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7.0 EXISTING ENVIRONMENTAL SETTING

AECOM was retained by SLI to complete the biophysical assessment for the proposed construction of an ASR from the terminus of Provincial Road 304 to the Berens River (PR 304 to Berens River). The ASR includes upgrades to the existing 76 km Rice River Road, a 12 km extension from the Rice River forestry road to the Bloodvein River and the construction of a new road from the Bloodvein River to the Berens River. This document was created to provide a background description of the existing environment to be used to assist in the completion of the route selection study and the ensuing environmental assessment.

Information gathered for this document was obtained through desktop review of various resources. Information gathered and summarized includes geology, soils, water resources, air quality, climate, plant species, wildlife species, animal species, protected areas and heritage resources. Additional information gathered recently by AECOM from field studies is summarized under separate technical report covers (Appendix 3 – Biophysical Inventories).

The socio-economic component of the study discussed in Section 7.4 below was undertaken by SNC-Lavalin, except for portions of sections 7.4.6, 7.4.7, and 7.4.8, where input was provided by AECOM.

7.1 Physical Environment

7.1.1 Locational Setting

As can be seen in Figure 7-1, the project area is located on the east side of Lake Winnipeg in Manitoba and encompasses the PR 304 to Berens River ASR alignment, which extends from Provincial Road 304 to the Berens River. The project is located entirely within the Lac Seul Upland Ecoregion of the Boreal Shield Ecozone. As a result, the Lac Seul Upland Ecoregion forms the basic physical characteristics of the general project area.

Figure 7-2 illustrates the First Nations, Northern Affairs Communities and waterways that are located within and near the project, and includes areas that may be affected by the project, though not necessarily in the project area. As shown, there are seven (7) First Nation communities (Berens River First Nation, Hollow Water First Nation, Bloodvein First Nation, Little Grand Rapids First Nation, Pauingassi First Nation, Poplar River First Nation and Little Black River First Nation and eight (8) Northern Affairs Communities (Manigotagan, Loon Straits, Princess Harbour, Seymourville, Aghaming, Berens River, Pine Dock and Little Grand Rapids) located in the general project area.

Named waterways located in the study area include the following: Manigotagan River, Wanipigow River, English Brook, Steeprock Creek, Rice River, Loon Creek, Leyond River, Pakasekan Creek, Bloodvein River, Long Body Creek, Bradbury River, Pigeon Rover, Berens River, Etomami River and North Etomami River. There are also several unnamed waterways located within the immediate project area, though not all of these waterways are crossed by the PR 304 to Berens River ASR alignment.

The topography of the project area generally maintains an elevation of around 230 m above sea level (m.a.s.l.); however, the elevation varies from approximately 220 to 250 m.a.s.l.

Near many of the rivers, Lake Winnipeg, east of the community of Loon Straits, as well as the area between the Pigeon River and Berens River, the elevation is typically around 220 m.a.s.l. South of the Rice River to Provincial Road 304, the elevation mostly varies between 230 and 240 m.a.s.l. though increases in elevation to 250 m.a.s.l. east of the community of Aghaming. (Natural Resources Canada 2009)

Figure 7 - 1: Project Location

Figure 7 - 2: Project Area Features

7.1.2 Air Quality and Climate

Ambient Air Quality

There is no ambient air quality data available for the project area as there is no continuous air quality monitoring station in that zone. However, Manitoba Conservation and Environment Canada have several air quality monitoring stations surrounding the project area in Manitoba and northwestern Ontario. Manitoba Conservation's air quality monitoring stations are located in the City of Winnipeg, the City of Brandon, the City of Flin Flon and the City of Thompson. The nearest Environment Canada air quality monitoring stations in northwestern Ontario are located in Pickle Lake, the Experimental Lakes Area and Fort Frances.

Manitoba Conservation's Air Quality Section, was contacted to determine the most applicable air quality monitoring station(s) to represent the project area. The City of Winnipeg residential station as well as the Pickle Lake and the Experimental Lakes Area stations were identified as the most suitable data set for characterizing the project area.

The location of the three air quality monitoring stations, in relation to the project area, are shown in Figure 7-3 and the estimated ambient air quality data is provided in Table 7-1.

In general, the ambient air quality within Manitoba is excellent. Local or regional air quality issues may arise during the forest fire season as a result of major fires burning in other areas of the Province, or in neighboring portions of Saskatchewan or northwestern Ontario.

Table 7 - 1: Estimated Ambient Air Quality for the Project Area

Name of Pollutant	Data Source	Units of Measurement	Averaging Period	Average Annual Parameter Concentration
CO^1	Winnipeg (Residential) NAPS Site	ppm	1995 – 2007	0.34
$NO_2{}^1$	Winnipeg (Residential) NAPS Site	pphm	1995 – 2007	1.06
NO^1	Winnipeg (Residential) NAPS Site	pphm	1995 – 2007	0.54
$NO_X{}^1$	Winnipeg (Residential) NAPS Site	pphm	1995 – 2007	1.54
$PM_{2.5}{}^1$	Winnipeg (Residential) NAPS Site	$\mu g/m^3$	1997 – 2007	5.33
$O_3{}^1$	Winnipeg (Residential) NAPS Site	pphm	1995 – 2007	2.09
$O_3{}^2$	Experimental Lakes Area NAPS Site	ppb	1997-2006	32.1
$O_3{}^2$	Pickle Lake NAPS Site	ppb	2006	33.1

Sources: [1] Manitoba Conservation, Air Quality Section (Manitoba Conservation. Pollution Prevention Branch, Air Quality Section 2008).

[2] Environment Canada, NAPS Network Reports (Environment Canada 2009c).

Notes: 1. Data for the Experimental Lakes Area NAPS Site was also available for 1996 and 1995, however as the data sets were not complete, they were not included in the table

2. The 2006 data for the Pickle Lake NAPS Site was missing values for January and February; therefore the average annual concentration is based on a 10-month period

Figure 7 - 3: Air Quality Stations

Climate

The project area typically experiences short warm summers and very cold winters. It typically averages 557.1 mm of precipitation per year, with 134 mm as snow (Environment Canada, 2009a). The closest meteorological station which measures temperature and precipitation is located in Bissett, Manitoba while the next closest meteorological station that measures wind speed and direction is located in Red Lake, Ontario. The locations of the Bissett and Red Lake meteorological stations are illustrated on Figure 7-4.

Table 7-3 shows the monthly temperature and precipitation for the Bissett station and the monthly wind speed and direction for the Red Lake station over the 1971-200 year period. Table 7-6 shows other relevant weather parameters from the Bissett station and the Fort Alexander First Nation area.

Figure 7 - 4: Metereological Stations

Table 7 - 2: Climate Data for the Town of Bissett Metereological Station (1971-2000)
Latitude 51 1.800' N Longitude 95 42.000' W Elevation 259.00m
And the town of Red Lake Metereological Station (1971-2000)
Latitude 51 4.200' N Longitude 93 47.400' W Elevation 259.00m

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Yr
Daily Average Temperature (oC)[1]	-19	-15.2	-7.1	2.6	10.9	15.8	18.3	17.1	10.8	4.3	-5.9	-16.3	2.5
Precipitation (mm) [1]	21.5	17.5	26.9	31.9	50.9	89.3	73	79.5	67.9	48	30.1	20.6	557.1
Average Wind Speed (kph) [2]	9.4	9.7	11	11.5	11.7	11.5	10.7	10.5	11.9	12.8	12	9.9	11.1
Most Frequent Wind Direction[2]	NW	NW	SE	SE	SE	SE	NW	SW	NW	NW	NW	SE	NW
Days With Winds ≥ 52 km/hr[2]	0.2	0.2	0.6	0.7	0.5	0.9	0.5	0.7	0.7	0.7	0.7	0.1	6.3
Days With Winds ≥ 63 km/hr[2]	0	0	0.1	0.1	0.1	0.1	0	0.1	0	0.2	0.2	0	0.9

Sources: [1] Data obtained from Bissett (Manitoba) Meteorological Station (Environment Canada 2009a)

[2] Data obtained from Red Lake (Ontario) Meteorological Station (Environment Canada 2009b)

Table 7 - 3: Other Weather Parameters for Bissett, Manitoba

Weather Parameters	Value
Last Spring Frost (0 ^{0}C)[1]	May 24th -May 29th
First Fall Frost (0 ^{0}C) [1]	September 11th – September 16th
Frost Free Period (over 0 ^{0}C) [1]	105-115 days
Extreme Maximum Temperature (0 ^{0}C)[2]	37.5 (June 1995)
Extreme Minimum Temperature (0 ^{0}C)[2]	- 46.1 (January 1974)
Extreme Daily Rainfall (mm) [2]	81 (September 1980)
Maximum Hourly Wind (kph) [2]	59 (October 1984)
Maximum Wind Gust[2]	81 (June 1984)

*Sources: **1.** Data obtained from Manitoba Agriculture, Food and Rural Initiatives, (1999).*

***2.** Data obtained from Environment Canada Bissett Meteorological station (2009a).*

7.1.3 Geology

Figure 7-5 shows the distribution of the principal geological deposits throughout the study area.

Surface Geology

The surface geology in the project area is a mixture of quaternary and pre-quaternary sediments. Generally, north of the Bloodvein River the project area consists of a mixture of organic deposits (peat and muck) and offshore glaciolacustrine sediments (clay, silt and minor sand) with periodic bedrock outcrops, while south of the Bloodvein River, bedrock outcrops and organic deposits dominate the area with interspersed areas of offshore glaciolacustrine sediments. Two additional pockets of sediments may be encountered in the project area. The southern pocket occurs south of Hollow Water First Nation and consists of marginal glaciolacustrine sediments (sand and gravel). The northern pocket occurs along the shoreline of Pigeon Bay and consists of shoreline sediments (sand and gravel) (Matile and Keller 2004a; Matile and Keller 2004b). (Matile and Keller 2004a; Matile and Keller, 2004b).

Surface Deposits

Surface materials in the project area are derived from the Severn Upland Division of the Canadian Shield Physiographic Region, which is typically characterized by rolling to hilly bedrock. Predominantly, surface deposits consist of clay textured lacustrine sediments broken with occasional bedrock outcrops. In areas with level to gentle slopes, shallow deposits of various peats are typically underlain by lacustrine sediments. In areas with gentle to steep slopes, precambrian bedrock dominates the surface, though are subdued with veneers and blankets of lacustrine sediments on the lower slopes and depressions. (Woo et al. 1977, Dutchak et al. 1978).

Bedrock Geology

The bedrock geology of the project area is typical of the Superior Province of the Precambrian Shield (Bulloch et al. 2002). The majority of the area is underlain by granite, granodiorite, and quartz diorite formations with a complex of granetized sedimentary gneiss and schist and migmatite occurring along the eastern portion of Lake Winnipeg south of the Bloodvein River (Woo et al. 1977, Dutchak et al. 1978).

A continuous belt of volcanic, sedimentary and metamorphic rocks extends from Lake Winnipeg to the Manitoba-Ontario boundary, roughly following the Wanipigow River east of the community of Manigotagan. This area is characterized by a number of longitudinal faults. East of the community of Manigotagan, areas of greywacke, slate, quartzite and iron can be found mixed with volcanic rock formations. North of the community of Manigotagan, near Hollow Water First Nation, there is an area consisting of mafic and ultramafic intrusions of gabbro, diorite, peridodite and serpentinite (Woo et. al. 1977). Formations of granite, granodiorite, and quartz diorite with subordinate horneblende-biotite gneiss, biotite gneiss and biotite-chloride gneiss surround Berens River First Nation (Dutchak et al. 1978).

Areas east and south of the project area contain bands of volcanic and sedimentary rocks located within granitic and banded gneissic rock. These bands, also referred to as greenstone belts, can be highly mineralized and may be a large source of various minerals, including gold. (Bulloch et al. 2002)

Figure 7 - 5: Bedrock Geology

7.1.3 Soils

The soils of the project area are characterized by the Lac Seul Upland Ecoregion and are relatively young, since the land surface was covered by ice or glacial lakes up to seven to twelve thousand years ago. Soils in the project area contain between 10 and 90% organic content. These organic soils have developed on poorly drained peatlands and are predominantly Mesisols and Fibrisols. Mesisols consist of moderately decomposed peat, while Fibrisols are composed of only weakly decomposed peat. (Bulloch et al. 2002)

The project area falls within two major land regions as characterized by climate, vegetation, soil development and permafrost condition. The land regions of the project area are the Low Boreal region and the High Boreal-temperate region. The Wanipigow River is the rough boundary dividing the two regions, with the Low Boreal region located north of the Wanipigow River and the High Boreal-temperate region located south of the Wanipigow River. (Woo et al. 1977)

The dominant soils of the Low Boreal region include brunisols, luvisols, gleysols and organics. The Low Boreal region may also be further subdivided into three land districts: the Bloodvein River Land District, the Dogskin Lake Land District and the Rice River Land District. (Dutchak et al. 1978). The proposed project area crosses both the Bloodvein River Land District and the Rice River Land District. The Bloodvein River Land District typically contains the Indian Bay Rockland Complex soil association, the Baynham soil association and the Lettonia soil association. These are luvisol and mesisol soils, with drainage characteristics ranging from very poor to moderately well drain. The Rice River Land District typically contains the Cayer soil association, the Okno soil association, the Lettonia soil association and the McArthur soil association. These soils are mesisols and luvisols with drainage characteristics ranging from very poor to moderately well drain. (Dutchak et al. 1978)

The dominant soils of the High Boreal-temperate region include luvisols, brunisols, gleysols, and organics. The High Boreal-temperate region can be subdivided into land districts, which represent areas of relatively uniform relief, morphology, and associated vegetation. Within the High Boreal-temperate region, the proposed project area falls within the Wanipigow Lake Land District in the Manigotagan area. The Wanipigow Lake Land District is dominated by luvisol, mesisol, and brunisol soils with drainage characteristics that range from very poor to rapid. (Woo et al. 1977)

Soil Associations within the Project Area

Together, under the Northern Resource Information Program, the Canada-Manitoba Soil Survey and the Department of Renewable Resources and Transportation Services conducted a biophysical land classification of the Hecla Lake 62P region and the Berens River 63A region in 1976. This effort produced reports and accompanying maps that depict the relevant land systems at a scale of 1:125,000. Based on these biophysical land classification maps, the project area crosses the following soil associations as shown on Figure 7-6. (Woo et al. 1977, Dutchak et al. 1978).

Figure 7 - 6: Soil Associations

Baynham Soil Association

The Baynham soil association is predominantly composed of typic mesisols (greater than 40% of the soil association), but also includes sphagnic phase typic mesisol and typic humisol as significant subgroups (20-40% of the soil association). All of the soil subgroups are classified as poorly drained. The parent material of the Baynham soil association consists of deep (>160 cm) deposits of mesic to humic forest peat or very thin (15-60 cm) discontinuous fibric sphagnum peat overlying forest peat. These parent materials are further underlain by undifferentiated mineral materials. The topography generally consists of gently sloping to level bogs, slower slopes and depressions. (Woo et al. 1977)

Cayer Soil Association

There are two variations within the Cayer soil association. The first variation has a poorly drained terric mesisol as the dominant subgroup (greater than 40% of the soil association), with poorly drained sphagnic phase terric mesisol and terric humic mesisol as significant subgroups (20-40% of the soil association). The second variation has a poorly drained sphagnic phase terric mesisol with poorly drained terric mesisol and terric humic mesisol subgroups. These soils developed on shallow (40 to 160 cm) deposits of mesic to humic fen peat or very thin (15 to 60 cm) discontinuous fibric sphagnum peat overlying fen peat. These parent materials are further underlain by calcareous lacustrine clay sediments. The topography generally consists of level fens, often with water tracks or open water bodies. (Woo et al. 1977)

Indian Bay Complex Soil Association

There are two variations within the Indian Bay Complex soil association. The first of these variations contains a lithic phase eluviated dystric brunisol as the dominant subgroup (greater than 40% of the soil association) with a lithic phase gleyed eluviated dystric brunisol significant subgroup. The dominant subgroup in this association is considered to be moderately well to well drained, while the significant subgroup inclusion is classified as imperfectly drained. The topography where this soil is found is moderately rolling to ridge. The parent material for this soil is 60 to 85% Precambrian bedrock with some minor inclusions of sandy non-calcareous till, although inclusions of a 10 to 100 cm layer of calcareous lacustrine clay and/or fibric forest peat may also be present. (Woo et al. 1977)

The second variation in this association is composed of moderately well drained to well drained lithic phase solonetzic gray luvisol (dominant subgroup, greater than 40% of the soil association) and imperfectly drained lithic phase gleyed solonetzic gray luvisol (significant subgroup, 20-40% of soil association). These soils developed from dominantly (60-85%) Precambrian bedrock with minor pockets of calcareous lacustrine clay. A layer of non-calcareous till and/or fibric forest peat, 10 to 100 cm thick, may also be present in the parent materials. The topography is generally moderately rolling to ridge.

Lettonia Soil Association

There are two variations of the Lettonia soil association. The first variation has a moderately well drained to well drained, lithic phase solonetzic gray luvisol dominant subgroup, with imperfectly drained gleyed solonetzic gray luvisol and moderately well drained to well drained orthic gray luvisol as significant subgroups. These soils are generally found on the crest, upper and mid slopes of gently sloping to moderately rolling topography. (Woo et al. 1977)

The second variation of the Lettonia soil association consists of an imperfectly drained gleyed solonetzic gray luvisol dominant subgroup with moderately well drained to well drained solonetzic gray luvisol and poorly drained peaty phase orthic gleysol significant subgroups. These soils are generally found on the lower slopes and depressions of gently sloping to moderately rolling topography. (Woo et al. 1977)

Both variations of the Lettonia soil association developed on moderately to strongly calcareous clay textured lacustrine sediments. (Woo et al. 1977)

Okno Soil Association

The Okno soil association contains a poorly drained terric mesisol dominant subgroup with poorly drained sphagnic phase terric mesisol and terric fibric mesisol significant subgroups. These soils developed on shallow (40-60 cm) deposits of mostly mesic to humic forest peat or very thin (15-60 cm) discontinuous fibric sphagnum peat overtop forest peat. These parent materials are further underlain by lacustrine clay sediments. The soils of the Okno soil association are generally found on the depressions of gently sloping to level bogs. (Woo et al. 1977)

Rockland Soil Association

The Rockland soil association is predominantly (greater than 85%) acidic or basic igneous, volcanic or metamorphic Precambrian bedrock. This association is generally found on moderately rolling to ridged topography. (Woo et al. 1977)

Stead Soil Association

The Stead soil association has two major variations. The first variation is composed of a poorly drained typic mesisol dominant subgroup, with a poorly drained sphagnic phase typic mesisol significant subgroup. This variation is generally found on level to depressional fens often with water tracks or open water bodies. (Woo et al. 1977)

The second variation of this association consists of a poorly drained sphagnic phase typic mesisol dominant subgroup and a poorly drained typic mesisol significant subgroup. This variation is generally found on level to depressional fens. (Woo et al. 1977)

Both of the variations developed on deep (greater than 160 cm) deposits of mesic to humic fen peat or very thin (15 to 60 cm) discontinuous sphagnum peat overlying fen peat. These parent materials are underlain by undifferentiated mineral materials. (Woo et al. 1977)

Whithorn Soil Association

The Whithorn soil association is composed of a poorly drained mesic fibrisol dominant subgroup and a poorly drained typic fibrisol significant subgroup. The soils developed on deep (greater than 160 cm) organic soils consisting of fibric sphagnum peat greater than 65 cm overtop mesic forest and/or fen peat. These parent materials are further underlain by undifferentiated materials. The soils of the Whithorn soil association are generally found on gently sloping to level raised plateau bogs. (Dutchak et al. 1978)

Soil Drainage

General soil drainage in the project area is characterized by the Ecodistricts of the Lac Seul Upland Ecoregion. As shown in Figure 7-7, the Wrong Lake Ecodistrict 371 is situated at the southern and eastern portions of the project area, while the Berens River Ecodistrict 370 contains the northern and western portions of the project area. The remaining Ecodistrict, Nopiming 373, is located to the east of the Wrong Lake Ecodistrict and is not located within the project area. (Bulloch et al. 2002)

Figure 7-8 shows the drainage classes of the Lac Seul Upland Ecoregion in Manitoba, which are described below.

Soil Drainage of the Wrong Lake Ecodistrict 371

Soil drainage in the Wrong Lake Ecodistrict 371 varies from very poor to rapid to well drained, with much of the northern and west-central areas composed of very poor to poor with tracts of rapid to well drained soils. Rock of unclassified drainage is common in the west-central areas of the Wrong Lake Ecodistrict 371, while the southern portion is a mix of all of the aforementioned drainage classes. In the Manigotagan area, the soil drainage is predominantly rapid to well drained, however the proposed road is expected to cross very poor, imperfect to poorly drained and unclassified rock, moving northward. (Bulloch et al. 2002)

Soil Drainage of the Berens River Ecodistrict 370

Soil drainage in the Berens River Ecodistrict 370 is predominantly classified as very poor, particularly in the northern areas. The proposed project area is located in the southern half the Berens River Ecodistrict 370 and, in addition to large areas of very poorly drained soils, may include areas classified as imperfect to poorly drained and rapid to well drained. Areas of rock with unclassified drainage are also found in the proposed project area at the southern end of the Berens River Ecodistrict 370, as well as along the shore of Lake Winnipeg between Loon Straits and the Bloodvein River. (Bulloch et al. 2002)

Soil Capability for Agriculture

While the Canada Land Inventory (CLI) has mapped soil agricultural capability for several areas of the Province of Manitoba, no data is provided for the lands east of the eastern shore of Lake Winnipeg. As a result, the agricultural capability of the project area is undefined. (CLI 2000)

Figure 7 - 7: Ecodistricts within the Ecoregion

Figure 7 - 8: Soil Drainage Classes

Soil Capability for Forestry

The CLI also provides information regarding the suitability of soils for forestry. Lands are grouped into seven classes according to the natural state of the land, prior to improvements such as fertilization, drainage or amelioration practices. The capability for forestry is ranked between Class 1, which has no important limitations to the growth of commercial forests, to Class 7, which has severe limitations that preclude the growth of commercial forests (CLI, 2000).

The project area located north of the confluence of the Bradbury River and Lake Winnipeg is rated between Class 5 and Class 7, with Class 5 land having moderately severe limitations to commercial forestry, Class 6 land having severe limitations to commercial forestry and Class 7 lands having such limitations that it is unsuitable for commercial forestry. Though the project area is predominately Class 7, tracts of Class 5 and Class 6 soils occur along river systems such as the Berens River and the Pigeon River, as well as along the shores of Lake Winnipeg south of the Pigeon River. The soil capability for forestry has not been mapped for the project area south of the Bradbury River. (CLI 2000)

7.1.4 Water Resources

Hydrogeology

As previously mentioned, the surface geology of the project area is a mixture of quaternary and pre-quaternary sediments consisting of organic deposits of peat and muck, offshore glaciolacustrine sediments of clay, silt and minor sand and bedrock outcrops. The potential for shallow aquifers exists with these sediments but the extent and quality would vary locally. (Matile and Keller 2004a; Matile and Keller 2004b)

According to the Manitoba Department of Natural Resources, Water Resources Branch Bedrock Aquifer map, there are no continuous bedrock aquifers within the project area. According to the same source, “the aquifers in the Precambrian rocks are found in fractures or fracture zones in the rock. The water bearing fractures often are very scarce and, therefore, considerable test drilling may be required to find them.” (Rutulis 1986). Water yield generally ranges from 0.01 L/s to 0.5 L/s but can exceed 5 L/s. The water quality in these aquifers varies considerably depending on local conditions. (Rutulis 1986)

Extent of Groundwater Use

Based on a review of available water well records, an estimated 23 registered wells exist within the project area. Of these wells, two appear to have incorrect location information. Nine wells are located within the communities of Manigotagan and Aghaming, southwest of the immediate project area. Three wells are located with the community of Bloodvein and the former adjacent community of Long Body Creek. Seven wells are located in the community of Berens River at the north end of the project area. Two wells are located in the Curries Landing Park at the junction of the project area and Provincial Road 304. The well records indicate that of the 21 known registered wells near or in the project area, 13 are registered as production wells and eight (8) are registered as test wells. The approximate locations of the registered water wells in relation to the project area are shown in Figure 7-9. The well records for the water wells located in the project area are attached as Appendix 3.1 (Manitoba Water Stewardship, Groundwater Management Section 2007).

