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9.0 TERRESTRIAL ENVIRONMENT

This chapter provides information on the existing conditions for vegetation and wildlife in the Project assessment areas, including data gathered from desktop studies and field investigations, and information provided by local communities regarding their traditional subsistence and cultural activities that involve the terrestrial environment. The linkages between Project activities and the terrestrial environment were examined to determine the potential effects of the Project activities on vegetation and wildlife, and to identify mitigation measures to avoid or minimize potential Project effects. The residual effects remaining after the application of mitigation measures were then summarized and evaluated using the significance criteria outlined in **Chapter 6** (Environmental Impact Assessment Scope and Approach). A description of the spatial boundaries (Project Footprint, Local Assessment Area and Regional Assessment Area) used for the vegetation and wildlife study areas is provided in **Section 9.1.2** and **Section 9.1.3**. Note that the spatial boundaries for the wildlife assessment areas are larger than the spatial boundaries for the vegetation assessment areas to encompass the movements and home ranges of the wildlife species of interest.

9.1 Existing Conditions

The terrestrial environment in the Project assessment areas has remained largely undeveloped and consists of a diverse mosaic of forests, lakes, rivers, rock outcrops, bogs, fens and marshes. Current infrastructure includes: the First Nation communities of Berens River and Poplar River, a 96 km long, 12 m wide winter road (Smyrski, T., personal communication, September 11, 2015) connecting the two communities, non-permanent seasonal logging access trails and a Manitoba Hydro sub-transmission line west of the winter road that provides electricity to the Berens River First Nation and Poplar River First Nation communities. Existing infrastructure and land use in the Local and Regional Assessment Areas is further described in the Socio-Economic and Cultural Environment (**Chapter 10**).

Human activities and development in the area have included traditional First Nations subsistence activities such as hunting, trapping, fishing and use of plants for food, medicines, building, fuel supply and other cultural uses. With the arrival of European settlers, commercial fishing and trapping became an important means of income for the local communities and winter roads were established in the region to transport and distribute goods among the communities in the region (Sigfusson 1992). Currently there is one major winter road near the Local Assessment Area, which contains three sections: Road No. 710 (Section 30: Winter Road (WR) 700 to Berens River, Section 40: Berens River to Leaf River, Section 50: Leaf River to Poplar River) (Map 03 in Joro Consultants 2015a, see **Appendix 9-1**). Given that the winter road has been a part of the wildlife Local Assessment Area landscape for several decades, wildlife species such as boreal woodland caribou (*Rangifer tarandus caribou*), moose (*Alces alces*) and furbearers are likely accustomed to the presence and level of activity along these linear landscape features (Joro Consultants 2015a). Hereafter within **Chapter 9**, the 'winter road' is the winter road between Berens River First Nation and Poplar River First Nation unless otherwise stated.

The potential anthropogenic disturbances that could occur year-round in the wildlife Regional Assessment Area include:

- ATV and snowmobile use;
- Air traffic (cargo planes, float planes, helicopters);
- Development and operation of quarries (e.g., the quarry developed for use by Poplar River First Nation);
- Fishing and hunting lodges;
- Fishing and hunting activities;
- Forest fires (which also occur as a result of natural causes such as lightning);
- Trapping activities and use of trap lines;
- Wild rice harvesting; and
- Trails used by local people for fishing, hunting, trapping and the gathering of plants, wood and fungi for building materials, crafts, food, fuel and medicines.

Additional information on Traditional Land use and Traditional activities in the Project Regional Assessment Area is provided in **Chapter 10** (Socio-Economic and Cultural Environment), **Section 10.1.6.**

Activities and landscape features that influence, or have influenced, wildlife and their habitat in the local and regional wildlife assessment areas are described below.

Forestry

There are a number of Forest Management Units (FMUs) located in the area (Map 02 in Joro Consultants 2015a, **Appendix 9-1**) and logging activities have occurred in some areas of the region in the past. There are currently no quota holders within the Local Assessment Area and no timber sale agreements with First Nations as of September 2015 (Joro Consultants 2015a). Considering commercial logging activities are not currently taking place within the wildlife Regional and Local Assessment Areas, sensory disturbances and displacement of wildlife due to forestry and logging activities no longer occur. Some of the previously logged areas are less than 40 years old; these areas may not be suitable for species such as marten (*Martes americana*) that prefer old growth forest areas, but may be preferred by species such as moose that browse on successional vegetation.

Protected Areas

Within the wildlife Regional Assessment Area, there is one protected area where industrial activities are restricted, the Atikaki Wilderness Provincial Park, and four heavily frequented canoe routes: Little Grand Rapids (connects Poplar River, Berens River and Little Grand Rapids and continues into Ontario), Kautunigan (connects Berens River and Bloodvein and continues into Ontario), Sasaginnigak (connects Little Grand Rapids and Bloodvein and continues into Ontario) and Oiseau-Manigotagan (connects Aghaming, Manigotagan, Bissett and Pine Falls and continues into Ontario) (Paddle Manitoba 2010).

Hunting/Trapping

Hunting continues to be an important subsistence activity for members of the local communities. The wildlife Local Assessment Area is located within the Province of Manitoba's Game Hunting Area (GHA) 17B on the east side of Lake Winnipeg and is adjacent to GHA17 to the east, GHA 17A and GHA 26 to the south, and GHA 3A to the north (Map 02 in Joro Consultants 2015a, **Appendix 9-1**). Licensed hunting of boreal woodland caribou is not permitted in Manitoba (Manitoba Conservation and Water Stewardship [MCWS] 2015c). Trapping of furbearing wildlife species is another subsistence and commercial activity practiced on the land by members of the local communities. There are 10 Registered Trap Lines that intersect the wildlife Local Assessment Area (**Chapter 10, Figure 10-9**).

Forest Fire

The largest influence on the biophysical environment in the Regional Assessment Area is the periodic occurrence of forest fires. In the boreal forest, fire is an important natural disturbance that drives vegetation dynamics and subsequently shapes the wildlife and wildlife habitat present within the region. Forest diversity is a result of the variation of fire frequency, intensity, effect, size, shape and season of burn (Natural Resources Canada 2014). The area burned can vary greatly, with fire activity influenced by weather, climate, soil moisture conditions and human activity in the area (Brandt *et al.* 2013; Weber and Flannigan 1997) (**Photograph 9-1**).

The largest influence on the biophysical environment in the Regional Assessment Area is the periodic occurrence of forest fires.

High intensity fire rejuvenates boreal ecosystems by renewing forest stands and creating improved soil conditions for germination by releasing nutrients and minerals into soils, removing litter matter and increasing availability of sunlight at the forest floor (Brandt *et al.* 2013; Stocks *et al.* 2003). A mosaic of vegetation at different stages of succession from fire in the ecosystem results in greater landscape diversity and provides an array of habitats for flora and fauna (Perry 1994). The boreal forest fire season is April through October, with lightning fires occurring generally in late spring/summer and anthropogenically-generated fires tending to occur in early spring and fall (Stocks *et al.* 2003). In the boreal forest, lightning strikes account for about 35% of fires and are responsible for about 85% of the total area burned (Brandt *et al.* 2013).

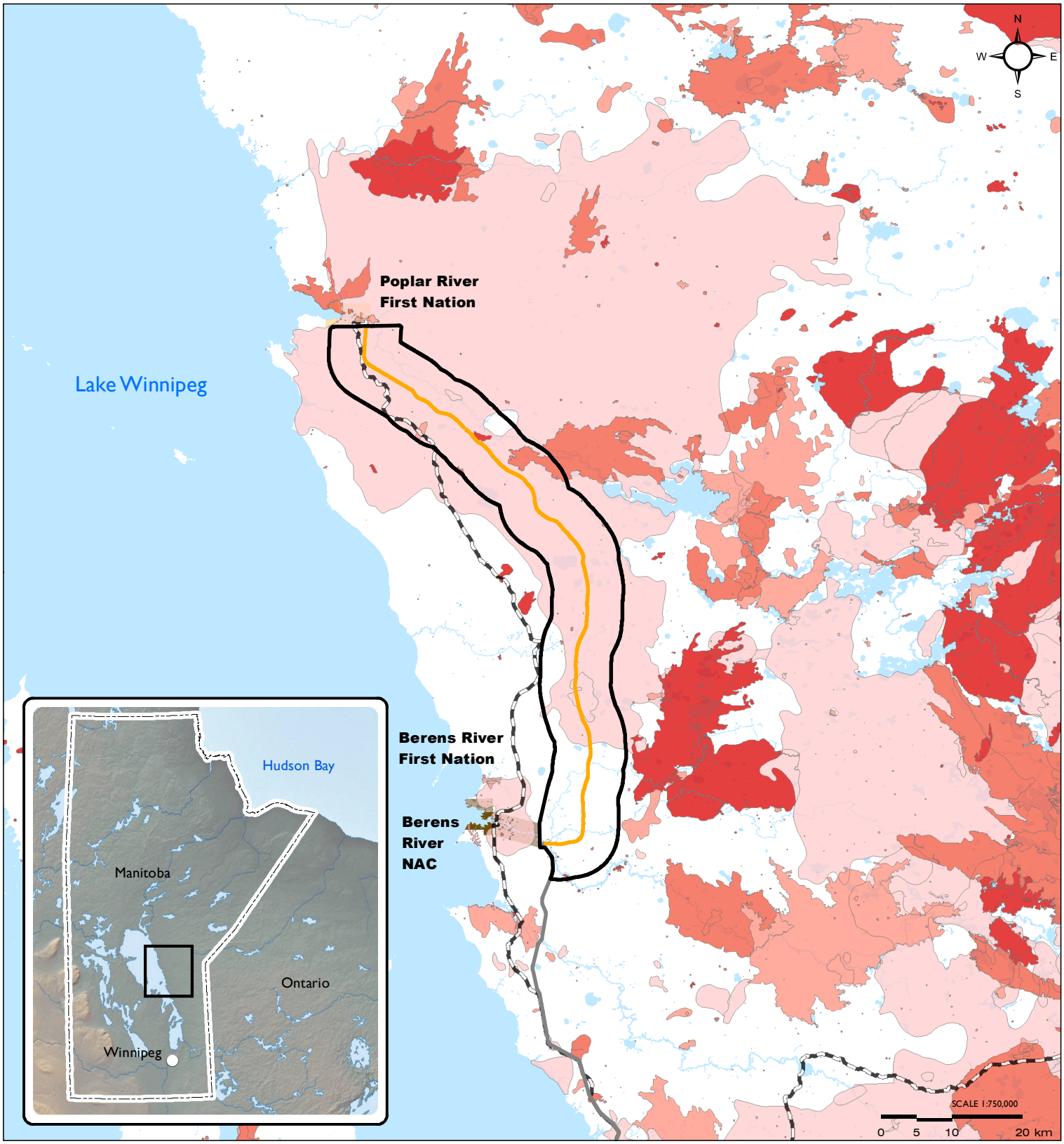
The boreal forest tends to burn at different intervals. The fire cycle for jack pine is approximately 15 to 35 years, while the spruce stand cycle is 50 to 100 years (Natural Resources Canada 2014). Stand-destroying crown fires occur at approximately 50 to 200 year intervals and can reach 500 years on very moist sites. Coniferous forests (e.g., pine and spruce) experience more frequent crown fires than deciduous dominated forests (Perry 1994). Coniferous-dominant forests cover approximately 42% of the vegetation Local Assessment Area, with deciduous dominated and mixedwood forest covering 23% and the remaining proportion (35%) being fen/bog (**Section 9.1.2**). Fires do not burn evenly over an area, but will favour vegetation on drier sites (e.g., jack pine dominated uplands). Treed wetlands with

deep water tables (e.g., jackpine bog) may be partially burned and wetter sites (e.g., black spruce/tamarack bog) are generally bypassed by fire (Poplar River First Nation 2011). This naturally occurring fire pattern results in burned areas interspersed with unburned patches of intact forest.

(**Source**: Hoffmann 2015)

Photograph 9-1: An Aerial View of the Extent of a 2003 Fire in the Boreal Forest of Manitoba, Canada

The distribution of fire history by decade dating back to 1920 in the vegetation Local Assessment Area is shown in **Figure 9-1**. The majority of fires within the vegetation Local Assessment Area occurred prior to 1930, with approximately three quarters of the Local Assessment Area having burned between 1920 and 1929. Over both the Project Footprint and vegetation Local Assessment Area, 20% of the land has seen no fire activity from 1920 to present, whereas the proportion of unburned land in the vegetation Regional Assessment Area is slightly higher, at approximately 25%. From 1970 to present, there has been little to no fire activity documented within the vegetation Local Assessment Area (Szwaluk Environmental Consulting Ltd. *et al.* 2015a).



Project 4 - All-Season Road Connecting Berens River to Poplar River First Nation

Figure 9-1
Fire History in the Vegetation Regional Assessment Area

- P4 All-Season Road Alignment
- P1 All-Season Road (South of Berens to PTH 304) - Under Construction
- 2013/2014 Manitoba Winter Road
- Vegetation Regional Assessment Area
- Berens River First Nation Reserve
- Poplar River First Nation Reserve
- Berens River Northern Affairs Community
- Year of Forest Fire 1928 - 1962
- Year of Forest Fire 1963 - 1984
- Year of Forest Fire 1985 - 1997
- Year of Forest Fire 1998 - 2013

Map Drawing Information:
ESRI Base Layers, Province of Manitoba, CanVec, GeoGratis, Dillon Consulting Limited

Map Created By: ECH
Map Checked By: MG/PS/LD
Map Projection: NAD 1983 UTM Zone 14N

DATE: 4/8/2016

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9.1.1 Traditional Knowledge

Workshops and interviews were conducted by ESRA in the communities of Berens River First Nation and Poplar River First Nation to share and document the knowledge and interests of community members regarding the terrestrial environment. **Chapter 10** (Socio-Economic and Cultural Environment) provides a summary of the types of information collected during the Traditional Knowledge interviews. Information provided by the community members in relation to vegetation and wildlife is provided below.

9.1.1.1 Vegetation

The use of plants and other vegetation for food, medicine and cultural purposes is a Traditional subsistence activity for the people in the communities of Berens River First Nation and Poplar River First Nation. It has a long history and continues today as an important part of meeting community food, medicinal and cultural needs.

The use of plants and other vegetation for food, medicine and cultural purposes is a Traditional subsistence activity for the people in the communities of Berens River First Nation and Poplar River First Nation. It has a long history and continues today as an important part of meeting community food, medicinal and cultural needs.

As noted in the *Asatiwisipe Aki Management Plan* (Poplar River 2011), the Anishinabek of Poplar River First Nation greatly value the poplar tree for the making of snares from poplar saplings, for medicinal use of the bark and as an important food source for beaver and rabbits that the people have depended on for food. Community members use white spruce for building because it doesn't crack and break, and the boughs have been important for bedding in winter camps (Poplar River First Nation 2011). They use red-osier dogwood for medicines, basket making and tobacco, and know the importance of this shrub to moose. Community members of Poplar River First Nation eat the wild strawberries, saskatoons and the bunchberries. The *Poplar River Anishinabek Plant Guide* (2002) lists 50 different trees, shrubs, herbs, grasses, mosses and lichens that they have used to sustain themselves and their cultural practices (Bruce 2002).

Similarly, the *Pimachiowin Aki Cultural Landscape Atlas: Land that Gives Life* identifies the trees, shrubs, flowers, mosses, lichens and fungi that are historically and currently an important source of food and medicine for the communities (Davidson-Hunt *et al.* 2012). Plant species important for building, crafts, fuel supply, sustenance and cultural practices include balsam poplar, birch, black spruce, jack pine and white spruce trees, red-osier dogwood (**Photograph 9-2**), Labrador tea, lichens, Sphagnum mosses and cinder cork fungus (Davidson-Hunt *et al.* 2012). Common food plants include blueberry (**Photograph 9-3**), cloudberry, pin cherry, small cranberry and water parsnip; while dewberry, poplar, sweet flag (calamus), wild mint and prickly and smooth rose are important medicinal plants (Davidson-Hunt *et al.* 2012). Blueberry picking is important to the people of Pimachiowin Aki and is depended on for nutrition (Szwaluk Environmental Consulting Ltd. *et al.* 2015a).

(**Source**: Government of Manitoba 2015b)

Photograph 9-2: Red Osier Dogwood

(**Source:** Government of Manitoba 2015c)

Photograph 9-3: Manitoba Blueberries

During the workshops and interviews conducted with Berens River First Nation, the community members shared information on the edible, medicinal and cultural plants harvested by communities in the vegetation Local Assessment Area for food, medicinal and cultural purposes (CIER 2015) including

important harvest locations. Edible plants included blueberries, cranberries/mossberries, chokecherries, gooseberries, hazelnuts, pincherries, raspberries, strawberries and wild rice. Plants and fungi used for medicinal purposes include calamus, mosses, waterlily, wild ginger and a fungus that grows on birch trees. A number of plants and trees are used for preparing teas, including Labrador tea, poplar, red willow, sage, St. John's wort, tamarack, wild roses and rosehips. Important tree species include birch, jack pine, maple, poplar and willows, including diamond willow. The sap and wood from these trees are used for a number of purposes, including firewood, snowshoe making and as teas. Wild rice is another important food source that is still valued by the community and may once again become an important locally harvested wild food around Berens River (Szwaluk Environmental Consulting Ltd. *et al.* 2015a). Members of the Berens River community also raise tomatoes, pumpkins, carrots, rhubarb and cucumbers in seasonal gardens (CIER 2015).

During the workshops and interviews conducted with Poplar River First Nation, the community identified several species of trees, shrubs and herbs as being important to the community. Important trees included black spruce, birch, balsam, poplar, white spruce, jack pine and diamond willow, which are also medicines. Other species and medicines include mountain ash (rare), bearberry, yellow pond lily, sweet flag, wild rose, mint, red willow, moose berry, wild ginseng, tamarack, strawberry, raspberry, Saskatoon, Labrador tea, sagewort, stinging nettle, yarrow, sweet gale, sweet grass, black poplar, scrub oak (rare), sarsaparilla and wild rice (Szwaluk Environmental Consulting Ltd. *et al.* 2015b; CIER and Poplar River First Nation 2015). Poplar River First Nation recognized that with development of the proposed all-season road, there would be improved access for community members for picking blueberries, Saskatoon, raspberries, strawberries, muskeg berries, chokecherries, high bush cranberries (**Photograph 9-4**) and low bush cranberries (**Appendix 9-3**) that are common throughout the region (CIER and Poplar River First Nation 2015).

The desktop and field investigations conducted for the vegetation component characterized the vegetation present in the local assessment area and the existing plant communities at the regional level. Included in this was the identification of plants that local communities indicated were valuable to them for food, medicine and cultural purposes. During the June 2015 vegetation surveys, 36 plant species with edible, medical, or cultural value to local communities were observed in the vegetation Local Assessment Area at 33 sampled sites (**Appendix 9-3**). The most frequent species observed in sampled plots was black spruce, which was recorded in 20 sampling plots. Willow species were recorded in 17 sampling plots, followed by Labrador tea, bunchberry and velvet-leaved blueberry, which were recorded in 13 sampling plots. Other species of importance identified by Poplar River First Nation that were observed during the field investigations included chokecherry, stinging nettle and common yarrow (Szwaluk Environmental Consulting Ltd. *et al.* 2015b).

(**Source**: Government of Manitoba 2015d)

Photograph 9-4: High Bush Cranberries

9.1.1.2 Wildlife

During the workshops and interviews conducted with Berens River First Nation, the Berens River community indicated that they conduct a number of wildlife hunting and trapping activities in the wildlife Local Assessment Area for food, income and cultural purposes (**Chapter 10,** Socio-Economic and Cultural Environment). These activities involve the hunting or trapping of small furbearing mammals such as beaver, fisher, marten, mink, muskrat, otter, rabbit, weasel and wolverine; waterfowl such as Canada geese and a variety of ducks; and, in the past, large mammals such as boreal woodland caribou, coyote, grey wolf, lynx and moose (CIER 2015). It was shared that several community members harvest local and migratory bird species, but the names of the species were not provided (CIER 2015). Local communities also expressed the importance of many of the wildlife species in the Local Assessment Area and Regional Assessment Area to their cultural and spiritual beliefs and practices. These wildlife species include mammals such as the black bear (**Photograph 9-5**) and moose, and raptor species such as the bald eagle (Poplar River First Nation 2011).

In the *Asatiwisipe Aki Management Plan* (2011), Poplar River First Nation community members shared information on the historical and current importance of trapping and hunting activities to local communities. They shared how the people hunt and trap small mammals such as beaver, mink, muskrat, otter, rabbit, squirrel and weasel, as well as lynx and moose, and game birds such as Canada goose, ruffed grouse and ducks (Poplar River First Nation 2011). In the past, boreal woodland caribou was also hunted.

(**Source**: Joro Consultants 2015b)

Photograph 9-5: Black Bear

During the workshops and interviews conducted with Poplar River First Nation, people from the Poplar River community shared that several species of fish, crayfish and turtles can be found in the Poplar River and creeks in the area (CIER and Poplar River First Nation 2015). Frogs, toads, bullfrogs, garter snakes and turtles (painted and snapping) have been seen throughout the area (CIER and Poplar River First Nation 2015). Members of the Poplar River community indicated that they hunt for beaver, rabbits, chickens, muskrat, caribou, moose, groundhogs, owls, ducks and geese throughout their Traditional Territory (CIER and Poplar River First Nation 2015). Some members noted that there were less frogs, porcupine, weasels and foxes in the area than in previous times, and that there were new species in the area such as magpies and vultures (CIER and Poplar River First Nation 2015). Some members noted that species such as skunk and wolverine are coming back to the area (CIER and Poplar River First Nation 2015). Community members indicated that there were few caribou in the area, except for around Many Bays Creek in the winter and close to the winter road (CIER and Poplar River First Nation 2015).

In recognition of the value of Traditional hunting, trapping, cultural and spiritual needs of the communities, wildlife species of special importance to local communities were included as Valued Components (VCs) in the environmental assessment. Additional information on the wildlife VCs selected for the environmental assessment and the rationale for their selection is provided in **Section 9.2**.

9.1.2 Vegetation

The desktop and field investigations conducted for the vegetation component characterized the vegetation present in the Local Assessment Area, and the existing plant communities at the regional

level. For the purposes of the environmental assessment, the spatial boundaries for the terrestrial environment as it relates to vegetation are illustrated in **Figure 9-2** and described as follows:

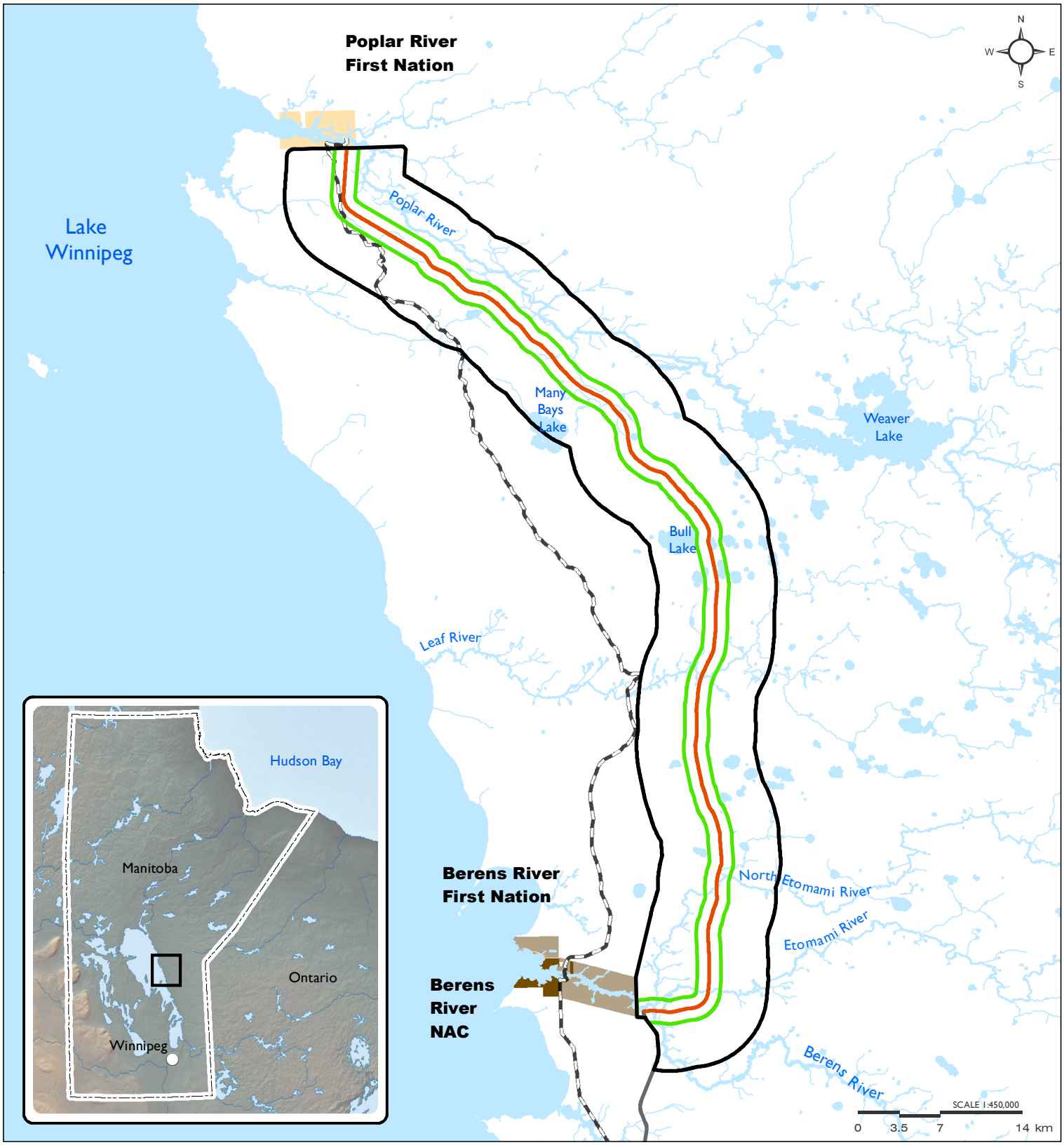
Project Footprint is the physical space or directly affected area on which the Project components or activities are located. The Project Footprint is the footprint of the proposed Project, which includes the 94.1 km gravel surface road, bridge and culvert crossings, granular borrow areas, new right-of-way, rock quarries and temporary access trails, bridges, camps and staging areas.

Local Assessment Area is the area within which Project effects are measurable and extend beyond the Project Footprint. For the vegetation assessment, this area was designated as 1 km on either side of the proposed all-season road, including rock quarries, borrow areas and access routes.

Regional Assessment Area is the area beyond the Local Assessment Area, which may be described in terms of administrative boundaries (e.g., municipalities; ecodistricts), within which most indirect and cumulative effects would occur. For vegetation, the Regional Assessment Area was designated as the area within five kilometres on either side of the proposed all-season road route.

Field and desktop studies were conducted to characterize the vegetation and provide an assessment of potential effects on vegetation in relation to the proposed Project (**Appendices 9-2** and **9-3**). The characterization of vegetation included a description of the Ecological Land Classification, physical environment (including the influence of fire and provincial fire history for the region), landscape level vegetation, local flora and Aboriginal Traditional Knowledge (Szwaluk Environmental Consulting Ltd. *et al.* 2015a).

The vegetation in this region of Manitoba consists primarily of coniferous forest with widespread stands of black spruce occurring on imperfectly drained mineral and organic soils, and upland sites supporting black spruce, willow and alder shrubs (Szwaluk Environmental Consulting Ltd. *et al.* 2015a). The understory herb and shrub vegetation in these areas is sparse to absent, and the ground cover is composed of feather mosses. In the southern portion of the Lac Seul Upland Ecoregion, there are occasional mixed wood stands of balsam fir, white spruce, trembling aspen and balsam poplar that form along the warmer river valleys and south facing slopes (Szwaluk Environmental Consulting Ltd. *et al.* 2015a). These mixed wood stands generally contain a more diverse shrub and herbaceous vegetation layer than the mainly coniferous areas. There are also areas of rocky outcrops, which may have patchy tree growth often dominated by jack pine, with an understory of ericaceous shrubs, herbs, mosses and lichens (Smith *et al.* 1998) (**Photograph 9-6**).



Project 4 - All-Season Road Connecting Berens River to Poplar River First Nation

Figure 9-2

Vegetation Assessment Areas

- P1 All-Season Road (South of Berens to PTH 304) - Under Construction
- 2013/2014 Manitoba Winter Road
- Vegetation Regional Assessment Area
- Vegetation Local Assessment Area
- Project Footprint*
- Berens River First Nation Reserve
- Poplar River First Nation Reserve
- Berens River Northern Affairs Community

*This area includes the Project all-season roadbed, cleared right-of-way and all potential quarry sites for impact assessment purposes

Map Drawing Information:
ESRI Base Layers, Province of Manitoba, CanVec, GeoGratis, Dillon Consulting Limited

Map Created By: ECH
Map Checked By: MG/PS/LD
Map Projection: NAD 1983 UTM Zone 14N

DATE: 4/8/2016

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(**Source**: Joro Consultants 2015b)

Photograph 9-6: Bog Swamp Transition to Treed Rock Island

Based on the Land Cover Classification (LCC) for the area (Map 07 in Joro Consultants 2015a), there are 11 vegetation classes that occur within the Project Footprint, Local and Regional Assessment areas, comprised mainly of bog and fen complexes and including: tall shrub; different types of wetland areas; coniferous, broadleaf and mixedwood forests; water; and exposed land. The area in hectares (ha) and proportion of land cover classes among the three assessment areas is provided in Table 4.3.1a of **Appendix 9-2** and is recreated below as **Table 9.1**.

Table 9.1: Area and Proportion of Vegetation Cover Classes among Vegetation Assessment Areas

Land Cover Classification	Project Footprint		Local Assessment Area*		Regional Assessment Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
Water	8.0	0.01	425.0	0.02	4,054.0	0.04
Exposed Land	4.0	0.00	72.0	0.00	189.0	0.00
Shrub Tall	0	0.00	0	0.00	1,798.0	0.02
Wetland Treed[1]	18.0	0.02	351.0	0.02	1,490.0	0.02
Wetland Shrub[1]	273.0	0.29	7,468.0	0.40	35,984.0	0.38
Wetland Herb[1]	26.0	0.03	868.0	0.05	6,246.0	0.07
Coniferous Dense	341.0	0.36	5,346.0	0.28	22,346.0	0.24
Coniferous Open	27.0	0.03	401.0	0.02	1,886.0	0.02
Coniferous Sparse	30.0	0.03	603.0	0.03	2,196.0	0.02
Broadleaf Dense	30.0	0.03	560.0	0.03	4,814.0	0.05
Mixedwood Dense	187.0	0.20	2,813.0	0.15	13,107.0	0.14

Note: 1 Composed predominantly of bog and fen complexes.
***Vegetation Local Assessment Area = 1 km either side of centreline of all-season road; Vegetation Regional Assessment Area = 5 km either side of centreline of all-season road.
Source: Szwaluk Environmental Consulting Ltd. *et al.* 2015a

9.1.2.1 Potential Quarry and Borrow Areas

Where feasible, the alignment follows rock outcrops, which allows aggregate to be sourced from within the right-of-way. Thirty-five potential rock quarries have been identified along the alignment which range in size from 1.1 ha to 53.4 ha, with the majority (68.6%) of potential quarry sites being less than 10 ha (**Appendix 9-2**; **Chapter 3, Appendix 3-3**). The area and proportion of land cover classes that occur within the thirty-five potential quarries for the three levels of assessment is provided in Table 4.3.2a of **Appendix 9-2** and is recreated below as **Table 9.2**.

Table 9.2: Area and Proportion of Land Cover Classes for Potential Quarry Sites Within Vegetation Assessment Areas

Land Cover Classes	Project Footprint		Local Assessment Area		Regional Assessment Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
Water	0.51	0.020	1.02	0.003	1.02	0.003
Wetland Treed[1]	0.00	0.000	6.18	0.019	6.19	0.017
Wetland Shrub[1]	0.97	0.039	30.48	0.093	34.49	0.096
Wetland Herb[1]	0.04	0.002	0.37	0.001	0.37	0.001
Coniferous Dense	9.93	0.400	98.45	0.300	111.14	0.309
Coniferous Open	4.10	0.165	41.45	0.126	46.84	0.130
Coniferous Sparse	8.62	0.348	120.57	0.368	130.21	0.362
Broadleaf Dense	0.00	0.000	0.20	0.001	0.20	0.001
Mixedwood Dense	0.64	0.026	29.25	0.089	29.25	0.081

Note: 1 Composed predominantly of bog and fen complexes.
Source: Szwaluk Environmental Consulting Ltd. *et al*. 2015a

9.1.2.2 Potential Access Routes

The majority of quarries are located directly adjacent to the proposed all-season road right-of-way (37.1%), or within 100 m (25.7%) of the right-of-way. Access to approximately one third of potential quarries is between 130 and 400 m off the right-of-way and there are two potential quarries that occur greater than 650 m from the alignment. For quarries located off the alignment, access routes will be required. To quantify the areas needed for access routes, a straight line access with a width of 30 m was assumed for access routes. Given that access to potential quarries falls within one km of the right-of-way, quantities of land cover classes are provided for the Project Footprint and Local Assessment Areas only (Szwaluk Environmental Consulting Ltd. *et al.* 2015a). The area and proportion of land cover classes for potential access routes is provided in Table 4.3.2c in **Appendix 9-2** and is recreated below as **Table 9.3**.

Table 9.3: Area and Proportion of Land Cover Classes for Potential Access Routes within the Project Footprint and Vegetation Local Assessment Areas

Land Cover Classes	Project Footprint		Local Assessment Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
Exposed Land	0.15	0.047	0.19	0.014
Wetland Treed[1]	0.15	0.047	0.73	0.053
Wetland Shrub[1]	0.56	0.177	4.36	0.318
Wetland Herb[1]	0.00	0.000	0.06	0.004
Coniferous Dense	1.48	0.465	6.02	0.440
Coniferous Open	0.00	0.001	0.07	0.005
Coniferous Sparse	0.06	0.020	0.24	0.017
Broadleaf Dense	0.53	0.168	1.10	0.080
Mixedwood Dense	0.24	0.075	0.92	0.067

Note: 1 Composed predominantly of bog and fen complexes.
Source: Szwaluk Environmental Consulting Ltd. *et al*. 2015a

9.1.2.3 Wetland Areas

Approximately 85% of Canada's wetland areas are located in the boreal forest (Ducks Unlimited Canada 2015) and it has been estimated that wetland areas cover 43% of the terrestrial landscape in Manitoba, with peatlands representing 90% of wetland areas (Halsey *et al.* 1997). The ecological importance of boreal wetland areas is well documented, including the importance of calcareous wetland areas (e.g. fens) and their potential to support species of conservation concern (Bond *et al*. 1992; Foster *et al.* 2004; Locky *et al.* 2005; Ducks Unlimited Canada 2015; Goldsborough 2015).

