2006). The implementation of best operating practices including, limiting clearing operations to frozen ground conditions, and limiting the need to remove stumps to tower locations and other infrastructure sites will minimize soil disturbance and root damage to trees thereby substantially mitigating operational concerns.

These protection and mitigation measures will be incorporated into the Project, Construction Phase Environmental Protection Plan (EnvPP).

Although the White Spotted Sawyer Beetle (*Monopchamus scutellatus*) prefers dead and dying conifers, it will attack live trees as well (Ives, 1982). Sawyer beetle populations are known to spike in areas of prolonged drought, snow damage, blow-down, fire and in timber harvest areas where slash levels are high. Incidents of damage or mortality to healthy trees in adjacent areas, as a result of adult feeding, are not uncommon (Evans et al, 2007). ROW clearing and slash disposal practices will reduce residual woody debris accumulations that may otherwise attract high sawyer beetle populations, thus minimizing risk of damage to trees adjacent to the Project footprint.

White elm trees may be encountered in riparian zones and hardwood stands on wet sites during the ROW clearing process. Storing dead elm wood is prohibited by law in Manitoba, as it contributes to the spread of Dutch Elm Disease by providing feeding areas and overwintering sites for the elm beetle. The beetle is responsible for transferring fungal spores from infected trees to healthy trees, thereby spreading the disease. All elm wood will be immediately burnt, chipped or disposed of at designated disposal sites.

Risk of wild fire exists where cleared vegetative debris is burnt following ROW clearing. Care will be taken to limit burning activities to winter months and on mineral soils. Monitoring activities will ensure all fires are extinguished prior to spring breakup. Debris piles must be placed well away from the ROW edge to minimize the risk of scorching adjacent trees and vegetation. Alternative methods of vegetative debris disposal may include chipping, mulching, mounding and burying.

Thin-barked tree species (some species of poplars) are subject to damage and mortality when exposed to full sunlight and the increase in temperature fluctuations brought about by ROW clearing. Sunscald to the bark and cambium layers of newly exposed trees may result in severe damage or mortality.

The creation and existence of ROWs may facilitate additional local access. Associated with access are increased fire occurrence risk (human caused) and the introduction and proliferation of vegetation species that do not currently exist within specific ecosites. The opening of decommissioned access roads and the development of new roads for the construction phase of the Project may not complement management initiatives to increase the moose population in the Project Study Area. Manitoba Hydro, in consultation with MCWS, Eastern Region, will identify areas of concern from an access perspective and develop an access management plan prior to clearing and construction, thereby reducing the risks and effects of unwanted access. The access management plan will form part of the Environmental Protection Plan.

Commercial and Domestic Forest Resource Utilization

The primary effect of the Project, on commercial forest resource utilization, is the conversion of productive forestland to non-productive land. Effects extend to annual allowable cut levels, productive forestland withdrawal from FML 01 and volumes of standing timber.

Domestic forest resource utilization in the Project area is primarily limited to the personal use of fuelwood and, to a limited extent, commercial firewood production. The effect of the Project on domestic forest resource utilization is limited to the ability of people, residing adjacent to the Project footprint, to access the forest for fuelwood gathering purposes. The potential effect is limited to the duration of the construction phase of the Project. Where demand exists, Manitoba Hydro may make salvage timber available as fuelwood to nearby communities as part of clearing activities. The effect on domestic forest resource utilization is minimal and potentially positive.

Aboriginal Traditional Knowledge Forest Values

The effect of the Project on ATK forest values is provided in Table 7-10, and includes three ATK forestry value areas.

Table 7-10: Effect on Aboriginal Traditional Knowledge Forest Values

Map No.	ATK Forest Value
ATK_1	Firewood collected, for personal use, by Black River First Nation peoples
ATK_2	Firewood collected in old burn areas, for personal use, by Manigotagan and Seymourville residents.
ATK_3	Firewood harvesting area

Source: NLHS 2012

The clearing of the transmission line may result in positive effects through the generation of firewood; however, forest fires in 1989 and 1999 burnt most of the timber on the Project footprint from Black River to the Manigotagan Corner Station. Where demand exists, Manitoba Hydro may make salvage timber available as firewood to nearby communities but it will need to be transported from the southern extent of the Project footprint. The effect on ATK forest values is therefore minimal and possibly positive.

Proposed Mitigation Measures

Adherence to all applicable provincial and federal regulations and guidelines and to the Environment Act Licence to be issued for the Project, potential forestry environmental effects on and off the Project footprint can be partly mitigated. Detailed advance planning prior to construction and the preparation of a Project-specific EnvPP will serve to identify issues and areas of concern in advance of construction. On-site supervision of all activities during the construction phase further reduces potential problems and effects.

Clearing

The entire Project footprint needs to be cleared where forest resources exist. As much as possible clearing should be limited to the removal of the above ground organic matter, leaving the root systems in place. This will minimize the risk of root damage to ROW edge trees. Merchantable timber should be salvaged, if an economically feasible market can be found.

Where timber is salvaged and utilized, carbon in the form of wood fibre is tied up in construction materials and paper products. This reduces the carbon footprint of the Project by limiting the volume of cleared biomass that is disposed of by other means. Local communities and the Waabanong Anishinaabe Interpretive Learning Centre have identified a desire to secure firewood (Maskwa Ecological Consulting Inc. et al, 2012), which would assist in maximizing utilization of the resource.

Timber that cannot be salvaged and other woody debris created through the clearing operation may be disposed of by piling and burning (under frozen conditions), chipping, mulching, mounding or as directed by MCWS. The disposal of this dead woody material will minimize the attraction of White Spotted Sawyer Beetles and thereby minimize the risk of their damage to adjacent forest stands through adult feeding on the bark and twigs of healthy trees All elm wood must be burnt or chipped immediately or disposed of at approved municipal disposal sites to prevent the potential spread of Dutch Elm Disease.

Where fire is employed as a method of debris disposal, burning should occur on mineral soil, where possible. Piles must be kept well removed from the ROW edge to minimize the risk of heat scorching adjacent trees and other vegetation. All burning should be conducted during the winter months. Weather conditions, including inversions and wind direction, need to be considered to reduce the potential of smoke affecting local communities. All burn sites must be thoroughly examined prior to spring breakup to ensure all fires have been fully extinguished.

Forest Damage Appraisal and Valuation

The MCWS Forest Damage Appraisal and Valuation (FDAV) policy stipulates financial compensation for timber values and investments on crown productive forestlands. Manitoba Hydro will compensate MCWS for the effects of the Project as specified in the policy. The compensation payable for the loss of standing timber and high value reforestation sites will provide mitigation, in part, for the effects of the Project on these VECs. The damage appraisal calculations and estimates of compensation payable to MCWS are summarized in Table 7-11.

Table 7-11: Crown Land Forest Damage Appraisal and Valuation Summary

Crown Charges	Softwood ($)	Hardwood ($)	Plantations ($)	Total ($)
Crown Dues	$11353	$8,490		$19,342
Forest Renewal Charge	$37,303	$2,426		$39,728
Forest Protection Charge	$1,103	$825		$1,928
Plantation Charge			$20,638	$20,638
Total All				$82,,138

Crown Dues - $1.75 m^3; Forest Renewal Charge - softwood $5.75 m^3, hardwood $0.50 m^3; Forest Protection Charge - $0.17/$m^3$ and Plantation charge – $882.35/ha. Considers volume from all age classes using the MCWS conventional standard, tree length volume tables.

Clearing, in addition to the productive forestland evaluated in the Project footprint, may be required for access development, borrow/deposition areas or bypass routes necessitated by

terrain features encountered during ROW clearing. The locations of these areas are currently unknown; however, they will be very localized, small in extent and minimally incremental. It should be noted that this evaluation is an estimate only and that recalculations may be required by MCWS after ROW clearing to ensure timber dues and the Project footprint are accurately reflected in the results.

7.2.5.3 Summary of Residual Effects

Table 7-12 summarizes the residual effects of the Project on the forest environment, and their significance. Residual effects include a loss of productive forestland resulting in a loss of standing timber, and reduction in annual allowable cut and reduction in the size of FML01, and a loss in high value forestry and private forestland. These effects are considered small in magnitude, within the Project footprint to regional in geographic extent, and reversible upon decommissioning of the project. None of the residual effects of the Project on the forest environment are considered to be significant.

Table 7-12: Summary of the Significance of Residual Effects on the Forest Environment

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Loss of productive forestland	Construction	Reduction in AAC levels	**Magnitude:** small **Geographic Extent:** regional **Duration:** medium-term **Frequency:** infrequent **Reversibility:** reversible	Not Significant
Withdrawal of productive forestland from FML 01	Operation	Reduction in size of FML 01	**Magnitude:** small **Geographic Extent:** regional **Duration:** medium-term **Frequency:** infrequent **Reversibility:** reversible	Not Significant
Loss of standing timber	Construction	Reduction in standing timber	**Magnitude:** small **Geographic Extent:** project footprint **Duration:** medium-term **Frequency:** infrequent **Reversibility:** reversible	Not Significant
Loss of high value reforestation sites	Construction	Loss in area of high value reforestation sites	**Magnitude:** small **Geographic Extent:** project footprint **Duration:** medium-term **Frequency:** infrequent **Reversibility:** reversible	Not Significant
Loss of private land natural forest	Construction	Loss in private land natural forest area	**Magnitude:** small **Geographic Extent:** project footprint **Duration:** medium-term **Frequency:** infrequent **Reversibility:** reversible	Not Significant

7.2.5.4 Follow up and Monitoring Activities

A monitoring program will be developed to assess and evaluate the effectiveness of the implementation of the proposed mitigation measures and the accuracy of the forestry effects assessment.

In addition to monitoring the implementation of the mitigation measures, the following components may be assessed in order to verify the forestry residual effects

- quantifying the amount of timber salvaged and utilized from the Project footprint;
- obtaining forest fire records during construction activities in the vicinity of the Project to determine if they are the result of Project activities, and quantifying any effects on area burnt and timber volume affected;
- documenting any changes to the forest damage appraisal and valuation due to final design changes in the area cleared for the ROW, or borrow/deposition areas or bypass routes necessitated by terrain features; and
- documenting mitigation and compensation measures between Manitoba Hydro and each private land owner affected by the Project.

7.3 SOCIO-ECONOMIC EFFECTS ASSESSMENT

The Project Study Area included the following communities (from south to north):

- the Hamlet of Silver Falls;
- the Hamlet of St-Georges;
- the Town of Powerview-Pine Falls;
- Sagkeeng First Nation;
- Black River First Nation;
- the Northern Affairs Community of Manigotagan;
- Hollow Water First Nation;
- the Northern Affairs Community of Seymourville; and
- the Northern Affairs Community of Aghaming.

Approximately 40 km east of Manigotagan is the Northern Affairs Community of Bissett which was considered in the socioeconomic effects assessment because of mine development in the area.

The following socio-economic components were considered for the effects assessment:

- socio-economics and land use, including infrastructure and services, employment and economy, personal well being, commercial and residential land use, high potential geological features and non-recreational hunting and trapping;
- heritage resources; and
- cultural resources.

Chapter 4.0 describes the existing environment, upon which the assessment of effects was based. Project effects for the PQ95 Transmission Line and the Manigotagan Corner Station were considered by evaluating the linkages between potential changes caused by the Project, and the socio-economic environment. A broad range of components were considered in the effects assessment, however emphasis was placed on selected VECs.

Following identification of potential effects, mitigation measures were considered, and residual effects that remained after mitigation were assessed for significance. Finally, proposed monitoring and follow-up activities were discussed. More detailed effects assessment are provided in the supporting Technical Reports.

Each socio-economic component section is summarized under the following headings:

- overview (including potential Project activities and effects);
- effects assessment and mitigation;
- summary of residual effects (including an assessment of significance); and
- monitoring and follow-up activities.

7.3.1 Socio-economics and Land Use

7.3.1.1 Overview

Potential effects from construction and operation and maintenance of the PQ95 Transmission Line and Manigotagan Corner Station Site include the following:

- increased pressure on infrastructure and services;
- creation of jobs and other economic opportunities;
- changes to personal wellbeing;
- changes to land ownership and tenure;
- changes to resource use; and
- effects on recreation and tourism activities.

7.3.1.2 Effects Assessment and Migitation

Population, Infrastructure, and Services

Population

Construction – Transmission Line and Stations

The Project will contribute to a temporary increase in the local population due to an influx of workers during project construction. This temporary increase in population has the potential to affect local infrastructure and services by changing the availability or quality of infrastructure and services for local residents on a temporary basis. During construction, the Pine Falls – Manigotagan 115 kV Transmission Line (PQ95) will require a peak workforce of 115 individuals. If all of these individuals were hired from outside the Project Study Area, this would be a population increase of 2.3% . However, local hiring will reduce this number. The Manigotagan Corner Station will require up to 40 individuals, which could be an increase of up to 0.8% of the Project Study Area population. The Pine Falls Generating Station Switchyard will require up to 12 individuals, which could be an increase of up to 0.2% of the Project Study Area population. The effects of increased population from construction activities are expected to be short-term and intermittent. Construction will last approximately 2 years, starting in the winter of 2013/2014. The transmission line will be winter construction, but the Manigotagan Corner Station will be year round construction.

Operations and Maintenance – Transmission Line and Stations

During operations, a limited workforce will be required. Manitoba Hydro staff will routinely patrol the transmission line (i.e., annual inspection), requiring two individuals plus a crew of four to conduct any repairs and maintenance, as required. The Manigotagan Corner Station will not require any staff, and the Pine Falls Generating Station Switchyard upgrades are not expected to result in an increased workforce. Effects on population during the operations and maintenance phase are anticipated to be neutral, i.e., no measureable change, and, therefore, no residual effects are expected.

Transportation Infrastructure

Construction – Transmission Line and Stations

Project traffic will utilize PR 304 to transport equipment, materials and workers resulting in a minor increase in traffic volumes in the area. This increase could be up to 75 to 100 vehicles (e.g., an increase of 10.9-14.5% vehicles just north of Powerview-Pine Falls, or 16.7-22.2% just south of Manigotagan) per day during construction of the transmission line. The Manigotagan Corner Station construction could require up to 6 vehicles (e.g., an increase of 0.9% just north of Powerview-Pine Falls, or 1.3% just south of Manigotagan). In addition to increased traffic volumes, construction at the southern end of the transmission line will result in the temporary closure of one lane of traffic over the Winnipeg River Bridge which will disrupt traffic flows in the Project Study Area. Manitoba Hydro has had discussions with Manitoba Infrastructure and Transportation (MIT) regarding the lane closure and to review the preferred route. The transmission line also crosses PR 304 at five locations. Road crossings will require reduced-speed constructions zones and create the potential for temporary lane closures that could also disrupt traffic for local residents; the effects will be small in magnitude and short-term in duration. Manitoba Infrastructure and Transportation (MIT)and Manitoba Hydro are committed to working together to minimize potential traffic disruption caused by the lane closure.

Examples of mitigation measures to be implemented include:

- Manitoba Hydro will work with the appropriate agencies and government authorities (e.g., MIT) to minimize traffic-related effects and will comply with all relevant government regulations and by-laws;
- Manitoba Hydro will notify the appropriate agencies and infrastructure operators as to the schedule for equipment and material deliveries during the period of construction;
- All related movements will be subject to regulations governing load restrictions and transport of dangerous goods.

Operations and Maintenance Phase – Transmission Lines and Stations

During operations and maintenance, only a small number of vehicles will be required for short periods of time (e.g., annual inspection will take approximately 1 week). No measurable effect is anticipated.

Existing Infrastructure and Facilities

Construction Phase – Transmission Line and Stations

The proposed transmission line route crosses or is in proximity to a number of existing infrastructure installations. The proposed route crosses PR 304 and an existing Manitoba Hydro 66 kV sub-transmission line five times. The first crossing, starting from the south and travelling north, occurs at approximately 50 meters, where the line goes under the PR 304 bridge. It then crossed PR 304 again at 2.6 km, 30 km, 42 km, and 58 km. Manitoba Infrastructure and Transportation has undertaken a preliminary review of the proposed route and crossings, and

has identified no concerns with the crossings or the alignment of the proposed route. The proposed route/infrastructure does not interfere with the control zone for PR 304.

The nearest airfield is in Silver Falls, approximately 9 km to the southeast, and the nearest aerodrome is located in Bissett (i.e.float plane base), approximately 38 km to the east. In addition to aerodromes, there are also 20 antenna communication towers and 6 broadcast communication towers in the study area The closest broadcast tower is located over 2.5 km away from the transmission line and the closest antenna tower is approximately 1 km away from project infrastructure.

Overall, no adverse effects are anticipated on infrastructure and facilities as a result of the transmission line and station. If issues arise with respect to impacts on infrastructure and facilities from the project, they are subject to application and adherence to established design protocols and procedures and will be mitigated to address any associated potential effects. For example, necessary clearances over transmission lines, roadways, waterways, and rail will meet or exceed the minimum values outlined in the CSA c22.3 No. 1-10 - "Overhead Systems" standard.

Examples of mitigation measures that will be implemented include:

- consultation of Agencies responsible for infrastructure crossed by the transmission line prior to clearing and construction activities.
- confirmation of any necessary permits and approvals or design measures for construction will be made during the detailed design stage of the project.
- implementation of applicable standards.

These agencies will also be notified with respect to clearing and construction schedules, including possible requirements for temporary access points off of PR 304 to minimize disruptions to operations.

Operations and Maintenance Phase – Transmission Line and Stations

No measureable effects on existing infrastructure and facilities are expected during the operations phase of the project. Agencies responsible for infrastructure crossed by the transmission line (e.g., MIT) will be notified with respect to operations and maintenance schedules for the transmission line to minimize disruption to operations; and the locations of infrastructure crossed by the line will be identified in a Project specific operations and maintenance Environmental Protection Plan.

Housing

No effect on housing during the construction and Operations and Maintenance phases are expected as a result of the project.

Temporary Accommodation

Construction Phase – Transmission Line and Stations

To the extent possible, existing accommodation in Powerview-Pine Falls will be used for the project. There are a total of 60 rooms available in the Papertown Motor Inn and Manitou Lodge in Powerview-Pine Falls. The Woodn' Bell Motel and North Star Motel in Manigotagan have 15 rooms combined. Accommodation in the northern Project Study Area has low capacity to support the Project because of demands from other existing Projects in the area. At peak construction (approximately 115 workers for the transmission line, 40 for the Manigotagan Corner Station, and 12 for the Pine Falls Generating Station Switchyard), there might be insufficient accommodation in the Project Study Area for the entire workforce. If this is the case, contractors will be encouraged to consider the use of a work camp or accommodation outside the Project Study Area during construction activities. Overall, the Project will likely increase pressure on local temporary accommodation, which may limit availability, but will ultimately provide a modest benefit to local communities..

Operations and Maintenance Phase – Transmission Line and Stations

During operations and maintenance, temporary accommodation will only be required for a small workforce, for up to 1 week at a time. No measurable effect on accommodation in the Project Study Area is anticipated.

Health and Emergency Services

Construction Phase – Transmission Line and Stations

Communities in the Project Study Area rely primarily on the Town of Powerview-Pine Falls for health and emergency services. Individual communities including Manigotagan, Seymourville, Sagkeen First Nation, Hollow Water First Nation, and Black River First Nation also have health offices or centres which can provide basic and primary services. It is anticipated that the Project may increase demand on emergency services slightly during the construction period. The Powerview RCMP detachment key person interview did not identify any concerns regarding the influx of temporary workers required for the Project and the Project is expected to result in no or minor effects to fire services. A key person interview with the Pine Falls Hospital identifies concerns that the Project could place additional strain on the existing health care services in the Project Study Area. The hospital has experienced shortages of beds for short periods (12 hours) in the past. However, the busiest time of year for the hospital is the summer. Because Project construction for the largest contributor to the workforce (i.e., transmission line construction) will primarily occur in winter, it is expected that the Project will result in only a negligible to small magnitude increase in pressure on health services. Emergency services will be provided with a schedule of Project activities so they are aware of the Project workforce in the Project Study Area.

Operations and Maintenance Phase – Transmission Line and Stations

During the operations and maintenance phase, no effect to health and emergency services in the Project Study Area is anticipated.

Employment and Economy

Employment and Business Opportunities

Construction Phase - Transmission Line

A small number of short-term and temporary employment opportunities are expected during transmission line clearing and ROW preparation. The workforce for clearing and ROW preparation is seasonal in nature and the activities will primarily occur in the winter months. Construction of the transmission line component of the Project will require personnel with varying skill levels. It is estimated that there will be a total of 54 person years employment associated with constructing the transmission line. Construction is expected to commence in late 2013 and be completed by early 2016. Construction of the transmission line is expected to primarily occur during the winter months. However, construction associated with the Winnipeg River crossing is expected to occur in the summer of 2014.

Clearing and construction of the transmission lines will be subject to a collective agreement (the Transmission Line Agreement) that will allow Manitoba Hydro to include hiring preferences in tender specifications. Through the contracting process, Manitoba Hydro expects the contractor to actively promote the participation of Manitoba businesses, and Aboriginal businesses for the Project. In addition, when the contractor in selecting persons (other than supervisory personnel) to be employed on the Project, preference will be given to Aboriginal and local residents who meet the contractor's requirements in training, experience and other qualifications for the work to be performed.

Regarding, business opportunities, First Nation and Aboriginal communities with construction expertise in the vicinity of Project could secure contracting opportunities made available under the terms of Manitoba Hydro's Northern Purchasing Policy, which includes measures to increase the participation of local businesses and workers. Possible contract or employment opportunities where the Northern Purchasing Policy could be applied include clearing and/or construction work on the project.

Indirect business effects could also be expected by communities in the vicinity of the Project through the purchase of meals, gasoline, and accommodations by the contractors, as well as incidental purchases of repairs and parts for construction vehicles and equipment.

Examples of enhancement measures that will be implemented for the project will include:

- Implement Transmission Line Agreement to facilitate local employment and business opportunities.

Operations & Maintenance Phase - Transmission Line

During operations, there is limited employment opportunities associated with the Project. The transmission lines will be patrolled on an annual basis by Manitoba Hydro staff over a week long period. Two Manitoba Hydro Patrolmen would conduct the line patrols and a four person Manitoba Hydro Line Crew would conduct repairs (e.g., replacing defective insulators) when and where necessary. In addition to line patrols, throughout the life of the line vegetation control will

also be conducted. Some of these opportunities could be made available to local contractors/communities. Aside from annual patrols/inspections, there may be periodic work required to replace or repair Project components (e.g., damaged caused by extreme weather events, vegetation control below the lines).

Construction Phase - Stations

Manigotagan Corner Station

Construction of the new Manigotagan Corner Station is expected to occur over a three year period (early 2013 to late 2015). It is estimated that approximately 26 person years of employment will be needed to construct the station. Local employment opportunities will be less for the station than for the 115 kV transmission line due to the highly specialized nature of the work. There will likely be modest local employment opportunities associated with clearing and site preparation for the station. Station equipment installation tends to involve highly specialized labour and is unlikely to offer significant job opportunities. Employment will peak for this part of the project in mid 2015 when there is an overlap of activities with an estimated peak workforce of 40 persons required on-site.

Construction of the station will take place in three stages. Civil work will take start in early 2013 and be completed by early to mid 2015. This will include site clearing and preparation, installing foundations, and erecting any necessary buildings. The workforce is expected to peak during this stage of constructing the station at approximately 22 persons. Towards the completion of civil works, risers, buswork, and steel structures will be erected . This work is scheduled to take place mid-2015. The workforce will peak at 15 persons for this stage of construction. Following the erection of structures, further electrical work will proceed. This work is expected to take place between mid to late 2015. Workforce is expected to peak at approximately 12 persons during this stage of construction.

Pine Falls Generating Station Switchyard Upgrades

Upgrades at the Pine Falls Generating Station Switchyard will take place from mid-2013 to mid-2015. Civil works will take place for approximately one month starting in mid-2013. An estimated seven persons are required for this phase of the upgrades. Electrical construction, which is currently planned to be carried out by Manitoba Hydro employees, will start in mid-2013 and be conducted over a five month period. The workforce for this phase of the project is small with an estimated peak workforce of four people. Construction will take place over approximately a one month period starting towards the end of March 2015. Peak workforce for this component of the project is 12 persons.

Modest indirect business effects could also be expected by communities in the vicinity of the station through the purchase of meals and gasoline, and potentially accommodations by the contractors, as well as incidental purchases of repairs and parts for construction vehicles and equipment during the construction phase.

Operations and Maintenance Phase - Stations

The Manigotogan Corner Station will be an un-occupied (i.e., un-manned) station. Periodic station inspections will occur on an annual basis; no employment or business opportunities will exist with this component of the project since staffing needs for maintenance are currently filled. The Pine Falls Generating Station Switchyard upgrades will also result in no employment or business opportunities; existing Manitoba Hydro staff will carry out any operations and maintenance work required.

Personal Well-being

Aesthetics

Construction and Operations and Maintenance – Transmission Line and Stations

Visual /aesthetic effects are addressed for both operations and maintenance phases.

The addition of a transmission line and station to the landscape can affect an individual's perception of the visual quality of the surrounding area. Opinions on the visual effect of transmission lines and associated infrastructure are subjective and depend on an individual's values and perspectives.

The following provides an overview of the preferred route regarding what was taken into consideration to minimize aesthetic effects of the proposed transmission line and station. Overall, the proposed route is close to PR 304 which crosses north-south through the Project Study Area and maximizes distances from lodges, parks and recreational sites/developments, and maximizes distances to residences and existing settlements and communities to the extent possible. This alignment minimizes further fragmentation of the viewshed and aesthetic effects are expected to be minor overall.