Hydrology

Surface waters in the study area flow in a general east-to-west direction towards Lake Winnipeg. Throughout much of the study area, but particularly north of the Bloodvein River, surface waters move as diffuse flow through wide, densely vegetated fens, with occasional consolidation in defined channels. Beaver dams result in diversion and ponding of waters within these areas, and many of the pools of open water visible on topographic maps and satellite imagery are the result of old, stable beaver dams. Due to the poorly drained nature of the area, even streams with very small drainage areas tend to retain water throughout the year, and truly ephemeral or intermittent watercourses are rare.

Larger watercourses to be crossed along the proposed PR 304 to Berens River ASR alignment include a few named waterways and numerous unnamed waterways. The major river systems, from PR 304 to Berens River, include the Wanipigow, Rice, Bloodvein, Bradbury, Pigeon and Berens Rivers. The Manigotagan, Leyond and Etomami Rivers are also in the area, but are not crossed by the proposed alignment.

Figure 7-10 shows the locations of the main watersheds and sub-watersheds within the project study area and surrounding area. Figure 7-11 identifies the location of the water features of the study area that include major falls, rapids and dams.

Water Survey of Canada (WSC) has four hydrometric stations located in the vicinity of the proposed project area on the Manigotagan River, Bloodvein River, Pigeon River and Berens River that record water flow data, as well as one hydrometric station on the Berens River that records water level data. Water flow and level data for the other river systems are not available. The approximate locations of the hydrometric stations in relation to the project area are shown in Figure 7-12 (Environment Canada, Water Survey of Canada, 2009).

Manigotagan River

The Manigotagan River flows into Lake Winnipeg at the community of Manigotagan. The river section from Quesnel Lake and Manigotagan Lake, in Nopiming Provincial Park, to Lake Winnipeg contains at least nine waterfalls and rapids as well as a dam at Quesnel Lake (Manitoba Eco-Network 2008).

A WSC hydrometric station (05RA001) is located near the community of Manigotagan to record water flow data. Based on the period of record from 1913 to 1996, median water flows are historically highest in May (21.9 m^3/sec) and lowest in February (2.79 m^3/sec). The gross drainage area of the river is approximately 1,830 km^2 (Environment Canada, Water Survey of Canada 2009).

Figure 7 - 9: Groundwater Wells

Figure 7 - 10: Watersheds

Figure 7 - 11: Water Features

Figure 7 - 12: Hydrometric & Water Quality Monitoring Stations

Wanipigow River

The Wanipigow River flows into Lake Winnipeg through the Hollow Water First Nation, just north of the community of Manigotagan. The river is partially regulated by the Wanipigow Dam which is located approximately halfway between Lake Winnipeg and Wanipigow Lake, and upstream of the proposed project Road crossing. (Natural Resources Canada 2009). Existing bridge crossings occur over the Wanipigow River and English Brook on Rice River Road. (Chambers 1999).

Manitoba Water Stewardship reported that the Wanipigow River in the area of Nopiming Park reached its highest autumn flow on record in 2007 (Government of Manitoba, 2007).

Rice River

The Rice River is located north of the community of Manigotagan between the Wanipigow and Bloodvein Rivers. Three rapids and one waterfall exist between Lake Winnipeg and Shallow Lake, with one set of rapids located near Rice River Road (Natural Resources Canada, 2009).

Bloodvein River

The Bloodvein River originates in Ontario, flows through Atikaki Provincial Wilderness Park and drains into Lake Winnipeg at the Bloodvein First Nation. Numerous rapids and waterfalls exist between the Manitoba-Ontario boundary and Lake Winnipeg. A report issued by Canadian Heritage River Systems to Manitoba Conservation indicates that the entire Bloodvein River contains up to 112 sets of rapids and waterfalls (Hilderman Thomas Frank Cram Landscape Architecture • Planning 2000).

A WSC hydrometric station (05RB003) is located near Bloodvein Bay. Based on the period of record from 1976 to 2007, median water flows are historically highest in June (90.5 m^3/sec) and lowest in March (15.4 m^3/sec). The gross drainage area of the river is approximately 9,090 km^2 (Environment Canada, Water Survey of Canada 2009).

Pigeon River

The Pigeon River flows into Lake Winnipeg at Pigeon Bay and is located north of the Bloodvein River and south of the Berens River. The Pigeon River contains over 50 rapids and many waterfalls. One section of the river consists of a 40 km canyon which contains approximately 30 rapids. Long flat water stretches exist between most rapids (Canadian Mountain Encyclopedia 2009 (accessed)).

A WSC hydrometric station (05RD008) is located at the outlet of Round Lake, approximately 70 km upstream from the River's outlet to Lake Winnipeg. Based on the period of record from 1957 to 1996, median water flows are historically highest in July (141 m^3/sec) and lowest in March (36.5 m^3/sec). The gross drainage area of the river is approximately 18,400 km^2 (Environment Canada, Water Survey of Canada 2009).

Berens River

The Berens River flows into Lake Winnipeg at the community of Berens River. The Berens River is noted to contain many rapids and waterfalls (Kocay, 1995).

A WSC hydrometric station (05RD007) located at the outlet of Long Lake (approximately 60 km east-southeast from Berens River First Nation) records water flow data. Based on the period of record from 1957 to 1992, median water flows are historically highest in July (71.9 m^3/sec) and lowest in March (13.4 m^3/sec). The gross drainage area of the Berens River at Long Lake is approximately 18,400 km^2. A second WSC hydrometric station (05RD005) is located at Lake Winnipeg which records water level data. Based on the period of record from 1914 to 2007, median water levels at this station are historically highest in August (217.697 m) and lowest in February (217.244 m).

Surface Water Quality

Much of the PR 304 to Berens River ASR alignment, particularly the reach north of the Bloodvein River, traverses expansive fens, through which water moves slowly among dense vegetation and peat. Due to the decomposition of peat within these fens, surface waters are characteristically acidic and low in dissolved oxygen. Larger streams and rivers within the area tend to be slightly acidic with oxygen levels near saturation and do not undergo wide variation in these parameters, as photosynthetic activity is limited by low light penetration into the water column. These "tea-stained" waters are low in suspended sediments, but high in colour due to the tannins released by decomposing peat in the headwaters.

The local geology, natural acidity and lack of hardness in surface waters in the area can result in background (natural) concentrations of some metals, including copper, lead and iron, occasionally exceeding Manitoba Water Quality Guidelines and Objectives (Bulloch et al. 2002). However, anthropogenic contamination of surface water and groundwater in the area is minimal, due to the remoteness of the area.

The Province of Manitoba and Environment Canada have collected water samples at various times and locations along four of the named rivers in the project area, including Manigotagan River, Wanipigow River, Bloodvein River and Berens River, as illustrated in Figure 7-9. The following sections provide a summary of data from these water quality monitoring programs.

Manigotagan River

The Manigotagan River is located south of the proposed PR 304 to Berens River ASR alignment, but its data is presented here to provide context. Manitoba Water Stewardship collected 26 water samples from the Manigotagan River in the years 1993, 1994 and 1997 at seven locations near the mouth of the river, including MB05RAS060, MB05RAS061, MB05RAS062, MB05RAS063, MB05RAS064, MB05RAS065 and MB05RAS074. From the 26 samples, six were collected in July of 1993, six were collected in February of 1994, seven were collected in March of 1994 and seven were collected in October of 1997 (Manitoba Water Stewardship, Water Quality Management Section 2009). A summary of the laboratory results for the water samples collected is provided below and presented in Table 1 in Appendix 3.1.

Several metal parameters were found to be at or above the Manitoba Water Quality Objectives and Guidelines for Surface Water: Freshwater Aquatic Life (Williamson 2002) and/or the Canadian Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment 1999). The concentration of metal parameters above the guidelines included dissolved and total copper, total iron, dissolved and total lead as well as dissolved zinc and were only above guidelines in the 1997 samples as the 1993 and 1994 samples were not analyzed for these parameters.

The guideline for total iron, 0.3 mg/L, was exceeded in all seven samples collected in 1997, with sample concentrations ranging from 0.63 mg/L to 0.71 mg/L. Though the guidelines for total copper and total lead are based on water hardness, they have set parameter values between 0.002 and 0.004 mg/L for total copper and 0.001 to 0.007 mg/L for total lead. For total copper, one of the 1997 samples exceeded the guideline with a value of 0.005 mg/L, while the other six samples were below the laboratory's detection limit of 0.005 mg/L. For total lead, three of the 1997 samples exceeded the guideline with values of 0.001 mg/L, while the other six samples were below the laboratory's detection limit of 0.001 mg/L.

The objective values for dissolved copper, dissolved lead and dissolved zinc are calculated based on water hardness, with their respective value varying with the water hardness of each sample. Based on their calculated objectives, six of the 1997 samples exceeded their objective, with samples ranging in values from 0.043 mg/L to 0.634 mg/L, while the remaining sample was below the laboratory's detection limit of 0.005 mg/L. For dissolved lead, one of the 1997 samples exceeded the objective with a value of 0.001 mg/L, while the six remaining samples were below the laboratory's detection limit of 0.001 mg/L. For dissolved zinc, one of the 1997 samples exceeded the objective with a value of 0.06 mg/L while two of the remaining samples had values below the laboratory's detection limit of 0.01 mg/L. The remaining three samples had values of 0.01, 0.02 and 0.03 mg/L, but were below their respective calculated objective value.

Though there were several metals exceedances in the samples collected, they are likely attributable to the background geology of the Canadian Shield region, which typically exceeds various metals parameters for surface water. (Bulloch et al. 2002)

Additionally, though the dissolved oxygen values of the samples varied between the seasons, from a low of 8.4 mg/L in the summer to a high of 13.3 mg/L in the winter, all samples were above the minimum objective based on aquatic life stage and water temperature. (Canadian Council of Ministers of the Environment 1999; Williamson 2002)

Though total phosphorous concentrations varied between the different years, their concentrations were similar at each of the locations during the sampling year. The samples collected in 1993 ranged from 0.027 to 0.036 mg/L, indicating that the river was at a meso-eutrophic trophic level, with the potential of being slightly eutrophic. The samples collected in 1994 and 1997 indicated that the river was somewhere between mesotrophic and meso-eutrophic trophic levels with concentrations between 0.019 and 0.028 mg/L. (Canadian Council of Ministers of the Environment 1999)

Total suspended solids (TSS) and turbidity are based on a change from the background value resulting from a disturbance or effluent discharge. As a result, since there are no comparison guidelines or objectives for these values, they are presented in Table 7-1 as a historic baseline to which new samples can be compared. TDS values are also presented for reference, though there are no guidelines or objectives for aquatic life use.

Table 7 - 4: Background TDS, TSS and Turbidity Results from 1993, 1994 and 1997 in the Manigotagan River

Station No.	Total Dissolved Solids (mg/L)			Total Suspended Solids (mg/L)			Turbidity (NTU)		
	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
MB05RAS 060[1]	72	97	88.33	6	6	6	2	6	3.57
MB05RAS 061[1]	78	100	90	-	-	-	2.9	6.4	5
MB05RAS 062[1]	88	120	98	-	-	-	2.8	7	5.53
MB05RAS 063[1]	85	97	91.5	5	5	5	3.1	6	4.98
MB05RAS 064[1]	81	100	91.75	5	5	5	4.1	7	5.6
MB05RAS 065[1]	82	110	94.5	5	5	5	4.2	7	5.05
MB05RAS 074[1]	88	92	90	-	-	-	4.5	6.9	5.53

Source: Compiled *from: [1] Manitoba Water Stewardship (Manitoba Water Stewardship, Water Quality Management Section 2009*

Wanipigow River

Manitoba Water Stewardship has periodically sampled the Wanipigow river water quality with 70 samples obtained during 1976, 1977, 1980 – 1983, 1992, 2001 and 2002 at various locations along the river including eight locations within or near Wanipigow Lake, five locations upstream of Wanipigow Lake and five locations downstream of Wanipigow Lake. (Manitoba Water Stewardship, Water Quality Management Section 2009; Green 2003)

Towards the eastern portion of the River and its watershed, the surface water may be influenced by several mining developments. As a result, only the seven water quality stations nearest to the PR 304 to Berens River ASR alignment were thought to be representative of conditions around the project area. These stations are MB05RAS143, MB05RAS144, MB05RAS145, WR1, WR2, WR3 and WR4, which are located between the outlet of Wanipigow Lake and Lake Winnipeg. A summary of analysis results on all 70 water samples is presented in Table 22 in Appendix 3.1.

The seven nearest locations were sampled in 2002 with several samples having exceedances of metals, including total aluminum, ammonia nitrogen, and total copper and total iron.

The guideline for total aluminium is based on the pH of the sample with values of either 0.005 mg/L for pH below 6.5 or 0.1 mg/L for pH above 6.5. Based on the pH of the samples, all seven samples exceeded their guideline with values ranging from 0.27 mg/L to 0.35 mg/L. The guideline for total copper is based on water hardness, with values ranging between 0.002 and 0.004 mg/L. Four of the samples exceeded the guideline with values between 0.002 mg/L and 0.0022 mg/L., while the remaining three samples had a value of 0.0014 mg/L. The guideline for total iron, 0.3 mg/L, was exceeded by all seven samples with concentrations ranging from 0.58 to 0.69 mg/L. The objective for ammonia nitrogen is calculated based on the pH of the sample. Four of the samples collected were analyzed for this parameter with three of the samples exceeding their calculated objective with values ranging from 0.2 to 0.24 mg/L, while the fourth sample had a value of 0.11 mg/L. (Canadian Council of Ministers of the Environment 1999; Williamson 2002)

Additionally, though the dissolved oxygen values of the samples collected in the project area varied from a low of 7.2 mg/L downstream of the PR 304 to Berens River ASR alignment to a high of 8.3 mg/L upstream of the PR 304 to Berens River ASR alignment, all samples in the project area were above the minimum objective based on aquatic life stage and water temperature. (Canadian Council of Ministers of the Environment 1999; Williamson 2002)

Based on the total phosphorous concentration of the samples, the river appeared to be in a eutrophic trophic state, with concentrations between 0.051 to 0.061 mg/L. (Canadian Council of Ministers of the Environment 1999; Williamson 2002)

Background values for TDS, TSS and turbidity in the Wanipigow River are presented in Table 7-5 for reference.

Table 7 - 5: Background TDS, TSS and Turbidity Results for the Wanipigow River from the Nearest Stations Sampled in 2002

Station No.	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)	Turbidity (NTU)
MB05RAS143[1]	98	9	7.7
MB05RAS144[1]	106	9	6.7
MB05RAS145[1]	99	9	7.4
WR1[2]	111	8	6.9
WR2[2]	98	9	7.7
WR3[2]	106	9	6.7
WR4[2]	99	9	7.4

Source: Compiled from [1] Manitoba Water *Stewardship (Manitoba Water Stewardship, Water Quality Management Section 2009*

[2] Manitoba Water Stewardship (Green 2003)

Bloodvein River

The Bloodvein River was sampled on two consecutive days by Manitoba Water Stewardship in July of 2008 at station no. MB05RBS013, located at the mouth of the Bloodvein River (Manitoba Water Stewardship, Water Quality Management Section 2009). In addition, between 1991 and 1998, Environment Canada sampled the Bloodvein River on 28 occasions at station no. MA05RB0001 (Bulloch et al. 2002). A summary of the laboratory results for the water samples collected is provided below and presented in Table 3 in Appendix 3.1. The samples collected at MB05RBS013 were taken at the mouth of the river and may be influenced by water from Lake Winnipeg, while the samples collected at MA05RB0001 are likely representative of the river quality.

The two Manitoba Water Stewardship samples were obtained at depths of 3.8 m and 2.6 m and were reported to have total suspended solids concentrations of 10 mg/L and 4 mg/L respectively. The clarity of the water was measured using a secchi disk, which was visible to 0.5 m at the time of the first sample and 1.3 m at the time of the second sample. None of the analyzed parameters resulted in exceedances of Manitoba Water Quality Standards, Objectives and Guidelines for Surface Water: Freshwater Aquatic Life or Canadian Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment 1999; Williamson 2002).

From 1991 to 1996, Environment Canada sampled the river four times a year, approximately once each season. After 1996, the spring session, was stopped, though sampling during the other periods continued into 1998. For these samples, several of the total metals parameters exceeded the Manitoba Water Quality Standards, Objectives and Guidelines for Surface Water: Freshwater Aquatic Life or the Canadian Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment 1999; Williamson 2002). The metals parameters that were exceeded included total aluminium, total cadmium, total copper, total iron and total lead. For total aluminium, 15 of the 17 analyzed samples exceeded the guideline of 0.1 mg/L, with results ranging between 0.166 and 0.312 mg/L. The two samples below the guideline had values of 0.09 and 0.093 mg/L. For total iron, 15 of the 17 analyzed samples exceeded the guideline of 0.3 mg/L, with results ranging between 0.315 and 0.635 mg/L. The remaining two samples below the guideline had values of 0.25 and 0.263 mg/L. Total cadmium was the next parameter with the most exceedances with 16 of 25 analyzed samples above the Canadian Council of Ministers of the Environment guideline of 0.000017 mg/L, with values ranging from 0.001 to 0.0108 mg/L. The remaining nine samples had values below the laboratory's detection limits of 0.0001 mg/L (7 samples) and 0.001 mg/L (2 samples). Total copper had six of twenty-five analyzed samples exceeding the guideline value of 0.002 mg/L, based on water hardness, with values ranging from 0.002 to 0.0067 mg/L. The remaining samples had values from 0.0003 to 0.0015 mg/L. Total lead had four of twenty-five analyzed samples exceeding the guideline value of 0.001 mg/L, based on water hardness, with values ranging from 0.0021 to 0.004 mg/L. Seven of the remaining samples were below the laboratory's detection limits of 0.0007 mg/L (4 samples), 0.0002 mg/L (2 samples) and 0.002 mg/L (1 sample), while the remaining samples had values between 0.0002 and 0.0008 mg/L. However, as mentioned earlier, exceedances of various metals parameters can be typical for surface water flowing through the Canadian Shield region. (Bulloch et al. 2002).

In addition to the metals exceedances, two samples obtained during the summer had field pH levels less than the minimum guideline of 6.5, with values of 6.45 and 5.89. However,

none of the samples were below the minimum guideline when tested in the laboratory. (Canadian Council of Ministers of the Environment 1999; Williamson 2002).

Total phosphorous concentrations varied between the two locations. The samples collected near the mouth of the river appeared to have a trophic level between meso-eutrophic and eutrophic, with concentrations ranging from 0.032 to 0.077 mg/L. The samples collected at the other location were typically somewhere between mesotrophic and meso-eutrophic trophic levels with concentrations ranging from 0.013 to 0.027 mg/L, though two samples collected were at a eutrophic trophic level with concentrations of 0.048 and 0.055 mg/L. (Canadian Council of Ministers of the Environment 1999).

Background values for TDS, TSS and turbidity in the Bloodvein River are presented in Table 7-6 for reference.

Table 7 - 6: Background TDS, TSS and Turbidity Results from 1991-1998 and 2008 in the Bloodvein River

Station No.	Total Dissolved Solids (mg/L)			Total Suspended Solids (TSS)			Turbidity (Ntu)		
	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
MB05RBS013[1]	-	-	-	4	10	7	-	-	-
MA05RB0001[2]	22	37	27.17	2	9.6	4.84	2.5	11.4	5.05

Source: Compiled from [1] Manitoba Water *Stewardship (Manitoba Water Stewardship, Water Quality Management Section 2009)*

[2] *Manitoba Ecosystem Based Management Pilot Project: Science Team Report (Bulloch et al. 2002)*

Berens River

In July 2008, Manitoba Water Stewardship obtained a water sample from station no. MB05RDS015, located at the mouth of Berens River (Manitoba Water Stewardship, Water Quality Management Section 2009). Though the water quality of the sample is presented in this report, the water quality is likely influenced by Lake Winnipeg and is not necessarily solely representative of the water in Berens River. As presented in Table 4 in Appendix 3.1, none of the parameters resulted in exceedances of Manitoba Water Quality Standards, Objectives and Guidelines for Surface Water: Freshwater Aquatic Life or Canadian Water Quality Guidelines for the Protection of Aquatic Life. However, based on the total phosphorous concentration, 0.076 mg/L, the water sample was at a eutrophic trophic state. (Canadian Council of Ministers of the Environment 1999; Williamson 2002).

During the sampling period, the clarity of the river was measured with a secchi disc, which was visible to 1 m below the water surface. A sample, obtained at a depth of 2 m below the water surface was reported to have a total suspended solids concentration of 6 mg/L. (Water Stewardship, Water Quality Management Section 2009)

7.2 Aquatic Environment

7.2.1 Methodology

The assessment of the existing aquatic environment was produced by integrating information from the following sources:

- Field studies conducted in 2002 (NSC 2003) and 2009;
- Topographic data;
- Low-level, ortho-rectified aerial imagery collected in 2009;
- Low-level aerial imagery collected in 2008 (km 50-88);
- Computerized terrain and hydrological modeling, based on survey data.(for the southern portion of the ASR alignment) and GIS data;
- Published and unpublished literature;
- Traditional Ecological Knowledge sources; and,
- Discussions with Manitoba Conservation's regional fisheries biologist and manager.

Field studies were conducted by truck along the existing Rice River Road and by helicopter along the km 49-156 portion of the ASR alignment. Fish habitats were characterized through the collection of water quality measurements (including dissolved oxygen, dissolved solids and pH) and visual assessment of physical habitat parameters. Assessments conducted at each waterbody included characterization of morphology and dimensions of the channel, floodplain and riparian zones, connection to upstream and downstream habitats (including Lake Winnipeg, verified through helicopter flight), and potential use by representative or indicator species.

Based on the above information, each watercourse crossing along the ASR alignment was evaluated in terms of habitat value and sensitivity to disturbance, based on guidance from DFO (1998). A complete description of methods, evaluation criteria, and rationale used in the assessment of fish habitats along the ASR alignment is presented in Section 2 of Appendix 3.1.

7.2.2 Aquatic Environmental Setting

Figure 7-13 shows the study area associated with the assemblage of desktop information for both the aquatic and terrestrial studies. Figure 7-14 identifies the detailed study area in which field studies for the fisheries biology were conducted for the proposed route alignment. Figure 7-15 to Figure 7-16 show the detailed locations of the watercourse crossings considered in the fisheries habitat assessment. Surface waters in the area of the ASR alignment flow in a general east-to-west direction, towards Lake Winnipeg. Through much of the area, but particularly north of the Bloodvein River, surface waters move as diffuse flow through broad, densely vegetated fens, with occasional consolidation in defined channels. Many of these channels appear as pools of open water (usually created by beaver dams) that are connected to larger watercourses or Lake Winnipeg by narrow, poorly defined channels, or by fens without recognizable channels. Frequent ponding, flooding of treed areas and diversion of flows occur due to and many of the pools of open water visible

on topographic maps and satellite imagery are the result of old, stable beaver dams. Figures 7-17 to 7-21 provide examples of these typical habitats along the ASR alignment. South of the Bloodvein River and along the Rice River Road, more frequent variations in topography, created by bedrock outcrops, result in better-defined waterbodies distinguishable as small streams and cattail-marshes, although broader fens are common as well.

Due to the high storage capacity in the lakes and undrained habitats in the watersheds east of Lake Winnipeg, annual flow in the rivers is less dominated by the spring freshet than in prairie rivers, with base flows in late fall and winter being more significant relative to the peak flows. High flows in the largest rivers occur considerably after the spring melt; the highest mean monthly flows generally occur in June in the Bloodvein River and July in the Pigeon and Berens rivers (Section 7.1.3).

Due to the very poor drainage in the area, even streams with very small drainage areas tend to retain water throughout the year, albeit frozen during the winter. Under non-frozen conditions, very few streams along the ASR alignment are truly seasonal or ephemeral; although water velocities within them become imperceptible as in stream vegetation develops over the growing season. Dense vegetation in the sedge fens, and in some cattail marshes adjacent to the existing Rice River Road, obscure much of the water volume moving through the area.

As the water volumes within these small watercourses are continuous with those that saturate the relatively large areas of flooded peat surrounding them, their water quality is characterized by high acidity and low dissolved oxygen concentrations. For many streams, the poor water quality and lack of connectivity to larger watercourses pose severe limitations to their suitability as fish habitat, and they are likely to provide habitat for only a small number of hardy forage fish species, if at all (Sections 1.1.2 and 4.2 of Appendix 3.1).