Within the vegetation Regional Assessment Area, wetland area types present include bog and fen complexes, fens and bogs; the proportion of these wetland area types was found to be similar across the three assessment area scales (Szwaluk Environmental Consulting Ltd. *et al.* 2015a). The area and proportion of wetland types among the three assessment areas is provided in Table 4.3.3 in **Appendix 9-2** and is recreated below as **Table 9.4**.

Table 9.4: Area and Proportion of Wetland Types among Vegetation Assessment Areas

Wetland Area Types	Project Footprint		Local Assessment Area		Regional Assessment Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
Bog and Fen Complex	569	0.67	10,617.00	0.56	49,621.00	0.60
Fen- non-patterned, shrubby, open	237	0.28	5,269.00	0.31	25,702.00	0.31
Fen- non-patterned, treed	24	0.03	597	0.04	3,057.00	0.04
Fen- patterned, open	0	0	0	0	1,742.00	0.02
Bog- treed	20	0.02	398	0.02	2,317.00	0.03

Note: In the Regional and Local Assessment Area, wetlands are predominantly bogs and fens.
Source: Adapted from Halsey *et al.* 1997 in Szwaluk Environmental Consulting Ltd. et al. 2015a.

Within the Project Footprint, 67% of the proposed all-season road right-of-way was characterized as fen and bog complex; 28.0% was classed as open or shrubby fen with no surface peat ridge pattern; and the remaining 5.0% was divided between treed non-patterned fens and treed bogs. There were no areas characterized as patterned open fens within the Project Footprint or Local Assessment areas (Szwaluk Environmental Consulting Ltd. *et al.* 2015a).

Eight types of wetland areas were found within the vegetation Local Assessment Area during field studies conducted in June 2015 (**Appendix 9-3**). The wetland area types include treed bog, shrub bog, treed poor fen, shrub poor fen, graminoid fen, shrub swamp, riparian shrub and meadow marsh. Representative photographs of each of these wetland area types are provided below as **Photographs 9-7 – 9-12** (all sourced from Szwaluk Environmental Consulting Ltd. *et al.* 2015b).

Photograph 9-7: Treed Bog

Photograph 9-8: Shrub Bog

Photograph 9-9: Treed Poor Fen

Photograph 9-12: Shrub Poor Fen

Photograph 9-10: Graminoid Fen

Photograph 9-13: Swamp Fen

Photograph 9-11: Riparian Shrub

Photograph 9-14: Meadow Marsh

9.1.2.4 Native Species

There are over 450 vascular and non-vascular native plant species from over 80 families that potentially occur in the terrestrial and aquatic habitats of the vegetation Local and Regional Assessment Areas (**Appendix 9-2**). A list of the potential plant species expected to occur in the Local and Regional Assessment Areas is provided in Appendix II of **Appendix 9-2**. The presence or absence of these species was investigated through field studies conducted in the Local and Regional Assessment Areas in

June 2015 (**Appendix 9-3**). Thirty-three forest area sites and wetland area sites were sampled between Berens River and Poplar River along the proposed all-season road alignment and quarry areas. A total of 186 plant taxa were observed in the Local Assessment Area (**Appendix 9-3**). There were 177 plants identified to the species level, while nine taxa were identified to the genus level including three vascular (herbs) and six non-vascular plants (mosses and lichens). A list of the native plant species found within the vegetation Local and Regional Assessment Areas during the June 2015 field studies is provided as Appendix III in **Appendix 9-3**.

9.1.2.5 Introduced Species

Introduced species are plant species that are either exotic (i.e., non-native but not invasive) or invasive (i.e., non-native and threaten the diversity or abundance of native species or their habitats). The Boreal Shield Ecozone, where the proposed Project is located, has a relatively high number of non-native and invasive plants, which commonly consist of perennial herbs and grasses, particularly from the Asteraceae (composites), Fabaceae (legumes) and Poaceae (grasses) families (Canadian Food and Inspection Agency 2008; Langor *et al.* 2014).

Up to 26 species of non-native and invasive plants that are expected to occur across the vegetation Regional Assessment Area are identified in Table 4.4.2 in **Appendix 9-2**. The presence or absence of these species was investigated through field studies conducted in the vegetation Local and Regional Assessment Areas in June 2015 (**Appendix 9-3**). Five invasive and non-native species were observed during the surveys and as incidental observations. Invasive plant species included common burdock (*Arctium minus*), caraway (*Carum carvi*), reed canary grass (*Phalaris arundinacea*), common dandelion (*Taraxacum officinale*) and alsike clover (*Trifolium hybridum*). These species are members of four families including aster (Asteraceae) with two species (common burdock and common dandelion); pea (Fabaceae) with alsike clover; grass (Poaceae) with reed canary grass; and the carrot family (Apiaceae) with caraway (**Appendix 9-3**). These four species were observed in Berens River, near Lake Winnipeg; reed canary grass was the only invasive plant species observed in the Project Footprint assessment area, at one site, in a meadow marsh area (**Appendix 9-3**).

9.1.2.6 Species of Special Interest

For the purpose of this Environmental Impact Assessment, species of special interest were defined as federal Species at Risk designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) for listing on Schedule 1 of the *Species at Risk Act (SARA)*, including species in the risk categories of extirpated, endangered, threatened and special concern (Canadian Environmental Assessment Agency [CEA Agency] 2015a); provincial species listed as Endangered or Threatened under the *Manitoba Endangered Species and Ecosystems Act* (*MBESEA*); species listed as very rare (provincial status of S1) or rare (provincial status of S2) throughout their range as listed by the Manitoba

Conservation Data Centre (MCDC) (MCDC 2015); and botanical resource areas[1] and culturally important plants (see **Section 9.1.1.1**).

With the exception of the flooded jellyskin (*Leptogium rivulare*) (**Photograph 9-15**), which is a lichen (i.e., a symbiotic relationship between an algae or cyanobacteria and a fungi), there are currently no vegetation Species at Risk listed in the Lac Seul Uplands Ecoregion.

(**Source**: Species at Risk Public Registry 2015)

Photograph 9-15: Flooded Jellyskin

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 (MCDC 2015). The term also encompasses species that are listed under the *MBESEA*, or that have a special designation by COSEWIC. A total of 56 species of conservation concern are expected to range in the Lac Seul Upland Ecoregion, and 40 of these species may potentially occur within the vegetation Regional Assessment Area (Table 4.4.3 in **Appendix 9-2**). The abundance of these species ranges from S1 (very rare) to S4 (widespread) on a sub-national basis but are widespread on a global basis (G4G5). Of the 40 potential species, four species are ranked very rare (S1) and 15 species are ranked rare (S2) by the MCDC (**Appendix 9-2**). There have been very few detailed botanical field studies done in this area; as such, only four species of conservation concern have been previously collected from the region: big-head rush (*Juncus vaseyi,* S4?), blister sedge (*Carex vesicaria*, SU), dwarf bilberry (*Vaccinium caespitosum*, S3) and tessellated rattlesnake plantain (*Goodyera tesselata,* S3) (**Appendix 9-2**).

[1] Valued locations where Aboriginal people have gathered plants and collected berries for subsistence, medicinal, cultural and spiritual uses (Szwaluk Environmental Consulting Ltd. *et al.* 2015b)

The field studies conducted in June 2015 included surveys for plant species of interest and culturally important species as well as other species of conservation concern. One species of conservation concern, the orchid arethusa (*Arethusa bulbosa*), was observed in three graminoid fen sites as an incidental species (**Photograph 9-16**). This plant was observed to be present in the vicinity of the sampling plots, one of which was within the Project Footprint. Arethusa is ranked rare (S2) by MCDC and is generally found on sphagnum hummocks in coniferous bogs and fens (**Appendix 9-3**).

(**Source**: Szwaluk Environmental Consulting Ltd. *et al.* 2015b)

Photograph 9-16: Arethusa Orchid Observed in a Graminoid Fen

No species listed by the *MBESEA*, the federal *SARA* or COSEWIC, including the flooded jellyskin lichen, were observed during the June 2015 field studies (**Appendix 9-3**).

During the June 2015 vegetation surveys, 36 plant species with edible, medicinal, or cultural value to local communities were observed in the vegetation Local Assessment Area at 33 sampled sites (**Appendix 9-3**). The most frequent species observed in sampled plots was black spruce, which was recorded in 20 sampling plots. Willow species were recorded in 17 sampling plots, followed by Labrador tea, bunchberry and velvet-leaved blueberry, which were recorded in 13 sampling plots. Other species of importance identified by Poplar River First Nation that were observed during the field investigations included chokecherry, stinging nettle and common yarrow (**Appendix 9-3**).

9.1.3 Wildlife

The wildlife species and populations in the wildlife Local Assessment Area reflect the range of boreal forest habitats that have evolved through time in response to the geology, terrain, vegetation and climatic conditions that influence the region. Centuries of fire and other disturbances have created a

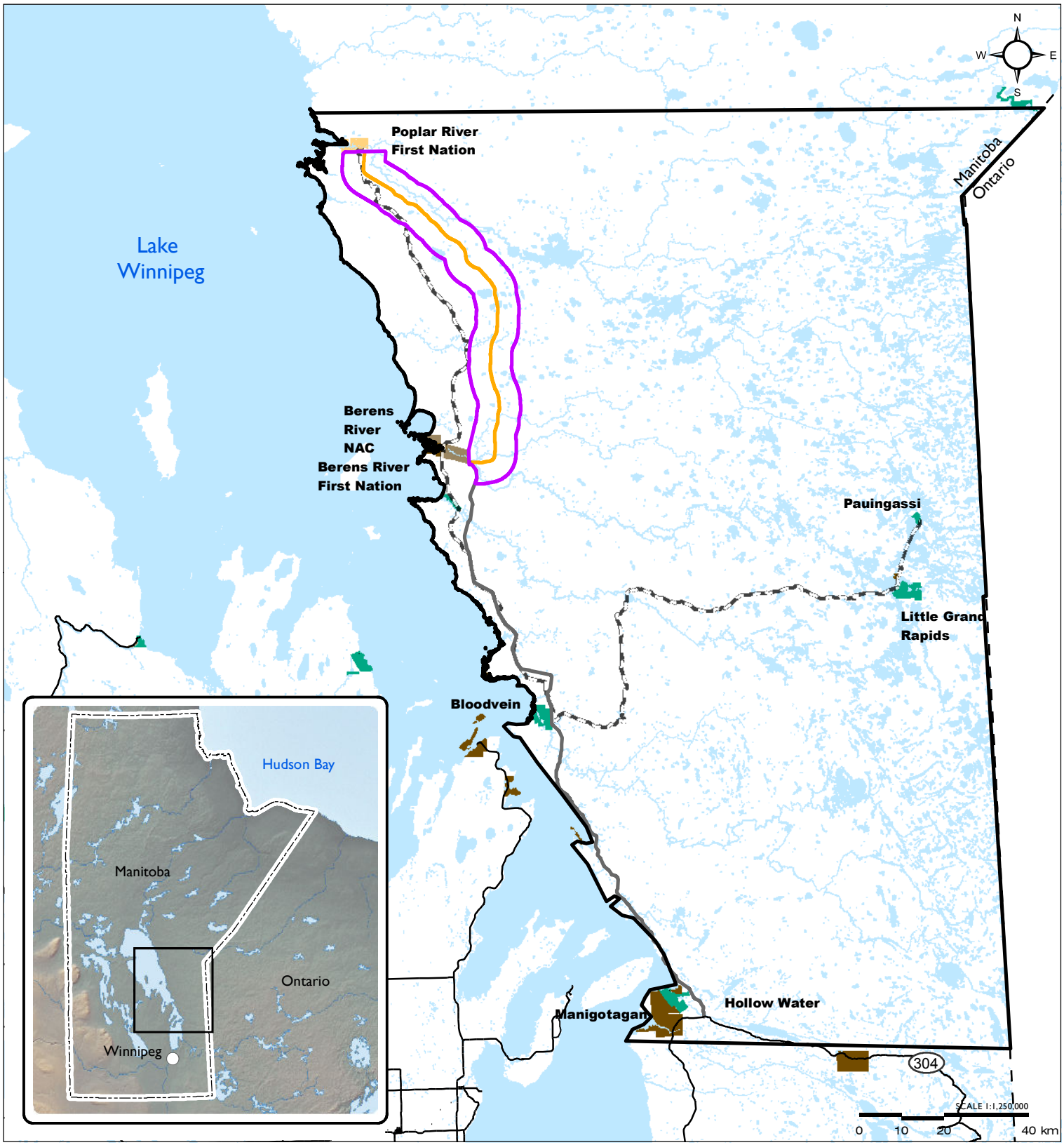
montage of vegetation types in varying stages of succession and renewal across the landscape. This ability to adapt to the changing conditions and occupy the array of available boreal forest habitats at different stages of succession is also exhibited by the wildlife species that inhabit this area.

In addition to understanding the relationships among wildlife and their habitat, the assessment of potential environmental effects on wildlife requires knowledge of the movements and spatial range of the animals of interest. As such, the spatial boundaries used to assess potential environmental effects on wildlife may vary by species. For the purposes of environmental assessment, the spatial boundaries are typically described for three spatial scales: a Project Footprint, a Local Assessment Area and a Regional Assessment Area. For the all-season road Project, the Project Footprint, Local Assessment Area and Regional Assessment Area for the terrestrial environment as it relates to wildlife are illustrated in **Figure 9-3** and are described as follows:

Project Footprint is the physical space or directly affected area on which the Project components or activities are located. For the terrestrial environment as it relates to wildlife, this area includes the 94.1 km gravel surface road, new right-of-way, bridge and culvert crossings, rock quarries, granular borrow areas and temporary access trails, bridges, staging areas and camps.

Local Assessment Area is the area within which Project effects are measurable and extend beyond the Project Footprint. For the terrestrial environment as it relates to wildlife, the Local Assessment Area was defined as a 5 km buffer on either side of the proposed all-season road route. This area was selected as it encompasses animal movements in the local area. This falls in the administrative boundaries relevant to existing wildlife and/or natural resource management areas; the Manitoba Conservation and Water Stewardship (MCWS), Wildlife and Ecosystem Protection Branch, Game Hunting Area 17b (GHA) (MCWS 2015c) and the MCWS, Forestry Branch, Forest Management Units (FMUs) 38 and 39 (MCWS 2013a) (Joro Consultants 2015a).

Regional Assessment Area is defined as the area beyond the Local Assessment Area within which most indirect and cumulative Project effects may occur. The Regional Assessment Area may be described in terms of administrative boundaries that are relevant to existing wildlife and/or natural resource management areas, such as Ecodistricts or Wildlife Management Units (e.g., Berens and Round Lake boreal woodland caribou sub-ranges, Atikaki-Berens management unit for boreal woodland caribou [Manitoba Boreal Woodland Caribou Management Committee 2014). For the purposes of the environmental assessment of potential regional effects on wildlife, a Regional Assessment Area was selected to encompass the majority of the species of interest and their movements in the region. This Regional Assessment Area includes the area contained within 5 km south of Manigotagan, northwards to 5 km north of Poplar River, east to the Manitoba/Ontario border and west to the edge of Lake Winnipeg, as shown in **Figure 9-3**. This Regional Assessment Area was used to assess the potential effects on wildlife, including the identified wildlife VC species, with the exception of moose and boreal woodland caribou. Information on the Regional Assessment Area for moose is provided in **Section 9.2.5.1** and information on the Regional Assessment Area for boreal woodland caribou is provided in **Section 9.2.5.2**.



Project 4 - All-Season Road Connecting Berens River to Poplar River First Nation

Figure 9-3

Wildlife Assessment Areas

- P4 All-Season Road Alignment
- P1 All-Season Road (South of Berens to PTH 304) - Under Construction
- 2013/2014 Manitoba Winter Road
- Wildlife Regional Assessment Area
- Wildlife Local Assessment Area
- Northern Affairs Community
- Berens River First Nation Reserve
- Poplar River First Nation Reserve
- Other First Nations

Map Drawing Information:
ESRI Base Layers, Province of Manitoba, CanVec, GeoGratis, Dillon Consulting Limited

Map Created By: ECH
Map Checked By: MG/PS/LD
Map Projection: NAD 1983 UTM Zone 14N

DATE: 4/9/2016

MANITOBA East Side Road AUTHORITY

Wildlife studies were conducted in the Local Assessment Area and adjacent areas between January 10, 2011 and January 31, 2015 (Joro Consultants 2015a). The studies conducted in the wildlife Local Assessment Area and Regional Assessment Area included:

- Identification of wildlife Species at Risk through review of historical information, published information for the area (including trapping and hunting records), field surveys, collaboration with government agencies and incorporation of Traditional Knowledge;
- Identification and assessment of habitat types, land use and resource use as they relate to wildlife use and wildlife lifecycle requirements through published information for the area, field surveys, collaboration with government agencies and GIS analysis;
- Identification and assessment of wildlife and wildlife habitat through, multi-species aerial surveys, deployment of trail cameras and satellite collaring of boreal woodland caribou and grey wolves (*Canis lupus*). Collaboration with local trappers as part of the Trapper Participation Program provided additional qualitative information on species presence in the Local Assessment Area;
- Identification and assessment of resident and migratory bird species and herpetological (herptiles) species through published information for the area, ground based field surveys, the use of Automatic Recording Units (ARUs), collaboration with government agencies and incorporation of Traditional Knowledge; and
- Habitat modelling for moose, furbearers and avian species of interest and a cumulative effects assessment for boreal woodland caribou and moose using habitat disturbance analysis.

The wildlife and habitat data collected and analysed to date for the wildlife Local Assessment Area and Regional Assessment Area provide valuable information on land use, movement patterns, home range sizes, core range use, habitat selectivity and other variables for boreal woodland caribou, grey wolf, moose and furbearing wildlife species such as beaver (*Castor canadensis*), marten, mink (*Neovison vison*) and fisher (*Mustela pennanti*). The habitat analysis utilizing the Land Cover Classification of Canada showed there are significant areas of mixed woods and broadleaf habitat that would support moose as well as a diversity of furbearer species (Joro Consultants 2015a). Bog and fen complexes and forest covered areas provide habitat for a number of large and small mammals, as well as bird and herptile (amphibian and reptile) species (Joro Consultants 2015a). Further discussion of the wildlife and their habitats within the Local Assessment Area is provided below.

9.1.3.1 Mammals

In addition to the mammal species noted in the above sections, the wildlife Local Assessment Area provides habitat for a number of small and large mammal species including black bear (*Ursus americanus*), Canada lynx (*Lynx canadensis*) (**Photograph 9-17**), ermine (*Mustela erminea*), least chipmunk (*Eutamias minimus*), muskrat (*Ondatra zibethicus*), otter (*Lutra canadensis*), red fox (*Vulpes vulpes*), red squirrel (*Tamiasciurus hudsonicus*), snowshoe hare (*Lepus americanus*), southern red-backed vole (*Clethrionomys gapperi*) and wolverine (*Gulo gulo*). As noted in **Section 9.1.1**, many of these species are hunted or trapped by local communities.

(**Source**: Joro Consultants 2015b)

Photograph 9-17: Canada Lynx

As reported in the Project 4: Wildlife Technical Report (Joro Consultants 2015a) included in **Appendix 9-1**, black bears can be found across most wooded habitats in North America and are relatively common throughout the northern mixed and eastern deciduous forests (Kolenosky and Strathearn 1987; Reid 2006). Black bear densities are highest in diverse forests that are at relatively early stages of development, and lowest where soils are thinner and plant growth is generally poorer (Kolenosky and Strathearn 1987). Black bears are common in the Local Assessment Area and are an integral component of the local ecosystem in their predator/prey relationship (Joro Consultants 2015a). MCWS licenses registered outfitters for foreign resident bear hunting, providing commercial hunting opportunities in GHA17 and GHA17B (MCWS 2015c).

As reported in **Appendix 9-1**, grey wolves (**Photograph 9-18**) are also abundant in most of Manitoba and in GHA17 and GHA17B. They tend to inhabit forested areas with sufficient prey species such as moose, beaver and snowshoe hare. Grey wolf populations are being monitored by ESRA for their movement patterns and their diet, in terms of prey species identification, as they are a primary predator in the area (Joro Consultants 2015a). MCWS licenses hunters for resident, non-resident and foreign resident hunting, which provides commercial wolf hunting opportunities in GHA 17 and GHA17B (MCWS 2015c).

(**Source**: Joro Consultants 2015b)

Photograph 9-18: Grey Wolf

There are several species of small mammals that can be considered to be within or at the edge of their natural range in the Local Assessment Area (Joro Consultants 2015a). These species include least weasel (*Mustela nivalis*), little brown myotis (*Myotis lucifugus*), masked shrew (*Sorex cinereus*), meadow jumping mouse (*Zapus hudsonius*), northern bog lemming (*Synaptomys borealis*), northern myotis (*Myotis septentrionalis*), porcupine (*Erethizon dorsatum*), pygmy shrew (*Sorex hoyi*), raccoon (*Procyon lotor*), short-tailed shrew (*Blarina brevicauda*), silver-haired bat (*Lasionycteris noctivagans*), striped skunk (*Mephitis mephitis*) and woodchuck (*Marmota monax*) (Joro Consultants 2015a).

A list of the mammal species present in the Local Assessment Area and their provincial and federal conservation status is provided in **Appendix 9-4**.

There were four mammal Species at Risk identified to be potentially present in the Local Assessment Area: boreal woodland caribou, little brown myotis, northern myotis and wolverine. Boreal woodland caribou have been included in the environmental assessment as a VC to identify and assess the potential effects of Project activities on this Species at Risk. Project clearing activities will take place in the winter period when the two bat Species at Risk will be overwintering in hibernacula. As such, the potential effects of Project activities on the two bat Species at Risk were assessed by: including bat hibernacula as Environmentally Sensitive Wildlife Sites (ESWS) and including these ESWS in the environmental assessment as a VC. This approach was also used to assess potential effects of Project activities on wolverine, by including mammal dens as an ESWS and as a VC. Additional information on the use and selection of ESWS as a VC is provided in **Section 9.2.5.7**.

Moose were also selected as a mammal VC due to their importance in the area to local communities for food and cultural purposes, their role in the local ecosystem and their hunting value. Beaver and marten were selected as VCs to represent furbearing species of importance to local communities for trapping and based on their role in the local ecosystem. Additional information on the VCs selected for the environmental assessment is provided in **Section 9.1.4**.

9.1.3.2 Herptiles

There are 14 species of herptiles (amphibians and reptiles) documented to be present within the Local Assessment Area (Joro Consultants 2015a; Manitoba Herps Atlas 2015). Amphibian species include the American toad (*Bufo americanus*), blue-spotted salamander (*Ambystoma laterale*), mink frog (*Rana septentrionalis*) and mudpuppy (*Necturus maculosus*). Reptile species include the common snapping turtle (*Chelydra serpentina serpentina*), red-sided garter snake (*Thamnophis sirtalis parietalis*) (**Photograph 9-19**) and western painted turtle (*Chrysemys picta*). These animals consume a variety of insects, including mosquitoes, as well as rodents and small invertebrates such as snails, spiders, slugs and worms (Canadian Wildlife Federation 2015a). They also serve as food items for other wildlife such as raccoons, skunks, hawks and herons (Canadian Wildlife Federation 2015a). The majority of herptiles are found in or near water at different stages of their lifecycle to meet their reproductive and/or feeding requirements. Being cold-blooded, herptiles are inactive during the winter months and overwinter in underground hibernacula, at the bottom of permanent waterbodies or under the cover of forest litter on the forest floor (Manitoba Herps Atlas 2015). There are no known snake hibernacula in the Local Assessment Area, although snakes have been observed in the area (CIER and Poplar River First Nation 2015).

(**Source**: Wikimedia Commons 2015)

Photograph 9-19: Red-Sided Garter Snake

A list of the amphibian and reptile species present in the Local Assessment Area and their provincial and federal conservation status is provided in **Appendix 9-5**.

There were one herptile Species at Risk identified to be potentially present in the Local Assessment Area: the common snapping turtle. This species has been included in the environmental assessment as a VC to identify and assess the potential effects of Project activities on herptile Species at Risk. Additional information on the VCs selected for the environmental assessment is provided in **Section 9.1.4**.

9.1.3.3 Birds

There are over 220 bird species with the potential to be present in the Local Assessment Area at different periods of the year (**Appendix 9-6**). A list of the migratory and resident bird species with the potential to be present in the Local Assessment Area, and the provincial and federal conservation status of these species, is provided in **Appendix 9-6**.

A combination of Autonomous Recording Units (ARUs) and ground-based pedestrian surveys were used to collect information on the bird species present in the all-season road Local Assessment Area (Joro Consultants 2015a). ARUs were deployed along and near the proposed all-season road route in April 2014 and April 2015. As a contributor to the Manitoba Breeding Bird Atlas program, ESRA provided assistance in the summer of 2014 for additional surveys in blocks within the vicinity of the Project to provide additional baseline data (Joro Consultants 2015a).

The most commonly heard bird species recorded by the ARUs in 2014 were the black-capped chickadee (*Poecile atricapillus*), great horned owl (*Bubo virginianus*) and woodpecker (unidentified species) and the most commonly heard bird species recorded by the ARUs in 2015 were the Canada goose (*Branta canadensis*), sora rail (*Porzana carolina*) and white-throated sparrow (*Zonotrichia albicollis*) (Joro Consultants 2015a). **Table 9.5** provides a summary of the bird species heard in 2014, and **Table 9.6** provides a summary of the bird species heard in 2015.

Table 9.5: Summary of ARU Results of Bird Species Heard in 2014 in the All-Season Road Local Assessment Area

Species Observation[1]	# of Calls in Sequence
Veery	1
Woodpecker *spp.*	75
Canada Goose	16
Black-Capped Chickadee	63
American Crow	6
Great Horned Owl	123
Sandhill Crane	2
Wilson's Snipe	13

Note: 1 Species scientific names are provided in **Appendix 9-6.**

Table 9.6: Summary of ARU Results of Bird Species Heard In 2015 in the All-Season Road Local Assessment Area

Species Observation	# of Calls in Sequence
Woodpecker *spp.*	14
Canada Goose	43
Yellow-Billed Cuckoo	7
Wilson's Snipe	5
Oven Bird	25
Great Horned Owl	6
Connecticut Warbler	15
Mallard (**Photograph 9-20**)	14
Swamp Sparrow	28
Hooded Oriole	5
Sora Rail	61
Nashville Warbler	21
Pine Warbler	21
Yellow-Rumped Warbler	22
Violet-Green Swallow	11
Yellow Warbler	18
Red-Winged Blackbird	13
American Redstart	15
Common Nighthawk[2]	1
Black-Capped Chickadee	15
White-Throated Sparrow	30
American Crow	15
Grey Jay	15
Blue Jay	15
Common Loon	1

Note: 1 Species scientific names are provided in **Appendix 9-6.**
2 Listed as Threatened under *MBESEA* and *SARA.*

The bird species observed to be present in the all-season road Local Assessment Area during the Manitoba Breeding Bird Atlas surveys are summarized in **Table 9.7**.

Table 9.7: Results of the 2014 Manitoba Breeding Bird Atlas Survey

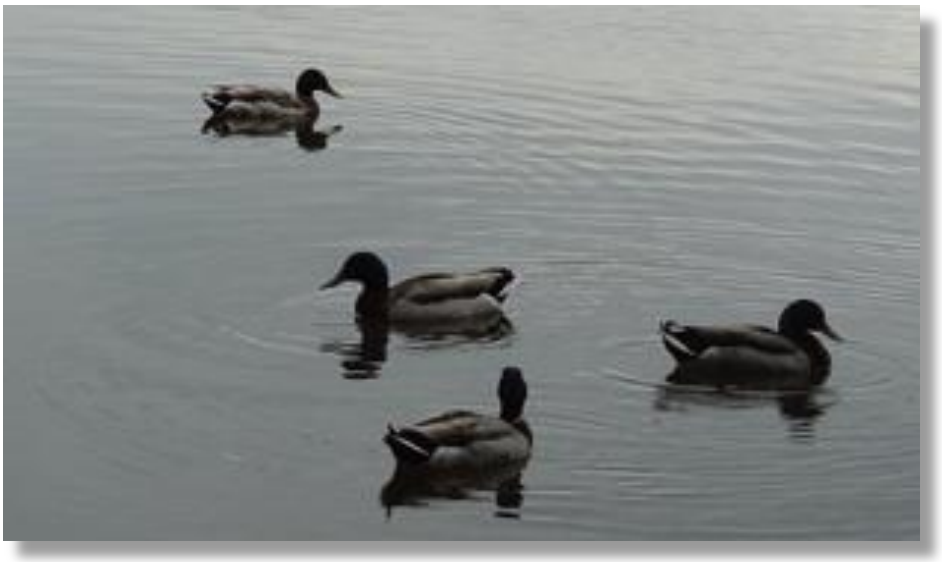
Manitoba Breeding Bird Atlas Block/Square[1]	Species Observation[2]	Total Count
14PD24	Alder Flycatcher	25
Atlas square: 14PD24 -	American Bittern	1
Atlas square: 14PD52 -	American Kestrel	1
Atlas square: 14PD24 -	American Redstart	1
14PD53	Bay-Breasted Warbler	1
Atlas square: 14PD52 -	Black-And-White Warbler	7
Atlas square: 14PD52 -	Black-Capped Chickadee	1
14PD24	Blue-Headed Vireo	10
14PD24	Boreal Chickadee	2
Atlas square: 14PD52 -	Broad-Winged Hawk	1
14PD53	Canada Goose	432
Atlas square: 14PD52 -	Cape May Warbler	1
Atlas square: 14PD52 -	Cedar Waxwing	1
14PD24	Chipping Sparrow	25
Atlas square: 14PD52 -	Common Goldeneye	2
Atlas square: 14PD52 -	Common Nighthawk[3]	8
Atlas square: 14PD52 -	Common Raven	1
Atlas square: 14PD34 -	Common Yellowthroat	16
14PD24	Connecticut Warbler	15
Atlas square: 14PD52 -	Golden-Crowned Kinglet	2
14PD24	Gray Jay	4
14PD24	Greater Yellowlegs	3
14PD53	Hairy Woodpecker	1
14PD24	Hermit Thrush	22
14PD24	Le Conte's Sparrow	14
Atlas square: 14PD52 -	Least Flycatcher	2
14PD24	Lincoln's Sparrow	16
14PD24	Magnolia Warbler	17
14PD53	Mallard	1
14PD24	Nashville Warbler	34
14PD24	Northern Flicker	2
Atlas square: 14PD52 -	Northern Parula	1
14PD53	Northern Waterthrush	3
Atlas square: 14PD34 -	Olive-Sided Flycatcher[3]	8
Atlas square: 14PD52 -	Orange-Crowned Warbler	1
14PD53	Ovenbird	7
14PD24	Palm Warbler	8
Atlas square: 14PD52 -	Pileated Woodpecker	1
Atlas square: 14PD52 -	Pine Siskin	3
14PD53	Red-Breasted Nuthatch	2

Manitoba Breeding Bird Atlas Block/Square[1]	Species Observation[2]	Total Count
Atlas square: 14PD52 -	Red-Winged Blackbird	1
14PD24	Ruby-Crowned Kinglet	23
Atlas square: 14PD34 -	Ruffed Grouse	1
14PD24	Sandhill Crane	6
14PD24	Savannah Sparrow	1
Atlas square: 14PD24 -	Sedge Wren	12
Atlas square: 14PD52 -	Sharp-Shinned Hawk	1
Atlas square: 14PD24 -	Short-Billed Dowitcher	1
Atlas square: 14PD52 -	Solitary Sandpiper	2
Atlas square: 14PD52 -	Spotted Sandpiper	2
Atlas square: 14PD34 -	Spruce Grouse	2
14PD24	Swainson's Thrush	16
Atlas square: 14PD34 -	Swamp Sparrow	8
14PD53	Tennessee Warbler	15
Atlas square: 14PD52 -	Tree Swallow	2
Atlas square: 14PD52 -	Turkey Vulture	1
14PD24	White-Throated Sparrow	30
Atlas square: 14PD52 -	White-Winged Crossbill	4
14PD24	Wilson's Snipe	3
Atlas square: 14PD52 -	Wilson's Warbler	1
Atlas square: 14PD52 -	Yellow Warbler	1
Atlas square: 14PD52 -	Yellow-Bellied Flycatcher	1
14PD53	Yellow-Rumped Warbler	7

Note: 1 Please see the Manitoba Breeding Bird Atlas at http://www.birdatlas.mb.ca for more information.
2 Species scientific names are provided in **Appendix 9-6.**
3 Listed as Threatened under *MBESEA* (MCDC 2015) and/or *SARA* (SARA 2015).

There were two bird species of conservation concern observed during the Manitoba Breeding Bird Atlas surveys: the common nighthawk (*Chordeiles minor*) and olive-sided flycatcher (*Contupus cooperi*). The common nighthawk is listed as "Threatened" under *MBESEA* and *SARA* (MCDC 2015; SARA 2015), and the olive-sided flycatcher is listed as "Threatened" under *SARA* (SARA 2015).

The assessment of migratory birds also included habitat modeling for 9 species of which 6 were forest birds and 3 water bird species. These modelled species also represent a broad range of habitat requirements for other bird species that could occur across the RAA and LAA. The bird and habitat associations provide ecological context for other species that occupy various habitat types and ecological niches across the region and would be proxies for over 80 other species of birds (Joro consultants 2015a)



(**Source**: Wikimedia Commons 2015)

Photograph 9-20: Mallard Ducks

9.2 Environmental Effects and Mitigation

The assessment of the potential effects of the Project activities on the Terrestrial Environment VCs was conducted as described in **Section 6.4** of **Chapter 6**, and included the following approach:

- Identification of the interactions among the selected VCs and the Project construction and operations and maintenance activities;
- Identification of the potential environmental effects of the Project prior to the implementation of mitigation measures;
- Initial screening of the potential environmental effects through the examination of the magnitude/ geographic extent, duration, frequency, reversibility and ecological context of the potential effects, as well as the probability of the occurrence of the predicted effect, prior to the implementation of mitigation measures;
- Identification of appropriate mitigation measures and their application to reduce or avoid potential adverse effects; and
- Prediction of residual adverse environmental effects remaining after mitigation and determination of the significance of those residual adverse effects.