From Pine Falls Generating Station Switchyard, the proposed route for the transmission line follows existing infrastructure and avoids residences until it crosses the Winnipeg River. Moving east after the Winnipeg River Crossing, the route would be in close proximity to an RV park. The owner identified some concerns regarding the location of the proposed route which would be in view of a beach which is used by its patrons. Furthermore, concern was expressed about the potential for visual impairment on the future expansion of the RV Park as it requires clearing of trees and hence, no visual buffer would remain between future lots and the proposed transmission line. The proposed route was adjusted to avoid the access road to the beach and boat launch. Travelling north from Pine Creek, the route was also adjusted further east to allow for a buffer between the transmission line and future development of the site to minimize aesthetic impacts. The second property owner north of the RV Park had an interest in keeping his/her property south of Broadlands Road unencumbered for future residential development, as well as to have the transmission line located away from the waterfront to limit impacts on aesthetics. The route was adjusted by moving it further west on the property to accommodate their concerns. The third property owner had no aesthetic related concerns as a result of the line being located on his/her property.

Once the route traversed the three private properties, the remainder of the transmission line would be located on Crown Land. Travelling north and east of Black River First Nation, community members identified a youth trapper's cabin in the area. An adjustment was made to this part of the route in order to avoid the trapper's cabin to limit aesthetic impacts. In addition to the trapper's cabin, there is also a picnic site at the Black River crossing. It is located approximately 680 m from the transmission line on the west side of PR 304. It is anticipated that there will be minimal visual impairment of the area due to the distance to the transmission line. Travelling further north there are two other campgrounds in the vicinity of the route and station, as well as cottage development and housing at the community of Manigotagan. One campground is located southeast of the community of Manigotagan and is managed by the Manigotagan Community Council. It is located approximately one kilometer away from the transmission line on the opposite side of PR 304. Another campground is located northeast of the Manigotagan Corner Station (i.e., English River) is approximately 2 kilometers away from the site. There are no lodges in the vicinity of the line, and other designated protected areas were avoided as well. Despite the route crossing the community boundary of Manigotagan, cottage and housing development in the area is located over 1 km from the transmission line; the community has not identified any concerns.

Regarding outfitting and resident hunting, the wilderness experience for those participating in these activities could be impacted by the presence of the line and, therefore, the line could result in a minor impairment on aesthetics values. The presence of the line may affect the sense of solitude and distance from civilization of individuals in the area

Regarding the Manigotagan crossing, an adjustment was made to move the route further east of the PR304 Bridge to limit effects on the viewshed due to the bridge being a common location for visitors to travel and to take photographs. The presence of the line could have a minor impairment on aesthetics for those who frequent the waterway.

Examples of mitigation measures to limit aesthetic impacts would include:

- Tower location (i.e., tower "spotting") has been identified as a potential mitigation measure to reduce adverse effects on sensitive land uses in proximity to the ROW. Manitoba Hydro Property Department staff will discuss tower placement preferences with the affected private landowners. Wherever feasible, tower placement will be selected to minimize impacts.

Worker Interactions and Public Safety

The Project will result in the presence of temporary workers in the Project Study Area. The peak workforce is expected to be 115 for the transmission line, 40 for the Manigotagan Corner Station, and 12 for the Pine Falls Generating Station Switchyard, some of whom may be from the communities within the Project Study Area. Workers will stay in temporary accommodation in local communities wherever possible, and will also use existing services and infrastructure in the communities. No effect on the public safety of local populations is anticipated as a result of the Project. However, should any concerns arise, Manitoba Hydro will address them on a case by case basis.

Electric and Magnetic Fields

Construction Phase – Transmission Line and Stations

No effect is anticipated during the construction phase of the project.

Operations and Maintenance Phase – Transmission Line and Stations

Manitoba Hydro's infrastructure (e.g., stations and transmission lines) produce EMF at a low frequency range of approximately 60 Hz. Electric and magnetic field levels associated with an alternating current transmission line depend upon the configuration of the line's conductors, the line's voltage, the amount of current the line is carrying, and distance from the conductors. Station equipment is configured in such a manner that fields drop off quickly with distance. At the fence surrounding a station, the EMF levels are typically within the range of background levels, except where the transmission lines cross. Canadian (e.g., Manitoba Clean Environment Commission (2001), and international studies including the World Health Organization (2007) have concluded that there is insufficient scientific evidence to show exposure to EMFs from power lines can cause adverse health effects such as cancer. Health Canada (2004) states that there is no conclusive evidence of any harm caused by exposures at levels normally found in Canadian living environments. Further, information on this topic can also be found in the Bipole III Environmental Impact Statement (2011).

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

- monitoring of worldwide research programs on EMFs;
- participating in and support of on-going health and safety research on the local, national and international levels; and
- maintaining active communications and provision of technical information to interested parties, including the public and agencies responsible for public and occupational health and the environment.

Noise, Dust, and Vibration

Construction Phase - Transmission Line

During construction of the transmission line, there will be elevated noise levels in the immediate area. Construction activities can result in noise and disturbances (i.e., dust and vibration) to people in the vicinity of the construction activities. Transmission line ROW clearing, site preparation, foundation installation, structure erection, works at marshalling yards, work camps (if required), and using implosives for splicing conductors are examples of activities that can lead to such effects (i.e., noise and disturbance effects). Other than the southernmost portion of the line, the majority of the Final Preferred Route is in areas that are not inhabited, which will limit the disturbance to humans. Noise and other disturbances generated during construction activities will be temporary and intermittent.

Examples of mitigation measures that will be implemented include:

- All equipment will be fitted with standard mufflers or silencers, and kept in good working order.
- Minimize construction activities during the spring and summer months during which time nearby seasonal residence will be present for the southern portion of the transmission line.
- Limit noise and vibration causing activities to daytime working hours in developed areas and comply with all applicable by-laws.
- Only water and approved dust suppression products will be used to control dust.

Examples of mitigation measures with respect to the use of implosives:

- Provide 48 hour advance notification before use of implosives to nearby residences and businesses;
- Comply with provincial legislation and guidelines for explosives use;
- Ensure that persons using explosives are licensed;
- Adhere to implosives schedule; and
- Restrict use of implosives to normal working hours.

Operations and Maintenance Phase - Transmission Line

Transmission lines are designed to operate 24 hours per day, year round. Operation of a transmission line involves the production of corona discharges which can result in audible noise. The levels will vary with time, subject to operating mode and loading conditions of the line and, and to external factors such as weather. Audible noise levels will fall within the provincial guidelines in Manitoba. Additional audible noise would also be generated during operations and maintenance activities (e.g., repairs to the line, inspection of the line); however, such activities are temporary and short-term in duration (i.e., patrols of the line are conducted annually, typically by ground). Non-scheduled patrols or maintenance may be conducted by air or ground should unexpected repairs be required. No mitigation is required.

Construction Phase - Stations

Similar to constructing the transmission line, there will be elevated noise levels during construction of the Manigotagan Corner Station and upgrades to the Pine Falls Generating Station Switchyard. Site preparation, installation of equipment and constructing buildings will all contribute to elevated noise levels and associated disturbance effects (i.e., dust, vibration). Noise generated during construction of the station will be temporary and intermittent, and will generally fall within provincial noise level guidelines. Furthermore, the location of the site is over approximately 3.5 km from the edge of the nearest community boundary (i.e., Manigotagan) and, therefore, should not directly affect communities. No mitigation is required.

Operations and Maintenance Phase - Stations

During operations, noise generated from the stations will be largely generated from the operation of the transformer units. The maximum noise level rating of the new transformer units will be in the range of 76 to 79 decibels (dBA). The transformers will meet Canadian Standards Association (CSA) Standards. During operations, the maximum overall sound level generated by the station is estimated to be approximately 50 db. Other sources of noise will include activities associated with periodic site-visits of workers once the station is in operation which will be minimal because it is an un-manned site. Given the location of the proposed station sites, noise levels are not expected to be a concern. No further mitigation is required.

Spraying

Construction Phase - Transmission Line

No herbicides will be applied during ROW clearing, therefore no effect is anticipated.

Operations and Maintenance Phase - Transmission Line

Through the public involvement process a number of communities expressed concerns over spraying herbicides within the existing 66 kV or new 115 kV transmission line ROWs to control vegetation and its effects on vegetation, mammals, aquatic resources, and people.

Vegetation management is required on an ongoing basis to ensure that re-growth in cleared ROW does not interfere with transmission line operations. Vegetation management involves a variety of methods including hand cutting (e.g., utilizing chainsaws, brush saws, axes, or brush hooks), mechanical shear blading (using “V” or “KG” blades), brush mowing with rotary and drum cutters (typically rubber-tired equipment), and herbicide treatment.

An integrated vegetation management and weed control approach is used within the ROW to control and reduce potential tree and weed problems. Herbicide treatments are formulated to target only broad-leafed plants (trees and weeds) leaving grasses unaffected. Permits for herbicides use are obtained on an annual basis. The process involves public notification as part of the formal permit application to Manitoba Conservation Pesticide Approvals Branch. All herbicide applications are completed and supervised by licensed applicators and in accordance with conditions specified in a Pesticide Use Permit. Herbicide application rates are established by Manitoba Hydro’s Chief Forester in accordance with product label instructions. Only herbicides which have been approved in the Pesticide Use Permit are used. Manitoba Hydro maintains a typical list of herbicide foliage treatments and has developed application guidelines that it adheres to for its activities. Manitoba Hydro’s vegetation management procedures are well established with respect to herbicide application requirements and obtaining the Pesticide Use Permits. On provincial Crown lands, a work permit issued under The *Forest Act* (Manitoba) is required and owners adjacent to the ROW are typically notified in advance. Manitoba Hydro’s Chief Forester coordinates the necessary approvals and is responsible for obtaining the necessary Pesticide Use Permits and submitting Post Seasonal Control Reports as per Manitoba Regulation 94-88R under *The Environment Act*. No effects to personal well-being from spraying herbicides are anticipated.

Herbicides will be applied according to standard Manitoba Hydro practices and applicable legislation, this includes:

- If herbicides are required to control vegetation growth, all applicable permits and provincial regulations will be followed;
- Plants of value to communities in the ROW will be identified and herbicide application will be restricted
- On private lands, prior to any vegetation management work, landowners or appropriate authorities will be contacted to obtain the necessary permission.
- On Crown land adjacent to Aboriginal communities, communities will be notified prior to any vegetation management work.

Construction Phase - Stations

No herbicides will be applied during site preparation, therefore no effect is anticipated.

Operations and Maintenance Phase - Station

Herbicides will be used to control vegetation at the Manigotagan Corner Station within the gated area and along the outside of perimeter fencing. Herbicides will be applied according to standard Manitoba Hydro practices and applicable legislation. No effect to personal well-being from the spraying of herbicides is anticipated due to the site being a secured site.

Electrical Interference

Construction Phase – Transmission Line and Stations

No electrical interference effects are expected during the construction phase of the Project.

Operations and Maintenance Phase – Transmission Line and Stations

Electrical interference from the proposed line and station could affect local residents, as well as communications infrastructure in the area. Radio and TV inference occurs by 'corona discharge' that occurs around transmission lines and stations; corona discharge generates broad band 'radio noise' over a range of radiofrequency signals. If the signals from AM and non-digital TV sources are weak, the radio noise from nearby power lines can overlap and cause poor reception very close to the lines. To the extent technically feasible and practical, Manitoba Hydro employs efforts to select routes to avoid interactions with infrastructure facilities and residences that could potentially be affected. With respect to the number and proximity of residences that could be affected, the route selected avoided all private property with residences. In the event that any residences experience interference problems, Manitoba Hydro will work with customers to rectify any issues.

There are also 20 antenna communication towers and 6 broadcast communication towers in the study area. The nearest broadcast tower to the transmission line located over 2.5 kilometers away. The nearest antenna tower is located approximately one kilometer away from the Pine Falls Generating Station Switchyard. It is anticipated that there will not be any effects from the transmission line on the facilities.

Overall, Manitoba Hydro does not anticipate any electrical interference effects with various infrastructure facilities and residences the vicinity of the transmission line or station. Manitoba Hydro will meet the requirements of the Radio Communications Act and the Radio Communication Regulations, and will also meet the requirements of industry Canada's Interference-Causing Equipment Standard - ICES-004 Issue December 2001 - Alternating Current High Voltage Power System. Therefore, no mitigation is required. For follow-up, in the event interference difficulties are encountered in the vicinity of the transmission line and/or at the station, Manitoba Hydro will identify the interference source, assess and test the signal reception equipment, and work with affected parties to rectify the problem.

Land Ownership and Tenure

Construction Phase - Transmission Line

The total length of the transmission line is approximately 71km. Approximately 98% of the transmission line crosses Crown Lands and 2% crosses private lands. There are a number of encumbrances located on Crown Land where the route will be located (e.g., Manitoba Highways and Manitoba Hydro rights-of-ways, forest management licence areas,etc.). The transmission line could affect tenure of some holders but mostly through nuisance effects, which are covered under personal well-being and are expected to be minimal. Easements/permits will be acquired from the Crown Lands and Property for locating the line on Crown Lands.

With respect to communities, two boundaries would be traversed by the transmission line. The Pine Falls Generating Station Switchyard, where the transmission line originates, is located in the RM of Alexander. Approximately 3.8 km of the transmission line is located in the RM of Alexander in lands zoned as Open Space "OS", Agricultural over 80 acres "A80" and Resource Development "RD". The municipality was involved in the public engagement process and did not identify any conflicts with existing or future land use. The other community boundary that the line would traverse is Manigotagan for approximately 3 km. Manitoba Hydro met with the community as part of the public engagement process, and representatives did not identify any concerns with respect to incompatible land use as a result of the location of the line.

Three private properties at the southern part of the route would be affected by the transmission line; however, none of the properties have residences located on their respective properties. Concerns respecting future development of property, aesthetics, and property values were identified by the property owners and route adjustments were made to accommodate their concerns. Changes made to the route are identified below:

- Local business owner - Travelling east after the Winnipeg River Crossing, the route was changed to avoid future development. Travelling north from Pine Creek, the route was adjusted and moved further east to allow for a buffer between the transmission line and future development of the site.
- Second property owner - The property owners had an interest in keeping their property unencumbered for future residential development. The route was adjusted by moving it further west on the property to accommodate their concerns.
- Third property owner – Through discussion it was identified that there were no immediate concerns about the proposed line other than assurance that there would be adequate

clearances in case the property was developed in the future. A review of the final route through private property is provided in the following paragraph.

Once the route crosses the Winnipeg River, it travels east and crosses the property of a local business for approximately 75 meters. The route then continues to the juncture of the Pine Creek and the Winnipeg River. From this point the route travels north where the second private property is traversed. A total of approximately 600_meters of the proposed route traverses the second property. Crossing PR 304, the route heads north and crosses 160 meters of the third affected property before entering Crown Land for the remainder of the route. The location of the preferred route in the southern part of the study area was largely dictated by proximity to residences, location of the generating station, and addressing landowner concerns. Therefore, it will result in minimal effects on private property owners. Easements will be acquired for locating the line on private lands and directly affected landowners will be compensated.

Manitoba Hydro has a policy in place for landowners whose property is crossed by the transmission line by way of easement. A one-time payment based on 75% of the market value of the land within the required ROW is provided to affected landowners, as well as payments for impacts associated with structures placed on agricultural lands.

With respect to Aboriginal Lands, all Reserve Lands were avoided during the identification of alternative routes. There are no Traditional Land Entitlements or Community Interest Zones near the Project. The closest parcel of Aboriginal lands to the transmission line is Black River First Nation, approximately 3 km west of the Project. No effect to Aboriginal lands is anticipated from the transmission line.

Regarding designated protected areas, such lands were identified and avoided during the identification of alternative routes. Protected Areas Intiative also reviewed the route and they have no concerns with the location of the transmission and station. The Final Preferred Route is located between the Observation Point WMA and Manigotagan River Provincial Park. The Observation Point WMAs is approximately 3 km west of the route and approximately 0.5 km west of the Manigotagan River Provincial Park. The Project crosses the eastern edge of the Observation Point Area of Special Interest. No other ecological reserve lands or conservation districts were crossed by the preferred route and, therefore, no effects are expected.

Examples of measures to mitigate effects will include:

- In addition to design mitigation through routing, tower location (tower “spotting”) will be used, where feasible, to reduce potential negative effects, and location preferences identified where technically and economically feasible
- Municipal and local protocols and by-laws will be respected and appropriate methods will be applied to comply with regulatory standards during construction of the line
- Care will be taken so construction activities and equipment do not impact neighbouring properties
- Manitoba Hydro’s Property Compensation Policy will be implemented; and

- Work permits from Manitoba Conservation will be obtained for all project activities occurring on provincial Crown lands.

Effects on existing land use during construction are largely nuisance effects (e.g., noise, vibration, dust) during construction and are addressed under personal well-being.

Operations and Maintenance Phase - Transmission Line

Given the life expectancy of the project, the three private properties crossed by the transmission line will be directly affected by the the presence of the line. Future development of their respective properties will be affected and the line may be an inconvenience when working in close proximity. The remainder of the line is located in Crown Land and land ownership and tenure will not be affected other than some minor impacts on future development of lands.

Concerns raised during the consultation process with the affected landowners were rectified through on-going discussions with Manitoba Hydro which resulted in route adjustments to accommodate their concerns. Overall, the line will be a net addition to the landscape and any adverse effects will be incremental in nature, particularly in areas where other infrastructure facilities are present (e.g., Pine Falls Generating Station Switchyard). Furthermore, with respect to effects on private property, in the unlikely event that physical damages are incurred by a landowner during operations and maintenance of the transmission line, damages are subject to compensation through Manitoba Hydro's existing compensation policies.

In addition to concerns regarding development and enjoyment of property, effects on property values was another issue that was raised. In terms of property values, Manitoba Hydro's position is that the presence of transmission lines does not negatively affect residential property values. Since 2000, Manitoba Hydro has undertaken an annual Property Value Monitoring Program in the Birds Hill and Lister Rapids areas (RMs ofEast and West St. Paul), north of the City of Winnipeg. The program was initiated in response to concerns about property values as these residential areas are located north of an existing transmission line ROW containing 500 kV and 230 kV transmission lines. Real estate transactions for residential properties have been tracked over the period from January 1, 1992.

Examples of mitigation measures to minimize effects during operations and maintenance include the following:

- Municipal and local protocols and by-laws will be respected and appropriate methods will be applied to comply with regulatory standards during operations and maintenance of the line; and care will be taken to ensure that operations activities/equipment do not impact neighbouring properties.
- In the event that physical damages are incurred by a landowner during operations of the transmission line, damages are subject to compensation through Manitoba Hydro's existing compensation policies.

With respect to other lands, the Final Preferred Route does not cross any Reserve Lands, Treaty Land Entitlements, Community Interest Zones, or Federal lands. Furthermore, the

transmission line is not located in any designated protected areas. The presence of the line is expected to have only a minimal impact on potential future development.

*Construction Phase - Station**s***

The Manigotagan Corner Station will be located on Manitoba Hydro owned property and is approximately 3.5 km away from the nearest community. Manitoba Hydro will acquire the property rights for the station site from the Crown (excluding mineral rights) prior to construction. All Aboriginal lands were avoided in the selection of the site. The closest parcel of Aboriginal lands to the station is Hollow Water First Nation, approximately 3.5 km to the northwest._Furthermore, no designated protected areas are affected by the location of the station site. The nearest designated protected lands are 4.5 km away. Due to the remoteness of the station and distance from the nearest community it is anticipated that there will be negligible effects on existing land use (other then nuisance effects [e.g., noise, dust, vibration] which are covered under personal well-being). The Pine Falls Generating Station Switchyard upgrades are occurring within Manitoba Hydro owned property and within the existing footprint and, therefore, will not have any effects on land ownership and tenure.

Operations and Maintenance Phase - Stations

No significant effects of the acquired property are anticipated from the Operations and Maintenance of the Manigotagan Corner Station or Pine Falls Generating Station Switchyard upgrades. The relative isolation and limited development of the area and lack of community and residential development in the vicinity of the Manigotagan Corner Station means that there is likely to be minimal impact on future development.

Resource use

Traditional Land Use

Construction – Transmission Line and Stations

Domestic resource use in the Project Study Area includes hunting, fishing, and plant gathering. Completed and on-going consultation and ATK interviews have identified important locations for hunting, fishing, and plant gathering. The Project covers a total of 431.3 ha. Of that area, approximately 76.9 ha (17.8%) of the 60 m ROW and Manigotagan Corner Station footprint are located in areas identified during ATK interviews as being important bird and mammal traditional use areas. A further 12.4 ha (2.9%) of the 60 m ROW and Manigotagan Corner Station footprint are located in areas containing cultural and heritage resources (see LWESI Heritage Technical Report). A further, 340.6 ha (79.0%) of the 60 m ROW and Manigotagan Corner Station footprint overlap forestry (timber) and vegetation resource use areas (See Commercial Forestry Technical Report and Plants Technical Report). Many of these areas overlap one another (i.e., the numbers above are not cumulative).

During construction, sensory disturbance (e.g., construction noise) and nuisance effects (e.g., traffic and construction activities) are anticipated to result in some sensitive bird and mammal species avoiding the area (See Wildlife Technical Report for further information). Hunting and

trapping are occasionally used to supplement diet in the Project Study Area. As a result, some individuals may experience a small reduction in harvesting success. Effects on harvesting success rates are expected to be minimal, due to the fact that construction of the line will primarily take place during the winter months and are limited to areas near the Project construction activities. Any changes are expected to be short-term and minor.

Alternative areas may be used to harvest wildlife during the construction period, and shift hunting activities to other geographic areas in Project Study Area and elsewhere. Individuals may have to travel further to find animals during the construction period. Added harvest pressure on other local wildlife populations and unfamiliarity with new hunting areas can marginally reduce harvest success rates if alternative hunting areas are over-utilized. Any changes are expected to be short-term and minor within and outside the Project Study Area.

Plant gathering areas may be temporarily disturbed by construction activities. Re-growth along the transmission line may provide new areas to harvest berries, while in some cases, other plant species (e.g., medicinal plants) may be reduced. The Project may also result in increased access to berry picking and other important plant locations. Access will be managed through the development of an Access Management Plan.

To mitigate effects to traditional land use, applicable legislation, regulations and guidelines will be adhered to, and Project-specific mitigation measures will be outlined in the Construction Environmental Protection Plan. Examples of measures to mitigate or minimize the effects of Project-related impacts include the following:

- Care will be taken to protect the natural landscape surrounding work activity sites;
- Construction activities will be conducted to prevent any unnecessary damage outside the required rights-of-way and other disturbed/developed areas; and
- Access will be managed through development of an Access Management Plan.

Operations and maintenance – Transmission Line and Stations

Operations and maintenance has less potential for disturbance to traditional land use in the Project Study Area. The presence of the transmission line and station, and the removal of habitat has the potential to affect wildlife movement, but wildlife generally returns to areas previously inhabited once the disturbance has ended (see Wildlife Technical Report). Removal of habitat is expected to be limited and not affect the overall abundance of bird and mammal species used for traditional resource purposes. Annual inspections could have an occasional effect on a few individual wildlife species, temporarily decreasing bird and mammal abundance in the area. Low level disturbances are not likely to be measureable. Increased access to the area could result in increased pressure on species harvested for traditional use purposes in the Project Study Area. Because the transmission line parallels and is located near existing access, access to remote wildlife populations (e.g., moose) should not occur. Although hunting may improve locally , regional hunting of wildlife species is not expected to change. In the long-term, the potential for increased wildlife mortality due to increased hunting pressure from new access may result in a minor decrease in local wildlife populations over the long-term. For important species such as moose which are in decline in GHA26, on-going management initiatives

including the Cooperative Committee for Moose Management, will ensure that a sustainable moose population is maintained.

Plant harvesting during operations and maintenance has the potential to increase due to plant growth on the ROW and improved access in the area. To mitigate increased access resulting in pressure on traditional use plants and medicines, an Access Management Plan will be developed. Spraying during operations and maintenance also has the potential to affect plant harvesting (See Section 6.2.3.5 for more details).

Adherence to measures outlined in the Operations Environmental Protection Plan willmitigate effects on traditional use resources. Examples of measures to mitigate or minimize the effects of Project-related impacts include the following:

- Care will be taken to protect the natural landscape surrounding work activities; and
- Access will be managed through development of an Access Management Plan.

Commercial Trapping

Construction Phase - Transmission Line

The Project Study Area is located in the Eastern Registered Trapline District (Manitoba); trapping in the area is organized by the Hole River and Lac Du Bonnet RTLs). There are three community lines within the Lac Du Bonnet Trapline Section – Manigotagan (RTL 70-28), Black River (RTL 70-27), and Sakeeng First Nation (RTL 70-26). The Hollow Water (RTL 80-16) Trapline Section has one registered trapline holder. The transmission line component of the Project traverses 22.4 km of RTL 70-26, 20.7 km of RTL 70-27, 27.5 km of RTL 70-28, and 0.3 km of RTL 80-16.

Based on trapping records from 2001 to 2011, marten was the predominant furbearer trapped in the area. Marten are considered a popular target species for local trappers because they are typically available for harvest, relatively easy to handle and prepare and the market demands a good price for pelts. For example, a price for a marten pelt could be in the range of $100 to $120 in the market based on recent fur auction sales (North American Fur Auctions – 2012 Spring Auction).