Larger streams and rivers within the area tend to be slightly acidic with oxygen levels near saturation, and do not undergo wide variation in these parameters, as photosynthetic activity is limited by low light penetration through the water column. These “tea-stained” waters are low in suspended sediments and algae, but high in colour, due to the tannins released by decomposing peat in the headwaters. The local geology, natural acidity, and lack of hardness in surface waters in the area result in significant concentrations of some metals which, at times, exceed Manitoba Water Quality Guidelines and Objectives (Section 7.1.3). Anthropogenic contamination of surface- and ground-waters in the area is minimal, due to the remoteness of the area. Water quality in the larger rivers along the ASR alignment does not pose a limitation to their ability to sustain fish populations at any time of the year.

Reflective of the surficial geology in the area, streambed substrata are dominated by fine, highly organic sediments in the smaller and lower-gradient streams, with bedrock outcrops influencing the channel morphology in the larger rivers. In particular, high proportions of the Bloodvein, Pigeon and Berens river channels are confined by bedrock. Gravel and sand deposits are likely rare to absent in the streams along the alignment.

Figure 7 - 13: Fisheries/Terrestrial Biology Desktop Study Area

Figure 7 - 14: Fisheries Biology Detailed Study Area

Figure 7 - 15: Watercourse Crossings: Berens River to Bloodvein River

Figure 7 - 16: Watercourse Crossings: Bloodvein River to PR304

The following list provides a brief description of the largest crossings along the ASR alignment (see Table 3-4 in Section 3 for additional details):

- Wanipigow River (UID1): The proposed ASR alignment crosses the Wanipigow River at the existing Rice River Road Bridge crossing, at a riffle approximately 650 m downstream of the Wanipigow Dam.
- English Brook (UID2): The proposed alignment crosses English Brook at the existing Rice River Road timber trestle bridge, which is currently susceptible to debris jams.
- Steep Rock Creek (UID7): The proposed alignment crosses Steep Rock Creek at the existing Rice River Road Bridge, in a low-gradient reach of the stream with grassed floodplains.
- Rice River (UID11/12_: The proposed alignment crosses Rice River at the existing bridge over a set of rapids, at a bedrock constriction in the river.
- Loon Creek (UID35/36/37): The proposed alignment crosses Loon Creek at the existing Rice River Road culvert crossing, in a flat, low-lying area approximately 250 m upstream of a short set of rapids.
- Eaglenest Creek (UID43): The proposed alignment crosses Eaglenest Creek at the existing Rice River Road culvert crossing, in an area with gently-sloped, grassy banks.
- Bloodvein River (UID53/54): The proposed ASR alignment crosses the Bloodvein River along the edge of an existing hydroelectric distribution line ROW, at a bedrock outcrop from the south bank that constricts the river channel and forms a narrow backwater on its south side at the crossing.
- Pakasekan Creek (UID57): The proposed alignment crosses Pakasekan Creek (a low-gradient, meandering stream with fine substrate) approximately 1.2 km upstream of its confluence with Long Body Creek.
- Long Body Creek (UID59): The proposed alignment crosses Long Body Creek (a low-gradient, meandering stream with fine substrate) approximately 1.0 km upstream of its confluence with Pakasekan Creek.
- Petopeko Creek (UID63): The proposed alignment crosses Petopeko Creek at the existing winter road crossing, within a low-gradient reach of the stream with several beaver dams along the channel.
- Bradbury River (UID69): The proposed alignment crosses the Bradbury River (a wide, low-gradient, meandering stream with fine substrate) at the existing winter road and hydroelectric distribution line crossing.
- Pigeon River (UID77): The proposed alignment crosses the Pigeon River at a bedrock constriction in the channel.
- Berens River (UID84): The proposed Berens River crossing is at a bedrock constriction and riffle with a small rock island in the channel. Existing access roads follow the north and south sides of the river from east of the crossing to the community of Berens River to the west.

More information describing all watercourse crossings along the ASR alignment, and the fish habitats present at and near the crossings, is provided in Section 4.2 of Appendix 3.1. Site-specific habitat assessments, complete with photographs, are provided in Appendix A of the Fish Habitat Assessment report (Appendix 3.1).

Surface waters in the area of the ASR alignment flow in a general east-to-west direction, towards Lake Winnipeg. Through much of the area, but particularly north of the Bloodvein River, surface waters move as diffuse flow through broad, densely vegetated fens, with occasional consolidation in defined channels. Many of these channels appear as pools of open water (usually created by beaver dams) that are connected to larger watercourses or Lake Winnipeg by narrow, poorly defined channels, or by fens without recognizable channels. Frequent ponding, flooding of treed areas and diversion of flows occur due to beaver activity, and many of the pools of open water visible on topographic maps and satellite imagery are the result of old, stable beaver dams. Figures 7-12 to 7-16 provide examples of these typical habitats along the ASR alignment. South of the Bloodvein River and along the Rice River Road, more frequent variations in topography, created by bedrock outcrops, result in better-defined waterbodies distinguishable as small streams and cattail-marshes, although broader fens are common as well.

Due to the high storage capacity in the lakes and undrained habitats in the watersheds east of Lake Winnipeg, annual flow in the rivers is less dominated by the spring freshet than in prairie rivers, with base flows in late fall and winter being more significant relative to the peak flows. High flows in the largest rivers occur considerably after the spring melt; the highest mean monthly flows generally occur in June in the Bloodvein River and July in the Pigeon and Berens rivers.

Due to the very poor drainage in the area, even streams with very small drainage areas tend to retain water throughout the year, albeit frozen during the winter. Under non-frozen conditions, very few streams along the ASR alignment are truly seasonal or ephemeral; although water velocities within them become imperceptible as in stream vegetation develops over the growing season. Dense vegetation in the sedge fens, and in some cattail marshes adjacent the existing Rice River Road, obscure much of the water volume moving through the area.

As the water volumes within these small watercourses are continuous with those that saturate the relatively large areas of flooded peat surrounding them, their water quality is characterized by high acidity and low dissolved oxygen concentrations. For many streams, the poor water quality and lack of connectivity to larger watercourses pose severe limitations to their suitability as fish habitat, and they provide habitat for only a small number of hardy forage fish species, if at all.

Larger streams and rivers within the area tend to be slightly acidic with oxygen levels near saturation, and do not undergo wide variation in these parameters, as photosynthetic activity is limited by low light penetration through the water column. These “tea-stained” waters are low in suspended sediments and algae, but high in colour, due to the tannins released by decomposing peat in the headwaters. The local geology, natural acidity, and lack of hardness in surface waters in the area result in significant concentrations of some metals which, at times, exceed Manitoba Water Quality Guidelines and Objectives. Anthropogenic contamination of surface- and ground-waters in the area is minimal, due to the remoteness of the area. Water quality in the larger rivers along the ASR alignment does not pose a limitation to their ability to sustain fish populations at any time of the year.

Reflective of the surficial geology in the area, streambed substrata are dominated by fine, highly organic sediments in the smaller and lower-gradient streams, with bedrock outcrops influencing the channel morphology in the larger rivers. In particular, high proportions of the Bloodvein, Pigeon and Berens river channels are confined by bedrock. Gravel and sand deposits are likely rare to absent in the streams along the alignment.

7.2.3 Fish Species

Approximately 60 species of fish inhabit Lake Winnipeg and/or the tributaries along the PR 304 to Berens River ASR alignment (Table 7-7). A number of these species (particularly walleye and Lake Whitefish) support extensive commercial fisheries on Lake Winnipeg and subsistence fisheries for local communities such as Berens River and Bloodvein. Due to the remoteness of the area, recreational fishing occurs primarily through the services of several commercial lodges located on the lakes in the upper reaches of the larger river systems, upstream of the ASR alignment.

Table 7 - 7: Fish Species Inhabiting Lake Winnipeg and/or its Immediate Tributaries

Family	Systematic Name	Common Name
Petromyzontidae	*Ichthyomyzon castaneus*	chestnut lamprey[2]
	I. unicuspis	silver lamprey
Acipenseridae	*Acipenser fulvescens*	lake sturgeon
Hiodontidae	*Hiodon alosoides*	goldeye
	H. tergisus	mooneye
Cyprinidae	*Couesius plumbeus*	lake chub
	Cyprinus carpio	common carp
	Macrhybopsis storeriana	silver chub
	Margariscus margarita	pearl dace
	Notemigonus crysoleucas	golden shiner
	Notropis atherinoides	emerald shiner
	N. blennius	river shiner
	N. heterolepis	blacknose shiner
	N. hudsonius	spottail shiner
	N. texanus	weed shiner
	N. volucellus	mimic shiner
	Phoxinus eos	northern redbelly dace
	Phoxinus neogaeus	finescale dace
	Pimephales promelas	fathead minnow
	Platygobio gracilis	flathead chub
	Rhinichthys cataractae	longnose dace
	R. obtusus	western blacknose dace
	Semotilus atromaculatus	creek chub
Catostomidae	*Carpiodes cyprinus*	quillback
	Catostomus catostomus	longnose sucker
	C. commersoni	white sucker

Family	Systematic Name	Common Name
	Ictiobus cyprinellus	bigmouth buffalo
	Moxostoma anisurum	silver redhorse
	M. macrolepidotum	shorthead redhorse
Family	Systematic Name	Common Name
Ictaluridae	*Ameiurus melas*	black bullhead
	A. nebulosus	brown bullhead
	Ictalurus punctatus	channel catfish
	Noturus gyrinus	tadpole madtom
Esocidae	*Esox lucius*	northern pike
Umbridae	*Umbra limi*	central mudminnow
Osmeridae	*Osmerus mordax*	rainbow smelt
Salmonidae	*Coregonus artedi*	cisco
	C. clupeaformis	lake whitefish
	C. zenithicus	shortjaw cisco
	Salvelinus namaycush	lake trout
Percopsidae	*Percopsis omiscomaycus*	troutperch
Gadidae	*Lota lota*	burbot
Gasterosteidae	*Culaea inconstans*	brook stickleback
	Pungitius pungitius	ninespine stickleback
Cottidae	*Cottus bairdi*	mottled sculpin
	C. cognatus	slimy sculpin
	C. ricei	spoonhead sculpin
Moronidae	*Morone chrysops*	white bass
Centrarchidae	*Ambloplites rupestris*	rock bass
	Micropterus dolomieu	smallmouth bass
	Pomoxis nigromaculatus	black crappie
Percidae	*Etheostoma exile*	Iowa darter
	E. nigrum	johnny darter
	Perca flavescens	yellow perch
	Percina caprodes	logperch
	P. maculata	blackside darter
	P. shumardi	river darter
	Sander canadensis	sauger
	S. vitreus	walleye
Sciaenidae	*Aplodinotus grunniens*	freshwater drum

1 List compiled from Scott and Crossman (1998), Bulloch et al. (2002) and Stewart and Watkinson (2004). Other species may exist within the study area, but their presence has not been confirmed.

[2] The published distribution of the chestnut lamprey does not extend north of the south basin of Lake Winnipeg, but capture of a single specimen was reported in 2007 from Eight-Mile Channel, north of the lake (Earth Tech unpublished data).

Species at Risk

Currently, no fish species are listed under the Manitoba Endangered Species Act (Manitoba Conversation, 2009b). However, of the fish species listed in Table 7-7, the following five

species have been identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) federally as species at risk:

- Silver chub. The silver chub is listed as a species of Special Concern on Schedule 1 of the federal Species at Risk Act (SARA). It generally inhabits slow to moderate-flowing rivers, is common in the Red and lower Assiniboine Rivers, and has been collected from various locations in the south basin of Lake Winnipeg. Its Manitoba population appears secure, and no local recovery strategy exists for the species.
- Shortjaw cisco. The shortjaw cisco has been listed as Threatened by the COSEWIC, and is listed as Threatened on Schedule 2 of SARA. The shortjaw cisco inhabits deepwater lake habitats, and individual populations are known to spawn in early spring or late fall, possibly ascending large rivers during this period (Stewart and Watkinson 2004). No local action plan exists for the recovery strategy for this species.
- Lake sturgeon. The Red-Assiniboine Rivers – Lake Winnipeg population of lake sturgeon has been listed as Endangered by COSEWIC, but it has not been listed under SARA. Lake sturgeon utilizes fast, turbulent waters in medium to large rivers for spawning, and is known to inhabit the large rivers on the east side of Lake Winnipeg.
- Chestnut lamprey. The chestnut lamprey has been listed as a species of Special Concern by COSEWIC, but it is not listed under SARA. The species occurs in low densities in the Lake Winnipeg watershed. Chestnut lamprey spawn in clean, sand-gravel substrate in small streams and develop in a filter-feeding larval stage for several years in these habitats before becoming the adult stage that is parasitic on a variety of host fish species. The streams on the east side of Lake Winnipeg in the vicinity of the ASR alignment are unlikely to provide spawning or rearing habitat for chestnut lamprey, due to a lack of sand and gravel substrate.
- Bigmouth buffalo. The bigmouth buffalo has been listed as a species of Special Concern by COSEWIC, but is not listed under SARA. Its preferred habitats are large, turbid, slow-moving rivers, and it is fairly common in the Red and lower Assiniboine Rivers in Manitoba. A single specimen has been captured in the Icelandic River (on the west side of Lake Winnipeg) (Stewart and Watkinson 2004), suggesting its possible presence in the south basin of the lake. The clear (non-turbid, albeit tea-stained) tributaries that cross the ASR alignment and flow into the east side of Lake Winnipeg do not likely provide preferred habitat for this species. Therefore, the potential for its presence at the ASR crossing locations is low.

The populations and habitat use of shellfish (including freshwater mussels and snails) in the eastern tributaries to Lake Winnipeg are less well known than those of the finned fish, but the presence of the maple leaf mussel (*Quadrula quadrula*) has been confirmed in the Bloodvein River (Government of Canada 2009). This mussel inhabits medium to large

rivers, and has been designated as Endangered by COSEWIC, but is not listed under SARA. Similarly, the Lake Winnipeg physa snail (*Physa* sp.) has been listed as endangered by COSEWIC, but it has not been listed for protection under SARA. No other shellfish species inhabiting the study area have been identified as by COSEWIC.

No protection measures specific to any of the species listed above are currently legislated, although each is protected through the general fish and habitat protection measures set out in SARA (where applicable) and the federal Fisheries Act.

7.2.4 Fish Habitats and Utilization in the Project Area

As described in Section 7.2.1, an abundance of fen and beaver-pond habitats exist east of Lake Winnipeg in the vicinity of the ASR alignment. Due to their proximity to the lake, these habitats have the potential to be accessible to fish residing in the lake, although abundant beaver dams pose barriers to fish passage and potential for stranding. The poor water quality (specifically, low dissolved oxygen) in the small creeks among these habitats poses a severe limitation to their overall productivity and suitability to most species, and their utilization is likely limited to that by pearl dace, northern redbelly dace, finescale dace, fathead minnow, white sucker, central mudminnow, brook stickleback, and Iowa darter (Stewart and Watkinson 2004). These species within these habitats likely do not contribute to the local recreational or commercial fisheries, which are based primarily on the Lake Winnipeg large game fish populations and a pelagic (open-lake) forage base of emerald shiner, cisco and, in recent years in the north basin, rainbow smelt.

Due to a lack of coarse substrate in the smaller streams, fish that require rapids or riffle habitats for spawning likely spawn in the larger rivers (e.g. Wanipigow, Rice, Bloodvein, Pigeon and Berens rivers), possibly on bedrock and boulder shoals due to a lack of gravel substrate. Based on local knowledge of the Berens River system, “sturgeon sucker” (likely longnose sucker) are believed to spawn in rapids in the Etomami River just upstream of its confluence with the Berens River, and walleye spawn at English Rapids on the Berens River, upstream of the ASR alignment and the confluence with the Etomami River (McKay pers. comm. 2008). Lake sturgeon is known to inhabit the Berens River, but is more common in the Pigeon River. (McKay pers. Comm. 2008).

Typical, preferred northern pike spawning habitat is flooded vegetation on the floodplains of low-gradient streams during the spring freshet. Although low-gradient streams are abundant along the east side of Lake Winnipeg, the majority of them are continuous with, or bordered by, sedge fens without firm supporting soils. During the high-water conditions observed in the 2009 field studies (which followed a major rainstorm), the loosely-rooted vegetation in these habitats floated, rather than become submerged (Photo 1-6). The flow of water through and under vegetation in these habitats when flooded causes hypoxic conditions due to the volumes of saturated, decomposing peat within them. This hypoxia and low water velocities make these habitats highly unsuitable as spawning habitat. Therefore, based on field observations, the productive spawning habitat for northern pike along the ASR alignment is limited to the relatively small number of streams bordered by defined banks with mineral soils and vegetated floodplains.

Of particular importance to the planning of construction activities is the potential for presence of summer, winter, or fall fish-spawning habitat. Summer-spawning species in the area include the lake sturgeon, channel catfish, white bass, and several minnow species.

These species are believed to spawn in the rivers and larger streams along the east side of Lake Winnipeg (Stewart and Watkinson 2004). The burbot is the only winter-spawning fish in the area, and it is generally found in lake and large-river habitats. Burbot spawn in a fairly broad range of habitats, and specific spawning habitats in the area of the ASR alignment have not been identified.

The fall-spawning species in the area are the lake whitefish and cisco, which are predominantly lake-dwelling species. These species occasionally ascend rivers and the lower reaches of large streams (Stewart and Watkinson 2004), but the populations in Lake Winnipeg are believed to spawn in the main body of the lake, and do not undergo notable migrations into the rivers (McKay pers. comm. 2008). Of the watercourses along the ASR alignment, the potential for presence of these species is predominantly limited to the larger rivers (e.g. the Bloodvein, Pigeon and Berens rivers), and this presence would not be associated with spawning activity by the Lake Winnipeg populations. Lake Whitefish and cisco are absent in the many smaller streams along the ASR alignment.

7.2.5 Fish Habitat Values

As described in Section 4 of Appendix 3.1, waterbodies along the ASR alignment were evaluated as providing Critical, Important, Marginal or No Fish Habitat based on guidance from DFO (1998) and specific evaluation criteria and rationale explained in the appendix. Of the 84 waterbodies crossed by the alignment, 45 were assigned fish habitat values of Marginal, and 21 were assigned values of Important Fish Habitat. The Marginal habitats were those with severe limitations to their productive capacity as fish habitat, and that were deemed to contribute little, if at all, to the local sport, commercial or subsistence fisheries. Most headwater streams and beaver pond habitats fell in this category, unless they were closely connected to larger streams or Lake Winnipeg. The Important habitats were those that were deemed to support one or more species important to the local fisheries, and included the larger streams and rivers, plus crossings of smaller watercourses in close proximity to important habitats. No critical fish habitats were identified along the ASR alignment.

Figure 7 - 17: Typical wet opening at edge of broad fen draining toward Lake Winnipeg (in background). Note lack of defined channel between open water and lake.

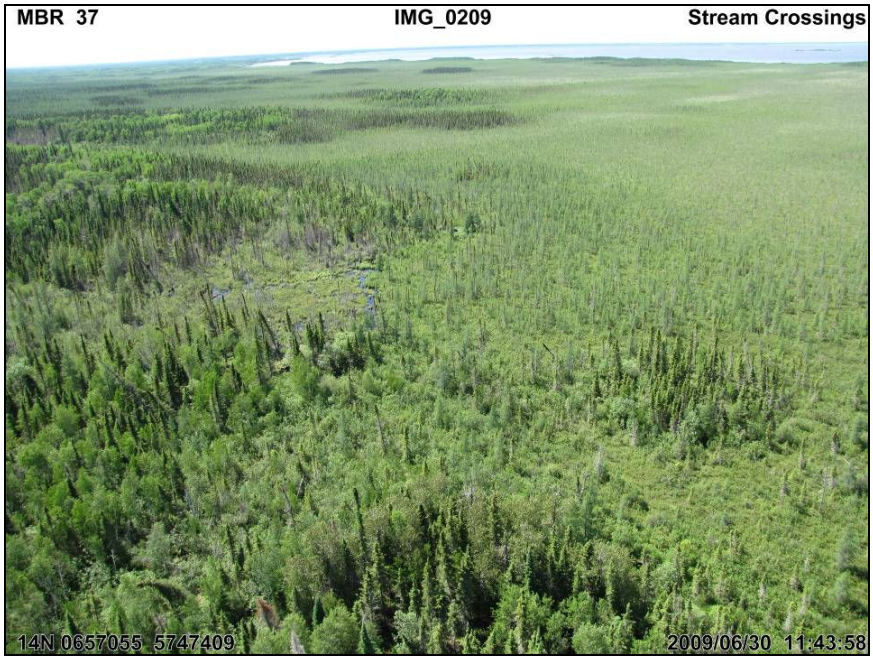

Figure 7 - 18: Open-water channels through sedge fen downstream of broad, treeless fen (in background, behind trees). The larger fen in the background lacked defined open-water channels.

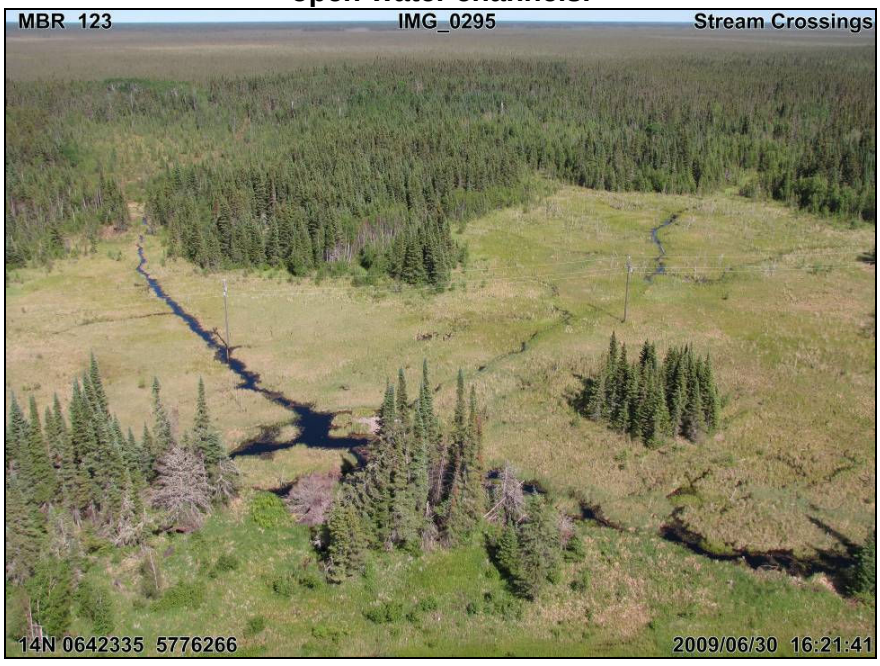

Figure 7 - 19: Wet fen channel draining into broad sedge fen, which drains into Lake Winnipeg (in background). The broader fen lacked open-water channels.

Figure 7 - 20: Consolidation of flows into stream channel in treed fen, draining toward Lake Winnipeg (in background).

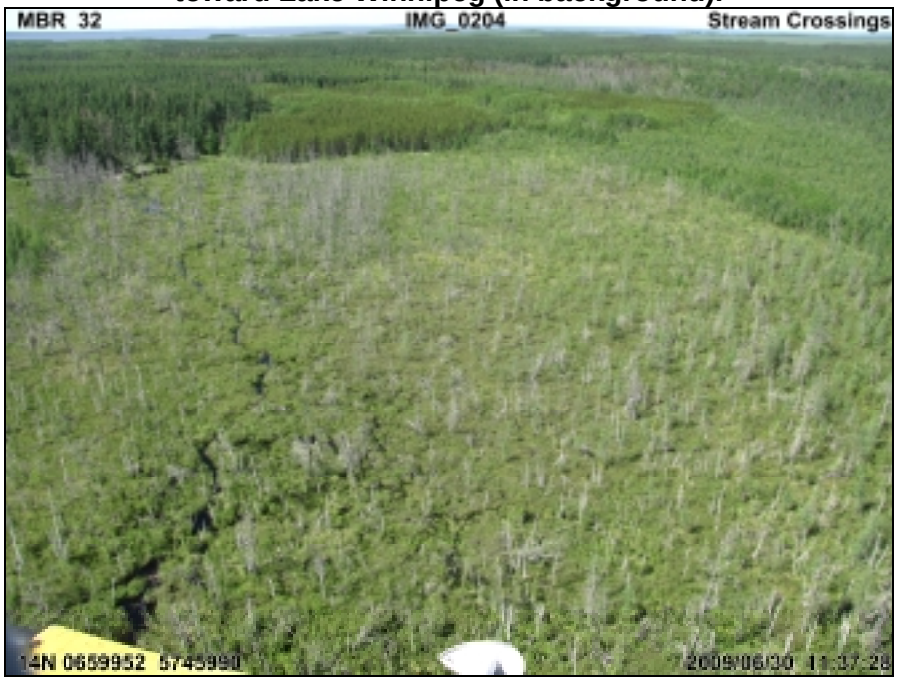

Figure 7 - 21: Treed area flooded by beaver dams, July 3, 2009. Note dams near foreground and at outlet of pond, near top of picture.

