4.0 ENVIRONMENT DESCRIPTION

This chapter of the environmental assessment report provides a description of the existing environmental setting for the proposed Tyndall 115 kV Transmission Line and DSC Project including biophysical and socio-economic components of the environment. Information on the existing environment is described to facilitate the identification and assessment of potential environmental effects, and the subsequent mitigation of adverse effects.

4.1 Ecological Classification

The proposed Tyndall Project is located in the Boreal Plains Ecozone, Interlake Plain Ecoregion and the Gimli Ecodistrict. The following ecological classification descriptions have been obtained from Smith et al. (1998).

4.1.1 Boreal Plains Ecozone

The Boreal Plains Ecozone extends as a wide band from the southeastern corner of Manitoba to the Peace River area of British Columbia. The geology consists of Cretaceous shales and Palaeozoic limestones and dolomites. The landscape varies from nearly level to gently rolling terrain that also includes areas of hummocky to undulating topography of till and glaciolacustrine deposits. Wetlands comprise 20 to 50% of the area. Prominent soils include Luvisols, Chernozems, Brunisols and Organics.

Vegetation in the ecozone includes both coniferous and deciduous tree species. White and black spruce, jack pine and tamarack are representative needleleaf trees. Black spruce and tamarack both become dominant in the northern portion of the ecozone. Trembling aspen, balsam poplar and white birch are the main broadleaf trees which are more prominent towards the integration with the Prairies Ecozone. Wildlife includes several ungulates, small animals, as well as many species of birds.

The sustainable use of the forest resource is the main land use of the ecozone. Agricultural developments occur in the southern and northwestern portions of the ecozone. Other activities include hunting, trapping, commercial fishing on the larger lakes, as well as recreation and tourism in the provincial and national parks.

4.1.2 Interlake Plain Ecoregion

The Interlake Plain Ecoregion extends from the international boundary with the United States from the southeastern edge of the Manitoba Plain, northwestward in a band to the Saskatchewan border at Red Deer Lake. This ecoregion forms a portion of the Sub-humid Low

Boreal Ecoclimatic Region which is marked by short, warm summers and long, cold winters. The mean annual temperature ranges from 1.1 to 2.4°C and has a growing season that varies between 173 to 184 days. The mean annual precipitation ranges from slightly less than 500 to near 525 mm.

This low-relief ecoregion, underlain by limestone bedrock, is covered by extremely calcareous, very stony, water-worked loamy glacial till. The surface of the plain has an elevation ranging from about 410 m above sea level (asl) near the Manitoba Escarpment to 218 m asl at Lake Winnipeg. The ecoregion is a mosaic agricultural land and forest marking the southern extent of the mixed boreal forest, and the northern and eastern extent of commercial agriculture.

Well to imperfectly drained Chernozemic Dark Grey soils and Chernozemic Black soils are common. Other soils include Eutric Brunisols and Gray Luvisols over till and glaciolacustine deposits, Organic Mesisols and Humic Gleysols. Vegetation is represented predominantly by stands of trembling aspen with occurrences of balsam poplar and an understory of tall shrubs and mixed herbs. Stands of jack pine occur on dry, sandy sites, while depressions and poorly drained sites occupy black spruce, tamarack, willows and sedges. White spruce and balsam fir also occur as climax species in the ecoregion but are not abundant as a result of fires.

Wildlife includes extensive habitat for white-tailed deer, moose, black bear, coyote, beaver, snowshoe hare, ruffed grouse, and waterfowl. The agriculture of the ecoregion is represented by production of spring wheat, other cereal grains, oilseeds, hay crops and pasture.

4.1.3 Gimli Ecodistrict

The Gimli Ecodistrict is a north-south elongated area extending from north of Fisher Bay to southeast of Birds Hill. This ecodistrict occurs within the more humid and cooler subdivision of the Sub-humid Low Boreal Ecoclimatic Region. The ecodistrict is characterized by short, warm summers and cold winters, with a mean annual temperature of 1.4oC and an average growing season of 176 days.

The mean annual precipitation is about 520 mm, and varies greatly from year to year and is highest from late spring through summer. About one-quarter of the precipitation falls as snow. The ecodistrict contains a number of climate stations including locations at Arborg, Beausejour, and the now closed Gimli Station.

The Gimli Ecodistrict is a level to depressional lowland and a gently undulating lake terrace. Deposits include glaciofluvial, glaciolacustrine, and till. Slopes on the landscape are gentle and are less than 2 percent. The ecodistrict has little relief however a significant change occurs at Birds Hill which rises about 30 m above the surrounding area as a result of an interlobate glaciofluvial and moraine complex. Local relief also occurs along the rivers of 5 to 10 m.

The northern portion of the ecodistrict is part of the Lake Winnipeg South drainage division, while the portion south of Lake Winnipeg is part of the Red River drainage division. Both are part of the Nelson River drainage system.

Soils in the lake terrace areas are dominantly well to imperfectly drained Dark Gray Chernozems; Gray Luvisols occur under the forest vegetation, and poorly drained Peaty Gleysols and shallow organic soils occur in the lowlands. Trembling aspen dominates the forest in this ecodistrict.

In the northern portion of the ecodistrict, white spruce is the more common the forest cover. Riverbanks support elm, Manitoba maple, green ash, and cottonwood. Low areas support willow, meadow grasses and sedges while vegetation in marshes consists of cattails, reeds and sedges. The higher elevation of Birds Hill supports deciduous trees, white spruce, and peatlands supporting black spruce, eastern white cedar and tamarack.

The majority of the soils in the southern lake terrace are cultivated, while only those soils in the lowlands with improved drainage are cultivated. Crops include spring wheat, other cereal grains, hay crops and oil seeds. Native pasture and hay fields occur in areas where drainage has not been improved or where soils are too stony to cultivate. Forested areas provide habitat for white-tailed deer, black bear, ruffed grouse and songbirds. Wetlands are important for waterfowl and migratory bird staging. The principal sources of water in the ecodistrict are groundwater from the aquifers and surface water from Lake Winnipeg, and the Red, Icelandic, and Fisher Rivers.

4.2 Biophysical Environment

4.2.1 Climate

The climate in the Gimli Ecodistrict is characterized by long, cold winters and short, warm summers. The average annual temperature is 1.4oC and the growing season has an average of 176 days. The number of growing degree days (i.e., measure of heat accumulation to predict the plant development rate) is around 1,540. The average annual precipitation is about 520 mm where the majority (75%) falls as rain. Precipitation is highest from late spring through summer. The mean annual moisture deficit is nearly 100 mm.

Table 4-1 shows selected climate data for Beausejour collected from 1971 to 2000, which are relevant data for the Tyndall Project area. The mean annual temperature for the Beausejour Station is 2.2oC. The mean annual precipitation is 558.3 mm with 432 mm occurring as rainfall. The moisture and heat energy available for crop growth in the area are sufficient to support a wide range of crops adapted to western Canada (Land Resource Unit 1999). Climate information is summarized in Appendix B.

Table 4-1: Selected Climate Data* for the Town of Beausejour

Parameters	Year	June – Aug.	May – Sept.	July	Jan.
Temperature ^{0}C	2.2	17.9	15.5	19.1	-18.5
Precipitation (mm)	558.3	236.8	353.3	70.4	25.8
Rain/Snow (mm/cm)	432/126.3	236.8/0	352.5/0.9	70.4/0	0.3/25.6

*Source: Environment Canada (2012).

4.2.2 Geology and Physiography

The bedrock in the Project area is from the Ordovician period and belongs to the Selkirk Member of the Red River Formation (Lauhn-Jensen 1987). The geology consists of mottled dolomitic limestone (Tyndall Stone), cherty high-calcium limestone, and grades northward to dolomite. Tyndall Stone occurs in the lower half of the Selkirk Member and is 43 m thick (Coniglio, n.d.). The depth to bedrock is shallow (about 6 m) in the Garson-Tyndall area (Michalyna et al. 1975).

Throughout the Tyndall Stone are many fossils of ancient marine life. The most common fossils found are the corals, particularly the sunflower corals. Also found are brachiopods, gastropods, and cephalopods. Fossils of snails and nautiloids can sometimes reach large sizes. The trilobite, the dominant form of the lower Paleozoic, is only occasionally found (Gillis Quarries Ltd. n.d.)

Physiographically, the Rural Municipalities of St. Clements and Brokenhead are located in the Southeastern Plain, Lac du Bonnet Plain, and Red River Valley. The Southeastern Plain is gently undulating to slightly ridged, while the Lac du Bonnet Plain and Red River Valley are level to gently sloping landscapes (Agriculture and Agri-Food Canada 1999a, 1999b).

4.2.3 Soils and Terrain

Soil materials in the Rural Municipalities of St. Clements and Brokenhead were deposited during the time of glacial Lake Agassiz. The Southeastern Plain in the area is characterized by thin, clayey lacustrine deposits underlain by loam textured, stony glacial till. Sandy to clayey sediments and areas of deep sand to gravel glaciofluvial outwash and loamy till deposits characterize the Lac du Bonnet Plain. The Red River Plain consists of deep clayey lacustrine sediments (Agriculture and Agri-Food Canada 1999a, 1999b).

Soils generally found in the Rural Municipalities of St. Clements and Brokenhead consist of Black Chernozems that are found on imperfectly drained sites and Humic Gleysols that occur on more poorly drained sites. Dark Grey Chernozems, weakly developed Brunisols and Gray Luvisols can also be found in the study area and often are found on rapid to imperfectly drained

sites with sandy materials. Inclusions of organic soils which are characterized by shallow to deep deposits for forests and fen peat can also be found in the study area.

The Winnipeg Region Soil Survey (Michalyna et al. 1975) provides information on the specific soil series that are found in the study area. The dominant soil is the Marquette Series which is characterized by imperfectly drained Gleyed Rego Black soils found on thin, fine textured, moderately to strongly calcareous glacial till.

These soils typically have a dark gray Ah horizon (20 to 40 cm thick) underlain by a dark gray to gray ACk horizon (8 to 20 cm) over an olive gray C horizon. These soils are generally found on gently sloping sites where runoff is moderately slow and vegetation generally consists of tall prairie grassland, herbs and some aspen. Other inclusions of Rego Black soils, found in the study area are from the Isafold Series which are similar to the Marquette series but lack the gleying properties.

The Isafold series have a very dark gray Ah horizon (12 to 20 cm thick) over a light gray to white extremely calcareous loamy till deposit. These soils are moderately stony and occupy gently sloping, well drained ridges and knolls. Runoff is generally moderate; permeability of these soils is moderate to moderately slow. Native vegetation on these soils consists of mixed prairie grasses, open stunted aspen and bur oak.

Orthic Dark Gray and Dark Gray soils found in the Project area include the Libau and Pelan Soil Series. These soils series have developed on thin moderately to strongly calcareous lacustrine or deltaic deposits over strongly to extremely calcareous till. A variant of the Libau soils is found which is characterized by very stony till. Both soil series may have a dark gray to gray Ahe (6 to 15 cm thick), followed by a Bt horizon in the Libau series (20 to 30 cm thick) and a B horizon in the Pelan series (15 to 45 cm thick) overlaying a strongly to extremely calcareous till. The Pelan soil series may also have a partially decomposed leaf mat on top of the Ahe horizon.

Topography found where these soils occur is described as gently sloping. Runoff is classified as being slow to moderate and drainage as moderately slow. Vegetation found growing on the Libau series consists of trembling aspen with bur oak, hazel and native grasses and the Pelan series is vegetated with trembling aspen, balsam poplar, dogwood and willow.

Inclusions of a variant of the Gross Isle series are also found in the Project area and are characterized as Orthic Black soils that have developed on a thin layer of fine textured lacustrine clay over extremely calcareous loamy till. These soils have a dark gray Ah horizon (10 to 20 cm thick) followed by a Bm horizon (10 to 15 cm thick) over a loamy to clay till and are moderately stony. These soils can be found on gentling sloping topography and runoff is moderate with drainage characterized as being moderate to moderately slow. Native vegetation found on these soils consists of tall prairie grasses, trembling aspen and bur oak.

Throughout the study area, inclusions of soils that occur in wet depressional areas can also be found. Soils in these areas are represented by the Kline or Cayer series. The Kline series is classified as being a Rego Humic Gleysol that has developed on thin, fine textured, moderately to strongly calcareous lcautrine deposits over stony, extremely calcareous loamy glacial and water modified till deposits. These soils are found in level to depressional areas where runoff is

slow and drainage is very slow. Partially decomposed organic layers (5 to 15 cm tick) are characteristic of these soils followed by a very gray to dark gray Ah horizon (10 to 15 cm thick) over a dark gray to olive gray calcareous C Horizon. A variant of the Kline Soil series can also be found in the study area that has all the characteristics of the Kline soil series with a peat layer above the mineral soil that is 15 to 40 cm thick. The peat is classified as being moderately decomposed and humified. Vegetation found on the Kline soils consists of meadow grasses, sedge with some willow and balsam poplar.

The Cayer soil series occur in areas of poor to very poorly drained depressional sites and are characterized as Terric Mesisols (Organic soils) that are comprised of decomposed herbaceous fen peat over moderately to strongly calcareous, medium to fine textured deposits. The organic soils consist of reddish brown to dark brown material near the surface. At the contact of mineral soil, a thin black Ah horizon is found and is underlain by dark greenish gray sediments. Vegetation on these sites consists of sedges, reeds, meadow grasses, swamp birch and willow.

4.2.4 Surface Water

The Project area is situated in the Cooks-Devils Creek Watershed and Red River Drainage Basin. The Gimli Ecodistrict has little relief however a significant change occurs at Birds Hill which rises about 30 m above the surrounding area; local relief also occurs along the rivers of five to 10 m (Smith et al. 1998). The Project area encompasses Devils Creek and Dubas Creek; Cooks Creek occurs immediately west of the Project area. These creeks drain into the Red River and ultimately Lake Winnipeg, which is part of the Nelson River drainage system. In the proposed Project area, a Cooks-Devils integrated watershed management plan encompasses the area of land which contributes water to Cooks and Devils creeks.

Other rivers that occur in the vicinity include the Brokenhead River to the east, Satans Creek to the south, and the Red River to the west. Lake Winnipeg occurs approximately 40 km to the north.

The water quality in the drainage basin is affected by factors including effluents and runoff from agricultural activities, industrial wastes, and municipal wastes (Manitoba Hydro 2006b). Above normal levels for iron and phosphorus, and occasional exceedences of copper and lead have been recorded in water samples collected (Manitoba Hydro 2006b). The waters of Cooks Creek and the Red River have similarly high concentrations of suspended sediment and high turbidities resulting in restricted light penetration within the water bodies (Windsor et al. 2005).

The proposed route for the 115 kV Transmission Line would cross Dubas Creek in the NW Quarter of Section 17, Township 13, Range 6, and would cross and travel along Devils Creek in the NE Quarter of Section 10, Township 13, Range 6. The transmission line would cross Devils Creek again at the NW and SW Quarters of Section 11, Township 13, Range 6. Transmission line access at creeks and water quality was identified as concerns during the Round One Public Open House for the Tyndall Project.

Waste water stabilization ponds occur in the NW and SW Quarters of Section 15, Township 13, Range 6, adjacent to Devils Creek. The distance from the proposed transmission line route to the stabilization pond is approximately 600 m. Waste water ponds are also located in the NW Quarter of Section 11, Township 13, Range 6, northeast of the proposed DSC site. The distance of the proposed transmission line route from the water ponds is greater than 200 m. Drainage ditches occur throughout the Project area, and some support standing water which was observed during the site reconnaissance.

4.2.5 Groundwater

Within the Rural Municipalities of St. Clements and Brokenhead, three types of ground aquifers can be found: carbonate aquifers, sandstone aquifers, and sand and gravel aquifers (Rutulis 1973, Rutulis 1974). Within the Project area, only the carbonate aquifers occur in the Rural Municipalities of St. Clements and Brokenhead.

According to Rutulis (1973), the carbonate aquifers in the Rural Municipality of St. Clements are comprised of carbonate rock and the depth to the aquifer ranges from 6 to 23 m. The depth to the water bearing zone of these aquifers is within the upper 15.2 m of the rock. South of Devils Creek, the carbonate rock tends to be less permeable than the rock north of Devils Creek and as a result well yields tend to be lower but are adequate for domestic use.

Domestic well depth ranges from 15 m to more than 30 m. Groundwater is found to be readily available throughout the municipality and yields from a majority of the domestic wells are approximately 38 litres per minute. Water quality is characterized as being fairly good to good quality; dissolved solid concentrations range from 400 to 800 parts per million and the hardness of the water ranges from 300 to 600 parts per million.

The carbonate aquifers in the Rural Municipality of Brokenhead are comprised of carbonate rock and these aquifers are main sources of groundwater in the western part of the municipality (Rutulis 1974). The depth to the carbonate aquifers ranges from 12.2 to 21.3 m and near Garson the water bearing zone of the rock is approximately 3 to 6 m below the top of the rock. Within the carbonate rocks, a fractured zone occurs in the upper 1.5 to 6 m which is a water bearing zone and as a result wells are commonly drilled only 6 m into the rock.

Water quality is characterized as being good quality and the hardiness of the water ranges from 400 to 500 parts per million. Concentrations of the total dissolved solids in the water is less than 1000 parts per million. Ground water supply in the municipality is considered to be adequate for thousands of homes, and through proper planning, can be adequate for industrial or other municipality requirements.

Near Garson, flowing wells (or areas where water levels in wells rise above the surface of the ground) can be found. Flowing wells can create problems such as icing of drains on streets, damage to roads/bridges, basement flooding and damage to buildings. Flowing wells tend to be the result of initial wells not being drilled deep enough or improper construction of the wells (Rutulis 1974).

Groundwater pollution hazard areas exist where aquifers are found at or near the ground surface and septic tank wastes can readily infiltrate the water bearing zone. Groundwater pollution hazard areas found near the Community of Garson only have a few feet of surficial deposits overlying the carbonate rock in these areas (Rutulis 1973). Several groundwater pollution hazard areas are found in the Rural Municipality of Brokenhead including at and near the Community of Tyndall, where carbonate rocks are close to the ground surface (Rutulis 1974).

More recent literature (Manitoba Clean Environment Commission 2003) has indicated that in the Tyndall-Garson area, contamination of the ground water (upper aquifer) has occurred as a result of saturated septic fields and surface runoff. Previously, the water and sewer services in these communities were comprised primarily of private wells, septic tanks and fields, and pump-out holding tanks. As of 2010, residents (LUD of Tyndall-Garson) were required to connect to the municipal water and sewer system as mandated by By-Law No. 2079-08, as a result of a Boil Water Advisory to private wells in the Tyndall-Garson area in 2000 due to presence of bacterial contamination. Municipal water is supplied by a well located beneath the Water Treatment Plant located in Henryville at 34046 Mile 73N (Rural Municipality of Brokenhead Website).

4.2.6 Vegetation

The vegetation within the Project area lies within the Manitoba Lowlands Section (Rowe 1959) which is bound by the Aspen-Oak Section to the west and the Nelson River Section to the east. The vegetation in this section typically consists of scrubby stands of trembling aspen (Populus tremuloides) on poor sites (stony soils) which can limit land use. Trembling aspen, white spruce (Picea glauca), balsam poplar (Populus balsamifera) and sometimes in mixture with balsam fir (Abies balsamea) and white birch (Betula papyrifera) occur on the better-drained sites bordering rivers and creeks.

Also present in the section are bur oak (Quercus macrocarpa), jack pine (Pinus banksiana), elm (Ulmus americana), green ash (Fraxinus pennsylvanica), Manitoba maple (Acer negundo), and eastern white cedar (Thuja occidentalis). Poorly drained sites support black spruce (Picea mariana) and tamarack (Larix laricina) trees as well as swamps and meadows.

Forests and grassland areas in the Project area represent a minor component of the land cover; agriculture dominates the land use. A field assessment at the proposed Project site was undertaken October 1, 2012 by Szwaluk Environmental Consulting to survey the flora and record any observed species of conservation concern. As a result of no land owner permission to access the properties at the time of the survey, assessments were completed roadside.

The majority of the land cover consisted of cultivated land or land that occupied crops, hay fields, and stubble land that has not been cultivated for the season. Pastures that occupy cattle were also present in the Project area. Non-agricultural land supported occasional stands of trees that are estimated to be 8 to 32 ha in size; one stand of approximately 130 ha occurs in

the south east portion of the Project area. Area calculations were based on ocular estimates using orthoimagery of the Project area. Forest stands typically were of trembling aspen with tall shrubs and grasses.

Other trees observed included bur oak, balsam poplar, cottonwood (*Populus deltoides*) and white spruce. Shrub species recorded included willows (*Salix spp*.), red-osier dogwood (*Cornus sericea*), snowberry (*Symphoricarpos albus*) and prickly rose (*Rosa acicularis*). Ditches adjacent to forest and agricultural areas commonly supported grasses such as common reed (*Phragmitis australis*), marsh reed (*Calamagrostis canadensis*) and smooth brome (*Bromus inermis*). Trees in the Project area also exist around residences and occur as shelterbelts.

The decommissioned Canadian Pacific Rail line, through the Project area, supported young trees and tall shrubs of trembling aspen and bur oak. Also observed were northern bedstraw (*Galium boreale*), Canada goldenrod (*Solidago canadensis*), smooth wild strawberry (*Fragaria virginiana*), giant hyssop (*Agastache foeniculum*) and smooth brome.

Also present in the Project area were locations of meadow grasses mixed with low shrubs and herbs. These areas were observed in the northeast and southeast portions of the Project area.

A list of plant species observed in the Project area is found in (Appendix C). Eleven species of the flora observed roadside were non-native or introduced plants. The high proportion of introduced plants reflects the anthropogenic nature of the land.

4.2.7 Fish

Creeks and rivers in the vicinity of the proposed Project support a variety of aquatic species. According to the Selkirk and District Planning Area Board (2010), major fish habitats include the Red River, Netley Creek, Wavey Creek, Cook's Creek, Devils Creek and the Netley-Libau Marsh. Several assessments have been completed in the watershed regarding aquatic habitat, and fish species composition and abundance (Baker 1996a, Baker, 1996b, Baker and Horne 1994, Eddy et al. 2000a, Eddy et al. 2000b, and Zrum and Lawrence 2000).

The Red River is known to support habitat for approximately 70 species of fish and some of the more common species include walleye (*Sander vitreus*), sauger (*Sander canadensis*), channel catfish (*Ictalurus punctatus*), goldeye (*Hiodon alosoides*), freshwater drum (*Aplodinotus grunniens*), white bass (*Morone chrysops*), white sucker (*Catostomus commersoni*), carp (*Cyprinus carpio*), emerald shiner (*Notropis atherinoides*), spottail shiner (*Notropis hudsonius*), and troutperch (*Percopsis omiscomaycus*) (Manitoba Hydro 2006b).

Cooks Creeks is one of the few tributaries of the lower Red River. The lower reaches of the creek provides habitat for a variety of aquatic biota that is believed to be used for feeding, rearing, over-wintering and spawning (Windsor et al. 2005). Cooks Creek supports a diverse fish community that varies seasonally in species abundance and composition (Manitoba Hydro 2006b). In 2000, spring studies identified 16 species with white sucker, freshwater drum and

sauger being the most abundant species; 27 species were identified in the summer (Eddy et al 2000a, Eddy et al. 2000b).

Cooks Creek also provides very good habitat for fish spawned locally and for post larval fish moving into the creek from the Red River. Young-of-the-year occupying the creek included walleye, sauger, channel catfish, goldeye, white sucker, freshwater drum, white bass, black bullhead (*Ameiurus melas*), quillback (*Carpiodes cyprinus*) and black crappie (*Pomoxis nigromaculatus*) (Manitoba Hydro 2006b).

The Selkirk and District Planning Area Board (2010) recognize the importance of recreational fishing along the rivers and tributaries significant to the Planning Area.

In the Project area, potential fish habitat occurs along the proposed 115 kV transmission line route at Dubas Creek (NW Quarter of Section 17, Township 13, Range 6) and Devils Creek crossings (NE Quarter of Section 10 and NW and SW Quarters of Section 11, Township 13, Range 6). Devils Creek was identified as fish habitat in a report prepared by the Manitoba Clean Environment Commission (2003) and was identified as a spawning area at the Round One Public Open House for the Tyndall Project.

No fish habitat occurs at the proposed tapping location at TS44 or the proposed DSC location.

4.2.8 Amphibians and Reptiles

Amphibians that are expected to occur and have their distribution overlap with the Project area according to Preston (1982) include the spring peeper (*Pseudacris crucifer*), eastern American toad (*Anaxyrus americanus americanus*), Canadian toad (*Anaxyrus hemiophrys*), gray treefrog (*Hyla versicolor*), Cope's treefrog (*Hyla chrysoscelis*), boreal chorus frog (*Pseudacris maculata*), wood frog (*Lithobates sylvaticus*), northern leopard frog (*Lithobates pipiens*), common mudpuppy (*Necturus maculosus maculosus*) and blue-spotted salamander (*Ambystoma laterale*).

Reptiles that have their distribution overlap with the Project area include the red-sided gartersnake (*Thamnophis sirtalis parietalis*), plains gartersnake (*Thamnophis radix*), northern red-bellied snake (*Storeria occipitomaculata occipitomaculata*), eastern snapping turtle (*Chelydra serpentina serpentina*) and western painted turtle (*Chrysemys picta belli*) (Preston 1982).

No amphibians or reptiles were observed in the Project assessment area at the time of the site visits on September 24 and October 1, 2012.

4.2.9 Mammals

Acording to Smith et al. (1998), the region provides habitat for white-tailed deer (*Odocoileus virginianus*), moose (*Alces alces*), black bear (*Ursus americanus*), coyote (*Canis latrans*) and snowshoe hare (*Lepus americanus*).

The Selkirk and District Planning Area, which includes the Project area, occupies an abundance of wildlife habitat ranging from marginal to high quality (Selkirk and District Planning Area Board 2010). Over 40 mammal species were previously observed nearby in Birds Hill Provincial Park (Manitoba Conservation 2012). Occasional beaver damming along Dubas Drain was identified at the Public Open House for the Tyndall Project.

The land capability for wildlife has slight to moderately severe limitations to the production of deer (Canada Land Inventory 1971). Capability of lands in the Garson area is moderately high but may be decreased in some years. Limitations are due to adverse topography, and soil fertility or lack of nutrients for optimum plant growth.

In the Tyndall area, capability of the lands are moderately low. Limitations are due to soil moisture, and adverse topography. According to Smith et al. (1997), the white-tailed deer is especially well established in the region where populations have benefited from the mixture of agricultural lands and deciduous forests which provides a varied habitat for this species. As of 2005, the deer herd size was approximated to be 600 animals nearby at Birds Hill Provincial Park, including deer living just beyond the park boundaries (Manitoba Conservation 2012).

No mammal species were observed in the local Project area at the time of the assessment on September 24 and October 1, 2012. At the Round One Public Open House for the Tyndall Project, it was noted that black bears have been previously observed in the Project area.

4.2.10 Birds

The region contains extensive habitat for ruffed grouse (Bonasa umbellus) and waterfowl (Smith et al. 1997). The land capability for wildlife in the Project area has moderate limitations to the production of waterfowl (Canada Land Inventory 1969). Water areas in the region are predominantly temporary ponds or waters with poorly developed marsh edges. Limitations of these lands are a result of adverse topography, and landforms with poor distribution of marshes which may prevent the development of optimum waterfowl habitat.

More than 200 bird species were previously observed near the Project area in Birds Hill Provincial Park (Manitoba Conservation 2012). Bird species that can be observed in the area are provide in Table 4-2.

Table 4-2: Bird Species ranging in the project study area

Common Name	Scientific Name
Ruffed grouse	
Turkey vulture	*Cathartes aura*
Cooper's hawk	*Accipiter cooperii*
Wilson's snipe	*Gallinago delicata*
American woodcock	*Scolopax minor*
Great horned owl	*Bubo virginianus*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Northern flicker	*Colaptes auratus*
Least flycatcher	*Empidonax minimus*
Red-eyed vireo	*Vireo olivaceus*
Tree swallow	*Tachycineta bicolor*
Sedge wren	*Cistothorus platensis*
Eastern bluebird	*Sialia sialis*
Cedar waxwing	*Bombycilla cedrorum*
Yellow warbler	*Dendroica petechia*
American redstart	*Setophaga ruticilla*
Northern waterthrush	*Parkesia noveboracensis*
Eastern towhee	*Pipilo erythrophthalmus*
Savannah sparrow	*Passerculus sandwichensis*
Lark sparrow	*Chondestes grammacus*
Le Conte's sparrow	*Ammodramus leconteii*
Indigo bunting	*Passerina cyanea*
Pine siskin	*Carduelis pinus*

Bird species observed in the Project area during site visits on September 24 and October 1, 2012 included:

- Canada geese (*Branta canadensis*),
- snow geese (*Chen caerulescens*),
- red-tailed hawk (*Buteo jamaiceusis*),
- killdeer (*Charadrius vociferus*),
- black-billed magpie (*Pica hudsonia*),
- dark-eyed junco (*Junco hyemalis*),
- sparrows, and
- warblers

Sighting of a bald eagle (*Haliaeetus leucocephalus*) was identified by an attendee at the Round Two Public Open House for the Tyndall Project. Bird habitat in the Project area includes tree and shrubs areas, pastures and ditches.

4.2.11 Species at Risk

The term "species of conservation concern" includes species that are rare, disjunct, or at risk throughout their range or in Manitoba and in need of further research (Manitoba Conservation Data Centre website). These species are listed by the Manitoba Conservation Data Centre (MBCDC) as very rare to uncommon. The term species of conservation concern also encompasses species that are listed under The Endangered Species Act (MBESA), or that have a special designation by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or the Species at Risk Act (SARA).

A search of the MBCDC database (Appendix D) in the fall of 2012 indicated one record for a species of concern (loggerhead shrike) previously known in the general Project area (Table 4-3). Loggerhead shrike (*Lanius ludovicianus migrans*) is listed by COSEWIC, SARA, and the MBESA as endangered meaning this is a species facing imminent extirpation or extinction. The MBCDC ranks this species as very rare throughout its range or in the province.

According to the Selkirk and District Planning Area Board (2010), there are three species designated at risk under the MBESA in the Planning Area, which encompasses the Project area. The species are: loggerhead shrike, piping plover (*Charadrius melodus*), and western silvery aster (*Symphyotrichum sericeum*).

Table 4-3: Species of Conservation Concern in the Vicinity of the Proposed Project

Scientific Name	Common Name	COSEWIC	SARA	MBESA	MBCDC
Lanius ludovicianus migrans	Loggerhead Shrike	Endangered	Endangered	Endangered	S1B

Note: Provincial (S) rank range from 1 to 5 (MBCDC).
1. Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals). May be especially vulnerable to extirpation.
B. Breeding status of a migratory species.