During construction of the transmission line, activities may temporarily displace wildlife from areas in proximity to the ROW due to sensory disturbances (see Wildlife Technical Report). A pilot project undertaken by Manitoba Hydro in 2012 for the Wuskwatim Transmission Line Project supported the assertion in which furbearers avoided areas with consistent amounts of noise and disturbance during construction; however, furbearers returned to the area once the disturbance ceased. It is possible that trappers could see a decrease in furbearer capture rates during construction in the area. Manitoba Hydro has a Trapper's Notification/Compensation Policy in place since the 1980s, for registered trapline holders to address these matters. Mitigative measures which are part of the notification policy are outlined below. In terms of compensation, the program is intended to provide compensation to holders of registered traplines whose lines are affected by the construction of transmission facilities 115 kV or greater

based on a 10 km disturbance zone. Prior to construction, a compensation amount will be determined with eligible holders of registered traplines for the disturbance during the period of construction. Compensation would also be paid for any damage to equipment, buildings and trapping trails during construction activities.

Examples of measures to minimize the effects of project-related impacts will include the following:

- Prior to construction activities, registered trapline holders will be notified as to the schedule for construction activities;
- Trapline holders will be requested to remove trapping equipment as required;
- Access will be managed through development of an Access Management Plan; and
- Ongoing discussions with directly affected registered trapline holders to establish mutually acceptable measures to deal with any issues.

Operations and Maintenance Phase - Transmission Line

After construction, some trappers may benefit from improved access to their trapping areas. Conversely, there may also be concerns regarding managing access to these areas. The cleared ROW will largely be accessible during the winter months (i.e., frozen period) due to the nature of the terrain in some areas (rock outcrops, difficult water crossings, extensive fens). However, because of proximity to PR 304, increased access in the summer may also occur (Ron Rawluk pers. comm. 2012). Increased access is not anticipated to provide much benefit to trappers, who already have access to local traplines from the Provincial Road. However, trap placement on the Project ROW may increase depending on targeted species. The main species trapped in the Project Study Area is Marten, which is a forest dwelling species. Although the right-of-way may result in increased trap placement on the ROW, marten are often trapped near forest edges, and in these cases, the right-of-way and access may prove to be beneficial. An access management plan will be prepared and implemented for the operations phase of the project to address issues of increased access potential. Anticipated effects are expected to be minimal.

The presence of the transmission line and station, and the removal of habitat has the potential to affect furbearer movements, but these species generally return to areas previously inhabited once the disturbance has ended (see Wildlife Technical Report). Removal of habitat is expected to be limited and not affect the overall abundance of commercial furbearing species. Annual inspections could have an occasional effect on a few individual wildlife species, temporarily decreasing furbearer abundance in the area. Low level disturbances are not likely to be measureable.

Examples of measures to minimize the effects of project-related impacts will include the following:

- Access will be managed through development of an Access Management Plan; and
- Ongoing discussions with directly affected registered trapline holders to establish mutually acceptable measures to deal with any issues.

Construction Phase - Stations

Construction activities could temporarily affect trapping in the area of the proposed

Manigotagan Corner Station. There is one registered trapline holder in the Hollow Water (Hole River) trapline area that is directly affected. Sensory disturbance associated with construction could result in avoidance of the area by furbearers. The total area affected is approximately 0.3 km. Under Manitoba Hydro's Trapper's Notification/Compensation Policy, compensation will be paid to the registered trapline holder for the period of construction. Compensation would also be paid for any damage to equipment, buildings, and trapping trails during construction activities. No effects to traplines are anticipated from the Pine Falls Generating Station Switchyard upgrades.

Examples of measures to mitigate or minimize the effects of Project-related impacts include the following:

- Ongoing discussions with directly affected registered trapline holders will continue to establish mutually acceptable measures to deal with any issues;
- Prior to construction activities, registered trapline holders will be notified as to the schedule for clearing and construction activities; and
- Trapline holders will be notified to remove trapping equipment as required.

Operations and Maintenance Phase - Stations

Sensory disturbances associated with the long-term operation of the Manigotagan Corner Station could result in the avoidance of the local area by furbearers (see Wildlife Technical Report), however, the station is adjacent to the road, therefore sensory disturbance of the station will not increase overall noise in the area. It is possible that the local trapper may have to move the trapline to an alternate site to improve trapping success elsewhere in the RTL. During operations. Anticipated effects are expected to be minimal.

Examples of measures to mitigate or minimize the effects of Project-related impacts will include:

- Ongoing discussions with directly affected registered trapline holders will continue to establish mutually acceptable measures to deal with any issues.
- Access will be managed through development of an Access Management Plan

Commercial Fishing

No effect to commercial fishing in the Project Study Area is anticipated due to the distance of the Project from Lake Winnipeg.

Existing Mining and Mineral Resources

Construction Phase - Transmission Line and Station

Manitoba Hydro met with the Manitoba Mining Association about the proposed project and the Mines Branch reviewed the Final Preferred Route. An initial review of the transmission line by the Mines Branch did not identify any concerns. Overall, the location of the transmission line has

a limited impact on existing mineral interests in the area. No active claims, mines, or mine leases are traversed by the proposed transmission line or station. There are only three casual quarry permit areas that crossed, as well as two others in close proximity that could be potentially affected. Potential concerns relate to the ability to develop sites and interference with operations of an aggregate deposit.

In instances where a potential adverse effect exists with quarry or aggregate operations, possible mitigation measures will include placement of towers to lessen/avoid interference with operationsat those locations.

Operations and Maintenance - Transmission Line and Stations

No adverse effects are expected from operations of the line on any existing mines, properties, quarry operations, or future exploration activities due to the type of minerals present in the area. Quarry operators in proximity to the line will be provided information regarding operations and maintenance schedules to minimize potential interference with operations.

Forestry

See the Forestry Technical Report (Maskwa 2012) for information on forestry in the Project Study Area.

Wild Rice Harvesting

No effect to commercial wild rice harvesting in the Project Study Area is anticipated due to the project not crossing any wild rice licence areas There are six wild rice harvesting locations within approximately 3 km of the transmission line. The nearest location is approximately 0.8 km east of the line.

Recreation and Tourism

Recreation

Construction – Transmission Line and Stations

The route selection process sought to avoid/minimize effects on recreation through routing, to the extent possible. The majority of the effects during construction will be nuisance effects. With respect to recreation, there are three outfitters (i.e., Hasting Brothers Outfitting, Sandy River Outfitters, Black River Outfitters) that have allocation areas affected by the proposed transmission line; however, their main lodges are not near the proposed route. Black River Outfitters is not known to actively outfit in the Project Study Area. Hastings Brothers and Sandy River Outfitters both specialize in bear hunts and Sandy River Outfitters also offers deer hunting packages in GHA 26. The outfitters have been apprised of the project as well as asked to identify any issues or concerns they have regarding the project. Both outfitters identified bear stands and bait sites in the area where the proposed route would be located. Effects on harvesting could result through sensory disturbance during construction (i.e., noise resulting in mammals avoiding the area) (See Wildlife Technical Report for further information) and nuisance effects through the need to relocate stands. Effects on harvesting success rates are

expected to be minimal, due to the fact that construction of the line will primarily take place during the winter months when big game hunting is limited by closed hunting seasons. This includes bear hunting, which is the primary business of the outfitters in the project area. Manitoba Hydro will work with both outfitters to coordinate schedules regarding construction to minimize potential effects.

There is one established cottage area (i.e., Manigotagan) that is in the vicinity of the transmission line but it is over 1 km away from the line. It is anticipated that there will not be any effect on cottage subdivisions. Furthermore, a review of Crown Land encumbrances in the vincity of the project did not identify any vacation/cottage property in the area.

The Final Preferred Route crosses the Manigotagan River, but avoids the Manigotagan River Provincial Park and Observation Point WMA. Due to the distance of the Manigotagan Corner Station from the river, and the fact that construction of the transmission line will take place during the winter months when the Manigotagan River is not frequented by visitors, it is expected that there will be no effect during the construction phase of the project.

There are a total of three campgrounds and one picnic site in the vicinity of the proposed route. One campground is located southeast of the community of Manigotagan and is managed by the Manigotagan Community Council. It is located approximately 1 kilometer away from the transmission line. Another campground is located northeast of the proposed Manigotagan Corner Station (i.e., English River). It is located approximately 2 km from the proposed station site. There is also a picnic site near the Black River. It is located approximately 680 m from the proposed route. There is also an RV park located at the southern end of the route near the Pine Falls Generating Station Switchyard. Manitoba Hydro has met with the proprietor of the RV park and his concerns have been addressed through routing. Due to the distance of the sites from the transmission line and station site, there is limited potential for effects, other then temporary nuisance effects during construction (see Section 6.2.3, Personal Well-being).

Residents of Manitoba actively hunt a variety of wildlife species in the Project Study Area for recreation purposes (e.g., big game species - deer, bear, wolf; upland and migratory game birds – grouse, geese duck). The route traverse GHA 26. Game Hunting Area 26 is currently closed to licensed moose hunting and to rights-based moose hunting in designated areas. Effects on harvesting big games species and birds could result through sensory disturbance during construction which could temporarily displace wildlife from areas in proximity to the ROW (e.g., noise from construction could result in mammals and birds avoiding the area). Effects are expected to be minimal, especially due to the fact that construction of the line will primarily take place during the winter months when big game hunting in GHA 26 is closed (except for hunting wolves), upland game bird hunting is closed, and migratory birds are outside of the study area in wintering areas. Only the Manigotagan Corner Station and Pine Falls Generating Station Switchyard upgrades will be taking place over the summer months. The site specific nature of the facilities suggests they would only have a minor effect on resident hunting. Direct project impacts on mammals and bird species and their habitat can be found in the Wildlife Technical Report.

No effects on recreational angling is anticipated during the construction of the project. The most direct access to the main rivers for angling is via PR 304, and it is unlikely that the project will

create any new access points that are more desirable to anglers. The transmission line will not cross any known fish spawning sites (which could potentially draw anglers to the transmission line crossing locations). Effects on fish and fish habitat can be found in the Aquatics Technical Report.

The proposed transmission line is not located near any hiking or snowmobile trails, however the Manigotagan Corner Station overlaps a dog sled track. Manitoba Hydro will work with communities to identify the portion of the track that is affected and will help relocate the route (see the Cultural Resources Technical Report for more details).

To mitigate effects to recreation and tourism, applicable legislation, regulations and guidelines will be adhered to, and Project-specific mitigation measures will be outlined in the construction Environmental Protection Plan. Examples of measures to mitigate or minimize the effects of Project-related impacts include the following:

- Affected outfitters and recreational resource users, including Crown land encumbrance holders, will be notified in advance as to the schedule for clearing and construction;
- Care will be taken to protect the natural landscape surrounding work activity sites; construction activities will be conducted to prevent any unnecessary damage outside the required rights-of-way and other disturbed/developed areas; and
- Access will be managed through development of an Access Management Plan.

Operations and Maintenance – Transmission Line and Stations

Operations has less potential for disturbance to recreation and tourism than construction activities. The physical presence of the line and stations will be a net addition to the landscape, and any adverse effect will be incremental in nature particularly in areas where other infrastructure facilities are present.

With respect to affected lodges/outfitters in the area, once a disturbance has ceased (e.g., sensory disturbance during construction) wildlife are known to return to areas once inhabited. There could be disruption to animal movements associated with the existence of transmission line corridor, but such effects are not expected with mammals targeted by outfitters (see Wildlife Technical Report for effects of the project on wildlife). Annual inspections of the transmission line could have a minor effect on wildlife but such events would be brief and infrequent. Increased access to the area could potentially lead to increased pressure on the desired mammal species through hunting and, thereby, affect outfitters/lodge operators harvest success.

Regarding the Manigotagan River Crossing, an adjustment was made to move the route further east of the PR 304 bridge to limit effects on the view shed due to the bridge being a common location for visitors to take photographs. The presence of the line could have a minor impairment on aesthetics for those who frequent the waterway (Aesthetics is addressed under Personal Well-being).

Effects on resident hunting will be similar to what is identified for lodges and outfitters above. Once a disturbance has ceased (e.g., sensory disturbance during construction) mammal and bird species are typically known to return to areas previously inhabited for the most part, but

there could be disruption regarding wildlife movements associated with the transmission line corridor (e.g., migratory birds and small mammal species)(see Wildlife Technical Report for direct impacts of the project on wildlife). Annual inspections of the transmission line could disturb wildlife but such events will be brief and infrequent. Increased access to the area caused by the ROW could potentially lead to increased pressure on desired mammal and bird species and, therefore, reduce harvest success rates by resident hunters. Effects are expected to be negligible.

With respect to recreational angling, while lakes are common in the Lake Winnipeg East region, they are not common within the Project Study Area where recreational fishing often occurs. Pine Falls Generating Station Switchyard is a common location for recreational anglers but the project will not affect this. Furthermore, the majority of the river crossings where the transmission line will be located are not locations recreational anglers are known to frequent (i.e., river mouths). Due to the location of the transmission line, increased pressure from increasd access is anticipated to have any effect on recreational fishing. Further information on fish and fish habitat can be found in the Aquatics Technical Report.

Adherence to measures outlined in the Operations Environmental Protection Plan will tend to protect the same environmental qualities that are valued for outdoor recreation purposes. Examples of measures to mitigate or minimize the effects of Project-related impacts include the following:

- care will be taken to protect the natural landscape surrounding work activities; and
- access will be managed through the development of an Access Management Plan.

7.3.1.3 Summary of Residual Effects

Table 7-13 summarizes the significant residual effects of the Project on socio-economic and land use components. Negative residual effects include a minor increase in population, a minor effects on traffic (volumes, disruption to flow, and road conditions, navigation), a minor decrease in availability of temporary accommodations, a minor increases in pressure on health and emergency services, a minor impairment of aesthetic services, a minor perceived risk to health from EMF, a decrease in personal well being due to nuisance-based effects and perceived health effects from spraying, a minor increased risk of electrical interference effects, a minor effect on future potential development, perceived effect to property values, minor effects on wildlife harvesting, berry harvesting, and trapping, nuisance effects to casual quarry permit holders, and minor nuisance effects to recreation and tourism. These effects are largely small in magnitude, regional in geographic extent, and short to medium term in duration. Most of the effects were reversible. None of the negative residual effects are considered significant.

Positive residual effects of the Project are related to employment opportunities and transferability of skills, and direct and indirect business opportunities. These effects are negligible to moderate in magnitude, local to regional in geographic extent, and short to medium-term in duration. Only one effect is considered significant: a moderate increase in employment opportunities in the Project Study Area.

Table 7-13: Summary of theSignificance of Residual Effects of the Project on Socio-economic and Land Use Components

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Population - Transmission Line and Stations				
Increase in population	Construction	Minor increase in study area population	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Transportation Infrastructure - Transmission Line and Stations				
Increased traffic volumes on roadways	Construction	Minor increase in traffic volumes	**Direction:** Negative **Magnitude:** Moderate **Geographic Extent:** Local **Duration:** short-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Disruption to traffic flows caused by lane closures	Construction	Minor disruption to traffic flows caused by lane closures	**Direction:** negative **Magnitude:** moderate **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Effects on Project Study Area road and highway conditions.	Construction	Minor adverse effect on road conditions	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Existing Infrastructure and Facilities - Transmission Line and Stations				
Potential for Interference with navigation	Construction	Minor effect on navigation	**Direction** – negative **Magnitude** – small **Geographic Extent** - local **Duration** – short-term **Reversibility** – reversible **Frequency** – regular/continuous	Not Significant
Temporary Accommodation - Transmission Line and Stations				
Increased pressure on temporary accommodations during construction and, therefore, reducing availability	Construction	Minor decrease in availability of temporary accommodations	**Direction:** negative **Magnitude:** moderate **Geographic extent**: local **Duration:** short-term **Reversibility**: reversible **Frequency**: regular/continuous	Not Significant
Health and Emergency Services - Transmission Line and Stations				
Increased pressure on health (i.e., hospital and medical clinic) services in Powerview-Pine falls	Construction	Minor increase in pressure on health services	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration**: short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Increased pressure on emergency (i.e., fire, RCMP, EMS) services in Powerview-Pine falls	Construction	Minor increase in pressure on emergency services	**Direction:** negative **Magnitude:** small **Geographic Extent**: local **Duration**: short-term **Reversibility**: reversible **Frequency:** sporadic/periodic	Not Significant

Table 7-13: Summary of theSignificance of Residual Effects of the Project on Socio-economic and Land Use Components

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Employment and Business Opportunities - Transmission Line				
Potential employment opportunities	Construction	Increase in employment opportunities in the Project Study Area	**Direction:** positive **Magnitude:** moderate **Geographic Extent:** regional **Duration:** short-term **Reversibility:** n/a **Frequency:** infrequent	Significant
Job skills through employment may be applied to other employment opportunities	Construction	Transferability of skills to other employment opportunities	**Direction:** positive **Magnitude:** small **Geographic Extent:** regional **Duration:** long-term **Reversibility:** permanent **Frequency:** sporadic/periodic	Not Significant
Contractors and local businesses (i.e., restaurants, temporary accommodation, entertainment) could financially benefit	Construction	Minor increase in direct and indirect business (e.g., increased cash flow from rooms and meals) opportunities in the Project Study Area	**Direction:** positive **Magnitude:** small **Geographic Extent**: regional **Duration:** short-term **Reversibility** – n/a **Frequency:** regular/continuous	Not Significant
Limited direct and indirect business opportunities	Operations and Maintenance	Minor increase in direct and indirect business opportunities	**Direction:** positive **Magnitude:** negligible to small **Geographic Extent:** local D**uration:** medium-term **Reversibility:** n/a Frequency: infrequent	Not Significant
Employment and Business Opportunities – Stations				
Potential employment opportunities	Construction	Minor increased employment opportunities in the Project Study Area	**Direction:** positive **Magnitude:** negligible to small **Geographic Extent:** local **Duration:** short-term **Reversibility:** n/a **Frequency:** infrequent	Not Significant
Job skills through employment may be applied to other employment opportunities;	Construction	Transferability of skills to other employment opportunity	**Direction:** positive **Magnitude:** negligible to small **Geographic Extent:** regional **Duration: long-term** **Reversibility:** permanent **Frequency**: sporadic/periodic	Not Significant
Contractors and local businesses (i.e., restaurants, temporary accommodation, entertainment) could financially benefit	Construction	Minor increase in direct and indirect business (e.g., increased cash flow from rooms and meals) opportunities in the Project Study Area	**Direction:** positive **Magnitude:** negligible to small **Geographic Extent:** regional **Duration:** short-term **Reversibility:** n/a **Frequency:** regular/continuous	Not Significant
Aesthetics – Transmission Line and Stations				
Impaired aesthetic values in local study area due to presence of the transmission line and station	Operations and Maintenance	Minor impairment of aesthetic values	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant

Table 7-13: Summary of theSignificance of Residual Effects of the Project on Socio-economic and Land Use Components

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Electric and Magnetic Fields – Transmission Line and Stations				
Decreased individual well-being due to perceived health risk of EMF from station and line	Operations and Maintenance	Perceived risk to health from EMF	**Direction: negative** **Magnitude:** small **Geographic Extent:** local **Duration**: medium-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Noise, Dust, and Vibration - Transmission Line				
A change in personal well-being due to nuisance effects (i.e., increased noise, dust, and vibration)	Construction	Decrease in personal well-being due to nuisance based effects.	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration: short-term** **Reversibility:** reversible **Frequency:** sporadic/periodic.	Not Significant
A change in personal well-being due to nuisance effects (i.e., increased noise) during operations	Operations and Maintenance	Decrease in personal well-being due to nuisance based effects.	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic.	Not Significant
Noise, Dust, and Vibration – Stations				
A change in personal well-being due to nuisance effects (i.e., increased noise, dust and vibration) during construction	Construction	Minor decrease in personal well-being due to nuisance based effects.	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** infrequent.	Not Significant
Spraying – Transmission Line				
A change in personal well-being due to perceived health effects as a result of spraying herbicides	Operations and Maintenance	Minor decrease in personal well-being due to perceived health effects of spraying	**Direction:** negative **Magnitude:** small to moderate **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Electrical Interference – Transmission Line and Stations				
Electrical interference effects on communication equipment	Operations and maintenance	Minor increased risk of electrical interference effects on communication equipment.	**Direction:** negative **Magnitude:** small **Geographic Extent**: local **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Land Ownership and Tenure – Transmission Line				
Physical presence of the transmission line resulting in limitation of future land use	Operations and Maintenance	Minor effect on future development potential	**Direction**: negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** medium-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Perceived effect of presence of transmission lines affecting property values	Operations and Maintenance	Perceived effect of impairment to property values due to presence of transmission lines.	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant

Table 7-13: Summary of theSignificance of Residual Effects of the Project on Socio-economic and Land Use Components

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Land Ownership and Tenure – Stations				
Physical presence of the facilities resulting in limitation of future land use	Operations and Maintenance	Minor effect on future development potential	**Direction:** negative **Magnitude:** negligible to small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Traditional Land Use – Transmission Line and Stations				
Reduced wildlife harvest success rate due to construction based disturbance	Construction	Minor reduction in harvester success rate	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Shift of harvest locations for existing users	Construction	Minor reduction in overall harvester success.	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Increased access to plant/berry harvest areas for existing users	Construction	Minor increase in plant/berry harvest for existing users	**Direction:** positive **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Increased access to plant/berry gathering locations for new users	Construction	Potential increase in plant /berry harvesting by new users and, therefore, affecting availability for existing users.	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Decreased plant gathering locations for some plant species (e.g., medicinal plants).	Construction	Potential reduction in desired plant abundance and, therefore, affecting plant harvest success	**Direction:** negative **Magnitude:** negligible to small **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** permanent **Frequency:** regular/continuous	**No**t Significant
Reduced harvest success rate due to disturbance and increased hunting pressure from new access	Operations and Maintenance	Minor reduction in harvester success rate due to disturbance and increase hunting pressure on the resource as a result of access	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Increased access to plant/berry harvest areas for existing users	Operations and Maintenance	Minor increase in plant/berry harvest for existing users	**Direction:** positive **Magnitude:** small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant

Table 7-13: Summary of theSignificance of Residual Effects of the Project on Socio-economic and Land Use Components

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Increased access to plant/berry gathering locations for new users	Operations and Maintenance	Potential increase in plant /berry harvesting by new users and, therefore, affecting availability for existing users.	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** regular/continuous	Not Significant
Commercial Trapping – Transmission Line				
Reduced harvest success rate due to construction based disturbance	Construction	Minor reduction in harvester success rate due to disturbance	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Reduced trapping success rate due to disturbance	Operations and Maintenance	Minor reduction in trapping success rate due to disturbance	**Direction:** negative **Magnitude:** negligible to small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Commercial Trapping – Stations				
Potential for decreased harvest due to construction –based disturbance	Construction	Minor decrease in trapping harvests	**Direction:** negative **Magnitude:** negligible to small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Reduced trapping success rate due to disturbance	Operations and Maintenance	Minor reduction in trapping success rate due to disturbance in the vicinity of the station	**Direction:** negative **Magnitude:** negligible to small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Existing Mining and Mineral Resources – Transmission Line and Stations				
Nuisance effects on nearby casual quarry permit holders	Construction	Nuisance effects to casual permit holders	**Direction:** negative **Magnitude:** negligible to small **Geographic extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency:** sporadic/periodic	Not Significant
Recreation – Transmission Line and Stations				
Nuisance effects to tourism activities due to construction	Construction	Minor nuisance effects on tourism activities during construction	**Direction:** negative **Magnitude:** negligible to small **Geographic Extent:** local **Duration:** short-term **Reversibility:** permanent **Frequency:** continuous	Not Significant
Nuisance effects to outfitters and recreational hunters from the need to relocate baits and stands	Construction	Minor increase in inconvenience from needing to relocate baits and stands	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility**: reversible **Frequency:** continuous	Not Significant

Table 7-13: Summary of theSignificance of Residual Effects of the Project on Socio-economic and Land Use Components

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Reduced harvest success rate for outfitters and resident hunters due to construction based disturbance	Construction	Minor reduction in harvester success rate by outfitter's clients and resident hunters	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** continuous	Not Significant
Nuisance effects to tourism and recreation due to the physical presence of the line and increased access	Operations and Maintenance	Minor nuisance effects on recreation and tourism.	**Direction:** negative **Magnitude:** negligible to small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** permanent **Frequency:** continuous	Not Significant
Increased mortality from new access due to increased hunting pressure	Operations and Maintenance	Minor decrease in local mammal and bird population	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** permanent **Frequency:** continuous	Not Significant
Reduced harvest success rate for outfitter's clients and resident hunters due to increased hunting pressure from new access	Operations and Maintenance	Minor reduction in harvester success rate by outfitter's clients and by resident hunters	**Direction:** negative **Magnitude:** small **Geographic Extent:** local **Duration:** medium-term **Reversibility:** permanent **Frequency:** continuous	Not Significant

7.3.1.4 Follow-up and Monitoring Activities

Monitoring key components of the socio-economic environment will be undertaken during the Construction of the proposed Project. A Socio-economic monitoring plan will be developed and submitted to the regulator in advance of start of constructionphases. All results from the socio-economic monitoring program will be reported to regulatory authorities annually. Two streams of socio-economic monitoring will be undertaken for the project – economic monitoring and social monitoring.

The purposes of the socio-economic monitoring program for the Project will be to:

- confirm effects predictions documented in the Environmental Assessment Report;
- monitor the effectiveness of mitigation measures;
- identify unanticipated effects;
- identify other actions necessary to mitigate adverse effects or enhance positiive effects; and
- provide socio-economic information for other uses.

7.3.2 Heritage Resources

7.3.2.1 Overview

Potential effects from construction of the PQ95 Transmission Line and Manigotagan Corner Station Site on heritage resources include the following:

- disturbance of unknown archaeological sites; and
- disturbance of unknown heritage resources.