Figure 7 - 22: Floating water arum (*Calla palustris*) at edge of open water in sedge fen. Roots were detached from bottom substrate in high water levels after a rainstorm.

7.3 Terrestrial Environment

Information on the terrestrial environment north of the Bloodvein River was gathered from Manitoba Conservation files, interviews with staff, discussions with local residents and TK studies conducted in the local communities. Appendix 3.2 contains a detailed overview of the terrestrial environment in the study area. Woodland Caribou (*Rangifer tarandus caribou*) has been the subject of field studies and radio and GPS tagging programs within the study area. Forest stands have been defined in the area east of Lake Winnipeg and some understory information is available. Plant surveys have been conducted for the Model Forest area south of the study area, and much of that work is applicable to the proposed Project.

The southern section of the project from PR 304 to Bloodvein is accessible, to some extent, by the existing Rice River Road. The area north of the Bloodvein River presents considerable challenges in terms of access in the summer. This fact, and the remoteness and size of the area, accounts for the lack of ground survey information in the overall study area. Cutlines for winter roads run through the region, and along a portion of the preferred route for the proposed road. Hydro distribution lines also run through the region, including section of the proposed road alignment. Once active, the winter roads in the area act as transportation corridors for the communities of Bloodvein and Berens Rivers, connecting east to Pauingassi and Little Grand Rapids, north to Poplar River, and northeast to St. Theresa Point.

These winter roads allow for the movement of goods and people throughout the east side of Manitoba.[1] This traffic largely replaces transport by air, which is the major option for the ice-free seasons of the year. The winter activity on these roads largely mirrors that which can be expected from the proposed all-season road, with the obvious exception that winter roads are only open during periods of freezing weather. The winter transport season can vary widely from year to year, and has recently been shortened by increasingly mild periods during normally frozen months of the year. This is one of the major reasons for the construction of an all-season road linking the communities on the east side of Lake Winnipeg.

7.3.1 Previous Studies

The study area for the proposed all-season road is encompassed within a portion of Ecoregion 90 located in Manitoba (Figure 7-23). This Ecoregion was selected for a pilot study on Ecosystem Based Management (EBM) conducted in cooperation with the Manitoba Model Forest, Manitoba Conservation, and a number of private and academic partners. The Science Team Final Report (Ecoregion 90: Lac Seul Upland Ecoregion Summary Technical Report, 2002) lists all known and expected wildlife and vegetation

[1] The rights of way cut for the currently active winter road and distribution lines north of the Bloodvein River did not require a formal environmental process prior to their construction. These projects predate the requirement for an Environmental Act submission or did not trigger the Act. No previous baseline information in relation to these projects therefore not available.

species for the Ecoregion. This study provides the foundation for the terrestrial program developed for the Manigotagan to Berens River Road EIA, and was used to design the study for the final road alignment and the field program.

Figure 7 - 23: Terrestrial Biology Detailed Study Area

There have been various studies in the Manitoba Model Forest (Figure 7-24) on rare and uncommon species. Punter (1994) produced a comprehensive inventory of vascular plants for the area. This list is directly applicable to the current study area, with the exception that some plants identified in the Punter report are reaching their northern and western range limits and may not be represented in the area north of the Bloodvein River.

Several rare plant surveys were conducted by the Manitoba Museum in the Manitoba Model Forest area in 1993 and 1994. These surveys included incidental observations of birds and mammals. Records from 1980 to 1998 from the general area of the Whiteshell and eastern boreal area of Manitoba also relate to the current study area. These records are contained in unpublished files in the museum archives. They are referenced in the vegetation and landscape type section of this report and included in the Terrestrial Technical Report.

Figure 7 - 24: Manitoba Model Forest

The winter road network was largely constructed by private contractors in the 1950's era (Figure 7-25). At the time cat trains pulled wagons and sleds across frozen lakes connected by overland trails. This network was turned over to the provincial highway authority in 1971. Since then the network has been upgraded to allow transport by truck and runs overland with the exception of river crossings. Lakes are largely avoided due to visibility problems in blowing snow and the danger of breaking through the ice with heavy vehicles.

Figure 7 - 25: Current Cut Lines in the Study Area for the Distribution Line to Berens River and the Winter Road

7.3.2 Methodology

Information on the terrestrial environment was gathered from available sources. This included past reports on the Rice River Road, studies from the Manitoba Model Forest, TEK study information, and information from the Manitoba Museum. Personnel from Manitoba Conservation were contacted and interviewed at the regional office in Lac du Bonnet. These sources indicate that Woodland Caribou are the major wildlife concern in the study area. Manitoba Conservation has conducted aerial surveys for caribou throughout the region. These studies have recently been enhanced through tagging studies using radio and GPS collars. Results from the tagging program have shown the preferred areas used by caribou both in winter and summer and suggest seasonal movements within portions of the current road study area.

Habitat Suitability Index (HSI) models have been developed to quantify the value of wildlife habitat for various species. These models are tailored for an individual species and based on the best vegetation information available for the area under study. Woodland Caribou have been the subject of considerable habitat study and an HSI model has been developed that is directly applicable to the Forest Resource Inventory (FRI) classification developed for forest stands in Manitoba by Manitoba Conservation, Forestry Branch. The FRI classifications for the east side of Lake Winnipeg are relatively detailed, and the HSI model for Woodland Caribou has been designed to apply directly to the FRI. This allows the forest stand classification maps for the study area to serve as the basis for habitat value assessments for caribou.

Several proposed route alignments and buffer zones of varying widths were examined in the route selection exercise in reference to the amount of high quality caribou habitat affected. The tagging program for caribou further refined the areas most preferred by this species in this region. The summary data from the HSI and tagging programs were used as part of the selection process for the final route. Once the preferred alignment was established, areas of high quality habitat for caribou were mapped and examined in the field program. Tagging results were used to determine areas along the preferred alignment that might attract caribou and create potential concerns with crossing points along the road. The overall HSI and tagging analysis was used to estimate the potential effects that the road could have on Woodland Caribou populations in the region by assessing the location of quality habitat and tagging returns along the entire length of the Rice River Road and the new segment from the Bloodvein to Berens Rivers. This analysis was used to ensure that quality habitat important to the Atikaki Berens woodland caribou herd was avoided in the final road selection exercise presented in Section 4 of the EIS.

Information for moose is less well developed than that for caribou. An HSI has been developed that can be applied to the FRI. However, further work is required to make this model available on a scale that is useful for analysis on specific projects such as a road alignment. The moose HSI has been applied to the area immediately south of the study area by staff of Manitoba Conservation, Wildlife and Ecosystem Protection. An exercise in the current study to apply the moose HSI to the area between PR 304 and Berens River did not result in a useful analysis tool. The resolution provided by the Moose HSI in its current form is very course, giving township sized habitat blocks that are not useful in locating a road alignment. No information on seasonal habitat requirements such as wintering and calving areas has yet been developed for the HSI. Moose are considered

ubiquitous in the study area, occurring widely throughout the region. This was confirmed through comments received from the TEK studies.

Furbearer information was provided by Manitoba Conservation, Wildlife and Ecosystem Protection. This provided presence and harvest information for the Registered Traplines (RTL) and community fur blocks (fur sections) in the communities along the proposed route. Trapping information does not provide accurate population information since fur returns are often based on current price for fur, ease of trapping certain species as opposed to others, and individual bias and preference for certain furbearers. However, trapping records do give a good estimate of the presence of furbearers across a large geographic region, as well as change in presence along geographic gradients, such as north south occurrence, or presence along water courses or upland versus lowland and wetland areas.

Information on other species was largely gained through interview, field observation and other studies. Minimal data is available on birds and amphibians in the study area. The Ecoregion 90 wildlife lists include reptiles (turtles) and amphibians, as well as bird species that are expected or observed in the area. The difficulty of access during summer months makes this area very challenging to survey from the ground.

The 2009 summer field program was designed to address the following data needs:

- Provide more detail on stand types identified in the FRI along the proposed road alignment.
- Ground truth the FRI areas used to identify high quality caribou habitat.
- Inspect the road alignment and local area (1000m buffer) for recent fire events that would change the FRI information used for caribou habitat evaluation in a major way.
- Inspect the road alignment for natural changes (stand maturation, beaver flooding, and wind or disease damage) that would impact the FRI information and habitat evaluation in a major way.
- Provide a detailed profile of the crossing points and landscape types identified in the route selection exercise in terms of plant community and habitat types present on the route and within a 1000 m buffer.
- Inspect crossing points and proposed resource extraction (quarry) sites.

Access to the area north of the Bloodvein River is very difficult in the summer. For this reason the field program was conducted by helicopter. Two Bell Jet Ranger helicopters were used in the field survey, one on floats and one on skids. The float machine was used primarily by the aquatics crew, and by the terrestrial crew for areas such as flooded sedge marsh that could not be accessed by ground. The skid machine was used by the terrestrial crew for most of the survey.

Upon landing at a selected site, the terrestrial crew recorded an inventory of the area through digital photographs, assessment of stand type, forest cover, dominant tree species, and major understory species. A GPS unit recorded both the location of the site

and time and location of all photographs collected during the ground survey. The field crew then conducted a 30 minute walk around the site to identify overstory and understory species, and all ground species encountered in the area. No attempt was made to record ground cover through quadrats or transects due to time constraints. All species encountered during the site survey were recorded in terms of presence at the site.

Photographs of the ground site area and general surrounding landscape were taken from the air. Resource extraction areas were also examined from the air. These included potential quarry sites that may be used for crush operations in support of the road. Typically, potential quarry sites are rock outcrop islands within the generally wet fen and Black Spruce environment along the preferred route. In most cases these rock islands did not present any landing opportunity. The ability of a helicopter to hover just above the tree line was used to assess the area in comparison to those sites that did offer landing opportunities. This offered a detailed view of ground cover at the site. A detailed description of the field survey program is presented in the Terrestrial Technical Report.

7.3.3 East Side Lake Winnipeg Environmental Setting

The landscape on the east side of Lake Winnipeg is a part of the boreal shield ecozone as defined by Environment Canada. The study area is located within the Lac Seul Upland Ecoregion, an area that extends from Lake Winnipeg to the Albany River in Ontario (Figure 7-21). The portion of this Ecoregion, within Manitoba from Lake Winnipeg to the Ontario border, contains three (3) ecodistricts; Berens River, Wrong Lake, and Nopiming (AECOM, 2009).

The region east of Lake Winnipeg is a flat plain punctuated by shield rock outcrops. The rock outcrops are surrounded by forest or fen and bog development. As a former lake bed from Lake Agassiz, the area contains fine grained sediments and clays overlaying till and bedrock. Drainage in general is poor, resulting in a very wet landscape. Large fens occur all along the east side of the lake, with drainage roughly towards the lake in the entire area. Fens are punctuated by bogs in many areas, especially along rock outcrops. Nutrient loading of these wet areas is highly variable, and reflects drainage from the local uplands. The nature of the organic accumulation in an area determines acidity, with sedge based accumulations in fens largely neutral to slightly basic, and sphagnum based accumulations highly acidic (AECOM, 2009).

This area is crossed by several major rivers that drain from lakes both in Manitoba and Ontario. The rivers often have rocky shorelines with many waterfalls and rapids. Wildlife and vegetation reflect the wet nature of the area, and the harsh winter climate. Many plant species are on the edge of their northern or southern ranges. This is also true of eastern range, with plants common in Ontario fading into the region east of Lake Winnipeg. The landscape is subject to forest fire and is burned frequently. Natural fire is the most common disturbance feature of this area. As a result, there is a large range of variation between new sites just revegetating from a burn, and mature sites that are much older.

7.3.4 Ecological Processes in the Study Area

The area east of Lake Winnipeg is dynamic in terms of rapid vegetation changes due to fire, as well as slow processes that build up large deposits of organic material and change the landscape over time. These processes are largely dictated by the wet nature of the area and the drainage characteristics of the mineral subsoil and glacial till base.

7.3.5 Wetland Processes

Wetlands in the study area are primarily fens with slow flowing ground water moving in a generally northwest direction (horizontal fens). Fens tend to accumulate organic material from both sedges and sphagnum/feather mosses. The study area is largely a sedge fen zone with varying depths of organic material. Water table levels are near the surface and nutrient levels vary as indicated by the limited development of tree growth. The surrounding rock outcrops tend to make a basin-like structure between them that fills with fen and bog accumulations. Bogs develop deep organic deposits based primarily on sphagnum and feather mosses. This can take place over natural depressions such as potholes and small lakes, as well as within fens. Bogs in fens tend to occur along the margins of rock outcrops. Fens tend to favour the growth of tamarack (Larix laricina) while bogs are usually covered by Black Spruce (Picea mariana). In both cases, tree growth reflects nutrient availability and water depth. Many fens and bogs have relatively open water areas near the centre. Tree growth will taper off towards these central areas, becoming more stunted as trees thin out.

The study area has been ice-free for approximately 10,000 years, and emerged from Lake Agassiz approximately 9,000 years ago. Landscape development has been ongoing since that time. Fens and bogs occur all along the proposed road alignment. There are very large fens to the east of the proposed alignment, and one (1) large fen that will be crossed just south of the Berens River. Both fens and bogs accumulate large and often deep deposits of organic peats, based on sedge and moss growth over a large span of time. Deep peat deposits tend to reduce overall nutrient availability and restrict water flows and drainage in a landscape. Over long periods of time peat bogs can begin to raise the landscape level and become relatively devoid of most vegetation. Terminal peat accumulations in this state of development are not found in the study area, but do occur in other areas further north, and in Saskatchewan.

7.3.6 Natural Disturbance

The most common natural disturbance in the study area is wildfire, which is typical of all boreal areas. The highly flammable nature of conifers and the intense hot dry weather that often occurs in early spring combine to make a combustible mixture that is readily ignited by lightning. As a result, a boreal forest burns often (Figure 7-26). Ehnes (1999b) estimates a fire frequency of 1 fire every 75 to 100 years, and indicates that over the last 120 years very little of this area has not burned. Fire does not burn uniformly across the landscape, but results in a patchy network of burned and unburned stands. Forest in deep wet areas tends to burn only around the margins while stands on rocky outcrops burn completely. Some older stands occur on islands, and the riverine forests along the major water courses tend to survive fire to a greater degree than the large single species

stands in the general area. Uplands with large poplar stands, or a high degree of poplar content in a mixed wood, tend to show a much more patchy burn pattern than a single species conifer stand.

Figure 7 - 26: Historical Fires in the Surrounding Area

The high fire frequency and widely distributed effects of fire across the landscape result in a vegetative community that is adapted to frequent disturbance. Post fire succession varies according to the nature of the site. Initially growth tends to be rapid on a burned area due to nutrient release by fire and the opening of the canopy to sunlight. Jack Pine (*Pinus banksiana*) is highly fire adapted. The cones are fire resistant and open after a burn, resulting in rapid growth of pine in areas where they were present prior to the fire. White Spruce (*Picea glauca*) returns to upland areas and Black Spruce to areas where there are wetter conditions. Spruce growth is slower than that of pine, and spruce stands take longer to regenerate.

Tamarack often survives fire through their location in very wet areas. Burned Tamarack stands on drier sites will often show a mixed regrowth with poplar and spruce intermingled (Figure 7-27). Poplar species tend to sucker out from roots after a fire and can grow rapidly. The high fire frequency results in very little mature forest, with turnover of stands occurring rapidly and continuously. This gives the landscape the appearance of always being in a state of succession to some degree.

Insects and disease also play a role in the evolution and development of forest stands in this region. Four (4) known insects that cause disturbances in forest stands have been recorded from this area. These are the Eastern Spruce Budworm (*Choristoneura fumiferana*), which infests spruce species, Jack Pine Budworm (*Choristoneura pinus*) which causes defoliation in Jack Pine stands, Larch Sawfly (*Pristiphora erichsonii*) which similarly attacks Tamarack, and Forest Tent Caterpillar (*Malacosoma disstria*) which causes defoliation in Poplar species. Dwarf Mistletoe (*Arceuthobium pusillum*) occurs in the area and primarily attacks Black Spruce. Insects can produce outbreaks of infestation that last over several years. This and the action of Dwarf Mistletoe tends to produce standing dead trees, both mature and young, with a forest floor covering of dead needles and leaves, which are excellent conditions for the spread of fire. Thus, Insects and disease act to promote the high fire frequency already observed in the region.

Figure 7 - 27: Revegetated Landscape on the Sand River Fire which Burned in 1989

7.3.7 Human Disturbance

Forest harvesting has taken place south of the study area since 1927. Pulp harvest was used to supply the paper mill in Pine Falls. More recently, the forest management license for Pine Falls was extended to the area north of PR 304 running to the Bloodvein River. A haul road was built to support these cutting operations and this has been upgraded over the years to the current Rice River Road. This road does not connect to the Bloodvein River, terminating about 1 km south of the river itself. Cutting along the road (Figure 7-28) has taken place over many years, but is not extensive and does not extend into the hinterland to the east as no spur roads have been constructed into that area.

There has been little cutting activity north of the Bloodvein River. Some community cutting has taken place in Berens River, both south of the community along the winter road, and to the east of the community along the Berens River. An access road was built along the southern bank of the Berens River to facilitate community logging activities. Although a sawmill was in operation in Berens River at one time, there is currently no logging activity in this area.

Winter roads and distribution lines have been cleared into the study area. A major distribution line crosses the Bloodvein River and runs north to the NAC and First Nation communities at the mouth of the Berens River. A winter road also runs along this distribution line for most of its length. In some sections the winter road winds away from the distribution line route in order to avoid high rock outcrops that the distribution line traverses. The winter road also crosses most water courses in a different location, as since the distribution line usually crosses at the highest point possible, while the winter road has to drop to water level to access the ice bridge across a river.

Mining activity has taken place along the Wanipigow River near Bissett. There are active claims in that area all along the river and to the north. However, there is no known mining activity or active claims in the study area.

Fire suppression has been increasing in the area as the province develops a framework for rapid fire fighting to facilitate their mandate to protect life and property in the forested areas of the province. Fire fighting often involves the use of heavy equipment and the cutting of fire lines and access trails. Given the importance of fire in the natural environment, it is unknown what effects human fire suppression will have in the long term succession of forest stands on the east side of Lake Winnipeg.

Figure 7 - 28: Logging along the Rice River Road

7.3.8 Rare and Endangered Species in the Study Area

Species at Risk Act (SARA)

The Species at Risk Act (SARA) public registry lists nine (9) vascular plants for Manitoba. All are Schedule 1 species and all are long or short grass prairie species. The rapid increase in agricultural production over the last 100 years has resulted in the loss of most native prairie areas in Canada. Many native prairie plant species are among the most endangered and threatened plant species in Canada. However, none of these species are known to occur either within or near to the study area for the proposed road. Two (2) Amphibians are listed under SARA, the Great Plains toad (*Bufo cognatus*) and the northern leopard frog (western boreal/prairie population) (*Lithobates pipiens*). Both are Schedule one species. The Great Plains toad is not found in the study area. Only the western/boreal prairie population of the northern leopard frog is scheduled under SARA. In all other areas of Canada it is listed as a species of concern. The northern leopard frog found in the study area is not a member of the scheduled population. One reptile is listed as a scheduled species, the Prairie Skink (*Plestiodon septentrionalis*). This is found in prairie environments and is not known to occur in the study area. The snapping turtle (*Chelydra serpentina*) is not scheduled but is listed as a species of special concern. Snapping turtles would be expected to occur in the major rivers that traverse the study area.

SARA lists 17 scheduled bird species for Manitoba. One, the piping plover (*Charadrius melodus circumcinctus*) (Schedule one) is known to occur near the study area. This species nests on sandy exposed beaches. The long, well developed beaches on Lake Winnipeg are known nesting sites for this species. Another scheduled bird that occurs south of the study area is the least bittern (*Ixobrychus exilis*) (Schedule one). This species is not known to occur in Manitoba north of the Winnipeg River. Out of range occurrence is always possible, but the least bittern prefers marshy areas and swamps as opposed to the fens and bogs prevalent north of the Wanipigow River. The rusty blackbird (*Euphagus carolinus*) is a Schedule one species under SARA. It occurs widely in Canada, and is known to nest in the boreal forest. It prefers the wet edges of forest near streams and waterbodies. Although a marsh species, the habitats north of the Manigotagan River could support nesting pairs of rusty blackbirds. There is no record of this blackbird in the study area, but the environmental conditions in the area may support this species. The yellow rail (*Coturnicops noveboracensi*) occurs across western Canada. Its range includes the western shore of Lake Winnipeg. There is no record of this species occurring in the study area or on the east side of Lake Winnipeg in general, although out of range occurrence is always possible.

The SARA public registry lists three (3) scheduled mammal species for Manitoba. The plains grizzly bear (Ursus arctos) is extirpated from the Prairie Provinces. The grey fox (*Urocyon cinereoargenteus*) (Schedule one) is known to occur in southeastern Manitoba south of the Winnipeg River. There is no record of this species in terms of trapping or sightings in the study area. The third scheduled mammal is woodland caribou *(Rangifer tarandus caribou*) (Schedule one). This species is known to occur in the study area. The region east of Lake Winnipeg is one of the most important habitats for this species in Manitoba.

In summary, the only species listed under SARA that is known to occur in the study area is woodland caribou. Piping plover are known to occur on the shores of Lake Winnipeg along sandy beaches on the east side of the lake. This is outside the preferred alignment area; however any development in terms of access roads or resource extraction activity that may occur close to the lakeshore will require careful screening.

Manitoba Endangered Species Act

The Manitoba Endangered species act provides four (4) levels of classification for endangered species. Endangered is applied to species in imminent danger of becoming extinct or extirpated in Manitoba. Threatened is applied to species likely to become endangered. Extirpated is applied to species that no longer exist in the wild in Manitoba, but do exist elsewhere, and Extinct is applied to species that no longer exist anywhere. The act lists 12 endangered, 15 threatened, and 8 extirpated species for Manitoba. Of these, only woodland caribou occur in the study area or nearby region. Woodland caribou are listed in Manitoba as Threatened. The Act provides protection for any species listed as Endangered or Threatened as well as the habitat necessary for its survival and propagation.

The Manitoba Conservation Data Centre lists rare species for Manitoba as a part of the Nature Serve Network. These species are not afforded any sort of legal protection unless they are named under the Manitoba Endangered Species Act, or SARA. The

definition of “rare” that is used for the CDC lists is based on standardized terminology used throughout the CDC network in Canada. The listings for rare species are broken down into the ecoregions of Manitoba. The listing for the Lac Seul Upland Ecoregion that contains the study area shows 48 plant species and eight vertebrate animal species. These are listed in a provincial designation (subnational rank) of S1 (very rare) to S5 (secure). A global designation is also given that shows the status of the species throughout its natural range, designated as G1 (very rare) to G5 (secure). A species can be rare in a province but common elsewhere in its range. In the case of the CDC list for the Lac Seul Upland Ecoregion, most of the plants shown have a G5 global ranking. The reason for their rare designation in Manitoba may relate to the fact that many plants along the east side of Lake Winnipeg are reaching either their northern, southern or western range limits. Plants that are just within their range and uncommon in the Lac Seul Upland may be common further east in Ontario, and this seems to be the case with most of the plants shown on the CDC list.

A further cause of a rare designation can be the normal growth form of a plant. Plants may be uncommon because it is natural for them to grow in a widely dispersed form with few individuals in any one geographic location. There is also a practical aspect to a rare designation, that of access. The area east of Lake Winnipeg is a remote region and summer access during the growing season is only possible either by water along the major rivers, which would involve portaging, or by air into lakes by float plane or by helicopter. As a result biological surveys are not conducted as often as in areas with road access. Further study in the east Lake Winnipeg zone may reveal more individuals of species now considered rare. Such surveys may also reveal new species not known to occur there previously.