The chestnut lamprey (*Ichthyomyzon castaneus*) is a parasitic species that spends its entire life in fresh waters of lakes and rivers of various sizes and is found only in North America. In Canada, it is found in Saskatchewan, Manitoba, Ontario and Quebec. Records have identified that the chestnut lamprey was observed in Devils Creek in 1983, which runs through the Project area, and the chestnut lamprey is listed as special concern by COSEWIC and SARA (COSEWIC 2010).

The MBCDC lists flora and fauna of conservation concern in the Interlake Plain Ecoregion (Appendix E)); this ecoregion encompasses the Project area. These species include four animal assemblages, seven invertebrate animals, 37 vertebrate animals, six terrestrial communities,

and 98 vascular plants. Species listed by MBESA, SARA and COSEWIC are included in Table 4-4.

No plant or animal species of conservation concern listed by the MBCDC (very rare to uncommon), MBESA, COSEWIC, or SARA were observed during site visits conducted on September 24 and October 1, 2012.

Table 4-4: Plant species listed by MBESA, SARA and COSEWIC

Scientific Name	Common Name	MBESA	SARA	COSEWIC
Agalinis aspera	Rough Agalinis	Endangered	Endangered	Endangered
Agalinis gattingeri	Gattinger's Agalinis	Endangered	Endangered	Endangered
Buchloë dactyloides	Buffalo Grass	Threatened	Threatened	Threatened
Celtis occidentalis	Hackberry	Threatened	-	-
Chenopodium subglabrum	Smooth Goosefoot	Endangered	Threatened	Threatened
Cypripedium candidum	Small White Lady's-slipper	Endangered	Endangered	Endangered
Dalea villosa	Hairy Prairie-clover	Threatened	Threatened	Threatened
Platanthera praeclara	Western Prairie Fringed Orchid	Endangered	Endangered	Endangered
Solidago riddellii	Riddell's Goldenrod	Threatened	Special Concern	Special Concern
Spiranthes magnicamporum	Great Plains Ladies'-tresses	Endangered	Enangered	-
Symphyotrichum sericeum	Western Silvery Aster	Threatened	Threatened	Threatened
Tradescantia occidentalis	Western Spiderwort	Threatened	Threatened	Threatened
Veronia fasciculata	Western Ironweed	Endangered	-	-
Veronicastrum virginicum	Culver's-root	Threatened	-	-

4.3 Socio-Economic Environment

The proposed Tyndall 115 kV Transmission Line and DSC Project is located in the Rural Municipalities of St. Clements and Brokenhead in east-central Manitoba. Information on municipalities and communities was obtained from municipal websites, Manitoba Community Profiles and Statistics Canada 2006 and 2011 census profiles.

4.3.1 Municipalities

The proposed Tyndall 115 kV Transmission Line and DSC is located in the Rural Municipalities of St. Clements and Brokenhead, and is bounded by the Rural Municipalities of Alexander, Lac Du Bonnet, Reynolds and Springfield.

4.3.1.1 Municipality of Brokenhead

The Rural Municipality of Brokenhead covers an area of 75,436 ha and is located in eastern Manitoba northeast of the City of Winnipeg. The Municipality was incorporated in 1900 and is named for the Brokenhead River which passes through the region. It is comprised of eight Townships, which encircle the Town of Beausejour. The Town is the largest population and service centre with smaller concentrations of people resident in the local urban districts of Tyndall and Garson, and the hamlets of St. Ouens, Dencross, Lydiatt and Ladywood. The DSC component of the proposed Project is located in the western portion of the Municipality.

Population data for the Rural Municipality of Brokenhead for 2006 and 2011, and percent population change between 2006 and 2011 are outlined on Table 4-5. The population of the community has increased 17.6% from 1996 to 2011. There are 1,944 private dwellings and the population density is 6.2 residents/km2 (2011 Census, Statistics Canada, 2012). Age characteristics of Brokenhead residents are illustrated in Figure 4-1.

Table 4-5: Population Summary for the Rural Municipality of Brokenhead

2006 Population	2011 Population	% Population Change 2006-2011	Private Dwellings	Total Area km^2	Population Density /km^2
3,940	4,635	17.6	1,944	750.54	6.2

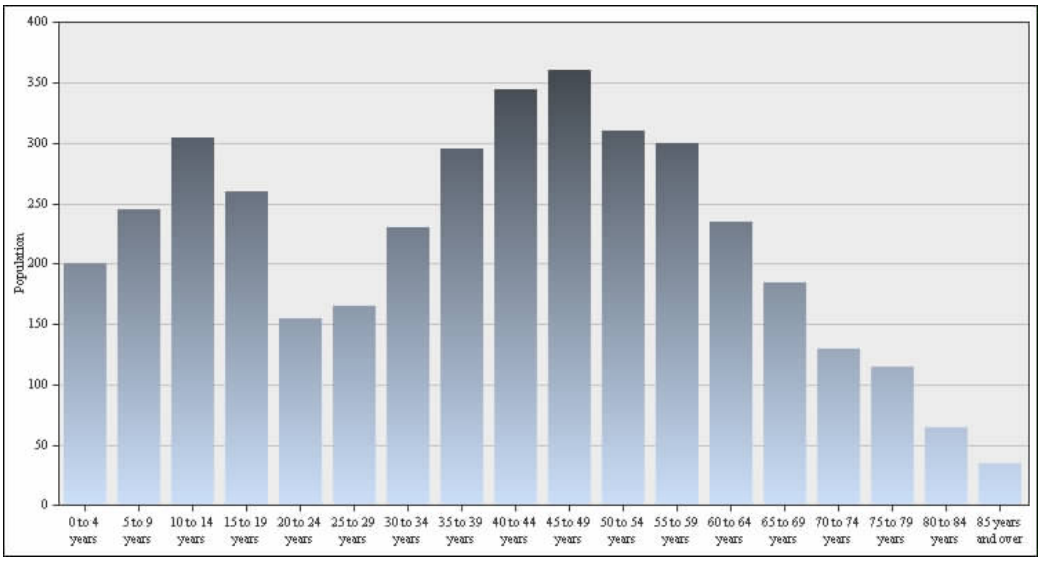

Figure 4-1 :Age Characteristics for the RM of Brokenhead – Sexes Combined (1996 Census, Statistics Canada).

4.3.1.2 Municipality of St Clements

The Rural Municipality of St. Clements covers an area of 86,533 ha located at the south end of Lake Winnipeg. It includes a narrow strip of land extending along the east side of the Red River to within 8 km of the City of Winnipeg. The Towns of Birds Hill and East Selkirk are the largest population and service centres with smaller concentrations of people resident in Garson, Grand Marais, Beaconia and the Brokenhead Ojibway Nation and the hamlets of Grand Beach, Balsam Bay, Libau, Glenmoor and Greenwall. Grand Beach Provincial Park on the east shore of Lake Winnipeg and a portion of Birds Hill Provincial Park are located in the municipality. The 115 kV Transmission Line component of the proposed Project is located in the eastern portion of the Municipality.

The Province of Manitoba passed legislation and allowed the formation of the Rural Municipality of St. Clements on July 7, 1883. The boundary of this new municipality consists of all the portion of the County of Lisgar, from the Red River to the line between Ranges 8 and 9, East, on the east, in Townships 13 to 18, both inclusive, whole or fractional with those portions of the parishes of St. Peters, St. Andrews, and St. Clements, and the First Nation lying east of the Red River, and Townships 19 and 20, Ranges 7 and 8 East fractional, east of Lake Winnipeg. The "town" of East Selkirk was absorbed into the Municipality of St. Clements in 1904.

Population data for the Rural Municipality of St. Clements for 2006 and 2011, and percent population change between 2006 and 2011 are outlined on Table 4-6. The population of the community has increased 10.7% from 1996 to 2011. There are 5,191 private dwellings and the population density is 14.4 residents/km2 (2011 Census, Statistics Canada, 2012). Age characteristics of St. Clements residents are illustrated in Figure 4-2.

Table 4-6: Population Summary for the Rural Municipality of St. Clements

2006 Population	2011 Population	% Population Change 2006-2011	Private Dwellings	Total Area km^2	Population Density/km^2
9,706	10,505	8.2	5,191	728.65	14.4

4.3.2 Communities

The closest communities to the proposed Tyndall 115 kV Transmission Line and DSC Project are the local urban districts of Tyndall and Garson, and the Town of Beausejour. Larger communities in the region include the cities of Winnipeg and Selkirk while smaller communities include East Selkirk, Oakbank, Lac Du Bonnet and Pinawa.

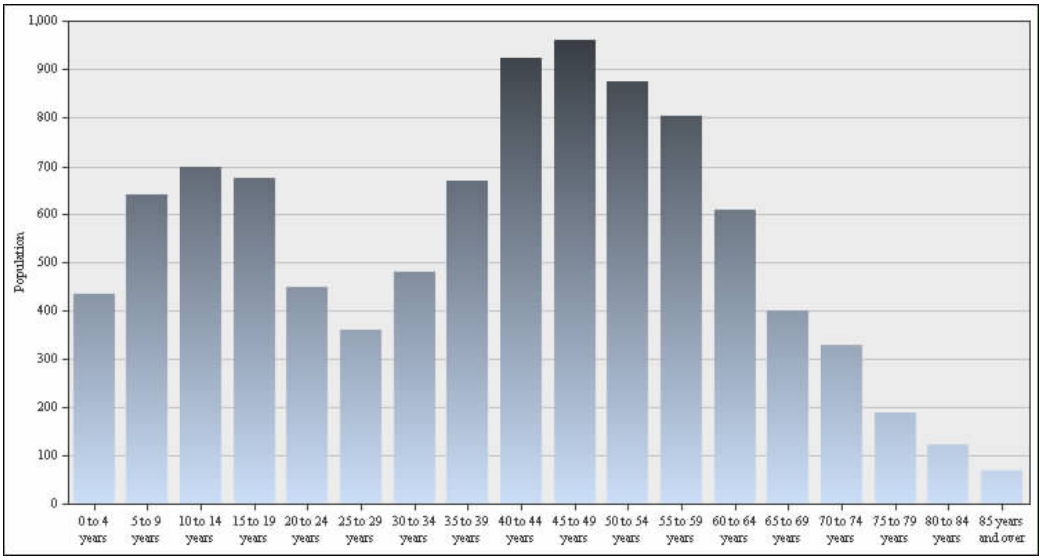

Figure 4-2: Age Characteristics for the RM of St. Clements – Sexes Combined (1996 Census, Statistics Canada).

4.3.2.1 Tyndall (Local Urban District)

The Local Urban District of Tyndall was founded in 1893 and is situated in the Rural Municipality of Brokenhead and is located 10 km west of the Town of Beausejour. Tyndall is well known for "Tyndall Stone" which has been mined from nearby quarries since 1832 and has been used in building construction and finishing throughout Canada and many other countries. The name Tyndall Stone is derived from the name of the railway shipping point, approximately 3 km east of Garson, from which the stone was originally shipped (Welsted et al. 1996). The proposed Tyndall 115 kV Transmission Line and DSC Project would be immediately northwest of Tyndall

(Map 2-1). Population data for Tyndall from 2006 and 2011, and percent population change between 2006 and 2011 are outlined on Table 4-7. The community population has increased 13.1% from 1996 to 2011. There are 314 private dwellings and the population density is 372.8 residents/km2 (2011 Census, Statistics Canada, 2012).

Table 4-7: Population Summary for the Community of Tyndall

2006 Population	2011 Population	% Population Change 2006-2011	Private Dwellings	Total Area km^2	Population Density/km^2
734	830	13.1	314	2.23	372.8

4.3.2.2 Garson (Local Urban District)

The Local Urban District of Garson was incorporated as a Community in 1915 and is situated in the Rural Municipality of Brokenhead and is located 13.5 km west of the Town of Beausejour. The community was named after William Garson who was the founder of the limestone quarry in the region during the early 1900s. Garson, along with the neighbouring community of Tyndall, has provided the famous fossil-filled Tyndall Stone. Tyndall Stone is produced in Garson at a plant which was built in 1968 and consolidated in 1977. The proposed Tyndall 115 kV Transmission Line and DSC Project would be immediately north of Garson (Map 2-1). Population data for Garson from 2006 and 2011, and percent population change between 2006 and 2011 are outlined on Table 4-8. The population of the community has increased 49.1% from 1996 to 2011. There are 199 private dwellings and the population density is 490.1 residents/km2 (2011 Census, Statistics Canada, 2012).

Table 4-8: Population Summary for the Community of Garson

2006 Population	2011 Population	% Population Change 2006-2011	Private Dwellings	Total Area km^2	Population Density/km^2
324	483	49.1	199	.99	490.1

4.3.2.3 Beausejour (Town)

The Town of Beausejour is located on PTH 44, 60 km northeast of the City of Winnipeg and 13.5 km east of the Community of Tyndall. Beausejour was incorporated as a Town in 1912 The Town is in the forefront of commercial and industrial expansion in eastern Manitoba and is the gateway to Whiteshell Provincial Park. Its proximity to the beaches and to work centres like Winnipeg have led many to consider Beausejour the perfect town to settle in.

The history of Beausejour begins with the Canadian Pacific Railway and the national dream to connect both sides of the country. The railway came into the region in the early 1880's and a

post office was erected shortly after that. Prior to the arrival of the railway, the area was known as “Stony Prairie” once the railway was here it was changed to “Burgoyne Station” and then finally christened “Beausejour”, meaning “beautiful resting place”.

The community enjoys a stable economy based on agriculture and tourism, with grain production being the mainstay of the agricultural activities in the surrounding area. Beausejour has a well-developed infrastructure that supports business and encourages growth. It is the central grain-handling facility for the region. Rail line service, natural gas, hydro, a four-lane highway, a stable tax rate and a fully-serviced industrial park makes Beausejour an attractive location for industrial growth.

A racetrack is located in their community, bringing motocross and snowmobile racing to eastern Manitoba. The Canadian Power Toboggan Championships and Double B Rodeo take place in the Town. Beausejour’s recreational opportunities include an ice arena, 6- sheet curling rink, swimming pool, nature and ski trails, golf course plus a recreational hall. A 30-bed hospital with an attached Primary Care Centre and two medical clinics provide the health care to the region’s residents.

Population data for the Town of Beausejour for 2006 and 2011, and percent population change between 2006 and 2011 are outlined on Table 4-9. The population of the community has increased 10.7% from 1996 to 2011. There are 1,470 private dwellings and the population density is 584.4 residents/km2 (2011 Census, Statistics Canada, 2012). Age characteristics of Beausejour residents are illustrated in Figure 4-3.

Table 4-9: Population Summary for the Town of Beausejour

2006 Population	2011 Population	% Population Change 2006-2011	Private Dwellings	Total Area km^2	Population Density/km^2
2,823	3,126	10.7	1,470	5.35	584.4

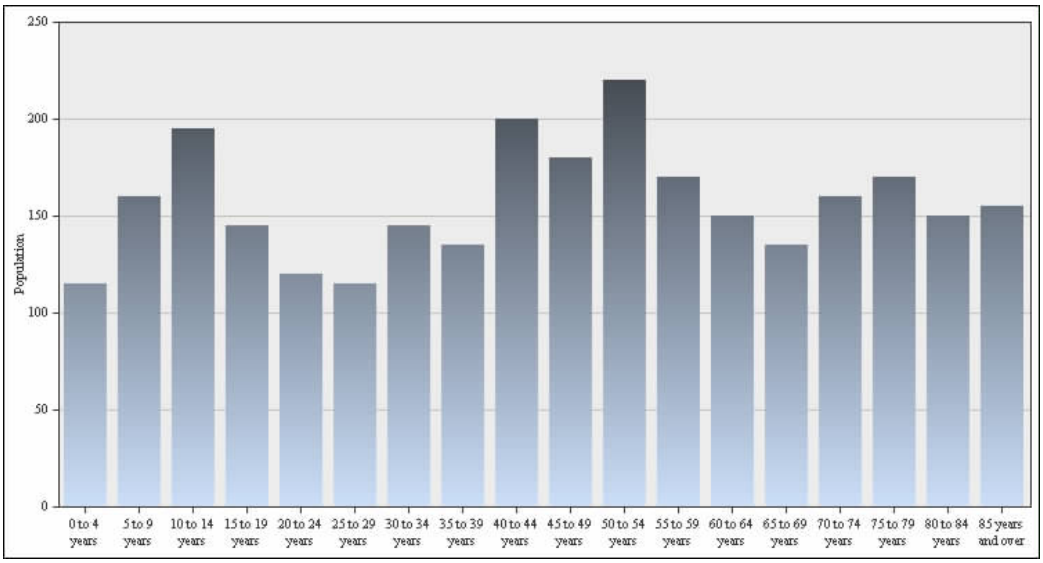

Figure 4-3: Age Characteristics for the Town of Beausejour – Sexes Combined (1996 Census, Statistics Canada).

4.3.2.4 Selkirk (City)

The City of Selkirk is located 25 km northeast of the City of Winnipeg and 27 km east of the Town of Beausejour. PTH 9 (Main Street) passes through Selkirk and veers northwest towards Lake Winnipeg.

The present-day City is near the center of the 530,000 km2 area purchased by the Earl of Selkirk from the Hudson's Bay Company. The first settlers of the Red River Colony arrived in 1813. Although the settlers negotiated a treaty with the First Nations of the area, the commercial rivalry between the Hudson's Bay Company and the North West Company gave rise to violent confrontations between the settlers and the trading companies. In recognition of the Earl's importance in bringing settlers to the region, the town was named Selkirk and incorporated in 1882.

The City of Selkirk, part of the Interlake Region of Manitoba, is separated into east and west by the Red River. The Red River offers a variety of recreation and sporting activities, and provides fertile fields surrounding the city on all sides. Selkirk is known as the “Catfish Capital of North America”. The City hosts manufacturing firms including the multi-national Gerdeau MRM Steel Mill, which employs 450 people. Selkirk businesses range from small to large fabricating and manufacturing firms, providing many products and services to the surrounding area. The Selkirk Mental Health Centre, the largest mental health facility in the province, is a major employer in the City. In addition, Selkirk has a thriving tourism industry, based on its proximity to the Red River and the prime location for trophy catfish fishing.

The Selkirk Marine Museum preserves the history of the area settlement, and the Selkirk Arena and the Selkirk Recreational Complex offer recreational activities and sporting events for the City residents.

Population data for the City of Selkirk for 2006 and 2011, and percent population change between 2006 and 2011 are outlined on Table 4-10. The population of the community has increased 3.4% from 1996 to 2011. There are 4,062 private dwellings and the population density is 395.4 residents/km2 (2011 Census, Statistics Canada, 2012). Age characteristics of Selkirk residents are illustrated in Figure 4-4.

Table 4-10: Population Summary for the City of Selkirk

2006 Population	2011 Population	% Population Change 2006-2011	Private Dwellings	Total Area km^2	Population Density/km^2
9,515	9,834	3.4	4,062	24.87	395.4

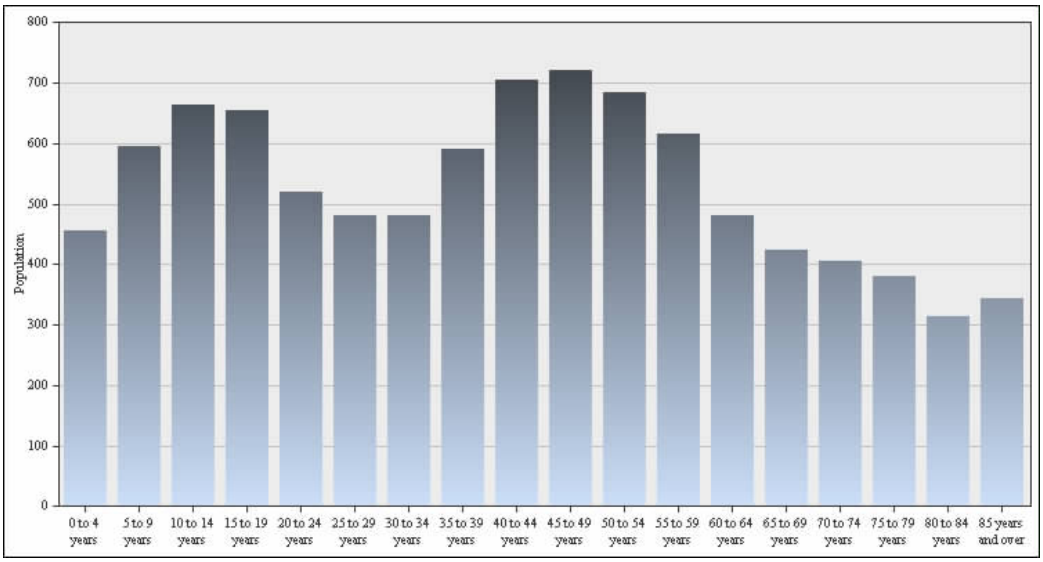

Figure 4-4: Age Characteristics for the City of Selkirk – Sexes Combined (1996 Census, Statistics Canada).

4.5.2.5 Oakbank (Population Centre)

The Population Centre of Oakbank is a small community situated on PH 206, about 15 km east of the City of Winnipeg and 27 km southwest of the Town of Beausejour in the Rural Municipality of Springfield. Oakbank has a population of about 3,000 residents.

4.3.3 First Nations

First Nations in southeast Manitoba that are closest to the proposed Tyndall 115 kV Transmission Line and DSC include:

- Brokenhead Ojibway First Nation
- Peguis First Nation

Of these First Nations, the closest to the proposed Project is the Brokenhead Ojibway Nation located about 26 km to the north. There are no reported Traditional Land Entitlement lands in the area of the proposed Tyndall 115 kV Transmission Line and DSC Project.

4.3.4 Land Use

The proposed Project is located in a mostly agricultural area of southeast Manitoba with transportation and municipal infrastructure, and residential developments. The route of the proposed transmission line occurs along existing roads, former rail line rights-of-way, across agricultural lands, and adjacent to Devils Creek. The DSC will be located on agricultural land. The land use encompasses two Planning Districts for the proposed Project, the Selkirk and District Development Plan By-Law 190-08 and the Brokenhead River Planning District Development Plan By-Law 138-09.

4.3.4.1 Land Use Zoning

The Selkirk and District Development Plan (Selkirk and District Planning Area Board 2010) and the Development Plan for the Brokenhead River Planning District (2012) are based on plans and policies of the districts respecting their purposes and their physical, social, environmental and economic objectives.

The Selkirk and District Development Plan outlines land use designations that apply the policy framework created for resource and agriculture, agricultural restricted areas, rural residential areas, resorts, settlement centres, general development, and industrial and business park. Also included in the Development Plan are land use policies to promote sustainable and regional development, as well as resources, services and infrastructure.

Implementation of the development policies include municipal zoning by-laws, secondary plans, subdivision control procedures, development agreements, public works programs, development and building permits for aspects of the development plan, waste water management plans, truck route restrictions, and by following the principles and guidelines of sustainable development.

The Brokenhead River Planning District Development Plan outlines general policies and land use policies that encourage and explore initiatives which contribute employment opportunities and economic growth that strengthen the community. General policies include economic development, heritage and cultural resources, environmental, transportation, utilities and service, and hazard lands and shoreland protection. Land use policies include agriculture, rural residential, seasonal recreational, residential, commercial, industrial, institutional, and parks and recreation. All policies are guided by specific principles.

4.3.4.2 Commercial, Industrial and Institutional

The Communities of Tyndall and Garson are located approximately 800 m east and 1.6 km west respectively from the proposed DSC location (Map 2-1). The Communities support restaurants, hotels, community centres, a café, church, curling rink, school, daycare, post office, arena, auto motive garage, gas bar, grocery store, sport fishing park, and other specialty shops and businesses.

Gillis Quarries Ltd., a company that quarries and processes Tyndall Stone, is located in Garson with its production facility at nearly 45,000 square feet. Gillis Quarries (previously under the name August Gillis and Sons) began in 1910, and presently occupies over 1800 acres of quarryable land and mineral rights. The plant consists of eight primary saws, three flow through production lines, six gantry saw stations, and four splitting machines that can achieve a high level of productivity for applications including cut stone panels for walls, columns, sills, steps, platforms, copings, and flooring, and random facing for buildings, homes, fireplaces, chimneys, planters, retaining walls, and flagging for walks and patios. Special uses have included Mausoleums, table tops, roof tiles, and souvenirs (Gillis Quarries Ltd. n.d.).

4.3.4.3 Dwellings and Farmsteads

The proposed Tyndall 115 kV Transmission Line and DSC in located near the Communities of Tyndall and Garson, north of PTH 44 along road allowances, agricultural land, an abandoned rail line and adjacent to Devils Creek. The number of dwellings (residences) and farmsteads on the subject sections and surrounding sections based on ocular counts from orthophotographs, topographic maps and Google Earth website are illustrated in Table 4-11.

Dwellings and farmsteads are located along the proposed transmission line route (approximately 10 km) however no dwellings or farmsteads are located on the quarter section of land (SE 10, Township 13, Range 6), north of PTH 44, where the proposed DSC will be situated.

The greatest concentration of dwellings occurs on the SW Quarter Section 11, Township 13, Range 6 due to the proximity of the Community of Tyndall. Fifteen dwellings are located in this section that supports the final segment of the 115 kV Transmission Line before terminating at the proposed DSC.

Table 4-11: Number of Dwellings and Farmsteads on and Adjacent to the Subject Properties

Property Description	Number of Dwellings and Farmsteads
SE Quarter Section 14, Twp 13, Rge 5 EPM	5
NE Quarter Section 14, Twp 13, Rge 5 EPM	0
SW Quarter Section 24, Twp 13, Rge 5 EPM	0
SE Quarter Section 24, Twp 13, Rge 5 EPM	1
SW Quarter Section 19, Twp 13, Rge 6 EPM	0
NW Quarter Section 13, Twp 13, Rge 5 EPM	1
NE Quarter Section 13, Twp 13, Rge 5 EPM	1
NW Quarter Section 18, Twp 13, Rge 6 EPM	0
NE Quarter Section 18, Twp 13, Rge 6 EPM	2
NW Quarter Section 17, Twp 13, Rge 6 EPM	1
NE Quarter Section 17, Twp 13, Rge 6 EPM	2
SW Quarter Section 17, Twp 13, Rge 6 EPM	2
SE Quarter Section 17, Twp 13, Rge 6 EPM	0
SW Quarter Section 16, Twp 13, Rge 6 EPM	0
SE Quarter Section 16, Twp 13, Rge 6 EPM	1
SW Quarter Section 15, Twp 13, Rge 6 EPM	5
NW Quarter Section 10, Twp 13, Rge 6 EPM	3
NE Quarter Section 10, Twp 13, Rge 6 EPM	4
SE Quarter Section 10, Twp 13, Rge 6 EPM*	0
NW Quarter Section 11, Twp 13, Rge 6 EPM	3
SW Quarter Section 11, Twp 13, Rge 6 EPM	15

* North of PTH 44.

4.3.4.4 Mineral and Aggregate Resources

Aggregate sources in the area are derived from gravel deposits and dolomitic limestone bedrock. Aggregate deposits are an important resource required to support municipal and provincial infrastructure requirements and local construction needs. In both Planning Areas

(Selkirk and District Development Plan and Brokenhead River Planning District Development Plan), it is noted that all aggregate deposits and major producing sources of dolomitic limestone shall be protected.

Gillis Quarries Ltd. is a local company that quarries and processes Tyndall Stone in the Garson area. In order to balance the provision of resource development and community interests, the following policies apply: exploration and development shall not contaminate ground water, high potential resource areas shall be protected from land uses that would restrict exploration, and environmental protection measures and a rehabilitation plan will be required prior to approval of resource extraction. A detailed list of policies is provided in the Development Plans for the area (Selkirk and District Planning Area Board 2010; Brokenhead River Planning District Development Plan 2012).

4.3.4.5 Agriculture

Agriculture has a strong presence in the region with the cultivation of grains, livestock operations, grazing, mixed farming, and agricultural related activities. The majority of farms grow grain and oilseed. Agriculture is an important part of the region's history and economic activity and is the dominant land use in the Rural Municipalities of Brokenhead and St. Clements. In the Selkirk and District Planning Area, over three quarters of the soil is classified as prime agricultural land, however the Rural Municipality of St. Clements experienced a 16% decline in annual crop land from 1994 to 2001.

Agricultural objectives in the region are to protect prime agricultural land for food production and diversification, prevent land uses from restricting agricultural operations, and promoting activities that support agricultural operations. Avoidance of agricultural lands for the transmission line was a concern identified during both Round One and Two Public Open Houses for the Tyndall Project.

4.3.4.6 Forestry

Most of the lands in the vicinity of the proposed Project have been cleared for agricultural and residential purposes. Existing stands of deciduous trees occur but are infrequent. Stands are estimated to be 8 to 32 ha in size, with one area in the south east portion of the Project area estimated at 130 ha. Those forests remaining provide wildlife habitat and recreation opportunities for residents. Public input for the Tyndall Project identified the importance of trees in the Project area.

Forestry objectives in the region include management and protection of forested lands, maintenance of benefits accruing from the forest resource sustainably, encouraging responsible use of the forests including best land use practices and soil conservation, sustaining the integrity of the forests, retaining existing tree cover and woodlots to maintain the natural character of the area and any development needs to consider wildlife potential or sensitive

ecological areas (Selkirk and District Planning Area Board 2010; Brokenhead River Planning District Development Plan 2012).

4.3.5 Infrastructure

The proposed Tyndall 115 kV Transmission Line and DSC is located in an agricultural area which has limited infrastructure development. The main infrastructure in the immediate vicinity of the proposed Project includes the PTH 44 to the south, the existing 115 kV transmission lines (TS44, SV24) immediately west of the Project area, the waste water stabilization ponds in the eastern portion of the Project area, and the regional gravel roads grid.

4.3.5.1 Roads

The major highway includes PTH 44 (historically part of PTH 1) located immediately south of the Project area. PTH 44 is a two-lane paved highway oriented in an east-west direction. It begins at Highway 9 (Main St.) in the town of Lockport, just north of Winnipeg. From Lockport the highway travels east, passing through Beausejour before heading south-east after Highway 11.

Provincial Road 212 and a network of mile roads that are gravelled also occur in the Project area. Major roads in the vicinity of the Project area are Highway 59 which is approximately 11 km west from the Community of Garson, and PTH 12 which is approximately 5 km east of Garson.