7.3.2.2 Effects Assessment and Mitigation

Construction Phase

Based on existing site data from the Historic Resources Branch (HRB) and literature review including topographic map assessment of the proposed Alternative Routes, four river crossings were identified as well as the southern portion of proposed development along Pine Creek, as having heritage potential.

There are no existing registered archaeological sites within the 100 m corridor of the Alternative Routes, nor were any heritage resources documented during the field investigation of the Preferred Route. Physical confirmation of the ATK identified heritage resources was not acquired as specific location information was unavailable. The results of the heritage assessment indicates that there are no measurable concerns to the VEC heritage resources. However, there is the potential for unknown heritage resources to be unearthed during construction activities.

There were two areas that were not fully investigated, the south shore of the O'Hanley River and the section of the Final Preferred Route that follows within 50 m of Pine Creek.

Key mitigation measures will involve education and awareness of project and construction workers as to the nature of heritage resources and management of any heritage resources that may be encountered. A Heritage Resources Protection Plan (HRPP) is recommended to provide infield guidance to construction crews. In the event that previously unknown heritage resources are unearthed or exposed during construction, terms within the Manitoba *Heritage Resources Act* (1986) will prevail. In addition, the Policy Concerning the Reporting, Exhumation and Reburial of Found Human Remains (1987) will be followed should human remains be discovered. The project archaeologist will be contacted and provide instruction. Further, the project archaeologist will arrive on-site to confirm the find and will conduct salvage collection with site documentation. If burials or human remains are encountered all construction in the vicinity must halt and the project archaeologist must be contacted immediately *The Act* and Policy Concerning the Reporting, Exhumation and Reburial of Human Remains will then take precedence.

7.3.2.3 Summary of Residual Effects

No heritage resource sites were identified during field investigation. Therefore the potential for unknown archaeological sites being discovered during clearing and construction remains low.

While there is low potential based on the investigation, there may be unknown heritage resource sites brought to light during clearing and construction. Since these activities will cause disturbance to the ground surface, on-site construction crews should be made aware of the potential for disturbance to newly found *in situ* heritage resources.

At this time no residual effects are expected to known heritage resources since there were no archaeological sites identified during the HRIA that fall within the Final Preferred Route. However, there is potential for the discovery of unknown heritage resources to be impacted through construction and increased human traffic along the new transmission ROW. Table 7-14 summarizes residual effects of the Project on heritage resources. Damage to unknown heritage sites and loss of heritage resources were considered to be reversible and infrequent.

Table 7-14: Summary of Significance of Residual Effects of the Project on Heritage Resources

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Changes to the physical environment	Construction	Damage to unknown heritage site	**Direction:** negative **Magnitude:** moderate to large **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency:** iInfrequent	Not Significant
Loss of traditional lands	Construction and operation	Damage to unknown heritage sites	**Direction:** negative **Magnitude:** moderate to large **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency:** infrequent	Not Significant
Disturbance of 1950s plane crash	Construction and operation	None	**Direction:** neutral **Magnitude:** negligible **Geographic Extent:** regional **Duration:** short-term **Reversibility:** reversible **Frequency:** infrequent	Not Significant
Disturbance of unmarked burial sites	Construction	None	**Direction:** negative **Magnitude:** moderate **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency:** infrequent	Not Significant
Disturbance of historic trail	Construction	Relocation of historic trail	**Direction:** neutral **Magnitude:** negligible **Geographic Extent:** local **Duration:** short-term **Reversibility:** reversible **Frequency:** infrequent	Not Significant

Table 7-14: Summary of Significance of Residual Effects of the Project on Heritage Resources

Potential Effect	Project Phase	Residual Effect	Significance Criteria	Overall Significance
Disturbance of unknown Heritage Resources at major river crossings	Construction	Loss of Heritage Resources	**Direction:** negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** short-term **Reversibility:** reversible **Frequency:** infrequent	Not Significant
Increased Human Traffic disturbing unknown Heritage Resources.	Construction and operation	Loss of Heritage Resources	**Direction:** negative **Magnitude:** small **Geographic Extent:** project footprint **Duration:** short-term **Reversibility**: reversible **Frequency:** sporadic	Not Significant

7.3.2.4 Follow-up and Monitoring Activities

The area along Pine Creek is considered to have heritage potential. Since access was not possible, monitoring of this area by a professional archaeologist during construction activities (tower placement) will be undertaken to identify any possible heritage materials if discovered. The south side of O'Hanly River was not accessed for field assessment. Monitoring of the area during the construction period (tower placement) at the river crossing by a professional archaeologist will be undertaken to monitor the presence of any buried Cultural Heritage Resources.

7.3.3 Cultural Resources

7.3.3.1 Overview

Potential effects from construction of the PQ95 Transmission Line and Manigotagan Corner Station Site on cultural resources include the following:

- disturbance of Culturally Sensitive Sites, such as an area of concern identified through ATK workshops, and a dog sled track.

7.3.3.2 Effects Assessment and Mitigation

A review of the results of the ATK study was applied to the Final Preferred Route to determine Culturally Sensitive Sites that could be affected by the Project. This process involved selecting all culture resource points, lines or polygons that fell within a 100 m corridor centered on the Preferred Route for each community that participated in ATK workshops (Hollow Water First Nation, Black River First Nation, Manigotagan and Seymourville). Information from the Medicinal Plant Harvesting key person interview (KPI) was also considered in the effects assessment.

Only one Culturally Sensitive Site fell within 100 metres of the Final Preferred Route. The site is located at the proposed Manigotagan Corner Station Site. This region is a winter track that is maintained and utilized for traditional dog sled races. A portion of this race track would run directly through the proposed Manigotagan Corner Station Site.

The proposed mitigation for the Traditional Dog Sled Track involves avoidance. This would require a repositioning of the Manigotagan Corner Station Site to accommodate the portion of track that would be affected by the proposed placement of the station.

The second more feasible mitigation measure would be to work with the communities that utilize the track to identify the exact portion of track that would be affected and assist in creating a diverted course around the proposed Manigotagan Corner Station Site.

During the construction phase of the Project, mitigative measures will be implemented to ensure that these sites are not disturbed by construction activities as well as ensuring that full access to these sites is not disrupted.

Relocation of the Traditional Dog Sled Track will allow the continued use of this area for this important cultural practice. Therefore the residual effects of the project on cultural resources should be negligible.

7.3.3.3 Summary of Residual Effects

No residual effects of the Project on cultural resources are expected.

7.3.3.4 Follow up Activities and Monitoring

Manitoba Hydro will work with the affected communities to relocate the affected portion of the dog sled track.

7.4 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

7.4.1 Background

The environmental setting that contains the Project will impact its design and construction. While most of this EA report focuses on potential effects of the Project on the biophysical and socio-economic components of the environment, this section describes potential effects to the Project resulting from environmental conditions or events.

The identified environmental condition that could affect the Project is long term changes in climate. Predictions of changes in climate parameters are complicated and prone to uncertainty due to many factors, including:

- the inherent variation of these parameters over space and time; and
- the complicated processes involved, as well as uncertainties about greenhouse gas emissions in the future.

7.4.2 Potential Effects

Despite the complex nature of developing future climate predictions, climate models have been able to agree on predictions of some general trends. Some of the relevant predictions are:

- Manitoba will experience higher mean temperatures by the middle of the 21st century; with the most dramatic increases predicted to occur in the winter;
- increased springtime temperatures and precipitation across the prairies; and
- increased summertime temperatures combined with decreases in precipitation.

These changing conditions are also predicted to contribute to increases in the frequency and intensity of thunderstorms, hailstorms and tornadoes (IISD 2001).

Increased spring precipitation and decreased summer precipitation, coupled with increased summer temperatures, could lead to increases in both flood and drought conditions. Due to the nature of the Project, as well as the history of floods experienced by Manitoba in recent times, flooding would be the main effect which could impact the Project. Mitigation can be achieved in the design phase of the Project through elements such as flood control infrastructure. Any flood control measures would have to be maintained and monitored over the Project life to ensure successful operation. As the effects discussed are long term in nature, adaptive management of mitigation measures should be used as new information becomes available over the Project life.

7.5 ACCIDENTS AND MALFUNCTIONS

7.5.1 Effects Assessment

This section reviews the potential for accidents or malfunctions that could affect primarily the biophysical environment. Accidents are discussed mainly in the context of hazardous materials and malfunctions in the context of fire response and emergency preparedness.

Manitoba Hydro designs its transmission lines to meet or exceed the current Canadian Standards Association standard for overhead transmission systems (Canadian Standards Association 2010). Structures, insulators and hardware are selected to minimize the risk of failure. Regular patrols of the transmission lines are undertaken to ensure potential problems are identified and rectified in advance of a failure or malfunction.

Hazardous materials are handled and generated in the course of construction and operational activities. Examples of some common types of hazardous materials to be handled or generated during the construction and operations of the Project include fuel, oil, lubricants, gasoline, solvents, herbicides, and pesticides. As with any project involving construction and operations, there is a risk of contingency events such as spills or fires. Accidental releases of hazardous materials may occur as a result of human induced error (e.g., during re-fuelling of equipment) or failure of station components. With respect to the Project, there are a number of components and stages where this risk exists and, depending on the nature and magnitude of the contingency event, there is a resulting potential for an effect on the biophysical environment including soil, groundwater, surface water, and the aquatic environment if materials such as fuel, lubricants, solvents or herbicides enter a water course. Other contingency events could include accidental fires which may affect air quality or result in wildlife and habitat loss. If any of these contingency events occurs, it may create a risk to public health and safety or may potentially affect wildlife, fish and terrestrial and aquatic habitat.

Project activities have the potential to result in accidental releases of hazardous materials. These accidents could occur during all Project phases and include, but are not limited to, the use of heavy equipment during construction, construction decommissioning and operations, the filling of station equipment with insulating oil during station commissioning and operations, and the storage, transportation and handling of hazardous materials. Releases of hazardous materials can be measured through analytical analysis of relevant parameters (e.g., Benzene, Toluene, Ethylbenzene, Xylenes [BTEX], Mineral Oil and Grease [MOG], and Herbicides). Relevant criteria within the Canadian Council of Ministers of the Environment (CCME) Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME 1999) would form the threshold levels for restoration of environments from any spills or leaks.

Spills in and adjacent to wetlands, waterbodies and water courses are of the greatest concern to fish and wildlife. Hydrocarbon spills in this type of habitat are difficult to clean-up and if not contained quickly, could contaminate the aquatic environment damaging aquatic life and habitat. Mitigation for the potential effects of accidental spills includes effective spill response management that will be outlined in the Construction and Phase Environmental Protection Plans.

During construction and operation of transmission lines and stations, spills of hazardous materials could occur during refuelling of equipment, or due to failure of station components. Soil contamination affecting soil productivity or entry into a watercourse could potentially occur as a result of a spill or leak of a hazardous substance. Spills into watercourses, or contaminants which enter groundwater, may create a risk to public health and safety or may potentially impact wildlife populations and habitat. The magnitude and duration of the potential effects of accidental spills are dependent upon the nature of the material spilled, the quantity spilled, the location of the spill, and the time of year the incident occurs.

Construction during the winter, under frozen ground conditions, will facilitate the containment and recovery of any spilled material and reduce the potential effects on soils, watercourses and groundwater. Standard environmental protection practices commit Manitoba Hydro to store fuel, lubricants, and other potentially hazardous materials within dedicated storage areas at work camps and marshalling yards. Dedicated areas would provide spill containment, bermed storage areas where necessary, and spill response equipment, and would be located away from any sensitive features. Any products transferred from storage sites to work areas would not exceed the daily requirement. Manitoba Hydro also requires its contractors to have an emergency-response plan in place that is consistent with Manitoba Hydro's spill response procedure.

The proposed station site will house a variety of electrical equipment, some of which (e.g., power transformers) will contain insulating oil, dielectric fluid or glycol. Much of the equipment is status and/or hermetically sealed, and essentially maintenance free. The probability of a leak or spill is extremely low. However, in some cases, there is a possibility of accidental spills during periodic fluid replacement (e.g., during transformer maintenance).

Chemicals present at the stations will be limited to those brought to the sites for the operation and maintenance of the facilities. There will be no permanent storage of chemicals or gasoline and no use of materials containing polychlorinated biphenyls (PCBs) at the proposed station sites. Additional information on the potential effects of accidental spills and leaks of substances harmful to the aquatic environment is outlined further in Section 7.2.2, and to the terrestrial environment in Section 7.2.1 and 7.2.4. There is also a risk of contamination of aquatic and terrestrial environments through the improper application of herbicides.

7.5.2 Mitigation

Potential effects and contingencies will be avoided or mitigated by application of design standards and established environmental construction and operations protocols. Current fire protection, oil containment and materials handling/spill response standards will be applied through the design, construction and operations phases:

- Manitoba Hydro has developed practices and protocols, documented in the Spill Response Handbook (1995), to ensure that, if a spill occurs at a station site, it is contained and remediated. Manitoba Hydro further undertakes to have personnel trained in emergency spill response techniques available to respond in the event of an oil spill. Manitoba Hydro will also adhere to its Hazardous Waste Management Handbook (1994), pertaining to the

transport and disposal of all hazardous products. Staff and contractors will also comply with all laws, bylaws and regulations respecting the transportation and handling of hazardous waste established by federal, provincial and municipal or local authorities.

- The storage, handling and disposal of chemicals will be carried out in accordance with Manitoba Hydro guidelines, and relevant federal and provincial statutes and regulations. Manitoba Hydro has developed a Chemical Control Program that provides its workers with the information necessary for the safe use and disposal of chemicals. Manitoba Hydro also complies with the federal Workplace Hazardous Materials Information System regulations and the provincial Workplace Health Hazard Regulations. An inventory of materials covered by Workplace Hazardous Materials Information System will be maintained on-site and Workplace Hazardous Materials Information System documentation will be displayed and available as required.

- The station sites will be designed and operated in accordance with Manitoba Hydro's Fire Manual, prepared by Manitoba Hydro's Fire Prevention Engineer. The manual provides corporate guidelines, rules and standards for fire prevention and protection.

Adherence to Manitoba Hydro's environmental protection practices and any additional specific mitigation measures identified as a condition of licence approval, or in development of the EnvPP, will further minimize the potential impact of accidents or malfunctions on soil, plants, wildlife or aquatic resources. Any potential adverse effects would likely be short term and reversible.

The approach to these potential accidents with hazardous materials involves good planning and prevention with the use of protocols, plans and mitigation measures. These are outlined in the EnvPP in sections on hazardous material and petroleum products use, handling and storage, appropriate emergency preparedness and response. All spills and leaks will be reported to regulatory authorities in accordance with provincial requirements including regulations under the *Dangerous Goods Handling and Transportation Act*.

Some of the general mitigation measures to prevent and respond to accidental spills/releases of hazardous materials include:

- Construction crews will be adequately trained in spill prevention and cleanup procedures.

- Fuel, lubricants and other potentially hazardous materials will be stored and handled within dedicated areas at work sites and marshaling yards in full compliance with regulatory requirements.

- Harmful substances, such as fuels, chemicals and herbicides will be stored greater than 100 m from the ordinary high water mark of any waterbody.

- All storage sites will be located a minimum distance of 100 m from waterbodies.

- Marshaling yards will be located on low permeability soils and upland sites, where possible (i.e., areas of well drained soils, as identified soils maps and locally by Manitoba Hydro's Construction Supervisor or Site Manager).

- Transfer of fuel must be attended at all times.

- An Emergency Preparedness and Spill Response Plan will be developed and an emergency response spill kit will be kept on-site at all times in case of fluid leaks or spills from machinery.

- Only clean construction materials and equipment will be used.

- Vehicles, machinery and construction materials will arrive on-site clean and free of leaks.

- Equipment refueling and maintenance will be conducted greater than 100 m from the stream's ordinary high water mark and away from wetlands.

- When servicing equipment, waste products such as oil and antifreeze will be drained into appropriate containers and removed to an approved disposal ground.

- Machinery will remain above the high water mark, unless fording is required to transport equipment across the watercourse and only in accordance with the Department of Fisheries and Oceans Operational Statements.

- Temporary crossings will be constructed to ensure that construction vehicles and machinery remain out of watercourses and will be done in accordance with the Department of Fisheries and Oceans Operational Statements.

- All fuel spills or leaks will be reported to the Manitoba Hydro Construction Supervisor or Site Manager or delegate immediately upon discovery.

- Any spills of hazardous substances will be cleaned up immediately and reported to the local Natural Resources Officer.

- General clean-up in storage areas, and sites where incidental spillage occurs, will be in accordance with regulatory standards.

- All soil is to be remediated or disposed of in a manner approved by regulatory authorities and Manitoba Hydro.

- Hazardous materials, fuel containers and other materials will be removed from the site and disposed of according to Manitoba Hydro's Hazardous Materials Management Handbook and in accordance with regulatory requirements.

- The Canadian Wildlife Service will be informed of all incidents where the spill of toxic pollutants will harm or potentially harm wildlife species and/or species at risk. In accordance

with the National Policy on Oiled Birds and Oiled Species at Risk (Environment Canada 2011).

The operation of oil containing electrical equipment, the burning of trees and brush for disposal, and other potential sources of ignition creates a risk for accidental fires to start. Strict adherence to proper protocols to minimize the risk of accidental fires makes its occurrence highly unlikely. Mitigation for the potential effects of accidental fires, as outlined in the EnvPP, includes effective fire response management as part of emergency preparedness and response plans to be developed for the Project. There is substantial design mitigation to be prepared for potential station fires and to collect and separate oil contaminated water from such an event. The stations are also designed with oil containment and drainage systems that will collect any oil and water from leaks, spills or fires and treat and separate the oil in oil/water separators prior to release to the environment. In the event of a station or other construction site fire, follow-up monitoring would be required.

Worker safety is highly regulated under provincial legislation and all activities during construction and operations of the Project components will be undertaken in compliance with current Workplace, Safety and Health requirements, to prevent accidents and injury. Manitoba Hydro is committed to safe workplaces and injury prevention through its corporate goals.

7.6 CUMULATIVE EFFECTS

7.6.1 Introduction

Cumulative effects are defined as changes to the environment resulting from human action in combination with other past, present and future human actions. The cumulative effects assessment (CEA) for the Project was developed based on guidance provided under the *Canadian Environmental Assessment Act* and the Cumulative Effects Assessment Practitioners Guide (Hegmann et al. 1999). Additional guidance is also provided by the Cumulative Effects Working Group (CEWG), which was established to give direction on conducting cumulative effects assessments in Canada. The CEWG states that:

"… an assessment of a single project (which is what almost all assessments do) must determine if that project is incrementally responsible for adversely affecting a VEC beyond an acceptable point (by whatever definition). Therefore, although the total cumulative effect on a VEC due to many actions (defined as projects and activities) must be identified, the CEA must also make clear to what degree the project under review is alone contributing to that total effect. Regulatory reviewers may consider both of these contributions in their deliberation on the project application (Hegmann et al. 1999)."

7.6.1.1 Cumulative Effects Assessment Scoping

The spatial boundary for the Project's CEA is the Project Study Area. Cumulative effects of the Project are assessed for adverse significant residual effects that have the potential to interact with the effects of other past, current, or future projects and human activities. Neutral or positive residual effects are not included in the cumulative effects assessment. Finally, the cumulative effects assessment only includes significant adverse residual effects that overlap both spatially and temporally with the effects of other projects and human activities.

Project and human activities within the Project Study Area, or nearby and with the potential to interact with Project activities were selected for inclusion in the cumulative effects assessment based on the following criteria:

- **Past Projects:** projects whose ongoing effects could be reasonably expected to change in the future and, potentially interact with this Project's adverse residual effects.
- **Current Projects**: projects in construction, development or operation;
- **Future Projects**: projects approved for construction/development or are in the permitting process; and
- **Prospective Projects**: projects announced but not yet moving along a development or permitting pathway, and any projected changes in land use patterns (e.g., changes in agricultural activity).

7.6.1.2 Projects and Activities

Table 7-15 summarizes the nature, location and timing of the projects that were considered in the cumulative effects assessment. These include:

- **Mining Projects:** expansion of San Gold Mine, mineral exploration and quarry development;
- **Forestry Activities:** future timber resource harvesting in FML01;
- **Wildlife:** ongoing closure of moose hunting in GHA 26;
- **Transportation and Communication Infrastructure:** ongoing construction of the East Side Road, and potential fibre optic cable in the area; and
- **Cottage Development:** ongoing cottage development by Black River First Nation, and potential cottage development by Hollow Water and Sagkeeng First Nations.

Table 7-15: Summary of Projects and Activities with the Potential to Interact with the Project considered in the Cumulative Effects Assessment

Sector	Project	Description	Location	Status	Timelines
Mining	San Gold Mine Expansion	Planned expansion of San Gold's Gold Mine and tailings pond in Bissett, northeast of Project Study Area; production is expected to double.	Northeast of Project Study Area	Ongoing	
	Mineral Exploration	The north end of the Project Study Area overlaps with many mining claims and exploration activities (e.g. drill holes); mining claims are held by Golden Pocket Resources, DLW Gold Ventures Inc., Canada Bay Resources Ltd., and San Gold Corp.	North of Project Study Area	Ongoing/ Planned	
	Quarry Development	There are 83 quarry leases within the Project Study Area, several in close proximity to the Project; lease holders include private companies, as well as Manitoba Infrastructure and Transportation (MIT), and the East Side Road Authority; development and expansion of existing and new quarries is likely, particularly for projects such as the East Side Road.	Within the Project Study Area	Ongoing/ Planned	
Forestry	Timber Resource Harvesting	A Request for Proposal (RFP) for timber resource harvesting in FML01 by Manitoba Conservation and Water Stewardship (MCWS). A potential respondent to the RFP would be a community and forest industry joint venture being spearheaded by the Manitoba Model Forest (Winnipeg River Integrated Wood and Biomass Project); this would result in an estimated 400 – 450 direct jobs, up to 400,000 m^3 softwood/year and 200,000 m^3 hardwood/year.	Within the Project Study Area	Planned	Within 1 – 3 years
Wildlife	Closure of Licensed and Rights Based Moose Hunting	As of January 26, 2012, all licensed hunting in Game Hunting Area (GHA) 26 is closed; in addition, moose protection zones in areas of heavy moose concentration areas along roads and rivers are closed to hunting for rights-based peoples; Proposed decommissioning of roads by MCWS.	GHA 26 within the Project Study Area	Ongoing/ Planned	2012 - On
Transportation & Communication	East Side Road Authority	Construction of a 156 km all season gravel road along the east side of Lake Winnipeg from Provincial Road #304 east of Hollow Water to Berens River First Nation.	North of Project Study Area	Ongoing	2010 - 2014

Table 7-15: Summary of Projects and Activities with the Potential to Interact with the Project considered in the Cumulative Effects Assessment

Sectior	Project	Description	Location	Status	Timelines
Infrastructure	Fibre Optic Cable	The San Gold Mine in Bissett, and several community members have expressed an interest in fibre optic cable service in the area.	Within and northeast of Project Study Area	Potential	Unknown
Sector	**Project**	**Description**	**Location**	**Status**	**Timelines**
Cottage Development	Black River First Nation Cottage Development Initiative	Expansion of cottage development within the Black River FN territory in conjunction with MCWS; phase I of the project is underway with road development for servicing of 50 cottage lots; future phases are planned for an additional 550 additional cottage lots.	Black River First Nation Reserve at the west of the Project Study Area	Ongoing/ Planned	Phase I: underway (year 1 of 5) Phase II:– 5 – 10 years
	Hollow Water First Nation Cottage Development Plans	Considering cottage development projects with MCWS.	Hollow Water First Nation Reserve at the north end of the Project Study Area	Potential	Unknown
	Sagkeeng First Nation Cottage Development Plans	Considering cottage development projects with MCWS.	Sagkeeng First Nation Reserve at the southwest end of the Project Study Area	Potential	Unknown

7.6.1.3 Assessment of Cumulative Effects

The effects of past projects and activities have shaped the existing environment. Accordingly, the interactions between these past and current projects and the LWESI Transmission Project are addressed in the description of the existing environment (Chapter 4) and the discussion of residual Project effects (Sections 7.2 and 7.3).

The potential interaction of residual adverse effects of the LWESI Transmission Project with future projects in the LWESI Transmission Project Study Area is evaluated in this assessment. This cumulative effects assessment emphasizes the use of the same environmental indicators and measurable parameters as the LWESITransmission Project environmental effects assessment. The assessment of cumulative effects requires that adverse residual effects resulting from the LWESITransmission Project are evaluated for interactions with reasonably foreseeable future projects and human activities.

Valued Environmental Components (VECs) identified in Chapter 3 are evaluated for potential interactions with future projects in determining if there is:

- A residual adverse effect of the Project on that VEC, as identified in Sections 7.2 and 7.3 (VECs with no residual effect, a positive or neutral residual effect are not included in the cumulative effects assessment).

- A spatial and temporal overlap of the residual effects of the Project on that VEC with the effects of the other projects and human activities.

Table 7-16 summarizes the residual effects of the LWESI Transmission Project on each VEC, and identifies which VECs are evaluated for potential interactions with future projects. The evaluation of potential cumulative effects on these VECs with future projects is described in the following sections.