The VCs identified for the terrestrial environment and the rationale for selection of the Terrestrial Environment VCs are shown in **Table 9.8**.

Table 9.8: Terrestrial Environment Valued Components and Selection Rationale

Valued Component*	Selection Rationale
Vegetation Communities	▪ Vegetation communities are an integral part of the ecosystem and provide food and habitat for wildlife.
Plant Species of Cultural Importance	▪ Due to the importance of various plant species to the local communities.
Ungulates	▪ Two species selected to serve as representative VCs to focus the environmental effects assessment on wildlife: ○ Moose - Importance for Aboriginal community cultural and traditional activities; hunting value; large home range; prey for large carnivores. ○ Boreal woodland caribou - Ranked "Threatened" under COSEWIC, Schedule 1 of SARA, and the Manitoba Endangered Species and Ecosystems Act (MBESEA); large home range requirements; CEA Agency Guidelines indicate that 'Species at Risk' are to be considered for assessment (CEA Agency 2015a).
Furbearers	▪ Two species are selected to serve as representative VCs to focus the environmental effects assessment on furbearers. The results of the assessments of furbearer VCs represent a number of other representative species or group of terrestrial and avian species, including those species identified by local communities that occupy similar ecological niches or habitat associations (Joro Consultants 2015a). Habitat associations also include those species which have been identified by communities as having traditional value as a hunted or trapped species or of cultural importance ○ Beaver - Ecosystem engineer; representative aquatic furbearer ○ Marten - Harvested furbearer and a valued economic species; important predator/prey species; representative terrestrial furbearer
Environmentally Sensitive Wildlife Sites	▪ Selected as a VC to represent the nests, dens and/or hibernacula required by some terrestrial species for breeding and/or overwintering requirements. These sites include: bat and snake hibernacula; terrestrial mammal dens (e.g., bears, wolves, wolverine); rookeries; large stick nests; as well as mineral licks.
Migratory Birds	▪ Two groups were selected to serve as representative VCs to focus the environmental effects assessment on birds (which include both migratory and non-migratory species). The results of the assessments of migratory bird VCs represent species or group of avian species, including those species identified by local communities that occupy similar ecological niches or habitat associations (Joro Consultants 2015a). Habitat associations also include those species which have been identified by communities as having traditional value as a hunted or trapped species or of cultural importance: ○ Forest birds ○ Waterbirds ▪ Migratory birds were identified in the CEA Agency Guidelines as a VC to be considered for assessment (CEA Agency 2015a). ▪ Many bird species have cultural importance for Aboriginal communities, including relevance to traditional activities such as hunting
Herptiles	▪ Herptiles (i.e., amphibians and reptiles) are valued for their role in ecosystem health

Note: *Socio-Economic effects on culturally important vegetation and wildlife species are addressed in Chapter 10 *Socio-Economic and Cultural Environment.*

Terrestrial Species at Risk and of Special Interest

For this environmental assessment, Species at Risk and species of special interest were defined as federal species listed on Schedule 1 of *SARA*, including species in the risk categories of: endangered, threatened and special concern (CEA Agency 2015a); COSEWIC status, provincial species listed as Endangered or Threatened under *MBESEA*; and species listed as very rare or rare (status of S1, S2) in the Regional Assessment Area as listed by the Manitoba Conservation Data Centre (MCDC 2015). Those species on the fringe of their range or that are infrequent migrants to the area were not included for assessment. Species occurrence by Ecoregion as defined by the MCDC for the Lac Seul Upland was utilized in determining these species. **Appendix 9-7, Table 9.7a** provides a list of the terrestrial Species at Risk, along with their current conservation status, a brief description of preferred habitat, potential occurrence, potential effects, mitigation opportunities and conclusions regarding assessment in the Local Assessment Area. The potential Species at Risk and species of special interest were reviewed in terms of their known range and any identified critical habitat within the Regional Assessment Area. Potential presence was determined based on field studies conducted in the area; review of habitat data, COSEWIC reports, Manitoba Avian Research Committee (2003) and breeding evidence maps maintained by the Manitoba Breeding Bird Atlas (Manitoba Breeding Bird Atlas [MBBA] 2015; **Appendix 9-8**); and professional knowledge and experience in the area. **Appendix 9-7, Table 9.7b** provides information on how terrestrial Species at Risk and species of special interest potentially occurring in the Local Assessment Area are potentially affected by the Project, and the proposed mitigation to avoid potential adverse effects to those species and their critical habitat. For some Species at Risk, there are Recovery Strategies and Action Plans developed as required under the federal *Species at Risk Act*. Mitigation described within available Recovery Strategies and Action Plans are important tools that form an integral component of the proposed mitigation for the protection of Species at Risk and their critical habitat potentially affected by the Project, as described in **Appendix 9-7, Table 9.7b**.

9.2.1 Valued Components and Project Interactions

Chapter 3 (Project Description) provides information on the project description, and the equipment, materials and activities that will be used for the construction and operations and maintenance of the all-season road. Based on this information, a list of the project activities was developed to identify the key project activities that have the potential to interact with the Terrestrial Environment VCs. **Table 9.9** provides a summary of these key project activities. These interactions were identified based on the desktop and field investigations conducted for vegetation and wildlife in the Project study areas, and incorporate Traditional Knowledge of the terrestrial environment as provided by the local communities.

Table 9.9: Key Project Activity Interactions with Terrestrial Environment Valued Components

Project Activities	Terrestrial Environment VCs						
	Vegetation Communities	Plant Species of Cultural Importance	Ungulates (Moose and Caribou)	Furbearers	Ecologically Sensitive Wildlife Sites	Migratory Birds	Herptiles
Construction Phase							
Operation and staging of equipment, machinery and, vehicles and transportation of equipment as necessary during construction phase*.			✔	✔			
Clearing the road right-of-way including clearing vegetation, salvaging, burning, stockpiling, grubbing and mechanical brushing.	✔	✔	✔	✔	✔	✔	✔
Blasting.			✔	✔		✔	
Road construction including topsoil stripping, soil removal, rock placement/compaction, rock crushing, traffic control/signage and contouring.	✔	✔	✔	✔	✔	✔	✔
Grading and gravelling of road surface (see first row).							
Bridge construction including construction of components, batching/pouring concrete, steel girder placement.			✔	✔	✔		✔
Culvert installation including coffer damming, stream excavation, geotextile material placement, filling, crossing streams, culvert placement, backfilling and compaction.			✔	✔	✔	✔	✔
Erosion and sediment control including placing silt fencing and re-vegetation.	✔	✔	✔	✔	✔	✔	✔
Establishment of staging areas and temporary components (i.e., quarry and borrow areas, temporary access and crossings, staging areas, camps).	✔	✔	✔	✔	✔	✔	✔
Solid and liquid waste management.	✔	✔	✔	✔		✔	✔

Project Activities	Terrestrial Environment VCs						
	Vegetation Communities	Plant Species of Cultural Importance	Ungulates (Moose and Caribou)	Furbearers	Ecologically Sensitive Wildlife Sites	Migratory Birds	Herptiles
Storage and handling of hazardous materials.	✔	✔	✔	✔		✔	✔
Site cleanup including waste removal, contaminated soil removal, stockpiling and recycling materials.	✔	✔	✔	✔	✔	✔	✔
Closure and reclamation of temporary components (quarry and borrow areas, access, crossings, staging areas) including excavation, slope stabilization, re-vegetation and barrier installation.	✔	✔	✔	✔	✔	✔	✔
Operations and Maintenance Phase							
Road maintenance including vegetation maintenance, grading, washout repair and traffic controls.	✔	✔	✔	✔	✔	✔	✔
Ditch maintenance including excavation and debris removal.				✔		✔	✔
Bridge and culvert maintenance including seasonal inspections and debris removal.				✔		✔	✔
Erosion and sediment control including re-vegetation.	✔	✔	✔	✔	✔	✔	✔
Clearing snow.			✔	✔			
Operation and staging of equipment, machinery and vehicles and transportation of equipment as necessary during maintenance.			✔	✔		✔	✔

Note: *Other activities require the operation of equipment/vehicles/machinery. Therefore, influences on VCs for subsequent activities relate to how the completion of the activity potentially influences the VC.

9.2.2 Assessment of Potential Effects

As noted in **Section 6.4** of **Chapter 6** (Environmental Impact Assessment Scope and Approach), the potential environmental effects of the Project activities on the VCs were assessed using the five steps outlined and the assessment criteria described in **Table 6.3**. A number of different field survey methods, spatial analyses and habitat modelling were conducted to collect, record and analyse information on the wildlife and wildlife habitat in the all-season road Project Footprint, Local Assessment Area and Regional Assessment Area. This information was used to quantify the potential effects of Project activities on the selected VCs, where quantification was possible and qualify the potential effects where quantitative data were unavailable.

During the workshops and interviews conducted with Berens River First Nation and Poplar River First Nation, the community members expressed support for the road development and provided their input on the potential effects of the Project on the terrestrial environment (CIER 2015; CIER and Poplar River First Nation 2015). Some of the community members expressed that the Project may disturb some animals during construction, but that the animals would return after construction (CIER 2015; CIER and Poplar River First Nation 2015). **Chapter 10** (Socio-Economic and Cultural Environment) provides additional information on the Traditional Knowledge workshops and interviews.

9.2.3 Mitigation

As part of ESRA's commitment to environmental protection and sustainability, the design and routing of the Project has been developed with an acute awareness of the importance of the ecological and cultural resources of the area, including the value of the terrestrial environment to the people and animals of the region. The final route for the all-season road was selected after a number of alternative routes and design options were proposed, reviewed and rejected in terms of potential effects on the people, air, water, land, fish, vegetation, wildlife, Heritage Resources, Traditional land use and Traditional activities. Input received from Elders, elected officials and community members of Berens River and Poplar River was used to validate and refine the proposed all-season road alignment (**Chapter 2,** Project Justification and Alternatives Considered) and contributed to the use of appropriate designs and the application of environmental protection measures for the pre-construction, construction and post-construction stages of the Project. The environmental components that contribute to the ecological and cultural resources of the area were examined individually and collectively to find the best feasible route for the all-season road; a route that will connect the communities to desired services and amenities, while respecting and preserving the ecological and cultural resources of the region.

Many potential effects of road developments can be minimized through proper design. The following measures will be incorporated into the Project design to mitigate potential adverse effects on the terrestrial environment, including VCs and Species at Risk:

- Routing of the all-season road to avoid sensitive areas (e.g., culturally important sites, wetland areas, wildlife breeding areas) to the extent feasible;

- Installation of culverts and bridges in accordance with the Manitoba Stream Crossing Guidelines (Fisheries and Oceans Canada and Manitoba Natural Resources 1996), applicable Fisheries and Oceans Canada and Transport Canada regulations, policies and guidance and appropriate engineering and hydraulic design;
- Selection of quarry and borrow areas to avoid sensitive areas (e.g., culturally important sites, wetland areas, wildlife breeding areas) to the extent feasible;
- Provision for sight lines along the all-season road to aid in the reduction of animal and vehicle collisions;
- Use of signage (e.g., moose awareness signs) to aid in the reduction of animal and vehicle collisions;
- Road design to not include areas where vehicles can pull out or park;
- Decommissioning of temporary access routes and the existing 96 km long, 12 m wide winter road between the communities of Berens River First Nation and Poplar River First Nation, which includes blocking off human access to aid in the reduction of illegal hunting activities, and allowing for the regeneration of vegetation in the winter road right-of-way to provide additional areas of vegetation and wildlife habitat;
- Limits on the size of blasting areas and on the magnitude of blast charges in the vicinity of sensitive receptors (e.g., use more holes with smaller charges);
- Use of cut and fill road design and storage of overburden to reduce the extent of excavation activities;
- Identification of Environmentally Sensitive Sites (ESS) (e.g., culturally important sites, mineral licks and wildlife breeding areas) and implementation of buffer zones at these sites;
- Use of vegetated buffer zones (e.g., between right-of-way and borrow or quarry areas); and
- Use of fall and winter clearing to aid in the reduction of potential disturbance to migratory bird and other wildlife spring and summer breeding and nesting periods.

Information on the route selection process is provided in **Chapter 2** (Project Justification and Alternatives Considered). Information on the design mitigation features and measures that were used to reduce or avoid a number of potential environmental effects are described in the Project Description (**Chapter 3, Section 3.4**) and in Environmental Protection and Sustainable Development (**Chapter 5**, **Section 5.3**).

Chapter 5 also outlines the environmental protection and management plans that will be implemented for the Project. ESRA has developed a series of Environmental Protection Specifications (e.g., General Requirements 130 [GR130]) that are distributed to contractors as part of the contract agreements for clearing and construction works. These plans and specifications will provide information on the appropriate terrestrial environment mitigation methods and environment protection measures to be used before, during and after the works. The environmental protection and management plans will incorporate applicable provincial and federal management plans for vegetation (including wetland areas and introduced species), wildlife and Species at Risk, as well as applicable provincial and federal regulations, acts and guidance. The environmental protection and management plans will include the designation of areas important to local wildlife and Species at Risk (e.g., dens, mineral licks), as well as areas important to local communities for food, medicine, cultural and spiritual purposes, as

Environmentally Sensitive Sites to be protected during the construction and operations and maintenance of the Project.

9.2.4 Effects to Vegetation

Section 9.1.2 provides a characterization of the types and distribution of the vegetation found within the project study areas based on the field and desktop studies conducted for the Project. There are potential temporary, short-term effects as well as longer term or permanent effects of Project clearing, construction and operations and maintenance activities that may affect vegetation in the Project Footprint and/or Local Assessment Area. These potential effects may include:

- Loss or alteration of vegetation in the Project Footprint due to clearing of vegetation.
- Introduction and spread of non-native and invasive species in the Project Footprint and/or Local Assessment Area during construction and operations and maintenance. Construction equipment can be a source of non-native and invasive plant species, which may compete with and potentially displace some native plant species in the area.
- Loss or impairment of vegetation in the Project Footprint from accidental releases of fuels or hazardous substances during construction and operations and maintenance.
- Loss or impairment of desirable plant species in the Project Footprint from herbicide application during construction and maintenance. Herbicides not only inhibit the growth of undesirable species, but can also negatively affect desirable species by causing undue stress and possible mortality of vegetation that may be considered important for wildlife, traditional uses, or has botanical value (Szwaluk Environmental Consulting Ltd. *et al.* 2015a).
- Increased risk of forest fire in the Local Assessment Area during construction and operations and maintenance. Wildfire has the potential to develop from the accumulation of slash during clearing and construction activities and from human related causes as a result of new access during road operation (Szwaluk Environmental Consulting Ltd. *et al.* 2015a).
- The potential beneficial effect of providing increased access to new areas of edible, medicinal and cultural plants by local community members.

The potential effects of the Project on vegetation were assessed using vegetation communities and species of special interest as VCs. The assessment of the potential effects of the Project on selected VCs is provided in the following sections.

9.2.4.1 Vegetation Communities

The vegetation communities in the Project study areas consist of a number of types of coniferous and deciduous trees, with an understory consisting of several species of shrubs, forbs, grasses, lichens and other vascular and nonvascular plants (**Appendices 9-2** and **9-3**). As noted in **Section 9.1.2**, the LCC for the area shows 11 vegetation classes that occur within the Project Footprint and the Local and Regional Assessment Areas. They are comprised mainly of bog and fen complexes and include: tall shrubs; different types of wetland areas; coniferous, broadleaf and mixed wood forests; water; and exposed land (Map 07 in Joro Consultants 2015a). The information collected during the field and desktop studies was used to characterize the vegetation communities in the Project study areas and provide an

assessment of potential effects on vegetation communities in relation to the proposed Project (**Appendices 9-2** and **9-3**).

9.2.4.2 Plants Species of Cultural Importance

As noted in **Section 9.1.2.6**, for the purpose of this environmental assessment, species of cultural importance were defined as federal Species at Risk designated by COSEWIC for listing on Schedule 1 of *SARA*, including species in the risk categories of extirpated, endangered, threatened and special concern (CEA Agency 2015a); provincial species listed as Endangered or Threatened under *MBESEA*; species listed as very rare (provincial status of S1) or rare (provincial status of S2) throughout their range as listed by the Manitoba Conservation Data Centre (MCDC 2015); and botanical resource areas and culturally important plants (see **Section 9.1.1.1**). Note that the potential socio-economic effects on species important for cultural and harvesting are discussed in **Chapter 10** (Socio-Economic and Cultural Environment).

With the exception of the flooded jellyskin (*Leptogium rivulare*), which is a lichen (i.e., a symbiotic relationship between an algae or cyanobacteria and a fungi), there are currently no vegetation Species at Risk listed in the Lac Seul Uplands Ecoregion. One species of conservation concern, the orchid arethusa, was observed in three graminoid fen sites as an incidental species. During the June 2015 vegetation surveys, 36 plant species with edible, medical, or cultural value to local communities were observed in the vegetation Local Assessment Area at 33 sampled sites (**Appendix 9-3**). These plants can be found in suitable habitats throughout the region (CIER and Poplar River First Nation 2015).

9.2.4.2.1 Construction Effects and Mitigation

The potential construction effects and mitigation for vegetation communities and plant species of cultural importance are similar; therefore, these two VCS were assessed together. The potential effects on vegetation communities or plant species of cultural importance in the Project Footprint or Local Assessment Area due to Project construction prior to the implementation of mitigation measures were identified as follows:

- Loss or alteration of vegetation in the Project Footprint due to clearing of vegetation;
- Introduction and spread of non-native and invasive species in the Project Footprint;
- Loss or impairment of vegetation in the Project Footprint from accidental releases of fuels or hazardous substances;
- Loss or impairment of desirable plant species in the Project Footprint from herbicide application; and
- Increased risk of forest fire in the Local Assessment Area.

Using the approach described in **Section 9.2**, the overall level of effect of the potential construction effects on vegetation communities or plant species of cultural importance prior to the implementation of mitigation measures was examined. **Appendix 9-9** provides a summary of the potential construction effects on vegetation communities or plant species of cultural importance prior to the implementation of mitigation measures and the determined overall level of potential effect.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effects were identified as having a low level of effect:

- Loss or impairment of vegetation in the Project Footprint from accidental releases of fuels or hazardous substances;
- Loss or impairment of desirable plant species in the Project Footprint from herbicide application; and
- Increased risk of forest fire in the Local Assessment Area.

Loss or Impairment of Vegetation in the Project Footprint from Accidental Releases of Fuels or Hazardous Substances

The accidental release of fuels or other hazardous substances can result in the loss or impairment of vegetation due to the toxicity of the substance, or that it covers the surface of the vegetation, affecting photosynthesis and causing the eventual loss of the affected plant. Mitigation measures that will be used to prevent the accidental release of fuels or other hazardous substances include the following actions:

- Creating designated equipment, crew and vehicle staging areas that will include designated areas for fuelling and storage of fuels and other hazardous substances;
- Implementing appropriate fuelling/hazardous chemical buffers between designated equipment, crew and vehicle staging and fuelling areas;
- Locating spill clean-up kits on-site during construction and regularly topping up supplies; and
- Requiring contractors to have and implement procedures and plans on the handling, storage, clean-up and disposal of deleterious substances.

The application of the above mitigation measures, along with ESRA's applicable Environmental Protection Procedures and Environmental Protection Specifications, will reduce the magnitude, frequency and likelihood of potential accidental releases of fuels or other hazardous substances that could affect vegetation communities or plant species of cultural importance. As such, no loss or impairment of vegetation communities or plant species of cultural importance is expected in the Local Assessment Area due to the accidental release of fuels or other hazardous substances.

Loss or Impairment of Vegetation Communities or Plant species of Cultural Importance in the Project Footprint from Herbicide Application

Herbicides may not only inhibit the growth of undesirable plant species, but can also negatively affect desirable species by causing undue stress and possible mortality of non-targeted plant species. Effects to non-targeted plants can be avoided with proper application techniques and the use of the correct recommended concentration of the herbicide. ESRA will mitigate the potential effect of loss or impairment of vegetation communities or plant species of cultural importance due to herbicide application by adhering to the permit terms, conditions and methods for herbicide use. As such, no loss or impairment of vegetation communities or plant species of cultural importance is expected in the Local Assessment Area due to herbicide application.

Increased Risk of Forest Fire in the Local Assessment Area

The accumulation of slash and debris during clearing and construction activities can increase the risk of forest fires. This risk can be reduced by limiting vegetation clearing to designated areas within the right-of-way; conducting clearing and construction activities during winter months to the extent feasible; and undertaking the burning of slash piles during the winter months to the extent feasible to reduce fire risk. These measures, along with ESRA's applicable Environmental Protection Procedures and Environmental Protection Specifications, will reduce the magnitude, frequency and likelihood of the potential for an increased risk of forest fire that could affect vegetation communities or plant species of cultural importance. As such, no loss or impairment of vegetation communities or plant species of cultural importance is expected in the Local Assessment Area due to an increased risk of forest fire.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effects were identified as having a moderate level of effect:

- Introduction and spread of non-native and invasive species in the Local Assessment Area during construction; and
- Loss or alteration of vegetation in the Project Footprint due to clearing of vegetation.

Introduction and Spread of Non-Native and Invasive Species in the Project Footprint During Construction

Construction equipment and granular material used for construction can be a source of non-native and invasive plant species, which may compete with and potentially displace some native plant species in the area. The measures that will be used to mitigate the potential for the introduction and spread of non-native and invasive species include:

- Cleaning construction equipment and vehicles prior to bringing them into the construction area to reduce the potential introduction of non-native or invasive species;
- Limiting vegetation clearing to designated areas within the right-of-way;
- Conducting clearing and construction activities during winter months to the extent feasible;
- Using granular materials obtained on-site or using a nearby local quarry; and
- Restoring ground cover vegetation using natural means and augmenting with planting and seeding of native plants, as required, reducing the potential for the colonization of non-native or invasive species.

These measures, along with ESRA's applicable Environmental Protection Procedures and Environmental Protection Specifications, will reduce the magnitude, frequency and likelihood of the potential for the introduction and spread of non-native and invasive species that could affect vegetation communities or plant species of cultural importance.

The potential effects of Project construction activities on vegetation communities or plant species of cultural importance and mitigation measures that will be used to prevent or minimize these potential effects are summarized in **Table 9.15**.

Loss or Alteration of Vegetation in the Project Footprint Due to Clearing of Vegetation

The quantification of areas and types of vegetation that will be affected by Project activities was calculated by overlaying the all-season road right-of-way and the location of Project quarries, borrow areas and access routes with the Land Cover Classification layer for the Project Footprint, Local and Regional Assessment Areas (**Appendix 9-2**).

Table 9.10 provides a summary of the percentage (%) of vegetation that will be removed in the Local and Regional Assessment Areas by clearing on the right-of-way.

Table 9.10: Percent (%) of Vegetation Removal in the Local and Regional Assessment Areas by Right-of-Way Clearing

Land Cover Classification	Local[1] Removal (%)	Regional[1] Removal (%)
Wetland Treed[2]	5.17	1.22
Wetland Shrub[2]	3.66	0.76
Wetland Herb[2]	2.94	0.41
Coniferous Forest Dense	6.39	1.53
Coniferous Forest Open	6.76	1.44
Coniferous Forest Sparse	5.02	1.38
Broadleaf Forest Dense	5.42	0.63
Mixedwood Forest Dense	6.63	1.42

Note: 1 The Local Assessment Area for Vegetation is 1 km of either side of the centreline of the all-season road right-of-way, and the Regional Assessment Area for vegetation is 5 km of either side of the centreline of the all-season road right-of-way (**Section 9.1.2**), which is equivalent to the Local Assessment Area for Wildlife (**Section 9.1.3**).
2 Composed predominantly of bogs/fens.

Table 9.11 provides a summary of the percentage (%) of vegetation that will be removed from Local and Regional Assessment Areas for potential quarries.

Table 9.11: Percent (%) of Vegetation Removal from Local and Regional Assessment Areas for Potential Quarries

Land Cover Classification	Local[1] Removal (%)	Regional[1] Removal (%)
Wetland Treed[2]	1.759	0.415
Wetland Shrub[2]	0.408	0.096
Wetland Herb[2]	0.043	0.006
Coniferous Forest Dense	1.842	0.497
Coniferous Forest Open	10.341	2.484
Coniferous Forest Sparse	19.994	5.931
Broadleaf Forest Dense	0.036	0.004
Mixedwood Forest Dense	1.040	0.223

Note: 1 The Local Assessment Area for Vegetation is 1 km of either side of the centreline of the all-season road right-of-way, and the Regional Assessment Area for vegetation is 5 km of either side of the centreline of the all-season road right-of-way (**Section 9.1.2**), which is equivalent to the Local Assessment Area for Wildlife (**Section 9.1.3**).
2 Composed predominantly of bogs and fens.

Table 9.12 provides a summary of the percentage (%) of vegetation that will be removed from Local and Regional Assessment Areas for potential temporary access routes.

Table 9.12: Percent (%) of Vegetation Removal from Local and Regional Assessment Areas for Potential Temporary Access Routes

Land Cover Classification	Local[1] Removal (%)	Regional[1] Removal (%)
Wetland Treed[2]	0.207	0.049
Wetland Shrub[2]	0.058	0.012
Wetland Herb[2]	0.007	0.001
Coniferous Forest Dense	0.113	0.027
Coniferous Forest Open	0.019	0.004
Coniferous Forest Sparse	0.039	0.011
Broadleaf Forest Dense	0.196	0.023
Mixedwood Forest Dense	0.033	0.007

Note: 1 The Local Assessment Area for Vegetation is 1 km of either side of the centreline of the all-season road right-of-way, and the Regional Assessment Area for vegetation is 5 km of either side of the centreline of the all-season road right-of-way (**Section 9.1.2**), which is equivalent to the Local Assessment Area for Wildlife (**Section 9.1.3**).
2 Composed predominantly of bogs/fens.

Although the all-season road will result in the loss or impairment of some areas of vegetation in the Project Footprint, there will also be areas in the Project Footprint, Local Assessment Area and Regional Assessment Area where vegetation will be reclaimed and/or be allowed to naturally regrow. This regeneration of vegetation will include the vegetated areas affected by the temporary access routes, camps and staging areas during construction activities, and the right-of-way areas adjacent to the new road surface. Upon completion of construction, the temporary access routes, camps and staging areas will be decommissioned and, where appropriate, stabilized by seeding with a mix of native plants specific to the area, or allowed to regrow with native vegetation through the natural processes of colonization and succession. Flowering plant species expected to recolonize these areas and areas within the right-of-way include native grasses, fireweed, bedstraw, yarrow, asters, goldenrods, vetch and buttercups, with species such as marsh marigold and colt's-foot in the wetter sites (Szwaluk, K., personal communication, September 10, 2015). Shrubs that are expected to regenerate in these areas include prickly rose, raspberry and wild strawberry, and tree species such as willows and poplar (Szwaluk, K., personal communication, September 10, 2015).

In addition to the above noted decommissioned and reclaimed areas, there will also be the regeneration of vegetation in the area currently occupied by the 96 km long and 12 m wide winter road (**Photograph 9-21**). Vegetation recovery for vascular plants is expected within 5 years, followed by longer periods of success for tree species (Joro Consultants 2015b). **Table 9.13** provides a summary of the types and amount of vegetation expected to regenerate in the winter road area.

Table 9.13: Amount of Vegetation that will be Re-Established in the Wildlife Local and Regional Assessment Areas due to Regeneration of Vegetation Along the Decommissioned Winter Road

Land Cover Classification	Amount of Vegetation Regeneration In the Wildlife Local Assessment Area[1]		Amount of Vegetation Regeneration In the Wildlife Regional Assessment Area[1]	
	km^2	ha	km^2	Ha
Wetland Treed[2]	0.0000	0.00	0.0202	2.02
Wetland Shrub[2]	0.1707	17.07	0.6693	66.93
Wetland Herb[2]	0.0704	7.04	0.2331	23.31
Coniferous Dense	0.0167	1.67	0.0500	5.00
Coniferous Open	0.0031	0.31	0.0122	1.22
Coniferous Sparse	0.0016	0.16	0.0028	0.28
BroadLeaf Dense	0.0096	0.96	0.0184	1.84
Mixed Wood Dense	0.0234	2.34	0.0535	5.35
Water	0.0032	0.32	0.0193	1.93
Exposed Land	0.0071	0.71	0.0328	3.28
Total	**0.3059**	**30.58**	**1.1117**	**111.16**

Note: 1 Definitions for the Local Assessment Area and Regional Assessment Area for Vegetation are provided in **Section 9.1.2** and definitions for the Local Assessment Area and Regional Assessment Area for Wildlife are provided in **Section 9.1.3.**
2 Composed predominantly of bogs/fens.

(**Source**: Joro Consultants 2015b)

Photograph 9-21: Winter Road

There are a number of mitigation measures that will be used to prevent or minimize the potential effects to vegetation communities and plant species of cultural importance in the Project Footprint due to the clearing of vegetation. These mitigation measures include:

- Routing the all-season road and selecting Project component locations that avoid important botanical resources areas to the extent feasible;

- Further assessing the two arethusas (S2) specimens found within the Project Footprint and making efforts to protect them based on site-specific conditions;
- Limiting vegetation clearing to designated areas within the right-of-way;
- Conducting clearing and construction activities during winter months to the extent feasible; and
- Restoring ground cover vegetation using natural means, augmented with planting and seeding of native plants, as required.

These measures, along with the regeneration of vegetation in the decommissioned access routes, winter road and other Project Footprint areas (e.g., quarries), will reduce the magnitude, extent and likelihood of potential effects on vegetation communities and plant species of cultural importance due to the clearing of vegetation.

There were no adverse potential effects identified in **Appendix 9-9** as having a high level of effect.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on vegetation communities and plant species of cultural importance is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to vegetation communities and plant species of cultural importance are listed in **Table 9.14**.

Table 9.14: ESRA's Protection Procedures and Specifications for Vegetation Communities and Plant Species of Cultural Importance

Environmental Protection Procedures Section (Chapter 5, Appendix 5-3)	Environmental Protection Specifications (GR130s) (Chapter 5, Appendix 5-4)
Sec. 1 Clearing and Grubbing	GR130.6 General
Sec. 2 Petroleum Storage	GR130.8 Designated Areas and Access
Sec. 3 Spill Response	GR130.9 Materials Handling, Storage and Disposal
Sec. 6 Working within or near Fish Bearing Waters	GR130.10 Spills and Remediation and Emergency Response
Sec. 7 Stream Crossings	GR130.15 Working Within or Near Water
Sec. 8 Temporary Stream Diversions	GR130.16 Erosion and Sediment Control
Sec. 11 Culvert Maintenance and Replacement	GR130.17 Clearing and Grubbing
Sec. 15 Wildfires	GR130.20 Wildfires
Sec. 16 Erosion and Sediment Control	GR130.21 Cement Batch Plant and Concrete Wash-Out Area
Sec. 17 Concrete Area Management Practices	
Sec. 18 Dust Suppression Practices	

The potential effects of Project construction activities on vegetation communities and plant species of special interest and mitigation measures that will be used to prevent or minimize these potential effects, are summarized in **Table 9.15.**

Table 9.15: Summary of Construction-Related Potential Environmental Effects on Vegetation Communities and Plant Species of Cultural Importance and Proposed Mitigation Measures

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Introduction and spread of non-native and invasive species in the Local Assessment Area due to: ▪ All-season road construction activities.	▪ Conducting clearing activities during winter months to the extent feasible. ▪ Cleaning construction equipment prior to bringing them into the construction area. ▪ Using granular materials obtained on-site or using a nearby local quarry. ▪ Restoring of ground cover vegetation using natural means, augmenting with planting and seeding of native plants, as required.	Mitigation measures will reduce the magnitude, frequency and likelihood of the potential for the introduction and spread of non-native and invasive species that could affect vegetation communities or plant species of cultural importance.	Not Significant
Loss or impairment of vegetation communities and/or plant species of cultural importance in the Project Footprint due to: ▪ Clearing of vegetation.	▪ Routing the all-season road and selecting Project component locations that avoid important areas of botanical resources to the extent feasible. ▪ Further assessing the two Arethusas (S2) specimens found within the Project Footprint and making efforts to protect them based on site-specific conditions; ▪ Limiting vegetation clearing to designated areas within the Project Footprint. ▪ Conducting clearing activities during winter months to the extent feasible. ▪ Restoration of ground cover vegetation using natural means, augmented with planting and seeding of native plants, as required.	Mitigation measures, along with the regeneration of vegetation in the decommissioned access routes, winter road and other Project Footprint areas (e.g., quarries), will reduce the magnitude, extent and likelihood of potential effects on vegetation communities and plant species of cultural importance in the Project Footprint due to clearing of vegetation.	Not Significant

Note: *See **Table 9.17** for the summary of residual Project effects and significance conclusions for vegetation communities and plant species of cultural importance.

9.2.4.2.2 Operations and Maintenance Effects and Mitigation

The potential operations and maintenance effects and mitigation for vegetation communities and species of special interest are similar; therefore, these two VCS were assessed together. The potential effects on vegetation communities or plant species of cultural importance in the Project Footprint or Local Assessment Area due to Project operations and maintenance activities prior to the implementation of mitigation measures were identified as follows:

- Introduction and spread of non-native and invasive species in the Project Footprint or Local Assessment Area;
- Loss or impairment of vegetation in the Project Footprint from accidental releases of fuels or hazardous substances;
- Loss or impairment of desirable plant species in the Project Footprint from herbicide application; and
- Increased risk of forest fire in the Local Assessment Area.

The presence of the all-season road will also have the potential beneficial effect of providing increased access to new areas of edible, medicinal and cultural plants for local community members.

Using the approach described in **Section 9.2**, the overall level of effect of the potential operations and maintenance effects on vegetation communities or plant species of cultural importance prior to the implementation of mitigation measures was examined. **Appendix 9-10** provides a summary of the potential operations and maintenance effects on vegetation communities or plant species of cultural importance prior to the implementation of mitigation measures, and the determined overall level of potential effect.

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effects were identified as having a low level of effect:

- Loss or impairment of vegetation in the Project Footprint from accidental releases of fuels or hazardous substances;
- Loss or impairment of desirable plant species in the Project Footprint from herbicide application; and
- Increased risk of forest fire in the Local Assessment Area.

Loss or Impairment of Vegetation in the Project Footprint from Accidental Releases of Fuels or Hazardous Substances

The accidental release of fuels or other hazardous substances can result in the loss or impairment of vegetation due to the toxicity of the substance, or that it covers the surface of the vegetation, affecting photosynthesis and causing the eventual loss of the affected plant. Mitigation measures that will be used to prevent the accidental release of fuels or other hazardous substances during road maintenance activities include the following actions:

- Creating designated equipment, crew and vehicle staging areas that will include designated areas for fuelling and storage of fuels and other hazardous substances;
- Implementing appropriate fuelling/hazardous chemical buffers between designated equipment, crew and vehicle staging and fuelling areas;
- Locating spill clean-up kits on-site during operations and maintenance and regularly topping up supplies; and
- Requiring contractors to have and implement procedures and plans on the handling, storage, clean-up and disposal of deleterious substances.