Of the eight (8) vertebrate animals listed by the Manitoba CDC, the American white pelican (Pelecanus erythrorhynchos) occurs widely throughout the study area. It is a common species on Lake Winnipeg, where nesting colonies occur. Immature white pelicans congregate in small flocks throughout the study area during their first year as adults. They do not breed until the following year. Small groups and individuals are commonly seen in the study area in creeks and drainages, and near rapids and falls along the major rivers. A listing of species contained in the Manitoba CDC database for the Lac Seul Upland is shown in Appendix 3.2.

7.3.9 Vegetation Types on the East Side Landscape

Vegetation in the study area was assessed through a combination of previous studies, satellite and air photos, the Manitoba FRI data, and a field program. The FRI data is the most comprehensive source of forest stand information available. It is valuable in terms of the wide area that is covered in Manitoba. The entire region of the province in which the study area is located has been examined for stand type and defined in terms of species and crown closure, estimated age, understory and many other aspects useful for commercial forestry. The FRI supports habitat assessments for wildlife, such as the HSI model for Woodland Caribou.

The field program was designed to provide detailed information on the ground for forest stand types and wetlands within the study area along the immediate route proposed for

the new road and the crossing points. This survey was primarily used to provide a record of the stand types, understory, and ground cover that the proposed road would pass through. A vegetation survey was conducted at the site supported by digital photographs and GPS locations. The results of this survey are presented in the Terrestrial Technical Report.

Fens

A fen is a wetland connected to the local water table. It differs from a marsh in that a fen usually has water moving through it in one direction. A marsh is bounded by a discrete shoreline, and is usually associated with a lake or pothole. A fen can be very distributed occurring over a large area of the landscape. Water flowing across the fen horizontally produces a horizontal fen, often referred to as a string bog. Fens build up large accumulations of organic material based mostly on sedge growth with some moss and woody plants included. This accumulation can occur in banks of material separated by thin growth or open water, leading to the string appearance, especially from the air.

Fens are common in the region east of Lake Winnipeg. The poor drainage of this area promotes the growth of fens, and they occur over a very large area. Fens located in the study area are based on sedge growth. Larch typically grows in fens, decreasing is size and density towards the middle of the fen, which is often open water. The sedge base supports the growth of Dwarf Birch (Betula glandulosa) the most common shrub in these fens, and often the only understory species. The area of a fen near a rocky upland can include species from the upland and forest stands in the area, however vegetative growth thins out rapidly away from the margins (Figure 7-29). In the centre of the fen the only growth is often sedge alone.

The organic accumulations developed under a fen can be immense. The presence of rocky uplands throughout the region gives adjoining fens a basin like structure as they stretch between rock outcrops. Fens can be quite deep especially towards the middle of the basin. There are many smaller fens along the proposed route of the new road, both south and north of the Bloodvein River. There are very extensive fens to the east of the road alignment north of the Bloodvein River. Many fens will have to be crossed during road construction. The largest occurs towards the northern terminus of the road just south of the Berens River.

Figure 7 - 29: Wooded Fen Covered in Tamarack and Bounded by Rocky Uplands

Bogs

A bog is a wetland that normally develops over a lake, pothole or other depression through the ability of sphagnum and feather moss to form a floating mat. This mat grows over the surface of the water body and provides a substrate for tree growth, usually Black Spruce. Eventually the water body fills in with the organic accumulation from the moss growth. Bogs are a common feature of the area east of Lake Winnipeg. They often form within fens over depressions or discrete deep spots close to rocky outcrops (Figure 7-30). They produce uniform stands of Black Spruce, one of the few tree species that can grow in this environment. Bogs are very acidic, further reducing the species that can grow in that environment.

Figure 7 - 30: Bog Islands with Black Spruce Strands Located within a Fen and Tamarack Landscape

Forest Stands

The underlying soil and rock substrate along the proposed route from PR 304 to Berens River changes very quickly with geographic distance. As a result upland forest can change to fen and bog and back to lowland forest very quickly along the road alignment. Rocky outcrops and upland ridges are dominated by Jack Pine. This species grows rapidly and is renewed by fire. The high fire frequency in this region and patchy nature of wildfire results in a wide range of stand ages, from newly regenerating seedlings to mature older growth. Rock outcrops are often surrounded by fens that make a basin structure between highlands. Fens support Tamarack stands to varying degrees depending on nutrient level and depth to open water. Mineral soil plains support dense Black Spruce stands. Bogs with high stand density occur throughout the area, especially close to rock outcrops within the fen areas. Better drained soils support a mixed growth of black and white spruce, balsam fir (*Abies balsamea*), trembling aspen (*Populous tremuloides*) and balsam poplar (*Populous balsamifera*).

The major river banks at crossing points along the alignment vary from low wet bog and fen to high upland ridges. Well drained uplands along the rivers produce much better growing conditions with resultant higher stand density, crown closure, and tree height.

Forests along river banks are typically mixed poplar, white spruce with scattered balsam fir and occasional black spruce. Understory shrubs and ground cover is well developed. In most cases the forest floor in all areas along the road alignment is covered in sphagnum and feather mosses to a great degree. Poplar stands have a more open floor of leaf litter. Reindeer lichens predominate in jack pine stands especially on rocky outcrops. Forest floor composition changes rapidly with geographic distance along the road alignment, being a mixture of the above elements in most locations. Needle litter, deadfall, and standing snags are common in conifer stands all along the road route.

There is a noticeable difference in forest stand crown closure and tree height along the shore of Lake Winnipeg compared to inland forest stands, especially in the southern segment of the road route. Better drainage and soils along the lakeshore result in more luxuriant growth of both trees and understory (Figure 7-31). There is also a noticeable gradient in understory species from the wet fen and bog dominated region near Berens River to the junction of the Rice River Road at PR 304. The species diversity increases in the south of this area, with increasing numbers of understory species, and more common invasive and agricultural species.

Figure 7 - 31: Typical Continuous Forest Cover on the East Side of Lake Winnipeg

7.3.10 Migratory and Resident Birds

The study area is considered low quality for nesting waterfowl according to the Canada Land Inventory classifications. Waterfowl prefer marsh environments and the fen and flooded sedge meadow environments along the road alignment are not attractive to waterfowl in general. The exception is the Canada goose (*Branta Canadensis*), a species that nests in a wide variety of habitats. They will nest in open water areas

bordered by forest. Two (2) broods of Canada geese were seen during the field survey, both in beaver flooded sedge meadows bounded by Black Spruce forest. Waterfowl were seen on Lake Winnipeg, with the American white pelican (*Pelecanus erythrorhynchos*) being the most common. Ringed bill gulls (*Larus delawarensis*) were also seen on Lake Winnipeg, and occasionally within the study area.

In general, the region traversed by the road alignment was noticeably poor in bird life, with few birds observed while flying and little bird song heard at plant survey sites. One exception is the dense riverine forest along the banks of both the Bloodvein and Berens Rivers. Bird song was noticeable in these areas during ground surveys. Table 7-8 lists bird species encountered during the 2009 summer field season. There is little information on bird species in the study area. The Ecoregion 90: Lac Seul Upland Ecoregion Science Team Report (2002) does not list any bird species specifically for this area. There is no information from the Manitoba Model Forest or the Manitoba Museum on expected or observed bird species in the region from PR 304 to Berens River. Difficulty of access during summer months in this area is largely the reason for the lack of ground studies in the habitats east of Lake Winnipeg. The Ecoregion 90 report does list expected bird species for the entire Lac Seul Upland region and these are listed in Appendix C.

Table 7 - 8: Bird Species Observed Along Road Alignment during the Field Program

Common Name	Latin Name	Location
American White Pelican	*Pelecanus erythrorhynchos*	Occasional, on rivers
Raven	*Corvus corax*	Throughout study area
Canada Goose	*Branta Canadensis*	Flooded sedge meadow
Great Blue Heron	*Ardia herodias*	Throughout study area
Ringed Bill Gull	*Larus delawarensis*	Occasional along rivers
Northern Harrier	*Circus cyaneus*	PR 304 Junction
Common Goldeneye	*Bucephala clangula*	Lake Winnipeg
Bald Eagle	*Haliaeetus leucocephalus*	Rivers and lakeshores

Gamebirds expected for the study area are the sharp-tailed grouse (*Tympanuchus phasianellus*) and the spruce grouse (*Dendragapus Candensis*). Raptors are mobile and use the area for hunting. Nesting by raptors in the study area is unkown, but bald eagle (*Haliaeetus leucocephalus)* is likely to nest along rivers and lakeshores in the region.

7.3.11 Amphibians and Reptiles

Both Wood Frogs (*Rana sylvatica*) and Northern Leopard Frogs (*Lithobates pipiens*) were observed at most plant survey sites and crossing points along the road alignment. Wood Frogs were especially common at all forested sites. Deep fen and flooded sedge meadow sites was the only environment in which frogs were not seen. No turtles were observed during the field program. The snapping turtle (*Chelydra serpentine*) is an expected species for this area, and probably occurs along the major rivers. Another possible resident of this area is the western painted turtle (*Chrysemys picta*). As with

birds, the remoteness of this area during summer months makes ground surveys difficult. The Ecoregion 90 report lists expected amphibian and reptile species for the Lac Seul Upland and these are presented in the Terrestrial Technical Report.

7.3.12 Furbearers and Trapping

Fur blocks containing Registered Traplines (RTL's) in the study area are shown in Figure 7-32. Trapping records for the study area are available from provincial records that list furbearer species caught in the area (Table 7-9). Trapping records provide a window into mammal presence in the area, but not reliable for population estimates since trapping returns often reflect fur prices and personal preferences. Discussions with local residents at community meetings suggest that trapping effort has been decreasing in recent years as older trappers retire. Younger residents of the region are generally not taking up trapping as a profession, likely due to unfavourable fur prices. These factors are examined in detail in the Socio-economic study, Section 7.4 of the EIS. The study area provides habitats for a variety of typical boreal mammals. Traditional trapping techniques make use of natural access routes along frozen water courses. Winter roads help to provide easier access to trapping areas, as do cutlines and distribution lines that provide access by snowmobile. Traplines have to be arranged in terms of access to each trap site. This is often through snowshoe trails developed over the years. Trappers will cut small access trails and develop their own system of trail access for their trapline over time.

Fur prices will often dictate the level of effort that trappers expend in terms of a particular species. As an example, aquatic mammals such as beaver and muskrat have historically been the staple of the fur trade. Prices have recently dropped to the point that it is not worth the effort of trapping these species. However, prices for marten have risen, and the fur returns reflect the greater effort placed on trapping marten in recent years. Trappers assess the likely return for effort in their planning each year. Fur prices in general have dropped due to changes in fashion and the social acceptability of wearing fur. European bans on some furs, and the threat of a total ban on fur by the European Common Market, would further decrease the economic return for trappers, to the point that trapping as an industry could disappear. The most recent fur returns for the study area are shown in the Terrestrial Technical Report.

Black Bears

Black bears occur in this region and are ubiquitous in the study area. No specific survey information for black bears is available; however fur returns for the area include this species. Commercial outfitters operating on the east side of Lake Winnipeg offer bear hunting packages and bear hunting is offered by some of the lodges operating in this area. This activity is subject to blocks of hunting licenses allocated to each outfitter and lodge by Manitoba Conservation. Black bears typically frequent the most productive habitats in terms of food production. This includes tubers (roots) berries, nuts (especially oak and hazel) and insects (bee wasp and ant nests) as well as scavenging opportunities for dead animals, and garbage from human settlements. In the current study area, bears would be expected to occur most often along the major river systems

and lakes, in the highland areas near lakes and rivers, and along the shoreline of Lake Winnipeg. The black bear return in the commercial fur harvest is shown in Annex D, and included in the species lists for the study area (Annex C).

Figure 7 - 32: Fur Blocks and Sections in the Study Area (Manitoba Conservation)
This Figure has been replaced

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Table 7 - 9: Species of Furbearing Mammals Recently Reported in Provincial Trapping Records for the Study Area

Common Name	Latin Name
Beaver	*Castor canadensis*
Black Bear	*Ursus americanus*
Coyote	*Canis latrans*
Ermine	*Mustela erminea*
Fisher	*Martes pennanti*
Red Fox	*Vulpes vulpes*
Lynx	*Lynx lynx*
Marten	*Martes americana*
Mink	*Mustela vision*
Muskrat	*Ondatra zibethecus*
River Otter	*Lutra canadensis*
Red Squirrel	*Tamiasciurus hudsonicus*
Grey wolf	*Canis lupus*
Woverine	*Gulo gulo*

Figure 7-33 identifies bear and moose outfitter activity and provides a general indication where hunting of these two species occurs.

7.3.13 Moose

Moose Habitat and the HSI Model

Moose are the most common large mammal in the study area (Manitoba Conservation data), and the east side of Lake Winnipeg area in general. Moose occur over a wide range of habitats, both over the summer and winter seasons. HSI studies developed for moose in the Manitoba Model Forest is directly applicable to the region in which the proposed alignment will run. HSI studies break down habitat into components that are necessary to a species over the seasons, and for certain life stages. Moose are browsers, especially in the winter, and prefer a plentiful understory of shrubs. In general, aspen ridges with a heavy shrub understory associated with either a willow/wetland complex or riparian area are considered optimum for moose. This is accompanied by a preference for newly burned and cutover areas about 5 to 15 years old. Even-aged mixedwood and upland softwood stands provide medium quality moose habitat, while lowland conifer stands, bogs, fens and muskeg provide poor quality habitat for moose (Manitoba Model Forest HSI for Moose, 1994).

Habitat requirements for moose are divided according to seasonal and life cycle requirements. Summer food requirements are primarily leaf foliage and aquatic plants. Winter food is exclusively browse, and includes most shrub species as well as young deciduous trees. Calving areas are often located in dense cover near water. Islands and peninsulas are favoured, as are treed islands in fens and bogs. Lowland mature forests are often used as well. Rutting requirements are diverse, with no specific habitat requirements known.

Winter cover requirements reflect snow depth and crusting as the season progresses. Late winter snow depths are usually greater, and moose change their habitat to select areas that offer softer shallower snow conditions. Winter cover is provided by jack pine,

black spruce, balsam fir and white spruce. Dense conifer stands are often selected as late winter habitat. Access to browse species is important, and mixed wood areas are preferred for feeding. Thermal cover is also important in very cold weather. Stands with high crown closure provide shelter for moose in these conditions.

Summer cover requirements include high quality terrestrial forage, aquatic feeding areas, a course of water and cool dense lowland conifer stands. Preference is given to areas where all of these components are proximate with short travel distances. Cool microclimates in bogs and dense tree stands are important in conserving energy in the hottest times of the year. Access to open water is also important. Moose often bath, sitting in an open water body to cool off and submerging to escape flies. Insects can dictate movements in summer to open areas with more windy conditions. Proximity to water is an important feature of all summer habitats.

Mineral licks occur where mineral laden water is exposed on the surface and evaporates leaving salt deposits. These are important in spring and fall when aquatic plants are not available. Moose gain a wide variety of mineral requirements from aquatic plants. In areas with poor aquatic foraging potential mineral licks are important the year round.

In general, habitats that feature an abundance of “edge”, areas where different vegetation and landscape types meet, are highly favoured by moose. The east side of Lake Winnipeg offers many such areas, since stand types and water conditions vary abruptly across the landscape. Many beaver flooded stand edges occur in the study area, providing preferred aquatic habitats. The high fire frequency in the study area produces large areas of post fire succession that provide quality browse for moose.

Applying an HSI model to a given area requires the definition of a minimum geographic size that is based on an animal’s home range requirements. This is especially true of discrete habitat blocks surrounded by unsuitable landscape for the particular species under study. The large contiguous size of the boreal forest on the east side of Lake Winnipeg makes this unnecessary. There are few restrictions in terms of habitat for moose over a very large region. The other major factor is the information available on habitat types and vegetation in the area. The Forest Resource Inventory (FRI) lists stand types with various metrics on growth and density and includes some understory information. Typical understory species associated with a given type of stand can be used to estimate habitat quality for moose. The use of the FRI has significant advantages in that it is available for most landscapes over a large part of Manitoba. Sufficiently detailed vegetation and habitat information over a large area can be a major problem in the development of an HSI.

The HSI for moose is based on the FRI information generated by Manitoba Conservation, Forestry Branch. The use of the FRI offers many advantages in terms of large geographic scale. The importance of individual stands for moose cannot be viewed in isolation however since the proximity of other stand types, water, aquatic plants, snow cover associated with stand types and other factors such as insects and behaviour during various weather conditions, all determine the value of a given habitat to an animal. As a result an HSI model must be developed over time as new information on these relationships is gathered from field programs and research. The foundations of the Moose HSI have been developed for Manitoba, however further work is required to fine tune the HSI and increase the value of the model for wildlife managers. Currently the

moose HSI does not have sufficient resolution (very large habitat blocks) to provide sufficient detail for habitat studies (Figure 7-34). The development of the model in the Manitoba Model Forest is of direct benefit to the current study area traversed by the proposed road alignment. Early model runs and the experience of wildlife managers and biologists in the study area indicated that the east side Lake Winnipeg habitats are relatively high quality for moose and support large populations of this species. The relatively undisturbed nature of this area and difficulty of access have maintained moose populations at what are likely historic levels.

Figure 7 - 33: Bear/Moose Hunting Activity and Known Outfitters

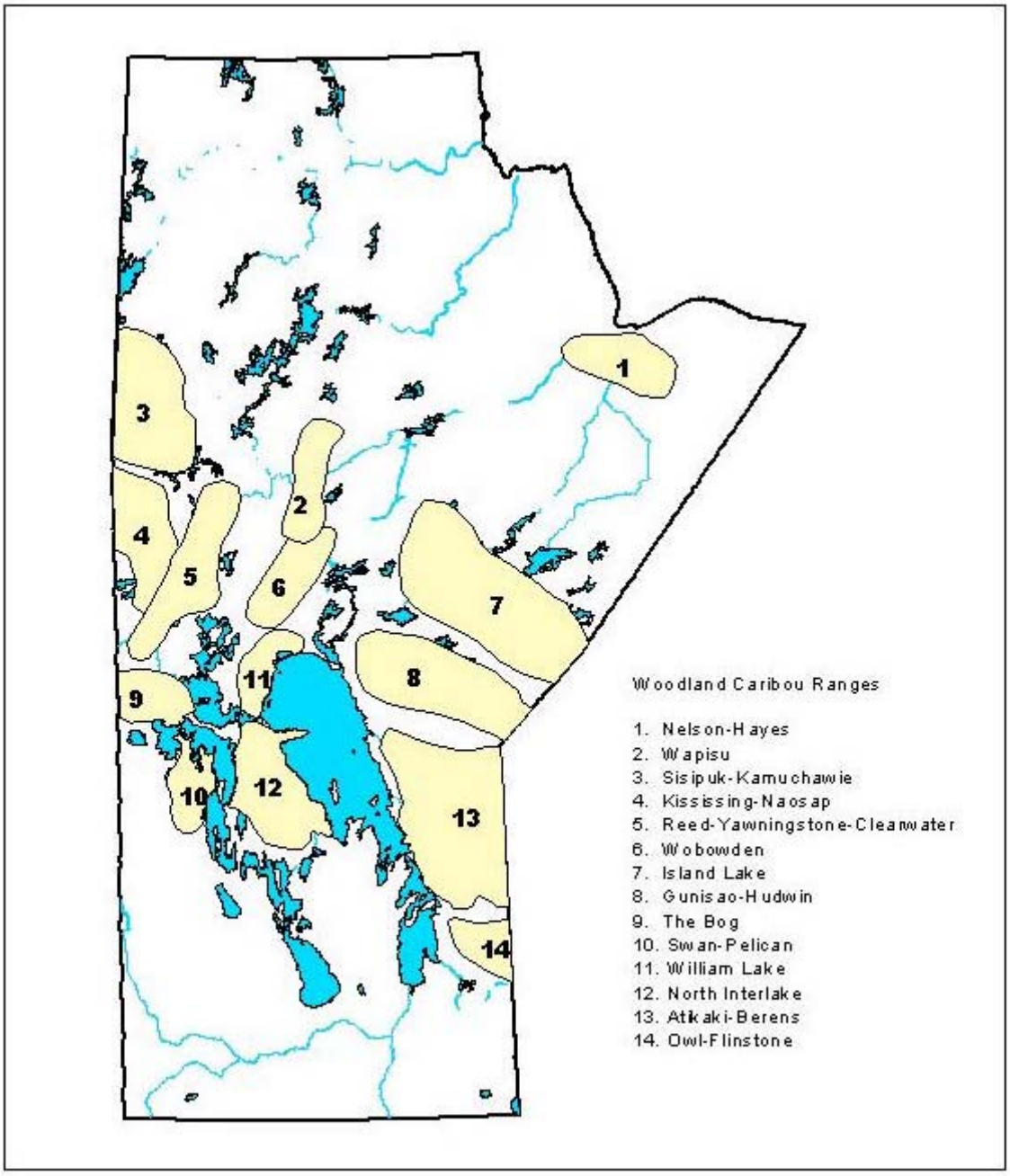
Figure 7 - 34: Moose Habitat Suitability Index

7.3.14 Caribou

Caribou Habitat and HSI Model

Woodland Caribou are a unique and threatened component of the boreal forest in Manitoba. They are closely related to the Barrens Ground Caribou found further north in Canada's mid-Arctic. Unlike the Barrens Ground species, Woodland Caribou do not undergo large scale migrations into tundra areas for breeding, but live entirely within the boreal forest of Canada. The Barrens Ground herds do migrate into the taiga and northern boreal forest fringe areas in winter, and there is some mixing with woodlands herds in the northern Prairie Provinces. Woodland Caribou remain in local areas within the boreal zone and form relatively distinct herds. Movements can take place within these greater ranges according to the seasons and other biological requirements. Spatial patterns at different times of the year are often specific to a particular herd. The proposed road alignment is contained within the Atikaki-Berens range (Figure 7-35).

Figure 7 - 35: Woodland Caribou Ranges in Manitoba (Manitoba Conservation)



A range such as that shown in Figure 7-35 is a general area known to be used as habitat areas by Woodland Caribou. Specific groups of animals occur within this range according to seasonal and biological requirements. Woodland Caribou are associated with large tracts of near mature to mature coniferous boreal forest that contain terrestrial (ground) and arboreal (growth in trees) lichens. Caribou are unique in their ability to make use of lichens as a food source. Lichens make up most of the food resources used by Woodland Caribou in winter. Terrestrial lichens are the most important forage.

Arboreal lichens are also used to a lesser degree. Open lichen woodlands typically located on rocky uplands under Jack Pine stands are the primary source of terrestrial lichens in the study area (Landscape Management Strategy for the Owl Lake Boreal Woodland Caribou Herd, Eastern Manitoba: An Update of the Original 1995 Strategy, 2005).

Winter range for caribou tends to be fairly well defined, with animals congregating in lichen rich habitats in small groups that often return to the same areas year after year. In summer, caribou are more widely dispersed across the landscape. Females seek out islands in lakes, peninsulas, lake shores with ready access to water or treed islands within fens in order to give birth to their calves. The summer diet is expanded to include sedges, forbes, fungi, and leafy foliage of shrubs as well as lichens. Summer range for caribou is less well understood than winter range. Both may overlap, or caribou may seek out completely different areas over the seasons. Tagging studies with GPS collars are increasing the knowledge of seasonal caribou movements in the area east of Lake Winnipeg.

Both summer and winter ranges are highly affected by fire. The high fire frequency in the study area changes caribou habitat dynamically over time. Fire tends to burn upland Jack Pine stands completely, eliminating preferred winter lichen browsing range for caribou. The patchy nature of wildfire however leaves portions of such habitats intact, and revegetation is very rapid after a fire. Large fires change caribou distributions on the landscape and these changes are happening continuously in a boreal environment.

Woodland Caribou are an endangered species listed under SARA under Schedule 1 as threatened. They are also listed under the Manitoba Endangered Species Act as threatened in Manitoba. Concern for caribou populations has resulted in research and studies on this species, especially in the area south of the Wanipigow River (Owl-Flintstone herd). The Berens herd that occurs in the study area is much larger, and occupies a much wider range.