Table 7-16: Application of Cumulative Effects Assessment with Future Projects to VECs

VEC	Notes Regarding Predicted (or anticipated) Lake Winnipeg East System Improvement Project Residual Effects	Overlap with Future Projects	Included in CEA for Future Projects or Activities
Fish Habitat	Residual adverse effects during construction and operation related to increased levels of suspended sediments in streams, loss of riparian vegetation	• Timber Resource Harvesting	Yes
Bog club moss	Residual adverse effects during construction and operation related to loss of potential habitat	• Timber Resource Harvesting • Cottage Development	Yes
Hooker`s orchid	Residual adverse effects during construction and operation related to loss of potential habitat	• Timber Resource Harvesting • Cottage Development	Yes

Table 7-16: Application of Cumulative Effects Assessment with Future Projects to VECs

VEC	Notes Regarding Predicted (or anticipated) Lake Winnipeg East System Improvement Project Residual Effects	Overlap with Future Projects	Included in CEA for Future Projects or Activities
Rattlesnake checkered plantain	Residual adverse effects during construction and operation related to loss of potential	• Timber Resource Harvesting • Cottage Development	Yes
Green ash/American elm forest	Residual adverse effects during construction and operation related to loss of Ash Forest during clearing	• Timber Resource Harvesting • Cottage Development	Yes
Moose	Residual adverse effects during construction and operation related to habitat loss and sensory disturbance.	• Mineral exploration • Timber Resource Harvesting • Quarry Development • San Gold Mine Expansion • Cottage Developments	Yes
American martin	Residual adverse effects during construction and operation related to habitat loss and sensory disturbance.	• Mineral exploration • Timber Resource Harvesting • Quarry Development	Yes
Canada warbler	Residual adverse effects during construction and operation related to habitat loss and sensory disturbance.	• Mineral exploration • Quarry Development • Mine expansion	Yes
Olive-sided flycatcher	Residual adverse effects during construction and operation related to habitat loss and sensory disturbance.	• Mineral exploration • San Gold Mine expansion • Timber Resource Harvesting • Quarry Development • East Side Road Authority • Cottage Developments	Yes
Bald eagle	Residual adverse effects during construction and operation related to habitat loss and sensory disturbance.	• Mineral exploration • Timber Resource Harvesting • Quarry Development • East Side Road Authority • Cottage Developments	Yes

Table 7-16: Application of Cumulative Effects Assessment with Future Projects to VECs			
VEC	**Notes Regarding Predicted (or anticipated) Lake Winnipeg East System Improvement Project Residual Effects**	**Overlap with Future Projects**	**Included in CEA for Future Projects or Activities**
Spruce grouse	Residual adverse effects during construction and operation related to habitat loss and sensory disturbance.	• Mineral exploration • Timber Resource Harvesting • Quarry Development • San Gold Mine expansion • Mineral exploration • East Side Road • Fibre Optic Cable • Cottage Developments	Yes
Population, Infrastructure, and Services	Residual adverse effects during construction and operation on traffic and community services.	• San Gold Mine Expansion • Timber Resource Harvesting • East Side Road Authority • Cottage Development	Yes
Employment and Economy	Positive residual effects related to employment and business opportunities	• San Gold Mine Expansion • Timber Resource Harvesting • East Side Road Authority • Cottage Development	No. Residual effects are positive.
Personal Well Being	Residual adverse effects to health and safety, public safety, and aesthetics during construction and operation.	No temporal or spatial overlap.	No
Heritage resources	Residual adverse effects during construction and operation related to disturbance of unknown heritage sites.	No spatial overlap	No.
Cultural Resources	Residual adverse effects during construction and operation related to interference with cultural resources.	No spatial overlap.	No.
Land Ownership and Tenure	Residual adverse effects to property values and future development	No temporal or spatial overlap.	No.
Commercial and domestically harvested plants	Residual adverse effects to plant / berry harvesting.	No temporal or spatial overlap.	No.
Resource Use	Residual adverse effects during construction and operation on hunting and trapping success.	No temporal or spatial overlap.	No.

Table 7-16: Application of Cumulative Effects Assessment with Future Projects to VECs			
VEC	**Notes Regarding Predicted (or anticipated) Lake Winnipeg East System Improvement Project Residual Effects**	**Overlap with Future Projects**	**Included in CEA for Future Projects or Activities**
Recreation and Tourism	Residual adverse effects during construction and operation on recreation and tourism due to nuisance effects.	• Mineral Exploration • Quarry Development • Timber Resource Harvesting • East Side Road Authority • Cottage Development	Yes.
Productive forest land	Residual adverse effects during construction and operation on annual allowable cut	• San Gold Mine Expansion • Quarry Development • East Side Road Authority • Cottage Developments	Yes.
High value forest sites	Residual adverse effects during construction and operation related to loss of high value forest sites	• San Gold Mine Expansion • Quarry Development • East Side Road Authority • Cottage Developments	Yes.

7.6.2 Residual Cumulative Effects

This section provides potential interactions of adverse residual Project effects with other reasonably foreseeable future projects. Table 7-17 provides the results of the consideration of the cumulative effects assessment with future projects.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Fish Habitat	**Residual Adverse Effects:** • Increased sedimentation and loss of riparian habitat. **Mitigation Overview:** • Site selection process. • Construct lines over watercourses and wetlands under frozen conditions. • Structures will be above high water mark. • Transmission line approaches and crossings will be perpendicular to watercourses. • Disturbed areas will be stabilized. Other mitigation described in Appendix 1.	• The effect of the LWESI Transmission Project on aquatic habitat is small in magnitude and local in geographic extent. • No change to conclusion that residual adverse effects are not significant.
Bog Club Moss	**Residual Adverse Effects:** • Potential loss of plants and habitat. **Mitigation Overview:** • Site selection process, e.g., site access trails to avoid Hookers Orchid. • Winter construction. • Monitoring to locate rare species and invasive plants and follow-up where required, e.g., containment/control programs for invasive plants. • Other mitigation described in Appendix 1.	• The effect of the LWESI Transmission Project in combination with other project is expected to be small to medium in magnitude and geographic extent, long-term. • No change to conclusion that residual adverse effects are not significant.
Hooker's Orchid	**Residual Adverse Effects:** • Potential loss of plants and habitat. **Mitigation Overview:** • Site selection process, e.g., site access trails to avoid Hookers Orchid. • Winter construction. • Monitoring to locate rare species and invasive plants and follow-up where required, e.g., containment/control programs for invasive plants. • Other mitigation described in Appendix 1.	• The effect of the LWESI Transmission Project in combination with other projects is expected to be regionally acceptable. • No change to conclusion that residual adverse effects are not significant.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Rattlesnake Checkered Plantain	**Residual Adverse Effects:** • Potential loss of plants and habitat. **Mitigation Overview:** • Site selection process, e.g., site access trails to avoid Rattlesnake Checkered Plantain. • Winter construction. • Monitoring to locate rare species and invasive plants and follow-up where required, e.g., containment/control programs for invasive plants. • Other mitigation described in Appendix 1.	• The effect of the LWESI Transmission Project in combination with other projects is expected to be regionally acceptable. • No change to conclusion that residual adverse effects are not significant. •
Green Ash/American Elm forest	**Residual Adverse Effects:** • Potential loss of plants and habitat. **Mitigation Overview:** • Site selection process, e.g., site access trails to avoid Green ash/American Elm forest. • Monitoring to locate rare species and invasive plants and follow-up where required, e.g., containment/control programs for invasive plants. • Other mitigation described in Appendix 1.	• The effect of the LWESI Transmission Project in combination with other projects is expected to be regionally acceptable. • No change to conclusion that residual adverse effects are not significant. •

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Moose	**Residual Adverse Effects:** Effects during construction and operation: • Decreased moose population in Project Study Area for two or more generations due to reduced habitat. • Altered movements in the Study Area due to sensory disturbance. • Decreased moose population in Project Study Area for two or more generations due to increased mortality. **Mitigation Overview:** • Site selection process. • Access Management Plan. • Vegetation buffers on transmission lines. • Prohibition of hunting in camps and worksites during construction. • Decommission right-of-way access trails where not required for operations. • Other mitigation described in Appendix 1.	• The long-term adverse effect of the LWESI Transmission Project in combination with other projects is expected to be small in magnitude and geographic extent. • No change to conclusion that residual adverse effects are not significant.
American Martin	**Residual Adverse Effects:** Effects during construction and operation: • Decreased American Martin population in Project Study Area for two or more generations due to reduced habitat. • Altered movements in the Study Area due to sensory disturbance. • Decreased American Martin population in Project Study Area for two or more generations due to increased mortality. **Mitigation Overview:** • Site selection process. • Access Management Plan. • Decommission right-of-way access trails where not required for operations. • Other mitigation described in Appendix 1.	• The long-term adverse effect of the LWESI Transmission Project in combination with other projects is expected to be small in magnitude and geographic extent. • No change to conclusion that residual adverse effects are not significant.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Bald Eagle	**Residual Adverse Effects:** • Localized change in Bald Eagle distribution and decreased population in Project Study Area related to alteration and loss of habitat during construction and operation. • Avoidance and/or reduced use of areas by Bald Eagle near Project Footprint due to noise effects during construction. • Reduced Bald Eagle population in Study Area due to potential collisions with vehicles and transmission-related infrastructure, e.g., towers and conductors. • Enhancement of foraging for forest-dwelling raptors – potentially altering local distribution. **Mitigation Overview:** • Clearing and vegetation management (operation) on the ROW, to occur outside the April 1 to July 31 breeding season. • Selectively use bird diverters on transmission conductors. • Other mitigation described in Appendix 1.	• The long-term adverse effect of the LWESI Transmission Project in combination with other projects is expected to be small in magnitude and geographic extent. • No change to conclusion that residual adverse effects are not significant.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Canada warbler	**Residual Adverse Effects:** • Localized change in Canada warbler distribution and population in Project Study Area related to alteration and loss of habitat during construction and operation. • Avoidance and/or reduced use of areas near Project Footprint due to Noise effects during construction. • Reduced Canada warbler population in Study Area due to potential collisions with vehicles and transmission-related infrastructure, e.g., towers and conductors. • Change in nesting locations and potential local increase in breeding associated with enhancement of foraging and nesting opportunities, e.g., creating new clearings. **Mitigation Overview:** • Clearing and vegetation management (operation) on the ROW, to occur outside the April 1 to July 31 breeding season. - Pre-clearing nesting surveys required between April 1 and August 31. - 200 m avoidance buffer around nests. • Selectively use bird diverters on transmission conductors. • Other mitigation described in Appendix 1.	• The long-term effect of the LWESI Transmission Project in combination with other projects is expected to be small in magnitude and geographic extent. • Overall net effect is adverse, but some associated positive effects • No change to conclusion that residual adverse effects are not significant.
Olive-sided flycatcher	**Residual Adverse Effects:** • Localized change in olive-sided flycatcher distribution and decreased population in Project Study Area related to alteration and loss of habitat during construction and operation. • Avoidance and/or reduced use of areas by olive-sided flycatchers near Project Footprint due to noise effects during construction. • Reduced olive-sided flycatcher population in Study Area due to potential collisions with vehicles and transmission-related infrastructure, e.g., towers and conductors.	• The long-term adverse effect of the LWESI Transmission Project in combination with other projects is expected to be small in magnitude and geographic extent. • No change to conclusion that residual adverse effects are not significant.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
	Mitigation Overview: • Clearing and vegetation management (operation) on the ROW, to occur outside the April 1 to July 31 breeding season. - Pre-clearing nesting surveys required between April 1 and August 31 - 300 m avoidance buffer around nests • Selectively use bird diverters on transmission conductors. • Other mitigation described in Appendix 1.	
Spruce Grouse	**Residual Adverse Effects:** • Very small localized change in Spruce Grouse distribution and decreased population in Project Study Area related to alteration and loss of habitat during construction and operation. • Minor avoidance and/or reduced use of areas by Spruce Grouse near Project Footprint due to noise effects during construction. • Reduced Spruce Grouse population in Study Area due to potential collisions with vehicles and transmission-related infrastructure, e.g., towers and conductors. **Mitigation Overview:** • Clearing and vegetation management (operation) on the ROW, to occur outside the April 1 to July 31 breeding season.. • Selectively use bird diverters on transmission conductors. • Other mitigation described in Appendix 1.	• The long-term adverse effect of the LWESI Transmission Project in combination with other projects is expected to be small in magnitude and geographic extent. • No change to conclusion that residual adverse effects are not significant.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Moose	**Residual Adverse Effects:** Effects during construction and operation: • Decreased moose population in Project Study Area for two or more generations due to reduced habitat. • Altered movements in the Study Area due to sensory disturbance. • Decreased moose population in Project Study Area for two or more generations due to increased mortality. **Mitigation Overview:** • Site selection process. • Access Management Plan. • Vegetation buffers on transmission lines. • Prohibition of hunting in camps and worksites during construction. • Decommission right-of-way access trails where not required for operations. • Other mitigation described in Appendix 1.	• The long-term adverse effect of the LWESI Transmission Project in combination with other projects is expected to be small in magnitude and geographic extent. • No change to conclusion that residual adverse effects are not significant.
Land and Resource Use	**Residual Adverse Effects:** • Reduced habitat for plants and animals leads to potential reduction in hunting, trapping and gathering opportunities. • Rights-of-way create access for recreational hunters and other recreational resource users resulting in increased hunting pressure. • Loss of timber resources. **Mitigation Overview:** • Site selection process • Trapper compensation • Access Management Plan • Other mitigation described in Section 7.3.1.2	• The effect of the LWESI Transmission Project in combination with other project is expected to be small to medium in magnitude and geographic extent, long-term. • No change to conclusion that residual adverse effects are not significant.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Economy	**Residual Adverse Effects:** • Residual effects are positive. No residual adverse effects. **Mitigation Overview:** • Local hiring preference and Northern purchase policy. • Ongoing communication between Manitoba Hydro and Aboriginal and municipal leadership. • Other mitigation described in Section 7.3.1.2	• Residual effects of LWESI Transmission Project are positive. Therefore not considered as part of potential interactions with future projects.
Population, Infrastructure and Services	**Residual Adverse Effects:** • Increased traffic in the vicinity of Pine Falls and on PR 280 between Pine Falls and Manigotagan. • Increased demands on community health, emergency services and recreation and leisure services. **Mitigation Overview:** • Ongoing communication between Manitoba Hydro and Aboriginal and municipal leadership and infrastructure services. • Winter Construction • Adherence to health and safety legislation and policies. • Other mitigation described in Section 7.3.1.2	• The effect of the LWESI Transmission Project in combination with other project is expected to be small to moderate in magnitude and regional in geographic extent and short-term in duration. • No change to conclusion that residual adverse effects are not significant.
Employment and Economy	**Residual Adverse Effects:** • Residual effects are positive. No residual adverse effects. **Mitigation Overview:** • Local hiring preference and Transmission Line Agreement. • Ongoing communication between Manitoba Hydro and Aboriginal and municipal leadership. • Other mitigation described in Section 7.3.1.2	• Residual effects of LWESI Transmission Project are positive. Therefore not considered as part of potential interactions with future projects.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Personal Well Being	**Residual Adverse Effects:** • Workplace health and safety and risk of accidents or injuries to area residents or resource users. • Minor impairment of aesthetic values • Perceived risk of EMF to Human Health • Loss of cultural landscape and culturally important resource use opportunities. **Mitigation Overview:** • Site selection process. • Education about EMF • Compensation and communication with private landowners regarding tower placement • Other mitigation described in Section 7.3.1.2	• The effect of the LWESI Transmission Project in combination with other project is expected to be small in magnitude and project footprint or local in geographic extent. • No change to conclusion that residual adverse effects are not significant.
Heritage/Cultural Resources	**Residual Adverse Effects:** • Residual effects are neutral. No residual adverse effects. **Mitigation Overview:** • Heritage Resources Protection Plan. • Other mitigation described in Appendix 1.	• Residual effects of LWESI Transmission Project are neutral. Therefore not considered as part of potential interactions with future projects.
Land Ownership and Tenure	**Residual Adverse Effects:** • Minor effect on future development potential • Perceived effect of impairment to property values due to presence of transmission lines. **Mitigation Overview:** • Land owner compensation • Consultation with affected land owners • Other mitigation described in Appendix 1.	• The effect of the LWESI Transmission Project in combination with other project is expected to be negligible to small in magnitude and project footprint in geographic extent with a long-term duration. • No change to conclusion that residual adverse effects are not significant.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Commercial and Domestically harvested Plants	**Residual Adverse Effects:** • Potential increase in plant /berry harvesting by new users and, therefore, affecting availability for existing users. • Potential reduction in desired plant abundance and, therefore, affecting plant harvest success **Mitigation Overview:** • Site selection process • Access Management Plan • Winter Construction • Other mitigation described in Appendix 1.	• The effect of the LWESI Transmission Project in combination with other project is expected to be small in magnitude and local in geographic extent. • No change to conclusion that residual adverse effects are not significant.
Land and Resource Use	**Residual Adverse Effects:** • Minor increase in inconvenience from needing to relocate baits and stands • Minor reduction in harvester success rate by outfitter's clients and resident hunters • Rights-of-way create access for recreational hunters and other recreational resource users resulting in increased hunting pressure. **Mitigation Overview:** • Site selection process • Trapper compensation • Access Management Plan • Other mitigation described in Section 7.3.1.2	• The effect of the LWESI Transmission Project in combination with other project is expected to be small in magnitude and local in geographic extent. • No change to conclusion that residual adverse effects are not significant.
Recreation and Tourism	**Residual Adverse Effects:** • Minor nuisance effects on tourism activities during construction • Minor reduction in harvester success rate by outfitter's clients and resident hunters • Minor decrease in local mammal and bird population **Mitigation Overview:** • Site Selection • Access Management Plan • Winter Construction • Other mitigation described in Section 7.3.1.2	• The effect of the LWESI Transmission Project in combination with other project is expected to be small in magnitude and local in geographic extent, • No change to conclusion that residual adverse effects are not significant.

Table 7-17: Results of the Cumulative Effects Assessment with Future Projects

VEC	Summary of Residual Effects of the LWESI Transmission Project and Mitigation	Conclusions of CEA on Potential Interaction with Future Projects
Productive Forest Land	**Residual Adverse Effects:** • Reduction in AAC levels **Mitigation Overview:** • Limit Project footprint size, where possible • Locate Project footprint (e.g. access routes, borrow pits, storage sites, etc.) on non-productive forestlands, where possible • Rehabilitate productive forestlands after construction project and at decommissioning phase • Other mitigation described in Appendix 1.	• The effect of the LWESI Transmission Project in combination with other project is expected to be small in magnitude and regional in geographic extent, • No change to conclusion that residual adverse effects are not significant.
High Value Forest Sites	**Residual Adverse Effects:** • Loss in area of high value reforestation sites **Mitigation Overview:** • Limit clearing to defined Project footprint when intersecting high value reforestation sites • Avoid high value reforestation areas for access development, equipment staging and material storage • Complete Forest Damage Appraisal and Valuation and compensate MCWS • Other mitigation described in Appendix 1.	• The effect of the LWESI Transmission Project in combination with other project is expected to be small in magnitude and project footprint in geographic extent, • No change to conclusion that residual adverse effects are not significant.

7.7 SUSTAINABLE DEVELOPMENT

Sustainable development is an important component in the project lifecycle. Manitoba Hydro aims to implement sustainability practices during the planning, design, construction, operation and maintenance, and eventual decommissioning of the Project through the development of sustainable development corporate policies as well as following and meeting Manitoba's Principles and Guidelines of Sustainable Development, as scheduled under *The Sustainable Development Act* (SDA) .

As part of the sustainability analysis and ensuring the criteria of the SDA have been met, aspects of the Project have been compared to sustainability indicators (Section 7.7.2). The indicators have been selected based on similar projects and the final list will be finalized prior to the initiation of construction and incorporated into the follow-up program for the Project.

7.7.1 Sustainable Development

The general definition of sustainable development has been adopted from the Brundtland Commission Report entitled *Our Common Future*, as to "meet the needs of the present without compromising the ability of future generations to meet their own needs" by the Province of Manitoba (United Nations World Commission on Environment and Development 1987). Application of sustainable development is considered a general philosophy which includes the ethical approach to guide individual and collective behaviour with respect to the environment, the economy and social well-being. The SDA was established in 1998 creating framework through which sustainable development is to be implemented by the provincial public sector ad promoted in private industry and society. The SDA sets out principles and guidelines as the framework for implementing sustainable development within the Province. All of Manitoba's Crown Corporations are required to establish and adopt a corporate sustainable development policy to complement sustainable development.

Manitoba Hydro incorporates sustainability into all aspects of its operations to achieve environmentally sound and sustainable economic development. Manitoba Hydro has implemented a Plan-Do-Check Environmental Management System (EMS), registered to the ISO 14001 Environmental Management System standard, as their method to enable environmental compliance and protection. An additional key component of the EMS is Manitoba Hydro's Environmental Management Policy that guides all of the corporation's operations (Manitoba Hydro 2008).

Manitoba Hydro developed its corporate sustainability development policy in 1993 as compliment to the Provincial Framework. The policy contains 13 principals (Manitoba Hydro 1993) designed to meet the needs of the present without compromising the ability of future generations to meet their needs:

1. Stewardship;
2. Shared responsibility;

3. Integration of environmental and economic decisions;
4. Economic enhancement;
5. Efficient use of resources;
6. Prevention and remedy;
7. Conservation;
8. Waste minimization;
9. Access to adequate information;
10. Public participation;
11. Understanding and respect;
12. Scientific and technological innovation; and
13. Global responsibility.

In addition to provincial and corporate principals and policies, Manitoba Hydro is a member of the Canadian Electricity Association (CEA) Sustainable Electricity Program. This industry-specific program is focused on allowing the holistic management of sustainability by the Canadian electricity sector. As a condition of the program, Manitoba Hydro must report on sustainability indicators covering social, environmental and economic performance; CEA releases an annual report of industry performance relative to these sustainability indicators.

Manitoba Hydro has acknowledged that the construction of the Project has significant environmental activity. This acknowledgment has led Manitoba Hydro to elevate the following commitments above other corporate activities:

- Preventing or minimizing any adverse impacts, including pollution, on the environment and enhancing positive impacts by using previously existing impact footprints and twinning old transmission line infrastructure;
- Continually improving our EMS and policies;
- Meeting or surpassing regulatory requirements and other commitments;
- Considering the interests and utilizing knowledge of our customers, employees, communities, and stakeholders who may be affected by our actions;
- Reviewing our environmental standards, objectives and targets annually to ensure improvement in our environmental performance; and
- Ensuring transparent documentation and reporting our activities and environmental performance.

7.7.2 Project Sustainability Assessment

Manitoba Hydro and the Province of Manitoba's sustainable development principles and guidelines have been incorporated into the planning, design, construction, operation and maintenance, and eventual decommissioning of the Project, where applicable (Table 7-18). All of the core principals have been assessed and principals similar in nature have been amalgamated. The indicators will be finalized prior to commencing construction and will be incorporated into the Project Environmental Protection Program.

7.7.3 Conclusions

This sustainability assessment indicates that the Project is a good example of sustainable development. Appropriate design and implementation has avoided, minimized or compensated for environmental and social effects, as a result of a comprehensive environmental assessment process that included public, stakeholder and Aboriginal participation. In addition, plans will also be developed to minimize waste, protect the environment and rehabilitate construction sites (Hegmann et al. 1999).