The application of the above mitigation measures, along with ESRA's applicable Environmental Protection Procedures and Environmental Protection Specifications, will reduce the magnitude, frequency and likelihood of the potential for accidental releases of fuels or other hazardous substances that could affect vegetation communities or plant species of cultural importance. As such, no loss or impairment of vegetation communities or plant species of cultural importance is expected in the Local Assessment Area due to the accidental release of fuels or other hazardous substances.

Loss or Impairment of Vegetation Communities or Plant species of Cultural Importance in the Project Footprint from Herbicide Application

Herbicides may not only inhibit the growth of undesirable plant species, but can also negatively affect desirable species by causing undue stress and possible mortality of non-targeted plant species. Affects to non-targeted plants can be avoided with proper application techniques and the use of the correct recommended concentration of the herbicide. ESRA will mitigate the potential effect of loss or impairment of vegetation communities or plant species of cultural importance due to herbicide application by adhering to the permit terms, conditions and methods for herbicide use. As such, no loss or impairment of vegetation communities or plant species of cultural importance is expected in the Local Assessment Area due to herbicide application.

Increased Risk of Forest Fire in the Local Assessment Area

Wildfire has the potential to occur from human-related causes as a result of new access during road operations. This risk can be reduced by limiting operation activities to designated areas within the right-of-way; conducting operation activities during winter months to the extent feasible; and providing information to contractors on fire risk. These measures, along with ESRA's applicable Environmental Protection Procedures and Environmental Protection Specifications, will reduce the magnitude, frequency and likelihood of the potential for an increased risk of forest fire that could affect vegetation communities or plant species of cultural importance. As such, no loss or impairment of vegetation communities or plant species of cultural importance is expected in the Local Assessment Area due to an increased risk of forest fire.

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effects were identified as having a moderate level of effect:

- Introduction and spread of non-native and invasive species in the Local Assessment Area during construction.

Introduction and Spread of Non-Native and Invasive Species in the in the Project Footprint or Local Assessment Area During Operations and Maintenance

Equipment and granular material used for road maintenance during operations and maintenance of the proposed all-season road can be a source of non-native and invasive plant species, which may compete with and potentially displace some native plant species in the area. The measures that will be used to mitigate the potential for the introduction and spread of non-native and invasive species include:

- Cleaning equipment and vehicles prior to bringing them into the Project area, where necessary, to reduce the potential for the introduction of non-native or invasive species;
- Limiting operations and maintenance activities to designated areas within the right-of-way; and
- Using granular materials obtained on-site or using a nearby local quarry.

These measures, along with ESRA's applicable Environmental Protection Procedures and Environmental Protection Specifications, will reduce the magnitude, frequency and likelihood of the potential for the introduction and spread of non-native and invasive species that could affect vegetation communities or plant species of cultural importance.

There were no adverse potential effects identified in **Appendix 9-10** as having a high level of effect.

During the operations and maintenance phase of the Project, there will be the potential beneficial effect of habitat gain due to decommissioning of temporary access routes and the winter road, and regeneration of vegetation in these areas. This effect will reduce the magnitude and extent of vegetation loss, alteration and/or fragmentation in the Local Assessment Area.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on vegetation communities and plant species of cultural importance is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to vegetation communities and plant species of cultural importance are listed above in **Table 9.14**.

The potential effects of Project operations and maintenance activities on vegetation communities or plant species of cultural importance and mitigation measures that will be used to prevent or minimize these potential effects are summarized in **Table 9.16**, along with a description of the residual effects remaining after mitigation, and the significance of the residual effects.

Table 9.16: Summary of Potential Operations and Maintenance -Related Environmental Effects on Vegetation Communities and Plant Species of Cultural Importance and Proposed Mitigation Measures

Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Introduction and spread of non-native and invasive species in the Local Assessment Area due to: ▪ Operations and maintenance activities.	▪ Cleaning construction equipment prior to bringing them into the construction area, where necessary, to reduce the potential for the introduction of non-native or invasive species. ▪ Using granular materials obtained on-site or using a nearby local quarry.	Mitigation measures will reduce the magnitude, frequency and likelihood of the potential for the introduction and spread of non-native and invasive species.	Not Significant

Note: *See **Table 9.17** for a summary of residual Project effects and significance conclusions for Plants Species of Special Interest.

9.2.4.2.3 Summary of Project Residual Effects and Conclusion

After the application of the mitigation measures outlined in **Table 9.15** and **Table 9.16**, there are minimal residual effects remaining for vegetation communities and plant species of cultural importance. **Table 9.17** provides a summary of the residual effects assessment for vegetation communities and plant species of cultural importance in the Local Assessment Area. With the use of appropriate mitigation measures, environmental protection procedures and protection plans, the residual effects on vegetation communities and plant species of cultural importance in the Local Assessment Area due to Project activities are expected to be not significant. A potential beneficial effect of the operations and maintenance of the all-season road is the increased access to new areas of edible, medicinal and cultural plants for local community members.

Table 9.17: Summary of Residual Project Effects and Significance Conclusions for Vegetation Communities and Plant Species of Cultural Importance

Residual Effects	Residual Effects Characteristics/Level Rating						Ecological Context	Significance Conclusion
	Direction	Duration	Magnitude	Extent	Frequency	Reversibility		
Construction Phase								
▪ Loss or impairment of vegetation communities or plants species of special interest in the Project Footprint due to clearing of vegetation.	N-	III	II	I	I	III	I	N
▪ Introduction and spread of non-native and invasive species in the Project Footprint.	N-	II	I	I	II	II	I	N
Operations and Maintenance Phase								
▪ Introduction and spread of non-native and invasive species in the Project Footprint or Local Assessment Area during operations and maintenance.	N-	III	I	II	II	II	I	N
▪ Increased access to new areas of edible, medicinal and cultural plants by local community members	P+	III	I	II	III	III	I	N
▪ Reduction of habitat loss or alteration in the Local Assessment Area.	P+	III	I	I	I	III	I	N

KEY: (see also **Chapter 6, Section 6.4** for full definitions and Level of Effect criteria for determination of Significance)

Direction:
N- Negative
P+ Positive

Duration:
Short-term = Level I
Medium-term = Level II
Long-term = Level III

Magnitude:
Negligible or Low = Level I
Moderate = Level II
High = Level III

Extent:
Project Footprint = Level I
Local Assessment Area = Level II
Regional Assessment Area = Level III

Frequency:
Once = Level I
Intermittent = Level II
Continuous = Level III

Reversibility:
Reversible (short-term) = Level I
Reversible (long-term) = Level II
Irreversible = Level III

Ecological Context:
Low = Level I (Effect results in minimal disruption of ecological functions and relationships in the area).
Moderate = Level II (Effect results in some disruption of non-critical ecological functions and relationships in the area).
High = Level III (Effect results in disruption of critical ecological functions and relationships in the impacted area).

Significance Conclusion:
S = Significant residual effect
N = No significant residual effect

9.2.5 Effects to Wildlife

The wildlife present in the Project Regional Assessment Area have adapted to the variable climatic and terrain conditions that affect the vegetation and habitat in the region through time. Forest fire is a major temporal and spatial disturbance in the all-season road Regional Assessment Area that can result in the loss, alteration and fragmentation of habitat for some species for several years or decades. Forest fires can create burn areas that are unsuitable as habitat for some wildlife species, causing them to leave these areas and seek other areas of suitable habitat (e.g. boreal woodland caribou), while creating suitable habitats for other species (e.g., moose). The occurrence, extent and intensity of forest fires in the all-season road study area is highly variable (**Section 9.1; Figure 9-1**), creating an unpredictable pattern of habitat disturbance and displacement for wildlife in the region.

There are potential temporary, short-term effects as well as longer term or permanent effects of Project clearing, construction and operations and maintenance activities that may affect wildlife in the Project Footprint and/or Local Assessment Area. These potential effects may include:

- Temporary sensory disturbance in the Project Footprint, which may cause wildlife to be temporarily displaced from existing areas of habitat use;
- Loss, alteration or fragmentation of existing habitat in the Project Footprint;
- Increased mortality in the Project Footprint due to vehicle collisions;
- Increased mortality or changes in distribution in the Local Assessment Area due to changes in hunting access;
- Increased mortality or changes in distribution in the Local Assessment Area due to changes in predation; and
- Introduction of disease/parasitism (i.e., brainworm [*P. tenius*] and liver flukes [*Fascioloides magna*] in addition to *P. tenuis* as an incidental cause of mortality in moose from white-tailed deer).

The assessment of the potential effects of the Project on selected wildlife VCs is provided in the following sections.

9.2.5.1 Moose

Moose (**Photograph 9-22**) are distributed across much of forested Canada (Banfield 1974) and are common within Manitoba's boreal forest and in the Local Assessment Area. Moose are a culturally and economically important terrestrial mammal species in Manitoba, valued for licensed hunting and consumptive purposes by both Aboriginal and non-Aboriginal people. Moose are found throughout Manitoba, particularly in forest, shrub and wetland habitats occupying much of the northern extent, and increasingly, are more common in the southern prairie region where they were previously absent. In certain areas, however, such as the western edge and southeast corner of the province, moose populations are in decline due to a number of factors, such as habitat disturbance and disease (MCWS 2015c). The home range for moose is typically 40 km^2. Moose are associated with riparian habitat, predominantly featuring willow (a key forage species), and other habitats that feature areas of aquatic

feeding, coniferous cover and mineral licks (Renecker and Schwartz 1998). Cover is critical for moose both in the winter to reduce snow depths and in the summer to provide relief from heat stress. Moose populations experience a degree of fluctuation over time as part of their natural range of variation. The natural range of variation on the east side of Lake Winnipeg represents animal population variation as a result of natural factors, natural disturbance regimes and aboriginal subsistence hunting. The historical range of conditions prior to modern human influence provides the best scientific basis for understanding landscape dynamics and conditions as a reference for biodiversity.

Moose are highly valued for rights-based subsistence and licensed hunting in GHA 17, 17B and are an integral component of the ecosystem in their predator/prey relationships (MCWS 2015c). Traditional hunting of moose occurs throughout the RAA in areas of existing access such as rivers, lakes and the existing winter road. Recreational moose hunting in GHA 17B is permitted between mid-September and mid-October. Licenced hunters are allowed one bull for general rifle, non-resident and foreign resident hunters, and again in early December for one bull moose for general rifle non-draw, resident only (MCWS 2015c). Moose populations are managed by MCWS through various regulations such as licenced season length, vehicle restrictions for licensed hunters, and road refuges, such as are found in GHAs 17-A. MCWS also consults with First Nations on moose management in areas of conservation concern. The current sustainability of moose populations in GHA 17 and 17B is not a conservation concern at this time as there have been no increased restrictions on licensed hunting. .

(**Source**: Joro Consultants 2015b)

Photograph 9-22: Moose

The Local Assessment Area for moose is defined as a 5 km buffer on either side of the proposed all-season road route (Joro Consultants 2015a). For the purposes of the environmental assessment of

potential regional effects on moose, the Regional Assessment Area for moose was defined as the boundaries of GHA17B (MCWS 2015c). Manitoba Conservation's delineation of GHA17B encompasses the area from the eastern shore of Lake Winnipeg to approximately 20 km east of the PR 304 to Berens River First Nation all-season road alignment (P1 all-season road) as well as approximately 20 km east of this proposed P4 all-season road alignment (Joro Consultants 2015a). Given moose home range size is typically 40 km^2, GHA17B (approximately 20 km^2 on either side of the linear all-season road features) offers an effective Regional Assessment Area boundary. See Map 14 in the Joro Consultants (2015a) report for the Regional Assessment Area used to model quality moose habitat.

Factors that affect moose populations in the Regional Assessment Area include licenced harvest (fall only) and traditional hunting activities on rivers and lakes as well as areas associated with the exiting winter road. Habitat change due to forest fires also contribute to the natural variability and distribution of moose in the region. Former logging areas and associated decommissioned access routes within the Regional Assessment Area are in various stages of vegetative regeneration, offering moose a selection of several seral stages for food and protective cover. Wasser *et al.* (2011) found that moose select for forage over security from predators as moose were shown to select for habitat with shrubs, areas of recent wildfires (within 40 years), areas near water and areas of less coniferous cover. Once the construction of the all-season road is underway, a phased decommissioning of the winter road is planned. As the winter road to the west of the Local Assessment Area is decommissioned, natural vegetative succession will create quality moose habitat (Joro Consultants 2015a).

Numerous baseline studies were carried out for moose from 2011-2015 within the Local Assessment Area and Regional Assessment Area (Joro Consultants 2015a). Aerial moose surveys, aerial multispecies surveys, an access density survey, as well as an extensive wolf collaring program (2013-2015) were conducted. Based on the wildlife baseline data acquired from these studies, several analyses were performed on data collected for moose including: moose distribution within the Local Assessment Area, wolf predation rates and moose habitat modelling (Joro Consultants 2015a). The results of the baseline data acquired and associated analyses were used to derive the significance of the predicted construction and operations and maintenance effects and inform the development of effective mitigation measures.

9.2.5.1.1 Construction Effects and Mitigation

The potential effects on moose in the Local Assessment Area due to Project construction prior to the implementation of mitigation measures were identified as follows:

- Loss, alteration, or fragmentation of existing habitat and temporary sensory disturbance;
- Increased mortality due to vehicle collisions;
- Increased mortality or changes in distribution due to changes in hunting access;
- Increased mortality or changes in distribution due to changes in predation; and
- Introduction of disease/parasitism (i.e., brainworm/liver fluke from white-tailed deer).

Using the approach described above in **Section 9.2**, the overall level of effect of the potential construction effects on moose prior to the implementation of mitigation measures was examined.

Appendix 9-9 provides a summary of the potential construction effects on moose prior to the implementation of mitigation measures, and the determined overall level of potential effect.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effects were identified as having a low level of effect:

- Increased mortality due to vehicle collisions;
- Increased mortality or changes in distribution due to changes in hunting access;
- Increased mortality or changes in distribution due to changes in predation; and
- Introduction of disease/parasitism (i.e., brainworm/liver flukefrom white-tailed deer).

Increased Mortality Due to Vehicle Collisions

The all-season road will be a two-lane gravel road with low traffic volumes. During construction, the all-season road corridor will be restricted to construction personnel. Information about wildlife awareness will be provided for road construction workers in order to reduce vehicle speeds. Construction equipment and vehicles will be traveling at reduced speeds, which will further minimize the risk of a wildlife collision (Jaarsma *et al.* 2006; Van Langevelde and Jaarsma 2009). Preventative design and traffic management mitigation measures will also reduce the magnitude, frequency and likelihood of increased mortality due to vehicle collisions. To date, monitoring of Project 1 (PR304 to Berens) from 2011-2014 has only identified one moose-vehicle collision (Joro Consultants 2015a). As such, no increased risk in moose mortality is expected in the Local Assessment Area due to vehicle collisions.

Increased Mortality or Changes in Distribution Due to Changes in Hunting Access

The predicted effect of increased access may be increased mortality of moose as a result of hunting activities. To reduce moose mortality due to hunting during road construction, the all-season road corridor will be restricted to construction personnel, with the possession of firearms by workers prohibited in camps and at work sites. Road access controls (**Photograph 9-23**) will be implemented during construction to limit access to reduce hunting opportunities until such time as the road is in operation. Barricades will be installed by camp entrances to restrict the use of the functioning portion of the all-season road, as it is constructed, and to discourage use of the road as a potential access trail. Mitigation measures adopted to decrease the overall amount of linear corridors within the Local Assessment Area and Regional Assessment Area will include the decommissioning of temporary access routes and the winter road. As construction proceeds, winter roads, temporary access routes and trails no longer required will be blocked off to limit access. As such, no increased risk to moose mortality or distribution is expected in the Local Assessment Area during construction due to increased hunting access.

Photograph 9-23: Barricades and Signage Installed in the P1-All-Season Road Corridor During the Construction Phase to Discourage hunters

Increased Mortality or Changes in Distribution Due to Changes in Predation

Some literature has suggested that wolves move along constructed linear corridors such as roads (Kunkel and Pletscher 2000; Stein 2000). An increase in linear features, such as the proposed all-season road, may therefore allow predators (wolves) to access new areas which may affect existing predator-prey dynamics. Wolf collaring and telemetry studies conducted within the P4 Project's Local Assessment Area and Regional Assessment Area from 2013-2015 have shown that wolves are using anthropogenic (i.e., constructed) linear features far less than they are using the natural linear features available to them (**Table 9.18**; Joro Consultants 2015a). Wolf kill sites in the Regional Assessment Area are not correlated with anthropogenic linear features and monitoring activities conducted to date have not identified a significant change in wolf predation on moose over time (Joro Consultants 2015a).

Table 9.18: Collared Wolf Travel Distances on Natural and Anthropogenic Linear Features within the Regional Assessment Area

Wolf Paths	Distance Travelled (km)	Distance Travelled on Anthropogenic Linear Features (km)	% of Total Length Travelled on Anthropogenic Linear Features	Distance Travelled on Natural Features (km)	% of Total Length Travelled on Natural Linear Features
2013	1,3124	256.29	1.95%	1,358.16	10.35%
2014	3,7547	423.5	1.13%	3,893.54	10.37%

Source: Joro Consultants 2015a (**Appendix 9-1**)

Based on these findings, wolves are not expected to utilize the right-of-way during construction due to construction disturbance and wolves' natural human avoidance tendencies. In addition, preliminary results of ongoing monitoring on wolves in the Regional Assessment Area indicate very low use and no association of moose predation near all-season roads (Joro Consultants 2015a). As such, no increased risk in moose mortality or distribution is expected in the Local Assessment Area due to changes in predation.

Introduction of Disease/Parasitism (Brainworm/Liver Fluke)

Parelaphostrongylus tenuis meningeal worm, also known as "brainworm", is a parasitic nematode of the central nervous system, whose natural host is white-tailed deer (*Odocoileus virginianus*) (Wasel et al. 2003; Kopcha et al. 2012). *P. tenuis* within white-tailed deer host characteristically completes its life cycle without causing associated significant adverse health effects in the host (Kopcha et al. 2012). However, *P. tenuis* occurrence in other ungulates such as moose, elk and caribou, causes serious physical deterioration and eventual death of the host. A Minnesota Study looking at primary parasites of white-tailed deer identified liver flukes (*Fascioloides magna*) in addition to *P. tenuis* as an incidental cause of mortality in moose (Joro Consultants 2015b).

White-tailed deer use road right-of-ways to feed, especially when the available forage is more abundant or of better quality than in adjacent landscapes. Right-of-ways have the potential to provide white-tailed deer with good forage opportunities, given that much of their diet consists of browse, grasses, forbs, mast and succulents, many of which grow in right-of-way edge habitats (Joro Consultants 2015a). Only one white-tailed deer was identified in Local Assessment Area during baseline studies conducted from 2011-2015 (Joro Consultants 2015a). Local communities have not reported recent sightings of white-tailed deer. Therefore, although white-tailed deer may be present in the Local Assessment Area, their numbers are likely very low, as their range is generally limited to south of the Bloodvein River due to harsh winter conditions and limited food supply (MCWS 2012b). The brainworm/liver fluke host, the white-tailed deer, is not anticipated to persist at densities capable of transmitting this parasite in the Project area during construction; therefore, no effects on moose are expected due to the introduction of disease/parasitism (Joro Consultants 2015a).

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effects were identified as having a moderate level of effect:

- Habitat loss/alteration/fragmentation; and
- Temporary sensory disturbance.

Habitat Loss/Alteration/Fragmentation and Temporary Sensory Disturbance

Moose often select habitats of early successional vegetation such as shrubland areas and deciduous forests (Gillingham and Parker 2008). Such successional vegetation often exists after disturbance, both natural (i.e., wildfire) and anthropogenic (i.e., forest removal) (Stewart *et al.* 2010). Linear features may result in both direct and indirect disturbance effects on ungulate populations. Of the available studies,

several show that moose searching for forage may take them near roadways and trails (Gillingham and Parker 2008; Laurian *et al.* 2012). When the right-of-way contains a large quantity of shrub and deciduous vegetation, forage availability is increased, and therefore the carrying capacity of these right-of-ways as quality moose habitat is increased (Ballard *et al.* 1988). Roads and areas along the roads may offer some benefits to moose given roads can create highly desirable resources or microhabitats that are otherwise rare (Laurian *et al.* 2008).

Moose will experience habitat disturbance/alteration and potential fragmentation as a result of Project construction. Moose habitat modelling, using the Land Classification Model, was undertaken to model both winter and summer potential moose habitat utilizing mixed woods, broadleaf and shrub stands less than 10 years of age (Joro Consultants 2015a). Potential summer moose habitat within the Local Assessment Area was determined to be 176.83 km^2 with 2.16 km^2 of habitat lost due to the Project Footprint (1.22%). During winter, potential moose habitat was determined to be 393.44 km^2 of habitat within the Local Assessment Area with 5.57 km^2 of habitat lost due to the Project Footprint (1.42%). Habitat for moose is not limiting within the Local Assessment Area and Regional Assessment Area (Joro Consultants 2015a). During the operations and maintenance phase of the Project, moose will experience habitat gain due to decommissioning and regeneration of temporary access routes and winter road vegetation. This habitat gain will reduce the magnitude and extent of habitat disturbance, alteration, or fragmentation in the Local Assessment Area. The amount of moose habitat lost as a result of the Project is a very small percentage of the overall moose habitat available.

Although moose have been extensively studied, little research has focused on fragmentation and the habitat or landscape thresholds in the management of the species. Salmo *et al.* (2004) recommended that access density and stream crossing indices be used as land-use indicators and that core areas and patch/corridor size be used as habitat indicators when conducting cumulative effects assessments. Salmo *et al.* (2004) compiled a table of management indicators and guidelines for moose based on studies across Canada. In summary, the authors identified a target threshold for linear disturbance on a landscape scale at 0.4 km/km^2 and a critical threshold of 0.9 km/km^2. Analyses were conducted to determine the linear density within the Local Assessment Area and the Regional Assessment Area (**Table 9.19**), and were identified to be 0.13 km^2 and 0.15 km^2 respectively (M. Forster Enterprises 2015). The linear densities within the Local Assessment Area and Regional Assessment Area are well below the published Salmo *et al.* (2004) thresholds.

Table 9.19: Linear Density within the P4 Local Assessment Area and Regional Assessment Area

Area	Linear Feature Length (km)	Area (km^2)	Linear Density (km/km^2)
Local Assessment Area	122.70	937.70	0.13
Regional Assessment Area	1,080.34	7,022.00	0.15

Mitigation measures adopted to reduce habitat disturbance/alteration and fragmentation include design measures such as all-season road routing to avoid areas of high quality habitat where feasible and riparian vegetation clearing within the right-of-way limited to the removal of trees and tall shrubs (to maintain line of sight safety requirements) with no removal of low growing vegetation beyond the road ditch. Mineral licks that are identified will be included in ESRA's Environmental Protection Plans (Environmental Protection Procedures) as Environmentally Sensitive Sites. Existing access routes, trails, or cut lines will be used to the least extent feasible and access routes and trails will be kept as short and narrow as possible. The existing winter road, and temporary access routes and trails (as soon as feasible), will be decommissioned to allow the regeneration of vegetation.

Temporary sensory disturbance within the Local Assessment Area as a result of construction activities is a potential effect on moose. Within the Local Assessment Area and Regional Assessment Area there are no known publicized forestry, mining, or oil and gas activities occurring or planned in the future. To mitigate the temporary sensory disturbance to moose during road construction, activities will be localized to construction work areas within the Project Footprint and road clearing will occur during fall and winter to the extent feasible and avoid parturition (birthing) times for moose. If required, staged construction will be used to stop/delay construction activities in sensitive areas until animal use of the area and/or sensitive time period has passed.

There were no adverse potential effects identified in **Appendix 9-9** as having a high level of effect.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on moose is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to ungulates (including moose and boreal woodland caribou [**Section 9.2.5.2**]) are listed in **Table 9.20**.

Table 9.20: ESRA's Protection Procedures and Specifications for Ungulates

Environmental Protection Procedures Section (Chapter 5, Appendix 5-3)	Environmental Protection Specifications (GR130s) (Chapter 5, Appendix 5-4)
Sec. 1 Clearing and Grubbing	GR130.6 General
Sec. 2 Petroleum Storage	GR130.8 Designated Areas and Access
Sec. 3 Spill Response	GR130.9 Materials Handling, Storage and Disposal
Sec. 5 Materials Handling and Storage	GR130.10 Spills and Remediation and Emergency Response
Sec. 14 Wildlife	GR130.17 Clearing and Grubbing
Sec. 17 Concrete Area Management Practices	GR130.19 Wildlife
Sec. 18 Dust Suppression Practices	GR130.21 Cement Batch Plant and Concrete Wash-Out Area

The potential effects of Project operations and maintenance activities on moose and mitigation measures that will be used to prevent or minimize these potential effects are summarized in **Table 9.21**, along with a description of the residual effects remaining after mitigation and the significance of the residual effects.

Table 9.21: Summary of Potential Construction-Related Environmental Effects on Moose and Proposed Mitigation Measures

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat disturbance, alteration or fragmentation due to the following construction activities: ▪ Clearing of vegetation in the right-of-way. ▪ Road construction and installation of bridges and culverts. ▪ Set up and use of equipment, crews, temporary staging areas, temporary work camps. ▪ Setup and use of borrow and quarry areas. ▪ Development of temporary access routes and trails.	▪ Applying design mitigation measures (**Section 9.2**). ▪ Routing all-season road to avoid areas of high quality habitat where feasible. ▪ Limiting riparian vegetation clearing within the right-of-way to the removal of trees and tall shrubs (to maintain line of sight safety requirements). ▪ Timing road clearing to occur during fall and winter to the extent feasible to avoid parturition times for moose. ▪ Maintaining existing water flow patterns, levels and wetland hydrologic regimes. ▪ Staging construction as required (i.e., stop and delay construction activities in sensitive areas until animal use of the area and/or sensitive time period has passed). ▪ Using existing access routes, trails, or cut lines to the extent feasible and access routes and trails will be kept as short and narrow as feasible. ▪ Decommissioning the existing winter road to allow the regeneration of vegetation. ▪ Decommissioning temporary access routes and trails as soon as feasible to allow the regeneration of vegetation. ▪ Decommissioning winter roads, temporary access routes and trails to block off/limit human access. ▪ Identifying mineral licks and including them in Environmental Protection Procedures as Environmentally Sensitive Sites.	Moose habitat is not limiting in the Local and Regional Assessment Areas; loss, alteration or fragmentation of habitat is a very small portion of available habitat.	Not Significant

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Temporary sensory disturbance due to the following construction activities: ▪ Blasting activities. ▪ Clearing of vegetation in the right-of-way. ▪ Road construction and installation of bridges and culverts. ▪ Set up and use of equipment, crews, temporary staging areas, temporary work camps. ▪ Setup and use of borrow and quarry areas. ▪ Development of temporary access routes and trails.	▪ Routing all-season road to avoid areas of high quality habitat where feasible. ▪ Limiting construction to work areas within the Project Footprint and Local Assessment Area (quarries). ▪ Clearing during fall and winter to the extent feasible to avoid parturition times for moose. ▪ Applying dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures. ▪ Staging construction, i.e., stop and delay construction activities in sensitive areas until animal use of the area and/or sensitive time period has passed. ▪ Using existing access routes, trails, or cut lines to the extent feasible and access routes and trails will be kept as short and narrow as feasible.	Mitigation measures will reduce the magnitude, extent, frequency and likelihood of temporary sensory disturbance to moose during construction. Effect is reversible on cessation of activities.	Not Significant

Note: *See **Table 9.23** for the summary of residual Project effects and significance conclusions for moose.

9.2.5.1.2 Operations and Maintenance Effects and Mitigation

The potential effects on moose in the Local Assessment Area due to Project operations and maintenance activities prior to the implementation of mitigation measures were identified as follows:

- Temporary sensory disturbance;
- Increased mortality due to vehicle collisions;
- Increased mortality or changes in distribution due to changes in hunting access;
- Increased mortality or changes in distribution due to changes in predation; and
- Introduction of disease/parasitism (i.e., brainworm/liver fluke from white-tailed deer).

Using the approach described in **Section 9.2**, the overall level of effect of the potential operations and maintenance effects on moose prior to the implementation of mitigation measures was examined. **Appendix 9-10** provides a summary of the potential operations and maintenance effects on moose prior to the implementation of mitigation measures and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effects were identified as having a low level of effect:

- Increased mortality due to vehicle collisions;
- Increased mortality or changes in distribution due to changes in hunting access;
- Increased mortality or changes in distribution due to changes in predation; and
- Introduction of disease/parasitism (i.e., brainworm/liver fluke from white-tailed deer).

Increased Mortality Due to Vehicle Collisions

Increased mortality due to vehicle collisions is a potential effect due to increased traffic during operations and maintenance activities, and use of the road by local communities and visitors to the communities and region (hunters, fishers, trappers, transport of goods and materials). Operations and maintenance activities will be localized within the Project Footprint. Road, bridge and culvert maintenance activities will be timed to occur during late fall and winter to the extent feasible to avoid parturition times for moose. The road will be designed to optimize line of site with the noise, light and dust suppression techniques applied per ESRA's GR130s and Environmental Protection Procedures. Moose crossing and/or speed reduction signs will be installed where necessary to reduce the potential of wildlife-vehicle collisions. Monitoring in the P1 all-season road project area from 2011 to 2015 recorded only one moose-vehicle collision that occurred on the Rice River Road in February 2012 (Joro Consultants 2015a). Monitoring of moose populations in areas of the P4 Local and Regional Assessment Areas was conducted from 2011 to 2015. ESRA will continue research and monitoring during construction so that environmental protection and mitigation measures perform as intended, and to identify where adaptive management is required. These activities will be used to inform the nature of a post-construction monitoring program and will be reviewed with the Province and interested stakeholders in the Local Assessment Area. As such, no increased risk in moose mortality is expected in the Local Assessment Area due to vehicle collisions.

Increased Mortality or Changes in Distribution Due to Increased Hunting Access

The predicted effect of increased mortality due to improved access by local communities and visitors to the communities and region (hunters, fishers, trappers, transport of goods and materials) may result in wildlife avoidance of heavily used areas and the potential increased mortality of moose as a result of hunting activities. It is expected that existing traditional hunting in areas associated with the winter road will shift to areas adjacent to the ASR. To mitigate access-related effects of harvest and predation, temporary access trails will be decommissioned. Road access control will be developed during construction and continued through the operations and maintenance phase to limit access to reduce hunting opportunities.

The application of existing provincial moose population management actions (e.g., hunting seasons, bag limits and vehicle use regulations) and cooperative efforts with local communities and regional moose management committees will be undertaken. Access management, road refuges (e.g. the establishment of a Wildlife Refuge buffer zone along the all-season road right-of-way), and provincial harvest management strategies that regulate hunting will play an important role in monitoring changes in moose population numbers and status. Mitigation measures adopted to decrease the overall amount of linear corridors within the Local and Regional Assessment Areas will include the decommissioning of temporary access routes and the winter road. As such, no increased risk in moose mortality or distribution is expected in the Local Assessment Area due to increased hunting access during operations and maintenance.

Increased Mortality or Changes in Distribution Due to Changes in Predation

Linear corridors, such as the proposed all-season road, may result in increased moose mortality due to increased predation by increasing wolf travel speed, influencing their interactions with prey species, their distribution and their travel routes. Based on wolf collaring and telemetry studies conducted within the Local and Regional Assessment Areas from 2013-2015, wolves are using anthropogenic features far less than they are using natural linear features (Joro Consultants 2015a). To date, wolf kill sites are not correlated with anthropogenic linear features and monitoring activities have not identified a significant change in wolf predation on moose (Joro Consultants 2015a). Given the areas adjacent to or beyond the road surface will not be altered during the spring, summer or fall, access for wolves will not become easier or more available. Monitoring of the wolf and moose populations in the Local and Regional Assessment Areas has been conducted from 2013 to 2015. ESRA will continue research and monitoring during construction so that environmental protection and mitigation measures perform as intended and to identify where adaptive management is required. These activities will be used to inform the nature of a post-construction monitoring program and will be reviewed with the Province and interested stakeholders in the Local Assessment Area. As such, no increased risk in moose mortality or distribution is expected in the Local Assessment Area due to changes in predation.

Introduction of Disease/Parasitism (Brainworm/Liver fluke)

Only one white-tailed deer has been identified in the Local Assessment Area during baseline studies conducted from 2011-2015 (Joro Consultants 2015a). Local communities have not reported recent sightings of white-tailed deer. Therefore, although white-tailed deer may be present in the Local

Assessment Area, there numbers are likely low and their range generally limited to south of the Bloodvein River due to harsh winter conditions and limited food supply (MCWS 2012b). As required, MCWS will apply existing provincial deer population management actions. The brainworm/liver fluke host, the white-tailed deer, is not anticipated to persist at densities capable of transmitting this parasite in the Project area during operations; therefore, no effects on moose are expected due to the introduction of disease/parasitism (Joro Consultants 2015a).

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effects were identified as having a moderate level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Sensory disturbance within the Local Assessment Area as a result of operations and maintenance activities is a potential effect on moose. These sensory disturbances include operations and maintenance activities (e.g. snow clearing, grading and addition of aggregate as required), right-of-way vegetation management, bridge and culvert maintenance activities (e.g., debris removal, structural repairs) and the use of the road by local communities and visitors to the communities and region (hunters, fishers, trappers, transport of goods and materials).

Within the Local and Regional Assessment Areas there are no known publicized forestry, mining, or oil and gas activities occurring or planned to occur in the future. To mitigate the sensory disturbance on moose, activities will be localized to operations and maintenance work areas within the Project Footprint. Road, bridge and culvert maintenance activities will be timed to occur during fall and winter to the extent feasible to avoid parturition times for moose. The dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures will also be applied. The all-season road will be a two-lane gravel road with low traffic volumes and designed with no pull outs or parking areas.

There were no adverse potential effects identified in **Appendix 9-10** as having a high level of effect.