4.3.5.2 Railway Lines, Airports and Other Infrastructure

An abandoned Canadian Pacific Rail line right-of-way occurs in the Project area that is oriented in northwest to southeast direction. The railway served as the hub bringing supplies in to the area and taking finished products out. This abandoned line was favored (public input) as an option for the proposed transmission line. The closest existing railway to the proposed Project area is the Canadian National Rail line which is located west of PTH 44, approximately 15 km west of the Community of Garson. The closest airport to the proposed Project area is St. Andrews Airport which is located approximately 23 km west of the Community of Garson. The Richardson International Airport is located in the City of Winnipeg, approximately 42 km southwest of the Project area. Waste water stabilization ponds occur in the eastern portion of the Project area.

4.3.5.3 Other Utilities

Transmission and distribution systems of Manitoba Hydro are the major utilities in the region. The utilities system includes a generating station, transmission stations, DSCs and various

transmission lines. The Selkirk Generating Station is a natural gas-fired station located in Selkirk on the side of the Red River, approximately 12 km west of the Project area. Garson Station is located in the Project area and will be decommissioned as a result of the new Tyndall DSC. Other transmission stations in the vicinity of the Project area include the East Selkirk,

Oakbank and Transcona Stations. The closest DSCs to the Project area include Melrose, which was recently constructed, and Seddon's Corner.

Existing 115 kV Transmission Lines are located immediately west of the proposed Project area. The TS44 line runs from the East Selkirk Station to the Transcona Station, and the SV24 runs from the Selkirk Generating Station to the Oakbank Station.

There are also numerous other distribution lines, MTS lines, gas pipelines, and sewer and water lines within and in the vicinity of the Project area.

4.3.6 Parks and Protected Areas

Parks and protected areas in the vicinity of the Tyndall 115 kV Transmission Line and DSC Project include Bird's Hill Provincial Park, Chryplywy Wilderness Park, Sandilands Provincial Forest, Tyndall Centennial Park, and Springhill Winter Sports Park. Parks and protected areas are detailed below under Tourism and recreation.

4.3.7 Tourism and Recreation

The proposed Tyndall Project is located in the Central Region of the Eastman Region of Manitoba. The region extends from the Red River and Lake Winnipeg in the west and the Manitoba-Ontario border in the east. It includes several provincial parks, many recreation areas and facilities, and numerous tourist destinations described below.

Aspen Acres Reindeer Farm and Lapland Centre: This centre located 3.2 km south of Beausejour on PR 302. It contains a live reindeer herd with interpretation of the ancient Laplander (Sami) at the only Sami Cultural Center in Canada

Bird's Hill Provincial Park: Bird's Hill Provincial Park is located 15 minutes north of Winnipeg on Highway 59. Bird's Hill plays host to The Winnipeg Folk Festival every July, which is one of North America's largest most sought after folk music events. Year-round visitors can explore an old homestead, walk along trails or beach shoreline, take a dip in the human-made lake, cycle kilometers of paved roadways, or enjoy a picnic lunch. The human-made lake at Bird's Hill Park is the perfect place for a family water adventure.

Chryplywy Wilderness Park: This 25 ha park in Beausejour features natural woodland, paved walking trails and seasonal cross-country ski trails for the winter enthusiasts.

Dawson Trail: Begin a walk down Dawson Trail from either the town of Ste. Anne or Taché, this trail features rocky and treed paths some along the Seine River. Redemptoriste Park is a popular picnic spot in Ste. Anne to stop for lunch after a hike.

Day Lily Gardens: The Beausejour Day Lily Gardens are the coldest American Hemerocallis Society Display Garden in the world, and are a Manitoba Regional Lily Society Display Garden. Present are two acres with 600 day lily cultivars, 150 different irises, dozens of peonies, hundreds of lilies and other perennials, prairie hardy fruit trees and shrubs, picnic site and game area.

Garson Ponds: These ponds are located just northeast of Tyndall and south of PTH 44. The ponds are former quarry pits and offer year-round sport fishing for trout. The lakes support a bait and tackle store in Garson and an annual fishing derby.

Great Woods Park and Campground: This is a 50 ha park with the Brokenhead River winding through it and campground located just 5 min from the Town of Beausejour.

Sandilands Forest Education Centre: The Sandilands Forest Education Centre, a 121 ha site, contains various forest environments including a black spruce bog, eastern deciduous and jack pine forests. It includes the Beaven Suspension Bridge across the Whitemouth River, self-guiding nature trails, the famous Tree Planting Car, Dawson Ranger Station, a fire tower, a forest museum with displays of local plants and animals, forest conservation and harvesting operations past and present.

Sandilands Provincial Forest This forest has varying landscapes including heavily wooded areas, sand hills, wetlands, and mostly unpopulated crown lands sprawling over 3,000 km2. Visitors can hunt, hike and camp within the park and workers have been logging the area for years. The sand hills were left behind by the last ice age and are known by the names Bedford Hills or Cyprus Hills, and are the second highest point in Manitoba.

Springhill Winter Sports Park: This Park is located 15 min north of Winnipeg off of Highway 59 at Oasis Road. It provides downhill and cross-country skiing, snowboarding, ski and snowboard rentals, professional ski and snowboard lessons, night skiing, Canadian Ski Patrol first aid service, kitchen and licensed bar, private events, quad chair lift, rope tow, terrain park, race run and learning area.

Tyndall Centennial Park: Construction of the Tyndall Centennial Park began in 1991 when the community acquired former Canadian Pacific Railway property. This beautiful, 7 acre park consists of a baseball diamond, a regulation size soccer field, swings, slides and picnic tables. This park will provide relaxation and enjoyment for Tyndall residents and surrounding communities for many years to come.

Whiteshell Provincial Park: With an area of 2,729 km2, Whiteshell Provincial Park is characterized by numerous lakes, rivers and the rugged Precambrian Shield. Forested areas are typically boreal forest of black spruce, white spruce and balsam fir, intermixed with trembling aspen, balsam poplar, and poorly drained tamarack or black spruce fens and bogs. Classified as a Natural Park, its purpose is to preserve areas that are representative of the Lake of the

Woods portion of the Manitoba Lowlands Natural Region and provide a diversity of recreational opportunities and resource uses.

The Central Region of the East Manitoba Tourism Region has rich and celebrated cultures and heritages that provide for year-round celebrations and festive activities. Some of the key festivals of the region include:

- Winnipeg Folk Festival
- Triple “S” Fair and Rodeo
- Selkirk Manitoba Highland Gathering Celebrations
- Canadian Power Toboggan Championship Races

4.3.8 Services

The nearest service centre is the Town of Beausejour located 10 km to the east of the Community of Tyndall. The Town serves the Communities of Tyndall and Garson and other smaller population centers in the Eastern Manitoba Region. It has a well-developed infrastructure that supports business and encourages growth. There is a central grain-handling facility for the region. Local businesses include a full range of services ranging from banking, accounting, legal, health care, groceries, restaurant, accommodation, construction and many others.

Police services in the region are provided by the Royal Canadian Mounted Police. The nearest detachment is located in the Town of Beausejour. The Beausejour Brokenhead Fire Department is also located in Beausejour, and provides protection for the communities of the Town of Beausejour, Garson, Tyndall and the Rural Municipality of Brokenhead. There are twenty eight volunteer paid on-call members on the department. Members are trained as NFPA standard level 1 firefighters accredited through the Manitoba Emergency Services College, and there are five accredited instructors on staff. The Town of Beausejour and the Rural Municipality of Brokenhead have also formed a joint Emergency Measures Committee.

Beausejour is located in the Interlake-Eastern Regional Health Authority that has offices in Pinawa, Stonewall and Selkirk. With its central location in North Eastern Manitoba, Beausejour has assumed the role of the primary health care service providing centre. A new 30-bed hospital with an attached Primary Care Centre serves as the hub for area health care. Two medical clinics, dental offices, a denturist, an optometrist office, massage therapists, a physiotherapist and chiropractic services are also available within the Town. Senior’s housing is offered through one personal care home and six senior residences in addition to a 55+ condominium complex.

The Town of Beausejour and the Rural Municipality of Brokenhead are home to the Sunrise School Division. The Gillis School is located in Tyndall and serves the western portion of the municipality. The Beausejour Early Years’ School and Edward Schreyer High School are both located within the town of Beausejour. Adult education needs are serviced through the Agassiz Adult Education Centre, also located in Beausejour.

The Brokenhead River Planning District is responsible for the preparation, adoption and administration of district land use plans and related by-laws. The District is also responsible for the day-to-day responsibilities for the administration of zoning by-laws, zoning amendments and rezoning, zoning enforcement, variation orders and conditional use orders for the Rural Municipality of Brokenhead. The Planning District is responsible for administration of the Municipal Building By-Laws, and Provincial and Federal Building Codes. This includes, but is not limited to, the issuance of building permits and building inspections.

The LUD of Tyndall-Garson water and sewer Project began after the Province of Manitoba Water Stewardship issued a Boil Water Advisory to private wells in the Tyndall and Garson area in 2000 due to presence of bacterial contamination. This advisory is still in effect and will remain in effect indefinitely. Municipal water is supplied by a well located beneath the Water Treatment Plant located in Henryville at 34046 Mile 73N. Water meters are issued by Grant at the Water Treatment Plant.

4.3.9 History

The eastern Manitoba Region has a rich and interesting history and is one of the oldest settled areas of Manitoba. First Nations people were the first to inhabit the geographical area. The European fur traders arrived some 230 years ago followed shortly by the European settlers. Rural Municipalities of St. Clements and Brokenhead in particular are now home to some very interesting historical sites, churches and points of interest. There are also many memorials and cairns throughout the community at designated locations honouring the people and places in the community of local historical significance. Following are the historic sites in the greater assessment region for the proposed Tyndall 115 kV Transmission Line and DSC Project.

Historic Highway No. 1 (Now 44): PTH 44, in eastern Manitoba, extends from Lockport in the west to West Hawk Lake in the east. The highway stretches over 145 km and runs through the communities of Garson, Tyndall, Beausejour, Whitemouth and Rennie. It was part of the first national highway system in Canada before the present Trans-Canada Highway route was completed and was a key link in the movement of people and goods across the vast territory of Canada. It also played an integral role in the economic development of Manitoba and in the population growth of Western Canada. In 2007 the PTH 44 was designated and protected under The Historic Highway No. 1 Act.

Brokenhead Pioneer Monument (Beausejour): This monument in front of the offices of the Rural Municipality of Brokenhead, near the Town of Beausejour, was erected in 2000 in commemoration of the 100th anniversary of the formation of the municipality. Listed on it are the names of municipal officials in 1900 and 2000. (N50.06279, W96.49769).

Broken Beau Pioneer Village Museum (Beausejour): Established in 1967, the Pioneer Village Museum recreates a small pioneer village. The museum contains a log house, school, community hall, Canadian Pacific Railway Station, store, blacksmith shop and a Ukrainian

Church with a bell tower. Many artifacts depicting the lifestyle of the early pioneers of the surrounding area are located in these buildings.

Manitoba Glass Works Historical Site (Beausejour): The Manitoba Glass Works was founded in Beausejour in 1906, by Joseph Keilback and his partners. The factory was sustained by a nearby deposit of high quality sand, and it was the first glass container factory in Western Canada. At its peak the Manitoba Glass Works employed approximately 350 workers, and eventually was purchased in 1913, and relocated to Redcliff, Alberta. The factory site was designated a Provincial Heritage Site No. 41 in 1989.

St. Mary's Catholic Church - Leo Mol Paintings (Beausejour): St. Mary's Catholic Church in Beausejour, is home to the ceiling and wall paintings of the famous and now deceased internationally acclaimed Manitoba artist Leo Mol.

Garson War Memorial: This monument in the Community of Garson, in the Rural Municipality of Brokenhead, was erected in commemoration of soldiers from the local area killed in the First World War and Second World War. (N50.07612, W96.70440).

St. Andrew's United Church (Garson): Initially a Presbyterian church when it was built in 1910, this quaint limestone building is situated in the Community of Garson. Constructed by mason John Hart and carpenter George Cushnie, it was entirely planned and built by volunteers employed at the nearby Garson quarry. Now used as a private residence, the building is a municipally designated historic site. (N50.07614, W96.70550).

Golden Bay Lutheran Cemetery: This cemetery is situated in the Rural Municipality of Brokenhead. A monument within the cemetery commemorates Holy Cross Lutheran Church, which operated in the Golden Bay area from 1907 to 1967. (N50.06160, W96.38460).

Tyndall War Memorial: This monument in the Village of Tyndall, in the Rural Municipality of Brokenhead, was erected in commemoration of soldiers from the local area killed in the First World War and Second World War. (N50.08542, W96.66280).

Ukrainian Catholic Church of St. Michael and Archangel Bell Tower (Tyndall): This monument commemorates St. Michael's Ukrainian Catholic Church. Construction of the first church by builder Anton Prychun was completed in 1917 and the first mass was celebrated by Father Roman Krupa. The church was replaced in 1961 by a new structure, designed by Radyslaw Zuk and built by Father Matt Kotowich, who also celebrated the first mass. This second church was demolished in 1990. (N50.07725, W96.65804).

Gillis Quarries (Garson): The Gillis Quarries, incorporated in 1915, provided Tyndall Stone used to build the Parliament Buildings in Ottawa, the Manitoba Legislature, and many very well-known buildings across Canada. Tyndall stone is a dolomitic limestone quarried from the Selkirk member of the Ordovician Red River Formation, in the vicinity of Tyndall, Manitoba. It was first used in 1832 for building Lower Fort Garry, and has since become popular for building purposes throughout Canada and the United States of America. The rock is famous for its cream colour limestone with its pervasive coloured mottling of dolomite, caused by the burrowing of marine creatures when the limestone was deposited.

Sacred Heart of Jesus Roman Catholic Parish Cemetery (Garson): This cemetery is at 71095 Gillis St (shown as Dundee Garson Rd. on some mapping), 1 1/2 miles south of Garson. (N50° 03.361 W096° 42.231).

Community of Garson Cemetery: This cemetery is on Aspen Street at Poplar Avenue in the Community of Garson. (N50° 04.433 W096° 42.518).

St. Michael's and All Angels Ukrainian Catholic Cemetery: There are four cemeteries close together here, 1.6 km north of Tyndall. St. Michael's and All Angels Ukrainian Catholic Cemetery is the second oldest one and it's close to the road on the right side of the centre driveway. (N 50° 05.991 W 096° 39.447).

Cook's Creek Heritage Museum: Cook's Creek Heritage Museum is situated in the oldest Galician settlement in western Canada. The museum is located at PR 212 and Stapon Rd., east of Birds Hill Provincial Park. It is the oldest Galician settlement in western Canada and is dedicated to early pioneers from Slavic Europe. The seven buildings include a restored barn and blacksmith shop, pioneer homes, candle house and chapel.

Cook's Creek Immaculate Conception Church & Grotto: This church and grotto are located on PTH 12 and Zora Rd.

Other than the above heritage sites there are no known designated sites in the immediate vicinity of the proposed Tyndall 115 kV Transmission Line and DSC Project.

4.3.10 Heritage

From 70,000 to 10,000 years ago, 97% of Canada was covered with ice. The Wisconsin glacier made most areas of North America uninhabitable. However, around 10,000 years ago, when the glacier began to recede, much rich and fertile land was uncovered. With the melting of this glacier, endless amounts of water were deposited on the earth. By 8000 BC, current day St. Clements was covered by the waters of Glacial Lake Agassiz, the largest freshwater lake on the continent. Although first explorers began arriving in Manitoba as early as 11,000 years ago, it was not until 6300-6000 BC that St. Clements' region dried enough to become habitable. It is estimated that First Nations explorers may have traveled the Selkirk area anywhere from 6500-5500 BC. However, more established bands were not present in the area until near 1000 BC, when they arrived in present day Lockport.

Prehistory of this region is marked by specific cultural groups arriving/leaving the land. The first included the Larter Culture, which existed from 1000 – 200 BC. They were named for the family whose property held evidence of the early peoples, discovered in 1951. They were the first group of people to occupy the Lockport area. Being nomadic people, their tools and houses were easily assembled, disassembled and transferred. The main purpose for coming here was because they followed the bison to the shelter of the Red River Valley in the winter months. Bison bones and corner-notched dart points at the site show this (Rural Municipality of St. Clements website).

Provincially-designated historic sites in the greater assessment region for the proposed Tyndall 115 kV Transmission Line and DSC Project are described below.

Ukrainian Catholic Church of the Immaculate Conception at Cooks Creek

The Ukrainian Catholic Church of the Immaculate Conception at Cooks Creek is a Manitoba Provincial Heritage Site (No. 23). The Church is located 7.6 km southwest of Garson on Cooks Creek Road. Construction of this church began in 1930 and the exterior painting and elaborate interior decoration, mainly by local amateur artists, began in 1938 when the structure was completed. This work was well advanced in 1952 when the church was consecrated. The design is the work of the Very Reverend Philip who was responsible for planning at least 30 Ukrainian Catholic churches in Canada, 13 of which survive in Manitoba. The present owner is the Immaculate Conception Church of Cooks Creek.

Manitoba Glass Company Site

The Manitoba Glass Company Site is a Manitoba Provincial Heritage Site (No. 41) located on Cemetery Road West in the Town of Beausejour. This is the site of the first glass container factory in Western Canada. It was built in 1906 by Joseph Keilbach. Glassblowers from Poland and the United States, aided by local labour, used silica sands to produce bottles for breweries and soft drink companies in Winnipeg.

After it was taken over and enlarged by Winnipeg businessmen between l109 and 1911, the new company expanded its production to include jars, and medicine and ink bottles. At its peak it employed 350 workers. The plant was purchased in 1913 by a Montreal company which then relocated its Western operations to Redcliff, Alberta, in response to an offer of free natural gas and land. The Beausejour works were closed in 1913-14.

Sts. Peter and Paul Ukrainian Orthodox Church

The Sts. Peter and Paul Ukrainian Orthodox Church is Manitoba Provincial Heritage Site (No. 343) located at Lot 5 Pearson Drive in the Community of Tyndall. The compact, seven-domed church recalls the richness and depth of religious traditions brought to the Brokenhead area by Ukrainian pioneers in the early 1900s. Restrained yet symbolic in its form and detail, outside and within, the building is a fine representation of a village church based on Ukrainian architectural traditions adapted to the conditions and materials found in Manitoba. Erected by Anton Prychun, a local builder who constructed several churches in Western Canada and Ontario, this facility, now used for special services, is the only church still functioning in Tyndall, which once had six churches.

Heritage resources in Manitoba are protected under The Heritage Resources Act. The potential to impact significant heritage resources is low and therefore the Historic Resources Branch has no concerns with the project. If at any time however, significant heritage resources are recorded in association with these lands during development, the Historic Resources Branch may require that an acceptable heritage resource management strategy be implemented by the developer to mitigate the effects of development on the heritage resources (Appendix F). Figure 4-5 shows historic resource sites in the vicinity of the proposed Project.

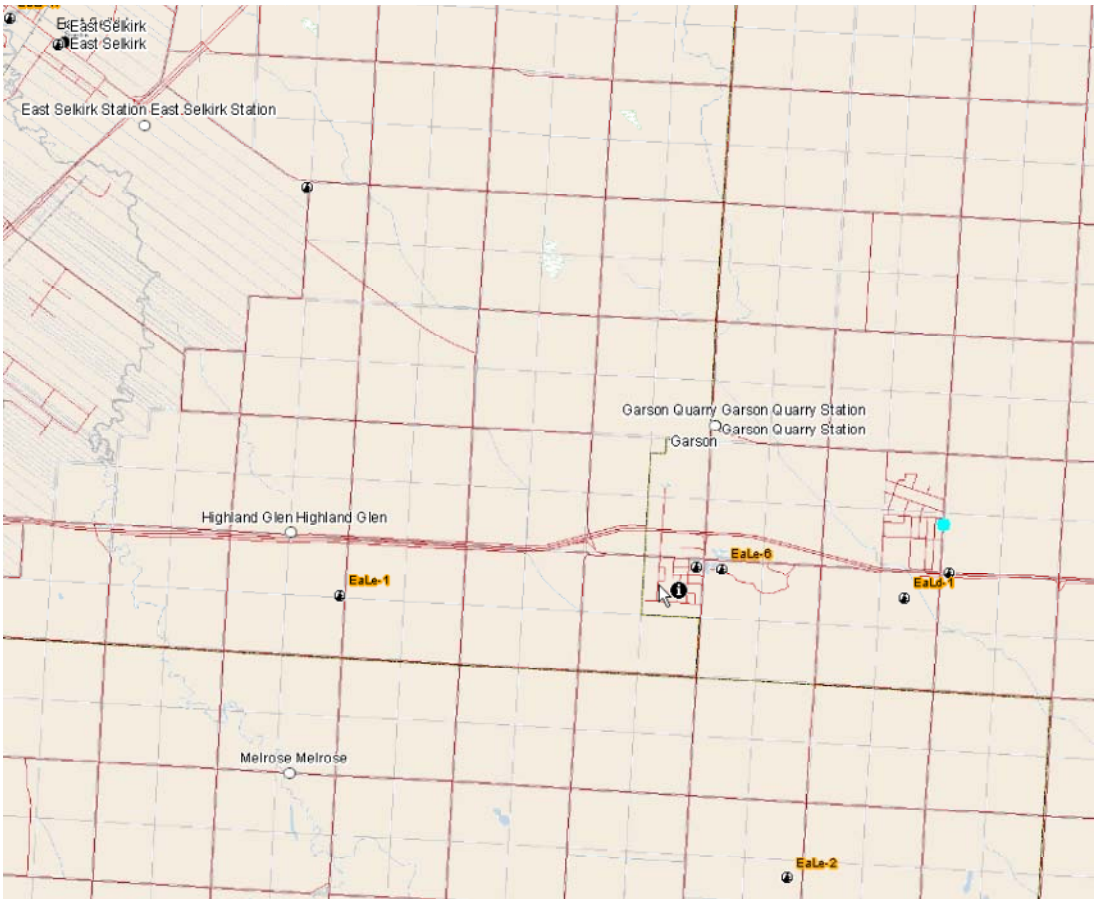

Figure 4-5: historic resource sites in the vicinity of the proposed Project.

The DSC will be located on agricultural land and the transmission line will run along road allowances, an abandoned rail bed, on agricultural lands, and adjacent to Devils Creek. One attendee at the Round One Public Open House for the Tyndall Project identified a previously known native settlement near the proposed tap that will be avoided during construction.

4.3.11 Economy

The economy of the regional assessment area is diversified with a strong agricultural base complimented by a variety of industries such as quarries, food-processing, agricultural value-added and a wide range of commercial and service businesses.

The Rural Municipality of St. Clements has a strong agricultural presence ranging from crop production to market gardening to honey farming. Tourism is also one of this municipality's strongest economic activities. There are also large professional and service industries in the municipality. The Rural Municipality of Brokenhead's economy is diversified with a strong agricultural base complimented by a variety of industries such as quarries, food-processing, agri-cultural value-added and a wide range of commercial and service businesses. The municipality has some of the richest agricultural lands in Manitoba. Production is very diverse,

ranging from cereals and forage to specialty crops; as well as livestock such as chickens, hogs, cattle (both beef and dairy) and lambs.

The Town of Beausejour is largely considered to be the service center of the area with over a hundred of its businesses serving the entire region. The Town has a stable economy based on agriculture and tourism, with grain production being the mainstay of the agricultural activities in the surrounding area. It has a well-developed infrastructure and a recently constructed Industrial Park. Rail line service, natural gas, hydro, a four-lane highway, a stable tax rate and a fully-serviced industrial park makes Beausejour an attractive location for industrial growth. Tourism has become an important economic tool for the community which holds world class events such as the Canadian Power Toboggan Championships.

The Local Urban District encompasses the Communities of Tyndall and Garson, as well as Henryville midway between. A three member committee oversees the maintenance of parks, roads and drainage. The LUD Committee also oversees the issues of by-law enforcement for its residents in cases such as noise, animal control, burning and unsightly property. Gillis Quarries is the main industry in Garson. Other businesses in the area include hotels, restaurants, trucking companies, agricultural product suppliers, landscapers, speciality shops and fishing tackle outlets.

4.4 Summary

This chapter of the environmental assessment report provides a description of the existing environmental setting for the proposed Tyndall 115 kV Transmission Line and DSC Project including the regulatory and ecological context, and biophysical and socio-economic components of the environment. Information on the existing environment is described to facilitate the identification and assessment of potential environmental effects, and the subsequent mitigation of adverse effects.

5.0 PUBLIC ENGAGEMENT

5.1 Overview

This chapter of the environmental assessment report describes the Public Engagement Process carried out for the proposed Tyndall 115 kV Transmission Line and DSC Project. The process aimed to gather local input on the Project as well to inform local residents of Manitoba Hydro's activities. Manitoba Hydro undertook a two (2) Round approach and utilized a variety of notification methods to inform the public, which included:

- direct mailings;
- a Project website;
- newspaper advertising; and
- postal code drops.

Manitoba Hydro utilized meetings with interested parties and held public open houses to provide and gather information from local residents and elected officials. The results of the process, including environmental issues and concerns identified, are presented and discussed in relation to the environmental assessment.

5.2 Public Engagement Process

The Public Engagement Process included two (2) rounds of public engagement to share and gather information. Utilizing a variety of notification methods and venues to collect and disseminate information the following objectives for both rounds were met.

The objectives of Round One (Alternative Route Review) aimed to:

- Introduce the Project
- Present alternative routes
- Respond to questions
- Document and address concerns and issues
- Collect information which would assist in the identification of a preferred route.

The objectives of Round Two (Preferred Route Review) aimed to:

- Present the preferred route
- Identify outstanding concerns
- Collect additional site specific constraints from local residents
- Provide an opportunity to discuss mitigation measures to reduce or eliminate any potential effects.

Specific concerns and issues were documented throughout the process and are discussed further in the chapter. Input gathered throughout the process assisted Manitoba Hydro in determining a preferred route and provided local residents with the opportunity to modify the preferred route to accommodate local concerns.

5.3 Notification Methods

Public notification was an important process throughout the public engagement process and assisted Manitoba Hydro in sharing project information and gathering local input into the preferred route. Notification methods utilized throughout the public engagement process are discussed in this section.

5.3.1 Direct Letters

Round One

Information about the Tyndall 115 kV Transmission Line and DSC was mailed to 40 property owners in the immediate vicinity of the proposed Project location on February 25, 2013. These letters provided local landowners with information regarding;

- Need for the Project
- Project description
- Opportunities to participate in the engagement process (date and location of the open house)

Each letter contained a localized aerial map of the route adjustments as well as contact information which included a project website, toll free project information line and an email address.

Round One letters and information about the Tyndall 115 kV Transmission Line and DSC were mailed to Brokenhead Ojibway Nation, Peguis First Nation, and the Manitoba Metis Federation on February 8, 2013. The purpose of the letters were to coordinate meetings to share information, answer questions, and identify any concerns regarding the proposed Project.

Round Two

Round Two letters were mailed April 12, 2013 to thirty-seven property owners and 17 local landowners and those who participated during Round One to advise that a preferred transmission line route and DSC has been selected and to inform them that a second open house would be held on April 30 2013. These letters once again outlined the need for the project and contained a project newsletter which outlined further project information. General letters and a map were also mailed in Round Two to attendees of the Round One Open House.

Round Two letters were mailed April 12, 2013 to mailed to Brokenhead Ojibway Nation, Peguis First Nation, and the Manitoba Metis Federation to advise that a preferred route for the transmission line and DSC has been selected, and to welcome the opportunity to meet and share information, answer any questions and discuss the community's participation in the Project.

Letters were accompanied by a Project Newsletter which outlined project information as well as contact information. The letters are provided in Appendix G.

5.3.2 Newspaper & Poster Notification

Newspaper advertisements aimed to inform the larger public and local residents in neighbouring communities regarding the proposed Tyndall 115 kV Transmission Line and DSC Project. Newspaper advertisements contained a brief Project description, contact information and the location and time of the Open Houses. All notifications were placed in newspapers two (2) weeks prior to the scheduled events. A listing of the newspapers utilized and the published dates are provided in Table 5-1.

Table 5-1: Newspaper Notifications

Newspaper	Date
Round One Public Open House	
Winnipeg Free Press	February 16 and 23, 2013
Beausejour Clipper	February 25, 2013
Selkirk Record	February 25, 2013
Selkirk Journal	February 25, 2013
Round Two Public Open House	
Winnipeg Free Press	April 27, 2013
Beausejour Clipper	April 15 and 22, 2013

Public Open House notification posters were utilized during Round Tow and were posted April 25, 2013 at the Sportsman Esso, Tyndall Power Products, Tyndall Mail Box Bulletin Board and Tyndall Hotel. Copies of the materials are provided in Appendix G.

5.3.3 Postal Code Mail Drop

Postcards were deemed the most efficient method of notifying the public. These postcards were 10”x6” and in color. The postcards provided a project description, a map of the alternative routes (Round One) / preferred route (Round 2), contact information and the time and location of the Public Open House.

5.3.4 Other Contacts

In the fall of 2012, an e-mail was sent to Canadian Pacific general contact information inquiring about the decommissioned rail line in the Project area. On January 31, 2013, the Rural Municipality of St. Clements was contacted to provide further information regarding the decommissioned rail line in the municipality.

Manitoba Hydro contacted Peguis First Nation, Brokenhead Ojibway Nation and the Manitoba Métis Federation by letter and by phone to notify these groups of the Project. Meetings were held with those who indicated an interest in the Project and wished to provide feedback, comments or have questions answered.

Project Website, email address and Project Information Line Website

The Project website was utilized to share Project information including mapping to individuals who did not attend a public open house or wanted to acquire project information. The website was kept up to date with current project statuses and locations of public events. The website was listed on notification materials throughout the engagement process (www.hydro.mb.ca/tyndall).

Email address and project information line

The Licensing and Environmental Assessment Department utilizes a Project information line (1-877-343-1631) and email address (LEAprojects@hydro.mb.ca) to address concerns and provide project information. Six (6) calls and no emails were received regarding the Project and are discussed in Section 5.5.2.

5.4 Engagement Mechanisms

Meetings with local elected officials and public open houses were utilized throughout both rounds of the Public engagement process. These two engagement mechanisms assisted Manitoba Hydro in disseminating information and collecting local information to assist in the determination of a preferred route for the Project.

5.4.1 Meetings

Meetings were held with local municipalities, Brokenhead Ojibway Nation, Peguis First Nation and Planning Districts. The purpose of these meetings was to:

- Present the proposed Tyndall 115 kV Transmission Line and DSC Project,
- Discuss the Project need,

- Provide a map of the Project area and diagrams/photographs of proposed transmission structures,
- Inform local officials of the open houses,
- Identify municipal approval requirements,
- Discuss regulatory requirements, and Identify that an environmental assessment report was being prepared for submission to Manitoba Conservation and Water Stewardship.