Table 7-18: Project Sustainability Assessment

MB Sustainable Development Principal and guidelines	Comment	Indicator
Integration of environmental and economic decisions Economic decisions should adequately reflect environmental, human health and social effects. Environmental and health initiatives should adequately take into account economic, human health and social consequences.	The goal of Manitoba Hydro's site selection process for the Project was to balance environmental, economic and social considerations in selecting the preferred Project route. A total of 22 factors were used to evaluate select the preferred route in two general categories: biophysical and socio-economic. Once the preferred route was selected, environmental and economic considerations were further considered in the environmental assessment of the preferred route.	Report on Environmental Protection Plan and mitigation effectiveness through the Environmental Inspection Program (Chapter 8). Conduct frequent inspections of work sites and report regularly. The number and type of incidents will be tracked and addressed during the construction phase of the Project.
Stewardship The economy, the environment, human health and social well-being should be managed for the equal benefit of present and future generations. Manitobans are the caretakers of the economy, the environment, human health and social well-being for the benefit of present and future generations. Today's decisions are to be balanced with tomorrow's effects. **Integrated decision-making and planning** …encouraging and facilitating decision making and planning processes that are efficient, timely, accountable and cross-sectoral and which incorporate an inter-generational perspective of future needs and consequences.	Increasing power demands in the Lake Winnipeg East region of Manitoba have led to load growth on the Manitoba Hydro 66 kV system. Manitoba Hydro forecasting studies indicated that without voltage support, transmission planning criteria would be violated at the Pine Falls Generation Station Switchyard. The Project will provide economic benefits to Manitobans with the major economic benefit from the construction phase.	Goods and services purchased in or from: • Manitoba • Local businesses/suppliers • Aboriginal businesses/suppliers Percent of total project workforce that is Aboriginal. Health and safety - Accident frequency: Number of accidents per 200,000 hours worked.
Shared responsibility and understanding Manitobans should acknowledge responsibility for sustaining the economy, the environment, human health and social well-being, with each being accountable for decisions and actions in a spirit of partnership and open cooperation. Manitobans share a common economic, physical and social environment. Manitobans should understand and respect differing economic and social views, values, traditions and aspirations. Manitobans should consider the aspirations, needs and views of the people of the various geographical regions and ethnic groups in Manitoba, including aboriginal peoples, to facilitate equitable management of Manitoba's common resources.	Planning, designing, constructing, operating and maintaining the proposed Project involves many departments within Manitoba Hydro, as well as external consultants and contractor staff. Personnel gained an awareness of technical and environmental issues associated with the project and considered such concerns to arrive at balanced project decisions. A Construction Phase EnvPP will be created for the construction phase of the Project, followed by an Operations Phase EnvPP. The purpose of the plans are to provide for the effective implementation of mitigation measures and follow-up actions, as well as the application of regulatory requirements, environmental guidelines and best practices identified in the Project EA Report. EnvPPs help to ensure that contractors and field staff effectively fulfill their responsibilities for protecting the environment during the life of the Project. Environmental Inspectors will be on-site during construction, and detailed inspection and reporting functions are identified to ensure construction activities occur in a responsible fashion. Successful and effective implementation of EnvPPs is dependent on the shared responsibilities of Manitoba Hydro, regulators, contractors and stakeholders. Two rounds of public consultation were held for this Project. The purpose of Round One was to introductive the Project, describe the SSEA process, identify potential routing issues, present alternative routes and receive feedback on them. The purpose of Round Two was to present the preferred route, describe outcomes from Round One, identify any outstanding routing issues and obtain input on potential mitigation measures. Participants in both rounds included Rural Municipality Councils, Aboriginal peoples, key residents and other stakeholders and the general public. Feedback received during these consultations was instrumental in the selection of the preferred route and identifying key issues to be addressed during the environmental assessment process. Project information has been and will continue to be shared with all individuals and communities that are interested and/or potentially affected by the proposed Project during the regulatory review, project construction and operation phases.	Number of Environmental Inspectors on-site during construction. Number of training sessions for contractors on EnvPPs

Table 7-18: Project Sustainability Assessment

MB Sustainable Development Principal and guidelines	Comment	Indicator
Efficient use of resources Encouraging and facilitating development and application of systems for proper resource pricing, demand management and resource allocations together with incentives to encourage efficient use of resources; and Employing full-cost accounting to provide better information for decision-making.	The decision to proceed with the development of the Project was made after careful consideration of a range of other options. The SSEA process (Chapter 3) was employed to facilitate the selection of a route with minimal and efficient use of monetary resources and natural capital. During construction of the project all activities and personnel will be working under the auspices of the EMS framework and governance including Manitoba Hydro's Environmental Management Policy.	Total volume of recycled materials used during project construction.
Prevention Manitobans should anticipate, and prevent or mitigate, significant adverse economic, environmental, human health and social effects of decisions and actions, having particular careful regard to decisions whose impacts are not entirely certain but which, on reasonable and well-informed grounds, appear to pose serious threats to the economy, the environment, human health and social well-being. **Rehabilitation and reclamation** Manitobans should: • Endeavour to repair damage to or degradation of the environment; and Consider the need for rehabilitation and reclamation in future decisions and actions	A proactive approach was taken through the identification of alternative routes and ultimately the selection of the preferred route to avoid adverse environmental effects and enhance positive project effects. Habitat of species at risk has been avoided, and future residential development in rural municipalities was accommodated. Through the comprehensive environmental assessment process it has been determined that there will be no significant residual adverse effects with the application of mitigation measures. Remediation plans will be prepared to manage remediation activities and any contaminated sites identified as a result of the Project. Borrow areas, construction sites, access roads and other Project components that are no longer required will be decommissioned and lands will be restored as required. EnvPPs will be implemented during the construction and operation phases of the Project to ensure contractors and field staff can effectively fulfill their responsibilities for protecting the environment. An adaptive management approach will be implemented for the project and what is learned through project monitoring will be taken into account in making any necessary changes to activities to address issues in an expeditious manner and to remedy any unforeseen issues.	Number and volume of spills during the construction phase of the Project. Number of available project components decommissioned and/or restored (e.g., total number of borrow areas reclaimed).
Waste minimization and substitution Encouraging and promoting the development and use of substitutes for scarce resources where such substitutes are both environmentally sound and economically feasible. Reducing, reusing, recycling and recovering the products of society	It is recognized that hazardous and non-hazardous waste materials will be generated during construction of the transmission line and associated facilities. Waste generated by the Project will be collected, managed and disposed of in accordance with provincial legislation and guidelines. Hazardous materials will be managed in accordance with Manitoba Hydro's Hazardous Material Management Policy (2003). Opportunities to reduce, reuse and recycle non-hazardous wastes will be taken whenever possible.	Total quantity of waste generated (per thousand tonnes) during the construction phase of the project. Total quantity of waste materials diverted from landfills.
Public participation Establishing forums that encourage and provide opportunity for consultation and meaningful participation in decision-making processes by Manitobans. Endeavouring to provide due process, prior notification and appropriate and timely redress for those adversely affected by decisions and actions. Striving to achieve consensus among citizens with regard to decisions affecting them. **Access to information** Encouraging and facilitating the improvement and refinement of economic, environmental, human health and social information. Promoting the opportunity for equal and timely access to information by all Manitobans.	Two rounds of public consultation were held for this Project. The purpose of Round One was to introductive the Project, describe the SSEA process, identify potential routing issues, present alternative routes and receive feedback on them. The purpose of Round Two was to present the preferred route, describe outcomes from Round One, identify any outstanding routing issues and obtain input on potential mitigation measures. Participants in both rounds included Rural Municipality Councils, Aboriginal communities, key residents and other stakeholders and the general public. Feedback received during these consultations was instrumental in the selection of the preferred route and identifying key issues to be addressed during the environmental assessment process. Project information has been and will continue to be shared with all individuals and communities that are interested and/or potentially affected by the proposed Project during the regulatory review, project construction and operation phases.	Number of notifications sent to communities/property owners prior to construction on their property/jurisdiction. Number of locations where project information is made available to the public.

Table 7-18: Project Sustainability Assessment

MB Sustainable Development Principal and guidelines	Comment	Indicator
Research and innovation Encouraging and assisting the researching, development, application and sharing of knowledge and technologies that further our economic, environmental, human health and social well-being.	A number of modern technologies and software were used in the design of the transmission line and associated facilities (i.e., towers) that results in improved reliability and more cost effective solutions. Light Detection and Ranging (LiDAR) was used to survey the preferred route and played an instrumental role in many aspects of design. LIDAR is a remote sensing technology that can measure the distances to objects or properties of a target using pulses from a laser. For the Project the information from LiDAR was imported into a software program to create 3D visual renderings that assisted in generation of the line profile, span optimization and development of the tower family. With respect to design, the application of the Reliability Based Design method will deliver design of the transmission line to a prescribed reliability level with higher confidence than traditional deterministic methods. The following factors are expected to contribute to the overall reliability of the Project: Design loads: Selection of design loads have been based on statistical analysis of the most current weather data as recorded at various weather stations. Scientific analysis of the data was used to predict these loads for a chosen reliability level corresponding to a 150-year return period. Material Strength: Load and strength factors have been derived from statistical functions separately for each of the transmission line components. This allows one to design transmission lines in such a way that will allow it to fail in a prescribed mode if it is exposed to weather loads in excess of its capacity. Consequences of such failure can be easier handled by the use of proper mitigation measures. Security Measures: The transmission line will be designed to resist uncontrolled failures through the introduction of special security load cases and the provision of “anti-cascading” towers. Should the line fail due to a weather event exceeding line capacity, the damage is expected to be contained to the line section rather than allow the propagation of the failure in an uncontrolled manner.	Project reliability and successful operation with minimal outages. Number of customer complaints related to electrical device interference.
Global responsibility Manitobans should think globally when acting locally, recognizing that there is economic, ecological and social interdependence among provinces and nations, and working cooperatively, within Canada and internationally, to integrate economic, environmental, human health and social factors in decision-making while developing comprehensive and equitable solutions to problems.	Manitoba Hydro considers the potential transboundary effects (e.g., Greenhouse Gas [GHG] emissions) from its projects and takes them into account during project planning. Overall, It is anticipated that the Project will not have any significant adverse transboundary effects through GHG emissions.	Amount of atmospheric emissions of GHGs from Project vehicle fleet.
Conservation and enhancement Maintain the ecological processes, biological diversity and life-support systems of the environment. Harvest renewable resources on a sustainable yield basis. Make wise and efficient use of renewable and non-renewable resources. Enhance the long-term productive capability, quality and capacity of natural ecosystems.	The Project is subject to a comprehensive environmental assessment to identify the effects of the project on the environment and communities and to mitigate any adverse effects. Through the routing process the most sensitive ecological areas were avoided. The conclusion from the Environmental Assessment Report is that the Project is not expected to result in any significant adverse effects with the implementation of mitigation measures. Any potentially sensitive sites along the preferred route and at associated facilities will be protected through specific measures for each site that were identified by discipline experts.	The success of the EnvPP implementation as measured by annual review.

8.0 ENVIRONMENTAL PROTECTION, FOLLOW-UP AND MONITORING

Mitigation measures, monitoring and other follow-up actions identified in the effects assessment (Chapter 7.0) will be implemented through an Environmental Protection Program . Manitoba Hydro's EPP provides the framework for implementing, managing, monitoring and evaluating environmental protection measures consistent with regulatory requirements, corporate commitments, best practices and public expectations. Environmental protection, management and monitoring plans will be prepared and implemented under the environmental protection framework to address environmental protection requirements in a responsible manner. Socio-economic elements will be encompassed within environmental protection programs.

The purpose of this EPP 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 and policy requirements and other commitments identified in the LWESI Project EA Report. The EPP was developed in accordance with Manitoba Hydro's vision, goals and environmental policies.

The Corporate Vision is:

> "To be the best utility in North America with respect to safety, rates, reliability, customer satisfaction, and environmental leadership, and to always be considerate of the needs of customers, employees, and stakeholders" (Manitoba Hydro 2012).

One of the corporation's goals is "*To protect the environment in everything we do*". This goal can only be achieved with the full commitment of Manitoba Hydro management, employees, consultants and contractors at all project stages from planning and design through the construction and operational phases. Manitoba Hydro's Corporate Environmental Management Policy (Manitoba Hydro 2012) states that:

> *"Manitoba Hydro is committed to protecting the environment by:*

- preventing or minimizing any adverse impacts, on the environment, and enhancing positive impacts;
- continually improving our Environmental Management System;
- meeting or surpassing regulatory, contractual and voluntary requirements ;
- considering the interests and utilizing the knowledge of our customers, employees, communities, and stakeholders who may be affected by our actions;
- reviewing our environmental objectives and targets annually to ensure improvement in our environmental performance; and
- documenting and reporting our activities and environmental performance."

8.1 ENVIRONMENTAL PROTECTION PROGRAM

8.1.1 Overview

Manitoba Hydro's 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 best practices, and input from stakeholders and the Aboriginal community. The Program describes how Manitoba Hydro is organized and functions to deliver timely, effective, and comprehensive solutions and mitigation measures to address potential environmental effects. Roles and responsibilities for Manitoba Hydro employees and contractors are defined, and management, communication and reporting structures are outlined. The EPP includes the what, where and how aspects of protecting the environment during the pre-construction, construction, operation and decommissioning of the Project.

8.1.2 Organization

The organizational structure of the EPP includes senior Manitoba Hydro management, and project management and implementation teams that work together to ensure timely and effective implementation of environmental protection measures identified in environmental protection plans (Figure 8-1). Manitoba Hydro senior management is responsible for the overall EPP including resourcing, management and performance, and is accountable for regulatory compliance, policy adherence and stakeholder 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, and consultation with regulators, stakeholders and aboriginal communities. The management team is supported by environmental consultants and advisors. 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 on an as required basis.

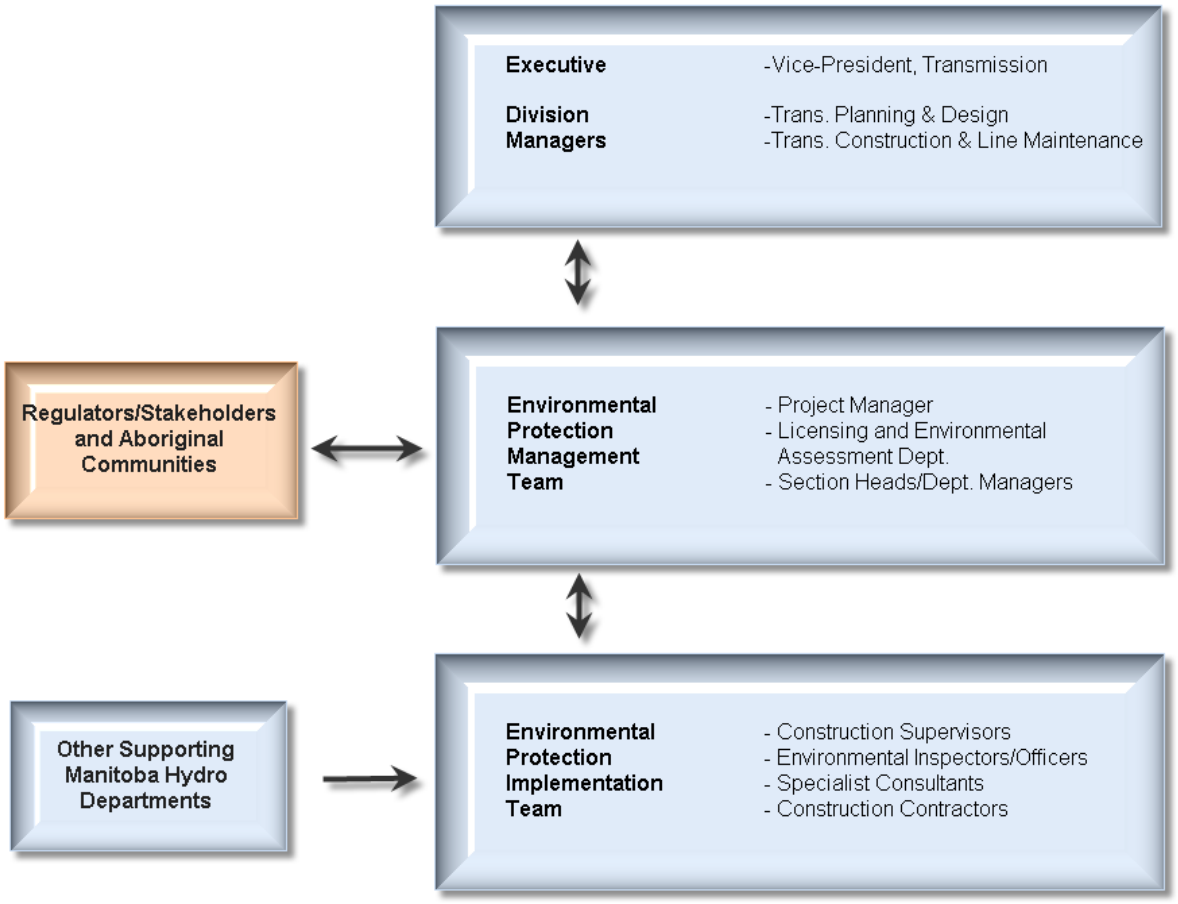

Figure 8-1: Environmental Protection Organizational Structure

8.1.3 Roles and Responsibilities

Roles and responsibilities for delivery of the Project and implementation of environmental protection measures are illustrated in general terms in Figure 8-2.

- The Construction Supervisor has overall responsibility for the implementation of the environmental protection plans and reports to a Section Head or Department Manager.
- Senior Environmental Assessment Officer is responsible for implementation of inspection program and providing guidance and assistance to the Construction Supervisor in implementation of environmental protection plans.
- The Licensing and Environmental Assessment Department oversees the development of environmental protection documents and associated inspection and monitoring programs.
- The Construction Contractor is responsible for ensuring work adheres to the environmental protection plans and reports to the Construction Supervisor.

- Environmental Officers/Inspectors have the primary responsibility to confirm that environmental protection measures and specifications are implemented as per the environmental protection plans as well as provide information and advice to 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.

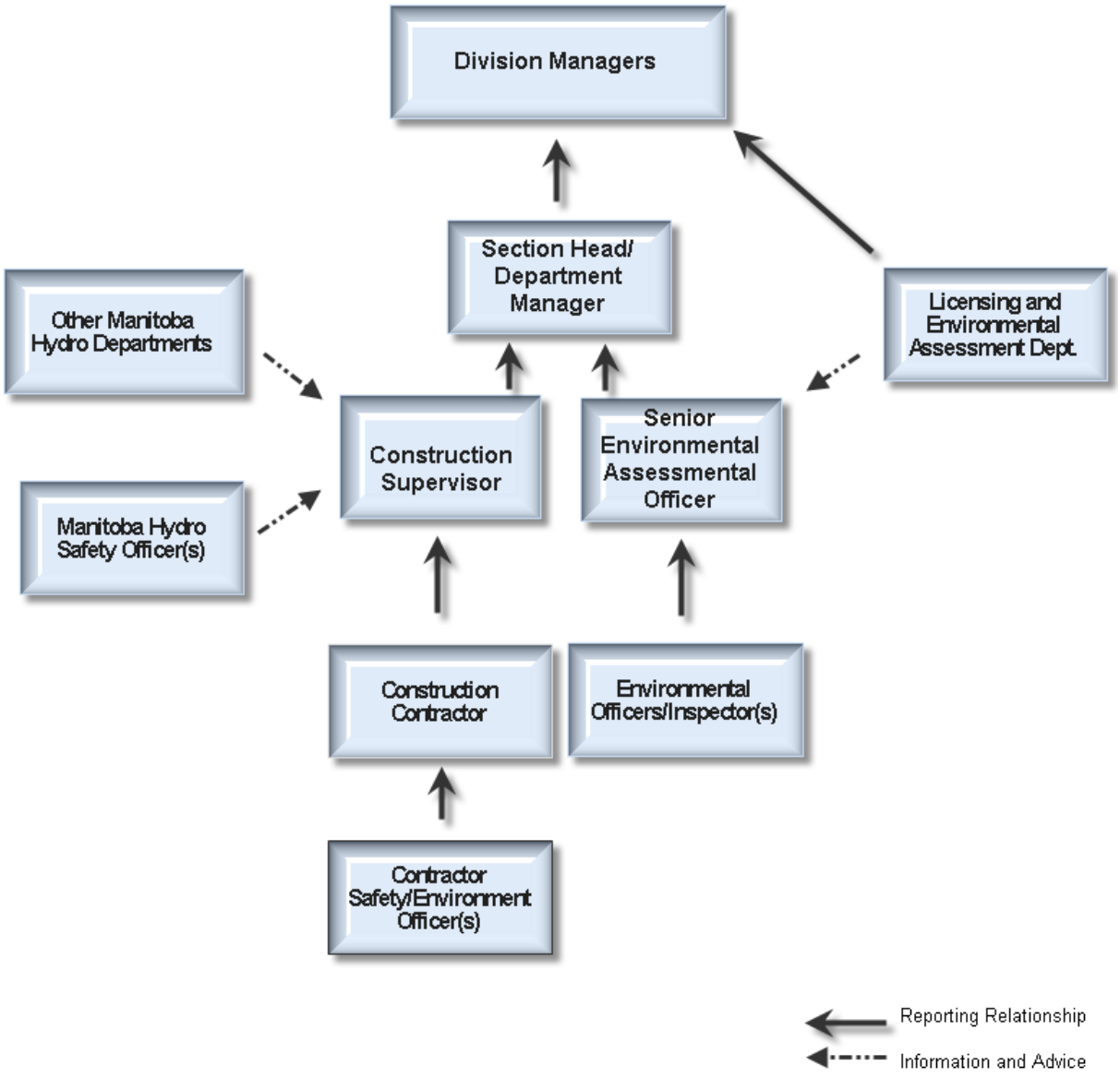

Figure 8-2: Typical Organizational Lines of Reporting and Communication

8.1.4 Resources

Allocating adequate resources to the environmental aspects of project planning, development, implementation and operation is key to successful implementation of environmental protection measures and follow-up including monitoring and other requirements. Manitoba Hydro commits resources early in the planning cycle to ensure effective environmental assessment, mitigation and monitoring. During the SSEA process teams of engineers and environmental professionals develop preventative or avoidance mitigation measures that include design, routing and siting alternatives. In addition, there are resource allocations for the delivery and implementation of specific environmental protection measures to meet corporate policy and government regulatory requirements. Manitoba Hydro is committed to staffing the EPP with sufficient Environmental Inspectors and providing required support including training, financial resources and equipment.

8.1.5 Environmental Management

Manitoba Hydro is certified under the ISO 14001 EMS standard and is subject to requirements of the standard including annual audits to verify its environmental performance. An EMS 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 EMS 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 EPP.

8.1.6 Environmental Protection Documents

Several environmental protection planning documents are developed for different project phases, components and activities. The documents include environmental protection, management and monitoring plans. The level of detail captured in the various plans increases as the project advances through planning, design, construction and operation phases, and the environmental assessment and licensing process (Figure 8-3).

The Draft EnvPP attached as Appendix 1 has been developed for review and consideration during the regulatory process and will be finalized once the licence terms and conditions, and other regulatory requirements are known. This Draft EnvPP will provide the framework under which detailed Construction and Operation Phase EnvPPs, along with various Management and Monitoring Plans that include socio-economic considerations, will be developed.

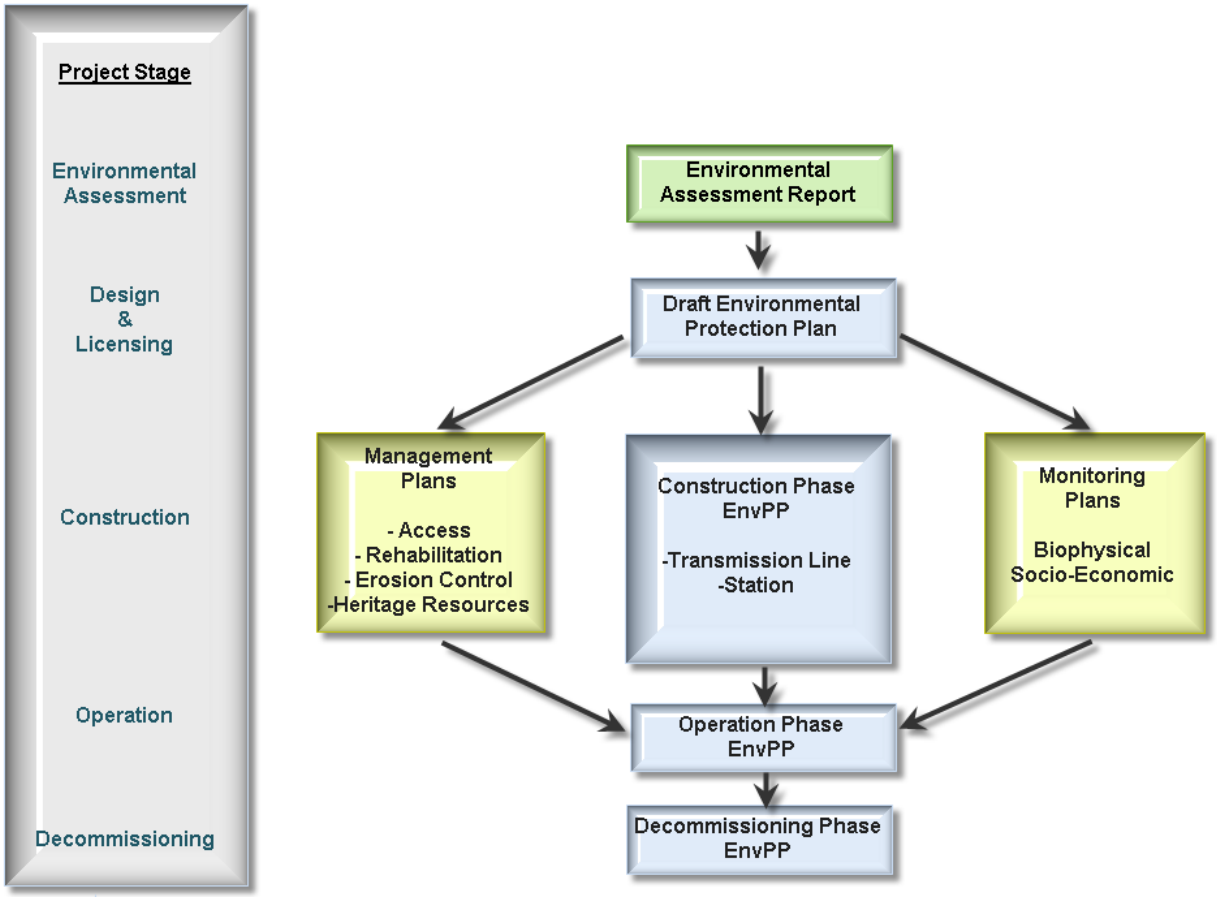

Figure 8-3: Typical Environmental Protection Documents

The Operation Phase EnvPP will be prepared prior to completion of the Project and will cover the period from commissioning to the eventual decommissioning of the Project. A Decommissioning Phase EnvPP would be prepared prior to the eventual decommissioning of the Project.

Management plans are prepared in response to specific environmental issues identified during the environmental assessment of the Project. Typical environmental issues include erosion control and emergency response. Management plans are structured documents that provide reasoned and approved courses of action to address environmental issues. Management plans are also prepared in response to regulatory requirements and responsible management practices.

Monitoring plans are prepared in response to specific follow-up requirements identified during the environmental assessment of the Project. Follow-up requirements include those actions implemented to confirm compliance with regulatory requirements and to assess the effectiveness of the environmental assessment. Example follow-up actions include invasive vegetation management, water quality protection, and the protection of fish and fish habitat.

8.1.7 Pre-construction Activities

Manitoba Hydro will obtain all licenses, permits, authorizations and other approvals including property agreements, rights-of-way easements and releases prior to commencement of construction of each individual project component or segment. Any additional terms and conditions of these approvals will be incorporated into the Construction Phase EnvPP. Any additional approval requirements to be obtained by the Contractors will be identified and communicated to the successful bidders. Pre-construction contacts will be established with provincial and federal regulatory authorities including MCWS, Department of Fisheries and Oceans, Transport Canada and others, and formal points of contact will be identified.