During the operations and maintenance phase of the Project, there will be the potential beneficial effect of habitat gain due to decommissioning of temporary access routes and the winter road, and regeneration of vegetation in these areas. This effect will reduce the magnitude and extent of habitat loss, alteration, or fragmentation in the Local Assessment Area.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on moose is provided in **Chapter 5.**

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to ungulates (including moose and boreal woodland caribou [**Section 9.2.5.2**]) are listed in **Table 9.20**. A summary of the

potential effects of Project operations and maintenance on moose and the mitigation measures that will be used to prevent or minimize these effects are provided in **Table 9.22**.

Table 9.22: Summary of Potential Operations and Maintenance Related Environmental Effects on Moose and Proposed Mitigation Measures

Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat gain due to: ▪ Decommissioning and regeneration of vegetation of temporary access routes and winter road.	▪ Not required.	Reduction of the magnitude and extent of habitat disturbance, alteration or fragmentation in the Local Assessment Area.	Not Significant
Localized areas of temporary sensory disturbance due to: ▪ Road maintenance activities: snow clearing, grading and addition of aggregate as required, right-of-way vegetation management. ▪ Bridge and culvert maintenance activities: debris removal, structural repairs. ▪ Use of road by local communities and visitors to the communities and region (hunters, fishers, trappers, transport of goods and materials).	▪ Localized to operations and maintenance work areas within the Project Footprint. ▪ Road, bridge and culvert maintenance activities will be timed to occur during fall and winter to the extent feasible to avoid parturition times for moose. ▪ The all-season road will be a two-lane gravel road with low traffic volumes. ▪ Moose crossing and/or speed reduction signs will be installed where necessary to reduce the potential of wildlife-vehicle collisions. ▪ Road designed to optimize line of sight. ▪ Road designed with no pull outs or parking areas.	Mitigation measures will reduce the magnitude, extent, frequency and likelihood of temporary sensory disturbance to moose during operations and maintenance. Effect is reversible on cessation of activities.	Not Significant

Note: *See **Table 9.23** for the summary of residual Project effects and significance conclusions for moose.

9.2.5.1.3 Summary of Project Residual Effects and Conclusion

The residual effects remaining after mitigation for moose during the construction phase of the Project are identified as:

- Loss, alteration or fragmentation of habitat; and
- Temporary sensory disturbance.

The residual effects remaining after mitigation for moose during the operations and maintenance phase of the Project are identified as:

- Temporary sensory disturbance.

Moose are an important species to the province and region. The Province of Manitoba has a number of management activities in place for moose, including harvest seasons, harvest limits, vehicle restrictions and in some cases areas closed to moose harvest. The Province of Manitoba has been working with local communities located on the east side of Lake Winnipeg regarding moose management strategies and have engaged in discussions with these communities regarding the possibility of a wildlife refuge on either side of the road.

Habitat loss and alteration associated with construction constitutes a very small portion of the overall available moose habitat within the Local Assessment Area (Joro Consultants 2015a). Habitat for moose is not limiting within the Local Assessment Area and Regional Assessment Area (Joro Consultants 2015a). The linear density within the Local Assessment Area is well below the documented linear density thresholds for moose (Joro Consultants 2015a). The winter road, temporary access routes and trails will be decommissioned, resulting in vegetation succession and additional habitat for moose.

Temporary sensory disturbance associated with the all-season road will be localized to construction work areas within the Project Footprint and road clearing will occur during fall and winter to the extent feasible to avoid parturition times for moose. Staged construction will be used to stop/delay construction activities in sensitive areas until animal use of the area and/or sensitive time period has passed.

Given the nature of the landscape adjacent to the all-season road, limited access beyond the actual road surface during spring, summer and fall is likely (wetlands/bogs are not good for walking or the use of ATVs); therefore, little change in access is anticipated during these seasons. Since the winter road has already existed on the landscape and moose within the Local Assessment Area have co-existed with the winter road, little change in human access during winter from previous winters is anticipated. To further mitigate potential human access off of the all-season road, no car pull-outs or parking areas will be available.

Manitoba Conservation is responsible for enforcing regulations that protect wildlife populations. Natural Resource Officers are currently deployed to the Project area from the Eastern Regional office located in Lac Du Bonnet.

Monitoring of moose populations in areas of the Local Assessment Area and Regional Assessment Area was conducted from 2011 to 2015. ESRA will continue its research and monitoring during construction to so that environmental protection and mitigation measures perform as intended and to identify where adaptive management is required. These activities will be used to inform the nature of a post-construction monitoring program and will be reviewed with the Province of Manitoba and interested stakeholders such as communities in the Local Assessment Area.

Table 9.23 provides a summary of the residual effects assessment for moose. With the use of appropriate mitigation measures, MCWS resource management, environmental protection measures and environmental protection plans, the residual effects on moose due to the Project are expected to be not significant.

Table 9.23: Summary of Residual Project Effects and Significance Conclusions for Moose

Residual Effects	Residual Effects Characteristics/Level Rating						Ecological Context	Significance Conclusion
	Direction	Duration	Magnitude	Extent	Frequency	Reversibility		
Construction Phase								
▪ Loss, alteration or fragmentation of moose summer and winter habitat.	N-	I	II	I	I	III	I	N
▪ Temporary sensory disturbance.	N-	I	II	I	II	I	I	N
Operations and Maintenance Phase								
▪ Reduction of habitat loss or alteration in the Local Assessment Area.	P+	III	I	I	I	III	I	N
▪ Temporary sensory disturbance.	N-	III	II	I	II	I	I	N

KEY: (see also **Chapter 6, Section 6.4** for full definitions and Level of Effect criteria for determination of Significance)

Direction:
N- Negative
P+ Positive

Duration:
Short-term = Level I
Medium-term = Level II
Long-term = Level III

Magnitude:
Negligible or Low = Level I
Moderate = Level II
High = Level III

Extent:
Project Footprint = Level I
Local Assessment Area = Level II
Regional Assessment Area = Level III

Frequency:
Once = Level I
Intermittent = Level II
Continuous = Level III

Reversibility:
Reversible (short-term) = Level I
Reversible (long-term) = Level II
Irreversible = Level III

Ecological Context:
Low = Level I (Effect results in minimal disruption of ecological functions and relationships in the area).
Moderate = Level II (Effect results in some disruption of non-critical ecological functions and relationships in the area).
High = Level III (Effect results in disruption of critical ecological functions and relationships in the impacted area).

Significance Conclusion:
S = Significant residual effect
N = No significant residual effect

9.2.5.2 Boreal Woodland Caribou

Boreal woodland caribou (**Photograph 9-24**) are listed as Threatened under the *Manitoba Endangered Species and Ecosystems Act* and listed as Threatened on Schedule 1 of *SARA* (COSEWIC 2002). The Manitoba Boreal Woodland Advisory Committee (MBWCAC) identifies the RAA within the Atikaki-Berens Management Unit which is comprised of the Berens, Atiko, and Bloodvein caribou ranges. Only the Berens range overlaps with the P4 LPSA. The current Conservation Status Assessment for the Atikaki-Berens Management Unit indicates the population size (acceptable), population trend (under review), natural disturbance (high), anthropogenic disturbance (moderate), and planned development (moderate) ((MBWCAC 2015).

This species has been monitored extensively for over 15 years within the RPSA through various collaring programs conducted as part of land and wildlife management activities. The results of past and current monitoring have provided valuable information data that have informed the delineation of current range and Management Unit as defined by the Manitoba Boreal Woodland Caribou Management Committee (MBWCMC 2015). Historic and current data from these extensive collaring programs has provided increased knowledge and confidence regarding range occupation, movement patterns, core use areas (winter and summer), and other important areas (calving habitat) in the region. The Atikaki-Berens Management Unit includes the Local Assessment Area as well as the majority of the Regional Assessment area. Of the three boreal woodland caribou ranges found in this Management Unit, the Berens range encompasses the Local Assessment Area (MCWS 2011). In the Manitoba Recovery Strategy (Manitoba Boreal Woodland Caribou Management Committee 2014) the population size for the Atikaki-Berens Management Unit is ranked as acceptable, with the population trend under review. The Atikaki-Berens Management Unit has been identified as medium risk (Manitoba Boreal Woodland Caribou Management Committee 2014).

Boreal woodland caribou are a medium-sized ungulate with distinctive characteristics such as large crescent-shaped hooves, providing caribou the ability to walk in snow-covered landscapes and soft peat lands, as well as dig through snow to forage for lichens during the winter. Both male and female boreal woodland caribou have antlers during part of the year. Boreal woodland caribou prefer large, continuous tracts of undisturbed habitat with inherently low ecological diversity and low predator densities during critical calving and rearing periods (Environment Canada 2012).

(**Source**: Joro Consultants 2015b)

Photograph 9-24: Boreal Woodland Caribou

Boreal woodland caribou generally inhabit mature to old growth boreal coniferous forests with an ample supply of lichen in the winter as well as peatlands (Environment Canada 2012). In these areas, succulent biomass associated with young regenerating forests is limited, resulting in low prey densities across the larger landscape. Terrestrial and arboreal lichen are found in abundance within mature coniferous habitats. Lichens are considered to be the primary forage for boreal woodland caribou during the winter. Lichen is a late successional flora that requires long periods of time, an estimated 50 to 100 years, to return to the original community type following fire disturbance. Given that lichen is an important food source for boreal woodland caribou in the winter, burned habitat is associated with boreal woodland caribou dispersing to search for forage elsewhere. Boreal woodland caribou are not found in large numbers, nor are they evenly distributed across boreal landscapes. They occur at very low densities across boreal landscapes, congregate during winter in traditional wintering areas and disperse during the spring, exhibiting solitary behaviour during the calving and calf-rearing season, which is thought to be a predator avoidance strategy.

Studies conducted across boreal woodland caribou ranges in Canada have examined distance between annual individual calving sites to assess calving fidelity at different scales. Boreal woodland caribou show seasonal fidelity at the landscape scale (return to the same general area); however, at the site scale, boreal woodland caribou generally illustrate variability in calving site selection with average distances between successive annual calving sites being typically greater than 10 kms (Berglund *et al.* 2014; Rettie and Messier 2001; Schaefer *et al.* 2000). Results of calving site fidelity analyses conducted indicate that female caribou typically do not return to the site to calve, with annual variation of calving site selection between – and 8 kilometers (Joro Consultants 2015a). Boreal woodland caribou also use predator avoidance strategies that

include spacing away from each other to reduce potential interactions with predators (Bergerud *et al.* 1990).

Boreal woodland caribou were traditionally hunted by some communities on the east side, but use of this species as a food source has declined or ceased as the communities have become aware of its status. Licenced hunting of boreal woodland caribou is not permitted in Manitoba (MCWS 2015c).

Boreal woodland caribou baseline data acquisition has been undertaken within the Local Assessment Area and Regional Assessment Area from 2011-2015 (Joro Consultants 2015a). Boreal woodland caribou telemetry collaring, recruitment surveys, group counts, as well as calving site assessment and mortality investigations have been undertaken. Based on the boreal woodland caribou baseline data acquired from these studies, several analyses were performed on boreal woodland caribou data including: caribou distribution within the Local Assessment Area and Regional Assessment Area; Project intersection of caribou core use areas; calving habitat assessment; pregnancy testing; range fragmentation; survival and rates of increase analysis; and cumulative effects assessment (Joro Consultants 2015a).

Boreal woodland caribou have evolved within the boreal forest with fire as driver of disturbance and a part of caribou natural variability in the region (Joro Consultants 2015a). A fire history analysis conducted within the Atikaki-Berens Management Unit suggests a major burn cycle occurs at 40 year intervals with approximately 2,700-2,800 km^2 (12-13% of total area) being lost to fire each major burn cycle (Joro Consultants 2015a). Habitat management toward old growth (fire suppression) forms part of the current Recovery Strategy and pending Action Plan for the Atikaki-Berens Management Unit (Manitoba Boreal Woodland Caribou Management Committee 2014).

The results of the baseline data studies (**Appendix 9-1**; Joro Consultants 2015a) are summarized as follows:

- Boreal woodland caribou generally move east to west across the future all-season road between wintering and summering core use areas. This finding was supported by Traditional Knowledge.
- Boreal woodland caribou are currently moving across the existing winter road and sub-transmission line. This finding was supported by Traditional Knowledge.
- Neither the existing winter road or transmission line appears to be preventing access or movements, or separating individuals/populations.
- Calving complexes are located within and around the Local Assessment Area, but demonstrated calving site fidelity and available calving habitat suggests these sites are not limiting. The majority of quality calving complex habitat in the vicinity of the Project is between the eastern shore of Lake Winnipeg and west of the western boundary of the Local Assessment Area.
- Winter core use tends to be more prominent in the northern portion of the Local Assessment Area.
- Summer core use tends to be more prominent in the southern portion of the Local Assessment Area.

Details regarding the methods and results of the baseline data research and GPS collaring activities are found in the Joro Consultants (2015a) report. In addition to the above noted findings, no boreal woodland

caribou-vehicle collisions have been reported in the Regional Assessment Area in relation to winter or all-season roads.

The findings of previous studies on linear developments, the monitoring results for the P1 all-season road and the baseline data studies for the Project were used to assess the significance of the predicted construction and operations and maintenance effects and identify effective mitigation measures.

9.2.5.2.1 Construction Effects and Mitigation

The potential effects on boreal woodland caribou in the Local Assessment Area due to Project construction prior to the implementation of mitigation measures were identified as follows:

- Loss, alteration or fragmentation of existing habitat and temporary sensory disturbance;
- Increased mortality due to vehicle collisions;
- Increased mortality or changes in distribution due to changes in hunting access;
- Increased mortality or changes in distribution due to changes in predation; and
- Introduction of disease/parasitism (i.e., brainworm/liver fluke from white-tailed deer).

Using the approach described above in **Section 9.2**, the overall level of effect of the potential construction effects on boreal woodland caribou prior to the implementation of mitigation measures was examined. **Appendix 9-9** provides a summary of the potential construction effects on boreal woodland caribou prior to the implementation of mitigation measures, and the determined level of the potential effect.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effects were identified as having a low level of effect:

- Increased mortality due to vehicle collisions;
- Increased mortality or changes in distribution due to changes in hunting access;
- Increased mortality or changes in distribution due to changes in predation; and
- Introduction of disease/parasitism (i.e., brainworm/liver fluke from white-tailed deer).

Increased Mortality Due to Vehicle Collisions

The P4 all-season road corridor will be restricted to construction personnel and construction vehicles will be traveling at slow speeds. Information about wildlife awareness will be provided for road construction workers to reduce vehicle speeds and therefore the risk of wildlife-vehicle collisions. Preventative design and traffic management mitigation measures will reduce the magnitude, frequency and likelihood of increased mortality due to vehicle collisions. No boreal woodland caribou-vehicle collisions have been reported in the Regional Assessment Area in relation to winter or all-season roads. As such, no increased risk in boreal woodland caribou mortality is expected in the Local Assessment Area due to vehicle collisions.

Increased Mortality or Changes in Distribution Due to Changes in Hunting Access

The predicted effect of increased hunting access has the potential risk of increased mortality of boreal woodland caribou as a result of poaching activities. Licenced boreal woodland caribou hunting is not currently permitted in Manitoba. As construction proceeds, winter roads, temporary access routes and trails no longer required will be blocked off to limit access. The all-season road corridor will be restricted to construction personnel, with the possession of firearms by workers prohibited in camps and at work sites to reduce potential caribou mortality due to poaching during road construction. Road access control will be developed during construction to limit access and to reduce poaching opportunities. Barricades will be installed by camp entrances to restrict the use of the functioning portion of the all-season road, as it is constructed, and to discourage use of the road as a potential access trail. As such, no increased risk in boreal woodland caribou mortality or distribution is expected in the Local Assessment Area due to increased hunting access.

Increased Mortality or Changes in Distribution Due to Changes in Predation

Some literature has suggested that wolves may move along linear corridors (Kunkel and Pletscher 2000; Stein 2000), such as a road. The concern is that an increase in linear features such as the road may allow predators such as wolves to access new areas and may affect existing predator-prey dynamics. Due to construction disturbance and wolves' natural human avoidance tendencies, wolves are not expected to utilize the right-of-way during construction. In addition, preliminary results of ongoing monitoring on wolves in the Regional Assessment Area indicate very low use or association of predation near human linear features, with moose being the main prey species. (Joro Consultants 2015a). As such, no increased risk in caribou mortality or distribution is expected in the Local Assessment Area due to changes in predation.

Introduction of Disease/Parasitism (Brainworm/liver fluke)

White-tailed deer are the host for the brainworm and liver fluke parasite. Northward encroachment of white-tailed deer in the Local Assessment Area has not been identified during baseline studies conducted from 2011-2015 (Joro Consultants 2015a). Local communities have not reported seeing white-tailed deer. Therefore, while white-tailed deer may be present in the Local Assessment Area, their range is generally limited to south of the Bloodvein River due to harsh winter conditions and limited food supply (MCWS 2012b). The brainworm/liver fluke host, the white-tailed deer, is not anticipated to persist at densities capable of transmitting this parasite in the Project area during construction; therefore, no effects on boreal woodland caribou are expected due to the introduction of disease/parasitism (Joro Consultants 2015a).

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effects were identified as having a moderate level of effect:

- Habitat loss/alteration/fragmentation; and
- Temporary sensory disturbance.

Habitat Loss/Alteration/Fragmentation and Temporary Sensory Disturbance

A potential effect of the Project on boreal woodland caribou is habitat loss, alteration or fragmentation as a result of construction due to the clearing of vegetation along the right-of-way, the installation of bridges, culverts, borrow sites and quarries and the development of temporary access routes and trails. Construction activities may also create temporary sensory disturbances such as noise and vibration.

Core Use Areas

Analysis of boreal woodland caribou core use areas was undertaken to determine the degree of high use habitat disturbance within the Local Assessment Area (Joro Consultants 2015a). Core use areas can be defined as areas where wildlife (i.e., boreal woodland caribou) utilize habitat at significantly higher rates, for a longer length of time, within home ranges. They are developed using GPS data and surveys and supported by Traditional Knowledge (Joro Consultants 2015a). Analysis of data collected from 2011 to 2015 indicates that the all-season road (total length 94.53 km) will intersect 26.3 km of caribou summer core use, and 25.2 km of boreal woodland caribou winter core use (**Table 9.24**; Joro Consultants 2015a).

Table 9.24: Percent Disturbance in Summer and Winter Core Areas

Seasonal Use	Total core area (km^2)	Disturbance Buffer*	Total Area of Potential Disturbance in Core Are (km^2)	Area of Disturbance (km^2)	% of Total Disturbance to Core Area in the Range
Summer	2,292.4	1km	26.3	26.3	1.2%
Winter	994.2	1km	25.2	25.2	2.5%

Note: * Environment Canada (2008) suggests that the disturbance profile extends ~500m from anthropogenic features.
Source: Joro Consultants 2015a (**Appendix 9-1**)

Based on the analysis summarized in **Table 9.24**, winter core and summer core areas that will be subject to disturbance from the Project represent a small portion of total winter and summer core areas available in the Local Assessment Area (Joro 2015a). Furthermore, there are substantially more core use areas adjacent to the Local Assessment Area than within the Local Assessment Area itself (Joro Consultants 2015a).

Range Level Disturbance

A boreal woodland caribou cumulative effects analysis was conducted to determine total habitat disturbance within the management unit relative to the sustainable threshold of 65% undisturbed (35% disturbed) habitat identified by Environment Canada (2012). The disturbance analysis was conducted on the entire Atikaki-Berens Management Unit which is contained entirely in Manitoba. The small portion of the Berens River range in Ontario includes remote and undisturbed habitat utilized by a small number of individual animals during summer. Fire history data (for natural disturbance calculations) was also not available and there is no human disturbance footprint in this area. The portion of the range in Ontario was therefore excluded from the assessment as a precautionary approach to assess human and natural disturbance within the Management Unit delineated by Manitoba using the Environment Canada threshold.

Disturbance was broken into two major disturbance components consistent with those described by Environment Canada (2012) and included natural disturbance (mainly fire less than 40 years old) and anthropogenic disturbance. Anthropogenic disturbances include linear features such as winter roads and transmission lines, as well as other footprint disturbance including forestry and quarry development (Joro Consultants 2015a). The Atikaki-Berens Management Unit in 1960 had a total disturbance of 48.13%, whereas in 1980 the total disturbance measured 33.43%, in 2015 measures 34.66%, and is anticipated to measure 34.34% in 2020 and 34.62% in 2025. Each 5 year period assessed includes the current and anticipated disturbance for that time period such as the existing transmission line, winter road and all-season roads as they are constructed and become operational. Apart from in 1960, the disturbance threshold within the Atikaki-Berens Management Unit is below the 35% disturbance threshold identified by Environment Canada (2012). Fire is the largest contributor of disturbance. Based on these analyses, the overall loss of habitat due to the P4 all-season road footprint is a small contributor to the overall effect, with fire being the greatest contributor to disturbance (Table 18 in **Appendix 9-1**). Refer to **Chapter 13** (Cumulative Effects) for the cumulative effects assessment for boreal woodland caribou.

Linear Features

One potential effect of Project construction is for the east/west movement of boreal woodland caribou to be influenced by construction traffic and equipment noise and activities along the right-of-way. Similar to findings from previous studies on boreal woodland caribou interaction with linear features, it is anticipated that boreal woodland caribou will cross these features, but potentially at a higher rate of speed than normal rates of movement in undisturbed habitat (Joro Consultants 2015a). In addition, the use of habitat directly adjacent to the construction areas (~500 m) is anticipated to be utilized to a lesser degree than similar habitat elsewhere. In 2014 and 2015, boreal woodland caribou were found to be moving across the right-of-way under construction in the P1 all-season road area (Joro Consultants 2015a). Similar caribou movements across the right-of-way during construction are expected for the P4 Project under similar conditions. Overall loss of functional habitat through sensory disturbance and road avoidance is considered to be minimal, as habitat is not limiting in the Regional Assessment Area. In addition, the effect of sensory disturbance ends with the cessation of the construction activity.

Mitigation measures developed to reduce the potential effect of habitat loss, alteration or fragmentation and sensory disturbance include the application of design mitigation measures (**Section 9.2.3**). The all-season road routing has avoided areas of high quality habitat where feasible with efforts to minimize construction related clearing (e.g. quarries, borrow, etc.) in potentially sensitive areas (i.e., known calving sites and high quality habitat areas). Quarry blasting and other construction activities will be suspended during spring months near known calving sites to avoid parturition times for Boreal Woodland Caribou. Staged construction (i.e., scheduling of construction activities in areas adjacent to sensitive sites until sensitive life cycles have passed [e.g., calving periods (May-June)]) will be implemented. Vegetation clearing will be limited to fall and winter to the greatest extent feasible, avoiding parturition times for boreal woodland caribou. Borrow areas and quarry sites will be avoided near sensitive habitat. Existing access routes, trails, or cut lines will be used where feasible and new access routes and trails will be kept as

short and narrow as feasible. Existing water flow patterns, levels and wetland hydrologic regimes will be maintained and thereby avoid water-related changes to the surrounding habitat. The existing winter road and temporary access routes and trails will be decommissioned to allow the regeneration of vegetation. The overall habitat loss or alteration will be reduced, as there will be 0.13% of forest and wetland habitat gained over time in the Local Assessment Area due to the decommissioning of temporary access routes. Decommissioning of the winter road is expected to provide an additional 31 ha of mixed habitat types in the Local Assessment Area and an additional 112 ha of mixed habitat types in the Regional Assessment Area.

There were no adverse potential effects identified in **Appendix 9-9** as having a high level of effect.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on boreal woodland caribou is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to ungulates (including moose and boreal woodland caribou [**Section 9.2.5.2**]) are listed in **Table 9.20**.

A summary of the potential effects of construction on boreal woodland caribou and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.25**.

Table 9.25: Summary of Potential Construction-Related Environmental Effects on Boreal Woodland Caribou and Proposed Mitigation Measures

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat disturbance, alteration or fragmentation due to the following construction activities: ▪ Clearing of vegetation in the right-of-way. ▪ Road construction and installation of bridges and culverts. ▪ Set up and use of equipment, crews, temporary staging areas, temporary work camps. ▪ Setup and use of borrow and quarry areas. ▪ Development of temporary access routes and trails.	▪ Applying design mitigation measures (**Section 9.2**). ▪ Routing all-season road to avoid areas of high quality habitat where feasible. ▪ Limiting riparian vegetation clearing within the right-of-way to the removal of trees and tall shrubs (to maintain line of sight safety requirements). ▪ Timing road clearing to occur during fall and winter to the extent feasible to avoid parturition times for boreal woodland caribou. ▪ Maintaining existing water flow patterns, levels and wetland hydrologic regimes. ▪ Staging construction as required, i.e., stop and delay construction activities in sensitive areas until animal use of the area and/or sensitive time period has passed. ▪ Using existing access routes, trails, or cut lines to the extent feasible and access routes and trails will be kept as short and narrow as feasible. ▪ Decommissioning the existing winter road to allow the regeneration of vegetation. ▪ Decommissioning temporary access routes and trails as soon as feasible to allow the regeneration of vegetation. ▪ Decommissioning winter roads, temporary access routes and trails to block off/limit human access. ▪ Identifying mineral licks and including them in EPPs as Environmentally Sensitive Sites.	The overall contribution of the all-season road to the disturbance in the Atikaki-Berens Management Unit is 0.47%. Fire is the largest contributor to disturbance. Mitigation measures will reduce the magnitude and extent of the potential effect of habitat disturbance, alteration or fragmentation during construction.	Not Significant

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Temporary sensory disturbance due to the following construction activities: ▪ Blasting activities. ▪ Clearing of vegetation in the right-of-way. ▪ Road construction and installation of bridges and culverts. ▪ Set up and use of equipment, crews, temporary staging areas, temporary work camps. ▪ Setup and use of borrow and quarry areas. ▪ Development of temporary access routes and trails.	▪ Routing all-season road to avoid areas of high quality habitat where feasible. ▪ Limiting construction to work areas within the Project Footprint and Local Assessment Area (quarries). ▪ Clearing during fall and winter to the extent feasible to avoid parturition times for boreal woodland caribou. ▪ Suspending quarry blasting and other construction activities near sensitive sites during spring months to avoid parturition times for boreal woodland caribou. ▪ Applying dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures. ▪ Staging construction, i.e., stop and delay construction activities in sensitive areas until animal use of the area and/or sensitive time period has passed. ▪ Using existing access routes, trails, or cut lines to the extent feasible and access routes and trails will be kept as short and narrow as feasible.	Mitigation measures will reduce the magnitude, extent, frequency and likelihood of temporary sensory disturbance to boreal woodland caribou during construction. Effect is reversible on cessation of activities.	Not Significant

Note: *See **Table 9.27** for the summary of residual Project effects and significance conclusions for boreal woodland caribou.

9.2.5.2.2 Operations and Maintenance Effects and Mitigation

The potential effects on boreal woodland caribou in the Local Assessment Area due to Project operations and maintenance prior to the implementation of mitigation measures were identified as follows:

- Temporary sensory disturbance;
- Increased mortality due to vehicle collisions;
- Increased mortality or changes in distribution due to changes in poaching access;
- Increased mortality or changes in distribution due to changes in predation; and
- Introduction of disease/parasitism (i.e., brainworm/liver fluke from white-tailed deer).

Using the approach described above in **Section 9.2**, the level of effect of the potential operations and maintenance effects on boreal woodland caribou prior to the implementation of mitigation measures was examined. **Appendix 9-10** provides a summary of the potential operations and maintenance effects on boreal woodland caribou prior to the implementation of mitigation measures, and the determined level of effect of each potential effect.

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effects were identified as having a low level of effect:

- Increased mortality due to vehicle collisions;
- Increased mortality or changes in distribution due to changes in poaching access;
- Increased mortality or changes in distribution due to changes in predation; and
- Introduction of disease/parasitism (i.e., brainworm/liver fluke from white-tailed deer).

Increased Mortality Due to Vehicle Collisions

Increased mortality due to vehicle collisions is not identified as a limiting factor or threat to boreal woodland caribou in Manitoba (MBWCAC 2015), however, there is a potential effect during the operations and maintenance phase of the Project due to increased traffic during operations and maintenance activities and the use of the road by local communities, for supply delivery and by visitors to the communities and region. The all-season road will be a two-lane gravel road with low traffic volumes. Boreal woodland caribou demonstrate a tendency to move through disturbed areas and are unlikely to loaf on or along the road way, thus decreasing the likelihood of a collision (Joro Consultants 2015a).

Operations and maintenance activities will be localized within the Project Footprint. The road will be designed to optimize line of site with the dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures applied. Boreal woodland caribou crossing and/or speed reduction signs may be installed where necessary to reduce the potential of wildlife-vehicle collisions. Monitoring in the P1 all-season road project area from 2011 to 2015 recorded no boreal woodland caribou-vehicle collisions (Joro Consultants 2015a). Monitoring results of mortalities and movement during construction will inform the development of a post-construction monitoring program and will allow for adaptive measures to be employed (i.e., installation of caribou crossing or speed reduction signs). As such, no

increased risk in boreal woodland caribou mortality is expected in the Local Assessment Area due to vehicle collisions.

Increased Mortality due to Increased Hunting Access

The potential effect of improving access for local communities and visitors to the communities and region may result in the increased mortality of boreal woodland caribou as a result of poaching activities. Licenced hunting of boreal woodland caribou is not permitted in Manitoba.

To mitigate access-related effects, the road is being designed with no pull outs, parking areas or boat launches. Temporary access trails will be decommissioned to further inhibit back-country access by non-locals. Road access control will be developed during construction and continued through the operations and maintenance phase to limit access and therefore reduce hunting opportunities. Mitigation measures adopted to decrease the overall amount of linear corridors within the Local Assessment Area and Regional Assessment Area will include the decommissioning of temporary access routes and the winter road. As such, no increased risk in boreal woodland caribou mortality or distribution is expected in the Local Assessment Area due to increased hunting access.

Manitoba Conservation is responsible for enforcing regulations that protect wildlife populations. Natural Resource Officers are currently deployed to the Project area from the Eastern Regional office located in Lac Du Bonnet.

Increased mortality due to increased predation

Some literature has suggested that wolves may move along linear corridors, such as a road, accessing new areas and changing predator/prey dynamics (Kunkel and Pletscher 2000; Stein 2000). The potential use of the right-of-way by wolves and subsequent increases in boreal woodland caribou mortality due to higher levels of wolf predation has been considered. While it is possible that wolves may increase their travel speed by using the right-of-way, the surrounding habitat is unchanged and access into these areas would thus remain unchanged (Joro Consultants 2015a). Baseline studies conducted within the Berens Range found that wolves are using anthropogenic features far less than they use the natural linear features available to them. Further, wolf kill sites have not been correlated with anthropogenic linear features (Joro Consultants 2015a). Based on wolf collaring and telemetry studies conducted within the Local Assessment Area and Regional Assessment Area from 2013-2015, no boreal woodland caribou have been determined to be predated upon by the collared wolves (Joro Consultants 2015a).

Mitigation measures adopted to decrease the overall amount of linear corridors within the Local Assessment Area and Regional Assessment Area will include the decommissioning of temporary access routes and the winter road. Given that the areas adjacent to or beyond the road surface will not be altered during the spring, summer or fall, access for wolves will not become easier or more accessible. As such, no increased risk in caribou mortality or distribution is expected in the Local Assessment Area due to changes in predation.

Introduction of Disease/Parasitism (e.g., brainworm/liver fluke and giant liver fluke)

Northward encroachment of white-tailed deer in the Local Assessment Area has not been identified during baseline studies conducted from 2011-2015 (Joro Consultants 2015a). Further, communities do not report seeing white-tailed deer. Therefore, while white-tailed deer may be present in the Local Assessment Area, their range is generally limited to south of the Bloodvein River due to harsh winter conditions and limited food supply (MCWS 2012b). As such, no effects on boreal woodland caribou are expected due to the introduction of disease/parasitism (Joro Consultants 2015a).

Based on the screening of potential effects in **Appendix 9-10**, temporary sensory disturbance was identified as a potential adverse effect having a moderate level of effect.

Temporary Sensory Disturbance

Temporary sensory disturbance within the Local Assessment Area as a result of operations and maintenance activities is a potential effect on boreal woodland caribou. These sensory disturbances include operations and maintenance activities (e.g., snow clearing, grading and addition of aggregate as required), right-of-way vegetation management, bridge and culvert maintenance activities (e.g., debris removal, structural repairs) and the use of the road by local communities and visitors to the communities and local area. Due to load restrictions placed on the proposed all-season road during spring, significant road, bridge and culvert maintenance activities will seldom occur during sensitive life stages (i.e., calving) and thus maintenance activities are unlikely to provide a significant sensory disturbance.

Boreal woodland caribou winter core and summer core areas that will be subject to disturbance from the Project represent a small portion of total winter and summer core areas available in the Local Assessment Area. Furthermore, there are substantially more core use areas in the adjoining areas on either side of the Local Assessment Area than within the Local Assessment Area itself. Based on cumulative effects analyses conducted for boreal woodland caribou, the overall loss of habitat due to the Project Footprint is a small contributor to overall disturbance with fire being the greatest contributor to disturbance (Table 18 in Joro Consultants 2015a).

Calving

Analysis of data collected from collared Berens Range Woodland Caribou from 2011 to 2015 indicates the presence of boreal woodland caribou calving areas across the Regional Assessment Area in suitable habitat including within the Local Assessment Area (Joro Consultants 2015a). Based on the results of calving habitat analysis, high quality calving habitat is not limiting in the Local Assessment Area or surrounding areas within the Regional Assessment Area. Although some high quality habitat is found along the all-season road alignment, female boreal woodland caribou have opportunities to select high quality calving habitat in other nearby areas. Based on the site fidelity analysis, females typically select calving sites within 6 to 8 kilometers of previous years calving sites. Analysis of available high quality calving habitat in the Local Assessment Area and adjacent areas suggest that displacement of females from calving sites or

disturbance resulting in shifts of local calf nursery areas would not limit females in finding suitable calf and rearing habitat (Joro Consultants 2015a), and thus calving success is not expected to be adversely effected.

Linear Features

Similar to potential construction effects, one possible effect of the road is for the east/west movement of boreal woodland caribou to be influenced by the road itself, the operational noise and maintenance activities. Findings from previous studies on boreal woodland caribou interaction with roads and other linear features has found that boreal woodland caribou will cross these features, but at a higher rate of speed than normal rates of movement in undisturbed habitat (Joro Consultants 2015a). In addition, the use of habitat directly adjacent to the linear feature (~500 m) is utilized to a lesser degree than similar habitat elsewhere.