Table 5-2 indicates the group and date of each meeting help regarding the Project.

Table 5-2: Meeting Dates, Time, and Location and Members Present.

Date and Time	Location
Rural Municipality of St. Clements January 9, 2013 2 :00 pm	East Selkirk 1043 Kittson Rd.
Rural Municipality of Brokenhead January 22, 2013 1 :00 pm	Beasuejour 72013 Rd. 42E
Selkirk and District Planning Area March 22, 2013 2 :00 pm	Selkirk 200 Eaton Avenue
Brokenhead River Planning District April 17, 2013 7 :00 pm	Beasuejour 72013 Rd. 42E
Brokenhead Ojibway Nation May 13, 2013 10 :00 am	Scanterbury Band Office

5.4.2 Public Open Houses

Public Open Houses were held during both Rounds of the engagement process. These open houses were well advertised utilizing a variety of mechanisms as outlined in the previous section.

Each Open House consisted of:

- project information boards;
- project mapping;
- diagrams/photographs; and
- newsletters.

The mechanisms provided attendees with opportunities to discuss and comment on the Project. Manitoba Hydro representatives (including those from Property, system design and environmental assessment) were on hand to discuss specific concerns with participants. Consulting support was present to provide technical information about the Project and provide information about the environmental assessment and Project approval processes.

Members of the public were asked to register and were provided with a comment form as well as a Project newsletter to take with them (Appendix G). Photographs taken during the Open House are provided in Appendix H.

The Round One Public Open House was held on March 5, 2013 at the Garson Community Centennial Centre from 3:00 pm to 7:00 pm.

The Round Two Public Open House was held on April 30, 2013 at the Garson Community Centennial Centre from 3:00 pm to 7:00 pm.

Discussions with participants as well as commentary provided through comment sheets is summarized in the following sections and highlights the common themes brought forward by local residents.

5.5 Public Engagement Summary

5.5.1 Project Meeting Summary

5.5.1.1 The Rural Municipality of St. Clements

The Rural Municipality of St. Clements (meeting January 9, 2013) identified that they may have information to provide on the decommissioned rail line in the assessment area. Road easements for the proposed transmission line were discussed and the Municipality noted limitations of operating farm equipment around transmission structures. The Municipality discussed that a riparian strip along agricultural fields is good practice to reduce nutrient run-off and infilling of ditches with sediment, which could also be used as an easement for the transmission line.

5.5.1.2 The Rural Municipality of Brokenhead

The Rural Municipality of Brokenhead (meeting January 22, 2013) advised that the decommissioned rail line was thought to be Crown owned and the possibility of using this location for the proposed transmission line was discussed. The Municipality noted the presence of water drains alongside of the old rail bed, and informed Manitoba Hydro that the Municipality has future plans to locate an industrial park in the assessment area.

5.5.1.3 Selkirk and District Planning Area Board

Selkirk and District Planning Area Board (meeting March 22, 2013) asked if easements will be used and if property will be purchased for the proposed Project. They questioned the appearance of the transmission structures and DSC. The decommissioned rail line was discussed as an option for the preferred route. Selkirk and District Planning Area Board had no concerns with the proposed Project.

5.5.1.4 Brokenhead River Planning District

Brokenhead River Planning District (meeting April 17, 2013) identified that a Manitoba Hydro Representative recently met with the Planning District to discuss the location and purchase of land for the proposed DSC. The decommissioned rail line was discussed for the preferred route including ownership of the rail line. Recent power outages in the area, and the appearance and size of the transmission structures for the proposed Project were also discussed.

5.5.1.5 Brokenhead Ojibway Nation

Brokenhead Ojibway Nation (meeting May 13, 2013) indicated that the proposed Project was quite removed from the community and that there are nocurrent Treaty Land Entitlement selections in the study area. The community indicated they had no concerns with the Project. The community was interested in updates regarding a transmission Project north of the community previously under construction denoting that the reliablity of their electrical supply is a concern to band members. The community's concerns were shared with Manitoba Hydro's Lac Du Bonnet District. The community indicated that updates on new transmission Projects with letters and newsletters would appreciated and if the possibility of employment opportunities for community members existed they would like to be kept informed.

5.5.1.6 Peguis First Nation

Peguis First Nation (meeting May 22, 2013) asked about the potential environmental impacts of new technology at the distribution supply centre. Manitoba Hydro staff indicated that any potential impacts should be addressed through mitigation. Manitoba Hydro indicated that they are planning to file the Environmental Assessment in July, but would appreciate the opportunity for a subsequent meeting and/or open house with Peguis if there is interest.

5.5.2 Phone Calls

A total of 6 phone calls were received from property owners and the general public in the Tyndall and Garson areas. Callers inquired about:

- the date of the open house;
- location of the transmission lines and DSC;
- identification of a windmill tower on their property; and
- to express a preference for using the decommissioned rail line for the preferred route.

5.5.3 Open Houses Attendance

Approximately 40 people attended the Round One Public Open House. Many of the attendees were property owners from the immediate vicinity of the proposed Tyndall 115 kV Transmission Line and DSC Project. Of this total, 30 of the attendees registered (Appendix G). Comment forms and or maps were received from 11 of the attendees at the Open House.

Twenty eight attendees registered at the Round Two Public Open House (Appendix G). Comment forms and/or maps were received from 4 of the attendees at the Open House.

5.6 Summary Of Discussions

Feedback on Alternatives

- Preference for routing along decommissioned rail line, roadways, mile and half mile lines, and existing transmission infrastructure.
- Concerns about aesthetics of DSC and transmission line.
- Agricultural, construction and economic concerns.
- Impediment to farm operations (hog farm).
- Concerns about DSC location.

Sensitive Site Determination

- Access at creeks and waterways (spawning and water quality).
- Previously known native settlement and water well site.
- Concerns about wetlands, wildlife and groundwater contamination.
- Importance of trees and shelterbelts in the area.
- Farm lagoons.

Property

- Concerns about access, health and safety, pole placement, tap location and reclamation.
- Property ownership and compensation.
- Proximity to residences.
- Concerned about removal of trees and trails on decommissioned rail line at Rd. 34E.

Recommendations

- Relocate the tap location.
- Construct away from waterways.
- Double pole construction will be a farming concern.
- Continue straight north down Rd. 29E to railway bed.
- Avoid going through agricultural land, especially where hazards exist.

General Comments

- The open house provided answers to questions.
- This is a good Project if it improves service and makes service more reliable.
- Questions regarding the appearance of structures, tower height and span.
- Questions asking what is a distribution supply centre.
- Decommissioned rail line is currently used as a trail which is access for vandalism.
- Concern regarding the extent of tree and shrub cover to be removed along decommissioned rail line.
- Health concerns from transmission line EMF.
- Questions asking where hydro poles would be located along decommissioned rail line.

The main issues identified from the Round One open house included:

- Transmission line routes and preference for the proposed line to be constructed along the decommissioned rail line.
- Appearance of transmission structures and DSC.
- Concern over the potential effect on creeks and fish spawning.
- Maximizing the separation between residences and routing.
- Avoiding agricultural lands.
- Positive response to service upgrade.

The main issues identified from the Round Two open house included:

- Two landowners concerned with the preferred route crossing their properties (area of agricultural land, and rail bed vegetated with trees and shrubs).
- Landowner concerned with pole placement and line of sight along Rd. 34E.
- Appearance of transmission structures, tower span and width between poles.
- Preference for the proposed transmission line to be constructed along the decommissioned rail line

5.7 Incorporation Of Feedback Into Route Selection

Several changes to the final preferred route were made based on public input. The route was adjusted across a landowners property to accommodate current and future land use. A large shelter and future residence were avoided while staying on the same landowners property.

5.8 Summary

This chapter of the environmental assessment report described the Public Engagement Process carried out for the proposed Tyndall 115 kV Transmission Line and DSC Project. The engagement program consisted of meeting with municipal officials, newspaper notification, letters to property owners, public open houses and other contacts. The results of the program including environmental issues and concerns identified are presented and discussed in relation to the environmental assessment.

6.0 ENVIRONMENTAL EFFECTS ASSESSMENT

6.1 Overview

This chapter of the environmental assessment report identifies, describes and assesses the potential effects of the proposed Tyndall 115 kV Transmission Line and DSC Project on the biophysical and socio-economic environment. The environmental assessment approach is described and environmental issues relating to the proposed Project are discussed. Environmental effects are identified and assessed. Measures to mitigate adverse effects and actions for follow-up are identified. Effects of accidents and malfunctions, effects of the environment on the Project and cumulative environmental effects are also considered.

6.2 Environmental Assessment Approach

6.2.1 Methods

The environmental assessment of the proposed Tyndall 115 kV Transmission Line and DSC Project was carried out based on information provided by Manitoba Hydro, Rural Municipalities of Brokenhead and St. Clements, Brokenhead River Planning District and Selkirk and District Planning Area, reference materials obtained from Manitoba Conservation and Water Stewardship and Manitoba Hydro libraries, literature and internet searches. Environmental assessments conducted on other transmission Projects in Manitoba were also reviewed.

Requirements of *The Environment Act* (Manitoba) and the *Canadian Environmental Assessment Act* (2012) and regulations, guidelines and policy statements were considered in the preparation of the environmental assessment for the proposed Project. Canadian and international best environmental assessment practices were followed including those of the International Association for Impact Assessment.

The environmental effects of the proposed Project were identified by professional judgement and by referring to interaction matrices and linkage (network) diagrams provided in other recent environmental assessment reports on similar projects (Manitoba Hydro 2009c and 2012c). The adversity of biophysical and socio-economic effects was determined based on the categories in Table 6-1.

Table 6-1: Adversity Categories

Adversity Category	Biophysical Effects	Socio-Economic Effects
Beneficial	Net improvement to the biophysical environment expected.	Net improvement of social and economic well-being expected.
Adverse	Net impairment to the biophysical environment expected.	Net impairment of social and economic well-being expected.
High	Effect on an entire region, population or habitat in sufficient magnitude and over a sufficient period to cause a decline in abundance and/or adverse change in distribution beyond which natural irregularities would cause. Reversibility time for population is several generations.	Effect is either long duration or affecting an entire group of people in sufficient magnitude to cause significant changes in social and economic well-being. Reversibility time to baseline conditions expected to be several generations.
Moderate	Effect on a portion of the region, population or habitat is localized, but that results in a change in abundance and/or adverse distribution over one or more generations dependent upon it, but does not change the integrity of any population as a whole.	Effect is either limited to one or two generations but affects a moderate portion of the population while not necessarily affecting the integrity of the population as a whole.
Low	Effect on a local area, specific group of individuals or habitat in the Project area and/or over a short period (one generation or less), but do not affect other trophic levels or integrity of population as a whole.	Effect either short-term or affects a specific group of people in the local area but does not necessarily affect the integrity of the entire group as a whole.

The significance of the residual environmental effects for the proposed Tyndall 115 kV Transmission Line and DSC Project were evaluated using factors adapted from the Canadian Environmental Assessment Agency (1994, 2000) and the Canadian Standards Association draft environmental assessment standard (1999). Significance was evaluated based on the criteria and ratings in Table 6-2.

Table 6-2: Evaluation Criteria and Ratings

Criteria	Rating		
	1	2	3
a) Societal value of the affected environmental components – includes nature and degree of protection provided	Low – no formal designation	Moderate – protected locally, regionally or provincially but not by legislation	High – designated or protected provincially, nationally or internationally by legislation
b) Ecological value – includes rarity and uniqueness, fragility, importance within ecosystem, importance to scientific studies	Low – no protected species or habitats, important features, scientific value	Moderate – species of concern, important features, resilient ecosystems, scientific value	High – threatened or endangered species, significant features, fragile ecosystems, scientific value
c) Magnitude – predicted disturbance compared to existing conditions	Low – no measurable disturbance in Project assessment area (< 1% of feature)	Moderate – measurable disturbance in local assessment area (1 – 25% of feature)	High – Measurable disturbance into regional assessment area (> 25% of feature)
d) Geographic extent – area over which the effect will occur	Small – Project or footprint assessment area	Moderate – local assessment area	Large – regional assessment area or larger
e) Frequency – rate of reoccurrence of the Project activity causing the effect	Occurs once – during Project construction or operation	Sporadic – during Project construction or operation	Continuous – during Project construction or operation
f) Duration – length of time the Project activity will last	Short-term – several days during Project construction	Moderate- term – during Project construction	Long-term – after Project construction
g) Reversibility – time the environmental component will take to recover after the source of the effect ceases	Reversible – within 25 years	N/A	Not reversible – after 25 years

This environmental assessment report conforms to Manitoba Conservation and Water Stewardship's guidelines for preparing an Environment Act proposal report (Manitoba Conservation 2011).

6.2.2 Site Visits

A site visit for the proposed Tyndall 115 kV Transmission Line and DSC Project was conducted in September 2012 by Mel Falk (Falk Environmental), Kevin Szwaluk (Szwaluk Environmental Consulting) and David Block (Manitoba Hydro, Licensing and Environmental Assessment). The site visit was conducted to gather baseline information on the area and look at the potential route options and DSC site locations.

Kevin Szwaluk conducted a site assessment in October 2012. This site visit was conducted to collect more detailed information on vegetation communities and potential wildlife habiat. Photographs captured during the site visit and assessment are provided in Appendix H.

6.2.3 Public Engagement

The Public Engagement Process for the proposed Tyndall 115 kV Transmission Line and DSC Project is presented in Chapter 5 of this environmental assessment report. The program consisted of meetings with municipal officials, newspaper notification, letters to property owners, public open houses and other contacts. Results from the Public Engagement Process were considered in the identification of environmental issues and effects, and in the identification of mitigation measures and follow-up actions.

6.3 Environmental Issues

Regional issues of concern for the environmental assessment of the proposed Tyndall 115 kV Transmission Line and DSC Project were determined from professional experience, literature and public feedback to include:

Taking Agricultural Land Out of Production: Agricultural is an important part of the region's history and economic activity. Agriculture is the dominant land use within the Rural Municipalities of Brokenhead and St. Clements. Much of the land in the region is cultivated and used for spring wheat, other cereal grains, hay crops and oil seed production. Native pasture and hay fields occur in areas where drainage has not been improved. The Brokenhead River Planning District and the Selkirk and District Planning Area Board Development Plans identify objectives and policies to protect, support and strengthen agricultural operations in the region.

Agricultural land is an important resource for the regional economy. The loss of agricultural lands was identified as a concern for the Tyndall Project.

Transmission Line and DSC Aesthetics: The local assessment area is characterized largely by agricultural land, residential developments, rural gravel roads and transmission lines. There are a limited number of forest stands in the area, and occasional trees occur on residential properties, and along road allowances and fence lines. The physical appearance of a DSC and additional transmission lines may present visual aesthetic concerns and can be temporarily disruptive to people living in the immediate vicinity. In terms of the proposed DSC, the facility will be situated 800 m west of Tyndall and 1.6 km east of Garson, immediately north of PTH 44. The closest residential homes to the DSC are located to the south less than 400 m away. Since the proposed DSC will be located in an open area, aesthetics is an important issue for nearby residents who will have a clear view of the facility. Transmission line (e.g., structure appearance and tower span) and DSC aesthetics were identified as issues at the Public Open House for the Project.

Access at Creeks: Dubas Creek and Devils Creek both occur in the Project area. Creeks are important in the water cycle, ground water recharge, providing habitat, and play an important role in connecting habitats and conserving biological diversity. The area immediately adjacent to the water's edge is the riparian zone. This zone is often vegetated with a mixture of trees, shrubs and graminoids (grasses and sedges) that offer bank stabilization and reduce runoff and erosion into the waterway. At the Public Open House, transmission line access at creeks was identified as a concern in the Project area as local waterways are stressed and are important spawning areas.

Decreased Property Values: Property values in the vicinity of the proposed Tyndall Project reflect a rural lifestyle in a rural setting with basic utilities and services provided. However, there is already a relatively high density of transmission and distribution lines in the local assessment area. The value of property is important to land owners, particularly agricultural properties adjacent to the proposed DSC and residential properties near the facility. The property on which the proposed DSC will be situated will be purchased from the property owner by Manitoba Hydro while properties along which transmission lines will be secured through easements and owners will be compensated. Maximizing residence separation from transmission line routing and concern from perceived decreased property values were identified as public concerns for the Project.

Removal of Trees/Shelterbelts: Trees and shelterbelts provide shelter for wildlife, protection from the elements, and offer recreational opportunities and aesthetics to local residents. According to the Brokenhead River Planning District Development Plan, existing tree cover should be retained in order to maintain the natural appeal and character of the area and future development should consider wildlife potential. As much of the area has been cleared for agricultural and residential purposes in the Selkirk and District area, existing stands of trees are important in an ecological sense and need to be managed to enhance forest resource benefits. The removal of trees and shelterbelts were identified as concerns at the Public Open Houses for the Project.

Electric and Magnetic Fields and Health: Local property owners gain personal well-being from the values offered by an agricultural setting and rural lifestyle. There is general public concern about the risks to human health from electric and magnetic fields (EMF) produced by transmission lines. Each component of Manitoba Hydro's electrical system produce electric and magnetic fields in the extremely low frequency range that includes 60 Hz. Electric fields are due to a system's voltage and are measured in kilovolts per metre (kv/m). Magnetic fields are due to the flow of electrical current and are measured in milligauss (mG). Electric and magnetic field (EMF) levels measured near any source depend upon a number of factors – largely on the distance from the source. Research has shown that the strongest EMF comes from the lines within the right-of-way but EMF measurements drop off rapidly with distance from the source. The risk of shock and electrocution from transmission facilities are also well known and documented. Health concerns related to EMF were identified at the Round Two Public Open House for the Project.

Groundwater Contamination: Groundwater is an important resource in the Selkirk and District Planning Area, and the Brokenhead River Planning District. The groundwater is found in carbonate aquifers and is used for municipal, residential and agricultural purposes. Pollution of groundwater is a concern in the Selkirk and District Planning Area and the Brokenhead River Planning District. To protect the quality of groundwater, objectives and policies have been established that include the implementation of management plans that address runoff and leaching of contaminants, provide containment systems for developments, and any potential risk on groundwater from development shall be evaluated.

Increased Property Taxes: Residents in the local assessment area are accustomed to paying lower property taxes as a result of the location of their rural properties compared to residential properties located in nearby cities such as Winnipeg and Selkirk. Concerns of property owners and Rural Municipality elected officials may include:

a) who will be responsible for paying the taxes for the DSC and associated transmission line,
b) will any grants in lieu of taxes be paid by Manitoba Hydro to the Rural Municipality, and
c) if local property taxes will increase or decrease as a result of the proposed utility.

Regional Economy: Local businesses in the regional assessment area are diverse and consist of various services that support the surrounding communities. The Rural Municipalities have a stable economy as a result of an established agricultural presence in the surrounding area. Nearby towns such as Tyndall and Garson provides a number of commercial and educational services. Business owners and elected officials for the municipalities may be interested in confirming if local business and the economy will benefit positively as a result of increased workers and purchases in the local assessment area for the Project. Currently, the economy (nationally) may be considered depressed do to global economics, but on a smaller scale, businesses in the local assessment area may experience a short-term influx of workers resulting in a temporary increase in business revenues.

6.4 Valued Environmental Components (Vecs)

Valued Environmental Components or VECs are elements of the environment that are identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance. The value of an environmental component may be determined on the basis of ecosystem value, scientific concern, cultural ideals or economic importance. VECs that have the potential to be adversely affected by Project activities receive special consideration in the assessment of cumulative environmental effects.

VECs identified for the proposed Tyndall 115 kV Transmission Line and DSC Project environmental assessment include the following:

Agricultural Land: Agriculture has a large presence in the Rural Municipalities of Brokenhead and St. Clements with the cultivation of grains, market gardening, honey farming and cattle farming. Agricultural land is a valued resource with importance to the regional economy and community produce directly providing for local residents.

Property Values: Property values in the vicinity of the proposed Project reflect an agricultural and forested setting with basic utilities and services provided, and limited non-agricultural development. The value of property is important to land owners, particularly those residing in the immediate vicinity of the proposed transmission line and DSC.

Rural Lifestyle: Residents in the local assessment area enjoy a rural or agricultural lifestyle exemplified by peace and quiet, open spaces, neighbourly trust and mutual good will. The rural lifestyle has considerable value to property owners in the local assessment area.

Aesthetic Values: The local assessment area is characterized by crop lands, agricultural buildings, forested lands, shelterbelts, residential developments, rural gravel roads, and transmission, distribution and supply lines. Vistas are vast and scenic, and aesthetic values are important to residents who live in the vicinity of the proposed Tyndall 115 kV Transmission Line and DSC Project.

Creeks and Drains: Devils Creek passes through the assessment area and previously a species of special concern (chestnut lamprey) listed by COSEWIC and SARA was observed in the creek. Drains are considered to be valued as these areas dispose of excess water from agricultural fields that become channelled into local creeks and rivers. Both creeks and drains have considerable biophysical value.

Birds and Mammals: A protected bird species (loggerhead shrike) has previously been identified in the vicinity of the Project area and migratory birds (geese) have been frequently observed in the assessment area. Several stands of trees also exist in the assessment area which provide habitat for wildlife.

6.5 Biophysical Environment

6.5.1 Microclimate

Microclimate is a local atmospheric zone that differs in climate from the surrounding area. The effect on atmosphere from hydropower infrastructure has been reported by Manitoba Hydro (2009c) and identified that an increase in vehicular traffic and heavy equipment will increase emissions of greenhouse gases.

The presence of the transmission facilities can affect wind patterns resulting in snow deposition, and cause shaded areas affecting snow melt and vegetation growth. Trace amounts of ozone can be produced by chemical reactions during periods of high humidity. The removal of vegetation or the change in ground cover includes various aspects such as albedo, transfer of water vapor, and the amount of snow cover (Rind 1984).

The proposed Tyndall 115 kV Transmission Line and DSC Project may result in environmental effects on microclimate in the vicinity of the proposed facility during pre-construction, construction, operation/maintenance and decommissioning.

The effects on microclimate may include altered wind patterns and increased shade, increased release of greenhouse gases from increased vehicular traffic and use of heavy equipment as well as the removal of vegetation and change in ground cover.

The adversity of the effects was determined to be low. Mitigation includes routine maintenance of vehicles and heavy equipment, and limiting idling time to reduce the amount of greenhouse gases emitted. Residual effects on microclimate were determined to be low in ecological value and magnitude, small in geographic extent, once to continuous in frequency, long-term, and reversible. Follow-up includes inspection to ensure that mitigation is implemented.

VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for microclimate is summarized in Table 6-3.

Table 6-3: Environmental Effects Analysis for Microclimate

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Modified wind patterns and increased shade	• None identified	• Minor change in microclimate	Adverse, low ecological value, low magnitude, small geographical extent, continuous, long term duration and reversible
Increased greenhouse	• Routine maintenance of vehicles and heavy	• Minor change in microclimate	Adverse, low ecological value, low magnitude,

Table 6-3: Environmental Effects Analysis for Microclimate

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
emissions from vehicular traffic and heavy equipment	equipment • Limit unnecessary idling		small geographical extent, sporadic frequency, long-term duration, and reversible
Change in microclimate at DSC site due to removal of vegetation and ground cover and erection of structures	• None identified	• Minor change in microclimate	Adverse, low ecological value, low magnitude, small geographical extent, occurs once, long-term duration, and reversible

6.5.2 Air Quality

The potential effects from development of transmission facilities and lines on air quality have been reported by Manitoba Hydro (2004a, 2004b, 2004c, 2007c and 2012c). Potential effects include local increases in fugitive dust and emissions as a result of vehicular traffic and the use of heavy equipment during construction. The storage and dispensing of fuels such as gasoline and diesel, and storage of lubricants has the potential to cause localized effects on air quality (Manitoba Hydro 2009d).

The proposed Tyndall 115 kV Transmission Line and DSC Project may result in increased fugitive dust, and increased nitrogen oxide, sulfur dioxide, greenhouse gases and volatile organic compound emissions in the local assessment area during construction and operation activities. The effects were determined to be low in adversity. Mitigation measures include using acceptable dust control measures such as water or approved dust suppression agents on gravel roads to limit the amount of airborne dust (Manitoba Hydro 2009d).

Oils or petroleum products are not to be used to control dust. Construction, installation or removal of possible petroleum product storage tank systems are to occur under the supervision of a licensed petroleum technician, and contractors and/or workers are to prevent fuel, lubricants or compounds from being released (Manitoba Hydro 2006a). Any releases of hazardous substances are to be reported to Manitoba Hydro and the local Conservation Officer and cleaned up immediately.

Residual effects were determined to be low in ecological value and magnitude, small in geographical extent, sporadic, short to long-term and reversible. Follow-up actions identified include inspections to ensure mitigation is implemented and effective. VECs will not be

adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for air quality is summarized in Table 6-4.

Table 6-4: Environmental Effects Analysis for Air Quality

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Increased fugitive dust level from Project activities including heavy equipment use and vehicle traffic during construction and operation	• Apply dust control measures as necessary such as water or an approved dust suppressant • Curtain construction activities during high wind events that increase airborne dust levels • Restrict speed of work vehicles as required	• Minor increase in dust levels	Adverse, low ecological value, low magnitude, small geographical extent, sporadic frequency, long-term and reversible
Increased emissions of Volatile Organic Compound (VOCs) from storage and release of fuels and hazardous substances during construction and operation	• Limit unnecessary vehicle and equipment idling • Comply with provincial regulations, guidelines and licenses for hazardous substances • Construction, installation and removal of petroleum product storage to occur under the supervision of a licenced technician • Contractors and workers to prevent the release of fuels and hazardous substances • Spills will be reported to Manitoba Hydro and local Conservation Officer and cleaned up immediately	• Minor increase in emissions	Adverse, low ecological value, low magnitude, small geographical extent, sporadic frequency, long-term and reversible

6.5.3 Surface Water

Potential environmental effects of transmission projects on surface water have been reported by Manitoba Hydro (2001, 2004c, 2007c and 2012c). Potential localized effects on surface water quality include releases from refuelling of vehicles and storage of fuels and other possible hazardous materials. Surface water was observed during site visits in ditches, stabilization ponds and in Devils Creek. The proposed Tyndall 115 kV Transmission Line and DSC Project

may affect surface water through modification of drainage and potential for impairing water quality from construction including clearing and grading, tower and pole placement, treated wood contamination, accidental releases of hazardous substances and herbicide use during maintenance activities.

The protection of surface water quality from future land use developments is an objective for Selkirk and District Planning Area, and Brokenhead River Planning District. Concern for the water quality in creeks was identified during the Round One Public Open House for the Tyndall Project. The adversity of the effects was determined to be low.

Mitigation measures include providing required containment for hazardous substances; stockpiling material away from drainage ditches; preventing fuel, lubricants or compounds from being released on the ground; draining waste products such as oil and antifreeze from serviced equipment into approved containers and removing them to a licensed disposal/treatment facility (Manitoba Hydro 2006a); using adequately sized culverts, and providing erosion protection and sediment control for disturbed areas adjacent to surface waters; prohibiting herbicide applications near surface water; and minimizing construction activities during spring and summer months.

Residual effects on surface water were determined to be low in ecological value, low to moderate in magnitude, small to moderate in geographic extent, sporadic, moderate to long-term and reversible. Follow-up includes inspections to ensure mitigation is implemented. VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for surface water is summarized in Table 6-5.

Table 6-5: Environmental Effects Analysis for Surface Water

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Modification of surface water drainage during construction	• Provide surface drainage for snow melt and rain • Provide adequately sized metal culverts at access points to the DSC • Stockpile materials away from drainage routes and ditches	• Minor changes to surface water drainage possible	Adverse, low ecological value, low magnitude, small geographical extent, sporadic, moderate -term and reversible
Increased risk of soil erosion during construction	• Provide erosion protection and sediment control at Devils Creek, around DSC, along drainage ditches and at culvert locations	• Minor erosion and siltation during construction	Adverse, moderate ecological value, low magnitude, small geographical extent, sporadic, moderate -term and reversible

Table 6-5: Environmental Effects Analysis for Surface Water

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
	• Avoid construction activities on saturated ground conditions		
Impaired surface water quality from release of hazardous substances during construction and operation	• Provide required release containment for transformers • Locate fuel and hazardous substance storage 100 m from drainage ditch • Ensure vehicles and equipment are free of fuel and fluid leaks • Equipment waste products to be drained into approved containers and removed to a licenced disposal ground • Contractors to prevent fuel, lubricants or compounds from being released on the ground	• Minimal risk of impaired surface water quality	Adverse, low ecological value, moderate magnitude, moderate geographical extent, sporadic, long-term and reversible
Impairment of surface water quality from release of herbicides during operation	• Adhere to all permit conditions and provincial regulations (*The Noxious Weed Act; The Pesticides and Fertilizers Control Act*) • Adhere to Manitoba Hydro's Vegetation Management Guidelines (2007b) • Herbicide applications are not to occur on surface water such as standing water of ditches	• Minimal risk of impaired surface water quality	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible.

6.5.4 Groundwater

The potential effect of transmission facilities and transmission lines on groundwater have been reported by Manitoba Hydro (2001, 2004a, 2004b, and 2004c). The primary threat to groundwater resources is the possibility of a petroleum product release or release of hazardous substances during construction and operation activities. The proposed Tyndall 115 kV Transmission Line and DSC Project may affect groundwater by impairing water quality and modifying the groundwater regime during construction and operation including tower and pole placement, contamination from treated wood, accidental releases of hazardous substances, and herbicide use during maintenance activities.

The adversity of the effects was determined to be low. Decreased risk of groundwater contamination will occur from decommissioning Garson Station. Mitigation measures include providing required spill containment for transformers, using approved wood preservatives; preventing petrochemical products from being released (Manitoba Hydro 2006a); reporting releases of hazardous substances to Manitoba Hydro and the local Conservation Officer, and cleaning them up immediately; draining waste products such as oil and antifreeze into approved containers and removing them to an licensed disposal/treatment facility; and providing dedicated petroleum storage areas with spill containment (Manitoba Hydro 2006a).

Residual effects were determined to be moderate in ecological value, low in magnitude, moderate in geographic extent, once to sporadic in frequency, short to long-term in duration and irreversible. Follow-up includes inspections to ensure that mitigation is implemented and effective. VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for groundwater is summarized in Table 6-6.