The Licensing and Environmental Assessment Department will typically participate in the tender/direct negotiated contract development process to ensure environmental requirements will be included as contract specifications. All bidders are required to list and defend their environmental record and must have an environmental policy including a commitment to environmental protection.

Meetings will be held with the successful contractors to review the environmental protection requirements, establish roles and responsibilities, management, monitoring and other plans, inspection and reporting requirements, and other submittals. Prior to the start of construction, contractor employees will be trained and/or oriented on environmental protection requirements. Manitoba Hydro and contract employees, project managers, consultants and others working on the proposed Project will be required to attend orientation sessions.

8.1.8 Construction Activities

A number of activities occur during construction of the Project to implement environmental protection measures and ensure compliance with regulatory requirements. Such activities include meetings with contractors, working with regulators, inspection and compliance, works stoppage and emergency response.

The Project Manager, Construction Supervisor, Environmental Officer/Inspector and Licensing and Environmental Assessment staff will meet with regulatory authority points of contact at the beginning of the Project to outline construction plans and schedules, and will request regular meetings to provide updates on project progress, environmental protection measure implementation and regulatory compliance. Manitoba Hydro will fulfill all regulatory requirements for submission of inspection, monitoring and other reports. Regulators will be notified immediately in case of emergencies situations, environmental accidents or other incidents in accordance with regulatory requirements. Any proposed changes or alterations to the construction project, environmental protection measures or monitoring activities will be reviewed with the appropriate regulatory authorities.

Manitoba Hydro will establish a comprehensive integrated environmental inspection program to comply with regulatory requirements, implement environmental protection measures and meet corporate environmental objectives.

8.1.9 Work Stoppage

The duty to stop work rests with everyone encountering situations where the environment, including biophysical, socio-economic and heritage resources, are threatened by an activity or occurrence that has not been previously identified, assessed and mitigated. Work stoppage is also to occur in the event of an environmental accident, extreme weather event or exposed human remains. Individuals discovering such situations are to inform their supervisor who will report the matter to the Construction Supervisor immediately who will issue a stop work order. The Contractor is also required to stop work voluntarily where construction activities are adversely affecting the environment or where mitigation measures are not effective in controlling environmental effects. Remedial action plans or other environmental protection measures will be developed and implemented immediately after discussion and prior to resumption of work if previously halted. Work is not to resume until the situation is been assessed and responded to and the Construction Supervisor approves the resumption of work. All stop work orders will be documented, reported to regulatory authorities (if applicable) and reviewed at construction meetings.

8.1.10 Emergency and Contingency Response

Spills of hazardous substances, fires and explosions, environmental accidents, heritage resource discoveries and other emergency or contingency situations require immediate action and response in accordance with established response plans. Provincial, federal and municipal authorities, and Manitoba Hydro personnel are to be notified in accordance with regulations and emergency and contingency response plans. These plans provide names of emergency responders, up to date contact information and notification procedures. Contractors are also required to have emergency response plans outlining contacts and response measures to exigent situations including hazardous materials spills, heritage resource discoveries, environmental accidents and fires or explosions. Manitoba Hydro has emergency response coordinators to deal with spills of hazardous and other substances.

8.1.11 Tools and Resources

An Environmental Protection Information Management System (EPIMS) will be developed as a central repository of environmental protection information including but not limited to:

- environmental protection documents;
- reference information such as regulations and guidelines;
- daily, weekly and monthly inspection reports;
- environmental incident reports; and
- monitoring program field data and reports.

The environmental inspection program will employ modern electronic recording, reporting and communication systems using field computers, geographic positioning systems and digital cameras. Electronic forms will be transferable to supervisors and project managers thereby enabling rapid communication and response to emerging situations. Field computers will have project and other reference information needed for effective implementation of environmental protection measures including regulations, guidelines, licences, permits, engineering drawings, specifications, maps, reports and data.

The EPIMS will monitor and report on environmental protection implementation, regulatory compliance and incident reporting. EPIMS will be the mechanism to provide reporting and tracking of environmental protection performance, and the foundation of an auditable environmental protection program.

Manitoba Hydro personnel will maintain ongoing communications with MCWS, other provincial and federal departments, and Aboriginal communities as necessary regarding implementation of the Project EnvPP. The Construction Supervisor and Environmental Officers/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.

8.2 ENVIRONMENTAL PROTECTION PLAN

8.2.1 Overview

EnvPP's are the main implementation instrument under the EPP. The Project Draft EnvPP (Appendix 1) is attached as a draft to allow for review and input from the regulatory process before finalization which will occur subsequent to licensing and prior to construction. .The EnvPP documents the environmental protection measures to provide for compliance with regulatory and other requirements, and to achieve environmental protection goals consistent with corporate environmental policies. Manitoba Hydro's environmental protection plans are designed as "user-friendly" reference documents that provide project managers, construction supervisors and contractors with detailed lists of environmental protection measures and other requirements to be implemented in the design, construction and operation phases of a project. Environmental protection measures are organized by construction component and activity, and environmental component and issue to assist project personnel in implementing measures for specific work sites and activities.

The EnvPP is a key element in implementing effective environmental protection and minimizing the potential adverse environmental effects identified in the EA Report.. It also outlines actions to identify unforeseen environmental effects and to implement adaptive management strategies to address them. An important component of an EnvPP is monitoring and updating which serves to ensure that environmental protection measures remain current and to provide for continual improvement of environmental performance.

8.2.2 General Environmental Protection Measures

General environmental protection measures for the Project include mitigation measures and follow-up actions identified in the EA Report including design mitigation, provincial and federal regulatory requirements, best practice guidelines, Manitoba Hydro environmental policies and commitments, and input from stakeholders, Aboriginal communities and the general public.

8.2.3 Specific Environmental Protection Measures

Specific environmental protection measures will be provided for environmentally sensitive sites where general measures do not provide adequate mitigation of potential effects. Environmentally sensitive sites are locations, features, areas, activities or facilities along or immediately adjacent to the transmission line right of way and other project components that are determined to be ecologically, socially, economically or culturally important and sensitive to disturbance by the Project and, as a result, require site-specific mitigation measures. The sites may include sensitive or unique terrain features, waterbodies and wetlands, important mammal, bird, and amphibian habitats, protected species and areas, and heritage resources.

Through ATK workshops culturally, and environmentally sensitive sites were identified. Manitoba Hydro will be working with aboriginal communities prior to the start of construction to further identify and map these sites and develop mitigation measures to minimize the effects of the project on them.

For the Construction and Operation Phase EnvPPs, orthophoto map sheets will provide Manitoba Hydro project managers, construction supervisors and employees, and contractors and contract employees detailed site-specific environmental protection information that can be implemented, managed, evaluated and reported on in the field. The orthophoto map sheets will be provided in paper and electronic formats which will be used by Manitoba Hydro, contractor and regulatory staff on laptop computers in field offices, vehicles and aircraft.

8.2.4 Follow-up Activities

Follow-up is an activity carried out to verify the accuracy of the environmental assessment of a project, assess the effectiveness of measures taken to mitigate adverse effects and determine compliance with regulatory requirements. Follow-up identified in Chapter 7.0 will be implemented through inspection, monitoring, management and auditing actions.

Inspection

Inspection is the organized and routine examination or evaluation, including observations, measurements and sometimes tests, of a construction project or activity. Inspection results are compared to pre-defined requirements or standards to determine whether an activity conforms to these requirements. Inspection provides an essential function in environmental protection and implementation of mitigation measures. Much of the success in environmental protection will be attributable to how well environmental inspection is carried out during the construction phase of a project.

Manitoba Hydro is establishing a comprehensive and integrated environmental inspection program to ensure effective implementation of environmental protection measures, compliance with regulatory approvals and fulfillment of corporate environmental objectives. The inspection program includes hiring and training of Environmental Inspectors to be on-site during all construction activities. Trained inspectors visit work sites daily and inspect for compliance with license terms and conditions, and adherence to environmental protection measures. Inspection activities are recorded in journals and daily inspection forms that are submitted to the Construction Supervisor. Weekly and monthly summary reports are also submitted to the Manitoba Hydro Project Manager and senior management as required or requested.

Monitoring

Monitoring is the continuing observation, measurement or assessment of environmental conditions at and surrounding a construction project or activity. Two main types of monitoring are typically undertaken for environmental assessments: 1) environmental monitoring to verify the accuracy of the predictions made and the effectiveness of the mitigation measures implemented; and 2) compliance monitoring to verify whether a practice or procedure meets legislated requirements. Monitoring determines if environmental effects occur as predicted, residual effects remain within acceptable limits, regulatory limits, criteria or objectives are not exceeded and mitigation measures are as effective as predicted. Monitoring also allows for adaptive management where monitoring results show there is a need for additional environmental protection or enhancement.

Monitoring plans will describe parameters to be monitored, methods to be used, roles and responsibilities, and reporting schedules. Monitoring will be carried out by Manitoba Hydro and may be contracted to environmental consultants that possess the necessary expertise, equipment and analytical facilities.

Management

Management is the control of pre-defined environmental effects, issues and concerns through the implementation of reasoned and approved courses of action. Management plans will be prepared to address important management issues, regulatory requirements and corporate commitments identified in the EA Report. The management plans will describe the management actions, roles and responsibilities, evaluation mechanisms, updating requirements and reporting schedules. The following management plans will be prepared prior to the construction of the Project:

- Access Management Plan;
- Vegetation Management and Rehabilitation Plan;
- Heritage Resources Protection Plan;
- Erosion Protection and Sediment Control Plans;
- Emergency Preparedness and Response Plans; and

- Solid Waste/Recycling Management Plans.

The above plans will be prepared by Manitoba Hydro or its Contractor's and may be contracted to environmental consultants that possess the necessary expertise and experience.

8.2.5 Review and Updating

The Construction Phase EnvPP will be reviewed annually or at the end of each construction season. Reviews will be conducted by Manitoba Hydro personnel in consultation with the Contractor, and regulators. Checklists will be used to ensure that reviews address all required information in a consistent manner. The results of each review will be summarized in a report that documents the issues addressed and provides recommended updates to the EnvPPs.

REFERENCES

Aboriginal Affairs and Northern Development Canada. 2012. First Nations Profiles. Available at: http://pse5-esd5.ainc-inac.gc.ca/fnp/Main/Index.aspx?lang=eng (accessed November 30, 2012).

AEC (Aquatic and Environmental Consultants). 1999. Lake Winnipeg east road stream crossing evaluation for fisheries values. 25 pp + appendices.

Altman, B. 1998. Productivity of the olive-sided flycatcher in the Cascade Mountains of northern Oregon: a pilot project to assess nesting success as a potential factor in population declines. In Olive-sided flycatcher (*Contopus cooperi*). In The Birds of North America, No. 502. Edited by A. Poole and F. Gill. The Birds of North America, Inc., Philadelphia, PA.

Altman, B. and R. Sallabanks. 2000. Olive-sided flycatcher (*Contopus cooperi*). In The Birds of North America. No. 502. Edited by A. Poole and F. Gill. The Birds of North America, Inc., Philadelphia, PA

Andrew, J.M. and J.A. Mosher. 1982. Bald eagle site selection and nesting habitat in Maryland. Journal of Wildlife Management 46(2): 382-390.

APLIC (Avian Power Line Interaction Committee). 2006. Suggested practices for avian protection on power lines: the state of the art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC and Sacramento, CA. 204 pp.

Banfield, A.F.W. 1987. The Mammals of Canada. University of Toronto Press. Toronto, ON. 438 pp.

Banfield, A.F.W. 1987. The Mammals of Canada. University of Toronto Press. Toronto, ON. 438 pp.

Bangs, E.E., S.A Duff, and T.N. Bailey. 1985. Habitat differences and moose use of two large burns on the Kenai Peninsula, Alaska. Alces 21: 17-35.

Ben-David, M.R., W. Flynn, and D.M. Schell. 1997. Annual and seasonal changes in diets of martens: evidence from table isotope analysis. Oecologia 111: 280-291.

Bent, A.C. 1942. Life histories of North American flycatchers, larks, swallows, and their allies. In Olive-sided flycatcher (*Contopus cooperi*), in The Birds of North America No. 502. Edited by A. Poole and F. Gills. The Birds of North America Inc., Philadelphia, PA.

Bevanger, K. and H. Brøseth. 2001. Bird collisions with power lines – an experiment with ptarmigan (*Lagopus* spp.). Biological Conservation 99: 341-346.

Brumm, H. 2004. The impact of environmental noise on song amplitude in a territorial bird. Journal of Animal Ecology 73: 434-440.

Buehler, D.A. 2000. Bald eagle (*Haliaeetus leucocephalus*). In The Birds of North America. No. 506. Edited by A. Poole and E. Gill. The Birds of North America, Inc., Philadelphia, PA

Buskirk, S.W., and S.O. MacDonald. 1984. Seasonal food habits of marten in south-central Alaska. Canadian Journal of Zoology 62: 944-950.

Calyx Consulting. 2012. *Lake Winnipeg East System Improvement (LWESI) Transmission Project. Vegetation Technical Report*. Prepared for Golder Associates Ltd. and Manitoba Hydro. Winnipeg, MB

Canada–Manitoba Agreement on Environmental Assessment Cooperation. 2007. http://www.ceaa.gc.ca/default.asp?lang=En&n=AAA97EB9-1) CEAA

CEA (Canadian Environmental Assessment) Act. 2012. http://www.ceaa-acee.gc.ca/default.asp?lang=En&n=16254939-1

Chace, J.F., C. Farmer, R. Winfree, D.R. Curson, W.E. Jensen, C.B. Goguen, and S.K. Robinson. 2005. Cowbird (*Molothrus* spp.) ecology: a review of factors influencing distribution and abundance of cowbirds across spatial scales. Ornithological Monographs No. 57, Management of Cowbirds and Their Hosts: Balancing Science, Ethics, and Mandates, pp. 45-70.

Chapin, F.S III, P.A. Matson, and P.M. Vitousek. 2011. Principles of Terrestrial Ecosystem Ecology. Second Edition. Springer Science+Business Media, LLC, New York, NY. 529 pp. Available from http://books.google.ca/books?hl=en&lr=&id=68nFNpceRmIC&oi=fnd&pg=PR5&dq=ecosystem+approach+terrestrial+matter+cycle&ots=V0EY4Afppn&sig=hE0FyUawRxDZZzf2Kb8fL_uDWmo#v=onepage&q=ecosystem%20approach%20terrestrial%20matter%20cycle&f=false [accessed September 18, 2012].

Chapin, T.D., D.J. Harrison and D.D. Katnik. 1998. Influence of landscape pattern on marten. Conservation Biology 12: 1327-1337.

Clark, T.W., E. Anderson, C. Douglas, and M. Strickland. 1987. *Martes americana*. Mammalian Species 289: 1-8.

Clatterbuck, W.C. (2006). Dieback and Decline of Trees. SPS 686. Associate Professor Forestry, Fish and Wildlife. The Trees for Tennessee Landscapes Series, Tennessee Urban Forestry Council, Department of Agriculture, Division of Forestry. University of Tennessee.

Clevenger, A.P., B. Chruszcz, and K.E. Gunson. 2003. Spatial patterns and factors influencing small vertebrate fauna road-kill aggregations. Biological Conservation 109: 15-26.

Coker, D.R. and D.E. Capin. 1995. Landscape-level habitat use by brown-headed cowbirds in Vermont. Journal of Wildlife Management 56(4): 631-673.

Colescott, J.H., and Gillingham, M.P. 1998. Reaction of moose (*Alces alces*) to snowmobile traffic in the Greys River Valley, Wyoming. Alces 34: 329-338.

Conway, C.J. 1999. Canada warbler (*Wilsonia canadensis*). In The Birds of North America, No. 421. Edited by A. Poole and F. Gill. The Birds of North America, Inc., Philadelphia, PA.

Cooper, J.M., K.A. Enns, and M.G. Shepard. 1997. Status of the Canada warbler in British Columbia. Wildlife Working Report WR-81. Ministry of Environment, Lands and Parks Wildlife Branch, Victoria, BC. 24 pp.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2012. http://www.cosewic.gc.ca/eng/sct6/index_e.cfm

COSEWIC. 2007. COSEWIC assessment and status report on the olive-sided flycatcher *Contopus cooperi* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, ON. vii + 25 pp. Available from http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_olivesided_flycatcher_0808_e.pdf [accessed September 7, 2012].

COSEWIC. 2007a. COSEWIC assessment and status report on the common nighthawk *Chordeiles minor* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, ON. vi + 25 pp. Available from http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_chordeiles_minor_e.pdf [Accessed September 17, 2012].

COSEWIC. 2008. COSEWIC assessment and status report on the Canada warbler *Wilsonia canadensis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, ON. vi + 35 pp. [Available from http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_canada_warbler_0808_e.pdf [accessed August 30, 2012].

COSEWIC. 2008a. COSEWIC assessment and update status report on the short-eared owl *Asio flammeus* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, ON. Available from http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_shorteared_owl_0808_e.pdf [accessed August 30, 2012].

COSEWIC. 2008b. COSEWIC assessment and status report on the snapping turtle *Chelydra serpentina* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, ON. vii + 47 pp. Available from http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_snapping_turtle_0809_e.pdf [accessed September 6, 2012].

COSEWIC. 2009b. COSEWIC assessment and update status report of the least bittern *Ixobyrychus exilis* in Canada. Committee on the Status of Endangered Wildlife in Canada Ottawa, ON. vi + 36 pp.. Available from http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_least_bittern_0809_e.pdf [accessed September 7, 2012].

COSEWIC. 2009d. COSEWIC assessment and update status report on the northern leopard frog *Lithobates pipiens*, Rocky Mountain population, Western Boreal/Prairie populations and Eastern populations, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, ON. vii + 69 pp. Available from http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_northern_leopard_frog_0809i_e.pdf [accessed September 6, 2012].

COSEWIC. 2012. Emergency assessment concludes that three bat species are endangered in Canada. Press release, Committee on the Status of Endangered Wildlife in Canada, Ottawa, ON. Available from http://www.cosewic.gc.ca/eng/sct7/Bat_Emergency_Assessment_Press_Release_e.cfm [accessed September 18, 2012].

Dojack. J. (2012). Director, Forestry Branch. Manitoba Conservation and Water Stewardship. Winnipeg, MB

Dussault, C., J.-P. Ouelett, R. Courtois, J. Huot, L. Breton, and H. Jolicoeur, 2005. Linking moose habitat selection to limiting factors. Ecography 28: 619–628.

EBM (Ecosystem-based Management) Project. 2002. Science team report: Ecoregion 90 Lac Suel Upland Ecoregion summary technical report. 123 pp.

Environment Canada. 2012. National Climate Data and Information Archive. Available at: http://www.climate.weatheroffice.gc.ca/climateData/canada_e.html.

Evans H.J., A.A. Hopkin and T.A. Scarr. (2007). Status of Important Forest Pests in Ontario in 2006. Natural Resources Canada, Canadian Forest Service, Great Lakes Forestry Centre, 1219 Queen St. E. Sault Ste. Marie, Ontario.

Fur Institute of Canada. 2003. Trappers: stewards of the land. Fur Institute of Canada, Ottawa, ON. 20 pp.

Goldade, C.M., J.A. Dechant, D.H. Johnson, A.L. Zimmerman, B.E. Jamison, J.O. Church, and B.R. Euliss. 2002. Effects of management practices on wetland birds: yellow rail. Northern Prairie Wildlife Research Center, Jamestown, ND. 21 pp. Available from http://www.npwrc.usgs.gov/resource/literatr/wetbird/download/yera.pdf [accessed September 18, 2012].

Golder (Golder Associates Ltd.). 2012. *Lake Winnipeg East System Improvement (LWESI) Transmission Project. Socio-economic and Land Use Technical Report*. Prepared for Manitoba Hydro. Winnipeg, MB.

Golder (Golder Associates Ltd.). 2012a. *Lake Winnipeg East System Improvement (LWESI) Transmission Project. Climate, Soils, Hydrogeology, and Geology Technical Report*. Prepared for Manitoba Hydro. Winnipeg, MB.

Goodwin, S.E. and W.G. Shriver. 2011. Effects of traffic noise on occupancy patterns of forest birds. Conservation Biology 25(2): 406-411.

Government of Manitoba. 2011a. Community Profiles: Aghaming. Available at: http://www.gov.mb.ca/ana/community_profiles/pdf/aghaming.pdf (accessed November 23, 2012).

Government of Manitoba. 2011b. Community Profiles: Bissett. Available at: http://www.gov.mb.ca/ana/community_profiles/pdf/bissett.pdf (accessed October 22, 2012).

Government of Manitoba. 2011c. Community Profiles: Manigotagan. Available at: http://www.gov.mb.ca/ana/community_profiles/pdf/manigotagan.pdf (accessed November 23, 2012).

Government of Manitoba. 2011d. Community Profiles: Seymourville. Available at: http://www.gov.mb.ca/ana/community_profiles/pdf/seymourville.pdf (accessed November 23, 2012).

Government of Manitoba. 2012. Media Bulletin January 20 – Manitoba. Additional temporary closure on moose hunting put in place in eastern Manitoba. Available from

http://news.gov.mb.ca/news/index.html?archive=today&item=13048 [accessed October 9, 2012].

Gross, D.A. and D.W. Brauning. 2011. Bald eagle management plan for Pennsylvania (2010-2019). Bureau of Wildlife Management Pennsylvania Game Commission, Harrisburg, PA. 64 pp.

Guinn, J.E. 2004. Bald eagle nest site selection and productivity related to habitat and human presence in Minnesota. PhD thesis, Biological Sciences, North Dakota State University of Agriculture and Applied Science. 159 pp.

Habib, L., E.M. Bayne, and S. Boutin. 2007. Chronic industrial noise affects pairing success and age structure of ovenbirds (*Seiurus aurocapilla*). Journal of Applied Ecology 44: 176-184.

Harmata, A.R. 1984. Bald eagles of the San Luis Valley, Colorado: their winter ecology and spring migration. PhD thesis, Montana State University, Bozeman. In Buehler, D.A. 2000. Bald eagle (*Haliaeetus leucocephalus*). In The Birds of North America. No. 506. Edited by A. Poole and E. Gill. The Birds of North America, Inc., Philadelphia, PA.

Harmata, A.R., G.J. Montopoli, B. Oakleaf, P.J. Harmata, and M. Restani. 1999. Movements and survival of bald eagles banded in the Greater Yellowstone Ecosystem. Journal of Wildlife Management 63(3): 781-193.

Harness, R.E. and K.R. Wilson. 2001. Electric-utility structures associated with raptor electrocutions in rural areas. Wildlife Society Bulletin 29: 612-623.

Health Canada 2004. It's your health. Electric and Magnetic Fields at Extremely Low Frequencies. Fact Sheet. Available at: http://www.health.gov.nl.ca/health/publichealth/envhealth/electmagnet_eng.pdf (accessed November 2012).

Hegman, G.C. Cocklin, R. Creasey, S. Dupuis, A. Kennedy, L. Kingsley, W. Ross, H. Spaling and D. Stalker. 1999. Cumulative effects assessment practitioners guide. Prepared by AXYS Environmental Consulting Ltd. and the CEA Working Group for the Canadian Environmental Assessment Agency. Hull, QC. Available from the Canadian Environmental Assessment Agency. En106-44/1999E.

Heritage Resources Act.1986. http://web2.gov.mb.ca/laws/statutes/ccsm/h039-1e.php

Holland, G.E, C.E. Curtis, and P. Taylor. 2003c. Canada warbler. In The Birds of Manitoba, Manitoban Avian Research Committee. Edited by P. Taylor. Manitoba Naturalists Society, Winnipeg, MB. p. 339.

Holland, G.E. and P. Taylor. 2003d. Spruce grouse. In The Birds of Manitoba, Manitoban Avian Research Committee. Edited by P. Taylor. Manitoba Naturalists Society, Winnipeg, MB. p. 151.

Huggard, D.J. 2003. Use of habitat features, edges and harvest treatments by spruce grouse in subalpine forest. Forest Ecology and Management 175: 531-544.

IISD (International Institute for Sustainable Development and the Clean Environment Commission). 2001. Manitoba and Climate Change: A Primer. Available at: http://www.iisd.org/pdf/cc_2nd_ed_wcov.pdf. Accessed November 12, 2012.

Ives, W.G.J. (1982). Insect and Disease Pests and Allied Problems Affecting Lodgepole Pine in Alberta. In Lodgepole pine: regeneration and management. August 17-19, 1982. M. Murray (editor) Hinton, Alberta, USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, Or. General Technical Report PNW-157.

James, A.R.C. and A.K. Stuart-Smith. 2000. Distribution of caribou and wolves in relation to linear corridors. Journal of Wildlife Management 64(1): 154-159.

Janss, G.F.E. 2000. Avian mortality from power lines: a morphologic approach of a species-specific mortality. Biological Conservation 95: 353-359.

Johnsgard, P.A. 2008. Spruce grouse. Grouse and Quails of North America Paper 14. Available from http://digitalcommons.unl.edu/bioscigrouse/14 [accessed August 29, 2012].

KBM Forestry Consultants Inc. 2006. A pilot moose habitat model for the Mid Boreal Uplands Ecoregion of the Manitoba Model Forest. Prepared for Manitoba Model Forest Network. Available from http://www.manitobamodelforest.net/publications/Habitat%20Suitability%20index%20Model%20-%20Moose%202006.pdf [accessed October 10, 2012].

Koonz, W.H. 2003. Bald eagle. In The Birds of Manitoba, Manitoba Avian Research Committee. Edited by P. Taylor. Manitoba Naturalists Society, Winnipeg, MB. pp. 131-132.