Historical and current data from confirm that boreal woodland caribou have occupied range near the existing winter road transmission line. Neither of these linear features appear to be preventing access or movements, or separating individuals/populations (Joro Consultants 2015a). Similar to findings for other linear features, the baseline study found that the boreal woodland caribou increased their rate of speed by approximately 1.5 km per hour during crossing events to 1.7 km per hour, which is well below their average trotting speed of 14 km per hour or their top gallop speed of 80 km per hour. In the case of the all-season road, the effects of the road are anticipated to reflect the effects of an active winter road in that habitat use in the adjacent 500 m is anticipated to be similarly reduced; however, this habitat is not limiting in the Local Assessment Area or Regional Assessment Area (Joro Consultants 2015a). The decommissioning of the winter road will also replace lost or altered habitat. Overall loss of functional habitat through temporary sensory disturbance and road avoidance is minimal, as habitat is not limiting in the Regional Assessment Area.

Within the Local Assessment Area and Regional Assessment Area there are no known publicized forestry, mining, or oil and gas activities occurring or planned in the future (**Chapter 13,** Cumulative Effects). To mitigate the temporary sensory disturbance on boreal woodland caribou, activities will be localized to operations and maintenance work areas within the Project Footprint. The all-season road will be a two-lane gravel road with low traffic volumes with no pull outs of parking areas. Road, bridge and culvert maintenance activities will be timed to occur during fall and winter to the extent feasible to avoid parturition times for boreal woodland caribou near known calving sites. The dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures will be applied. The temporary sensory disturbance of maintenance activities cease upon completion of the activities. The operation of the road for local travel will cause an intermittent temporary sensory disturbance; however, traffic volumes will be low and limited to the use of the road by local communities and visitors to the communities and local area.

There were no adverse potential effects identified in **Appendix 9-10** as having a high level of effect.

During the operations and maintenance phase of the Project, there will be the potential beneficial effect of habitat gain due to decommissioning of temporary access routes and the winter road, and regeneration of

vegetation in these areas. This effect will reduce the magnitude and extent of vegetation loss, alteration or fragmentation in the Local Assessment Area.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on boreal woodland caribou is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to ungulates (including moose and boreal woodland caribou [**Section 9.2.5.2**]) are listed in **Table 9.20**.

A summary of the potential effects of operations and maintenance on boreal woodland caribou and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.26**.

Table 9.26: Summary of Potential Operations and Maintenance-Related Environmental Effects on Boreal Woodland Caribou and Proposed Mitigation Measures

Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat gain due to: ▪ The decommissioning and regeneration of vegetation of temporary access routes and winter road.	▪ Not required.	Reduction of the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area and Regional Assessment Area.	Not Significant
Localized areas of temporary sensory disturbance due to: ▪ Road maintenance activities: snow clearing, grading and addition of aggregate as required, right-of-way vegetation management. ▪ Bridge and culvert maintenance activities: debris removal, structural repairs.	▪ Localized to operations and maintenance work areas within the Project Footprint. ▪ Road, bridge and culvert maintenance activities will be timed to occur during fall and winter to the extent feasible to avoid parturition times for moose. ▪ The all-season road will be a two-lane gravel road with low traffic volumes. ▪ Road designed to optimize line of sight. ▪ Road designed with no pull outs or parking areas.	Mitigation measures will reduce the magnitude, extent, frequency and likelihood of temporary sensory disturbance to boreal woodland caribou during operations and maintenance. Effect is reversible on cessation of activities.	Not Significant

Note: *See **Table 9.27** for the summary of residual Project effects and significance conclusions for boreal woodland caribou.

9.2.5.2.3 Summary of Project Residual Effects and Conclusion

The potential residual effects remaining after mitigation for boreal woodland caribou during the Project construction phase were identified as:

- Loss, alteration or fragmentation of habitat; and
- Temporary sensory disturbance.

The potential residual effects remaining after mitigation for boreal woodland caribou during the Project operations and maintenance phase were identified as:

- Temporary sensory disturbance.

Based on the results of the calving habitat RSF (Joro Consultants 2015a), high quality calving habitat is not limiting in the Local Assessment Area. Avoidance of high quality habitat was not feasible; however, the route selected has avoided areas of higher proportion of potential high quality calving habitat. Changes to route alignments based on known calving sites are likely to result in no change to the overall effect, as route alignments would traverse higher proportions of quality habitat, and data are not available for the entire adult female caribou population that may be found in the Local Assessment Area. Therefore, although some high quality habitat is found along the all-season road alignment, female boreal woodland caribou have opportunities to select high quality calving habitat in other areas within the Regional and Local Assessment Area.

Within the Atikaki-Berens Management Unit, the overall cumulative effects analysis indicates that disturbance within the management unit is below the 35% undisturbed threshold established by Environment Canada (2012). Refer to **Chapter 13** (Cumulative Effects) for the cumulative effects analysis for boreal woodland caribou.

Based on Traditional Knowledge information, along with the baseline collaring study data and analyses, boreal woodland caribou cross the existing winter road and reside in close proximity to the winter road and its associated disturbance. The expected effects of Project development would be within the natural range of variation for boreal woodland caribou within the Local Assessment Area. The overall habitat alteration and loss is minimal and restricted to the Project Footprint. The use of reduced speed zones will aid in the reduction of boreal woodland caribou vehicle collisions. Research on collared wolves shows no evidence of predation on boreal woodland caribou by collared wolves.

In addition to the identified mitigation measures, the application of existing Province of Manitoba caribou population management actions (e.g., restrictions on hunting and vehicle use regulations) and cooperative efforts with local communities and regional boreal woodland caribou management committees will be undertaken. Access management, road refuges (e.g. the establishment of a Wildlife Refuge along the all-season road right-of-way) and provincial caribou management strategies will play an important role in managing boreal woodland caribou population numbers and status. Monitoring of the wolf and boreal woodland caribou populations in areas of the Local Assessment Area and Regional

Assessment Area has been conducted from 2013 to 2015. ESRA will continue its research and monitoring during construction so that environmental protection and mitigation measures perform as intended, and to identify where adaptive management is required. These activities will be used to inform the nature of a post-construction monitoring program and will be reviewed with the Province of Manitoba and with interested stakeholders such as communities in the Local Assessment Area.

Manitoba Conservation is responsible for enforcing regulations that protect wildlife populations. Natural Resource Officers are currently deployed to the Project area from the Eastern Regional office located in Lac Du Bonnet.

Table 9.27 provides a summary of the residual effects assessment for boreal woodland caribou. With the use of appropriate mitigation measures, MCWS resource management, environmental protection measures and environmental protection plans, the residual effects on boreal woodland caribou due to Project activities are expected to be not significant.

Table 9.27: Summary of Residual Project Effects and Significance Conclusions for Boreal Woodland Caribou

Residual Effects	Residual Effects Characteristics/Level Rating						Ecological Context	Significance Conclusion
	Direction	Duration	Magnitude	Extent	Frequency	Reversibility		
Construction Phase								
▪ Loss, alteration or fragmentation of habitat.	N-	III	II	I	I	III	I	N
▪ Temporary sensory disturbance.	N-	I	II	I	II	I	I	N
Operations and Maintenance Phase								
▪ Reduction of habitat loss or alteration in the Local Assessment Area.	P+	III	I	I	I	III	I	N
▪ Temporary sensory disturbance.	N-	III	II	I	II	I	I	N

KEY: (see also **Chapter 6, Section 6.4** for full definitions and Level of Effect criteria for determination of Significance)

Direction:
N- Negative
P+ Positive

Duration:
Short-term = Level I
Medium-term = Level II
Long-term = Level III

Magnitude:
Negligible or Low = Level I
Moderate = Level II
High = Level III

Extent:
Project Footprint = Level I
Local Assessment Area = Level II
Regional Assessment Area = Level III

Frequency:
Once = Level I
Intermittent = Level II
Continuous = Level III

Reversibility:
Reversible (short-term) = Level I
Reversible (long-term) = Level II
Irreversible = Level III

Ecological Context:
Low = Level I (Effect results in minimal disruption of ecological functions and relationships in the area).
Moderate = Level II (Effect results in some disruption of non-critical ecological functions and relationships in the area).
High = Level III (Effect results in disruption of critical ecological functions and relationships in the impacted area).

Significance Conclusion:
S = Significant residual effect
N = No significant residual effect

9.2.5.3 Aquatic Furbearers

The beaver (*Castor canadensis*) is a semi-aquatic furbearer species commonly found throughout Manitoba in aquatic and riparian areas of lakes, ponds, creeks, rivers and other water bodies. The beaver (**Photograph 9-25**) was selected as a VC to represent aquatic furbearers as its habitat requirements represent the habitat requirements for other aquatic furbearer species. The beaver and other aquatic furbearers are important for trapping as discussed in **Chapter 10** (Socio-Economic and Cultural Environment)**, Section 10.1.6.2.**

The beaver is an ecosystem engineer and keystone species that modifies drainage regimes by cutting vegetation and building dams that have long-term effects on landscapes. Beavers feed on most herbaceous or woody plants, but prefer willows, aspen and other deciduous trees, and construct lodges/dams from mud and sticks. This species mates for life and can produce a breeding colony of 2-12 members including the breeding pair, yearlings and kits. The beaver is primarily nocturnal and travels far from home to feed, overwintering under the ice for up to 6 months within the protection of their lodge. Habitat for beavers is not limiting within the Local and Regional Assessment Areas.

(**Source**: Wikimedia Commons 2015)

Photograph 9-25: Beaver

9.2.5.3.1 Construction Effects and Mitigation

The potential effects on beaver in the Local Assessment Area due to Project construction prior to the implementation of mitigation measures were identified as follows:

- Habitat loss/alteration/fragmentation; and
- Temporary sensory disturbance.

Using the approach described above in **Section 9.2**, the overall level of effect of the potential construction effects on beaver prior to the implementation of mitigation measures was examined.

Appendix 9-9 provides a summary of the potential construction effects on beaver prior to the implementation of mitigation measures and the determined level of the potential effect.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Temporary sensory disturbance within the Local Assessment Area as a result of construction activities is a potential effect on beaver. To mitigate potential sensory disturbance, construction activities will be localized to work areas within the Project Footprint. Road clearing activities will occur during daytime hours when beaver are less active. A vegetated buffer zone will be retained between the all-season road and lakes or ponds along the right-of-way (e.g., Bull Lake and Pamatakakowin Lake). Where feasible, roads will be located a minimum of 100 m from waterbodies except when crossing a watercourse. With the application of mitigation measures, the potential effect of temporary sensory disturbance to beaver is not expected to be significant.

Monitoring of furbearer populations in areas of the Local Assessment Area and Regional Assessment Area has been conducted from 2011 to 2015 (Joro Consultants 2015a) and will continue as part of cooperative efforts with the Province of Manitoba and local communities and through the Trapper Participation Program.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a moderate level of effect:

- Habitat loss/alteration/fragmentation.

Habitat Loss/Alteration/Fragmentation

Habitat loss, alteration or fragmentation is a potential effect of the Project on beaver as a result of construction related activities such as: clearing of vegetation in the right-of-way; road construction and the installation of bridges and culverts; set up and use of equipment, crews, temporary staging areas, temporary work camps; setup and use of borrow and quarry areas; and the development of temporary access routes and trails.

The amount of beaver habitat that will be lost as a result of the Project is a very small percentage of the overall beaver habitat available within the Local and Regional Assessment Areas (see **Tables 9.28** and **9.29** and Joro Consultants 2015a). Habitat modeling analysis for beaver showed that there will be a total loss or alteration of 2.30% of beaver habitat in the Local Assessment Area. The overall habitat loss or alteration will be reduced as there will be 0.13% of forest and wetland habitat gained over time in the Local Assessment Area due to the decommissioning of temporary access routes as well as a 0.10% gain of forest and wetland habitat in the Local Assessment Area due to the decommissioning of the existing

approximately 96 km winter road. The decommissioning of the winter road is expected to provide an additional 0.31 km^2 of mixed habitat types in the Local Assessment Area and additional 1.12 km^2 of mixed habitat types in the Regional Assessment Area (Joro Consultants 2015a).

Table 9.28: Potential Beaver Habitat within the Local Assessment Area

Habitat Type	Total Modeled Habitat (Local Assessment Area) in km^2	Habitat Lost Due to Clearing in the Project Footprint and GHA17B areas in km^2	Total Habitat Due to Winter Road Reclamation in km^2
Broadleaf Dense	16.5951	0.00	16.60
Mixedwood Dense	27.4738	0.16	27.48
Wetland Shrub*	27.1183	0.30	27.13
Wetland Treed*	1.4437	0.01	1.44
Total	72.6309	0.48	72.66

Note: * Predominantly bog and fen complexes.
Source: Joro Consultants 2015a (**Appendix 9-1)**

Table 9.29: Percentage of Total Beaver Habitat Lost within the Local Assessment Area Due to Clearing in the Project Footprint and GHA 17B, and Percentage of Habitat Gain Due to Winter Road Reclamation

Habitat Type	% Habitat Lost Due to Clearing in the Project Footprint and GHA17B	Habitat Gain (Winter Road Reclamation)
Broadleaf Dense	0.00%	0.03%
Mixedwood Dense	0.59%	0.03%
Wetland Shrub*	1.12%	0.04%
Wetland Treed*	0.59%	0.00%

Note: * Predominantly bog and fen complexes.
Source: Joro Consultants 2015a (**Appendix 9-1)**

Mitigation measures developed to reduce the potential effect of habitat loss, alteration or fragmentation include the application of design mitigation measures (**Section 9.2**). The all-season road routing avoided areas of high quality habitat such as lakes, ponds and wetlands where feasible, with alternate habitat available adjacent to and beyond the Project Footprint and all-season road right-of-way. Design mitigation measures will be undertaken to maintain the existing water flow patterns, levels and wetland hydrologic regimes. Riparian vegetation clearing within the right-of-way is limited to the removal of trees and tall shrubs (to maintain line of sight safety requirements) with no removal of low growing vegetation. A vegetated buffer zone will be retained between the all-season road and lakes or ponds along the right-of-way (e.g., Bull Lake and Pamatakakowin Lake). Where feasible, roads will be located a minimum of 100 m from waterbodies except when crossing a watercourse. Where this is not feasible, a buffer of undisturbed vegetation equal to 10 m plus 1.5 times the slope gradient, or 30 m, whichever is greater, will be left between the road and adjacent watercourses. There will appropriate erosion and sediment control (ESC) measures undertaken prior to the commencement of clearing and construction activities. The ESC measures will remain in place until disturbed areas are stabilized and re-vegetation is occurring.

Clearing activities will occur during fall and winter to the extent feasible, when beaver are overwintering and less active in the landscape. The suspension of blasting and other disruptive construction activities during spring months adjacent to beaver houses will be used where necessary to decrease disturbance during breeding periods. Access routes, trails, or cut lines will be used to the least extent feasible and access routes, trails and the existing winter road will be decommissioned to allow the regeneration of vegetation. Monitoring of furbearer populations in areas of the Local Assessment Area and Regional Assessment Area, including beaver, has been conducted from 2011 to 2015 and will be continued as part of cooperative efforts with the Province of Manitoba, local communities and through the Trapper Participation Program.

There were no adverse potential effects identified in **Appendix 9-9** as having a high level of effect.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on beaver is provided in **Chapter 5.**

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to furbearers are listed in **Table 9.30.**

Table 9.30: ESRA's Protection Procedures and Specifications for Furbearers

Environmental Protection Procedures Section (Chapter 5, Appendix 5-3)	Environmental Protection Specifications (GR130s) (Chapter 5, Appendix 5-4)
Sec. 1 Clearing and Grubbing	GR130.6 General
Sec. 2 Petroleum Storage	GR130.8 Designated Areas and Access
Sec. 3 Spill Response	GR130.9 Materials Handling, Storage and Disposal
Sec. 5 Materials Handling and Storage	GR130.10 Spills and Remediation and Emergency Response
Sec. 6 Working within or near Fish Bearing Waters	GR130.15 Working Within or Near Water
Sec. 7 Stream Crossings	GR130.16 Erosion and Sediment Control
Sec. 8 Temporary Stream Diversions	GR130.17 Clearing and Grubbing
Sec. 11 Culvert Maintenance and Replacement	GR130.19 Wildlife
Sec. 12 Blasting Near a Watercourse	GR130.21 Cement Batch Plant and Concrete Wash-Out Area
Sec. 14 Wildlife	
Sec. 16 Erosion and Sediment Control	
Sec. 17 Concrete Area Management Practices	
Sec 18 Dust Suppression Practices	

A summary of the potential effects of Project construction on aquatic furbearers and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.31**.

Table 9.31: Summary of Potential Construction-Related Environmental Effects on Aquatic Furbearers and Proposed Mitigation Measures

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat loss, alteration or fragmentation due to: ▪ Clearing of vegetation in the right-of-way. ▪ Road construction and installation of bridges and culverts. ▪ Set up and use of equipment, crews, temporary staging areas, temporary work camps. ▪ Setup and use of borrow and quarry areas. ▪ Development of temporary access routes and trails.	▪ Application of design mitigation measures (**Section 9.2**). ▪ All-season road routing avoided areas of high quality habitat such as lakes, ponds and wetlands where feasible. ▪ Existing water flow patterns, levels and wetland hydrologic regimes will be maintained through road design. ▪ Riparian vegetation clearing within the right-of-way will be limited to the removal of trees and tall shrubs (to maintain line of sight safety requirements) with no removal of low growing vegetation. ▪ A vegetated buffer zone will be retained between the all-season road and lakes or ponds along the right-of-way, e.g., Bull Lake and Pamatakakowin Lake. ▪ Where feasible, roads will be located a minimum of 100 m from waterbodies except when crossing a watercourse. ▪ Appropriate erosion and sediment control (ESC) measures will be in place prior to the commencement of clearing and construction and will remain in place until disturbed areas are stabilized and revegetation is occurring.	Habitat modeling analysis indicated a very small percentage of habitat alteration for beaver. The residual effect of habitat loss, alteration or fragmentation will be reduced in magnitude and extent with the application of the identified mitigation measures.	Not Significant

Note: *See **Table 9.33** for the summary of residual Project effects and significance conclusions for aquatic furbearers.

9.2.5.3.2 Operations and Maintenance Effects and Mitigation

The potential effects on beaver in the Local Assessment Area due to Project operations and maintenance prior to the implementation of mitigation measures were identified as follows:

- Temporary sensory disturbance.

Using the approach described in **Section 9.2**, **Appendix 9-10** provides a summary of the potential operations and maintenance effects on beaver prior to the implementation of mitigation measures and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Temporary sensory disturbance within the Local Assessment Area is a potential effect during operations and maintenance. These sensory disturbances include road operations and maintenance activities (e.g., snow clearing, grading and addition of aggregate as required), right-of-way vegetation management, bridge and culvert maintenance activities (e.g., debris removal, structural repairs) and the use of the road by local communities and visitors to the communities and region.

Within the Local and Regional Assessment Areas there are no known publicized forestry, mining, or oil and gas activities occurring or planned to occur in the future. To mitigate the temporary sensory disturbance on beaver, activities will be localized to maintenance work areas within the Project Footprint. The majority of the operations and maintenance activities will occur during daytime hours when beaver are less active. The all-season road will be a two-lane gravel road with low traffic volumes designed to optimize the line or sight with no pull outs or parking areas.

Disturbance (noise) from the use of the road by local communities and visitors (i.e., hunters, fishers, transportation of goods and materials) will occur during operations. This disturbance is expected to be minimal and no further mitigation is required. With the application of mitigation measures, the potential effect of temporary sensory disturbance to beaver is not expected to be significant.

There were no adverse potential effects identified in **Appendix 9-10** for the operations and maintenance phase as having a moderate or high level of effect.

During the operations and maintenance phase, there will be the potential beneficial effect of habitat gain due the regeneration of vegetation through the decommissioning of temporary access routes and the winter road. This effect will reduce the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area.

A summary of the potential effects of Project operations and maintenance on aquatic furbearers and the mitigation measures that will be used to prevent/minimize these effects are provided in **Table 9.32**.

Table 9.32: Summary of Potential Operations and Maintenance-Related Environmental Effects on Aquatic Furbearers and Proposed Mitigation Measures

Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat gain due to: ▪ Decommissioning and regeneration of vegetation of temporary access routes and winter road.	▪ Not required.	Reduction of the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area.	Not Significant
Localized areas of temporary sensory disturbance due to: ▪ Road maintenance activities: snow clearing, grading and addition of aggregate as required, right-of-way vegetation management. ▪ Bridge and culvert maintenance activities: debris removal, structural repairs.	▪ Localized to operations and maintenance work areas within the Project Footprint. ▪ The all-season road will be a two-lane gravel road with low traffic volumes. ▪ Road designed to optimize line of sight mitigates feasible wildlife-vehicle collisions. ▪ Road designed with no pull outs or parking areas.	Mitigation measures will reduce the magnitude, extent, frequency and likelihood of temporary sensory disturbance to beaver during operation. Effect is reversible on cessation of activities.	Not Significant

Note: *See **Table 9.33** for the summary of residual Project effects and significance conclusions for aquatic furbearers.

9.2.5.3.3 Summary of Project Residual Effects and Conclusion

The residual effect remaining after mitigation for aquatic furbearers during the construction phase of the Project was identified as:

- Loss, alteration or fragmentation of habitat.

The residual effect remaining after mitigation for aquatic furbearers during the operations and maintenance phase of the Project was identified as:

- Temporary sensory disturbance.

The temporary sensory disturbance will be most substantial during day light hours when beavers are less active. These activities will be localized to work areas within the Project Footprint with the majority of the activities occurring during fall and winter to the extent feasible when beaver are overwintering and less active on the landscape. Given that beavers are typically nocturnal animals, their activities during the day are limited when road traffic is likely to be more substantial, whereas during the night when beaver are more active, the traffic is likely to be limited.

Monitoring of the furbearer populations in areas of the Local Assessment Area and Regional Assessment Area has been conducted from 2013 to 2015 and will be continued as part of cooperative efforts with the Province of Manitoba, local communities, the Trapper Participation Program and Manitoba Trappers Association.

Table 9.33 provides a summary of the residual effects assessment for beaver. With the use of appropriate mitigation measures, MCWS resource management, environmental protection measures and environmental protection plans, the residual effects on aquatic furbearers due to Project activities are expected to be not significant.

Table 9.33: Summary of Residual Project Effects and Significance Conclusions for Aquatic Furbearers

Residual Effects	Residual Effects Characteristics/Level Rating						Ecological Context	Significance Conclusion
	Direction	Duration	Magnitude	Extent	Frequency	Reversibility		
Construction Phase								
▪ Loss, alteration or fragmentation of habitat.	N-	III	I	I	I	III	I	N
Operations and Maintenance Phase								
▪ Reduction of habitat loss or alteration in the Local Assessment Area.	P+	III	I	I	I	III	I	N
▪ Temporary sensory disturbance.	N-	III	II	I	II	I	I	N

KEY: (see also **Chapter 6, Section 6.4** for full definitions and Level of Effect criteria for determination of Significance)

Direction:
N- Negative
P+ Positive

Duration:
Short-term = Level I
Medium-term = Level II
Long-term = Level III

Magnitude:
Negligible or Low = Level I
Moderate = Level II
High = Level III

Extent:
Project Footprint = Level I
Local Assessment Area = Level II
Regional Assessment Area = Level III

Frequency:
Once = Level I
Intermittent = Level II
Continuous = Level III

Reversibility:
Reversible (short-term) = Level I
Reversible (long-term) = Level II
Irreversible = Level III

Ecological Context:
Low = Level I (Effect results in minimal disruption of ecological functions and relationships in the area).
Moderate = Level II (Effect results in some disruption of non-critical ecological functions and relationships in the area).
High = Level III (Effect results in disruption of critical ecological functions and relationships in the impacted area).

Significance Conclusion:
S = Significant residual effect
N = No significant residual effect

9.2.5.4 Terrestrial Furbearers

Marten (*Martes americana*) (**Photograph 9-26**) is an economically important furbearer species for commercial trapping due to a relatively desirable coat and ease in capture, and was selected as a VC to represent terrestrial furbearers such as fox, fisher, lynx and red squirrel. The marten is a solitary animal that spends most of its time in Manitoba's boreal forest. It is also an ecological indicator of mature coniferous forests featuring structural complexity (i.e., with high canopy closure and vertical and horizontal woody structure) and can be abundant in undisturbed forests. The marten is carnivorous and will feed on mice and other small rodents, utilizing coarse woody debris for foraging and to access prey. It has very large home range sizes for its body mass, particularly for males versus females, and dens in forest habitat with rock crevices and large logs and snags. Habitat for marten is not limiting within the Local Assessment Area and Regional Assessment Area.

(**Source**: Wikimedia Commons 2015)

Photograph 9-26: Marten

9.2.5.4.1 Construction Effects and Mitigation

The potential effects to marten in the Local Assessment Area due to Project construction prior to the implementation of mitigation measures were identified as follows:

- Habitat loss/alteration/fragmentation; and
- Temporary sensory disturbance.

Using the approach described above in **Section 9.2**, the overall level of effect of the potential construction effects on marten prior to the implementation of mitigation measures was examined. **Appendix 9-9**

provides a summary of the potential construction effects on marten prior to the implementation of mitigation measures and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Temporary sensory disturbance within the Local Assessment Area as a result of construction activities is a potential effect on marten. To mitigate potential sensory disturbance, construction activities will be localized to work areas within the Project Footprint. Road clearing activities will occur during daytime hours when marten are less active. With the application of mitigation measures, the potential effect of temporary sensory disturbance to marten is not expected to be significant.

Baseline studies on furbearer populations in areas of the Local Assessment Area and Regional Assessment Area have been conducted from 2011 to 2015 (Joro 2015a) and will be continued as part of cooperative efforts with the Province of Manitoba and local communities and through the Trapper Participation Program.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a moderate level of effect:

- Habitat loss/alteration/fragmentation.

Habitat Loss/Alteration/Fragmentation

Habitat loss, alteration or fragmentation is a potential effect of the Project on marten as a result of construction related activities such as: clearing of vegetation in the right-of-way; road construction and installation of bridges and culverts; set up and use of equipment, crews, temporary staging areas, temporary work camps; setup and use of borrow and quarry areas; and the development of temporary access routes and trails.

The amount of marten habitat that will be lost as a result of the Project is a very small percentage of the overall habitat available within the Local Assessment Area (see **Tables 9.34** and **9.35**). Habitat modeling analysis for marten indicated that there will be a total loss or alteration of only 0.84 km^2, due to the Project Footprint, of the 88.09 km^2 of potential marten habitat within the Local Assessment Area (Joro Consultants 2015a).

Table 9.34: Potential Marten Habitat within the Local Assessment Area

Habitat Type	Total Modeled Habitat (LSA) in km^2	Habitat Lost Due to Project Footprint in km^2	Total Habitat Due to Winter Road Reclamation in km^2
Broadleaf Dense	16.1036	0.0372	16.1036
Coniferous Dense	31.5359	0.3902	31.5359
Coniferous Open	2.6914	0.0363	2.6914
Coniferous Sparse	3.3650	0.0708	3.3650
Mixedwood Dense	34.3892	0.3028	34.3892
Total	88.0851	0.8373	88.0851

Source: Joro Consultants 2015a **(Appendix 9-1**)

Table 9.35: Percentage of Total Marten Habitat Lost within the Local Assessment Area Due to Clearing of the Project Footprint and GHA 17B, and Percentage of Habitat Gain Due to Winter Road Reclamation

Habitat Type	% Habitat Lost Due to Project Footprint	Habitat Gain (Winter Road Reclamation)
Broadleaf Dense	0.23%	0.00%
Coniferous Dense	1.24%	0.00%
Coniferous Open	1.35%	0.00%
Coniferous Sparse	2.10%	0.00%
Mixedwood Dense	0.88%	0.00%

Source: Joro Consultants 2015a **(Appendix 9-1**)

Mitigation measures developed to reduce the potential effect of habitat loss, alteration or fragmentation include the application of design mitigation measures (**Section 9.2**). Alternate habitat is available adjacent to and beyond the Project Footprint and all-season road right-of-way (Joro Consultants 2015a). Dens found during pre-construction surveys will be marked and isolated as Environmentally Sensitive Sites.

The existing access routes, trails, or cut lines will be used to the least extent feasible and access routes and trails will be kept as short and narrow as feasible. The existing winter road, temporary access routes and trails will be decommissioned to allow the regeneration of vegetation. The decommissioned winter roads, temporary access routes and trails will be blocked off to limit human access.

Wildlife monitoring activities conducted from 2011 to 2015 within the P1 all-season road wildlife monitoring study area did not find that marten core use area shifts during the construction phase (Joro Consultants 2015a).

Baseline studies of furbearer populations in areas of the Local Assessment Area and Regional Assessment Area, including marten, have been conducted from 2011 to 2015 and will be continued as part of cooperative efforts with the Province of Manitoba, local communities and through the Trapper Participation Program.

There were no adverse potential effects identified in **Appendix 9-9** as having a high level of effect.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on marten is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to furbearers are listed in **Table 9.36.**

Table 9.36: ESRA's Protection Procedures and Specifications for Furbearers

Environmental Protection Procedures Section (Chapter 5, Appendix 5-3)	Environmental Protection Specifications (GR130s) (Chapter 5, Appendix 5-4)
Sec. 1 Clearing and Grubbing	GR130.6 General
Sec. 2 Petroleum Storage	GR130.8 Designated Areas and Access
Sec. 3 Spill Response	GR130.9 Materials Handling, Storage and Disposal
Sec. 5 Materials Handling and Storage	GR130.10 Spills and Remediation and Emergency Response
Sec. 6 Working within or near Fish Bearing Waters	GR130.15 Working Within or Near Water
Sec. 7 Stream Crossings	GR130.16 Erosion and Sediment Control
Sec. 8 Temporary Stream Diversions	GR130.17 Clearing and Grubbing
Sec. 11 Culvert Maintenance and Replacement	GR130.19 Wildlife
Sec. 12 Blasting Near a Watercourse	GR130.21 Cement Batch Plant and Concrete Wash-Out Area
Sec. 14 Wildlife	
Sec. 16 Erosion and Sediment Control	
Sec. 17 Concrete Area Management Practices	
Sec 18 Dust Suppression Practices	

A summary of the potential effects of Project construction on terrestrial furbearers and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.37**.

Table 9.37: Summary of Potential Construction-Related Environmental Effects on Terrestrial Furbearers and Proposed Mitigation Measures

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat loss, alteration or fragmentation due to: ▪ Clearing of vegetation in the right-of-way. ▪ Road construction and installation of bridges and culverts. ▪ Set up and use of equipment, crews, temporary staging areas, temporary work camps. ▪ Setup and use of borrow and quarry areas. ▪ Development of temporary access routes and trails.	▪ Application of design mitigation measures (**Section 9.2**). ▪ Construction activities will be localized to work areas within the Project Footprint. ▪ Road clearing activities will occur during daytime hours when marten are less active. ▪ Dens found during pre-construction surveys will be marked and isolated as Environmentally Sensitive Sites.	Habitat modeling analysis indicated a very small percentage of habitat alteration for marten. The residual effect of habitat loss, alteration or fragmentation will be reduced in magnitude and extent with the application of the identified mitigation measures.	Not Significant

Note: *See **Table 9.39** for the summary of residual Project effects and significance conclusions for terrestrial furbearers.

9.2.5.4.2 Operations and Maintenance Effects and Mitigation

The potential effects on marten in the Local Assessment Area due to Project operations and maintenance activities prior to the implementation of mitigation measures were identified as follows:

- Temporary sensory disturbance.

Using the approach described in **Section 9.2**, the overall level of effect of the potential effects on marten prior to the implementation of mitigation measures was examined. **Appendix 9-10** provides a summary of the potential operations and maintenance effects on marten prior to the implementation of mitigation measures, and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Temporary sensory disturbance within the Local Assessment Area as a result of maintenance activities is a potential effect on marten. These sensory disturbances include road operations and maintenance activities (e.g., snow clearing, grading and addition of aggregate as required), right-of-way vegetation management and bridge and culvert maintenance activities (e.g., debris removal, structural repairs).

To mitigate the temporary sensory disturbance on marten, activities will be localized to operations and maintenance work areas within the Project Footprint. Road, bridge and culvert maintenance activities will be timed to occur during fall and winter to the extent feasible to reduce potential effects on marten during natal or maternal denning periods. The dust suppression techniques as per ESRA's GR130s and Environmental Protection will be applied. The all-season road will be a two-lane gravel road with low traffic volumes designed to optimize the line of sight for drivers, with no pull outs or parking areas. Disturbance (noise) from the use of the road by local communities and visitors to the communities and region (i.e., hunters, fishers, trappers, transportation of goods and materials) will occur during operations. This disturbance is expected to be minimal and no further mitigation is required.

There were no adverse potential effects identified in **Appendix 9-10** as having a moderate or high level of effect.

During the operations and maintenance phase of the Project, there will be the potential beneficial effect of habitat gain due to decommissioning of temporary access routes and the winter road, and regeneration of vegetation in these areas. This effect will reduce the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area.

A summary of the potential effects of Project operations and maintenance on terrestrial furbearers and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.38**.

Table 9.38: Summary of Potential Operations and Maintenance-Related Environmental Effects on Terrestrial Furbearers and Proposed Mitigation Measures

Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat gain due to: ▪ Decommissioning and regeneration of vegetation of temporary access routes and winter road.	▪ Not required.	Reduction of the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area.	Not Significant
Localized areas of temporary sensory disturbance due to: ▪ Road maintenance activities: snow clearing, grading and addition of aggregate as required, right-of-way vegetation management. ▪ Bridge and culvert maintenance activities: debris removal, structural repairs.	▪ Localized to operations and maintenance work areas within the Project Footprint. ▪ The all-season road will be a two-lane gravel road with low traffic volumes. ▪ Application of dust techniques as per ESRA's GR130s and Environmental Protection Procedures. ▪ Road designed to optimize line of sight. ▪ Road, bridge and culvert maintenance activities will be timed to occur during fall and winter to the extent feasible to reduce potential effects on marten during natal or maternal denning periods.	Mitigation measures will reduce the magnitude, extent, frequency and likelihood of temporary sensory disturbance to marten during operations and maintenance. Effect is reversible on cessation of activities.	Not Significant

Note: *See **Table 9.39** for the summary of residual Project effects and significance conclusions for terrestrial furbearers.

9.2.5.4.3 Summary of Project Residual Effects and Conclusion

The residual effects remaining after mitigation for marten during the construction phase of the Project was identified as:

- Loss, alteration or fragmentation of habitat.

The residual effects remaining after mitigation for marten during the operations and maintenance phase of the Project was identified as:

- Temporary sensory disturbance.

The decommissioning of the temporary access routes and winter road and regeneration of vegetation in these areas will provide habitat for marten over time as vegetation matures. Project activities will be localized to work areas within the Project Footprint, which will mitigate the effect of temporary sensory disturbance, with activities timed to occur during fall and winter to the extent feasible to reduce potential effects on marten during natal or maternal denning periods. The all-season road will be a two-lane gravel road with low traffic volumes.