The concern over the state of Woodland Caribou in Manitoba has resulted in two actions that directly relate to the area traversed by the proposed road development. The first is the creation of a detailed HSI model that is applicable to the FRI in eastern Manitoba. This model has been developed to a useful state that allows a detailed analysis of a large geographic area in terms of habitat quality for Woodland Caribou (Figure 7-36). The HSI model for Manitoba is exceptional in the large geographic range to which it can be applied. The second action is the tagging study for caribou that makes use of radio and GPS collars to accurately locate caribou over the seasons. The HSI model indicates overall habitat quality; however the actual use of that habitat can vary for many biological reasons such as insects, predators, conflict with other species and other factors. The combination of an accurate HSI and ongoing tagging studies has resulted in a relatively detailed picture of caribou distributions in the study area. Further tagging studies are currently being planned to better define seasonal movements within this area. This will include habitats used in winter and summer, and calving areas.

Figure 7 - 36: Caribou Habitat Suitability Index and Tagging

In general, Woodland Caribou in this area seem to be located primarily to the east of the road alignment, further inland from the shore of Lake Winnipeg. This has also been the observation of winter surveys conducted from aircraft. Some use of the shoreline of the lake does occur north of Berens River. There may be seasonal movements that bring caribou closer to the lake at certain times of the year. However, the greatest concentration of tagged caribou occurs in a large area arc between the Berens and Pigeon Rivers, and the area south of the Pigeon River into Atikaki Provincial Wilderness Park. The open lichen woodlands preferred for winter habitat are primarily located well to the east of the proposed road alignment. Tagging and tracking studies show that woodland caribou activity is at a minimum close to the shore of Lake Winnipeg in the study area. Caribou activity increases as distance east of the shoreline increases. No important seasonal activity such as calving is known to occur in the study area, based on current data.

7.4 Socio-Economic Environment

A socio-economic baseline was developed using recent statistical data for the communities that may be potentially affected by the Provincial Road 304 to Berens River First Nation All-Season Road Project. This section provides a description of the following study area characteristics:

- Demographic Profile;
- Human Health and Well-being;
- Education and Training;
- Economy;
- Heritage Resources;
- Land and Resource Use;
- Infrastructure and Services;
- Recreation and Tourism; and
- Crime and Social Issues

Data was organized into local and regional profiles. Data pertaining to the local level was presented in the form of community profiles (see Appendix 4: Community Profiles). This section will investigate the regional profile of East Side of Lake Winnipeg by comparing and contrast local information to regional and provincial trends.

7.4.1 Study Area

Fourteen First Nation and NAC communities on the east side of Lake Winnipeg have been identified as being potentially affected by the proposed project. These communities

and their traditional lands demarcate the study area of the socio-economic environment. Table 7-10 shows the study area communities. A map of the study area is provided in Section 1.0.

Table 7 - 10: Study Area

First Nation Communities	Northern Affairs Communities (NAC)[2]
Berens River First Nation	Manigotagan NAC
Hollow Water First Nation	Loon Straits NAC
Bloodvein First Nation	Princess Harbour NAC
Little Grand Rapids First Nation	Seymourville NAC
Pauingassi First Nation	Aghaming NAC
Poplar River First Nation	Berens River NAC
	Pine Dock NAC
	Little Grand Rapids NAC

As shown on all figures, various small localities within the study area have been identified, such as:

- Asinkaanumevatt;
- Kacheposit;
- Assineweetasataypawin;
- Kamaskawak; and
- Opekamank.

The classification of these named geographic localities may include; historic settlement camps, camp site, traditional gathering areas or spiritual areas.

7.4.2 Background Data and Data Sources

The Baseline Study drew upon various secondary information sources to assess the current social and economic conditions of the communities within the study area. Project area specific sources and information were derived from previous reports based on the location of the study area:

[2]NAC's are communities under the legal administration of the Manitoba Department of Aboriginal and Northern Affairs. These communities are legal communities and may or may not be Métis. When referring to the Métis community it is in the broader social community context of Métis people within the geographic area who may or may not live within the political boundaries.

- East Side Planning Initiative. September 2004. Promises to Keep: Towards a Broad Area Plan for the East Side of Lake Winnipeg. Manitoba: Government of Manitoba.
- Hallet, Bruce, Nancy Thornton, Harvey Stevens and Donna Stewart. 2006. Aboriginal People in Manitoba. Canada: Her Majesty the Queen in Right of Canada.

Data was also obtained from a federal government source:

- Statistics Canada - data on demographics, education, labour force indications, participation in wage labour force, average total income, and household composition.

Information derived from the Community Engagement Program (CEP) (see Section 5) and community visits is also included in the socio-economic baseline.

Limitations on Data Availability

There were various limitations which were encountered with respect the availability of data during the data compilation and research. Due to the remoteness and small size of some communities, some statistical information was unavailable. There are also some inconsistencies in the collection and analysis of data presented by different agencies. The project team has used the information provided by the various information sources, and expresses no opinion of the validity or accuracy of the information that was accessible during the time of writing.

Specific examples with respect to data limitations are outlined below:

- Communities belonging to the NAC, census information from 2006 by Statistics Canada were not utilized as a principle source of information as it combined all community statistics under one unorganized census division called “Area 19”.
- Statistics Canada was considered an important data source for the socio-economic baseline study; however, upon research, it was noticed that information on a select few of communities was available, rendering inconsistencies in the data available.
- Statistics pertaining to the general health of each community and for Manitoba on a more regional level was not available during the time of research. Therefore, a regional comparison of general health indicators for aboriginal and non-aboriginal populations for Manitoba will be utilized.
- Information on tourism was quite limited for both First Nation and NAC communities. The only available information for this topic were the community profiles provided by the Government of Manitoba, information

from the Wabanong Nakaygum Okimawin (WNO) Status Report, and information gained from community visits.

There are currently no major resource development or infrastructure projects currently planned for the study area that provide socio-economic data.

This section addresses information related to the wage economy (labor force indicators, income, businesses and related economic sections and economic development). Data pertaining to the traditional economy activities and resource use, such and hunting, trapping, fishing etc. practices, and the cultural implications are discussed in Section 6: Aboriginal Traditional Knowledge.

7.4.3 Demographic Profile

This section investigates the demographic profile of the study area. Demographic data includes current population estimates, population change rates or projections, recent ethnic and language composition and mortality and migration patterns.

Population

The most recent population estimate for communities within the study area is provided by Statistics Canada and Indian and Northern Affairs Canada (INAC). Statistics provided by each source for FN communities are inconsistent, and thus are not directly comparable. Statistics Canada only considers community members living on-reserve in 2006 while INAC data includes persons residing both on and off-reserve as of February 2009. Tables 7-11 and 7-12 show population estimates for the communities in the study area.

Table 7 - 11: Population Estimations of First Nations Communities by Statistics Canada 2006

	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River	Manitoba
2006 Census	736	576	619	796	352	643	1,148,401
2001 Census	625	637	622	792	417	644	1,119,583
2001 to 2006 Population Change (%)	18.2	-9.6	-0.5	0.5	-15.6	-0.2	2.6

Source: Statistics Canada, 2006

According to Statistics Canada, the largest FN community within the study area is Little Grand Rapids with a population of 796 residents. The Berens River First Nation has a

population of 736 inhabitants. Pauingassi First Nation has the smallest population in the study area with a population of 352 people in 2006.

Population change rates are defined by Statistics Canada as changes in demographics resulting from births, deaths (natural increase), and the difference between in- and out-migration (net migration) (Statistics Canada, 2008). Between 2001 and 2006, Berens River experienced a positive growth rate of 18.2%, compared to Little Grand Rapids with a 0.5% growth rate over the same period. The remaining four First Nations communities experienced negative growth rates, ranging from -0.5% to -15.6% between 2001 and 2006. Statistics Canada does not provide specific data on birth rates, death rates, or net migration rates. The reasons for negative population growth are unknown.

The total population of the FN component of the study area in 2006 was 3,722, representing less than 1.0% of the total population of Manitoba. Population statistics provided by INAC are provided in Table 7-12. As shown, data provided by Statistics Canada and INAC vary substantially.

Table 7 - 12: Population Estimations of First Nations Communities by INAC 2009

	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River
Registered Males on Own Reserve in 2009	936	466	516	608	296	614
Registered Females on Own Reserve in 2009	822	473	505	521	239	555
Total Population on Own Reserve in 2009	1758	939	1021	1129	535	1169
Registered Males Off Reserve in 2009	474	257	287	141	14	106
Registered Females Off Reserve in 2009	529	293	312	146	23	166
Total Population Off Reserve in 2009	1003	550	599	287	37	272
Total Registered Population	2765	1492	1620	1417	573	1465

Source: INAC, 2009

As previously stated, INAC estimates the population of community members residing both on- and off-reserve. On-reserve population estimates identify a total on-reserve population for all First Nations within the study area to be 6551 representing more that 50% of the total population of the study area as estimated by Statistics Canada. To maximize consistency in data and for the purpose of this study, only on-reserve population has been considered. According to INAC, Berens River FN is the largest community in the study area with an on-reserve population of 1758 residents, followed by Poplar River with 1169 residents, and Little Grand Rapids with 1129 residents. The

smallest community in the study area is Pauingassi with 535 community members in February of 2009. Table 7-13 shows population estimates for the NAC communities within the study area:

Table 7 - 13: Population Estimates for NAC Communities Statistics Canada 2001

Year	Aghaming	Berens River NAC	Little Grand Rapids NAC	Loon Straits	Manigotagan	Pine Dock	Princess Harbour	Seymourville	Manitoba (Census data)
1985	19	195	26	6	230	98	23	126	n/a
1991	16	140	48	8	197	113	12	127	1,091,942
1996	16	105	19	11	173	104	5	132	1,113,898
2001	10	42	10	10	192	108	10	135	1,119,583

Source: Statistics Canada 2001; Government of Manitoba, 2003

The largest NAC community in the study area is Manigotagan, with a population of 192 in 2001, followed by Seymourville with 135 residents and then Pine Dock with 108 residents. The smallest communities were Aghaming, Little Grand Rapids NAC, Loon Straits and Princess Harbour. Table 7-13 shows that Aghaming, Berens River NAC, experienced negative population growth between 1985 and 2001. Little Grand Rapids increased in 1991; however decreasing over two census periods. Loon Straits population growth rate has been relatively stagnant over three census periods, similar to that of Pine Dock and Seymourville. Manigotagan and Princess Harbour experienced negative population growth rates during 1991 to 1996; however, although not dramatic, population growth increased from the 1996 to 2001 census period.

The total population of the NAC communities within the study area in 2001 was 517 residents, representing less than 1.0% of the total population of the province, and approximately 12.2% of the study area using population estimation from the 2001 census.

Ethnic Composition and Language

The study area is composed of six FN communities and eight NAC communities. The linguistic groups of the FN communities consist of Cree, Ojibway, Oji-Cree, Saulteaux, and English. The NAC communities include Métis and non-aboriginal residents, as well as off-reserve aboriginal people. English is the predominant language in the NAC communities.

Migration and Mobility

A Manitoba experienced in-migration of 28,699 individuals and out-migration of 13,788 individuals between the period of June 1, 2007 and June 1, 2008; this yielded net immigration of 14,911 of persons (Manitoba Health and Healthy Living, 2008). Data

obtained from the Manitoba Health and Healthy Living Report did not provide an ethnic breakdown of migrants.

The *Aboriginal Peoples of Manitoba Report,* conducted by the Institute of Urban Studies (IUS) provides migration patterns and characteristics of self-identified Manitoba Aboriginal people. The report utilizes data from the 2001 census. According to the report 51.0% of the self-identified aboriginal population moved between communities in the period 1996 to 2001, compared to only 37.0% of all Manitobans (IUS, 2006). From 2000-2001, approximately 21.0% of aboriginal people reported moving, compared to that of 12% of all Manitobans. The report concludes that aboriginal people move more often than the non-aboriginal population (IUS, 2006, page 78).

The Report also outlines preferred destinations of migrant Aboriginals. Of the aboriginal migrants who moved to the City of Winnipeg, 42.0 % moved from other off-reserve locations within Manitoba while 33.0% moved from Manitoba reserves. Only 25.0% moved into Manitoba from outside the Province. According to the Aboriginal Peoples of Manitoba Report, the principle reasons for moving into the City were for employment; education and training (IUS, 2006, page 79).

Table 7-14 outlines the migration status of Aboriginal communities within the study area:

Table 7 - 14: Migration Status of First Nations Communities, 2006

	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River	Manitoba
Total population 5 years and over	690	510	550	210	325	550	1,065,210
Lived at the same address last 5 yrs	600	400	490	600	295	435	674,945
Lived within Manitoba last 5 years, but changed addresses within the same census subdivision (municipality)	60	65	20	25	25	55	237,910
Lived within Manitoba the last 5 years, but changed addresses from another census subdivision (municipality) within Manitoba	25	35	30	50	10	55	80,205

Source: Statistics Canada 2006

According to Statistics Canada (2006), the movement of aboriginal peoples within the study area was not significant. Only 7.2% of the population of interest resided within Manitoba within the last 5 years, but changed addresses from another census subdivision (municipality) within Manitoba. Preferred destinations of aboriginal migrants within the study area were not provided. However, according to informal discussions with community members during the community meetings conducted for this project in 2009, it was suggested that a major destination point was Winnipeg followed by movement among other communities located on the east side (i.e. Norway House). .

Migrations rate data was not available the NAC communities.

Mobility

Table 7-15 shows the means by which community resident's travel to work. The purpose of this table is to demonstrate the means by which people travel within the community. Statistics pertaining to NAC communities was not available.

Table 7 - 15: Mobility of First Nations Communities – Mode of Transportation to Work by Statistics Canada 2006

Mode of Transportation	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River	Manitoba
Total employed labour force 15 years and over with a usual place of work or no fixed workplace address	120	100	135	135	60	95	
Car, truck, van, as driver	65	40	95	35	10	70	
Car, truck, van, as passenger	20	10	25	20	0	10	
Public transit	0	10	0	10	0	0	
Walked or bicycled	20	45	15	70	45	10	
All other modes*	25	0	0	10	0	0	
** this includes ski-dos, ATV vehicles, canoes, etc*.							

Source: Statistics Canada 2006

External mobility or movement to destinations outside the community is difficult due to a lack of external community roads. Only five communities (Hollow Water, Manigotagan, Seymourville, Aghaming, and Pine Dock) within the study area are connected to the provincial highway system via PR 304 and PR 234. Winter roads are constructed between various communities and across Lake Winnipeg. A description of infrastructure is provided in Section 7.4.9.

7.4.4 Human Health and Well-being

Results from Round 1 of the Community Engagement Program (CEP) (described in Section 5.0), revealed there are many health issues of concern within the study area, arising in part due to a lack of health care facilities, health care officials and related services that are more common in the major urban centers.

General Health of the Population

According to *Aboriginal Peoples of Manitoba* (IUS, 2006, page 28), between 2000 and 2001, 22.4% of aboriginal Manitobans aged twelve and older, living off-reserve, rated their health as fair to poor, in comparison to 12.5% of the province's total population. Only 46.8% of aboriginal Manitobans rated their health as very good to excellent compared to 60.4% of the total population. Statistics pertaining specifically to on-reserve populations were not available.

In comparison, *Manitoba's Comparable Health Indicator Report* (2006) notes that 62% of Manitoba respondents rated their health status as excellent to very good; 28.0% as good; and only 10.0% of all Manitoba respondents reported that they believed their health status to be poor.

Most health services on-reserve are funded and administered by the Government of Canada, although in recent years, administrative responsibilities are increasingly being transferred to the First Nations. Federally funded programs for on-reserve residents, include: child and family services; housing; health; education; policing; fire protection; recreation; programs for drug, alcohol and substance abuse; care for seniors; and municipal infrastructure such as sewer and water, administration and recreation buildings (IUS, 2006, page 28). Health services and community infrastructure are described further in Section 7.4.9.

Health issues of general concern for aboriginals have been identified as follows (IUS, 2006, page 27-36):

- Suicide;
- Diabetes;
- Cardiovascular disease;
- HIV/AIDS; and
- Tuberculosis.

With respect to the general Manitoban population, *Manitoba's Comparable Health Indicator Report* (2004, pages 28-37) revealed the following health concerns:

- Cardiovascular disease;
- Diabetes;
- Cancer;

- Chronic obstructive pulmonary disease (COPD);
- Asthma;
- Mental illness such as depression; and
- Sexually Transmitted Infections (STI) s.

Child Health

Aboriginal children, particularly those that are geographically isolated, have a higher risk than that of non-aboriginal children of contracting a number of infectious diseases. In *Aboriginal People in Manitoba* (IUS, 2006, page 38), a study was conducted on shigellosis, a highly infectious diarrheal disease. The study indicated that aboriginal children experience this illness 29 times the rate for other Manitoban children. This was attributed to inadequate sewage and waste disposal facilities, as well as poverty-stricken overcrowded neighborhoods. Furthermore, as result of exposure to poor air quality conditions (tobacco and wood smoke); children are prone to contracting respiratory infections such as bronchitis and pneumonia. It was also noted that children were possibly more susceptible to infections due to Vitamin A deficiency which appears to be a developing trend in northern communities (IUS, 2006, page 38).

Another factor that affects the health of aboriginal children in Manitoba is tooth decay. According to *Aboriginal People in Manitoba* (IUS, 2006, page 38), tooth decay is most prevalent in children whose mothers had poor diets during pregnancy, and children who retire at night in bed with a bottle that contains milk, fruit juices, or sugary drinks.

7.4.5 Education and Training

High education and training rates of a subject population are indicative of a community's level of self-sustainability with respect to economic growth and development, active labour force, social and physical infrastructure and overall health and wellness of the residents. Education and training rates are also reflective of individual and human development.

This section will focus primarily on the educational levels attained by the aboriginal population in comparison with the general populace of Manitoba. Statistics pertaining to NAC communities within the study area were not available during the time of writing.

Educational Attainment and Enrolment

Based on the latest data (Statistics Canada 2006), the percentage of FN community members that have obtained a certificate, diploma, or degree from a post-secondary educational institution is lower than the provincial average. Table 7-16 below shows education attainment and enrolment levels of FN communities within the study area in contrast to that of all Manitobans.

Table 7 - 16: Levels of Educational Attainment of First Nations Communities (Statistics Canada 2006)

	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River	Manitoba
Total population 15 years and over	495	355	375	510	240	400	908,450
No certificate, diploma or degree	78.8%	73.2%	65.3%	83.3%	93.8%	82.5%	29.5%
High school certificate or equivalent	7.0%	8.5%	12.0%	5.9%	4.2%	8.8%	26.7%
Apprenticeship or trades certificate or diploma	3.0%	4.2%	6.7%	2.0%	0.0%	0.0%	9.7%
College, CEGEP or other non-university certificate or diploma	5.1%	8.5%	9.3%	2.0%	0.0%	5.0%	15.1%
University certificate or diploma below the bachelor level	3.0%	2.8%	2.7%	0.0%	0.0%	0.0%	4.0%
University certificate, diploma or degree	2.0%	4.2%	4.0%	5.0%	4.2%	2.5%	15.0%
Total population aged 15 to 24	1335	110	95	140	70	110	160,705
No certificate, diploma or degree	88.9%	81.8%	89.5%	93.0%	92.9%	90.9%	47.6%
High school certificate or equivalent	11.1%	9.1%	10.5%	7.1%	0.0%	9.1%	36.4%
Apprenticeship or trades certificate or diploma	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.9%
College, CEGEP or other non-university certificate or diploma	0.0%	9.1%	10.5%	7.1%	0.0%	9.1%	6.3%
University certificate or diploma below the bachelor level	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%
University certificate, diploma or degree	0.0%	9.1%	0.0%	0.0%	0.0%	0.0%	5.4%
Total population aged 25 to 34	100	75	80	100	50	80	139,770
No certificate, diploma or degree	80.0%	73.3%	62.5%	70.0%	80.0%	81.3%	16.4%
High school certificate or equivalent	10.0%	13.3%	12.5%	15.0%	20.0%	12.5%	27.9%
Apprenticeship or trades certificate or diploma	10.0%	0.0%	12.5%	0.0%	0.0%	0.0%	9.4%
College, CEGEP or other non-university certificate or diploma	10.0%	13.3%	0.0%	0.0%	0.0%	12.5%	19.5%
University certificate or diploma below the bachelor level	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.7%
certificate, diploma or degree	0.0%	13.3%	0.0%	10.0%	0.0%	0.0%	23.1%
Total population aged 35 to 64	220	160	175	225	105	180	456,165
No certificate, diploma or degree	72.7%	59.4%	51.4%	80.0%	95.2%	80.6%	21.6%
High school certificate or equivalent	6.8%	9.4%	11.4%	4.4%	0.0%	8.3%	24.6%
Apprenticeship or trades certificate or diploma	4.5%	6.3%	8.6%	4.4%	0.0%	0.0%	11.9%
College, CEGEP or other non-university certificate or diploma	6.8%	12.5%	14.3%	4.4%	0.0%	5.6%	18.5%
University certificate or diploma below the bachelor level	4.5%	0.0%	5.7%	0.0%	0.0%	0.0%	5.1%
University certificate, diploma or degree	4.5%	6.3%	8.6%	8.9%	0.0%	5.6%	18.3%

Source: 2006 Statistics Canada

High School and Post-Secondary Completion

According to *Aboriginal People in Manitoba 2000 Report*, (IUS, 2000), 33.7% of Aboriginal youth between the ages of 15 and 29 completed high school in 1996. However, based on the data extracted from Statistics Canada in Table 7-16, only 7.7% of aboriginal persons aged 15 years or over from the study area had graduated from a secondary school or equivalent compared to 26.7% for the province as a whole.

Within the study area, 3.7% of the aboriginal population aged 15 years or over in the FN communities obtained a university certificate, diploma or degree and 5.0% obtained a college, CEGEP or other non-university certificate or diploma. Compared to post-secondary education attainment rates for the province, Table 7-7 shows that provincial levels were generally 10.0% higher than that of the study area.

Currently, geographic isolation which results in decreased access to secondary and post-secondary educational institutions continues to be a factor in the low educational attainment rates in the FN communities. As demonstrated by the Statistics Canada 2006 data (Table 7-7), 79.5% of person ages 15 years and older in the study area had not completed post-secondary education in comparison to 29.5% of all Manitobans in that age group. Section 7.4.8 describes current educational facilities and services within each community in the study area.

Trades and Training Programs

The *Aboriginal People in Manitoba 2000 Report* (IUS, 2000) outlined the history of labour market training for the Aboriginals. In the mid-1990s, funding for labour market training and living allowances for trainees was mostly provided through the federal Human Resources and Development Canada (HRDC) department. However, the federal government withdrew from these services which were subsequently transferred to the Manitoba government and to Aboriginal organizations.

In 1997, HRDC signed agreements with the AMC and the MMF to manage employment and training funds for Aboriginal clients, thereby distributing funding to local offices throughout the province (IUS, 2000). Thereafter, in 1999, HRDC signed a similar agreement with the Centre of Aboriginal Human Resources Development to provide funding for Winnipeg Aboriginal clients.

Attempts to provide opportunities for training for Aboriginal peoples in Manitoba should increase with the further development of such agreement funds, with the diversification of economic opportunities and increased demand for skilled labour. Currently, only 2.7% of persons aged 15 and older within the study area FN communities have obtained apprenticeships or trades certificates or diplomas which are 7.0% less than the comparable provincial statistic (Table 7-7).

7.4.6 Economy

The economy of the East Side of Lake Winnipeg is comprised of wage, cash and traditional economic activities. The wage economy encompasses most labour market

activities and transactions including all jobs which are within a structured company or government agency. Participation in the wage economy for First Nations and even NAC communities is often undertaken to support and supplement traditional economic activities. Forms of state assistance such as unemployment insurance, income support, pensions, etc. exist; but, are not considered part of the cash or wage economy. The cash economy for this region incorporates the delivery of goods and services that occurs outside an official company or business, also known as a barter economy. The traditional economy entails subsistence economic activities, or traditional pursuits that do not involve money.

There are currently are no official records or statistics available that quantify the volume of business or percentage of personal income derived from the cash or traditional economy. The results of the Traditional Ecological Knowledge (TEK) study (Section 6.0) indicated that traditional activities such as hunting, fishing, trapping and/or berry collecting were executed for both familial sustenance and for "cash" income. It is difficult to document the importance of each of these economies to the Region, other than through opinion surveys and knowledge of the culture. From the TEK study, it is known that a number of residents in the region draw income from a combination of economic activities. Each part of the economy provides a component of family income and contributes to the regional economy at different levels and at different times, depending on factors such as seasonal harvesting activities and the availability of wage employment.

Labour Force Indicators (Employment / Unemployment)

Table 7-8 below shows the labour force activity in the Province of Manitoba and in Aboriginal communities in the study area, based on the Statistics Canada 2006 census data.