Table 6-6: Environmental Effects Analysis for Groundwater

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Impaired groundwater quality from the release of hazardous substances during construction and operation	• Locate fuel and hazardous substance storage 100 m from drainage ditch • Use approved pressure-treated wooden poles • Comply with provincial regulations, guidelines and licenses for hazardous substances • Construction, installation and removal of petroleum product storage to occur under the supervision of a licenced technician	• Minimal risk of groundwater regime modification	Adverse, moderate ecological value, low magnitude, moderate geographic extent, sporadic frequency, long-term duration, and not reversible

Table 6-6: Environmental Effects Analysis for Groundwater

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
	• Dedicated petroleum storage areas to be provided with spill containment • Contractors and workers to prevent the release of fuels and hazardous substances • When servicing equipment, waste products such as oil and antifreeze to be drained into approved containers and removed to a licensed disposal ground • Spills to be report to Manitoba Hydro and Conservation Officer and cleaned up immediately		
Possible contamination of groundwater from herbicides	• Adhere to all applicable permits and provincial regulations for noxious weeds and pesticide use (*The Noxious Weed Act; The Pesticides and Fertilizers Control Act*)	• Minimal risk of impaired groundwater quality	Adverse moderate ecological value, low magnitude, moderate geographic extent, sporadic frequency, long-term duration, and not reversible
Decreased risk of contamination from Garson Station decommissioning	• Comply with provincial regulations, guidelines and licenses for hazardous substances • Decommissioning and removal of petroleum product storage to occur under the supervision of a licenced technician	• N/A	Beneficial, moderate ecological value, low magnitude, moderate geographic extent, once frequency, short-term duration, and not reversible

6.5.5 Soil

Environmental assessments on transmission projects have identified that soils can be affected by conventional clearing and construction methods (Manitoba Hydro 2004a, 2004b, and 2004c). Other hydropower literature has identified specific effects on agricultural soils including soil compaction and erosion by transmission construction and maintenance activities (Public Service Commission of Wisconsin 2009). The proposed Tyndall 115 kV Transmission Line and DSC

Project potential adverse environmental effects on soil during construction and operation include disturbance of surface soils, soil erosion, contamination from herbicides and treated wood, and accidental releases of hazardous substances.

The adversity of the effects was determined to be low. Beneficial effects include decreased risk of soil contamination from Garson Station decommissioning. Mitigation includes carrying out site preparation work during non-saturated ground conditions, and establishing erosion control measures prior to any soil clearing or grading. Soils that have been stockpiled during construction will be used for rehabilitation of disturbed areas, and soil materials are not to be stockpiled in a manner that will impede natural drainage or block drainage ditches (Manitoba Hydro 2006a).

Construction, installation or removal of possible petroleum product storage tank systems are to occur under the supervision of a licensed petroleum technician, and contractors and/or workers are to prevent fuel, lubricants or compounds from being released (Manitoba Hydro 2006a). Any releases of hazardous substances are to be cleaned up immediately and reported to Manitoba Hydro and the local Conservation Officer. When servicing equipment, waste products such as oil and antifreeze are to be drained into approved containers and removed to a licensed disposal or treatment facility. Dedicated petroleum storage areas are to be provided with spill containment (Manitoba Hydro 2006a).

Residual effects were determined to be low ecological value, low to moderate in magnitude, small to moderate in geographic extent, sporadic, short to long-term, and reversible. Follow-up includes inspections to ensure that mitigation is implemented and effective. VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for soil is summarized in Table 6-7.

Table 6-7: Environmental Effects Analysis for Soil

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Disturbance of soil during construction	• Avoid construction activities on saturated ground conditions	• Minimal disturbance of soil integrity	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, moderate-term and reversible
Increased soil erosion during construction and operation	• Establish erosion control measures prior to construction activities • Minimize surface extent of soil disturbance	• Minimal risk of soil erosion	Adverse, low ecological value, low magnitude, small geographical extent, sporadic, long-term and

Table 6-7: Environmental Effects Analysis for Soil

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
			reversible
Impaired soil quality from accidental releases of hazardous substances during construction and operation	• Locate fuel and hazardous substance storage 100 m from drainage ditch • Comply with provincial regulations, guidelines and licenses for hazardous substances • Construction, installation and removal of hazardous product storage to occur under the supervision of a licenced technician • Dedicated petroleum storage areas to be provided with spill containment • Contractors and workers to prevent the release of fuels and hazardous substances • When servicing equipment, waste products such as oil and antifreeze to be drained into approved containers and removed to an licensed disposal ground • Use approved pressure-treated wooden poles • Spills will be cleaned up immediately. All spills will be reported in accordance with provincial legislation and guidelines, and Manitoba Hydro Guidelines.	• Minimal risk of impaired soil quality	Adverse, low ecological value, moderate magnitude, moderate geographic extent, sporadic, long-term and reversible
Soil disturbance from maintenance activities	• Undertake site maintenance involving surface disturbance during winter months or on non-saturated soil conditions	• Minimal disturbance of soil integrity	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible
Impaired soil quality from the	• Limit spraying to ROW only • Adhere to all applicable permits and provincial	• Minimal risk of impaired soil quality	Adverse, low ecological value,

Table 6-7: Environmental Effects Analysis for Soil

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
release of herbicides during operation	regulations (*The Noxious Weed Act; The Pesticides and Fertilizers Control Act*)		low magnitude, small geographic extent, sporadic, long-term and reversible
Decreased risk of contamination from Garson Station decommissioning	• Comply with provincial regulations, guidelines and licenses for hazardous substances • Decommissioning and removal of petroleum product storage to occur under the supervision of a licenced technician	• N/A	Beneficial, low ecological value, low magnitude, small geographic extent, once frequency, short-term duration, and reversible

6.5.6 Vegetation

The potential effects of transmission facilities and transmission lines on vegetation have been reported by Manitoba Hydro (2001, 2007c) and Szwaluk Environmental Consulting (2011). Effects include removal of ground cover, increase in erosion potential, loss of species of concern, introduction of non-native species, and hazardous releases. Other studies on hydropower development have identified adverse effects on non-target plant species from herbicide applications (Carvell 1975, Luken et al. 1994).

The proposed Tyndall 115 kV Transmission Line and DSC Project will have a potential effect on vegetation from shrub and tree clearing, introduction of invasive plant species, plant mortality from increased dust levels and herbicides use, accidental releases of hazardous substances, and possible loss of unknown plants of concern. The introduction or increase in abundance of invasive species is problematic as these plants have abundant seed production, vigorous growth, and compete well with native plant species. Trees that are required to be removed for the Project will be cut, piled and disposed. Manitoba Hydro's Agricultural Biosecurity Policy, designed to protect crops and livestock systems against invasive species, will be followed.

Mitigation includes; replanting shelterbelts that have been removed; using construction materials such as gravel from clean sources (i.e., weed free); washing construction equipment prior to site visits; minimizing the disturbance to native vegetation; preventing releases of fuels or other compounds by contractors (Manitoba Hydro 2006a); providing dedicated petroleum storage areas with spill containment (Manitoba Hydro 2006a); and adhering to permit terms and conditions and provincial regulations where herbicides are used.

Residual effects on vegetation were determined to be low to moderate in ecological value and magnitude, small in geographical extent, sporadic in frequency, long-term in duration and reversible. Follow-up includes inspections to ensure that mitigation is implemented and effective and identify unforeseen effects. VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for vegetation is summarized in Table 6-8.

Table 6-8: Environmental Effects Analysis for Vegetation

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Loss of trees and shrubs from construction	• Trees and shrubs will be disposed of as specified in Manitoba Conservation Permit • Replant shelterbelts that have been removed • Limit shrub clearing along the east portion of the decommissioned rail line in NE 10-13-6E	• Minimal amount of tree and shrub clearing	Adverse, low ecological value, low magnitude, small geographic extent, occurs once, long-term and reversible
Increased risk of invasive and non-native species introduction during construction and operation	• All equipment to be washed to reduce the spread of less desirable species • Use construction materials such as sand and gravel from clean sources. • Follow Manitoba Hydro's Agricultural Biosecurity Policy and standard operating procedures	• Minimal risk of invasive and non-native species introduction	Adverse, low ecological value, moderate magnitude, small geographic extent, sporadic , long-term and reversible
Mortality of vegetation from the accidental release of hazardous substances during construction and operation	• Locate fuel and hazardous substance storage 100 m from drainage ditch • Comply with provincial regulations, guidelines and licenses for hazardous substances • Construction, installation and removal of hazardous product storage to occur under the supervision of a licenced technician • Dedicated petroleum storage areas to be provided with spill containment • Contractors and workers to be trained to prevent the release of fuels and hazardous substances • When servicing equipment, waste	• Minimal risk of vegetation mortality	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible

Table 6-8: Environmental Effects Analysis for Vegetation

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
	products such as oil and antifreeze will be drained into approved containers and removed to an licensed disposal ground • Spills to be reported to Manitoba Hydro and Manitoba Conservation spill reporting line and cleaned up immediately		
Mortality of desirable vegetation from herbicide application during operation	• Limit spraying to ROW • Adhere to all applicable permits and provincial regulations for noxious weeds and pesticide use (*The Noxious Weed Act; The Pesticides and Fertilizers Control Act*)	• Vegetation mortality confined to ROW	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible

6.5.7 Mammals and Mammal Habitat

Environmental assessments on other transmission projects have identified that potential effects on mammals include the loss of habitat, displacement of wildlife as a result of noise from people and machinery, and accidental releases of hazardous substances (Manitoba Hydro 2004a). The proposed Tyndall 115 kV Transmission Line and DSC Project may affect mammals in the Project and local assessment area during construction and operation and include loss of habitat, displacement of species, increased attraction of nuisance species, increased wildlife collisions due to increased vehicular traffic, increased disturbance due to improved all-terrain access, and increased mortality from improved hunting access. During the Round One Public Open House for the Project, black bears were noted as being sighted previously in the Project area and wildlife was identified as a concern regarding the Project.

The adversity of effects was determined to be low as the Project area is largely comprised of agricultural lands. The removal of tree and shrub areas is not anticipated to affect the integrity of wildlife populations. Mitigation measures include confining tree and shrub removal to within the limits of the easement; ensuring the site is clean and garbage is disposed of properly; no feeding or harassing wildlife (Manitoba Hydro 2006a) and restricting vehicle speed to the posted limits (Manitoba Hydro 2006a).

Residual effects were determined to be low in ecological value and magnitude, moderate in geographic extent, sporadic, long-term in duration, and reversible. Follow-up includes inspections to ensure that mitigation is implemented and effective. VECs will not be adversely

affected by the Project with the implementation of mitigation measures. The environmental effects analysis for mammals and mammal habitat is summarized in Table 6-9.

Table 6-9: Environmental Effects Analysis for Mammals and Mammal Habitat

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Loss of habitat from construction	• Confine tree and shrub removal to within the limits of the easement	• Minimal amount of tree and shrub clearing	Adverse, low ecological value, low magnitude, small geographic extent, occurs once, long-term and reversible
Disturbance and displacement of mammals during construction and operation	• None identified	• Minor displacement of mammals such as deer	Adverse, low ecological value, low magnitude, moderate geographic extent, sporadic, long-term and reversible
Attraction of species resulting from garbage during construction and operation	• Ensure the site is clean and garbage is collected and disposed of at a licensed disposal ground	• Minimal attraction of mammal species	Adverse, low ecological value, low magnitude, moderate geographical extent, sporadic, long-term and reversible
Increased vehicle and wildlife collisions during construction	• Vehicle speed not exceed the posted limits • Injured or killed wildlife to be reported to the local Natural Resource Officer	• Minimal increase in wildlife mortality	Adverse, low ecological value, low magnitude, moderate geographic extent, sporadic, long-term and reversible
Increased mammal and habitat disturbance from improved ATV access during operation	• None proposed	• Minor displacement of mammals	Adverse, low ecological value, low magnitude, moderate geographic extent, sporadic, long-term and reversible
Increased mammal mortality from improved hunting access during operation	• None proposed	• Minor increase in hunting pressure	Adverse, low ecological value, low magnitude, moderate geographic extent, sporadic, long-term and reversible

6.5.8 Birds and Bird Habitat

Environmental assessments on transmission projects have found that potential effects on bird and bird habitat can result from construction, and operation and maintenance activities (Manitoba Hydro 2004a, 2004c and 2007c). These effects include the loss of bird habitat, disruption of breeding activity, temporary displacement of birds as a result of noise, potential for increased bird strikes with transmission lines, and bird collisions from increased vehicular traffic.

The proposed Tyndall 115 kV Transmission Line and DSC Project may have environmental effects on birds including loss or disturbance of habitat, displacement of species, increase in nuisance birds from improper garbage disposal, increased transmission line and tower strikes, increased collisions with vehicles, increased disturbance due to improved all-terrain access, and increased mortality from improved hunting access. The potential for increased bird strikes from the associated transmission lines may result during operation of the proposed Project. Collisions with transmission lines are recognized as a cause of waterfowl mortality and can result in a negative public response.

Data on bird mortality from transmission lines is difficult to obtain however it is estimated that distribution utilities cause about 115 bird deaths in Manitoba annually. Although the potential for bird strikes are generally non-mitigable, it is anticipated that there will be a minimal increase in bird mortality as a result of the Project. Snow geese and Canada geese were both observed in the assessment area during site visits in 2012. One bird species of concern (loggerhead shrike) was previously observed (MBCDC records) in the Project area vicinity. Loggerhead shrikes nest in dense trees and shrubs, however the Project area does not represent an abundance of this habitat type.

The adversity of effects was determined to be low. Mitigation measures include ensuring construction activities occur outside of the breeding bird season (April to May for loggerhead shrike) and minimizing disturbance to bird habitat.

Residual effects were determined to be low to high in ecological value, low in magnitude, small in geographic extent, sporadic to continuous in frequency, long term in duration, and reversible. Follow-up includes inspections to ensure that mitigation is implemented and effective. VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for birds and bird habitat is summarized in Table 6-10.

Table 6-10: Environmental Effects Analysis for Birds and Bird Habitat

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Loss or disturbance of bird habitat during construction and operation	•Ensure construction activities are contained within the Project site	•Minimal loss of bird habitat	Adverse, low ecological value, low magnitude, small geographical extent, sporadic, long-term and reversible
Disruption of breeding bird activity during construction and operation	•Conduct clearing and vegetation maintenance activities outside of breeding bird season to the extent possible (April to May)	•Minimal disruption of bird species	Adverse, low ecological value, low magnitude, small geographical extent, sporadic, long-term and reversible
Displacement of birds as a result of noise and vibration during construction and operation	• Conduct construction and operation activities outside of breeding bird season to the extent possible	•Temporary displacement of bird species	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible
Increased bird strikes from transmission lines, structures and guy wires	•None identified	•Some bird mortality possible	Adverse, low ecological value, low magnitude, small geographic extent, continuous, long-term and reversible
Increased bird collisions with vehicles during construction and operation	•Vehicle speed not exceed the posted limits	•Minimal increase in bird mortality	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible
Loss/disturbance to species of concern (loggerhead shrike) habitat during construction and operation	•Limit clearing of potential loggerhead shrike habitat •Ensure construction activities are contained within the Project area	•Minimal loss/disturbance of species of concern	Adverse, high ecological value, low magnitude, small geographical extent, sporadic, long-term and reversible

Table 6-10: Environmental Effects Analysis for Birds and Bird Habitat

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Increase in nuisance birds from improper garbage disposal during construction	• Ensure the site is clean and garbage is collected and disposed of at a licensed disposal ground	• Minor increase in nuisance birds	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible
Increased bird disturbance from improved ATV access during operation	• None proposed	• Minor displacement of birds	Adverse, low ecological value, low magnitude, moderate geographic extent, sporadic, long-term and reversible
Increased bird mortality from improved hunting access during operation	• None proposed	• Minor increase in hunting pressure	Adverse, low ecological value, low magnitude, moderate geographic extent, sporadic, long-term and reversible

6.5.9 Fish and Fish Habitat

The Tyndall 115 kV Transmission Line and DSC Project may have potential adverse effects on fish and fish habitat including impaired water quality, changing or blocking water flows, and risk to protected species. One fish species of concern (chestnut lamprey) was known to occur in Devils Creek which passes through the Project area. Concerns regarding access at creeks, spawning and water quality were expressed at the Round One Public Open House for the Project. Proposed mitigation includes maintaining vegetation buffers, using low disturbance clearing methods adjacent to waterways, providing erosion protection and sediment control, and adhering to applicable legislation and guidelines.

The adversity of effects was determined to be low. Residual effects were low to high in ecological value, low in magnitude, small in geographic extent, continuous in frequency, long term in duration, and reversible. Follow-up includes inspections to ensure that mitigation is implemented and effective. VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for fish and fish habitat is summarized in Table 6-11.

Table 6-11: Environmental Effects Analysis for Fish and Fish Habitat

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Increased suspended sediments in waterways crossed by the transmission line during construction and operation	• Maintain 30 m vegetated buffer areas adjacent to waterways • Use low disturbance clearing methods • Provide erosion protection and sediment control measures for disturbed areas • adhere to applicable legislation and guidelines	• Negligible increase in suspended sediments	Adverse, low ecological value, low magnitude, small geographical extent, continuous, long-term and reversible
Disruption of waterway flows during construction and operation	• Maintain 30 m vegetated buffer areas adjacent to waterways	• Minimal disruption of flows	Adverse, low ecological value, low magnitude, small geographical extent, continuous, long-term and reversible
Risk to species of concern (chestnut lamprey) habitat during construction and operation	• Maintain 10 m vegetated buffer areas adjacent to waterways	• Minimal loss/disturbance of species of concern	Adverse, high ecological value, low magnitude, small geographical extent, continuous, long-term and reversible

6.5.10 Amphibians

Habitat alteration includes loss of vegetation and wetlands, fragmentation of habitat or environmental contamination. Construction vehicles and machinery, increased use of access trails or roads, and transmission line rights-of-way may also alter habitat. The proposed Tyndall 115 kV Transmission Line and DSC Project may have environmental effects on amphibians including loss or minor impairment of habitat along drainage ditches (i.e., drainage, rutting, erosion, sedimentation), displacement of species during construction and maintenance activities, impairment of habitat from herbicides and hazardous substances, and increased mortality due to interactions with vehicles.

Mitigation measures include minimizing disturbance in adjacent drainage ditches; preventing fuel, lubricants or compounds from being released; providing dedicated petroleum storage areas with spill containment (Manitoba Hydro 2006a); adhering to permit terms and conditions, and provincial regulations where herbicides are used; and ensuring that herbicide applications do not to occur in standing water of drainage ditches.

Residual effects on amphibians were determined to be low in ecological value and magnitude, small in geographical extent, sporadic, long-term in duration, and reversible. Follow-up includes inspections to ensure that mitigation is implemented and effective and identify unforeseen effects. VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for amphibians is summarized in Table 6-12.

Table 6-12: Environmental Effects Analysis for Amphibians

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Loss and impairment of amphibian habitat during construction and operation	• Minimize construction activities in adjacent drainage ditches	• Minimal loss of amphibian habitat	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and not reversible
Displacement of amphibian species during construction and operation	• Minimize construction activities in adjacent drainage ditches	• Minimal displacement of amphibian species	Adverse, low ecological value, low magnitude, small geographical extent, sporadic, long-term and reversible
Increased mortality due to interactions with vehicles during construction	• Minimize construction activities in adjacent drainage ditches	• Minimal increase in mortality	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible
Impaired amphibian habitat from releases of fuels and hazardous substances during construction and operation	• Minimize disturbance in ditches • Comply with provincial regulations, guidelines and licenses for hazardous substances • Construction, installation and removal of hazardous product storage to occur under the supervision of a	• Minor impairment of amphibian habitat	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible

Table 6-12: Environmental Effects Analysis for Amphibians

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
	licenced technician • Provide dedicated petroleum storage areas to be provided with spill containment • Contractors and workers to prevent the release of fuels and hazardous substances • When servicing equipment, waste products such as oil and antifreeze to be drained into approved containers and removed to a licensed disposal ground • Spills to be cleaned up immediately and reported to Manitoba Hydro and local Conservation Officer		
Release of herbicides to amphibian habitat during maintenance activities	• Limit spraying to affected areas only with no application to standing water • Adhere to all applicable permits and provincial regulations for noxious weeds and pesticides (*The Noxious Weed Act; The Pesticides and Fertilizers Control Act*)	• Minimal risk of impaired amphibian habitat	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible

6.5.11 Reptiles

The proposed Tyndall 115 kV Transmission Line and DSC Project may have environmental effects on reptiles including loss and impairment of habitat, displacement of species during construction and maintenance activities, impairment of habitat from herbicides and hazardous substances, and increased mortality due to interactions with vehicles.

The adversity of the effects was determined to be low. Mitigation measures include minimizing disturbance in adjacent drainage ditches; contractors and/or workers are to prevent fuel, lubricants or compounds from being released; dedicated petroleum storage areas are to be

provided with spill containment (Manitoba Hydro 2006a); and adhering to permit terms and conditions, and provincial regulations where herbicides are used.

Residual effects on reptiles were determined to be low in low in ecological value and magnitude, small in geographical extent, sporadic, long-term in duration, and reversible. Follow-up includes inspection to ensure that mitigation is implemented and effective and identify unforeseen effects. VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for reptiles is summarized in Table 6-13.

Table 6-13: Environmental Effects Analysis for Reptiles

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Loss and impairment of reptile habitat during construction and operation	• Minimize construction activities in adjacent drainage ditches	• Minimal loss of reptile habitat	Adverse, low ecological value, low magnitude, small geographical extent, sporadic, long-term and reversible
Displacement of reptiles during construction and operation	• Minimize construction activities in adjacent drainage ditches	• Minimal disruption of reptile species	Adverse, low ecological value, low magnitude, small geographical extent, sporadic, long-term and reversible
Increased mortality due to interactions with vehicles during construction	• Minimize construction activities in adjacent drainage ditches	• Minimal increase in mortality	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible
Impaired reptile habitat from releases of fuels and hazardous substances during construction and operation	• Comply with provincial regulations, guidelines and licenses for hazardous substances • Construction, installation and removal of hazardous product storage to occur under the supervision of a licenced technician • Dedicated petroleum storage areas to be provided with spill containment	• Minor impairment of reptile habitat	Adverse low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible

Table 6-13: Environmental Effects Analysis for Reptiles

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
	• Contractors and workers to prevent the release of fuels and hazardous substances • When servicing equipment, waste products such as oil and antifreeze to be drained into appropriate containers and removed to an approved disposal ground • Spills to be reported to Manitoba Hydro and local Conservation Officer and cleaned up immediately		
Impaired reptile habitat from the release of herbicides during operation	• Limit spraying to affected areas only with no over-spraying on unaffected areas • Adhere to all applicable permits and provincial regulations for noxious weeds and pesticides (*The Noxious Weed Act; The Pesticides and Fertilizers Control Act*)	• Minimal risk of impaired reptile habitat	Adverse low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible

6.5.12 Invertebrates

The potential effects of transmission lines and other hydropower development on invertebrates have been reported by North/South Consultants Inc. (2011) and Manitoba Hydro (2011). Habitat alteration was identified as the main potential effect on invertebrates (North/South Consultants Inc. 2011).

The proposed Tyndall 115 kV Transmission Line and DSC Project may have environmental effects on invertebrates including loss and impairment of invertebrate habitat from vegetation removal and damage to wet areas such as ditches, displacement of species during construction and maintenance activities, and impairment of habitat from herbicide use and potential hazardous releases. As terrestrial invertebrates tend to have high reproductive capabilities and overall abundance (Manitoba Hydro 2011b), the adversity of effects was determined to be low. Mitigation measures include minimizing disturbance in adjacent drainage ditches; preventing

fuel, lubricants or compounds from being released; providing dedicated petroleum storage areas with spill containment (Manitoba Hydro 2006a); and adhering to permit terms and conditions, and provincial regulations where herbicides are used.

Residual effects were determined to be low in ecological value and magnitude, small in geographical extent, sporadic, long-term in duration, and reversible. Follow-up includes inspection to ensure that mitigation is implemented and effective and identify unforeseen effects. VECs will not be adversely affected by the Project with the implementation of mitigation measures. The environmental effects analysis for invertebrates is summarized in Table 6-14.

Table 6-14: Environmental Effects Analysis for Invertebrates

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Loss and impairment of invertebrate habitat during construction and operation	• Minimize construction activities in adjacent drainage ditches	• Minimal loss of invertebrate habitat	Adverse, low ecological value, low magnitude, small geographical extent, sporadic, long-term and reversible
Displacement of invertebrate species during construction and operation	• Minimize construction activities in adjacent drainage ditches	• Minimal displacement of invertebrate species	Adverse, low ecological value, low magnitude, small geographical extent, sporadic, long-term and reversible
Impaired invertebrate habitat from releases of fuels and hazardous substances during construction and operation	• Comply with provincial regulations, guidelines and licenses for hazardous substances • Construction, installation and removal of hazardous product storage to occur under the supervision of a licenced technician • Dedicated petroleum storage areas to be provided with spill containment • Contractors and workers to prevent the release of fuels and hazardous substances • When servicing equipment, waste products such as oil	• Minor impairment of invertebrate habitat	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible

Table 6-14: Environmental Effects Analysis for Invertebrates

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
	and antifreeze to be drained into appropriate containers and removed to an approved disposal ground •Spills to be cleaned up immediately and reported to Manitoba Hydro and local Conservation Officer		
Impaired invertebrate habitat from the release of herbicides during operation	•Limit spraying to affected areas only with no over-spraying on unaffected areas •Adhere to all applicable permits and provincial regulations (*The Noxious Weed Act; The Pesticides and Fertilizers Control Act*)	•Minimal risk of impaired invertebrate habitat	Adverse, low ecological value, low magnitude, small geographic extent, sporadic, long-term and reversible

6.5.13 Species at Risk

In the vicinity of the Project area, one bird species (loggerhead shrike) and one fish species (chestnut lamprey) were previously known to occur (MBCDC records and literature).

Loggerhead shrike (Lanius ludovicianus migrans) is listed by COSEWIC, SARA and MBESA as endangered while the MBCDC ranks the species as very rare throughout its range or in the province. The proposed Tyndall 115 kV Transmission Line and DSC Project may affect loggerhead shrike through loss or disturbance of habitat, displacement of species, bird strikes associated with transmission lines, and bird collisions from increased vehicular traffic. COSEWIC (2012) indicated that reasons for the loggerhead shrike's endangered species designation include a decrease in habitat availability and casualties due to collisions with cars.

Mitigation measures include ensuring construction activities occur outside of the breeding bird season (April to May), minimizing disturbance to shelterbelts and other tree and shrub areas, containing construction activities within the Project area and transmission line rights-of-way, minimizing disturbance of adjacent drainage ditches, enforcing posted vehicle speed limits and ensuring that workers do not harass bird species. Follow-up includes inspections to ensure that mitigation is implemented and effective, and monitoring for potential bird strikes.

Chestnut lamprey (Ichthyomyzon castaneus) is listed as special concern by COSEWIC and SARA. This fish species was previously observed in Devils Creek in 1983. The proposed Tyndall 115 kV Transmission Line and DSC Project may affect the habitat of the chestnut lamprey by impairing water quality and by changing or blocking water flow. Proposed mitigation includes maintaining buffers of vegetation, using low disturbance clearing methods adjacent to waterways, providing erosion protection and sediment control, and adhering to applicable legislation and guidelines. Follow-up includes inspections to ensure that mitigation is implemented and effective. It is anticipated that VECs will not be adversely affected by the Project with the implementation of mitigation measures.

6.6 Socio-Economic Environment

6.6.1 Social Conditions

The potential effects of transmission stations, DSC's and associated transmission lines on social conditions have been reported in other environmental assessments conducted by Manitoba Hydro (2001, 2004a, 2004b, 2004c, 2007c, 2009c, 2012c). Electrical and biological effects of transmission lines are reported in major review documents such as the Bonneville Power Administration (1989). Information on environmental effects of transmission lines and associated structures and corresponding mitigation measures are provided in "Shorelines, Shorelands and Wetlands: A Guide to Riparian Ecosystem Protection at Manitoba Hydro Facilities" (Manitoba Hydro 2000), "Fur, Feathers and Transmission Lines: How Rights of Way Affect Wildlife" (Manitoba Hydro 1995), and "Transmission Line and Transmission Station Vegetation Management Guidelines" (Manitoba Hydro 2007b).

Environmental protection guidelines for construction, operation and decommissioning of Manitoba Hydro worksites (Manitoba Hydro 2006a) provide mitigation measures for various Project activities. The Environmental Impact Statement for the proposed Bipole III Transmission Line contains current information on the social effects of transmission lines and converter stations (Manitoba Hydro 2011c).

The proposed Tyndall 115 kV Transmission Line and DSC may have potentially low adverse effects on aesthetic values, individual well-being, worker and public safety risk, as well as potential beneficial effects due to enhanced reliability of electrical services. Following are summaries of some of the main concerns related to social effects:

Aesthetic Values: The physical appearance or profile of transmission lines, and transmission and distribution facilities may cause visual or aesthetic concerns in urban or rural settings or in other sensitive circumstances. The proposed 115 kV tap will be located at a considerable distance from the nearest residences and farm buildings. The proposed 115 kV Transmission Line will be routed along existing road and former rail line allowances, across agricultural lands, and adjacent to Devils Creek. Distances from the transmission lines to the nearest residences and farm buildings range from < 100 m to 200 m. The proposed DSC site is immediately north of PTH 44 and there are no nearby residences or farm buildings. Decommissioning of the

Garson Station and associated transmission lines will result in a net improvement of aesthetic values. Concerns regarding aesthetics of the Project were identified from the Public Open House. Measures to mitigate aesthetic concerns include using existing rights-of-way, routing the transmission line away from residences, minimizing crossing of agricultural lands, limiting the extent of clearing, pole placement to minimize line of sight for residences, and restoring the Garson Station site to near natural conditions.

Vehicular Traffic: There will be increased vehicle and equipment traffic along gravel roads in the area during the construction phase of the proposed Tyndall 115 kV Transmission Line and DSC Project. Construction vehicles and equipment will be both rubber-tired and tracked. Support vehicles will include semi-trailers, pick-up trucks and all-terrain vehicles. Construction activity and vehicle movement will be relatively short-term in duration and will occur during normal daytime working hours to the extent possible. Warning signage, speed control and flag persons will be provided as required during construction. Provincial speed limits, municipal weight restrictions and other applicable regulations, by-laws and guidelines will be respected. During operation and maintenance phase, vehicle traffic will be required for periodic inspection and maintenance activities by Manitoba Hydro and contractors.