Monitoring of the furbearer populations in areas of the Local Assessment Area and Regional Assessment Area has been conducted from 2013 to 2015 and will be continued as part of cooperative efforts with the Province of Manitoba, local communities, the Trapper Participation Program and Manitoba Trappers Association.

Table 9.39 provides a summary of the residual effects assessment for marten. With the use of appropriate mitigation measures, MCWS resource management, environmental protection measures and environmental protection plans, the residual effects on marten due to Project activities are expected to be not significant.

Table 9.39: Summary of Residual Project Effects and Significance Conclusions for Terrestrial Furbearers

Residual Effects	Residual Effects Characteristics/Level Rating						Ecological Context	Significance Conclusion
	Direction	Duration	Magnitude	Extent	Frequency	Reversibility		
Construction Phase								
▪ Loss, alteration or fragmentation of marten habitat.	N-	III	I	I	I	III	I	N
Operations and Maintenance Phase								
▪ Reduction of habitat loss or alteration in the Local Assessment Area.	P+	III	I	II	II	III	I	N
▪ Temporary sensory disturbance.	N-	III	II	I	II	I	I	N

KEY: (see also **Chapter 6, Section 6.4** for full definitions and Level of Effect criteria for determination of Significance)

Direction:
N- Negative
P+ Positive

Duration:
Short-term = Level I
Medium-term = Level II
Long-term = Level III

Magnitude:
Negligible or Low = Level I
Moderate = Level II
High = Level III

Extent:
Project Footprint = Level I
Local Assessment Area = Level II
Regional Assessment Area = Level III

Frequency:
Once = Level I
Intermittent = Level II
Continuous = Level III

Reversibility:
Reversible (short-term) = Level I
Reversible (long-term) = Level II
Irreversible = Level III

Ecological Context:
Low = Level I (Effect results in minimal disruption of ecological functions and relationships in the area).
Moderate = Level II (Effect results in some disruption of non-critical ecological functions and relationships in the area).
High = Level III (Effect results in disruption of critical ecological functions and relationships in the impacted area).

Significance Conclusion:
S = Significant residual effect
N = No significant residual effect

9.2.5.5 Forest Birds

Within the Local and Regional Assessment Areas, the following migratory forest birds Species at Risk were selected as VCs with respect to the all-season road: Canada warbler, common nighthawk, eastern whip-poor-will and olive-sided flycatcher. These migratory forest birds were selected based on their listing as either "threatened" or "special concern" under *SARA* (Schedule 1), and/or *MBESEA*, as well as their cultural significance. The following is a brief overview of the biology and ecology of the migratory forest birds assessed.

Canada Warbler

The Canada warbler (*Wilsonia canadensis*) (**Photograph 9-27**) is a migratory songbird listed as threatened under *SARA* (Schedule 1) and endangered (S4B) under *MBESEA*. It is found in various forest types, but is most abundant in wet, deciduous-coniferous forest with thick underbrush (MBBA 2015). Generally, this species is uncommon in Manitoba, but found breeding throughout the southern boreal forest (along the Manitoba Escarpment in western Manitoba to the Whiteshell and Nopiming Provincial Park boundaries in the southeast) and north toward The Pas in scattered locations. This species may spend no more than a few months on its summer breeding grounds (i.e., it is one of the last species to arrive and the first to leave), then rapidly migrating in pairs (males typically arrive slightly ahead of females) at night to wintering grounds in southern Mexico and northwestern South America (MBBA 2015). This species is generally uncommon in Manitoba and may potentially occur in the Regional Assessment Area.

(**Source**: Species at Risk Public Registry 2015)

Photograph 9-27: Canada Warbler

Common Nighthawk

The common nighthawk (*Chordeiles minor*) (**Photograph 9-28**) is a migratory bird listed as threatened under *SARA* (Schedule 1), and threatened (S3B) under *MBESEA*. This species breeds in a wide range of open habitats (e.g. dunes, beaches, burnt, logged or recently harvested areas, rocky outcrops, rocky barrens, grasslands, pastures, or riparian areas), along with mixed and coniferous forests (MBBA 2015). Less common in southern Manitoba, it is still quite common in parts of northern Manitoba, and typically arrives late to spring breeding grounds. It winters in the tropics, but migratory patterns are difficult to distinguish from other nighthawks, which it mixes with in parts of the winter range. Uniquely, females usually arrive several days ahead of males to wintering areas (MBBA 2015).

(**Source**: Species at Risk Public Registry 2015)

Photograph 9-28: Common Nighthawk

Eastern Whip-Poor-Will

The Eastern whip-poor-will (*Antrostomus vociferus*) (**Photograph 9-29**) is a migratory bird listed as threatened under *SARA* (Schedule 1) and threatened (S3B) under *MBESEA*. It prefers to breed in semi-open or patchy forests with clearings, such as regenerating disturbed areas, upland deciduous or mixed-wood forests; occurring in a variety of similar forest-structure areas in Manitoba, but not wide-open spaces or dense forests (MBBA 2015). The northern limit of the breeding range is within the Regional Assessment Area. Wintering grounds are in Mexico and Central America (MBBA 2015).

(**Source**: Species at Risk Public Registry 2015)

Photograph 9-29: Eastern Whip-Poor-Will

Olive-Sided Flycatcher

The olive-sided flycatcher (*Contupus cooperi*) (**Photograph 9-30**) is a migratory songbird listed as threatened under *SARA* (Schedule 1) and threatened (S3S4B) under *MBESEA*. Commonly it is found in open forest habitat (boreal wetland, western coniferous, or mixed wood forests) containing tall mature trees or snags for perching to enable foraging. It is also found in open areas including natural forest-edge wetland areas, burned forest clearings, old-growth stand openings, or harvested areas such as logged areas (MBBA 2015). Successful breeding habitat is more likely to be in natural openings rather than harvested areas. In Manitoba, it is located in lowland coniferous forest; Riding Mountain National Park in the west to Moose Lake in the southeast, and up into the Interlake to Hecla Island and Mantagao Lake (MBBA 2015). This species has the longest migration of North American flycatchers, travelling solitary to its wintering grounds primarily in Panama, and the northern Andes from northern Venezuela to western Bolivia, with high densities in Colombia. Densities of olive-sided flycatcher are expected to be low in the Regional Assessment Area based on their breeding range and habitat preferences (MBBA 2015).

(**Source**: Species at Risk Public Registry 2015)

Photograph 9-30: Olive-Sided Flycatcher

Habitat modelling was undertaken for migratory forest bird Species at Risk found within the Local Assessment Area to assess the potential habitat loss/alteration associated with the Project (**Table 9.39**). It was found that habitat for the migratory forest bird Species at Risk is not limiting within the Local Assessment Area and Regional Assessment Area (Joro Consultants 2015a). Alternate forest bird habitat is available adjacent to and beyond the Project Footprint and all-season road right-of-way (Joro Consultants 2015a).

9.2.5.5.1 Construction Effects and Mitigation

The potential effects on forest birds in the Local Assessment Area due to Project construction prior to the implementation of mitigation measures were identified as follows:

- Habitat loss/alteration/fragmentation; and
- Temporary sensory disturbance.

Using the approach described above in **Section 9.2**, the overall level of effect of the potential construction effects on forest birds prior to the implementation of mitigation measures was examined. **Appendix 9-9** provides a summary of the potential construction effects on forest birds prior to the implementation of mitigation measures, and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Clearing activities will occur during late fall and winter to the extent feasible to reduce potential effects on migratory forest bird Species at Risk during spring migration and breeding periods. Where spring/summer clearing is required, surveys for breeding migratory forest birds and/or their nests will be conducted in the Project Footprint prior to clearing or construction activities to meet the requirements of the *Migratory Bird Convention Act* (1994). Nests found during these surveys will be marked and isolated as Environmentally Sensitive Sites, and where necessary setbacks away from construction activities will be applied.

The existing access routes, trails, or cut lines will be used to the least extent feasible and new access routes and trails will be constructed only where necessary and will be kept as short and narrow as feasible. Additionally, the existing winter road and temporary access routes will be decommissioned to allow for the regeneration of vegetation. Dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures will be applied to further minimize sensory disturbance.

Baseline studies on migratory forest bird Species at Risk in areas of the Local Assessment Area and Regional Assessment Area have been conducted from 2011 to 2015 (Joro Consultants 2015a) and will be continued as part of cooperative efforts with the Province of Manitoba, local communities and the Manitoba Breeding Bird Atlas to document observations of the species in the Project Footprint, Local Assessment Area and Regional Assessment Area.

ESRA will continue cooperative efforts with Environment Canada, the Province of Manitoba and local communities to document observations of these species in the Project Footprint, Local Assessment Area and Regional Assessment Area. The application of these mitigation measures and those identified for other wildlife and Terrestrial Environment VCs minimize potential effects on forest birds. With the application of mitigation measures, the potential effect of temporary sensory disturbance to forest birds is not expected to be significant.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a moderate level of effect:

- Habitat loss/alteration/fragmentation.

Habitat Loss/Alteration/Fragmentation

Habitat loss, alteration or fragmentation is a potential effect of the Project on migratory forest bird Species at Risk as a result of construction related activities such as: clearing of vegetation; blasting, road construction and installation of bridges and culverts; set up and use of equipment, crews, temporary staging areas, temporary work camps; setup and use of borrow and quarry areas; and the development of temporary access routes and trails.

The amount of habitat that will be lost or altered as a result of the Project is a very small percentage compared to the amount of overall available habitat within the Local and Regional Assessment Areas

(Joro Consultants 2015a) (see **Table 9.39**). Alternate forest bird habitat is available adjacent to and beyond the Project Footprint (Joro Consultants 2015a). Effects of fragmentation are also expected to be not significant at the Regional Assessment Area scale with some potential local effects (Joro Consultants 2015a). Mitigation measures developed to reduce the potential effects of construction activities identified for other wildlife VCs will reduce local and regional effects to migratory forest bird Species at Risk and include the application of design mitigation measures (**Section 9.2**).

Table 9.39: Summary of the Percentage of Habitat Loss or Altered for Forest Birds Due to Clearing in the All-Season Road Project Footprint

Forest Bird Species	% Habitat Loss or Alteration in the Project Footprint
Canada Warbler	1.66
Common Nighthawk	4.83
Eastern Whip-Poor-Will	4.82
Olive-Sided Flycatcher	4.69

Source: Joro Consultants 2015a (**Appendix 9-1**)

To minimize habitat loss, alteration or fragmentation, construction work areas will be localized to the Project Footprint. Riparian vegetation clearing within the right-of-way beyond the road and ditching will be limited to the removal of trees and tall shrubs (to maintain line of sight safety requirements) with no removal of low growing vegetation.

There were no adverse potential effects identified in **Appendix 9-9** as having a high level of effect.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on forest birds is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to migratory forest birds are listed in **Table 9.40.**

A summary of the potential effects of Project construction on forest birds and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.41**.

Table 9.40: ESRA's Protection Procedures and Specifications for Migratory Forest Birds

Environmental Protection Procedures Section (Chapter 5, Appendix 5-3)	Environmental Protection Specifications (GR130s) (Chapter 5, Appendix 5-4)
Sec. 1 Clearing and Grubbing Sec. 12 Blasting Near a Watercourse Sec. 14 Wildlife	GR130.6 General GR130.8 Designated Areas and Access GR130.17 Clearing and Grubbing GR130.19 Wildlife

Table 9.41: Summary of Potential Construction-Related Environmental Effects on Forest Birds and Proposed Mitigation Measures

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat loss, alteration, fragmentation due to: ▪ Various Project construction activities	▪ Project routing and siting to avoid sensitive areas and high quality habitats to the greatest extent feasible. ▪ Rehabilitation of trails and winter roads to offset habitat loss. ▪ Conduct pre-clearing migratory bird nest surveys during the nesting season. If found, they will be marked and isolated as Environmentally Sensitive Sites and setbacks from construction activities will be implemented to the greatest extent feasible. ▪ Reclaim disturbed areas and encourage natural regrowth (e.g., temporary access routes, winter roads and trails will be decommissioned as soon as feasible to allow the regeneration of vegetation).	Habitat modeling analysis for the migratory forest bird Species at Risk showed that there will be a minor loss or alteration of habitat in the Project Footprint, depending on the species. Alternate habitat is available adjacent to and beyond the Project Footprint. The residual effect of habitat loss, alteration or fragmentation will be reduced in magnitude and extent with the application of the identified mitigation measures.	Not Significant

Note: *See **Table 9.44** for the summary of residual Project effects and significance conclusions for forest birds.

9.2.5.5.2 Operations and Maintenance Effects and Mitigation

The potential effects on forest birds in the Local Assessment Area due to Project operations and maintenance prior to the implementation of mitigation measures were identified as follows:

- Temporary sensory disturbance.

Using the approach described above in **Section 9.2**, the overall level of effect of the potential construction effects on forest birds prior to the implementation of mitigation measures was examined. **Appendix 9-10** provides a summary of the potential operations and maintenance effects on forest birds prior to the implementation of mitigation measures, and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Temporary sensory disturbance within the Local Assessment Area as a result of operations and maintenance activities is a potential effect on migratory forest bird Species at Risk. These sensory disturbances include road maintenance activities (e.g., snow clearing, grading and addition of aggregate as required), right-of-way vegetation management, bridge and culvert maintenance activities (e.g., debris removal, structural repairs), the use of road by local communities, supply delivery and visitors to the communities and region. To mitigate the temporary disturbance to migratory forest bird Species at Risk, activities will be localized to operations and maintenance work areas within the Project Footprint. Limiting the areas of activities reduces the duration magnitude, extent and frequency of the disturbance. The effect is reversible upon cessation of activities. The dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures will be applied to further reduce effects.

There were no adverse potential effects identified in **Appendix 9-10** as having a moderate or high level of effect.

During the operations and maintenance phase of the Project, there will be the potential beneficial effect of habitat gain due to decommissioning of temporary access routes and the winter road and regeneration of vegetation in these areas. This will create habitat for migratory forest bird Species at Risk. The minimal habitat loss or alteration during construction will be further reduced with a 0.13% gain in habitat over time due to the decommissioning of the temporary access routes and 0.02% to 0.47% gain (depending on the species) through decommissioning of the winter road in the Local Assessment Area (**Table 9.42**). Decommissioning of the winter road is expected to provide an additional 0.31 km^2 of mixed habitat types in the Local Assessment Area and additional 1.12 km^2 of mixed habitat types in the Regional Assessment Area (see **Table 9.13)**.

Table 9.42: Summary of the Percentage of Habitat Gain for Forest Birds Due to Decommissioning of Winter Road

Forest Bird Species	% Habitat Gain in Local Assessment Area (Winter Road Reclamation)
Canada Warbler	0.02
Common Nighthawk	0.47
Eastern Whip-Poor-Will	0.45
Olive-Sided Flycatcher	0.03

Source: Joro Consultants 2015a (**Appendix 9-1**)

This habitat gain will reduce the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area.

ESRA will continue cooperative efforts with Environment Canada, the Province of Manitoba and local communities to document observations of these species in the right-of-way, Local Assessment Area and Regional Assessment Area.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on forest birds is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to migratory forest birds are listed in **Table 9.40.**

A summary of the potential effects of Project operations and maintenance on forest birds and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.43**.

Table 9.43: Summary of Potential Operations and Maintenance -Related Environmental Effects on Forest Birds and Proposed Mitigation Measures

Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat gain due to: ▪ Decommissioning and regeneration of vegetation of temporary access routes and winter road.	▪ Not required.	Reduction of the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area.	Not Significant
Localized areas of temporary sensory disturbance due to: ▪ Road maintenance activities.	▪ Localized to operations and maintenance work areas within the Project Footprint. ▪ Timed to occur during fall and winter where feasible to avoid nesting periods. ▪ Application of dust techniques as per ESRA's GR130s and Environmental Protection Procedures.	Mitigation measures will reduce the magnitude, extent, frequency and likelihood of temporary sensory disturbance to forest birds during operations and maintenance. Effect is reversible on cessation of activities.	Not Significant

Note: *See **Table 9.44** for the summary of residual Project effects and significance conclusions for forest birds.

9.2.5.5.3 Summary of Project Residual Effects and Conclusion

The residual Project effects remaining after mitigation for migratory forest bird Species at Risk during the construction phase of the Project were identified as:

- Loss, alteration or fragmentation of habitat.

The residual Project effects remaining after mitigation for migratory forest birds Species at Risk during the operations and maintenance phase of the Project were identified as:

- Temporary sensory disturbance.

The decommissioning and regeneration of vegetation of the temporary access routes and winter road will create habitat for migratory forest bird Species at Risk. The temporary sensory disturbance on migratory forest bird Species at Risk will be localized to work areas within the Project Footprint and timed to occur during fall and winter, where feasible, to avoid nesting periods. The all-season road will be a two-lane gravel road with low traffic volumes. Furthermore, the right-of-way will provide open areas for foraging that are required by some species as well as providing areas of habitat for prey (insects).

ESRA will continue cooperative efforts with Environment Canada, the Province of Manitoba and local communities to document observations of these species in the right-of-way, Local Assessment Area and Regional Assessment Area.

Table 9.44 provides a summary of the residual effects assessment for migratory forest bird Species at Risk. With the use of appropriate mitigation measures, MCWS resource management, environmental protection measures and environmental protection plans, the residual effects on migratory forest bird Species at Risk due to Project activities are expected to be not significant.

Table 9.44: Summary of Residual Project Effects and Significance Conclusions for Forest Birds

Residual Effects	Residual Effects Characteristics/Level Rating						Ecological Context	Significance Conclusion
	Direction	Duration	Magnitude	Extent	Frequency	Reversibility		
Construction Phase								
▪ Loss, alteration or fragmentation of migratory forest bird Species at Risk habitat.	N-	III	I	I	I	II	I	N
Operations and Maintenance Phase								
▪ Reduction of habitat loss or alteration in the Local Assessment Area.	P+	III	I	II	II	III	I	N
▪ Temporary sensory disturbance.	N-	III	II	I	II	I	I	N

KEY: (see also **Chapter 6, Section 6.4** for full definitions and Level of Effect criteria for determination of Significance)

Direction:
N- Negative
P+ Positive

Duration:
Short-term = Level I
Medium-term = Level II
Long-term = Level III

Magnitude:
Negligible or Low = Level I
Moderate = Level II
High = Level III

Extent:
Project Footprint = Level I
Local Assessment Area = Level II
Regional Assessment Area = Level III

Frequency:
Once = Level I
Intermittent = Level II
Continuous = Level III

Reversibility:
Reversible (short-term) = Level I
Reversible (long-term) = Level II
Irreversible = Level III

Ecological Context:
Low = Level I (Effect results in minimal disruption of ecological functions and relationships in the area).
Moderate = Level II (Effect results in some disruption of non-critical ecological functions and relationships in the area).
High = Level III (Effect results in disruption of critical ecological functions and relationships in the impacted area).

Significance Conclusion:
S = Significant residual effect
N = No significant residual effect

9.2.5.6 Waterbirds

Within the Local Assessment Area and Regional Assessment Area, the following migratory waterbirds were selected as VCs: trumpeter swan, yellow rail and geese and ducks. These migratory waterbirds were selected based on their listing as either “endangered”, "threatened" or "special concern" under *SARA* (Schedule 1) and/or the *MBESEA*, their value as a harvested species and their cultural significance.

Trumpeter Swan

Trumpeter swan (*Cygnus buccinators*) (**Photograph 9-31**) is a migratory waterbird not listed under *SARA* (Schedule 1) but is endangered (S1S2B) under *MBESEA*. It prefers nesting is shallow wetlands with stable water levels, abundant and elevated nest sites, abundant and diverse aquatic invertebrates and/or plants and low levels of human disturbance. Trumpeter swan are typically mates for life, with females laying an egg every second day until they have a full clutch (average of five to six eggs). Migration to wintering grounds is complex and flown in short segments with long layovers and very few long flights with birds from western Canada flying east of the Rockies to the Yellowstone area following freeze up in late fall. Trumpeter swan sightings in Manitoba have increased in recent years; several breeding pairs now nest in Riding Mountain National Park, one pair was observed near Bissett and a record was recently confirmed on the east side of Lake Winnipeg. Other observations in the Regional Assessment Area have been increasing; however, there is no evidence of breeding activity such as cygnets (young) to date.

(**Source**: Joro Consultants 2015b)

Photograph 9-31: Trumpeter Swans Observed in the Local Assessment Area

Yellow Rail

Yellow rail (*Coturnicops noveboracensis*) (**Photograph 9-32**) is a migratory marsh bird listed as Special Concern under *SARA* (Schedule 1) and is not listed (S3S4B) under *MBESEA*. It is typically found in marshes with little standing water (0-12 cm depth) and emergent vegetation (e.g., sedges, true grasses and rushes), but also inhabits damp fields and meadows, river and stream floodplains, herbaceous vegetation of bogs and drier margins of estuarine- and salt marshes. Yellow rail breeds in most areas of Manitoba, particularly the south, central and Hudson Bay Lowlands, where it is often associated with Le Conte's sparrow and sedge wren. It winters from the Carolinas south to Florida, along the Gulf Coast and rarely in southern California. Habitat conditions in the Local Assessment Area are not favourable for the yellow rail therefore their distribution is expected to be rare.

(**Source**: Species at Risk Public Registry 2015)

Photograph 9-32: Yellow Rail

Geese and Ducks

Local communities indicated that geese (e.g., Canada goose [*Branta Canadensis]***; Photograph 9-33**) and ducks were important as part of traditional hunting practices and as a food item (**Chapter 10,** Socio-Economic and Cultural Environment). The effects analysis on migratory waterbird Species at Risk was used as proxy for an effects analysis on these more common migratory waterbirds (geese and ducks).

Habitat Modelling

Habitat modelling was undertaken for migratory waterbird Species at Risk found within the Local Assessment Area to assess the potential habitat loss/alteration for each species in association with the Project. It was found that habitat for waterbird Species at Risk is not limiting within the Local and Regional Assessment Areas (Joro Consultants 2015a). Alternate waterbird habitat is available adjacent to and beyond the Project Footprint (Joro Consultants 2015a).

(**Source**: Joro Consultants 2015b)

Photograph 9-33: Canada Geese

9.2.5.6.1 Construction Effects and Mitigation

The potential effects on waterbirds in the Local Assessment Area due to Project construction prior to the implementation of mitigation measures were identified as follows:

- Habitat loss/alteration/fragmentation; and
- Temporary sensory disturbance.

Using the approach described above in **Section 9.2**, the overall level of effect of the potential construction effects on waterbirds prior to the implementation of mitigation measures was examined. **Appendix 9-9** provides a summary of the potential construction effects on waterbirds prior to the implementation of mitigation measures, and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Temporary sensory disturbance within the Local Assessment Area as a result of construction activities is a potential effect on waterbirds. To mitigate this potential effect, existing access routes, trails or cut lines will be used to the least extent feasible and new access routes and trails will be constructed only where necessary and will be kept as short and narrow as feasible to minimize fragmentation and limit sensory disturbance. Additionally, the existing winter road will be decommissioned to allow the regeneration of vegetation. Temporary access routes and trails will also be decommissioned as soon as

feasible. Where spring/summer clearing is required, surveys for breeding migratory birds and/or their nests will be conducted in the Project Footprint prior to clearing or construction activities to meet the requirements of the *Migratory Bird Convention Act* (1994). Nests found during these surveys will be marked and isolated as Environmentally Sensitive Sites and where necessary setbacks away from construction activities will be applied. Dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures will be applied to further minimize sensory disturbances.

Baseline studies on migratory waterbird Species at Risk in the Local and Regional Assessment Areas have been conducted from 2011 to 2015 (Joro Consultants 2015a) and will be continued as part of cooperative efforts with the Province of Manitoba, local communities and the Manitoba Breeding Bird Atlas to document observations in the Project Footprint and the Local and Regional Assessment Areas.

ESRA will continue cooperative efforts with Environment Canada, the Province of Manitoba and local communities to document observations of these species in the Project Footprint and the Local and Regional Assessment Areas. The application of these mitigation measures and those identified for other Terrestrial Environment VCs will minimize potential effects on waterbirds. With the application of mitigation measures, the potential effect of temporary sensory disturbance to waterbirds is not expected to be significant.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a moderate level of effect:

- Habitat loss/alteration/fragmentation.

Habitat Loss/Alteration/Fragmentation

Habitat loss, alteration or fragmentation is a potential effect of the Project on migratory waterbird Species at Risk as a result of construction related activities such as: clearing of vegetation in the right-of-way; blasting, road construction and installation of bridges and culverts; set up and use of equipment, crews, temporary staging areas and temporary work camps; setup and use of borrow and quarry areas; and the development of temporary access routes and trails.

The amount of habitat that would be lost or altered as a result of the Project is a very small percentage compared to the amount of overall available habitat within the Local Assessment Area (Joro Consultants 2015a). Habitat modeling analysis showed that there will be a total loss or alteration of between 0.99% and 1.60% of habitat in the Project Footprint, depending on the species (**Table 9.45**). The overall habitat loss or alteration will be reduced as there will be 0.13% of forest and wetland habitat gained over time in the Local Assessment Area due to the decommissioning of temporary access routes. Additionally, the overall habitat loss or alteration will be reduced further as there will be a gain of 0.04% to 0.09% of habitat (depending on the species) gained over time in the Local Assessment Area due to the decommissioning of the winter road. Decommissioning of the winter road is expected to provide an additional 0.31 km^2 of mixed habitat types in the Local Assessment Area and additional 1.12 km^2 of mixed habitat types in the Regional Assessment Area (Joro Consultants 2015a).

Table 9.45: Summary of the Percentage of Habitat Loss or Altered for Waterbirds Due to Clearing in the Project Footprint

Waterbird Species	% Habitat Loss or Alteration in the Project Footprint
Trumpeter Swan	1.15
Yellow Rail	1.60

Source: Joro Consultants 2015a (**Appendix 9-1**)

Mitigation measures developed to reduce the potential effects of Project construction activities identified for other wildlife VCs will reduce the local and regional effect, including the application of design mitigation measures (**Section 9.2**). The all-season road routing avoided areas of high quality habitat such as lakes, ponds and wetlands where feasible and clearing activities will occur during late fall and winter to the extent feasible to reduce potential effects on migratory waterbird Species at Risk during spring migration and breeding periods. Where spring/summer clearing is required, surveys for migratory waterbird Species at Risk and/or their nesting areas will be conducted in the Project Footprint prior to clearing. Nests found will be marked and isolated as Environmentally Sensitive Sites to protect them from disturbance as per the *Migratory Birds Convention Act* (1994) and where necessary setbacks away from construction activities will be applied.

A vegetated buffer zone will be retained between the all-season road and lakes or ponds along the right-of-way (e.g., Bull Lake and Pamatakakowin Lake). Where feasible, roads will be located a minimum of 100 m from waterbodies except when crossing a watercourse. Where this is not feasible, a buffer of undisturbed vegetation equal to 10 m plus 1.5 times the slope gradient, or 30 meters, whichever is greater, will be left between the road and adjacent watercourses. Riparian vegetation clearing within the right-of-way beyond the road and ditching will be limited to the removal of trees and tall shrubs (to maintain line of sight safety requirements) with no removal of low growing vegetation in order to minimize erosion and sedimentation in adjacent waterbodies.

Existing water flow patterns, water levels and wetland hydrologic regimes will be maintained. The measures outlined in **Tables 8.7** and **8.8** in **Chapter 8** (Aquatic Environment) will be used to mitigate the release and/or transport of sediment and/or other deleterious substances to watercourses. The appropriate erosion and sediment control (ESC) measures will be in place prior to the commencement of clearing and construction and will remain in place until disturbed areas are stabilized and revegetated.

Baseline studies on migratory waterbird Species at Risk in areas of the Local and Regional Assessment Areas have been conducted from 2011 to 2015 (Joro Consultants 2015a) and will continue as part of cooperative efforts with the Environment Canada, the Province of Manitoba, local communities and the Manitoba Breeding Bird Atlas.

There were no adverse potential effects identified in **Appendix 9-9** as having a high level of effect.

A summary of the residual Project effects during construction for waterbirds and the significance of these effects are provided in **Table 9.46.**

Table 9.46: Summary of Potential Construction-Related Environmental Effects on Waterbirds and Proposed Mitigation Measures

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat loss, alteration, fragmentation due to: ▪ Various Project construction activities.	▪ Project routing and siting to avoid sensitive areas and high quality habitats to the greatest extent feasible. ▪ Rehabilitation of trails and winter roads to offset habitat loss ▪ Conduct pre-clearing migratory bird nest surveys during the nesting season. If found, they will be marked and isolated as Environmentally Sensitive Sites and setbacks from construction activities will be implemented to the greatest extent feasible. ▪ A vegetated buffer zone will be retained between the all-season road and lakes or ponds along the right-of-way (e.g., Bull Lake and Pamatakakowin Lake). ▪ Existing water flow patterns, water levels and wetland hydrologic regimes will be maintained. ▪ Reclaim disturbed areas and encourage natural regrowth (e.g., temporary access routes, winter roads and trails will be decommissioned as soon as feasible to allow the regeneration of vegetation).	Habitat modeling analysis for the migratory waterbird Species at Risk showed that there will be a minor loss or alteration of habitat in the Project Footprint, depending on the species. Alternate habitat is available adjacent to and beyond the Project Footprint. The residual effect of habitat loss, alteration or fragmentation will be reduced in magnitude and extent with the application of the identified mitigation measures.	Not Significant

Note: *See **Table 9.49** for the summary of residual Project effects and significance conclusions for waterbirds.

9.2.5.6.2 Operations and Maintenance Effects and Mitigation

The potential effects on waterbirds in the Local Assessment Area due to Project operations and maintenance prior to the implementation of mitigation measures were identified as follows:

- Temporary sensory disturbance.

Using the approach described in **Section 9.2**, the overall level of effect potential operations and maintenance effects on waterbirds prior to the implementation of mitigation measures was examined. **Appendix 9-10** provides a summary of the potential operations and maintenance effects on waterbirds prior to the implementation of mitigation measures, and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Temporary sensory disturbance within the Local Assessment Area as a result of operations and maintenance activities is a potential effect on migratory waterbird Species at Risk. These sensory disturbances include road maintenance activities (e.g., snow clearing, grading and addition of aggregate as required), right-of-way vegetation management, bridge and culvert maintenance activities (e.g., debris removal, structural repairs), the use of road by local communities, supply delivery and visitors to the communities and region.

To mitigate the temporary disturbance to migratory forest bird Species at Risk, activities will be localized to operations and maintenance work areas within the Project Footprint. Limiting the areas of activities reduces the duration magnitude, extent and frequency of the disturbance. The effect is reversible on cessation of activities. The dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures will be applied to further reduce potential effects.

There were no adverse potential effects identified in **Appendix 9-10** as having a moderate or high level of effect.

During the operations and maintenance phase of the Project, there will be the potential beneficial effect of habitat gain due to decommissioning of temporary access routes and the winter road, and regeneration of vegetation in these areas. During the operations and maintenance phase of the Project, decommissioning and regeneration of vegetation of the temporary access routes and winter road will create habitat for migratory waterbird Species at Risk. The minimal habitat loss or alteration during construction will be further reduced with a 0.13% gain in habitat over time due to the decommissioning of the temporary access routes and 0.02% to 0.47% gain (depending on the species) through decommissioning of the winter road in the Local Assessment Area (**Table 9.47**). Decommissioning of the

winter road is expected to provide an additional 0.31 km^2 of mixed habitat types in the Local Assessment Area and additional 1.12 km^2 of mixed habitat types in the Regional Assessment Area (see **Table 9.13)**.

Table 9.47: Summary of the Percentage of Habitat Gain Due to Winter Road Reclamation

Waterbird Species	% Habitat Gain in Local Assessment Area (Winter Road Reclamation)
Trumpeter Swan	0.04
Yellow Rail	0.09

Source: Joro Consultants 2015a (**Appendix 9-1**)

This habitat gain will reduce the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area.

ESRA will continue cooperative efforts with Environment Canada, the Province of Manitoba and local communities to document observations of these species in the right-of-way, Local Assessment Area and Regional Assessment Area.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on waterbirds is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to migratory birds are listed in **Table 9.40.**

A summary of the potential effects of Project operations and maintenance on waterbirds and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.48**.

Table 9.48: Summary of Potential Operations and Maintenance-Related Environmental Effects on Waterbirds and Proposed Mitigation Measures

Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat gain due to: ▪ Decommissioning and regeneration of vegetation of temporary access routes and winter road.	▪ Not required.	Reduction of the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area.	Not Significant
Localized areas of temporary sensory disturbance due to: ▪ Various Project operations and maintenance activities.	▪ Localized to operations and maintenance work areas within the Project Footprint. ▪ Timed to occur during fall and winter where feasible to avoid nesting periods. ▪ Application of dust techniques as per ESRA's GR130s and Environmental Protection Procedures.	Mitigation measures will reduce the magnitude, extent, frequency and likelihood of temporary sensory disturbance to waterbirds during operations and maintenance. Effect is reversible on cessation of activities.	Not Significant

Note: *See **Table 9.49** for the summary of residual Project effects and significance conclusions for waterbirds.

9.2.5.6.3 Summary of Project Residual Effects and Conclusion

The residual effects remaining after mitigation for migratory waterbird Species at Risk during the construction phase of the Project were identified as:

- Loss, alteration or fragmentation of habitat.

The residual effects remaining after mitigation for migratory waterbird Species at Risk during the operations and maintenance phase of the Project were identified as:

- Temporary sensory disturbance.

The decommissioning and regeneration of vegetation of the temporary access routes and winter road will create habitat for migratory waterbird Species at Risk. The temporary sensory disturbance on migratory waterbird Species at Risk will be localized to work areas within the Project Footprint and clearing activities will be timed to occur during late fall and winter to the extent feasible to avoid potential disturbance of migratory waterbird species. The all-season road will be a two-lane gravel road with low traffic volumes.

ESRA will continue efforts with Environment Canada, the Province of Manitoba and local communities to document observations of these species in the right-of-way, Local Assessment Area and Regional Assessment Area.

Table 9.49 provides a summary of the residual effects assessment for migratory waterbird Species at Risk. With the use of appropriate mitigation measures, MCWS resource management, environmental protection measures and environmental protection plans, the residual effects on migratory waterbird Species at Risk due to Project activities are expected to be not significant.