Table 7 - 17: Labour Force Indicators for Manitoba and First Nations Communities in the Project Area

Labour Force Activity	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River	Manitoba
Total Population 15 Years and Over	495	355	375	510	240	400	908,450
In the Labour Force	235	150	200	230	95	200	611,280
Employed	145	110	140	135	65	165	577,710
Unemployed	85	40	50	90	30	30	33,570
Not in the Labour Force	260	200	180	280	145	200	297,170
Participation Rate (%)	47.5%	42.3%	53.3%	45.1%	39.6%	50%	67.3%
Employment Rate (%)	29.3%	31%	37.3%	26.5%	27.1%	41.3%	63.6%
Unemployment Rate (%)	36.2%	26.7%	25%	39.1%	31.6%	15%	5.5%

Source: Statistics Canada, 2006 census

Table 7-8 shows that the labour participation rate in the study area Aboriginal communities ranges between a maximum of 53.3 % (Hollow Water) and a minimum of 39.6 % (Pauingassi). This range is below the provincial rate of 67.3 %. Similarly Table 7-8 indicates that the employment rate for the communities range from a maximum of 41.3 % (Poplar River) to a minimum of 26.5 % (Little Grand Rapids) relative to a Manitoba employment rate of 63.6 %. It is clear that participation rates and employment rates in the study area communities are well below their respective provincial rates.

Table 7-9 provides labour force indicators by industrial sector in the Province of Manitoba and in FN communities in the study area, based on Statistics Canada 2006 census data.

Table 7 - 18: Labour Force Indicators by Industry for Manitoba and First Nations Communities in the Project Area

Industry	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River	Manitoba
Total Experienced Labour Force 15 years and over	180	135	170	160	75	190	602,150
Agriculture and other resource-based industries	40	20	30	10	0	20	47,595
Construction	10	10	20	10	10	10	32,310
Manufacturing	0	0	0	0	0	0	62,580
Wholesale trade	0	0	0	0	0	0	23,040
Retail trade	20	0	0	10	10	20	65,475
Finance and real estate	0	0	0	0	0	0	31,505
Health care and social services	25	25	30	35	10	40	75,915
Educational services	30	25	20	35	25	30	47,365
Business services	0	30	15	15	10	15	95,335
Other services*	45	20	45	50	15	60	121,030

***Other Services is defined by the Canadian Industry Statistics (CIS) as " establishments, not classified to any other sector, primarily engaged in repairing, or performing general or routine maintenance, on motor vehicles, machinery, equipment and other products to ensure that they work efficiently; providing personal care services, funeral services, laundry services and other services to individuals, such as pet care services and photo finishing services; organizing and promoting religious activities; supporting various causes through grant-making, advocating (promoting) various social and political causes, and promoting and defending the interests of their members. Private households are also included".*

Source: Statistics Canada, 2006 census

Table 7-9 indicates that approximately 26% of the experienced labour force in the six study area FN community's work in "other services", followed by 18% in each of the Healthcare/Social services, and Educational services sectors, and 13% work in the Agricultural and other resource-based industrial sector. Similarly, 20% of the experienced labour force in Manitoba is employed in "other services", followed by 16.0% in Business services, 13% in Health care/Social services, and approximately 10% in each of the Manufacturing and Retail sectors.

Based on Table 7-9, the following conclusions can be drawn for each study area FN community:

- *Berens River*: Around 50% of the experienced labour force works in the "other services" (27%) and the agriculture and resource-based industry (23%) sectors.
- *Bloodvein*: Approximately 23% of the experienced labour force works in the Business sector followed by 19% in each of the Healthcare/Social services and Educational services sectors.

- *Hollow Water*: Approximately 28% of the experienced labour force works in the "other services" sector, whereas 19% work in each of the Agriculture services and the Healthcare/Social services sectors.
- *Little Grand Rapids*: Approximately 30% of the experienced labour force works in the "other services" sector, and 21% in each of the Healthcare/Social services and Educational services sectors.
- *Pauingassi*: Approximately 31% of the experienced labour force works in Educational services, followed by 19% in "other services", and 12.5% in each of the Construction, services, Retail trade services, Healthcare/Social services and Business services sectors.
- *Poplar River*: Approximately 31% of the experienced labour force works in "other services", followed by 21% in the Healthcare/Social services, 15% in the Educational services, and 10% in the Retail trade services sectors.

Income levels

Table 7-10 compares the income levels in the Province of Manitoba versus those in the FN communities in the Project area, based on Statistics Canada 2006 census data. Information pertaining to communities belonging to the NAC was not available during the time of writing.

Table 7 - 19: Income Levels for Manitoba and First Nations Communities (Statistics Canada 2006)

Criteria	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River	Manitoba
Persons 15 years and over with income (counts)	490	330	365	500	240	380	865,400
Median income - Persons 15 years and over ($)	3,665	7,856	10,994	7,376	9,056	11,531	24,194
Median income after tax - Persons 15 years and over ($)	3,665	7,856	10,880	7,376	9,056	11,531	21,805
Composition of total income (100%)	100	100	100	100	100	100	100
Earnings - As a % of total income	56	97.1	74.4	60.2	55.8	64.3	75.2
Government transfers - As a % of total income	42.4	31.5	34.8	31.6	40.1	33	12.5
Other money - As a % of total income*****	1.6	1	1.9	7.9	5	2.9	12.3

****** Other money income is defined by the Statistics Canada as "regular cash income received during calendar year 2005 and not reported in any of the other ten sources listed on the questionnaire. For example, severance pay and retirement allowances, alimony, child support, periodic support from other persons not in the household, income from abroad (excluding dividends and interest), non-refundable scholarships, bursaries, fellowships and study grants, and artists' project grants are included"..*

Source: Statistics Canada, 2006 census

An important indicator of economic well being is income level. Table 7-10 shows the average annual income of persons (15 years and over) in the FN communities participating in the labour force economy. Despite the contribution of government transfer and other money, the reported median income in the Aboriginal communities ranged between $3,665 (Berens River) and $11,531 (Poplar River), compared to a provincial median income of $24,194. Transfer of Government money to the FN communities in the Project area, as a percentage of their total income, ranges between 31.5 % in Bloodvein to 42.4 % in Berens River, whereas the comparable provincial percentage is around 12.5 %. Clearly, the high unemployment rates reported in the study area communities (Table 7-8) contribute to the low median incomes in these communities as noted in Table 7-10.

Business and Related Economic Sectors

Tables 7-11 and 7-12 provide lists of businesses that currently operate within the study area in FN and NAC communities, respectively. This information was gleaned from the Southeast Community Futures Development Corporation and the Government of Manitoba.

Table 7 - 20: Inventory of Local Businesses of First Nation Communities

Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River
On-Reserve • Berens River Band Hall; • Berens River Log Inn; • Berens River Radio Station; • Meemeeweeseepi Memorial Arena; • Berens River General Store; • Withawick Garage; • C and D Convenience Store; • Oshetoon Building Supplies; • Oshetoon Auto Parts; • Meemeeweeseepi Development Corporation; • Violet's Video; • Nipi Marine Services; • Metik Enterprises. • Berens River Tug Boat/Barge; • Berens River Pump house (Water and Sewage); • Neil Disbrowe's Woodworking; • Linda & Valerie's Video Shop; • Christine's Coffee Shop; • Northern Store; and • Hubert Boyd (Store). **Off-Reserve** • Barra Inn; • Alix Enterprises Ltd.; Northern Store; • Berens River Community Centre; • Berens River Airport; • Manitoba Hydro	**On-Reserve** • Bloodvein Princess Harbour Fisheries Coop Ltd.; • Frank and Son's Store/Video Rentals; • School bus; • Bloodvein Arena; • Keller and Sons Grocery Store; • Mikisi Towing; • Mikisi Gas Bar and Convenience Store; • Bloodvein First Nation Foundation Inc./Subcontracting; • Helen's Place/General Store; • Clifford Bushie's Video Arcade; • Frank & Son's Store/Video Rentals; and • William McKay's (Howie's) Snack Bar.	**On-Reserve** • Hollow Water Development Corporation; • Wanipigow Producer Co-op; • Raven's Creek Chipstand; • William's Esso Service; • Grandpa George's Gas/Diesel Bar; and • Wy-ky-Kan Housing Authority.	**On-Reserve** • School bus; • Little Grand Rapids General Merchants; • Keywinds Grocery Store; • Northern Store; • Howard and Sons Grocery Store. • Nig-Gig Ventures/Construction; • Enil Keeper's Pool Hall; • Peggy Tracy's Pool Hall; • St.Aire; • Trace Air Service; and • J.J. Leveque General Store.	**On-Reserve** • Northern Store; • Dojo's Store; • Keywinds Store; • School bus; • Norwin Construction (Winter Road Subcontract); • Water Delivery Truck; • Sewer Truck; • Three Graders, Backhoe. • McRae's Northern Enterprise; and • Pauingassi Trading Post.	**On-Reserve** • Mitasosipe Trading Post; • Northern Store; • Dennis Bittern's Taxi Service; • Negginan Fishing Station; • K and J's Restaurant. • First Poplar River Ventures/Construction; • Poplar River Handicrafts; • Mike & Bev's Café; • Poplar River Transportation

Source: Southeast Community Futures Development Corporation Website, 2009, 2004-2005 First Nation Community Profiles - MB Region

Table 7 - 21: Inventory of Local Businesses of NAC Communities

Aghaming	Berens River	Little Grand Rapids	Loon Straits	Manigotagan	Pine Dock	Princess Harbour	Seymourville
• Bob's Septic Service (*Some of these businesses may be shared with Manigotagan, Seymourville and Hollow Water First Nation).*	• Alix Enterprises; • General groceries and merchandise; • Berens River Store; • North Country Lodge / Barra Inn; • Hotel accommodation ; • Murrays Rest & Billiards; • Christine's Coffee Shop; • Linda's Canteen; • P.M. Video Rentals; • Meesun Truck Rentals; and • Oshetoon Building Supplies. (*some of these businesses may be shared with Berens River First Nation)*	• Little Grand Rapids Merchants; and • Northern Store. (*Some of these businesses may be shared with Little Grand Rapids First Nation).*	n/a	• Bostrom's Store; • Lorne's Bush Operation; • Manigotagan Development Ltd.; • Manitago Camp Grounds; • Nor-East Enterprises Ltd.; • Moosehorn Auto; and • Pelican Harbour. (*Some of these businesses may be shared with Aghaming, Seymourville and Hollow Water First Nation).*	• Biscuit Harbour Resort; • Matheson Island Coop - Packing Station; • Northway Aviation; • Pine Dock Taxi and Service.	• Ed Anderson's Outboard Sales; • Princess Harbour Fish Agency; • Princess Harbour Store.	Wanipigow Producers Coop Fish Packing; McKay's Small Engine Repair.

Source: 2003 Community Profiles, Government of Manitoba

Economic Development

The economic development of the area is the mandate of the East Side Planning Initiative (now known as Wabanong Nakaygum Okimawin - WNO). The East Side Planning Initiative aims for an integrated and coordinated planning approach to the development of the East Side of Lake Winnipeg based on the sustainability of the ecosystem. Its goal is to ensure that future land, resource and development decisions take into consideration the social, environmental, health, cultural and economic needs of the communities. Their work is documented in *Promises to Keep. Towards a Broad Area Plan for the East Side of Lake Winnipeg* (2004).

As stated in *Promises to Keep* (2004), the development of the East Side is based on the continued protection of the land, where economic development initiatives will be allowed as long as they are sustainable and benefit local communities. Based on the result of the Community Engagement Program (CEP), many communities within the study area feel that development of natural resources and economic activities in their areas has often happened without their input or benefit.

Even though there has been little economic development within the East Side, it is widely recognized that the economic development potential of this area is enormous, which emphasizes the need for sound planning.

7.4.7 Land Status and Use

The study area consists of a large underdeveloped and environmentally rich area situated on the east side of Lake Winnipeg, which hosts a population of approximately 4200 residents (Statistics Canada 2001 and 2006). As noted in the document *Promises to Keep. Towards a Broad Area Plan for the East Side of Lake Winnipeg* (2004, page 11), there is significant interest in this area by residents and non-residents to both preserve the natural environment and protect Aboriginal traditional land and to open the area for economic development opportunities such as mining, forestry, tourism, etc. This section will discuss current land and resource use of the area by communities within the study area.

Land Status

The study area is predominately covered by Treaty 5, which was first established in September 1875. The traditional territory boundaries divide the study area into six communities, including (from north to south): Poplar River, Berens River, Pauingassi, Little Grand Rapids, Bloodvein, and Hollow Water. First Nation and Traditional Lands within the study area are shown on Figure 7-37.

Figure 7 - 37: First Nation and Traditional Lands within the Study Area

In the northern parts of the study area lays Poplar River's park reserve (i.e., the East Side traditional lands and special protected area). The specified area extends from north to south and covers both sides of Lake Winnipeg. The permanent forest lies to the east of the specified area. The study area includes two provincial parks, the Atikaki Provincial Park (in the southern part of the study area) and Hecla-Grindstone Provincial Park (between the east and west shores of Lake Winnipeg). A forest management license area is located in the southern parts of the study area. The southern portion of the west side of Lake Winnipeg is an agricultural area. Figure 7-37 shows land status in the study area.

Atikaki Provincial Wilderness Park and the Bloodvein Canadian Heritage River

Atikaki Provincial Park is the largest provincial park within the study area. With its pristine wilderness of boreal forest, granite shield and wild rivers, Atikaki Provincial Park became recognized as an important part of Manitoba's Provincial Park system in 1985.

The park is part of the Lac Seul Upland portion of the Precambrian Boreal Forest Natural Region (Natural Region 4C) (Manitoba Natural Resources, 1997). It is characterized by a landscape of rock outcrops and granite cliffs interspersed with a complex of bogs, fens, marshes, rivers and river bottom forest.

The Atikaki Provincial Park was created to:

- Preserve physical features and biological communities representative of the Lac Seul Upland portion of the Precambrian Boreal Forest Natural Region.
- Provide opportunities for a range of outdoor recreational experiences from canoeing and white-water rafting, to lodges and out camps.
- Promote public appreciation and understanding of the park's natural features and cultural heritage.

The total area of the park is approximately 398,100 hectares, of which over 99 percent falls under a wilderness land use category. The remainder is categorized as access land use to provide a point or route of access.

The park features three river corridors and associated shorelines, including the Pigeon and Leyond Rivers and the Manitoba portion of the Bloodvein Canadian Heritage River. These river corridors provide winter and summer habitat for of Woodland caribou (boreal population). The Woodland caribou is listed as threatened under the *Species at Risk Act* (SARA) registry.

Figure 7-38 illustrates the Present Use and Development within the park that includes primary canoe routes, lodges, out camps, private cottages, tent camps, commercial caches, and private fishing clubs.
Figure 7-39 identifies the special management zones within the park associated with the Bloodvein-Leyond Rivers and the Pigeon River. Portions of the park area are also included as part of a proposed World Heritage Site as described in a later section and shown on Figure 7-40.

Figure 7 - 38: Land Status

Figure 7 - 39: Special Management Zones (Atikaki Provincial Park)

Figure 7 - 40: Proposed United Nations World Heritage Site Identified by Atikaki/Woodland/First Nation Accord

Source: Pimachiowin Aki Project World Heritage Project (website accessed October 2009 - www.pimachiowinaki.org)

The Bloodvein River was first nominated to the Canadian Heritage Rivers System (CHRS) in 1984 as a nationally significant river corridor possessing a rich representation of cultural and natural heritage values, scenic and remote recreational canoeing, pristine wilderness experiences and outstanding natural river integrity. The nominated river corridor stretches approximately 130 kilometres west from the Manitoba/Ontario border to the junction of the Bloodvein and Leyond Rivers. Following nomination to the CHRS, the "Bloodvein Heritage River Management Plan" was prepared for Manitoba Parks Branch in 1986. The Management Plan provided recommendations for addressing management guidelines and goals. The Management Plan established the Bloodvein River corridor to include all lands stretching one kilometre from either bank of the river.

Since it designation in 1987, the river corridor has been subject to various land use and river management actions and activities that have lead to the preservation, promotion and enhancement of the river's original nomination values. Having been included within the boundaries of Atikaki Provincial Wilderness Park, and subject to protection under the *Provincial Parks Act (1996),* the Bloodvein River has been subject to little, if any conflicting land use which have negatively influenced the designated river corridor. However, small portions of the designated river corridor are identified as extending outside of the Atikaki Park boundary. In the reporting period, resource development activities including forest harvesting and mineral exploration have occurred in proximity to the boundaries of Atikaki Provincial Wilderness Park including the Bloodvein River corridor. No resource development activities have been identified as affecting the designated river corridor.

The extent of current land use within the Bloodvein River corridor includes a small but increasing number of wilderness canoeists and recreationalists; outfitters conducting canoeing, kayaking or rafting tours; fly-in fishermen and hunters; existing outcamps and boat caches operated by regional tourist lodges and local First Nation hunters, trappers and wild rice harvesters (Manitoba Conservation, 2008; A*tikaki Provincial Park & Bloodvein Canada Heritage River Management Plan)*.

Proposed World Heritage Site

In 2002, the Poplar River, Pauingassi and Little Grand Rapids First Nations in Manitoba and Pikamgikum First Nation in Ontario signed the *Protected Areas and First Nation Stewardship Accord*. Through this agreement, they recognized that collective action was needed to create sustainable economic opportunities for their communities while still protecting and managing their traditional lands according to Anishinabe values and land management practices.

The proposed World Heritage Site was reviewed at the Boreal Zone Workshop of the International Union for the Conservation of Nature (IUCN) in St. Petersburg, Russia. It generated international interest since it was shown to fill an identified gap in the system of protected areas. The report from that meeting stated:

> "*This site is remarkable because of the existence of diverse and significant boreal forest values… It fills an important gap by representing the Canadian boreal shield ecozone. This site is also internationally significant because*

> *of the planned integration of traditional and western ecological knowledge for land management and protection. The agreement between the First Nations in whose traditional territory this site is located is precedent setting*."

In 2004 the four Accord First Nations and the provinces of Manitoba and Ontario formed the partnership now known as the Pimachiowin Aki World Heritage Site Assembly to ensure that the unique heritage values of this living cultural landscape are protected. The Assembly partnership coordinates the six jurisdictions to ensure effective planning and eventual collective management of the entire site. The name 'Pimachiowin Aki' adopted for the site means *"The land that gives life"*.

In 2006 the partnership became incorporated as a non-profit organization and, in 2007, hired a project manager. A formal nomination document is expected to be completed in 2011. The preparation of this document will require extensive community consultations, research, mapping and comprehensive community-based land-use planning. It will include the final boundaries of the site and it will also describe the innovative way the area will be managed using both traditional Anishinabe and western scientific knowledge.

Creating a World Heritage Site in the area will not change the ownership of the land. Each jurisdiction will be responsible for planning and management in its area and all aboriginal and treaty rights will remain fully protected.

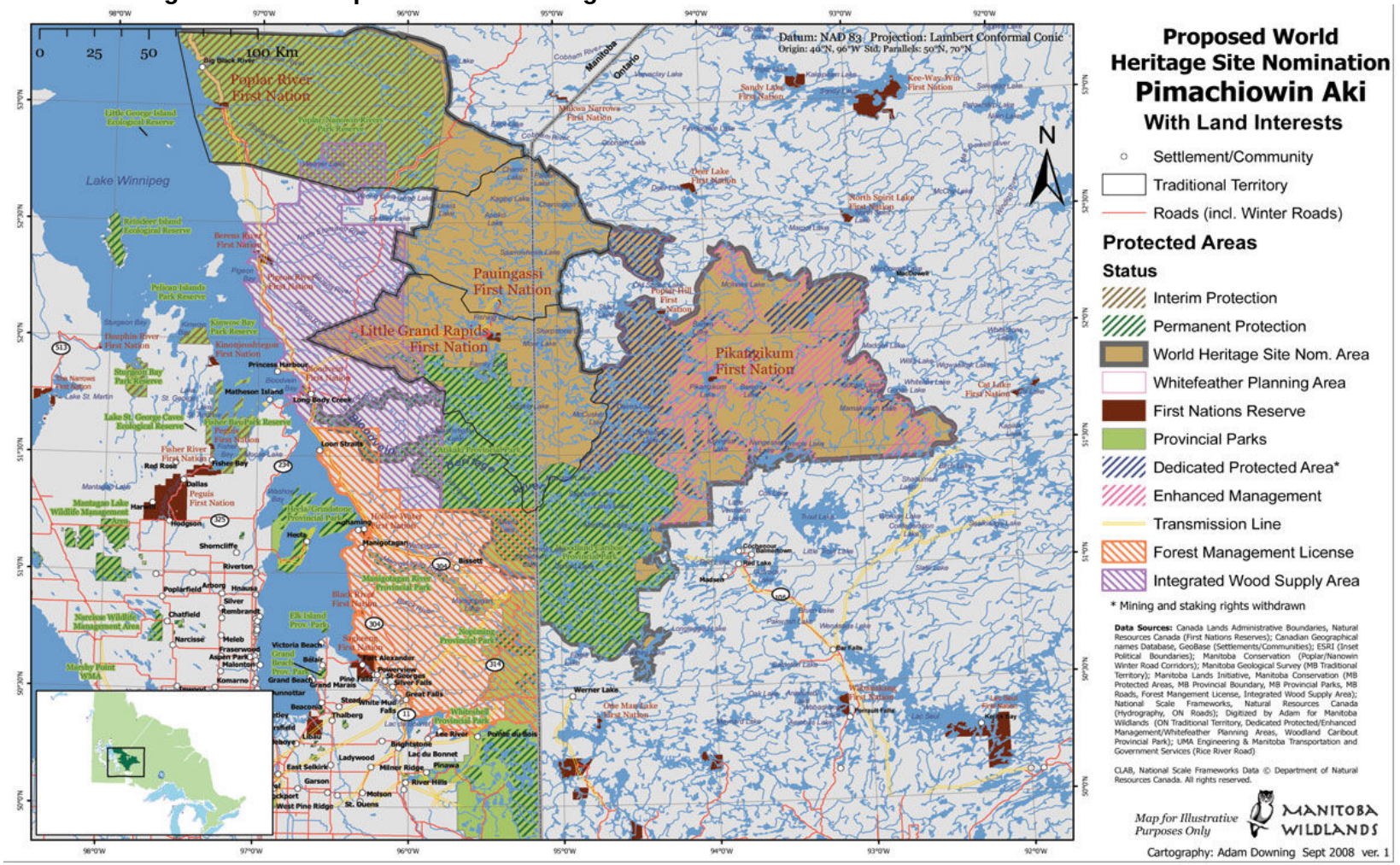
The Pimachiowin Aki World Heritage Site will be a place where one can experience an ancient land use tradition that continues today, a culture based on the intimate interaction between a people and their environment. It will combine natural and cultural values — a rare distinction among World Heritage Sites.

Pimachiowin Aki includes traditional territories of the four First Nations as well as Atikaki and Atikaki South Provincial Parks in Manitoba and Woodland Caribou Provincial Park and the Eagle-Snowshoe Conservation Area in Ontario.

Because the nomination of a candidate World Heritage Site to UNESCO must be made by a national government, the Federal Government of Canada completed a review of 125 proposed World Heritage Site candidates received from provincial and territorial governments. It included Pimachiowin Aki, (then known as the Atikaki/Woodland Caribou/Accord First Nations Site) on its tentative list of ten sites. Parks Canada and the International Institute for Sustainable Development continue to provide technical support to the Pimachiowin Aki Project.

Figure 7-40 presents a map showing the location of proposed United Nations World Heritage Site (WHS) in the context of the Boreal Forest of Canada. Figure 7-41 presents a more detailed map of the Proposed WHS nomination known as 'Pimachiowin Aki', and the associated land interests.

Figure 7 - 41: Proposed World Heritage Site Nomination: Pimachiowin Aki with Land Interests



Property Ownership / Land Tenure

As shown in Figure 7-42, the study area is generally composed of provincial crown land, either closed (e.g., Atikaki Provincial Park, Hecla/Grindstone Provincial Park), restricted (e.g., the East Side Traditional Lands and Special Protected Area), or open, i.e., for any leasing (most land on the east side of Lake Winnipeg). Some very limited areas belong to Federal Crown Land and the local government district (on the west side of Lake Winnipeg,

Reserve land and NAC communities are also shown on this map. First Nations traditional land demarcations are provided in Section 7.4.7

Currently the proposed Pimachiowin Aki World Heritage Site project area is under consideration. The project area consists of approximately 40,000km^2 of land which is intended to, "safeguard the Anishinabe who live in there and for the benefit and enjoyment of all humanity" (Pimachinowin Aki Corporation 2008 cited in Pimachiowin Aki World Heritage Project Area Ecosystem Services Valuation Assessment 2008).