Koonz, W.H. and P. Taylor. 2003a. Turkey vulture. In The Birds of Manitoba, Manitoba Avian Research Committee. Edited by P. Taylor. Manitoba Naturalists Society, Winnipeg, MB. p. 93.

Koonz, W.H. and P. Taylor. 2003b. Olive-sided flycatcher. In The Birds of Manitoba, Manitoba Avian Research Committee. Edited by P. Taylor. Manitoba Naturalist Society, Winnipeg, MB. pp. 252-253.

Kotak, B.G. 2006. Black River First Nation bio-monitoring project: Final report to the Fisheries Enhancement Initiative. 26 pp.

Kotak, B.G. and A. Selinger. 2006. Spatial variation in water quality in rivers of the boreal shield of eastern Manitoba: Influence of soils, disturbance history and beaver activity. Manitoba Model Forest Report 05-2-63. 32 pp. www.manitobamodeforest.net/publications

Kotak, B.G., A. Selinger and B. Johnston. 2005. Influence of watershed features and disturbance history on water quality on boreal shield streams and rivers. Manitoba Model Forest Report 04-2-63. 161 pp. www.manitobamodeforest.net/publications

Laing, D.K., D.M. Bird, and T. Chubbs. 2005. First complete migration cycles for juvenile bald eagles (*Haliaeetus leucocephalus*) from Labrador. Journal of Raptor Research 39: 11-18.

Lakes Environmental. 2011. WRPLOT View. Available at: http://www.weblakes.com/products/wrplot/index.html.

Laurian, C., Dussault, C., Ouellet, J.-P., Courtois, R., Poulin, M., and Breton, L. 2008. Behaviour of moose relative to a road network. Journal of Wildlife Management 72: 1550-1557.

Linck, M.H. 2000. Reduction in road mortality in a northern leopard frog population. Journal of the Iowa Academy of Science 107(3): 209-211.

Manitoba Breeding Bird Atlas. 2012. Online database available from http://www.birdatlas.mb.ca/mbdata/datasummaries.jsp?lang=en [accessed August 29, 2012].

Manitoba Clean Environment Commission. 2001. Electric and Magnetic Fields (EMFs) Health and EMF Expert's Consensus statement. Available at: http://www.cecmanitoba.ca/resource/reports/Commissioned-Reports-2000-2001-Electirc_Magnetic_Fields_Health_EMF.pdf (accessed November 2012).

Manitoba Conservation. 2005. Manitoba's Conservation and Recovery Strategy for Boreal Woodland Caribou. Government of Manitoba, Winnipeg, MB. 20 pp.

Manitoba Conservation. 2010. Forest Management Guidelines for Terrestrial Buffers. Forest Practices Guidebook. Government of Manitoba, Winnipeg, MB. 14 pp.

Manitoba Conservation. 2011. Action Plans for Boreal Woodland Caribou Ranges in Manitoba (*Rangifer tarandus caribou*). Draft. Government of Manitoba, Winnipeg, MB. 53 pp.

Manitoba Hydro. 1993. Sustainable Development Policy/Principles. http://www.hydro.mb.ca/environment/policy/sdp.shtml.

Manitoba Hydro. 2007. Transmission line and transmission station vegetation management practices. Manitoba Hydro, Winnipeg, MB. 14 pp. Available from http://www.hydro.mb.ca/environment/publications.shtml [accessed October 9, 2012].

Manitoba Hydro. 2008. Environmental management policy. October 30, 2008. http://www.hydro.mb.ca/environment/policy/ems_policy.pdf

Manitoba Hydro. 2010. Fur, feathers, fins, and transmission lines: how rights of way affect wildlife. Editing and design by Marr Consulting Services. Original edition written by R.P. Berger, Wildlife Resource Consulting Services MB Inc. Manitoba Hydro System Planning and Environment Division, Winnipeg, MB. 90 pp.

Manitoba Hydro. 2011. The Corporate Strategic Plan 2011-2012. Manitoba Hydro. 24p

Manitoba Hydro. 2012a. Corporate Vision.

Manitoba Hydro. 2012b. Environmental Management Policy. Manitoba Hydro. 1p.

Manitoba Model Forest Committee for Cooperative Moose Management meeting minutes October 13, 2011. Manitoba Model Forest, Pine Falls, MB. Available from http://www.manitobamodelforest.net/publications/CCMM_Minutes_Oct_13_2011.pdf [accessed October 9, 2012].

Manitoba Model Forest Committee for Cooperative Moose Management meeting minutes March 15, 2012. Manitoba Model Forest, Pine Falls, MB. Available from http://www.manitobamodelforest.net/publications/CCMM_Minutes_Mar_15_2012.pdf [accessed October 9, 2012].

Manitoba Model Forest Committee for Cooperative Moose Management meeting minutes June 27, 2011. Manitoba Model Forest, Pine Falls, MB. Available from http://www.manitobamodelforest.net/publications/CCMM_Minutes_June_27_2011.pdf [accessed October 9, 2012].

Manitoba Model Forest Committee for Cooperative Moose Management. 2011. Moose News February, 2011. Manitoba Model Forest, Pine Falls, MB. Available from http://www.manitobamodelforest.net/publications/MooseNewsFeb2011.pdf [accessed October 9, 2012].

Manitoba Model Forest. 1994. Manitoba Model Forest Inc. cooperative moose management strategy. Project # 93-2-16 Final Report. Prepared for the Manitoba Model Forest, Pine

Falls, MB by Terrestrial & Aquatic Environmental Managers Inc. in cooperation with Harvey Payne, Georg Lithman, and Manitoba Natural Resources. Available from http://www.manitobamodelforest.net/publications/Cooperative%20Moose%20Management%201994%20Report.pdf [accessed October 10, 2012].

Martin, N.D. 1960. An analysis of bird populations in relation to forest succession in Algonquin Provincial Park, Ontario. Ecology 41: 126-140.

Maskwa (Maskwa Ecological Consulting Inc.). 2012. *Lake Winnipeg East System Improvement (LWESI) Transmission Project. Forestry Technical Report*. Prepared for Golder Associates Ltd. and Manitoba Hydro. Winnipeg, MB.

Maskwa et al. (Maskwa Ecological Consulting Inc., Miette Environmental Consulting Inc, and Eagle Vision) 2012. *Lake Winnipeg East System Improvement (LWESI) Transmission Project. Public Engagement Program Technical Report*. Prepared for Golder Associates Ltd. and Manitoba Hydro. Winnipeg, MB

MBESA (Endangered Species Act, Manitoba). 2012. http://www.gov.mb.ca/conservation/wildlife/legislation/endang_act.html

MCWS (Manitoba Conservation and Water Stewardship). 2012a. Unpublished data. Moose fact sheet [online]. Available from http://www.gov.mb.ca/conservation/wildlife/mbsp/fs/moose.html [accessed September 18, 2012].

MCWS. 2012b. 2012 Manitoba Hunting Guide. Available from http://www.gov.mb.ca/conservation/wildlife/hunting/pdfs/hunting%20guide_2012_web.pdf [accessed August 29, 2012].

Miette (Miette Environmental Consulting Inc.). 2012. *Lake Winnipeg East System Improvement (LWESI) Transmission Project. Aquatic Environment Technical Report*. Prepared for Golder Associates Ltd. and Manitoba Hydro. Winnipeg, MB.

Miette. 2008. Baseline water quality in rivers of eastern Manitoba: 2007. A project report to Manitoba Conservation-Forestry Branch and the Manitoba Model Forest. 27 pp. www.manitobamodeforest.net/publications

Millsap, B., T. Breen, E. McConnell, T. Steffer, L. Phillips, N. Douglass, S. Taylor. 2004. Comparative fecundity and survival of bald eagles fledged from suburban and rural natal areas in Florida. Journal of Wildlife Management 68(4): 1018-1031.

Mojica, E.K., B.D. Watts, J.T. Paul, S.T. Voss, and J. Pottie. 2009. Factors contributing to bald eagle electrocutions and line collisions on Aberdeen Proving Ground, Maryland. Journal of Raptor Research 43(1): 57-61.

NatureServe. 2012. NatureServe Explorer: an online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, VA. Available from http://www.natureserve.org/explorer [accessed August 29, 2012].

NLHS (Northern Lights Heritage Services). 2012a. *Lake Winnipeg East System Improvement (LWESI) Transmission Project. Cultural Resources Technical Report*. Prepared for Golder Associates Ltd. and Manitoba Hydro. Winnipeg, MB.

NLHS. 2012b. *Lake Winnipeg East System Improvement (LWESI) Transmission Project. Heritage Resources Technical Report*. Prepared for Golder Associates Ltd. and Manitoba Hydro. Winnipeg, MB.

North Eastman Health Association (NEHA). 2012. NEHA Facilities. http://www.neha.mb.ca/facilities.html#pinefalls (accessed September 18 and November 23, 2012).

North EastMan. 2012a. Black River First Nation. Available at: http://www.investmanitoba.com/docREGION/reg_lbr1st.htm (accessed November 23, 2012)

North EastMan. 2012b. Community of Manigotagan. Available at: http://www.investmanitoba.com/docREGION/reg_mgt.htm (accessed November 23, 2012)

North EastMan. 2012c. Community of Seymourville. Available at: http://www.investmanitoba.com/docREGION/reg_seymourville.htm (accessed November 23, 2012)

North EastMan. 2012d. Hollow Water First Nation. Avialable at: http://www.investmanitoba.com/docREGION/reg_holwat.htm (accessed November 26, 2012)

North EastMan. 2012e. Townsite of Powerview-Pine Falls. Available at: http://www.investmanitoba.com/docREGION/reg_pinefalls.htm (accessed November 23, 2012).

Palidwor, D.L., D.W. Schindler, and B.R. Hagglund. 1995. Habitat Suitability Index Model - Moose Ver 2.0. Manitoba Model Forest, Pine Falls, MB. 151 pp.

Parnell, J.F., D.G. Ainley, H. Blokpoel, B. Cain, T.W. Custer, J.L. Dusi, S. Kress, J.A. Kushlan, W.E. Southern, L.E. Stenzel, and B.C. Thompson. 1988. Colonial waterbird management in North America. Colonial Waterbirds 11(2): 129-169.

Pattie, D.L. and R.S. Hoffmann. 1990. Mammals of the North American Parks and Prairies. Donald L. Pattie, Edmonton, AB. 579 pp.

Peek, J.M. 2007. Habitat relationships. In Ecology and Management of the Moose, 2nd Edition. Edited by A.W. Franzmann and C.C. Schwartz. University Press of Colorado, Boulder, CO. pp. 351-375.

Potvin, F., R. Courtois, and L. Bélanger. 1999. Short-term response of wildlife to clear-cutting in Quebec boreal forest: multiscale effects and management implications. Canadian Journal of Forest Research 29: 1120-1127.

Powerview-Pine Falls. 2011. Community Profile. Available at: http://www.powerview-pinefalls.com/ (accessed October 16,November 20, and November 23, 2012).

Rawluk, Ron. 2012. Personal Communication (Email, October 31 and November 21, 2012).

Robertson, B.A. and R.L. Hutto. 2006. A framework for understanding ecological traps and an evaluation of existing evidence. Ecology 87: 1075-1085.

Robertson, B.A. and R.L. Hutto. 2007. Is selectively harvested forest an ecological trap for olive-sided flycatchers? The Condor 109: 109-121.

Rocky Mountain Bird Observatory. 2007. Partners in Flight Population Estimates Database [online]. Available from http://www.rmbo.org/pif_db/laped/query.aspx. [Accessed October 31, 2012].

Ross, A.M. 2007. Spruce grouse distribution, movements and habitat selection: a mid-successional species in an aging forested landscape. M.Sc. Thesis. State University of New York, Syracuse, NY. 111 pp.

RRCS (Renewable Resources Consulting Services Ltd.). 1994. A review of the literature pertaining to the effects of noise and other disturbance on wildlife. EIS: military flight training. An environmental impact statement on military flying activities in Labrador and Québec. Department of National Defence (DND). 155 pp.

RV Review. 2011. Manitoba: Manigotagan. Available at: http://www.rvreview.net/rvparks/manigotagan-campground.html (accessed November 23, 2012).

Sagkeeng First Nation. 2010. Sagkeeng First Nation. Available at: http://www.sagkeeng.ca/ (accesses November 23 and 26, 2012).

Schindler, D.W. 2005. Determining woodland caribou home range and habitat use in eastern Manitoba. Prepared for the Eastern Manitoba Woodland Caribou Advisory Committee. Manitoba Model Forest, Pine Falls, MB. 77 pp.

Sleep, D.J.H., M.C. Drever, and K.J. Szuba. 2009. Potential role of spruce budworm in range-wide decline of Canada warbler. Journal of Wildlife Management 72: 546-555.

Smith, R. E., Veldhuis, H., Mills, G. F., Eilers, R. G., Fraser, W. R., and Lelyk, G. W. 1998. Terrestrial ecozones, ecoregions, and ecodistricts of Manitoba: an ecological stratification of Manitoba's natural landscapes. Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada. Research Branch. Technical Bulletin 1998-9E.

Statistics Canada. 2006. 2006 Designated Place Data. Available by request.

Statistics Canada. 2007. 2006 Community Profiles. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007. http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E (accessed September 18, 2012).

Statistics Canada. 2012. Census Profiles. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released May 29, 2012. http://www12.statcan.ca/census-recensement/2011/dp-

Steenhof, K., M.N. Kochert, and J.A. Roppe. 1993. Nesting by raptors and common ravens on electrical transmission line towers. Journal of Wildlife Management. 57(2): 271-281.

Stewart, K.W. and D.A. Watkinson. 2004. The freshwater fishes of Manitoba. University of Manitoba Press. 276 pp.

Stinson, D.W., J.W. Watson, and K.R. McAllister. 2007. Washington state status report for the bald eagle. Washington Department of Fish and Wildlife, Olympia, WA. 86+ pp.

Strickland, M.A., C.W. Douglas, M. Novak, and N.P. Hunziger. 1998. Marten (*Martes americana)*. In Wild furbearer management and conservation in North America. Edited by M. Novak, J.A. Baker, M.E. Obbard, and B. Malloch. Ontario Ministry of Natural Resources, Peterborough, Ontario. pp. 531-546.

Strickland, M.A., C.W. Douglas, M. Novak, and N.P. Hunziger. 1998. Marten (*Martes americana)*. In Wild furbearer management and conservation in North America. Edited

by M. Novak, J.A. Baker, M.E. Obbard, and B. Malloch. Ontario Ministry of Natural Resources, Peterborough, Ontario. pp. 531-546.

Takats, L., M. Stewart, R. Todd, R. Bonar, B. Beck, and R. Quinlan. 1999. Habitat suitability index model for the American marten. Manitoba Forestry Wildlife Management Project, Winnipeg, Manitoba.

Taylor, P. 2003. Red-headed woodpecker. In The Birds of Manitoba, Manitoban Avian Research Committee. Edited by P. Taylor. Manitoba Naturalists Society, Winnipeg, MB. pp. 244-245.

Tembec Forest Resource Management (Tembec). 2009. High Conservation Value Forest Assessment. HCVF Report FML – 01.

Terrestrial & Aquatic Environmental Managers. 1993. Moose census and habitat evaluation for the Manitoba Model Forest. Prepared for the Manitoba Model Forest, Pine Falls, MB. Available from http://www.manitobamodelforest.net/publications/Moose%20Census%20and%20Habitat%20Evaluation%2092-2-9.pdf [accessed October 10, 2012].

Tewksbury, J.J., L. Garner, S. Garner, J.D. Lloyd, V. Saab, and T.E. Martin. 2006. Tests of landscape influence: nest predation and brood parasitism in fragmented ecosystems. Ecology: 759-768.

United Nations World Commission on Environment and Development. 1987. Our common future. Oxford: Oxford University Press.

Wilbert, C.J., S.E. Buskirk, K.G. Gerow. 2000. Effects of weather and snow on habitat selection by American martens (*Martes americana*). Canadian Journal of Zoology 78: 1691-1696.

Wildlife Resource Consulting Services MB Inc. and Silvitech Consulting. 1997. Design and implementation of the Manitoba Model Forest bird monitoring program. Project 96-2-17 Management of the MBMF for the Conservation of Boreal Forest Birds. Prepared for Manitoba Model Forest Inc., Manitoba Department of Natural Resources Wildlife Branch and Parks Branch, Pine Falls Paper Company, Manitoba Forestry-Wildlife Management Project, and Canadian Wildlife Service Prairie and Northern Region. Prepared by Wildlife Resource Consulting Services MB Inc., Winnipeg, MB and Silvitech Consulting, Winnipeg, MB. 94 pp. + appendix.

World Health Organization (WHO). 2007. Extremely Low Frequencies Fields Environmental Health Criteria Monograph No. 238. Available at: http://www.who.int/peh-emf/publications/elf_ehc/en/index.html (accessed November 2012).

WRCS (Wildlife Resource Consulting Services). 2012. *Lake Winnipeg East System Improvement (LWESI) Transmission Project. Wildlife Technical Report*. Prepared for Golder Associates Ltd. and Manitoba Hydro. Winnipeg, MB

Zielinski, W.J., K.M. Slauson, and A.E. Bowles. 2008. Effects of off-highway vehicle use on the American marten. Journal of Wildlife Management 72(7): 1558-1571.

GLOSSARY

Aboriginal Traditional Knowledge (ATK)	Knowledge, innovations and practices of indigenous and local communities around the world which is developed from experience gained over centuries and adapted to the local culture and environment. ATK is transmitted orally from generation to generation, tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices
Alternative Routes	As a standard practice for new transmission line projects, Manitoba Hydro develops several options for routing transmission lines. The options are then evaluated through a Site Selection and Environmental Assessment process to identify a preferred route.
Anishinaabeg	The plural form of *Anishinaabe* which is the autonym used by Ojibway peoples.
Anishinaabemowin	The indigenous language of the Ojibway
Anthropogenic	of, relating to, or resulting from the influence of human beings on nature.
Aquatic Macrophyte	Aquatic plants that grow in or near water, and can include floating (e.g., duckweed), submergent (e.g., pondweed) and emergent (e.g., cattail, rush) plants.
Arboreal	frequenting or inhabiting trees.
Benthic Invertebrates	Aquatic invertebrates (organisms without a backbone) that live on or in the bottom sediments of waterbodies (e.g., larval forms of insects, clams, crayfish).
Borrow Pits	Areas excavated (usually for sand or gravel) for construction purposes, such as construction of roads or highways.
Buffer	The area immediately surrounding an area of interest, often imposed to surround or protect an area.
COSEWIC	Committee on the Status of Endangered Wildlife in Canada.
Cover Type	A parameter in the FRI, it is a measure of vegetation community attributes within a polygon, including dominant tree cover composition, site, age class, and height class.
Cultural Resources	Cultural properties that are unique and nonrenewable resources and can include physical features, both natural and manmade, associated with human activity as sites, structures, and objects possessing significance, either individually or as groupings in history, architecture, archaeology or cultural development.
Culturally Sensitive Site (CSS)	Areas of concern related to Cultural Resources noted by participating communities that fall within 60 metres (30 metres on either side of the centre line) of the established Project right-of-way of the Alternative Routes and Final Preferred Route that might be affected by the proposed construction of a new transmission line.

Danger Trees	Trees located outside a cleared transmission line right-of-way but which may pose a risk of contact or short circuit with the line or structures. Danger trees are removed, usually by hand felling.
Deleterious Substances	Any substance that, if added to any water, would degrade or alter the quality of that water so that it becomes toxic or harmful to aquatic organisms and habitat.
Discharge	The volume rate of water flow in a watercourse, and can be expressed as cubic metres per second (m^3/s).
Ecodistrict	A subdivision of an ecoregion characterized by relatively homogeneous biophysical and climatic conditions.
Ecoregion	An ecologically and geographically defined area that is smaller than an ecozone. The biodiversity of plants and animals that characterize an ecoregion are distinct from other ecoregions.
Ecozone	An area of the earth‘s surface representing large and very generalized ecological units characterized by interacting abiotic and biotic factors; the most general level of the Canadian ecological land classification.
Endangered	MBESA status category. A species indigenous to Manitoba, which is threatened with imminent extinction or with extirpation throughout all or a significant portion of its Manitoba range.
Endangered Species	A wildlife species listed under the Species at Risk Act that is facing imminent extirpation or extinction.
Environmental Assessment	The actual technical assessment work that leads to the production of an environmental impact statement. The technical methodologies used must be scientifically sound, and explainable and defendable in a court of law. The scope of the assessment is typically outlined at the start of the project so that the project has some well-defined boundaries (Dunster & Dunster 1996).
Ericaceous Shrubs	Plants in or related to the heather family (Ericaceae), typically found on acid soils. (Dunster & Dunster 1996).
Forb	a non-grassy herbaceous species.
Forest Resource Inventory (FRI)	The provincial digital Forest Resource Inventory is a collection of attributes describing vegetation across the landscape interpreted from aerial photography.
Glaciolacustrine	Pertaining to, derived from, or deposited in glacial lakes; especially said of the deposits and landforms composed of suspended material brought by meltwater streams flowing into lakes bordering the glacier, such as deltas, kame deltas, and varved sediments.
Gneiss	A type of rock formed by metamorphic processes from pre-existing igneous or sedimentary rock formations.
Grubbing	The act of removing roots from soil using a root rake, harrow or similar device.

High Water Mark (HWM)	The visible high water mark of a waterbody of water where the presence and action of the water over many years create a distinct mark on the banks. A high water mark can be visible as a natural line or "mark" impressed on the bank or shore, the presence of a shelf, or changes in soil or vegetation characteristics.
Hydraulic Conductivity	A property of soils or rock that describes the ease with which water can move through pore spaces or fractures
Ice Bridge	A temporary crossing of a waterbody in winter. Creation of a ice bridge can include flooding the ice surface to create a thicker and stronger ice bridge to support heavy vehicles or machinery.
Important Fish Habitat	In the context of the LWESI project, important fish habitat is found in perennial watercourses that contain water and flow all year, and which have sufficient water depth to prevent freezing to the bottom as well as sufficient dissolved oxygen concentrations to support fish all year.
Key Person Interview	A Key Person Interview is a qualitative in-depth interview with an individual who has specialized knowledge within a community. A community expert, with their particular knowledge and understanding, can provide insight on the nature of potential problems and can offer recommendations for solutions.
Large Woody Debris	Trees, logs, branches and other wood that fall into watercourses. Large woody debris provides important fish habitat, and can alter flow and channel characteristics of a watercourse.
MBESA	The Manitoba *Endangered Species Act.*
Mineral Soil	Shttp://www.biology-online.org/dictionary/Soiloil consisting primarily of mineral (sand, silt and clay) material, rather than organic matter.
Mitigation	With respect to a Project, the elimination, reduction or control of the adverse environmental effects of the project.
Neotropical migrants	species of birds that winter in tropical climates and breed within the temperate, boreal, or arctic regions of North America.
Orthophoto	Images based on air photos, but which are true to scale and free of distortion. Orthophotos resemble air photos but, in fact, are maps (Dunster & Dunster 1996).
Parturition	The act of giving birth to young.
Peatland	A diverse group of plant ecosystems that are characterized by very slow decomposition rates, leading to accumulation of peat over time. Includes bogs, fens and swamps.
Peatlands	A term describing all types of peat-covered terrain including bogs, swamps and fens.
Perennial Watercourse	A watercourse (e.g., creek, river, lake) that contains water in parts of its channel, and in the case of flowing water ecosystems, water flow throughout the entire year under typical climatic conditions.
Polygon	In GIS work, a stream of digitized points approximating the delineation (perimeter) of an area (e.g., forest type) on a map (Dunster & Dunster 1996).

Polygon	An irregularly shaped area used in an FRI to describe the boundaries of a vegetation community.
Project Footprint	The land and/or water surface area affected by a project. This includes direct physical coverage and direct effects. Consequently, a project footprint may be larger than its physical dimensions if off-site activities are involved.
Quarry	An open excavation area or pit from which stone, gravel or sand is obtained by digging, cutting or blasting.
Right-of-way (ROW)	A strip of land controlled and maintained for the development of a linear infrastructure such as a road or transmission [or distribution] line.
Riparian	Refers to terrain, vegetation or simply a position adjacent to or associated with a stream, flood plain, or standing body of water.
Site Selection and Environmental Assessment (SSEA)	Process used to select a site or route for a transmission facility (i.e., a station or a transmission line) and assess any potential environmental impacts of that facility on the biophysical environment and socio-economic conditions.
Species at Risk	A wildlife species that is extirpated, endangered, threatened or of special concern.
Study Area	In the context of describing the existing aquatic environment for the LWESI project, the area bounded by the Winnipeg River in the south, Wanipigow River in the north, eastern shore of Lake Winnipeg in the west, and Manitoba-Ontario border in the east.
Threatened	MBESA status category. A species indigenous to Manitoba, which is likely to become endangered; or is, because of low or declining numbers in Manitoba, particularly at risk if the factors affecting its vulnerability do not become reversed.
Tonalite	An igneous, intrusive rock, of felsic composition.
Understory	The assemblage of woody and herbaceous plants that make up the vegetation found between 0 cm (ground level) to 50 cm tall.
Valued Environmental Component	Any part of the environment that is considered important by the proponent, public, scientists, and government involved in the assessment process; importance may be determined on the basis of societal or cultural values, or scientific interest or concern. For the aquatics assessment of the LWESI project, fish habitat was chosen as the aquatics VEC.

Appendix 1

Draft Environmental Protection Plan

Appendix 2

Public Engagement Contact List

Appendix 3

Map Folio