Table 9.49: Summary of Residual Project Effects and Significance Conclusions for Waterbirds

Residual Effects	Residual Effects Characteristics/Level Rating						Ecological Context	Significance Conclusion
	Direction	Duration	Magnitude	Extent	Frequency	Reversibility		
Construction Phase								
▪ Loss, alteration or fragmentation of migratory waterbird Species at Risk habitat.	N-	III	I	I	I	II	I	N
Operations and Maintenance Phase								
▪ Reduction of habitat loss or alteration in the Local Assessment Area.	P+	III	I	II	II	III	I	N
▪ Temporary sensory disturbance.	N-	III	II	I	II	I	I	N

KEY: (see also **Chapter 6, Section 6.4** for full definitions and Level of Effect criteria for determination of Significance)

Direction:
N- Negative
P+ Positive

Duration:
Short-term = Level I
Medium-term = Level II
Long-term = Level III

Magnitude:
Negligible or Low = Level I
Moderate = Level II
High = Level III

Extent:
Project Footprint = Level I
Local Assessment Area = Level II
Regional Assessment Area = Level III

Frequency:
Once = Level I
Intermittent = Level II
Continuous = Level III

Reversibility:
Reversible (short-term) = Level I
Reversible (long-term) = Level II
Irreversible = Level III

Ecological Context:
Low = Level I (Effect results in minimal disruption of ecological functions and relationships in the area).
Moderate = Level II (Effect results in some disruption of non-critical ecological functions and relationships in the area).
High = Level III (Effect results in disruption of critical ecological functions and relationships in the impacted area).

Significance Conclusion:
S = Significant residual effect
N = No significant residual effect

9.2.5.7 Environmentally Sensitive Wildlife Sites

Several Environmentally Sensitive Wildlife Sites were identified as a VC for the all-season road. These Environmentally Sensitive Wildlife Sites, including bat hibernacula, snake hibernacula, heron rookeries, mineral licks, large stick nests and animal dens (wolverine, bear; **Photograph 9-34**), were selected given that they represent one or more of the following: critical wintering habitat; critical breeding habitat; species fidelity to dens and nests; and/or may be culturally significant sites.

Through the identification of these sites as a VC for the all-season road Project, the habitat needs of the remaining Terrestrial Environment VCs and Species at Risk (i.e., the two bat species and the wolverine) were protected with the application of mitigation measures for these sites/critical habitats. The additional Environmentally Sensitive Wildlife Sites that were not associated with a listed species under *SARA*/COSEWIC/*MBESEA* were selected based on their importance to local ecology and communities (e.g., bald eagle, black bear, wolves, herons and garter snakes).

(**Source**: North American Bear Centre 2015)

Photograph 9-34: Seven Year Old Black Bear in Den with Cubs

Bat hibernacula are typically first located on the basis of surficial geology with landscapes examined for karst features such as caves, sinkholes and trenches in areas where limestone, dolomite and gypsum bedrock were near the surface (Norquay *et al.* 2013). Given the landcover associated with the all-season road Local Assessment Area (Joro Consultants 2015a), bat and snake hibernacula are unlikely to be present. Further description of the physical environment of the Local and Regional Assessment Areas, including rock and soil types, is provided in **Chapter 7** (Physical Environment). Little brown bats choose caves and mines as hibernacula, where they form groups of a few to hundreds of thousands of individuals (Norquay *et al.* 2013). In fall, from August to October, bats gather at swarms, focused at

hibernacula, presumably to mate and potentially to familiarize juveniles with hibernation sites. Summer roosts can be a built for their maternity colonies but they also use tree cavities or other places that stay dark and warm during the day, like bat boxes (Canadian Wildlife Federation 2015b). The potential exists for the Local Assessment Area to be used during the summer as roosting sites within the forested areas.

The northern myotis bat seems opportunistic in selecting roosts, using tree species based on presence of cavities or crevices or presence of peeling bark. Suitable spring staging/fall swarming habitat consists of the variety of forested/wooded habitats where they roost, forage and travel, which is most typically within five miles of a hibernaculum (U.S Fisheries and Wildlife Service [USFWS] 2014). Such habitat exists within the all-season road Local Assessment Area; however, to date, no bat hibernacula have been identified within the Local Assessment Area (Joro Consultants 2015a).

Wolverines (**Photograph 9-35**) are listed as a species of Special Concern under COSEWIC (2014). Wolverine females den under snow-covered rocks, logs, or within snow tunnels. Dens are constructed either in talus boulders, along eskers, under deadfall, under logs in avalanche debris or in snow tunnels at higher elevations and tundra. Wolverine dens are also associated with large boulders and downed trees at lowland boreal sites in Ontario and Yukon. In the eastern Arctic, wolverines den in rocky areas with boulders, while in the western Arctic, knowledge holders describe finding dens in snow banks, under tree roots and along streams throughout the boreal region. The availability of adequate insulating snow cover (i.e., ≥1.0 m deep) late into spring appears to be an important habitat feature for denning. Such snow accumulation typically occurs in ravines and on leeward slopes. Dens with spring snow cover allow wolverines to construct snow tunnels that provide thermoregulatory benefits for kits and are secure from excavation by predators. Dens are located in areas used by few other carnivores and provide an abundance of small-mammal prey for feeding kits. Human recreation, such as snowmobiling and other forms of snow travel allowed in some parks, may disturb wolverines, particularly during the denning season in February to March. To date, wolverine denning has not been identified during wildlife baseline studies conducted in the Local Assessment Area from 2011-2015, and Traditional Knowledge gathered from the local community members residing within the all-season road Local Assessment Area have not indicated knowledge of wolverine denning within the Local Assessment Area (Joro Consultants 2015a).

(**Source**: Artuso 2014)

Photograph 9-35: Wolverine in Northern Manitoba

9.2.5.7.1 Construction Effects and Mitigation

The potential effects on Environmentally Sensitive Wildlife Sites in the Local Assessment Area due to Project construction prior to the implementation of mitigation measures were identified as follows:

- Loss, alteration or physical disturbance of overwintering dens, heron rookeries, hibernacula, large stick nests or mineral licks; and
- Temporary sensory disturbance.

Using the approach described above in **Section 9.2**, the overall level of effect of the potential construction effects on Environmentally Sensitive Sites prior to the implementation of mitigation measures was examined. **Appendix 9-9** provides a summary of the potential construction effects on Environmentally Sensitive Wildlife Sites prior to the implementation of mitigation measures, and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Temporary sensory disturbance within the Local Assessment Area as a result of construction activities is a potential effect on Environmentally Sensitive Wildlife Sites. These sensory disturbances include:

blasting and clearing activities, equipment and crew movement, installation of bridges and culverts and the temporary development of access routes and trails.

To mitigate sensory disturbance effects, construction work areas will be localized to the Project Footprint with road clearing activities occurring during late fall and winter to the extent feasible. Wildlife surveys conducted from 2011 to 2015 in areas of the Local Assessment Area and Regional Assessment Area have not identified the presence of dens, heron rookeries, hibernacula or large stick nests along the proposed all-season road alignment (Joro Consultants 2015a). There is a low probability for the presence of bat or snake hibernacula in the all-season road Project Footprint based on regional geology and known presence in Manitoba. There is also a low probability of presence of wolverine dens in the all-season road Project Footprint due to low presence/density of this animal in the Local Assessment Area. The right-of-way, existing access routes, trails, or cut lines will be used to the least extent feasible and access routes and trails will be kept as short and narrow as feasible. The dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures will be applied. With the application of mitigation measures, the potential effect of temporary sensory disturbance to Environmentally Sensitive Wildlife Sites is not expected to be significant.

Monitoring of Environmentally Sensitive Wildlife Sites in areas of the Local Assessment Area and Regional Assessment Area has been conducted from 2011 to 2015 (Joro Consultants 2015a) and will be continued as part of cooperative efforts with the Environment Canada, the Province of Manitoba and local communities.

Based on the screening of potential effects in **Appendix 9-9**, the following potential adverse effect was identified as having a moderate level of effect:

- Loss, alteration or physical disturbance of overwintering dens, heron rookeries, hibernacula, large stick nests or mineral licks.

Loss, Alteration or Physical Disturbance

Loss, alteration or physical disturbance of overwintering dens, heron rookeries, hibernacula, large stick nests, or mineral licks may occur as a result of construction related activities such as: clearing of vegetation in the right-of-way; road construction and installation of bridges and culverts; set up and use of equipment, crews, temporary staging areas and temporary work camps; setup and use of borrow and quarry areas; and the development of temporary access routes and trails.

Wildlife surveys conducted from 2011 to 2015 in areas of the Local Assessment Area and Regional Assessment Area have not identified the presence of dens, heron rookeries, hibernacula or large stick nests or mineral licks along the proposed all-season road alignment (Joro Consultants 2015a). There is a low probability for the presence of bat or snake hibernacula in the all-season road Project Footprint based on regional geology and known presence in Manitoba. There is also a low probability of presence of wolverine dens in the all-season road Project Footprint due to low presence/density of this animal in the Local Assessment Area. Alternate habitat is available for these species that use these

Environmentally Sensitive Wildlife Sites adjacent to and beyond the Project Footprint (Joro Consultants 2015a). The existing access routes, trails, or cut lines will be used to the extent feasible and access routes and trails will be kept as short and narrow as feasible. The existing winter road, temporary access routes and trails will be decommissioned to allow the regeneration of vegetation.

Surveys for dens, heron rookeries, hibernacula, or large stick nests will be conducted in the Project Footprint prior to clearing or construction activities. Dens, heron rookeries, hibernacula, large stick nests or mineral licks found during pre-construction surveys will be marked and isolated as Environmentally Sensitive Sites in the Environmental Protection Procedures. In the event that dens, heron rookeries, hibernacula, large stick nests or mineral licks are found during construction activities, these areas will be marked and isolated as Environmentally Sensitive Sites. Setbacks from construction activities and/or staged construction activities (i.e., stop and delay construction activities in sensitive areas until animal use of the area and/or sensitive time period has passed), will be implemented to the extent feasible.

ESRA will continue cooperative efforts with Environment Canada, the Province of Manitoba and local communities to document observations of Species at Risk such as little brown myotis, northern myotis and wolverine in the all-season road right-of-way and aid in the protection of these species and their habitats as per *SARA* guidelines.

There were no adverse potential effects identified in **Appendix 9-9** as having a high level of effect.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on Environmentally Sensitive Wildlife Sites is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

A summary of the potential effects of Project construction on Environmentally Sensitive Wildlife Sites and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.50**.

Table 9.50: Summary of Potential Construction-Related Environmental Effects on Environmentally Sensitive Wildlife Sites and Proposed Mitigation Measures

Construction Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Loss, alteration or physical disturbance of overwintering dens, heron rookeries, hibernacula, large stick nests or mineral licks due to: ▪ Clearing of vegetation in the right-of-way. ▪ Road construction and installation of bridges and culverts. ▪ Set up and use of equipment, crews, temporary staging areas, temporary work camps. ▪ Setup and use of borrow and quarry areas. ▪ Development of temporary access routes and trails.	▪ Application of design mitigation measures (**Section 9.2**). ▪ Mineral licks have been identified and included in Environmental Protection Procedures as Environmentally Sensitive Sites. ▪ Dens, heron rookeries, hibernacula, large stick nests or additional mineral licks found during pre-construction surveys will be marked and isolated as Environmentally Sensitive Sites in the Environmental Protection Procedures. ▪ In the event that dens, heron rookeries, hibernacula, large stick nests or additional mineral licks are found during construction activities, these areas will be marked and isolated as Environmentally Sensitive Sites; setbacks from construction activities and/or staged construction activities, (i.e., stop and delay construction activities in sensitive areas until animal use of the area and/or sensitive time period has passed) will be implemented to the extent feasible. ▪ Existing access routes, trails or cut lines will be used to the extent feasible and access routes and trails will be kept as short and narrow as feasible.	The residual effect of loss, alteration or physical disturbance of overwintering dens, heron rookeries, hibernacula, large stick nests or mineral licks will be reduced in magnitude and extent with the application of the identified mitigation measures.	Not Significant

Note: *See **Table 9.52** for the summary of residual Project effects and significance conclusions for environmentally sensitive wildlife sites.

9.2.5.7.2 Operations and Maintenance Effects and Mitigation

The potential effects on Environmentally Sensitive Wildlife Sites in the Local Assessment Area due to Project operations and maintenance prior to the implementation of mitigation measures were identified as follows:

- Temporary sensory disturbance.

Examined using the approach described in **Section 9.2**, **Appendix 9-10** provides a summary of the potential operations and maintenance effects on Environmentally Sensitive Wildlife Sites prior to the implementation of mitigation measures, and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendix 9-10**, the following potential adverse effect was identified as having a low level of effect:

- Temporary sensory disturbance.

Temporary Sensory Disturbance

Sources of temporary sensory disturbance within the Local Assessment Area as a result of operations and maintenance activities include blasting and clearing activities, equipment and crew movement, installation of bridges and culverts and the temporary development of access routes and trails.

Wildlife surveys conducted from 2011 to 2015 in areas of the Local and Regional Assessment Areas have not identified the presence of dens, heron rookeries, hibernacula or large stick nests along the proposed all-season road alignment (Joro Consultants 2015a). There is a low probability for the presence of bat or snake hibernacula in the Project Footprint based on regional geology and known presence in Manitoba. There is also a low probability of presence of wolverine dens in the Project Footprint due to low presence/density of this animal in the Local Assessment Area. There will be continued protection of overwintering dens, heron rookeries, hibernacula, large stick nests or mineral licks identified as Environmentally Sensitive Sites during the construction phase. The all-season road will be a two-lane gravel road with low traffic volumes. The right-of-way, existing access routes, trails or cut lines will be used to the least extent feasible and access routes and trails will be kept as short and narrow as feasible. Dust suppression techniques as per ESRA's GR130s and Environmental Protection Procedures will be applied. In the event that dens, heron rookeries, hibernacula, large stick nests, or additional mineral licks are found during operations and maintenance activities, these areas will be marked and isolated as Environmentally Sensitive Sites. The appropriate setbacks will be adhered to during operations and maintenance activities, and/or staged operations and maintenance activities (i.e., stop and delay operations and maintenance activities in sensitive areas until animal use of the area and/or sensitive time period has passed), will be implemented to the extent feasible.

There were no adverse potential effects identified in **Appendix 9-10** as having a moderate or high level of effect.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on Environmentally Sensitive Wildlife Sites is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

A summary of the potential effects of Project operations and maintenance on Environmentally Sensitive Wildlife Sites and the mitigation measures that will be used to prevent or minimize the potential environmental effects from occurring are provided in **Table 9.51**.

Table 9.51: Summary of Potential Operations and Maintenance-Related Environmental Effects on Environmentally Sensitive Wildlife Sites and Proposed Mitigation Measures

Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Habitat gain due to: ▪ Decommissioning and regeneration of vegetation of temporary access routes and winter road.	▪ Not required.	Reduction of the magnitude and extent of habitat loss, alteration or fragmentation in the Local Assessment Area.	Not Significant
Localized areas of temporary sensory disturbance due to: ▪ Road maintenance activities: snow clearing, grading and addition of aggregate as required, right-of-way vegetation management. ▪ Bridge and culvert maintenance activities: debris removal, structural repairs. ▪ Use of road by local communities and visitors to the communities and region (hunters, fishers, trappers, transport of goods and materials).	▪ Localized to operations and maintenance work areas within the Project Footprint. ▪ Continued protection of overwintering dens, heron rookeries, hibernacula, large stick nests or mineral licks identified as Environmentally Sensitive Sites during maintenance phase. ▪ In the event that dens, heron rookeries, hibernacula, large stick nests or additional mineral licks are found during maintenance activities, these areas will be marked and isolated as Environmentally Sensitive Sites; setbacks from operations and maintenance activities and/or staged operations and maintenance activities, (i.e., stop and delay operations and maintenance activities in sensitive areas until animal use of the area and/or sensitive time period has passed) will be implemented to the extent feasible.	Mitigation measures will reduce the magnitude, extent, frequency and likelihood of temporary sensory disturbance to Environmentally Sensitive Wildlife Sites during operations and maintenance. Effect is reversible on cessation of activities.	Not Applicable

Note: *See **Table 9.52** for the summary of residual Project effects and significance conclusions for environmentally sensitive wildlife sites.

9.2.5.7.3 Summary of Project Residual Effects and Conclusion

The residual effects of the Project remaining after mitigation for Environmentally Sensitive Wildlife Sites during the construction phase of the Project were identified as:

- Loss, alteration or physical disturbance of overwintering dens, heron rookeries, hibernacula, large stick nests, or mineral licks.

The residual effects remaining after mitigation for Environmentally Sensitive Wildlife Sites during the operations and maintenance phase of the Project were identified as:

- Temporary sensory disturbance.

During the operations and maintenance phase of the Project, decommissioning and regeneration of vegetation of the temporary access routes and winter road will create habitat due to the decommissioning and regeneration of vegetation of temporary access routes and winter road.

Wildlife surveys conducted from 2011 to 2015 in areas of the Local Assessment Area and Regional Assessment Area have not identified the presence of dens, heron rookeries, hibernacula or large stick nests along the proposed all-season road alignment (Joro Consultants 2015a). There is a low probability for the presence of bat or snake hibernacula in all-season road Project Footprint based on regional geology and known presence in Manitoba. There is also a low probability of presence of wolverine dens in the all-season road Project Footprint due to low presence/density of this animal in the Local Assessment Area.

There will be continued protection of overwintering dens, heron rookeries, hibernacula, large stick nests or mineral licks identified as Environmentally Sensitive Sites during the construction phase. The all-season road will be a two-lane gravel road with low traffic volumes. The right-of-way, existing access routes, trails, or cut lines will be used to the least extent feasible and access routes and trails will be kept as short and narrow as feasible.

In the event that dens, heron rookeries, hibernacula, large stick nests or mineral licks are found during operations and maintenance activities, these areas will be marked and isolated as Environmentally Sensitive Sites. The appropriate setbacks will be adhered to during operations and maintenance activities, and/or staged operations and maintenance activities (i.e., stop and delay operations and maintenance activities in sensitive areas until animal use of the area and/or sensitive time period has passed), will be implemented to the extent feasible.

Table 9.52 provides a summary of the residual effects assessment for Environmentally Sensitive Wildlife Sites. With the use of appropriate mitigation measures, MCWS resource management, environmental protection measures and environmental protection plans, the residual effects on Environmentally Sensitive Wildlife Sites due to Project activities are expected to be not significant.

Table 9.52: Summary of Residual Project Effects and Significance Conclusions for Environmentally Sensitive Wildlife Sites

Residual Effects	Residual Effects Characteristics/Level Rating						Ecological Context	Significance Conclusion
	Direction	Duration	Magnitude	Extent	Frequency	Reversibility		
Construction Phase								
▪ Loss, alteration or physical disturbance of overwintering dens, heron rookeries, hibernacula, large stick nests or mineral licks.	N-	I	I	I	I	III	I	N
Operations and Maintenance Phase								
▪ Reduction of habitat loss or alteration in the Local Assessment Area.	P+	III	I	II	II	III	I	N
▪ Temporary sensory disturbance.	N-	III	II	I	II	I	I	N

KEY: (see also **Chapter 6, Section 6.4** for full definitions and Level of Effect criteria for determination of Significance)

Direction:
N- Negative
P+ Positive

Duration:
Short-term = Level I
Medium-term = Level II
Long-term = Level III

Magnitude:
Negligible or Low = Level I
Moderate = Level II
High = Level III

Extent:
Project Footprint = Level I
Local Assessment Area = Level II
Regional Assessment Area = Level III

Frequency:
Once = Level I
Intermittent = Level II
Continuous = Level III

Reversibility:
Reversible (short-term) = Level I
Reversible (long-term) = Level II
Irreversible = Level III

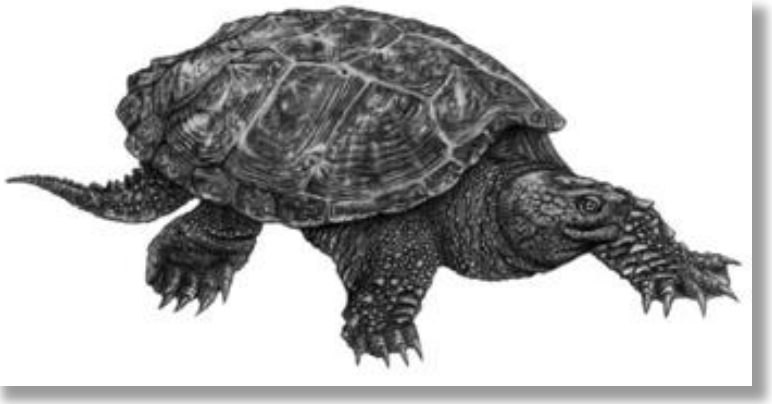
Ecological Context:
Low = Level I (Effect results in minimal disruption of ecological functions and relationships in the area).
Moderate = Level II (Effect results in some disruption of non-critical ecological functions and relationships in the area).
High = Level III (Effect results in disruption of critical ecological functions and relationships in the impacted area).

Significance Conclusion:
S = Significant residual effect
N = No significant residual effect

9.2.5.8 Herptiles

There was one Species at Risk identified to be potentially present in the Local Assessment Area: the common snapping turtle. Information for this species was obtained from the Canadian Herpetological Society (2015), COSEWIC (2008), the Manitoba Herps Atlas (2015) and the Species at Risk Public Registry (SARA 2015).

As stated in COSEWIC (2008), the common snapping turtle (**Photograph 9-36**) is Canada's largest freshwater turtle. The keeled carapace is brown, black or olive and the cross-shaped plastron is reduced compared with other turtles, leaving the limbs and sides of the body exposed. The common snapping turtle's head is large with a hooked upper jaw, the neck is relatively long and the tail is approximately as long as the carapace. The common snapping turtle has the greatest latitudinal distribution of turtles in North America, ranging from southern Manitoba south to Texas in the United States. In Canada, the species is present in mainland Nova Scotia, southern New Brunswick, southern and central Quebec, southern and central Ontario, southern Manitoba and southeastern Saskatchewan. The preferred habitat for the common snapping turtle is characterized by slow-moving water with a soft mud bottom and dense aquatic vegetation. Established populations are most often located in ponds, sloughs, shallow bays or river edges and slow streams, or areas combining several of these habitats. Breeding activities occur in the early spring, with hatchlings emerging from nests in early fall. Common snapping turtle habitat is diminishing in both quantity and quality in Canada with losses primarily due to conversion of wetlands to agriculture and urban development. The common snapping turtle requires permanent waterbodies for habitat and overwinters by resting on the bottom of permanent waterbodies (Manitoba Herps Atlas 2015). The common snapping turtle is common in southern Manitoba (S3) and is found in the southern third of the province (Manitoba Herps Atlas 2015). While identified in the Regional Assessment Area south of the Project, it was not identified in the Local Assessment Area. The common snapping turtle listed as a species of Special Concern under Schedule 1 of SARA. Discussions with community members during the Traditional Knowledge interviews have noted there are snapping turtles around the community of Poplar River and painted turtles in Many Bays (**Chapter 10,** Socio-Economic and Cultural Environment).



(**Source**: COSEWIC 2008)

Photograph 9-36: Common Snapping Turtle

9.2.5.8.1 Construction and Operations and Maintenance Effects and Mitigation

The potential effects on herptile Species at Risk in the Local Assessment Area due to Project construction and operations and maintenance activities prior to the implementation of mitigation measures were identified as follows:

- Temporary sensory disturbance during construction activities located near waterbody areas having suitable habitat for the species;
- Increased mortality due to vehicle collisions (accidental and intentional); and
- Loss or alteration of breeding or feeding habitat due to construction or operations and maintenance activities located near waterbody areas having suitable habitat for the species.

Using the approach described above in **Section 9.2**, the overall level of effect of the potential construction and operations and maintenance effects on herptile Species at Risk prior to the implementation of mitigation measures was examined. **Appendices 9-9** and **9-10** provide a summary of the potential construction and operations and maintenance effects, respectively, on herptile Species at Risk prior to the implementation of mitigation measures, and the determined overall level of the potential effect.

Based on the screening of potential effects in **Appendices 9-9** and **9-10**, the potential adverse effects to herptile Species at Risk were identified as having a low level of effect.

Chapter 8 (Aquatic Environment) outlines the location and types of watercourse crossings for the Project. These watercourse crossings include the installation of bridges at the Berens, Etomami, North Etomami and Leaf rivers, and the installation of culverts at Okeyakkoteinewin Creek and a number of small, unnamed creeks and drains with intermittent to ephemeral flows. In addition to these crossings, review of the LCC map for the all-season road alignment (Map 07 in Joro Consultants 2015a) shows that the alignment comes within proximity of open water areas between the North Etomami River and the Leaf River, and in the area near Bull Lake and Pamatakakowin Lake. Mitigation measures developed to reduce potential effects for on aquatic habitats in **Chapter 8** (Aquatic Environment)**, Section 8.2.3** and **Chapter 7** (Physical Environment), **Section 7.2.3** will reduce potential effects on herptiles as well.

Numerous studies have been conducted in regards to the relationship among roads, traffic density and potential effects on wildlife, including reptiles and amphibians. Depending on the study and the species of interest, these effects may be negative or neutral (Fahrig and Rytwinski 2009). Turtles can experience road mortalities during movements to breeding areas, and female turtles or their young may be injured or killed while attempting to use roadside sand and gravel areas for nesting sites (Ashley *et al.* 2007).

In a study conducted from 2011 to 2013 on the use of hydraulic and wildlife-only culverts to mitigate the effects of a new roadway through sensitive forests and wetlands near Ottawa, Ontario, a total of 24 wildlife species used the culverts to pass under the roadway (Taylor *et al.* 2014). Frogs, raccoons, muskrat and porcupines were the most frequent users. Fisher, skunk, long‐tailed weasel, turtles and coyote also used the culverts for passage, including the Common Snapping Turtle (Taylor *et al.* 2014).

It is expected that the installation of hydraulic culverts along the all-season road may provide an alternate route for herptiles and other wildlife to cross the roadway, which may help to reduce the potential effect of road mortalities. While the all-season road will be a two-lane gravel road with low traffic volumes, signage and reduced speed zones, are additional measures that may be employed if and where high use areas are identified to mitigate road mortality effects on herptiles. The use of reduced speed zones has been shown to be an effective mitigation measure to reduce animal-vehicle collisions (Jaarsma *et al.* 2006; Van Langevelde and Jaarsma 2009).

Section 9.2 provides a description of the design mitigation features that have been incorporated in Project planning to eliminate or reduce a number of potential environmental effects, including methods to protect sensitive sites such. The identification of these areas as Environmentally Sensitive Sites and inclusion of vegetated buffer zones around these sites will help to mitigate potential effects on the common snapping turtle, as these measures provide protection of potential overwintering areas, and create an area of undisturbed vegetation and habitat between these areas and the road construction and operations and maintenance activities.

There were no adverse potential effects identified in **Appendices 9-9** and **9-10** as having a moderate or high level of effect.

Additional information on the mitigation measures, environmental protection procedures and environmental protection specifications that will be implemented to prevent or minimize potential environmental effects on herptile Species at Risk is provided in **Chapter 5** (Environmental Protection and Sustainable Development).

Sections of ESRA's Environmental Protection Procedures and ESRA's Environmental Protection Specifications (GR130s) that will be applied to avoid or minimize potential adverse effects to herptile Species at Risk are listed in **Table 9.53.**

Table 9.53: ESRA's Protection Procedures and Specifications for Herptiles

Environmental Protection Procedures Section (Chapter 5, Appendix 5-3)	Environmental Protection Specifications (GR130s) (Chapter 5, Appendix 5-4)
Sec. 1 Clearing and Grubbing	GR130.6 General
Sec. 2 Petroleum Storage	GR130.8 Designated Areas and Access
Sec. 3 Spill Response	GR130.9 Materials Handling, Storage and Disposal
Sec. 5 Materials Handling and Storage	GR130.10 Spills and Remediation and Emergency Response
Sec. 6 Working within or near Fish Bearing Waters	GR130.15 Working Within or Near Water
Sec. 7 Stream Crossings	GR130.16 Erosion and Sediment Control
Sec. 8 Temporary Stream Diversions	GR130.17 Clearing and Grubbing
Sec. 11 Culvert Maintenance and Replacement	GR130.19 Wildlife
Sec. 12 Blasting Near a Watercourse	GR130.21 Cement Batch Plant and Concrete Wash-Out Area
Sec. 14 Wildlife	
Sec. 16 Erosion and Sediment Control	
Sec. 17 Concrete Area Management Practices	
Sec 18 Dust Suppression Practices	

The proposed mitigation measures described in **Table 8.8** in **Chapter 8** (Aquatic Environment) to prevent the release or transport of sediment and other deleterious substances to watercourses during construction or operations and maintenance activities are also applicable as mitigation measures to reduce or prevent potential effects on herptile Species at Risk.

Table 9.54 provides a summary of the construction and operations and maintenance related potential environmental effects and proposed mitigation measures for construction and operations and maintenance related environmental effects on the identified herptile Species at Risk.

Table 9.54: Summary of Potential Construction and Operations and Maintenance-Related Environmental Effects on Herptiles and Proposed Mitigation Measures

Construction and Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
Temporary sensory disturbance due to: ▪ Construction activities located near waterbody areas having suitable habitat for the species.	▪ Application of design mitigation measures (**Section 9.2**). ▪ Implementation of a vegetated buffer zone between lake and pond areas, and the road construction and operations and maintenance activities. ▪ Temporary sensory disturbance is localized to construction work areas within the Project Footprint. ▪ Clearing activities are planned for fall and winter to the extent feasible and will avoid herptile breeding periods and movements, and, for common snapping turtles, hatchling emergence periods and movements.	No residual effects due to temporary sensory disturbance anticipated after mitigation.	Not Applicable
Increased mortality due to: ▪ Vehicle collisions (accidental and intentional).	▪ Road designed to optimize line of sight. ▪ Wildlife warning signs will be installed in high use areas and at known crossing locations. ▪ Road clearings are planned for fall and winter to the extent feasible and will avoid herptile breeding periods and movements, and, for common snapping turtles, hatchling emergence periods and movements. ▪ The installation of culverts along the all-season road will provide alternate routes for passage under the roadway.	The residual effect of increased mortality due to vehicle collisions will be reduced in magnitude, extent and frequency with the application of mitigation measures.	Not Significant
▪ Loss or alteration of breeding or feeding habitat due to construction or operations and maintenance activities located near waterbody or bog and fen areas having suitable habitat for the species.	▪ All-season road routing avoided areas of high quality habitat such as lakes and ponds. ▪ Alternate habitat is available adjacent to and beyond the Project Footprint. ▪ Existing water flow patterns, levels and hydrologic regimes will be maintained. ▪ A vegetated buffer zone will be retained between the all-season road and lakes or ponds along the right-of-	The residual effect of loss or alteration of feeding or breeding habitat will be reduced in magnitude and extent with the application of mitigation measures. Habitat is not limiting and no effects are anticipated after	Not Applicable

Construction and Operations and Maintenance Activities and Potential Environmental Effects	Proposed Mitigation Measures	Residual Effects	Significance Evaluation*
	way (e.g., Bull Lake and Pamatakakowin Lake). ▪ Where feasible, roads will be located a minimum of 100 m from waterbodies except when crossing a watercourse. ▪ The implementation of vegetated buffer zones around identified Environmentally Sensitive Sites will help to mitigate potential effects on common snapping turtle.	mitigation.	

Note: *See **Table 9.55** for the summary of residual Project effects and significance conclusions for herptile Species at Risk.

9.2.5.8.2 Summary of Project Residual Effects and Conclusion

After the application of the mitigation measures outlined in **Table 9.54**, the residual effect remaining for herptile Species at Risk is increased mortality due to vehicle collisions.

Studies that have included green frogs have shown that they do not exhibit the same extent and frequency of movements as other frog species, and tend to remain near streams and use streams and hydraulic culverts as movement corridors. As such, it is not expected that green frogs will be present or travelling on or alongside the road surface in numbers that would result in a high level of mortality for the species. The implementation of buffer zones at lakes and ponds will provide areas of protected habitat for this species and use of culverts will provide passage under the road. Common snapping turtles may attempt to cross the road surface during breeding or migratory movements between overwintering and nesting sites. This potential effect can be mitigated by the implementation of vegetated buffer zones at lake and pond areas; installation of culverts; the use of reduced speed zones; and wildlife signage (if needed).

The alteration and loss of habitat in the right-of-way is unavoidable due to the footprint of the road and required structures (culverts and bridges) and the need to maintain sight lines. However, the affected areas represent a very small fraction of the watercourse habitat that is available for snapping turtles in the Local Assessment Area and Regional Assessment Area (**Section 9.2.2**). With the application of the mitigation measures outlined in **Table 9.54** and ESRA's environmental protection measures and specifications (**Chapter 5,** Environmental Protection and Sustainable Development), there are no significant negative residual effects expected on the herptile Species at Risk. The species is not expected to be found in the Local Assessment Area (COSEWIC 2008; Manitoba Herps Atlas 2015).

Table 9.55 provides a summary of the residual effects assessment for herptile Species at Risk in the Local Assessment Area. With the use of appropriate mitigation measures, MCWS resource management, environmental protection measures and environmental protection plans, the residual effects on herptile Species at Risk in the Local Assessment Area due to Project activities are expected to be not significant.

Table 9.55: Summary of Residual Project Effects and Significance Conclusions for Herptiles

Residual Effects	Residual Effects Characteristics/Level Rating						Ecological Context	Significance Conclusion
	Direction	Duration	Magnitude	Extent	Frequency	Reversibility		
Construction Phase								
▪ Increased mortality due to vehicle collisions.	N-	I	I	I	II	III	I	N
Operations and Maintenance Phase								
▪ Increased mortality due to vehicle collisions.	N-	III	I	I	II	III	I	N

KEY: (see also **Chapter 6, Section 6.4** for full definitions and Level of Effect criteria for determination of Significance)

Direction:
N- Negative
P+ Positive

Duration:
Short-term = Level I
Medium-term = Level II
Long-term = Level III

Magnitude:
Negligible or Low = Level I
Moderate = Level II
High = Level III

Extent:
Project Footprint = Level I
Local Assessment Area = Level II
Regional Assessment Area = Level III

Frequency:
Once = Level I
Intermittent = Level II
Continuous = Level III

Reversibility:
Reversible (short-term) = Level I
Reversible (long-term) = Level II
Irreversible = Level III

Ecological Context:
Low = Level I (Effect results in minimal disruption of ecological functions and relationships in the area).
Moderate = Level II (Effect results in some disruption of non-critical ecological functions and relationships in the area).
High = Level III (Effect results in disruption of critical ecological functions and relationships in the impacted area).

Significance Conclusion:
S = Significant residual effect
N = No significant residual effect