Noise and Lighting: During construction of the proposed 115 kV tap, 115 kV Transmission Line and DSC, and decommissioning of the Garson Station, there will be increased noise and vibration levels from operating vehicles and equipment for clearing, grading and drilling, and the use of explosives (conductor splicing). Noise and vibration may be felt by residents living along the gravel roads. Construction will be relatively short-term in duration and will occur during normal daytime working hours to the extent possible. While the Project components are located outside municipal noise abatement areas, other applicable noise regulations, bylaws and guidelines will be respected. Local residents will be advised in advance of using explosive devices. Noise levels from operation of the tap, transmission line and DSC will be minor and will not be audible in the immediate area or by nearby residents.

Lighting will be provided at the 115 kV tap and DSC locations during the construction phase of the Project for safety and security purposes. There will be lighting required during the operation phase.

Radio/Television Interference: Electrical interference from the 115 kV tap, 115 kV Transmission Line and DSC can be a concern to local residents. The most common cause of radio and television interference is loose electrical hardware which can be eliminated by proper construction and maintenance methods (i.e., tightening of hardware components). The likelihood of such interference from the proposed Tyndall Project is very low due to the nature of the facilities and the associated power levels. Manitoba Hydro meets the requirements of the *Radio Communications Act* and the Radio Communication Regulations, and also meets the requirements of Industry Canada's Interference-Causing Equipment Standard - ICES-004 Issue 2, January, 1999 – Alternating Current High Voltage Power Systems. Manitoba Hydro will attempt to resolve any radio or television interference problems attributable to the proposed Tyndall Transmission Line and DSC Project.

Electrostatic and Electromagnetic Induction Effects: The DSC will produce minor electrostatic and electromagnetic induction effects as a consequence of the low voltages and currents, respectively. The risks of electrocution and shock are well-known and documented. During Round One engagement, health and safety was identified as a concern regarding the Project. Safe methods, procedures, standards and codes of protection for both the public and employees are well-established and are routinely used by Manitoba Hydro (Manitoba Hydro 2006a, 2009). Applicable provincial legislation as well as national, international and industry standards will be adhered to. The most common method of protecting against electrostatic induction shock hazard is to ensure that metal objects are adequately grounded. Manitoba Hydro will provide grounding for all metal objects (i.e., metal structures, equipment and fences). Electromagnetic induction effects occur when current produces a magnetic field in a metallic object, and depends on the strength of the current and separation distance. Due to the nature of the electrical equipment, and low voltages and currents, fencing is not required at the 115 kV tap and DSC.

Electric and Magnetic Fields: The Manitoba Hydro electrical system carries power from generating stations to homes by transmission lines, stations and distribution lines. Each component of the system produces electric and magnetic fields in the extremely low frequency range that includes 60 Hz. Electric fields are due to a system's voltage and area measured in kilovolts per meter (kv/m). Magnetic fields are due to the flow of electrical current and are measured in milligauss (mG). Electric and magnetic field (EMF) levels measured near any source depend upon a number of factors but diminish rapidly with increasing distance from the source. The EMF levels associated with an AC transmission line depend upon the configuration of the lines conductors, the line's voltage, the amount of current the line is carrying, distance from the conductors, etc. Electrical equipment at transmission stations and DSC's is configured in such a way that fields drop off quickly with distance. EMF levels immediately adjacent to electrical facilities are typically within the range of background levels, except where the transmission lines cross. Health and safety concerns from the Project were identified during the Round Two Open House.

Canadian (Manitoba Clean Environment Commission 2001) and international studies including World Health Organization (2007), International Agency for Research on Cancer (2001) and National Institute of Environmental Health Sciences (1999) have concluded that there is insufficient scientific evidence showing 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. There are no national, provincial or territorial standards or guidelines related to EMFs in Canada. While Manitoba Hydro is sensitive to public concerns regarding potential health effects from electric and magnetic fields, there is at present no scientific evidence to justify modification of existing practices respecting facilities for the generation, transmission and distribution of electricity. Manitoba Hydro continues to undertake the following actions regarding the issue:

- monitoring of worldwide research programs on electric and magnetic fields;

- 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.

Mitigation measures identified for social effects include: locating facilities away from residential areas; using existing rights-of-way, routing away from residences and minimizing crossing of agricultural lands; providing warning signage, speed control and flag persons; restoring disturbed sites and the Garson Station to near previous conditions; and providing information to local area residents prior to and during construction. Follow-up includes regular inspections of the construction site, monitoring noise, vibration and EMF levels as required, and maintaining contacts with local area residents. Residual effects were determined to be low in magnitude, low to moderate in geographic area, sporadic to continuous and reversible to not reversible during the life of the Project. The environmental effects analysis for social conditions is summarized in Table 6-15.

Table 6-15: Environmental Effects Analysis for Social Conditions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Aesthetic Values			
Impaired aesthetic values in local assessment area due to presence of new 115 kV Transmission Line	• Route transmission line away from residences • Route transmission line along existing rights-of-way/road allowances • Minimized crossing agricultural lands • Minimize cutting trees in forested areas • Minimize line of sight for residences with pole placement	• Minor impairment of aesthetic values	Adverse, low magnitude, moderate geographic extent, continuous, long-term and not reversible during the life of the Project
Impaired aesthetic values in local assessment area due to presence of new DSC	• Locate DSC away from residences • Minimize footprint of facilities to the extent possible • Minimize vertical profile of facilities to the extent possible • Restore surface damage immediately after construction	• Minor impairment of aesthetic values	Adverse, moderate magnitude, moderate geographic extent, continuous, long-term and not reversible during the life of the Project

Table 6-15: Environmental Effects Analysis for Social Conditions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Improved aesthetic values due to decommissioning of Garson Station	• Remove site equipment, fence and redundant transmission lines	• N/A	Beneficial, low magnitude, low geographic extent, continuous and reversible
Individual Well-being			
Decreased individual well-being in the local assessment area due to noise and vibration from construction activities	• Provide information to local area residents • Comply with licence terms and conditions • Limit noise and vibration causing activities to daytime working hours	• Minor decrease in individual well-being	Adverse, moderate magnitude, moderate geographic extent, sporadic, moderate-term and reversible after construction is complete
Decreased individual well-being in the local assessment area due to noise from use of explosive devices	• Comply with provincial legislation and guidelines for explosives use • Ensure that persons using explosives are licenced • Provide 48-hour advance notification before use of implosives • Adhere to implosive use schedule • Restrict use of implosives to normal working hours	• Minor decrease in individual well-being	Adverse, moderate magnitude, moderate geographic extent, sporadic, short-term and reversible
Decreased individual well-being in the local assessment area due to presence of new 115 kV Transmission Line	• Route transmission line away from residences • Route transmission line along existing rights-of-way/road allowances • Minimized crossing agricultural lands • Minimize cutting trees in forested areas	• Minor decrease in individual well-being	Adverse, low magnitude, moderate social value, moderate geographic extent, continuous and not reversible during the life of the Project
Decreased individual well-being in the local assessment area	• Locate DSC away from residences • Minimize footprint of DSC to the extent possible • Minimize vertical profile of	• Minor decrease in individual well-being	Adverse, moderate magnitude, moderate geographic extent,

Table 6-15: Environmental Effects Analysis for Social Conditions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
due to the presence of new DSC	DSC to the extent possible • Restore surface damage immediately after construction		continuous, long-term and not reversible during the life of the Project
Decreased individual well-being due to perceived health risks of EMF from electrical facilities	• Provide information to local area residents • Comply with national and international standards electrical installations • Adhere to Health Canada Safety Codes and guidelines • Adhere to Manitoba Hydro health and safety guidelines	• Some perceived risk likely to remain	Adverse, low magnitude, moderate geographic extent, continuous and not reversible during the life of the Project
Decreased individual well-being due to increased traffic during construction	• Limit construction activities to daytime working hours • Provide warning signage, speed control and flag persons • Adhere to provincial highway safety regulations and codes	• Minor decrease in individual well-being	Adverse, low magnitude, moderate geographic extent, sporadic and reversible after construction is complete
Improved individual well-being due to decommissioning of Garson Station	• Remove site equipment, fence and redundant transmission lines • Recycle and reuse station materials and equipment to the extent possible	• N/A	Beneficial, low magnitude, low geographic extent, continuous and reversible
Improved individual well-being from increased reliability of electrical services	• None proposed	• N/A	Beneficial, moderate magnitude, large geographic area, continuous and reversible
Land Use			
Loss of agricultural production at tap, along transmission	• Negotiate easements with property owners • Compensate property	• Minor decrease in production and minor obstruction	Adverse, moderate magnitude, small geographic extent,

Table 6-15: Environmental Effects Analysis for Social Conditions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
line and at DSC	owners in accordance with Manitoba Hydro policies • Utilize maximum separation distance for pole placement		long term and reversible
Potential increased of agricultural production from fully decommissioned Garson Station	• Remove site equipment, fence and redundant transmission lines • Recycle and reuse station materials and equipment to the extent possible	• N/A	Beneficial, low magnitude, small geographic area and long term and reversible
Recreation			
Increased recreational use along transmission line corridor	• Post warning signage along transmission corridor • Provide information to local residents • Provide information to snowmobile/ATV associations	• Minor impairment of recreational use	Adverse, low magnitude, low geographic extent, continuous and not reversible during the life of the Project
Impaired recreational use along abandoned rail line	• Maintain a minimum distance between transmission corridor abandoned rail line • Provide information to local residents • Post warning signage along transmission corridor	• Minor impairment of recreational use	Adverse, low magnitude, low geographic extent, continuous and not reversible during the life of the Project
Health and Safety			
Increased risk of vehicle accidents, increased nuisance and decreased individual well-being due to increased dust levels along gravel roads during construction	• Apply dust control measures as necessary such as water or an approved dust suppressant • Restrict speed of work vehicles as required	• Minor increase in dust levels	Adverse, low magnitude, small geographical extent, sporadic frequency, moderate-term duration and reversible after construction is complete

Table 6-15: Environmental Effects Analysis for Social Conditions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Increased public safety risk during construction of transmission line and DSC	• Provide warning signage, fencing and site security • Adhere to Manitoba Hydro safe construction guidelines • Provide information to local area residents	• Minimal risk to public safety	Adverse, low magnitude, small geographic extent, continuous and reversible after construction is complete
Increased public safety risk due to construction traffic	• Provide warning signage, speed control, flag persons • Adhere to provincial highway safety regulations and codes	• Minor risk to public safety	Adverse, low magnitude, moderate geographic extent, continuous and reversible after construction is complete
Increased worker safety risk during construction	• Adhere to provincial safety and health regulations and codes • Adhere to Manitoba Hydro safe working guidelines	• Minimal risk to worker safety	Adverse, low social value, low magnitude, small geographic extent, continuous and reversible after construction is complete
Increased worker safety risk during operation	• Adhere to provincial safety and health regulations and codes • Adhere to Manitoba Hydro safe working guidelines	• Minimal risk to worker safety	Adverse, low magnitude, small geographic extent, continuous and not reversible during the life of the Project
Infrastructure			
Impaired condition of gravel roads due to heavy vehicles and equipment during	• Establish and maintain contacts with the rural municipalities regarding road condition and use before and during construction • Designate access and	• Minor impairment of gravel roads possible due to local road conditions	Adverse, moderate magnitude, moderate geographic extent, sporadic and

Table 6-15: Environmental Effects Analysis for Social Conditions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
construction	egress routes for construction vehicles and equipment • Respect seasonal truck weight restrictions		reversible after construction is complete

6.6.2 Heritage Resources

There is little to no potential for heritage resources in the Project assessment area, therefore low potential to be adversely affected by construction of the 115 kV tap, 115 transmission line and DSC. The area has negligible to low heritage resource importance due to its location which is at considerable distance from elevated areas, unique features, substantial forest cover and major waterbodies.

The Project assessment area including the locations of the 115 kV tap, 115 kV transmission line and DSC have been disturbed by agricultural practices, and rail and road construction activities. Also, there are no known historic or contemporary buildings or structures in the immediate vicinity of the proposed Project facilities.

One previously known native settlement in the Project area (near 115 kV tap location) was identified during the Public Open House, and will be avoided.

Drilling holes will be required for the transmission line and limited excavation, trenching and drilling will be carried out for the DSC. Any potential heritage resources would more likely be covered by gravel rather than being excavated. Manitoba's Heritage Resources Branch advised that the potential to affect significant heritage resources is low, and therefore the Branch has no concerns with the proposed Project (Appendix F).

The effects on heritage resources were determined to be negligible to low in adversity. Mitigation measures identified to avoid or minimize adverse effects on heritage resources included limiting the extent of excavations, providing instructions to construction workers, reporting any heritage resources and stopping work until authority to resume is provided.

Follow-up identified includes regular inspections of the construction site and observations for heritage resources. If significant heritage resources are identified a heritage resource management strategy will be implemented in engagement with the Heritage Resources Branch. Residual effects were determined to be low in magnitude, small in geographic area, sporadic and not reversible during the life of the Project. The environmental effects analysis for heritage resources is summarized in Table 6-16.

Table 6-16: Environmental Effects Analysis for Heritage Resources

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Loss or damage to heritage resources in the Project assessment area due to excavating, trenching and drilling during construction	• Limit extent of excavations to the extent possible • Instruct construction workers to be vigilant for heritage resources including artifacts, implements, bones, etc. • Report heritage resources and human remains to Historic Resources Branch immediately. Stop work until clearance is given by Historic Resources Branch • As required, implement a culture and heritage resources management plan	• None identified	Adverse, low magnitude, small geographic extent, occurs once, short-term and not reversible during the life of the Project

6.6.3 Economic Conditions

The proposed Tyndall 115 kV Transmission Line and DSC Project may have potential adverse effects on economic conditions including interference with farming operations, loss of agricultural production, decreased property values and increased property taxes, as well as potential beneficial effects including increased contract and employment opportunities and increased regional revenues.

Economic and property concerns from the Project were identified during public engagements. Mitigation measures identified include negotiating easements for the tap, transmission lines and DSC, providing compensation to affected property owners in accordance with Manitoba Hydro policies, purchasing local materials and supplies, and hiring local contractors and workers to the extent possible.

Follow-up measures identified include ensuring implementation of mitigation measures and adherence to Manitoba Hydro generic environmental protection plan practices and guidelines. Residual effects were determined to be small to moderate in magnitude, moderate in geographic area, continuous, moderate to long-term in duration, with residual adverse effects reversible to not reversible within the life of the Project. The environmental effects analysis for economic conditions is summarized in Table 6-17.

Table 6-17: Environmental Effects Analysis for Economic Conditions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Perception of decreased property values due to presence of tap, transmission line and DSC	• None proposed	• Minor decrease possible but not likely measurable	Adverse, moderate magnitude, moderate geographic extent, continuous, long-term and not reversible
Perceived increase in property taxes due to local improvements associated with electrical facilities	• None proposed	• No actual increase likely	Adverse, moderate magnitude, moderate geographic extent, continuous, long-term and not reversible
Interference with farming operations due to presence of transmission lines and towers/poles	• Negotiate easements with property owners • Compensate property owners in accordance with Manitoba Hydro policies	• Minor interference with operations	Adverse, moderate magnitude, small geographic extent, long term and reversible
Decreased crop production due to presence of transmission lines (towers/ poles) and DSC	• Negotiate easements with property owners • Compensate property owners in accordance with Manitoba Hydro policies	• Minor decrease in production	Adverse, moderate magnitude, small geographic extent, long term and reversible
Contract opportunities for transmission line and DSC construction	• Provide opportunities for local contractors	• N/A	Beneficial, moderate magnitude, large geographic extent, moderate term and reversible
Employment opportunities for transmission line and DSC construction	• Hire locally to the extent possible	• N/A	Beneficial, moderate magnitude, large geographic extent, sporadic, moderate term and reversible
Regional revenue from accommodation of construction	• None proposed	• N/A	Beneficial, moderate magnitude, large geographic extent,

Table 6-17: Environmental Effects Analysis for Economic Conditions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
personnel			sporadic, moderate term and reversible
Regional revenue from purchase of equipment and supplies	• Purchase equipment and supplies locally to the extent possible	• N/A	Beneficial, small magnitude, large geographic extent, sporadic, moderate term and reversible
Regional revenue for transmission line and DSC maintenance and repair	• Provide opportunities for local contractors	• N/A	Beneficial, small magnitude, large geographic extent, sporadic, long-term and reversible
Regional employment for transmission line and DSC maintenance and repair	• Hire locally to the extent possible	• N/A	Beneficial, small magnitude, large geographic extent, continuous, long-term and reversible

6.7 Accidents And Malfunctions

During construction of the proposed 115 kV tap, 115 kV Transmission Line and DSC there are risks of accidents involving construction vehicles, machinery and equipment, releases of hazardous substances including fuels, fires and explosions due to the presence of fuel, flammable materials and explosives, electrocution of workers around high-voltage equipment, and vehicle accidents due to increased construction traffic. During operation of the DSC there are risks of cooling oil releases, releases of hazardous substances, fires and explosions, worker electrocution and vehicle accidents. Following are summaries of some of the main concerns for accidents and malfunctions:

Cooling Oil: Cooling or insulating oil is a highly-refined mineral oil that is stable at high temperatures and has excellent electrical insulating properties. Transformer oil is not classified as a dangerous good under Manitoba's Dangerous Goods Handling and Transportation Regulation and is not regulated as a petroleum product under the Storage and Handling of Petroleum Products and Allied Petroleum Products Regulation. Spills of cooling oil are possible as a result of equipment malfunction or human error during filling of electrical equipment or periodic replacement of oil.

Procedures for filling and replacing oil in transformer are outlined in Manitoba Hydro's Hazardous Materials Handbook (2007a). In addition, an emergency response plan will be put in place for the construction phase of the Project and will be updated for the operation and maintenance phase. An oil containment system is not required for a DSC. No polychlorinated biphenyl (PCB)-containing equipment or oil will be used. A contaminated site assessment will be carried out at the Garson Station and any required remediation will be undertaken to achieve petroleum hydrocarbon criteria for agricultural soil.

Fuels, Oils and Greases: Fuels (gasoline, diesel, propane) as well as lubricating oils and greases will be used during construction of the 115 kV tap, 115 kV Transmission Line and DSC. Storage, handling and transport of fuels will be in accordance with Manitoba Conservation's Storage and Handling of Petroleum Products and Allied Petroleum Products Regulation and guidelines as well as Manitoba Hydro's Code of Practice for Storage and Handling of Petroleum Products and Allied Petroleum Products Storage Tank Systems (2003) and Environmental Protection Guidelines, Construction, Operation and Decommissioning, Manitoba Hydro Work Sites and Facilities (2006a). After construction is complete, no fuel, oil or grease will be stored at the DSC.

Hazardous Substances: Other hazardous substances commonly used at electrical facilities include sulphur hexafluoride, carbon tetrafluoride and herbicides. Hazardous substances will be subject to provincial and federal workplace hazardous materials information system regulations and guidelines, and the Manitoba Workplace Safety and Health, Workplace Safety and Health Regulation, and will be managed in accordance with Manitoba Hydro's Hazardous Materials Management Handbook (2007a).

Sulphur Hexafluoride (SF_6) is a colourless, odourless, non-toxic and non-combustible gas that is used as an insulating medium in hermetically-sealed circuit breakers. It poses a health hazard as an asphyxiant in confined areas but poses negligible risk to humans in outdoor locations. The main concern with SF_6 is its greenhouse gas properties since the gas can potentially affect global warming by a factor about 23,900 times larger than that of carbon dioxide emissions.

Carbon Tetrafluoride (CF_4) is also used as an insulting medium in hermetically-sealed circuit breakers. It is colourless, has a characteristic odour and is non-flammable. It poses a health hazard as an asphyxiant in confined areas but poses negligible risk to humans in outdoor locations. CF_4 is also a greenhouse gas with a greenhouse warming potential of 6,500 compared to carbon dioxide.

Herbicides will be used to manage vegetation growth at the 115 kV tap, along the 115 kV Transmission Line and at the DSC in accordance with Manitoba Hydro's Transmission Line and Transmission Station Vegetation Management Guidelines (2007b). Herbicides used will be those approved or recommended by Manitoba Conservation and Water Stewardship and application of herbicides will be in accordance with permit terms and conditions.

Fires and Explosions: The main sources of fuel for fires at transmission stations are equipment cooling and cable insulating oils. Manitoba Hydro's Fire Protection Manual includes procedures for preventing and responding to fires and explosions. Explosive devices (implodes)

used to splice conductors will be stored and used in accordance with provincial and federal legislation. Only trained and licensed personnel are permitted to use explosives. An emergency response plan will be put in place for the construction phase of the Project and will be updated for the operation and maintenance phase. The scope of the plan will include fires and explosions. In addition, the DSC site will be kept free of vegetation that would provide a fuel source.

Mitigation measures identified for accidents and malfunctions include preparing an emergency response plan that addresses all risks, providing the plan to local authorities, adhering to provincial fuel storage and transport regulations, following electrical codes, complying with Manitoba Hydro safe work procedures, providing site security and warning signs, and regular maintenance of vegetation. Levels of cooling oil, sulphur hexafluoride and carbon tetrafluoride will be monitored continuously and reported electronically to the Manitoba Hydro control centre. Follow-up identified includes regular inspection of works sites and updating the emergency response plan.

Residual effects were determined to be low to moderate in magnitude, small to moderate in geographic area, sporadic to continuous, moderate to long-term, and either not reversible or reversible during the life of the Project or after Project completion. Equipment explosions/oil releases, fuel releases and fires could have potentially significant adverse environmental effects. However, such effects are unlikely with the implementation of mitigation measures and follow-up actions. Environmental effects analysis for accidents and malfunctions is summarized in Table 6-18.

Table 6-18: Environmental Effects Analysis for Accidents and Malfunctions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Increased risk of construction vehicle/ equipment accidents during construction	• Provide warning signage, speed control, flag persons • Adhere to provincial highway safety regulations and codes • Adhere to Manitoba Hydro safe working guidelines	Minimal risk of accidents	Adverse, low magnitude, small geographic extent, sporadic, moderate-term and reversible after completion of the Project
Increased risk of vehicle accident during operation	• Adhere to provincial highway safety regulations and codes • Adhere to Manitoba Hydro safe working guidelines	Minimal risk of accidents	Adverse, low magnitude, small geographic extent, sporadic, long-term and not reversible
Risk of electrocution to workers during	• Adhere to electrical codes • Adhere to Manitoba Hydro	Minimal risk of electrocution	Adverse, low magnitude, small

Table 6-18: Environmental Effects Analysis for Accidents and Malfunctions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
construction and operation	safe working guidelines		geographic extent, sporadic, long-term and not reversible during the life of the Project
Risk of electrocution to public during construction and operation	• Adhere to Manitoba Hydro safe working guidelines • Provide warning signage and contact information	Negligible risk to public	Adverse, low magnitude, small geographic extent, sporadic, long-term and not reversible during the life of the Project
Risk of equipment explosion/fire during operation	• Provide adequate/required spacing around electrical equipment • Prepare emergency response plan that includes equipment explosion/fire • Provide emergency response plan to rural municipalities	Minimal risk of equipment explosion/fire	Adverse, moderate magnitude, small geographic extent, sporadic, long-term and not reversible during the life of the Project
Risk of cooling oil leak/ release during filling	• Prepare emergency response plan that includes electrical equipment leaks/sills	Minimal risk of oil leak/release	Adverse, low magnitude, small geographic extent, sporadic, short-term and reversible
Risk of cooling oil leak/ release during operation including refilling	• Prepare emergency response plan that includes transformer leaks/sills	Minimal risk of oil leak/release	Adverse, low magnitude, small geographic extent, sporadic, long-term and reversible
Risk of fuel spill during construction	• Adhere to provincial fuel storage and handling regulations and guidelines • Prepare emergency response plan that includes fuel releases	Minimal risk of fuel release	Adverse, low magnitude, small geographic extent, sporadic, short-term and reversible
Risk of fire or	• Adhere to Manitoba Hydro safe working guidelines	Minimal risk of	Adverse, low

Table 6-18: Environmental Effects Analysis for Accidents and Malfunctions

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
explosion during construction	• Prepare emergency response plan that includes fires and explosions	fire or explosion	magnitude, moderate geographic extent, sporadic, short-term and reversible
Risk of fire or explosion during operation	• Adhere to Manitoba Hydro safe working guidelines • Regular maintenance of transmission line and distribution supply center vegetation • Prepare emergency response plan that includes explosions and fires	Minimal risk of fire or explosion	Adverse, low magnitude, moderate geographic extent, sporadic, long-term and reversible

6.8 Effects of The Environment

The proposed transmission line and DSC facilities will be subject to damage from extreme weather events (e.g., tornado, intense lightening, wind shear, ice storm) and grass fires resulting in power outages. Climate change will increase the risk over time of extreme weather events and grass fires. Mitigation measures proposed include ensuring proper grounding of equipment; managing vegetation at the DSC and along transmission lines; coordinating emergency procedures with the Rural Municipalities of St. Clements and Brokenhead, local area property owners; and preparing and maintaining an emergency response plan that includes extreme weather events and grass fires. Follow-up identified includes regular updates of the emergency response plan.

Residual effects were determined to be potentially high in magnitude, moderate in geographic area, sporadic, moderate-term and reversible. However, accidental fuel releases and wild fires caused by others could have potentially significant environmental effects. Environmental effects analysis for effects of the environment on the Project is summarized in Table 6-19.

Table 6-19: Environmental Effects Analysis for Effects of the Environment on the Project

Environmental Effects	Mitigation Measures	Residual Effects	Evaluation
Risk of power outages from line damage due to extreme weather events	• Ensure proper grounding of electrical equipment • Coordinate contingency procedures with rural municipalities and local area residences • Prepare emergency response plan that includes extreme weather events	Minimal risk of power outages	Potential high magnitude, moderate geographic extent, sporadic, moderate-term and reversible
Risk of power outages from grass fires	• Manage vegetation at distribution supply center and along transmission lines • Coordinate contingency procedures with rural municipalities and local area residences • Prepare emergency response plan that includes grass fires	Minimal risk of power outages	Potential high magnitude, moderate geographic extent, sporadic, moderate-term and reversible

6.9 Cumulative Environmental Effects

Cumulative effects are the environmental effects that are likely to result from a project in combination with the environmental effects of other past, existing and future projects or activities. The Canadian Environmental Assessment Agency Operational Statement (2007) provides guidance on how cumulative environmental effects should be considered under the Canadian Environmental Assessment Act and the Agency's Practitioner's Guide (1999) outlines a five-step environmental assessment process for cumulative environmental effects that includes: Scoping, Analysis of effects, Identification of mitigation, Evaluation of significance, and Follow-up.

6.9.1 Scoping

Regional Issues: Regional environmental issues of concern for the assessment of cumulative effects for the Tyndall 115 kV Transmission Line and DSC Project were determined to include:

- Taking agricultural land out of production
- Removal of trees/shelterbelts

- Transmission line and DSC aesthetics
- Access at creeks
- Property values
- Electric and magnetic fields and health
- Groundwater contamination
- Property taxes
- Regional economy

Regional issues are discussed in section 6.3 of the environmental assessment report.

Regional Valued Environmental Components: Regional VECs relevant to the cumulative effects assessment for the Tyndall 115 kV Transmission Line and DSC Project were determined to be:

- Agricultural land
- Property values
- Rural lifestyle
- Aesthetic values
- Creeks and drains
- Birds and mammals

VECs are discussed in section 6.4 of the environmental assessment report.

Spatial and Temporal Boundaries: Spatial boundaries are generally greater and temporal boundaries are often longer for a cumulative effects assessment since the effects of other Projects and activities may occur over a wider area and extend before and after the Project boundaries. The spatial boundary identified for the cumulative effects assessment area includes the Rural Municipalities of Brokenhead and St. Clements (1,479.1 km^2; 147,914.0 ha) (Map 2-2). The temporal boundary for the cumulative effects assessment was determined to extend over an approximate 50-year period which is the normal life expectancy for a transmission facility.

Other Actions: Other actions that may affect the VECs were determined to include:

- Existing:
    - Tyndall Community
    - Garson Community
    - Agricultural land use
    - Gillis Quarries
    - Water treatment/lagoon
    - Personal vehicle use
    - Commercial vehicle use
    - Off-road vehicle use
    - Recreational hunting
    - Resource use
- Future:
    - Residential development
    - Industrial development
    - Transmission Projects
    - Tree/forest clearing

Potential Effects: The potential environmental effects on VECs due to the proposed Tyndall 115 kV Transmission Line and DSC Project and other Projects and activities in the cumulative effects assessment area for the reasonably foreseeable future are shown as interactions in Table 6-20.

Table 6-20: Potential Cumulative Effects Identification

Projects and Activities	Regional VECs					
	Agricultural Land	Property Values	Rural Lifestyle	Aesthetic Values	Creeks and Drains	Birds and Mammals
Proposed Project						
Project construction	X	X	X	X	X	X
Project operation	X	X	X	X	X	X
Existing Projects and Activities						
Communities						X
Agricultural land use					X	X
Gillis Quarries	X	X	X	X	X	X
Water treatment/lagoon	X	X	X	X	X	X
Vehicle use						X
Recreational hunting						X
Resource use			X			
Future Projects and Activities						
Residential development	X		X	X	X	X
Industrial development	X	X	X	X	X	X
Transmission projects	X	X	X	X	X	X
Tree/forest clearing	X	X		X	X	X

6.9.2 Analysis of Effects

The potential cumulative effects of the proposed Tyndall 115 kV Transmission Line and DSC Project in combination with the effects of other Projects and activities in the assessment area are summarized below:

Agricultural Land: The effects of construction and operation of the proposed Tyndall Project may act cumulatively with the effects of the existing Gillis Quarries and water treatment/lagoon, and future residential and industrial development, and transmission Projects where agricultural land may be taken out of production. Future tree and forest clearing may result in a beneficial effect on agricultural land production.

Property Values: The effects of construction and operation of the proposed Tyndall Project may act cumulatively with the existing Gillis Quarries and water treatment/lagoon, and future industrial development, transmission Projects and tree clearing where property values may be adversely affected.

Rural Lifestyle: The effects of construction and operation of the proposed Tyndall Project may act cumulatively with the existing Gillis Quarries and water treatment/lagoon, and future residential and industrial development, and transmission Projects where rural lifestyles may be adversely affected. Resource use (berry picking, plant harvesting) may have a beneficial effect on rural lifestyle.

Aesthetic Values: The effects of construction and operation of the proposed Tyndall Project may act cumulatively with the existing Gillis Quarries and water treatment/lagoon, and future residential and industrial development, transmission Projects and tree clearing where aesthetic values may be adversely affected.

Creeks and Drains: The effects of construction and operation of the proposed Tyndall Project may act cumulatively with existing agricultural land use, Gillis Quarries and the water treatment/lagoon, and future residential and industrial development, transmission Projects and tree clearing where creeks and drains may be adversely affected.

Birds and Mammals: The effects of construction and operation of the proposed Tyndall Project may act cumulatively with existing communities, agricultural land use, Gillis Quarries, water treatment/lagoon, vehicle use, and recreational hunting, and future residential and industrial development, transmission Projects, and tree clearing where birds and mammals may be adversely affected.

The potential cumulative effects of the proposed Tyndall 115 kV Transmission Line and DSC Project in combination with the effects of other Projects and activities in the assessment area are evaluated in Table 6-21. The rating of evaluation criteria (see Table 6-2) for the potential cumulative effect categories include low to moderate for ecological value, low to high for societal value, low to moderate for magnitude, small geographic extent, continuous, long-term and reversible. Any potential cumulative environmental effects for the Project would be very small and would be difficult to observe or measure.

Table 6-21: Potential Cumulative Environmental Effects Analysis

Potential Cumulative Effect Category	Evaluation Criteria and Rating							Significant
	Ecological Value	Societal Value	Magnitude	Geographic Extent	Frequency	Duration	Reversibility	
Agricultural land	Low	High	Low	Small	Cont.	Long	R	No
Property values	Low	High	Low	Small	Cont.	Long	R	No
Rural lifestyle	Low	Mod	Mod	Small	Cont.	Long	R	No
Aesthetic values	Mod	Mod	Mod	Small	Cont.	Long	R	No
Creeks and Drains	Mod	Mod	Low	Small	Cont.	Long	R	No
Birds and Mammals	Low	Low	Low	Small	Cont.	Long	R	No

6.9.3 Identification of Mitigation

No additional mitigation measures are required for any potential cumulative environmental effects.

6.9.4 Evaluation of Significance

No significant cumulative environmental effects were identified for the proposed Tyndall 115 kV Transmission Line and DSC Project in combination with the environmental effects of other Projects and activities in the assessment area currently or for the reasonably foreseeable future.

6.9.5 Follow-up

No additional follow-up is required for any potential cumulative environmental effects.

6.10 Summary

This chapter of the environmental assessment report identified, described and assessed the biophysical and socio-economic effects of the proposed Tyndall 115 kV Transmission Line and DSC Project on the environment. The environmental assessment approach is described and environmental issues relating to the proposed Tyndall Project are discussed. Measures to mitigate adverse effects and actions for follow-up are identified. Effects of accidents and

malfunctions, effects of the environment on the Project and cumulative environmental effects are also addressed. Environmental protection measures are summarized in the following chapter.

7.0 ENVIRONMENTAL PROTECTION

7.1 Overview

This chapter of the environmental assessment report describes the Environmental Protection Plan for the proposed Tyndall 115 kV Transmission Line and DSC Project and how environmental protection measures will be implemented. Manitoba Hydro's environmental protection guidance materials are described. Mitigation measures and follow-up actions identified in Chapter 6 of this report are summarized by Project phase.

7.2 Environmental Protection Program

Manitoba Hydro, Transmission Planning and Design's Environmental Protection Program provides a framework for the implementation, management and monitoring of environmental protection measures that satisfies corporate policies, regulatory requirements, environmental protection guidelines and best practices, and inputs from stakeholders and the public.

The Program describes how Manitoba Hydro is organized and functions to ensure that environmental protection measures are implemented and effective, and unforeseen environmental effects are identified and addressed. Roles and responsibilities for Manitoba Hydro employees and contractors are defined, along with management, information, communication, and reporting structures.

7.3 Environmental Protection Plan

Environmental protection plans document environmental protection measures as part of the overall environmental protection program to ensure compliance with regulatory and other requirements, and to achieve corporate environmental protection goals. Environmental protection measures are based on legislation, guidelines, best practices and other guidance materials, and supplement Project specifications to avoid or minimize potential adverse environmental effects arising throughout the life-cycle of a Project.

Environmental protection plans are designed as "user-friendly" reference documents that provide Manitoba Hydro construction supervisors and site managers as well as contractors with detailed environmental protection measures. Environmental protection plans include inspection and monitoring programs and updating schedules to ensure that the environmental protection measures remain current and effective, and to enable continual improvement of environmental performance.

The Environmental Protection Plan for the proposed Tyndall 115 kV Transmission Line and DSC Project will be based on the Manitoba Hydro's Generic Environmental Protection Plan for Transmission Line Construction, Operation and Maintenance (Manitoba Hydro 2007d), the

Generic Environmental Protection Plan for Distribution Supply Centres (Manitoba Hydro 2011a), and the Draft Environmental Protection Plan outlined for the Bipole III Transmission Project (Manitoba Hydro 2011d).

7.4 Environmental Protection Guidance

Manitoba Hydro has produced a number of corporate policies and procedures that relate directly or indirectly to environmental protection. Relevant policies and procedures including manuals, handbooks, rules and reports are outlined below. Manitoba Hydro's policies, procedures and guidelines work together under the umbrella of environmental protection plans to achieve environmental protection as well as the protection of employees and public safety and health.

Corporate Strategic Plan

Manitoba Hydro's Corporate Strategic Plan outlines its vision, operating principles, mission and goals. 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", and one of its goals is to "Protect the environment in everything that we do".

Environmental Management Policy

Manitoba Hydro's Environmental Management Policy 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 environment objectives and targets annually to ensure improvement in our environmental performance; and*
- *documenting and reporting our activities and environmental performance.*

Corporate Safety and Health Rules

Manitoba Hydro's Corporate Safety and Health Rules (2009a) provide the minimum standards for employee safety and must be incorporated into all work procedures and integrated into all activities including design, material specification, purchasing, construction, operation and maintenance. Line managers are responsible for ensuring that employees are qualified and that they understand and apply these safe working rules and practices to eliminate the risk of injury. Employees are responsible for taking all necessary actions to protect themselves and their fellow workers, including refusing to perform work deemed to be unsafe.

Hazardous Materials Management Handbook

Manitoba Hydro's Hazardous Materials Management Handbook (2007a) covers safe practices for managing hazardous materials to protect the health and safety of employees, the public and the environment. The handbook is divided into four parts: 1) spill response guidelines; 2) hazardous waste management guidelines; 3) managing PCBs; and 4) managing specific hazardous materials. Health, safety and environmental protection protocols, emergency contacts and incident report forms are also provided in the handbook.

Corporate Fire Manual

The Manitoba Hydro Corporate Fire Manual (2009e) provides guidelines, rules and standards for the fire prevention and protection programs used to protect people and property in Manitoba Hydro. The manual provides this information to Manitoba Hydro's needs and to coordinate all design, construction, maintenance and operations of fire protection equipment throughout Manitoba Hydro. The manual consists of two parts: 1) Part one contains operating and maintenance instructions for fire equipment and emergency programs used in the protection of Manitoba Hydro facilities. Questions, exemptions or requests for deviations pertaining to this section shall be directed to the Fire Marshal; and 2) Part two contains guidelines, rules and standards for fire prevention and protection required by the design and administrating personnel of the corporation including consultants and external agencies.

Environmental Protection Guidelines for Construction, Operation and Decommissioning at Manitoba Hydro Work Sites and Facilities

Environmental Protection Guidelines for Construction, Operation and Decommissioning at Manitoba Hydro Work Sites and Facilities (Manitoba Hydro 2006a) provides guidance to ensure that Manitoba Hydro employees and contractors are aware of their responsibilities in protecting the environment at work sites and facilities. The guideline report contains general environmental protection measures for various Project components and activities, specific environmental protection measures for environmental components, as well as reporting requirements and reference documents.

Overhead Transmission Line Inspection Manual

Manitoba Hydro's Overhead Transmission Line Inspection Manual (2008) provides a means for facilitating the thorough inspection of overhead transmission line construction Projects. The manual documents inspector responsibilities and presents quality control techniques to ensure the successful completion of the Project and compliance with all drawings and specifications. Environmental protection and safety requirements are also outlined.

Fur, Feathers, Fins and Transmission Lines: How Transmission Lines and Rights of Way Affect Wildlife

Manitoba Hydro's Third Edition (2010) provides information on the environmental effects of transmission line construction and operation activities, and measures to mitigate adverse effects. The report also provides general environmental protection measures for the construction, operation and maintenance, and decommissioning of transmission line projects in Manitoba. Specific measures are also provided for urban environments, agricultural lands and boreal wilderness areas.

Shorelines, Shorelands and Wetlands: A Guide to Riparian Ecosystem Protection at Manitoba Hydro Facilities

Shorelines, Shorelands and Wetlands: A Guide to Riparian Ecosystem Protection at Manitoba Hydro Facilities (Manitoba Hydro 2000) provides information on the effects of transmission lines on aquatic ecosystems and the measures implemented to mitigate adverse effects. This report focuses on the potential effects of Manitoba Hydro facilities including transmission lines and stations on riparian ecosystems in Manitoba and suggests ways to protect them. The effects and mitigation measures in this report are not site-specific, but apply to riparian ecosystems in general including erosion protection and sediment control.

Transmission Lines and Transmission Station Vegetation Management Practices

Manitoba Hydro's Transmission Lines and Transmission Station Vegetation Management Practices (2007b) provide background information and a general understanding of Manitoba Hydro's transmission line system vegetation management practices. This report describes Manitoba Hydro's vegetation control policy and practices, and outlines responsibilities, methods used, notification procedures and the overall management process.

Generic Environmental Protection Plan for Distribution Supply Centres

Manitoba Hydro's Generic Environmental Protection Plan for Distribution Supply Centres (2011a) provides general environmental protection measures for the construction of distribution supply centers.

7.5 Environmental Protection Measures

Environmental Protection Guidelines for Construction, Operation and Decommissioning at Manitoba Hydro Work Sites and Facilities (Manitoba Hydro 2006a) provide general environmental protection measures for Manitoba Hydro facilities. Specific environmental protection measures identified in this environmental assessment report include mitigation measures and follow-up actions identified in the following sections.

7.5.1 General Mitigation Tables

Access Roads and Trails (PC-1)

ID	Mitigation
PC-1.01	Access roads and trails no longer required will be decommissioned and rehabilitated in accordance with the Rehabilitation and Vegetation Management Plan.
PC-1.02	Access roads and trails required for future monitoring, inspection or maintenance will be maintained in accordance with the Access Management Plan.
PC-1.03	Access roads and trails will be constructed to a minimum length and width to accommadate the safe movement of construction equipment
PC-1.04	Access roads and trails will be located, constructed, operated and decommissioned in accordance with contract specifications.
PC-1.05	Access roads and trails will be provided with erosion protection and sediment control measures in accordance with the Erosion Protection and Sediment Control Plan.
PC-1.06	All season access roads will not be permitted within established buffer zones and setback distances from waterbodies, wetlands, riparian areas and water bird habitats.
PC-1.07	Approach grades to waterbodies will be minimized to limit disturbance to riparian areas.
PC-1.08	Bypass trails, sensitive sites and buffer areas will be clearly marked prior to clearing, to identify that prescribed selective clearing is to occur as per Map Sheets.
PC-1.09	Contractor will be restricted to established roads and trails, and cleared construction areas in accordance with the Access Management Plan.
PC-1.10	During winter construction, where necessary (i.e. unfrozen wetlands, creeks), equipment will be wide-tracked or equipped with high flotation tires to minimize rutting and limit damage and compaction to surface soils.
PC-1.11	Equipment, machinery and vehicles will only travel on cleared access roads and trails, and will cross waterways at established temporary and permanent crossings.
PC-1.12	Existing access roads, trails or cut lines will be used to the extent possible. Permission to use existing resource roads (ie forestry roads (North/South Jonas roads) will be obtained.
PC-1.13	MCWS Work Permits will be obtained prior to the commencement of the project.
PC-1.14	No chemical melting agents are to be utlized.
PC-1.15	Only water and approved dust suppression products will be used to control dust on access roads where required. Oil or petroleum products will not be used.
PC-1.16	Public use of decommissioned access routes will be controlled through the Access Management Plan.
PC-1.17	Public use of project controlled access roads and trails during construction will be controlled through the Access Management Plans.
PC-1.18	Routing for access roads and trails should follow natural terrain contours to the extent possible and should be minimized adjacent to and approaching waterbodies.
PC-1.19	Surface water runoff will be directed away from disturbed and erosion prone areas but not directly into waterbodies.
PC-1.20	Vegetation control along access roads and trails will be in accordance with Rehabilitation and Vegetation Management Plan.

Agricultural Areas (EC-1)

ID	Mitigation
EC-1.01	All fences and gates will be left in "as-found" condition.
EC-1.02	Any necessary access on agricultural lands will be discussed in advance with the landowner.
EC-1.03	Construction areas and sites will be asessed for compaction and if required will be deep ploughed by the contractor to mitigate any compaction prior to returning them to agricultural use.
EC-1.04	Erosion protection and sediment control measures will be established before construction work commences in agricultural areas where necessary.
EC-1.05	Excess construction materials (i.e. waste, granular fill; clay) will be removed from construction sites and areas located on agricultural lands. Area will be restored to pre-existing conditions.
EC-1.06	Existing access to agricultural lands will be utilized to the extent possible.
EC-1.07	Required travel off existing roads will be minimized and restricted to previously designated and approved routes.
EC-1.08	Vehicular travel on agricultural lands will follow existing roads, trails and paths to the extent possible.

Blasting and Exploding (PA-1)

ID	Mitigation
PA-1.01	A communication protocol will be developed to notify affected parties of blasting operations and conductor splicing. Affected parties may include Manitoba Conservation and Water Stewardship, RCMP, municipalities, landowners, and resource users.
PA-1.02	Blasting will be conducted and monitored in accordance with Fisheries and Oceans Canada Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters
PA-1.03	Blasting will not be permitted around idenitified caribou calving habitats during calving season. (May 1 to June 30)
PA-1.04	Blasting will not be permitted during timing windows established for sensitive bird breeding, nesting and brood rearing months.
PA-1.05	Explosives will be stored, transported and handled in accordance with federal requirements through the Explosives Act and Transportation of Dangerous Goods Act and provincial regulations stated in The Workplace Safety and Health Act.
PA-1.06	Implode Compression conductor splicing will be minimized to extent possible on weekends and after normal working hours in residential areas
PA-1.07	Quarry blasting operations and conductor splicing will be scheduled to minimize disturbance to wildlife and area residents, and to ensure the safety of workers.
PA-1.08	The Blasting Contractor will be in possession of valid licenses, permits and certificates required for blasting in Manitoba.
PA-1.09	The Blasting Contractor will submit a Blasting Plan to the Construction Supervisor for review and approval prior to commencement of blasting operations.
PA-1.10	Use of ammonium nitrate and fuel oil will not be permitted in or near waterways.
PA-1.11	Warning signals will be used to warn all project personnel and the public of safety hazards associated with blasting.
PA-1.12	Written and/or oral notification will be outlined in the Communication Plan prior to each blasting period.

Borrow Pits and Quarries (PC-2)

ID	Mitigation
PC-2.01	Access to abandoned borrow pits and quarries will be managed in accordance with the Access Management Plan.
PC-2.02	All equipment and structures will be removed from borrow pits prior to abandonment.
PC-2.03	Borrow pits and quarries will be designed, constructed and operated in compliance with provincial legislation and guidelines.
PC-2.04	Borrow pits and quarries will not be located within 150 m of a provincial trunk highway or provincial road unless an effective vegetated berm is provided to shield the area from view.
PC-2.05	Borrow pits and quarries will not be located within established buffer zones and setback distances from identified Environmentally Sensitive Sites.
PC-2.06	Drainage water from borrow pits and quarries will be diverted through vegetated areas, existing drainage ditch(s) or employ a means of sediment control prior to entering a waterbody.
PC-2.07	Erosion protection and sediment controls will be put in place before borrow pit excavation commences, when required as determined by the Environmental Inspector.
PC-2.08	Fuel storage will not be permitted near stockpiles outlined in PC 2.21.
PC-2.09	Garbage, debris or refuse will not be discarded into borrow pits and quarries.
PC-2.10	Only water and approved dust suppression products will be used to control dust on access roads where required. Oil or petroleum products will not be used.
PC-2.11	Organic material, topsoil and subsoil with-in borrow pits and quarries will be stripped and stockpiled for use in future site rehabilitation
PC-2.12	Previously developed borrow sites and quarries will be used to the extent possible before any new sites are developed.
PC-2.13	Signs will be posted at borrow pits and quarries to warn all persons of safety hazards.
PC-2.14	Surface drainage will be redirected away from the borrow pits and quarries before excavation commences.
PC-2.15	Vegetated buffer areas will be left in place when borrow pits are cleared in accordance with provincial guidelines.
PC-2.16	Vegetation control at borrow pits and quarries will be in accordance with the Vegetation Management Plan.
PC-2.17	Vegetation in active Manitoba Hydro permitted borrow pits and quarries will be maintained as per the Rehabilitation/ and Vegetation Management Plan
PC-2.18	Worked out borrow pits and granular quarries will be left with maximum 4:1 (horizontal to vertical) side slopes.

Built-up and Populated Areas (EC-2)

ID	Mitigation
EC-2.01	Construction activities and equipment will be managed to avoid damage and disturbance to adjacent properties, structures and operations.
EC-2.02	Mud, dust and vehicle emissions will be managed in a manner that ensures safe and continuous public activities near construction sites where applicable.
EC-2.03	Noisy construction activities where noise and vibration may cause disturbance and stress in built-up areas will be limited to daylight hours.

Burning (PA-2)

ID	Mitigation
PA-2.01	All occurrences of fire spreading beyond the debris pile will be reported immediately in accordance with work permit conditions
PA-2.02	Any residue or unburned materials remaining post-burn is not to encumber operations or re-vegetating activities.
PA-2.03	Burning of slash on permafrost soils should be avoided. If it is unavoidable, the utiliazation of other methods such as a metal container that can be removed from site.
PA-2.04	Burning of solid wastes including kitchen wastes and treated wood will not be permitted.
PA-2.05	Burning will be monitored to ensure that fires are contained and subsequent fire hazards are not present. Post season all burn piles will be scanned for hot spots using infrared scanning technology
PA-2.06	Burning will not be carried out within riparian buffer zones or setbacks for stream crossings or waterbodies.
PA-2.07	Burning will only be carried out in accordance with provinical work permits. A Burning Permit is required between April 1st and November 15.
PA-2.08	Debris and wood chip piles located near habitation or highways will only be burned when weather conditions are favourable to ensure the safe dispersal of smoke and in acordance with burning permits where applicable.
PA-2.09	Debris piles scheduled for burning will be piled on mineral soils where possible.
PA-2.10	Firefighting equipment required by legislation, guidelines and contract specifications will be kept on site and maintained in serviceable condition during burning.
PA-2.11	Slash will be piled in a manner that allows for clean, efficient burning of all material and on mineral soils where applicable (ie permafrost).

Clearing (PA-3)

ID	Mitigation
PA-3.01	Riparian Buffers shall be a minimum of 30m and increase in size based on slope of land entering waterway. (See Riparian Bufffer Table in CEnvPP) Within these buffers shrub and herbaceous understory vegetation will be maintained along with trees that do not violate Manitoba Hydro Vegetation Clearance Requirements.
PA-3.02	Access to clearing areas will utilize existing roads and trails to the extent possible.
PA-3.03	All clearing and construction equipment is to remain within the bounds of access routes and the Project footprint identified.
PA-3.04	Areas identified for selective clearing (e.g., buffer zones, sensitive sites) will be flagged prior to clearing.
PA-3.05	Chipped or mulched material may be collected for use in construction areas and sediment/erosion control.
PA-3.07	Cleared trees and woody debris will not be pushed into or adjacent to standing timber, wetlands or waterbodies.
PA-3.08	Clearing activities will be carried out in accordance with contract specifications and Annual Harvest Plan
PA-3.09	Clearing and disturbance and equipment use will be limited to the project footprint and associated access routes.
PA-3.10	Clearing will not be permitted within established setbacks for bird nesting and rearing during established timing windows.
PA-3.11	Clearing within environmentally sensitive areas, not designated for organic removal will be carried out in a manner that minimizes disturbance to existing organic soil layer.
PA-3.12	Construction vehicles where possible will be wide-tracked or equipped with high floatation tires to minimize rutting and limit damage and compaction to surface soils.
PA-3.13	Construction vehicles, machinery and heavy equipment will not be permitted in designated machine-free zones except at designated crossings.
PA-3.14	Danger trees will be flagged/marked for removal using methods that do not damage soils and adjacent vegetation.
PA-3.15	Environmentally sensitive sites, along the right-of-way will be clearly identified by signage.
PA-3.16	In locations where grubbing and vegetation stripping is not required, existing low growth vegetation such as grasses, forbs and shrubs will be maintained to the extent possible; disturbance to roots and adjacent soils will be minimized.
PA-3.17	Machine clearing will remove trees and brush with minimal disturbance to existing organic soil layer using only "V" or "K-G" type blades, feller-bunchers and other means approved by the Construction Supervisor.
PA-3.18	Property limits, right-of-way boundaries, buffers and sensitive areas (where applicable) will be clearly marked with stakes and/or flagging tape prior to clearing.
PA-3.19	Selective clearing will be carried out in erosion prone areas. Low ground disturbance methods will be employed to minimize soil disturbance.
PA-3.20	Slash piles will be placed at least 15 m from forest stands.
PA-3.21	Slash piles will not be placed on the surface of frozen waterbodies and will not be located within established setbacks from waterbodies or within the ordinary high water mark.
PA-3.22	The Construction Supervisor will issue a stop work order if extreme wet weather or insufficient frost conditions results in soil damage from rutting, and soil erosion is resulting in sedimentation of adjacent waterbodies.
PA-3.23	Trees containing active nests and areas where active animal dens or burrows are encountered will be left undisturbed until unoccupied.
PA-3.24	Trees will be felled toward the middle of rights-of-way or cleared area to avoid damage to standing trees. Trees will not be felled into waterbodies.
PA-3.25	Vegetation will be removed by mechanical means except where other selective clearing methods are stipulated at identified Environmentally Sensitive Sites.
PA-3.26	Where practical, merchantable timber will be salvaged and brought to market. As per Annual Harvest Plan, timber that is not salvaged will be piled and burned during frozen conditions in accordance with timing windows.

Demobilizing and Cleaning Up (PA-4)

ID	Mitigation
PA-4.01	Buildings, structures, trailers, equipment, utilities, waste materials, etc will be removed from construction areas and sites when work is completed.
PA-4.02	Construction access roads/trails that are no longer required will be decommissioned and rehabilitated to prevent access.
PA-4.03	Construction areas and sites will be rehabilitated and re-vegetated as appropriate immediately after demobilizing and clean-up.
PA-4.04	Construction areas no longer required will be demobilized and rehabilitated in accordance with Rehabilitation and Vegetation Management Plan and/or provicial regualtions (ie quarries and borrow sites)
PA-4.05	Petroleum product and other hazardous substances storage areas will be cleaned up, assessed and, if necessary, remediated in accordance with provincial guidelines and Manitoba Hydro guidelines.
PA-4.06	Stream crossings and drainages will be left free of obstructions so as not to impede natural runoff.

Draining (PA-5)

ID	Mitigation
PA-5.01	Blockage of natural drainage patterns by construction activities will be avoided.
PA-5.02	Culverts will be installed and maintained in accordance with Manitoba Stream Crossing Guidelines and DFO Operation Statement on Culvert Maintenance.
PA-5.03	Dewatering discharges will be directed into vegetated areas, existing drainage ditch(s) or a means of sediment control at such a rate and will have adequate flow dissipation at the outlet to ensure it does not cause erosion at the discharge point or at any point downstream
PA-5.04	Drainage water from construction areas will be diverted through vegetated areas, existing drainage ditch(s) or a means of sediment control prior to entering a waterbody.
PA-5.05	Erosion protection and sediment control will be provided in accordance with the Erosion Protection and Sediment Control Plan.
PA-5.06	Existing, natural drainage patterns and flows will be maintained to the extent possible.
PA-5.07	No debris or slash is allowed to be placed in drainage channels/ditches

Drilling (PA-6)

ID	Mitigation
PA-6.01	Abandoned drill holes will be sealed with bentonite or other effective sealers to prevent interconnection and cross-contamination of ground and surface waters.
PA-6.02	Drilling activities in northern Manitoba will be carried out under frozen ground conditions to minimize damage to surface vegetation, soils and permafrost to the extent possible.
PA-6.03	Drilling equipment and machinery will not be serviced within 100 m of waterbodies or riparian areas.
PA-6.04	Drilling fluids and waste materials will not be allowed to drain into waterbodies, riparian areas or wetlands.
PA-6.05	Drilling in environmentally sensitive sites, features and areas will not be permitted unless approved in advance by Environmental Inspector and mitigation measures are implemented.
PA-6.06	Drilling will not be permitted during established timing windows for caribou calving areas.
PA-6.07	Drilling will not be permitted within established buffer zones and setback distances from waterbodies.
PA-6.08	Spill control and clean-up equipment will be provided at all drilling locations.
PA-6.09	The drilling contractor will ensure that equipment and materials are available on site for sealing drill holes.
PA-6.10	The drilling contractor will inspect drilling equipment and machinery for fuel and oil leaks prior to arrival at the project site, and will inspect for fuel and oil leaks and spills regularly.
PA-6.11	Where there is potential for mixing of surface and ground water, precautions will be taken to prevent the interconnection of these waters.

Emergency Response (EI-2)

ID	Mitigation
EI-2.01	All fires will be reported in accordance with fire reporting procedures in the Emergency Preparedness and Response Plan.
EI-2.02	All spills at construction sites will be reported in accordance with provincial legislation and guidelines , and Manitoba Hydro Guidelines.
EI-2.03	All vehicles hauling petroleum products will carry spill containment and clean-up equipment.
EI-2.04	Clean-up and the disposal of contaminated materials will be managed in accordance with provincial guidelines and Manitoba Hydro guidelines.
EI-2.05	Emergency Preparedness and Response Plans and procedures will be communicated to all project staff and a copy will be made available at the project site.
EI-2.06	Emergency spill response and clean-up materials and equipment will be available at construction sites, marshalling yards, fuel storage facilities and standby locations.
EI-2.07	Fire extinguishers will be mounted on buildings at locations where they will be most readily accessible. Safety Officers will conduct annual inspections of fire extinguishers.
EI-2.08	Orientation for Contractor and Manitoba Hydro employees working in construction areas will include emergency response awareness.
EI-2.09	Post audit assessments will be carried out for all major spills and fires reported to ensure that procedures are followed and plans remain effective.
EI-2.10	Project emergency response and evacuation procedures in the Emergency Preparedness and Response Plan will be adhered to in the event of forest fires.
EI-2.11	Reasonable precautions will be taken to prevent fuel, lubricant, fluids or other products from being spilled during equipment operation, fuelling and servicing.
EI-2.12	Spill response and clean-up equipment will be capable of containing and recovering the largest release possible and be suitable for the site location.
EI-2.13	Temporary construction camps will have a designated fire marshall in accordance with the Emergency Preparedness and Response Plan.
EI-2.14	The Emergency Preparedness and Response Plan will be prepared by the Contractor, approved by the Construction Supervisor/Site Manager prior to construction and updated annually.
EI-2.15	The Manitoba Hydro hazardous materials incident report form will be completed when reporting a spill.
EI-2.16	The on-site Emergency Spill Response Coordinator will be notified of hazardous substance releases immediately in accordance with the Emergency Preparedness and Response Plan.

Erosion Protection and Sediment Control (EI-3)

ID	Mitigation
EI-3.01	Accumulated sediment will be removed from silt fences and other barriers in accordance with the Erosion Protection and Sediment Control Plan to ensure proper functioning.
EI-3.02	Construction activities will be suspended during extreme wet weather events where erosion protection and sediment control measures are compromised.
EI-3.03	Contractor specific Erosion Protection and Sediment Control Plans will be prepared by the Contractor, accepted by Manitoba Hydro prior to construction and updated annually.
EI-3.04	Erosion protection and sediment control installations will only be removed after disturbed areas are protected and sediments are disposed of in accordance with Erosion Protection and Sediment Control Plan.
EI-3.05	Erosion protection and sediment control measures will be left in place and maintained until either natural vegetation or permanent measures are established.
EI-3.06	Erosion protection and sediment control measures will be put in place prior to commencement of construction activities and will remain intact for the duration of the project.
EI-3.07	Orientation for Contractor and Manitoba Hydro employees working in construction areas will include erosion protection and sediment control techniques and procedures.
EI-3.08	The Contractor will be responsible for developing. implementing and maintaining Erosion Protection and Sediment Control Plans and procedures be put in place prior to commencement of construction activities.
EI-3.09	The Contractor will be responsible for modifying erosion protection and sediment control installations to ensure continued effectiveness.
EI-3.10	The Contractor will communicate erosion protection and sediment control information to all project staff and a copy will be made available at the project site.
EI-3.11	The Environmental Inspector will make regular inspections of erosion protection and sediment control measures to confirm implementation and continued effectiveness.

Fish Protection (EC-3)

ID	Mitigation
EC-3.01	Construction activities will not be carried out within established buffer zones and setback distances from waterbodies, wetlands and riparian areas without prior written notification of Department of Fisheries and Oceans.
EC-3.02	Disturbances to waterbodies, shorelines, riparian areas, etc. will be rehabilitated immediately upon completion of construction activities.
EC-3.03	Erosion protection and sediment control measures will be put in place at all project locations where surface drainage is likely to flow into fish bearing waters.
EC-3.04	Fish and fish habitat will be protected in accordance with federal legislation and federal and provincial guidelines.
EC-3.05	MCWS and Fisheries and Oceans Canada (DFO) will be notified if beaver dams must be cleared along rights-of-ways and along access roads and trails. Clearing of dams will be carried out in accordance of the Fisheries and Oceans Canada Operational Statement
EC-3.06	Project personnel will be prohibited from fishing at project locations or along rights-of-way

Grading (PA-7)

ID	Mitigation
PA-7.01	A thick gravel layer (1.2 m) or compacted snow layer (0.6 m) will be used in temporary workspaces or marshalling yards located in permafrost areas where required to prevent damage to surface materials.
PA-7.02	Grading for gravel pads for construction areas and access roads will be limited to areas where it is needed for the safe and efficient operation of vehicles, machinery and construction equipment.
PA-7.03	Grading for site rehabilitation and restoration will be in accordance with Rehabilitation and Vegetation Management Plan.
PA-7.04	Grading will not be permitted within established buffer zones and setback distances from waterbodies.
PA-7.05	Grading will only be permitted within rights-of-ways and construction areas.
PA-7.06	Gravel pads will be graded so the surface runoff is directed away from waterbodies, riparian areas and wetlands.
PA-7.07	Required erosion protection and sediment control measures will be put in place prior to grading in accordance with the Erosion Protection and Sediment Control Plan.

Groundwater (EC-4)

ID	Mitigation
EC-4.01	Potable water samples will be collected every two weeks and submitted for analysis according to provincial sampling and analysis protocol.
EC-4.02	Well location will be marked with flagging tape prior to construction.
EC-4.03	Where there is potential for mixing of surface and ground water, precautions will be taken to prevent the interconnection of these waters.

Grubbing (PA-8)

ID	Mitigation
PA-8.01	Construction areas containing soil with high silt content, artesian springs or areas of previous erosion will receive special erosion protection and sediment control techniques.
PA-8.02	Construction areas requiring extensive grubbing will be stabilized as soon as possible to minimize erosion.
PA-8.03	Grubbing will be halted during heavy precipitation events when working in areas of finely textured soils.
PA-8.04	Grubbing will not be permitted within 2 m of standing timber to prevent damage to root systems and to limit the occurrence of blow down.
PA-8.05	Grubbing will not be permitted within established buffer zones and setback distances from waterbodies.
PA-8.06	Stockpiled materials from grubbing will not block natural drainage patterns.
PA-8.07	Unless required for the work, the extent of grubbing will be minimized to the extent possible.
PA-8.08	When not under frozen conditions, erosion protection and sediment control measures will be put in place prior to grubbing in accordance with the Erosion Protection and Sediment Control Plan.
PA-8.09	Windrows of grubbed materials will be piled at least 15 m from standing timber.

Hazardous Materials (EI-4)

ID	Mitigation
EI-4.01	A Contractor specific Hazardous Substances Management Plan will be prepared by the Contractor, approved by the Construction Supervisor/Site Manager prior to construction and updated annually.
EI-4.02	Access to hazardous materials storage areas will be restricted to authorized and trained Contractor and Manitoba Hydro personnel.
EI-4.03	An inventory of WHMIS controlled substances will be prepared by the Contractor and maintained at each project site and updated as required by provincial legislation.
EI-4.04	Bulk waste oil will be stored in approved aboveground tanks provided with secondary containment in accordance with provincial legislation.
EI-4.05	Containers of hazardous substances stored outside will be labelled, weatherproof, placed on spill containment pallets and covered by a weatherproof tarp.
EI-4.06	Contractor personnel will be trained and certified in the handling of hazardous materials including emergency response procedures in accordance with provincial legislation.
EI-4.07	Contractor personnel will receive WHMIS training in accordance with provincial legislation.
EI-4.08	Controlled substances will be labelled in accordance with WHMIS requirements, required documentation will be displayed and current Materials Safety Data Sheets will be available at each project site in accordance with the Hazardous Substances Management Plan
EI-4.09	Empty hazardous waste containers will be removed to a licensed or approved disposal site.
EI-4.10	Hazardous materials storage sites will be secured, and signs will be posted that include hazard warnings, contacts in case of a release, access restrictions and under whose authority the access is restricted.
EI-4.11	Hazardous materials will be adequately contained and will be protected from wind and rain to prevent entry of fine particles into streams through runoff of dust deposition.
EI-4.12	Hazardous substance and WHMIS inventories will be completed prior to construction. Inventories will be updated in accordance with regulatory requirements and Manitoba Hydro policies.
EI-4.13	Hazardous substances management procedures will be communicated to all project staff and a copy will be made available at the project site.
EI-4.14	Hazardous substances storage areas including coke materials for ground electrode facilities will be located a minimum of 100 m from the ordinary high water mark of a waterway and above the 100-year flood level.
EI-4.15	Hazardous substances will be transported, stored and handled according to the procedures prescribed by provincial legislation and at a minimum follow Manitoba Hydro policies.
EI-4.16	Hazardous waste substances will be segregated and stored by type.
EI-4.17	Indoor storage of flammable and combustible substances will be in fire resistant and vented enclosed storage area or building in accordance with national codes and standards.
EI-4.18	Manitoba Hydro will approve all hazardous materials that are used on the project prior to their arrival on-site.
EI-4.19	Non-hazardous products will be used in place of hazardous substances to the extent possible.
EI-4.20	Orientation for Contractor and Manitoba Hydro employees working in construction areas will include hazardous substance awareness.
EI-4.21	Pesticide storage will be in accordance with provincial legislation and Manitoba Hydro guidelines.
EI-4.22	The Contractor will be responsible for the safe use, handling, storage and disposal of hazardous substances including waste as well as procedures for emergency conditions in accordance with provincial and federal legislation and standards.
EI-4.23	The Contractor will monitor containers of hazardous substance containers regularly for leaks and to ensure that labels are displayed.
EI-4.24	The Environmental Inspector will make routine inspections of hazardous substance storage sites to ensure that environmental protection measures are implemented and effective.
EI-4.25	Waste oil will be transported by licensed carriers to licensed or approved waste oil recycling facilities.
EI-4.26	Wet batteries will be stored and transported to licensed or approved waste recycling facilities.

Heritage Resources (EC-5)

ID	Mitigation
EC-5.01	All archaeological finds discovered during site preparation and construction will be left in their original position until the Project Archaeologist is contacted and provides instruction.
EC-5.02	Construction activities will not be carried out within established buffer zones for heritage resources except as approved by Project Archaeologist.
EC-5.03	Environmental protection measures for heritage resources will be reviewed with the Contractor and employees prior to commencement of any construction activities.
EC-5.04	Orientation for project staff working in construction areas will include heritage resource awareness and training including the nature of heritage resources and the management of any resources encountered.
EC-5.05	Orientation information will include typical heritage resource materials and reporting procedures.
EC-5.06	The Contractor will report heritage resource materials immediately to the Construction Supervisor will cease construction activities in the immediate vicinity until the Project Archaeologist is contacted and prescribes instruction.
EC-5.07	The Culture and Heritage Resource Protection Plan will be adhered to during Preconstruction and construction activities.
EC-5.08	The Environmental Inspector will inspect borrow pits and other excavations regularly for the presence of heritage resource materials.

Management Measures (MM)

ID	Mitigation
MM-01	All licenses, permits, contracts, project specifications, guidelines and other applicable documents will be in the possession of both the Contractor and Manitoba Hydro prior to commencement of work.
MM-02	All project participants will ensure that project activities are carried out in compliance with applicable legislation, guidelines contractual obligations and environmental protection plan provisions.
MM-03	Environmental concerns will be identified and discussed at planning meetings on an as required basis.
MM-04	Manitoba Hydro will contact First Nation and Aboriginal community representatives prior to project start-up.
MM-05	Manitoba Hydro will contact local municipal authorities prior to project start-up.
MM-06	Manitoba Hydro will contact local resource users, lodge operators, outfitters and recreational resource users and associations to the extent feasible and practical prior to project start-up.
MM-07	Manitoba Hydro will contact Manitoba Conservation and Forest Management Licence Holders prior to clearing regarding timber use opportunities.
MM-08	Manitoba Hydro will meet the Contractor at the beginning of each new contract to review environmental protection requirements including mitigation measures, inspections and reporting.
MM-09	Manitoba Hydro will notify trappers in advance of clearing and construction schedules in their trapline areas.
MM-10	Manitoba Hydro will provide the contractor with a stakeholders list with names, organizations and contact information for the purpose of contacting stakeholders as necessary.
MM-11	Project construction update meetings will be held weekly for the ongoing review of environmental and safety issues.
MM-12	Relevant documents including licenses, permits, approvals, legislation, guidelines, environmental protection plans, orthophotos maps, etc will be made available to all project participants.
MM-13	Response to enforcement actions by regulatory authorities will be in accordance with Manitoba Hydro policy P602.
MM-14	The Contractor will obtain all licenses, permits, contracts and approvals other than those that are Manitoba Hydro's responsibility prior to project start-up.
MM-15	The Contractor will review terms and conditions of all authorizations, contract specifications, agreements, etc prior to project start-up and will discuss any questions or concerns with Manitoba Hydro.

Marshalling Yards (PC-5)

ID	Mitigation
PC-5.01	Contractor employees responsible for receipt and distribution of hazardous substances will be trained in handling and transportation of dangerous goods, and WHMIS.
PC-5.02	Emergency Preparedness and Response Plan and procedures for marshalling yards will be developed.
PC-5.03	Erosion protection, sediment control and drainage management measures will be put in place prior to construction.
PC-5.04	Fire breaks will be established around marshalling yards in areas where there is a risk of fire.
PC-5.05	Garbage and debris will be stored in approved containers, sorted for recycling and disposed of at a licensed or approved waste disposal site.
PC-5.06	Hazardous substances entering and leaving the marshalling yards will be inventoried and accounted for.
PC-5.07	Hazardous substances will be stored in accordance with provincial legislation, and provincial and national codes and standards.
PC-5.08	Marshalling yards will be located based on criteria that consider soils, topography, land form type, permafrost, wildlife habitat and other environmental factors.
PC-5.09	Marshalling yards will be located in existing clearings or natural openings.
PC-5.10	Marshalling yards will be located, constructed, operated and decommissioned in accordance with contact specifications.
PC-5.11	Once marshalling yards are no longer required, structures, equipment, materials, fences, etc. will be dismantled and moved to storage or a new location.
PC-5.12	Organic material, topsoil and sub-soil stripped during site preparation will be stockpiled separately for later use in site rehabilitation.
PC-5.13	Petroleum products will only be stored, handled and dispensed in designated areas within marshalling yards in accordance with provincial legislation and guidelines.
PC-5.14	Spill control and clean-up equipment to be located at designated areas within marshalling yards.
PC-5.15	Staging and work storage areas no longer required will be decommissioned and rehabilitated in accordance with the Rehabilitation and Vegetation Managment Plan.
PC-5.16	Vegetation control at marshalling yards will be in accordance with Rehabilitation and Vegetation Management Plan.
PC-5.17	Vehicle, machinery and equipment maintenance and repairs will be carried out in designated areas within marshalling yards.
PC-5.18	Waste hazardous substances, fuel containers and other materials will be stored in approved containers and transported to licensed or approved waste disposal facilities by a licensed carrier.
PC-5.19	Welding mats will be used to minimize the risk of fire.

Petroleum Products (EI-5)

ID	Mitigation
EI-5.01	Aboveground tanks will be equipped with overfill protection and spill containment consisting of perimeter dykes or secondary containment in the tank design.
EI-5.02	All aboveground petroleum product tanks with a capacity greater than 5,000 L will be registered with Manitoba Conservation and Water Stewardship and have a valid operating permit.
EI-5.03	Construction, installation or removal of petroleum product storage tank systems will only occur under the supervision of a registered licensed petroleum technician.
EI-5.04	Containment measures, such as secondary containment (i.e., berms) will be used at all locations where stationary oil-filled equipment is used.
EI-5.05	Contractors will inspect all mobile and stationary equipment using petroleum products on a regular basis to ensure that measures are taken immediately to stop any leakage discovered.
EI-5.06	Fuelling of equipment or portable storage tanks will be a minimum of 100 m from the ordinary high water mark of any waterbody.
EI-5.07	Fuelling operations require the operator to be visually observing the process 100% of the time.
EI-5.08	If dykes are used, the containment areas will be dewatered after rainfall events and the containment water disposed of as specified in contract specifications.
EI-5.09	Once petroleum product storage areas are no longer required, a Phase I and II Environmental Site Assessment will be carried out to determine if remediation is required in accordance with national standards.
EI-5.10	Only approved aboveground petroleum storage tanks will be used during the construction phase of the project. No underground tanks will be permitted.
EI-5.11	Orientation for Contractor and Manitoba Hydro employees working in construction areas will include petroleum product storage and handling awareness.
EI-5.12	Petroleum product dispensing systems will be secured and locked when not in use by authorized personnel.
EI-5.13	Petroleum product inventories will be taken weekly by the owner/operator on all aboveground tanks greater than 5,000 L and retained for inspection by Manitoba Hydro or Manitoba Conservation upon request.
EI-5.14	Petroleum product storage containers in excess of 230 L will be located on level ground and will incorporate secondary containment with a capacity of 110% of the largest container volume.
EI-5.15	Petroleum product storage sites and mobile transportation units will be equipped with fire suppressant equipment and products.
EI-5.16	Petroleum product storage tanks will be protected from vehicle collisions by concrete filled bollards.
EI-5.17	Petroleum product storage will be located a minimum of 100 m from the ordinary high water mark of waterbodies, riparian areas or wetlands.
EI-5.18	Petroleum products stored outside will be in waterproof and labelled containers, placed on spill containment pallets.
EI-5.19	Petroleum products will be transported and handled according to the procedures prescribed by provincial legislation.
EI-5.20	Petroleum products will display required signage, placards and labelling, and will be stored and handled in accordance with provincial legislation.
EI-5.21	Petroleum products will only be stored and handled within designated areas at construction camps and marshalling yards.
EI-5.22	Portable petroleum product storage containers will be placed on spill trays with a capacity of 110% of the largest container when not in use.
EI-5.23	Slip tanks and barrels will be securely fastened to the vehicle during transport and fuelling operations.
EI-5.24	Spill control and clean-up equipment and materials will be available at all petroleum product storage and dispensing locations.
EI-5.25	Spill trays will remain impervious at very low temperatures (-45 °C) and have accumulated precipitation removed regularly.
EI-5.26	The Contractor will be responsible for the safe use, handling, storage and disposal of petroleum products including waste as well as procedures for emergency conditions in accordance with provincial and federal legislation and standards.
EI-5.27	The Contractor will inspect all petroleum product storage tanks and containers regularly for leaks, and product inventories will be recorded and retained for inspection by Manitoba Hydro and Manitoba Conservation and Water Stewardship.

Petroleum Products (EI-5)

EI-5.28	There will be no ignition sources in and adjacent to petroleum product storage areas.
EI-5.29	Transfer of petroleum products between storage areas and work sites not exceed daily requirements and will be in accordance with provincial legislation and guidelines.
EI-5.30	Used petroleum products (including empty containers) will be collected and transported to a licensed oil recycling facility in approved storage containers.
EI-5.31	Vehicles hauling petroleum products will carry equipment and materials for emergency spill containment and clean-up.
EI-5.32	Warning signs will be posted in visible locations around petroleum product storage areas. Signs will indicate hazard warning, contact in case of a spill, access restrictions and authority.

Rehabilitating and Re-vegetation (PA-9)

ID	Mitigation
PA-9.01	Construction areas no longer required will be re-contoured, stabilized, re-vegetated and restored to near natural conditions in accordance with Rehabilitation and Vegetation Management Plan
PA-9.02	Natural re-vegetation will be allowed to occur although active rehabilitation programs may be required at specific sites where erosion warrants seeding or planting
PA-9.03	Organic material, topsoil and subsoil stripped from construction areas will be stockpiled and protected to be used for future site rehabilitation.
PA-9.04	Rehabilitation of construction areas will incorporate erosion protection and sediment control measures in accordance with the Erosion and Sediment Control Plan as required.
PA-9.05	Rehabilitation Plans will include objectives for restoration of natural conditions, erosion protection, sediment control, non-native and invasive plant species management, wildlife habitat restoration and restoration of aesthetic values as required.
PA-9.06	Where appropriate, regional native grass mixtures will be used to assist re-vegetation of disturbed areas to control erosion or prevent invasion of non-native species. The mixtures will not contain non-native or invasive species.

Rights-of-Way (PC-8)

ID	Mitigation
PC-8.01	Access to transmission line rights-of-way for clearing and construction will utilize existing roads and trails to the extent possible.
PC-8.02	Access to transmission line rights-of-way will be closed, signed and/or controlled in accordance with an Access Management Plan.
PC-8.03	Additional clearing outside established rights-of-way will be approved by the Construction Supervisor/Site Manager prior to clearing and may require an amendment to contract specifications.
PC-8.04	Clearing and disturbance will be limited to defined rights-of-way and associated access routes to the extent possible.
PC-8.05	Clearing of rights-of-way will occur under frozen or dry ground conditions during established timing windows to minimize rutting and erosion where applicable.
PC-8.06	Construction vehicles will be wide-tracked or equipped with high floatation tires to minimize rutting and limit damage and compaction to surface soils.
PC-8.07	Disturbed areas along transmission line rights-of-way will be rehabilitated in accordance with site Rehabilitation and Vegetation Management Plan.
PC-8.08	Environmentally sensitive sites, features and areas will be identified and mapped prior to clearing.
PC-8.09	In situations where the ROW doesn't have completely frozen or have dry ground conditions alternate products such as construction mats will be used.

Safety and Health (EI-6)

ID	Mitigation
EI-6.01	Orientation for Contractor and Manitoba Hydro employees working in construction areas will include safety and health awareness.
EI-6.02	Safety and health information will be posted at each project location and made available to all project personnel.
EI-6.03	Workplace safety and health committees will be established and safety meetings will be held as required by provincial legislation and Manitoba Hydro guidelines at all project locations.

Soil Contamination (EI-7)

ID	Mitigation
EI-7.01	A closure report will be prepared for completed remediation projects in accordance with provincial and Manitoba Hydro guidelines.
EI-7.02	A Remediation Plan will be prepared by the Contractor for sites contaminated by project activities and will remediate soils according to provincial standards.
EI-7.03	All spills and releases reported will be responded to in accordance with provincial legislation and guidelines and Manitoba Hydro guidelines.
EI-7.04	Any contaminated soil treatment areas must be designed and constructed to contain surface runoff and prevent leaching to soil and groundwater.
EI-7.05	Contractor personnel will take all reasonable steps to prevent soil, groundwater and surface water contamination.
EI-7.06	If contamination is suspected or evident, a Phase II Environmental Site Assessment will be carried out on previously used construction sites following Manitoba Hydro procedures.
EI-7.07	If laboratory results show that the soil is contaminated the soil must be treated on-site or transported to an approved landfill or land farm for remediation in accordance with a Remediation Plan.
EI-7.08	If laboratory results show that the soil is not contaminated then the soils may be used in accordance with contact specifications.
EI-7.09	Remediation Plans will be prepared by the Contractor and approved by the Construction Supervisor/Site Manager prior to implementation if remediation of contaminated soils is determined to be required.
EI-7.10	The Contractor will assess previously used construction sites for potential contamination following Canadian Standards Association Environmental Site Assessment (CSA Z768- 01 and Z769-00) procedures.
EI-7.11	The Contractor will carry out a CSA Phase II Environmental Site Assessment (CSA Z769-00) at abandoned construction camps, marshalling yards, petroleum product storage and dispensing areas and hazardous substance storage areas if contamination is suspected
EI-7.12	The Environmental Inspector will inspect contaminated site assessment and remediation work regularly to ensure that environmental protection measures are implemented and effective.

Stream Crossings (PC-9)

ID	Mitigation
PC-9.01	Access road crossings will be at right angles to waterbodies to the extent possible.
PC-9.02	Construction of temporary crossings will follow the Fisheries and Oceans Canada Manitoba Operational Statement for Temporary Stream Crossings.
PC-9.03	Construction of transmission line stream crossings will follow the Fisheries and Oceans Canada Manitoba Operational Statement for Overhead Line Construction.
PC-9.04	Where applicable, the Fisheries and Oceans Canada Manitoba Operational Statement for Isolated or Dry Open Cut Stream Crossings and/or High-pressure Directional Drilling will be adhered to.

Stripping (PA-10)

ID	Mitigation
PA-10.01	Construction areas containing soil with high silt content, artesian springs or areas of previous erosion will receive special erosion protection and sediment control techniques.
PA-10.02	Erosion protection and sediment control measures will put be in place prior to stripping in accordance with the Erosion and Sediment Control Plan as required.
PA-10.03	In areas of known salinity, excavated or stripped soil will be stored on liners or in designated areas were possible.
PA-10.04	Mineral topsoils and surficial organic materials should be stripped separately from subsoils, segregated, and stockpiled for later use in backfilling, contouring and rehabilitation. Soils should be replaced in the reverse order to which they were removed.
PA-10.05	Stockpiled materials from stripping will not block natural drainage patterns.
PA-10.06	Stripping in northern Manitoba will normally be carried out under frozen ground conditions during established timing windows to minimize rutting and erosion.
PA-10.07	Stripping will not be permitted within established buffer zones and setback distances from waterbodies except where approved in work permits, authorizations or contract specifications.
PA-10.08	The Contractor will stabilize construction areas requiring extensive stripping as soon as possible to minimize erosion.

Transmission Towers and Conductors (PC-10)

ID	Mitigation
PC-10.01	Areas where soil was disturbed will be stabilized and re-vegetated with low growth vegetation as soon as practical.
PC-10.02	During tower foundation excavation the duff layer and A horizon soils shall be stripped and stored separately from other soils. When back filling, these soils are to be replaced as the surface soils to encourage site re-vegetation.
PC-10.03	Excavations required for tower installations will be restricted to the minimum required footprint.
PC-10.04	The Construction Supervisor will issue a stop work order if extreme wet weather conditions result in soil damage from rutting and erosion is resulting in sedimentation of adjacent waterbodies.

Treated Wood (EI-8)

ID	Mitigation
EC-8.01	Salvage and disposal of treated wood products will be in accordance with Manitoba Hydro guidelines.
EC-8.02	Small quantities of surplus or unwanted treated wood products may be disposed of as domestic waste products at licensed or approved waste disposal sites.
EC-8.03	Treated wood products will not be used indoors and will not be burned.
EC-8.04	Treated wood will be delivered to project locations or construction sites on an as required basis to reduce storage time in the field.

Vehicle and Equipment Maintenance (EI-9)

ID	Mitigation
EI-9.01	An Emergency Preparedness and Response Plan and spill control and clean-up equipment will be provided at all designated vehicle, equipment and machinery maintenance areas.
EI-9.02	Emergency vehicle, equipment and machinery maintenance repairs will contain waste fluids and will use drip trays and tarps.
EI-9.03	Unnecessary idling of vehicles, equipment and machinery will be avoided to the extent practical.
EI-9.04	Vehicle, equipment and machinery maintenance and repairs will be carried out in designated areas located at least 100 m from the ordinary high water mark of a waterbody, riparian area or wetland.
EI-9.05	Vehicle, equipment and machinery operators will perform a daily inspection for fuel, oil and fluid leaks and will immediately shutdown and repair any leaks found. All machinery working near watercourses will be kept clean and free of leaks.
EI-9.06	Vehicles transporting dangerous goods or hazardous products will display required placards and labelling in accordance with provincial legislation and Manitoba Hydro guidelines.
EI-9.07	Vehicles, equipment and machinery must arrive on site in clean condition free of fluid leaks and weed seeds.
EI-9.08	Vehicles, equipment and machinery that carry fuel, hydraulic oil and other petroleum products will also carry spill control and clean-up equipment and materials.

Waste Management (EI-10)

ID	Mitigation
EI-10.01	A Contract specific Waste and Recycling Management Plan will be prepared by the Contractor, reviewed by the Construction Supervisor and Environmental Specialist prior to construction and updated annually.
EI-10.02	Bear-proof waste containers and/or electric fencing will be used in northern, remote and rural project locations.
EI-10.03	Construction sites will be kept tidy at all times and bins will be provided wherever solid wastes are generated.
EI-10.04	Indiscriminate burning, dumping, littering or abandonment will not be permitted.
EI-10.05	Kitchen wastes will be stored in closed containers to minimize wildlife interactions.
EI-10.06	Solid waste materials will be collected and transported to a licensed or approved waste disposal facility in accordance with the Solid Waste/Recycling Management Plan.
EI-10.07	Waste materials remaining at snow disposal sites after melting will be disposed of at a licensed or approved landfill.

Wetlands (EC-8)

ID	Mitigation
EC-8.01	Clearing wastes and other construction debris or waste will not be placed in wetland areas. Existing logs, snags and wood debris will be left in place.
EC-8.02	Environmental protection measures for working in and around wetlands will be reviewed with the Contractor and employees prior to commencement of any construction activities.
EC-8.03	Natural vegetated buffer areas of 30 m will be established around wetlands and riparian zones will be maintained to the extent possible.
EC-8.04	Project activities will avoid wetland areas to the extent possible. If avoidance is not practical, the extent of disturbance will be minimized. Disturbance of wetlands will only be carried out under frozen ground conditions.

Wildlife Protection (EC-9)

ID	Mitigation
EC-9.01	Any wildlife killed or injured by vehicles will be reported to Manitoba Conservation.
EC-9.02	Bird Diverters or aerial markers may be installed in high bird traffic areas.
EC-9.03	Boundaries of important wildlife habitats will be flagged by prior to commencement of construction.
EC-9.04	Clearing will occur during late fall and winter to the extent possible to avoid the spring/summer nesting season for birds and parturition times for mammal species and breeding windows for frog species
EC-9.05	Construction activities will not be carried out during prescribed timing windows for wildlife species.
EC-9.06	Construction camps will be kept clean, food will be kept in sealed storage areas, and kitchen wastes will be stored in bear-proof containers and/or electric fencing in northern and rural areas.
EC-9.07	Hunting and harvesting of wildlife by project staff will not be permitted while working on the project sites.
EC-9.08	Low, non-danger trees will be maintained in high quality lichen production areas within caribou ranges.
EC-9.09	Manitoba Conservation will be notified if animal traps are encountered and must be removed for project activities.
EC-9.10	MB Conservation and Dept.of Fisheries and Oceans will be notified if beaver dams must be cleared along rights-of-way and access roads and trails. Clearing of dams will be carried out in accordance of the DFO Operational Statement on Beaver Dam Removal
EC-9.11	No firearms will be permitted at construction sites.
EC-9.12	Orientation for Contractor and Manitoba Hydro employees will include awareness of environmental protection measures for wildlife and wildlife habitat.
EC-9.13	Problem wildlife will be reported immediately to Manitoba Conservation and Water Stewardship.
EC-9.14	Trails through or near important habitat types will be managed in accordance with the Access Management Plan.
EC-9.15	Trees containing large nests of sticks and areas where active animal dens or burrows are encountered will be left undisturbed until unoccupied. Artificial structures for nesting may be provided if unoccupied nests must be removed.
EC-9.16	Vehicles will not exceed posted speed limits and wildlife warning signs may be installed in high density areas and at known crossings locations as a result of wildlife monitoring.
EC-9.17	Where buffer zones or setbacks are not feasible for colonial waterbirds, bird deflectors will be placed on sky wires to improve visibility of the wires to birds and to minimize potential bird-wire collisions.
EC-9.18	Wildlife and wildlife habitat will be protected in accordance with provincial and federal legislation and provincial and federal guidelines.
EC-9.19	Wildlife will not be fed, befriended or harassed at construction areas.
EC-9.21	Understory vegetation will be managed at access routes to limit line of sight.
EC-9.22	New by-pass trails and access routes will be sited where possible to utilize existing natural terrain features and existing vegetation to minimize line of site.

7.5.2 Follow-up Actions

The following follow-up actions are summarized from those identified in Chapter 6 of the environmental assessment report:

Construction:

- Conduct daily inspections of fuel and other hazardous substance storage areas, and petroleum product releases and leaks.
- Conduct weekly inspections of construction site for implementation of mitigation measures, effectiveness of mitigation measures and unforeseen environmental effects.
- Maintain records of wildlife mortalities resulting from construction activities.

Operation and Maintenance:

- Conduct required inspections for health and safety.
- Conduct required inspections of the transmission line and DSC for vegetation growth.
- Conduct routine monitoring at the DSC and EMF levels.
- Maintain records of wildlife mortalities from electrocution by electrical equipment and collision with transmission line.
- Maintain continuous remote monitoring of transformer and breaker operation.

7.6 Summary

This chapter of the environmental assessment report described the Environmental Protection Plan for the proposed Tyndall 115 Transmission Line and DSC Project and how environmental protection measures will be implemented. Manitoba Hydro's environmental protection guidance materials are described. Mitigation measures and follow-up actions identified in the report are summarized by Project phase.

8.0 SUMMARY AND CONCLUSION

8.1 Summary

Manitoba Hydro is proposing to construct a 115 kV Transmission Line and Distribution Supply Centre (DSC) in the Rural Municipalities of Brokenhead and St. Clements to ensure reliable electrical supply to the area and surrounding region.

Manitoba Hydro System Planning have identified the need for a new source to replace the existing Garson Station due to extensive reliability and performance issues attributed to line condition, lack of capacity and voltage issues related to the 33kV sub-transmission system supplying the station. The risk associated with not proceeding is extended outages during peak loading conditions affecting the communities of Garson and Tyndall as well as the surrounding area.

The proposed Tyndall Project involves the construction of a 10 MVA, 115-12.47 kV DSC that will include three regulators and one 4-way switching cubicle to provide three feeder positions; a 115 kV tap; construction of approximately 10 km of 115 kV transmission line from the proposed tapping location (TS44) to the proposed DSC; salvage 3.8 km of transmission line and related components; and Garson Station decommissioning.

The proposed Tyndall Project requires a licence for a Class II development under The Environment Act (Manitoba). The environmental assessment was carried out based on information provided by Manitoba Hydro, Rural Municipalities of Brokenhead and St. Clements, reference material from the Brokenhead River Planning District and Selkirk and District Planning Area, reference materials obtained from Manitoba Conservation and Water Stewardship and Manitoba Hydro libraries, literature and internet searches, and personal reference collections.

Valued environmental components were identified as:

- agricultural land;
- property values;
- rural lifestyle;
- aesthetic values;
- creeks and drains; and
- birds and mammals.

Environmental issues included:

- taking agricultural land out of production;
- removal of trees/shelterbelts;
- transmission line and DSC aesthetics;
- property values;
- electric and magnetic fields;
- groundwater contamination;
- property taxes;
- regional economy; and
- access at creeks.

A Public Engagement Process was carried out for the proposed Tyndall Project. The program consisted of meetings with municipal officials and planning districts, Project notification by mail and newspapers, letters to property owners and First Nations, notices to area residents, and public open houses. Public concerns about the Proposed Project included avoidance of agricultural lands, maximizing separation between residences and transmission line routing, transmission line and DSC aesthetics, and preference for routing along the decommissioned rail line.

Environmental effects of the proposed Tyndall 115 kV Transmission Line and DSC Project were identified and assessed, mitigation measures were identified and residual environmental effects were evaluated. The assessment considered biophysical and socio-economic effects, effects of accidents and malfunctions associated with the Project, effects of the environment on the Project, and cumulative environmental effects.

Potential environmental effects of the proposed Project; including avoidance of agricultural lands, maximizing separation between residences and transmission line routing, and transmission line and DSC aesthetics, can be avoided or minimized by adherence to regulatory requirements, application of environmental guidelines, best practices, Project-specific mitigations, and implementation of environmental protection measures.

8.2 Conclusion

Based on the information contained in the environmental assessment report and the implementation of mitigation measures and follow-up actions under an environmental protection plan, the proposed Tyndall 115 kV Transmission Line and DSC Project will not result in any significant adverse environmental effects.

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