Figure 7 - 42: Ownership

Land Use / Environmentally Sensitive Areas

Fourteen FN and NAC communities are located on the east side of Lake Winnipeg. Most of these communities are situated at seven major locations (i.e., Poplar River, Berens River, Bloodvein, Hollow Water, Bissett, Pauingassi, and Little Grand Rapids) positioned along the shoreline or near small lakes, with the rest near some streams. The seven major locations are connected by transmission line, winter/limited use road, Provincial Road 304, Rice River Road, and the planned road extension.

East Side traditional lands and special protected area lies in the northern parts of the study area. In the south-western part of the study area exits Atikaki Provincial Park, which was designated a provincial park in 1985 to preserve physical features and biological communities of the Lac Seul Uplands. Another provincial park, Hecla-Grindstone Provincial Park, lies between the east and west shores of Lake Winnipeg, comprising Hecla Island, Grindstone (the area located on the mainland peninsula along the west shore of Lake Winnipeg), Black Island and a number of other small islands. Two wildlife refuge areas have been set up, with one near Rice River, the other near Wanipigow River. Outfitters, cottage subdivisions and licensing advisory committee information (e.g., out camps, caches, etc.) are distributed in the study area. Provincial forest, wildlife management area, park reserve, and areas of special interest also exist on the west side of Lake Winnipeg. These features are shown on Figure 7-43.

Additional areas of special interest (ASI) such as burial sites and historic settlement areas that were identified during the execution of the Traditional Ecological Knowledge (TEK) study are presented in Section 6.0.

Figure 7 - 43: Land Use / Areas of Special Interest

7.4.8 Commercial Resource Use

Commercial Wild Rice Activity

Zinzania aquatica, from which wild rice is derived, grows naturally in the pristine lakes of Manitoba. *Zinzania aquatica* grows widely in the study area, particularly in the northern part, i.e., Berens River section, Pauingassi section, and Little Grand Rapids section. However, wild rice activity only occurs in very limited locations within the study area (refer to Figure 7-44).

Wild rice harvesting is an activity that has traditionally been carried out by FN community members throughout the study area, either as a source of food or cash income, or both. *Ecoregion 90 Traditional Land Use and Occupancy Study 65: Poplar River, Little Grand Rapids and Pauingassi First Nations*, identifies that wild rice has historically been an integral part of the First Nations traditional lifestyle, as a diet staple, as a source of employment and income, and for ceremonial purposes. Areas traditionally used for wild rice harvesting are shown on Figure 7-44. Communities most involved traditionally are Berens River, Pauingassi, Poplar River and Little Grand Rapids.

Traditionally the gathering of wild rice was a social event in which community members would congregate and share information, form partnerships, and arrange marriages. Since the advent of commercial rice harvesting, the subsistence harvest and participation rates have declined since 1980 and few people currently participate in wild rice harvesting at all, be it for subsistence or commercial purposes (*Ecoregion 90 Traditional Land Use and Occupancy Study 65: Poplar River, Little Grand Rapids and Pauingassi First Nations*, 2000, page 65 and 68). .

Commercial wild rice harvesting is based on an allocation system, that is controlled by the group of individuals and/or communities that are holding the allocations. For community members to gain access to the wild rice areas, one must obtain a “license”. There are approximately 75 wild rice harvesting “licenses”, located on approximately 100 lakes within the Ecoregion 90 planning area. However, it must be noted that the quality of wild rice harvesting varies from year to year. The quality of a wild rice crop is dependent on environmental conditions, as wild rice requires specific light, water level and water quality conditions (*Ecoregion 90: The Social and Economic Landscape*, 1999, page 134).

Figure 7 - 44: Wild Rice Activity

Trapping and Commercial Trapping Activity

Manitoba created the Registered Trapline system (RTL) in 1940 to allow local people to continue trapping on their traditional lands and to provide exclusive rights to trapline holders to trap within designated areas (Manitoba Conservation, 2008-2009). The RTL system has since been revised, and is now known as the Registered Fur Block System, part of a commercial furbearer harvest management program managed by Manitoba Conservation.

The system grants "line holders" the right to harvest furbearing animals in a defined area, known as the "RTL." Some RTL areas have no line holder. These are referred to as "community blocks". Any community member can trap within a community block. Within the RTL, only registered line holders have trapping rights to that designated area. Six trapline areas exist within the study area. Boundaries of the trapline areas coincide with First Nations traditional territory boundaries. Each trapline area includes numerous fur block areas and RTLs. Trapline areas are shown in Figure 7-45.

Trapping records provided by the Manitoba Conservation Wildlife and Ecosystem Protection Branch provide data on furbearer species caught within the study area for the 2007-2008 winter season. This data is replicated in Appendix 3.2, Appendix D: Trapline Return Data. The records indicate that beaver, black bear, coyote, ermine, fisher, red fox, lynx, marten, mink, muskrat, river otter, red squirrel, grey wolf, and wolverine were all trapped in the 2007-2008 season.

In recent years, Aboriginal and non-aboriginal community members within the study area continue to engage in trapping activities as a commercial activity. Information gathered from community meeting/open-houses suggests that participation in trapping activities has decreased in the past several years primarily due to rising costs for fuel and equipment, declining demand and shrinking markets for fur, and a corresponding decrease in pelt prices. However, the activity continues to provide a source of income for families, especially in remote areas where participation in wage employment is not readily available.

Fur prices and an estimate of harvest values for each community within the study area for the 1995-1996 trapping season as extracted from *Ecoregion 90: A Social and Economic Description* (Peckett, 1999, page 133), are provided in Table 7-22.

Figure 7 - 45: Trapping Activity

Table 7 - 22: An Economic Summary of Trapping in Ecoregion 90: 1995-1996

Species (price per pelt)	Berens River		Bloodvein		Hollow Water		Little Grand Rapids		Pauingassi		Poplar River	
	Market Value	#	Market Value	#	Market Value	#	Market Value	#	Market Value	#	Market Value	#
Beaver ($34)	$3,468	102	$6,086	179	$6,188	182	$3,434	101	$3,944	116	$5,202	153
Ermine ($5)	0	0	0	0	0	0	0	0	0	0	0	0
Fisher ($41)	$410	10	$164	4	$328	8	$410	10	$82	2	$820	20
Red Fox ($26)	0	0	$26	1	$208	8	$312	12	0	0	0	0
Lynx ($98)	0	0	0	0	0	0	0	0	0	0	0	0
Marten ($47.50)	$19,285	406	$4,607	97	$3,562	75	$4,180	88	$4,132	87	$28,452	599
Mink ($26)	$260	10	$156	6	$104	4	$286	11	$156	6	$468	18
Muskrat ($5)	$305	61	$360	72	$230	46	$9,280	1856	$410	82	$775	155
Otter ($71)	$994	14	$639	9	$852	12	$497	7	$994	14	$1,278	18
Wolf ($145)	0	0	0	0	0	0	$145	1	$290	2	--	--
Total Value/ Production	**$24,722**	**603**	**$12,038**	**368**	**$11,472**	**335**	**$18,544**	**2086**	**$10,008**	**309**	**$36,995**	**963**
Total Economic Value of Trapping in the Study Area: $113,780												

Source: Ecoregion 90: A Social and Economic Description (1999) from Manitoba Natural Resources. (Modified to illustrate returns for communities specific to the study area).

As shown in Table 7-23, the total commercial value of trapping within the study area in 1995-1996 was approximately $113,780. This summary only reflects the number of pelts that were harvested by licensed trappers and sold to fur buyers. Royalties for fur were also paid (Peckett, 1999, page 133). Additional income, derived by individuals for subsistence purposes, is unknown.

In contrast to the data reported above, current data on the economic value of trapping for 2007 to 2008 is summarized in Table 7.14. The table illustrates the amount of various species trapped against the price of the fur pelt. It appears that the most valuable fur pelt is the bobcat; however, the most valuable animals to the communities that actively trap are beaver and marten. Some additional information about the number of animals trapped by individuals is provided in Section 6.0: Traditional Knowledge.

Table 7 - 23: An Economic Summary of Trapping in Ecoregion 90: 2007-2008

Species (price per pelt)	Berens River		Bloodvein		Hole River*		Little Grand Rapids		Pauingassi		Poplar River	
	Market Value	#	Market Value	#	Market Value	#	Market Value	#	Market Value	#	Market Value	#
Badger ($46.32)	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0	Information Not Available	
Bear ($49.96)	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0		
Beaver ($23.58)	$1,815.66	77	$565.92	24	$6,602.40	280	$377.28	16	$424.44	18		
Bobcat ($227.77)	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0		
Coyote ($31.89)	$95.67	3	$31.89	1	$159.45	5	$31.89	1	0	0		
Fisher ($70.67)	$1,060.05	15	$282.68	4	$1,272.06	18	0	0	0	0		
Fox - Red ($23.82)	$285.84	12	$2,858.40	10	$476.40	20	$95.28	4	0	0		
Fox - White ($14.01)	$0.00	0	$0.00	0	$0.00	0	$0.00	0	$0.00	0		
Lynx ($156.15)	$1,093.05	7	$156.15	1	$3,747.60	24	0	0	0	0		
Marten ($65.19)	$37,549.44	576	$9,582.93	147	$38,983.62	598	$4,172.16	64	$2,281.65	35		
Mink ($15.55)	$1,010.75	65	$264.35	17	$2,099.25	135	$139.95	9	$46.65	3		
Muskrat ($2.37)	$9.48	4	$7.11	3	$49.77	21	0	0	0	0		
Otter ($36.81)	$331.29	9	$257.67	7	$36.81	29	$36.81	1	0	0		
Raccoon ($23.72)	$23.72	1	$23.72	1	$166.04	7	0	0	0	0		
Squirrel ($1.05)	$4.20	4	$9.45	9	$13.65	13	$1.05	1	0	0		
Weasel (long- & short-tailed) ($4.29)	$330.33	77	$68.64	16	0	0	$25.74	6	0	0		
Wolf ($112.57)	$0.00	0	$0.00	0	$0.00	0	$112.57	1	$112.57	1		
Wolverine ($278.29)	$0.00	0	$0.00	0	$0.00	0	0	0	0	0		

** Hole River is a Trapline Zone and a Metis community part of the Manitoba Metis Federation*

Source: Manitoba Conservation

Commercial Fishing / Fish Management

Manitoba has a vibrant and valuable commercial fishing industry that coexists with recreational and local subsistence fishing activities as described in Section 6.0. As shown in Figure 7-46, the majority of commercial fishing activity within the study area takes place on Lake Winnipeg. Commercial fishing delivery points are located along the shoreline. In many small lakes, fish management strategies (high quality size limitations) have been imposed on fishing activity.

Lake Winnipeg is Manitoba's largest commercial fishery. The annual commercial harvest from Lake Winnipeg between 2000 and 2003 has averaged 64% of the total value of fish production in Manitoba (about 8.3 million kilograms), translating to approximately $30 million (Manitoba Water Stewardship, Fisheries Branch 2009).

Commercial fishing of Lake Winnipeg is managed by individual quotas, which can be bought and sold by fishers, who must meet certain eligibility requirements (i.e., residency, fishing experience, etc.). There are four (4) community licensing areas that are within the vicinity of the proposed all-season roadway between the communities of Manigotagan and Berens River: Wanipigow/Manigotagan, Pine Dock/Matheson Island, Princess Harbour/Bloodvein and Berens River (Coughlin 2006).

Commercial fishing in the waterbodies east of Lake Winnipeg is managed by a lake quota system whereby a set number of licensed fishers can fish a lake until the quota is exhausted. Most individual and lake quotas have not changed since inception, and were initially based on established or average harvests, maximum sustainable yield estimates and/or the average number of people who fished the lake prior to implementation of the quota (Manitoba Water Stewardship, Fisheries Branch 2009).

The only inland commercial fishing activity identified by the Resource Management Branch of Manitoba Conservation was in Kapeemechekamak Lake on Rice River, approximately 10 km inland from Lake Winnipeg (Manitoba Conservation, Wabanong Nakagum Okimawim 2004).

The communities of Manigotagan, Berens River, and Bloodvein have all had commercial fisheries for over 100 years. The economy is reliant on fishing and it is estimated that these communities generate approximately $300,000 annually from their commercial fisheries. These sites have processing and packaging plants and would like Manitoba Conservation to establish local fish hatcheries to service the communities (Manitoba Water Stewardship, Fisheries Branch 2009).

Manitoba recreational or sport fishing has been in existence for many years, and is one of Canada's largest due to Manitoba's abundant and healthy lake and river systems. On average, about 230,000 anglers fish annually in Manitoba, contributing in excess of $120 million to the provincial economy. Approximately 14 million fish are caught, and about 77% of these fish are released. It is estimated that there are over 30 different species that can be caught by anglers in lakes and rivers in Manitoba (Manitoba Water Stewardship, Fisheries Branch 2009). The most sought-after species are Walleye, followed by Northern Pike, Yellow Perch, Smallmouth Bass and Channel Catfish.

Lake Winnipeg is one of the province's most important sport fishing lakes. Sport fishers from all over the world visit Manitoba to fish Lake Winnipeg's waters. Most boats are launched from road accessible points, like Gimli, Hecla Island and Victoria Beach.

Fly-in fishing is the most popular type of fishing for in-land lakes located in eastern Manitoba. Pine Dock, Berens River, Bloodvein are communities along Lake

Figure 7 - 46: Commercial Fishing/Fish Management

Winnipeg that offer fishing lodges, guides and float-plane chartering to remote lakes in the area. Bissett also provides float plane access to lodges in the eastern portion of the province.

Domestic fishing for food is carried out by First Nations people, who have been provided with a constitutional right to access a fisheries resource at any time of the year to meet basic subsistence requirements. Northern Manitoba First Nation communities have always harvested fish for domestic use, which saves families valuable money that is needed for other necessities. The Traditional Ecological Knowledge Study (Section 6.0) documents fishing activity of First Nations communities residing within the study area.

Fishing vessels operated by Aboriginal people are frequently observed on Lake Winnipeg and are especially prevalent along the eastern shore of Lake Winnipeg. The eastern shore of Lake Winnipeg is considered one of the most important domestic fisheries in all of Manitoba (Manitoba Water Stewardship, Fisheries Branch 2009).

Productive Forest Areas and Commercial Forestry Operations

Productive Forest Areas

Forest resources on the east side of Lake Winnipeg are valuable as commercial logging and processing operations constitute an important economic activity. The forest is a habitat for hundreds of species and provides significant ecological value, much more than timber. The First Nations and the Métis Nation on the east side of Lake Winnipeg is heavily reliant on the forest because of their ancestral habitation of the area, their use of the forest for food, furs, medicines, spiritual and ceremonial purposes, and economic interests.

The study area is identified as a productive forest area. According to the Tembec Annual Operating Plan (AOP) 2008/2009 and 2003 (Refer to Figure 7-47), forestry operations mainly occur along the shoreline, centered on Berens River, Bloodvein, Hollow Water and Bissett.

Figure 7 - 47: Productive Forest Areas

Forest Management Units (FMU) and Forest Management Licenses (FML)

Manitoba's forested area is divided into 10 forest sections based on forest characteristics. The forest sections are defined by Forest Management Units (FMUs) based on the similarities of management of forest characteristics. Forest inventories within the FMUs determine the harvestable limits of both softwood and hardwood tree species (Manitoba Conservation, Forestry Branch 2009).

In Manitoba, FMUs only apply to the Wooded and Aspen-Parkland areas. Other areas, such as the transition zone and tundra, are not classified under a FMU (Manitoba Land Initiative, 2009).

The project area falls within the Lake Winnipeg East Section which comprises FMU 30 to 39 (refer to Figure 7-48).

Commercial forestry activities are managed by Manitoba Conservation, who is responsible for issuing forest management licenses, quotas and timber permits (see Figure 7-49). Forest management licenses (FMLs) are issued to companies that require a large quantity of wood to supply an existing or proposed forest products processing facility. As part of the FML, Manitoba is responsible for timber sales in the Integrated Wood Supply Areas east and west (1 & 2) of Lake Winnipeg (Promises to Keep, 2004, page 58).

In addition to FML's, the forest industry also adheres to a quota system, where a certain level of security and dedicated access to defined small and medium-sized cutting areas is provided to commercial operators. Under the conditions of a quota, the operator's volume allocation is reviewed, and if necessary, revised every five years.

Small operators (individuals) requiring less than 100 m^3 for personal use or up to 300 m^3 for commercial purposes, can be issued a timber permit.

Forestry Management License No. 1 - Tembec Inc. (1979 to the present)

Manitoba Conservation granted Forest Management License No. 1 to Abitibi-Price Inc. in 1979. In May of 1979, Tembec Industries Inc (Tembec), formerly the Pine Falls Paper Company (PFPC), became and continues to be the primary license holder within the study area holding Forest Management License (FML) No.1 (Promises to Keep, 2004, page 58). This FML occupies approximately 50% of the land base of Ecoregion 90.

Tembec's current annual operations plans are shown in Figure 7-49. Tembec's forest harvesting areas identified in their Annual Operating Plans for the period 2003 to 2010 indicate that there are no harvesting areas currently identified within the 25 km of the segment of the ASR between the area of the Bloodvein and the Berens River communities. Most forestry harvesting occurs in the eastern portion of the traditional land areas of the Hollow Water community.

Figure 7 - 48: Forest Management Units

Figure 7 - 49: Forest Management Licenses

Figure 7 - 50: Tembec Inc. Forestry Operations

Mining

Mining Claims and Mineral Leases

According to the Manitoba Science, Technology, Energy and Mines (MSTEM), the area in the region of the proposed project area includes both surveyed and un-surveyed territory in the Winnipeg Mining District (2009a). Several mining claims cover the area around Manigotagan to north of Black Island on Lake Winnipeg. There is also one (1) mining claim east of Deer Island on the east side of Lake Winnipeg near Rice River (MSTEM 2009b). Gold mining has been active south of the Wanipigow River, as early as 1911 with claims being staked around Rice Lake (Woo et al. 1977).

In the Manigotagan area, claim holders include;

- Golden Pocket Resources;
- Central Consolidated Resources Inc.;
- Mustang Minerals Corp;
- Denis L. M. Savioe; and
- Goldshore Syndicate Inc.

The mining claim near Rice River is held by DLM Gold Ventures (MSTEM, 2009b).

The only active mineral leases in the study area are in the Rice Lake/Gold Lake area (MSTEM 2009b).

Quarry Leases and Withdrawals

There are several quarry leases and withdrawals, shown on Figure 7-50, are located within the project area, as listed below:

- In the Manigotagan area, Manitoba Infrastructure and Transportation have several quarry withdrawals; ;
- The Community of Seymourville. has one (1) quarry withdrawal;
- Manitoba Infrastructure and Transportation has a large quarry withdrawal north of Hollow Water First Nation running parallel to Lake Winnipeg northwards to Bloodvein First Nation;
- Two (2) quarry withdrawals are located at Berens River First Nation, and are listed under the Department of Indian and Northern Affairs Canada;
- There are several small quarry leases in the Manigotagan area, south of the community of Seymourville;
- There are also three (3) small quarry leases between Manigotagan First Nation and Bloodvein First Nation.

Figure 7 - 51: Mining

7.4.9 Heritage Resources

Areas of spiritual or cultural significance were identified in the Traditional Ecological Knowledge Study (TEK) (Section 6.0). Archaeological sites have also been identified along waterways and well-traveled trails in the Lac Seul Upland Ecoregion (refer to Figure 7-51), where more sites have been found in the south and east as the northern areas are generally less accessible. Eleven (11) pictographs, two (2) campsites and one (1) historic site have been found north and east of Berens River, while in the general area from Bloodvein First Nation to Hollow Water First Nation, two petroforms, one (1) campsite and one (1) isolated find have been recorded (Bulloch et al., 2002).

Many of the identified sites indicate that the Lac Seul Upland Ecoregion was inhabited by Algonkian people around 500 BC. Some of the sites indicate that the region between Wanipigow and Manigotagan Lakes may have been inhabited by the Paleo-Indian and Archaic peoples prior to the Algonkian people (Northern Lights Heritage Services, 2000).

At the identified sites, archaeologists have found evidence of stone tools, created from local stones, dating back approximately 8,000 years, from the approximate time of the Paleo-Indian people. Copper tools, dating back approximately 5,000 years, have also been found, including a copper workshop near Manigotagan Lake. What could be considered new technologies at the time were also developed as evident in the production and use of toggle-head harpoons, fired earthenware pottery and the bow and arrow, with evidence dating from approximately 1000 B.C. to 800 A.D. (Peckett, 2001).

A field investigation will be conducted prior to construction to determine the full extent of archaeological sites along the proposed ASR alignment. The investigation will include a visual survey of the proposed alignment, crossings and right-of-way, and shovel testing areas of potential sites. Should a cultural resource be located, test pits will be excavated to determine the extent. A visual survey includes looking for evidence of:

- major habitation sites;
- short-term campsites;
- game observation sites;
- quarry sites; and
- spiritual sites.

Indicators (other than tools, bones and pot shards) of the types of sites listed above can include;

- site accessibility;
- food resources;
- site drainage;
- flatness of site;
- high ground;

- quarried materials;
- petroglyphs;
- petroforms; and
- pictographs.

Upon completion of the field investigation, a Heritage Resource Impact Assessment (HRIA) will be conducted for the entire project area. The results of the HRIA will be submitted as a supporting technical document.

Figure 7 - 52: Heritage Resources

7.4.10 Infrastructure and Services

Infrastructure and services reviewed in this section for each community includes:

- Municipal;
- transportation;
- communications;
- medical;
- educational;
- judicial; and
- recreational.

Small communities in northern Manitoba, with an increased population growth and climate change issues, are currently faced with the challenge of self-sustainability. According to Indian and Northern Affairs Canada (INAC, 2009), there are sixty-three First Nations communities that are not accessible, with twenty-three of these communities not accessible by an ASR. Within the study area, there is only seasonal winter road access for the communities of Bloodvein, Berens River First Nation, Berens River NAC, Little Grand Rapids, Little Grand Rapids NAC and Pauingassi. The communities of Hollow Water First Nation, Manigotagan NAC, Seymourville NAC, Aghaming NAC, Pine Dock NAC and Matheson Island NAC are connected to the provincial highway system. Loon Straits can be accessed seasonally via the Rice River Road from PR 304.

Tables 7-14 and Table 7-15 lists all established infrastructure forms and services within each community:

Table 7 - 24: Inventory of Infrastructure Forms and Services of First Nations Communities

Infrastructure Services	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River
Water Supply	Water is obtained from the Berens River, then treated and distributed via watermains to 239 houses; 23 houses have no service. The Frontier School, teacherages, Nursing Station and the adjoining NAC community all operate individual water treatment facilities and distribution systems.	Water is obtained from the Bloodvein River then treated and distributed to the community through pipelines or by trucks. 80 homes have piped service, 52 with cisterns, and 3 have water barrels.	Water is obtained from the Wanipigow River, then treated and distributed to the community through pipelines A small number of homes received treated water from tucks.	Water is obtained from Family Lake, then treated and distributed to the community through pipelines or trucks. 159 houses have piped water and 69 houses have cisterns.	Water is obtained from Family Lake, then treated and distributed to the community by trucks. The school, teacherages and nursing station are serviced by pipelines. 47 houses have piped service, 29 houses with water trucked to cisterns and 10 houses with no service.	The community has a water treatment plant and water is distributed to all houses and community buildings.
Sewage Disposal	The community has a sewage treatment plant connected to 239 houses and all public facilities. 23 houses utilize pit privies.	The community has 80 houses that are served by a piped sewage collection system. 52 homes have sewage pumped from holding tanks to trucks. Sewage is treated in a two cell sewage lagoon and effluent discharged to a force main to an area south of the lagoon.	The community is served by a piped sewage collection system. Sewage is treated in a two cell sewage lagoon and effluent discharged to a ditch draining to the Wanapigow River. A small number of homes utilize pit privies.	159 houses are served by a piped sewage collection system, with the remaining served by holding tanks. Sewage is treated in a two cell aerated sewage lagoon and effluent discharged to a ditch to an inland lake.	The nursing station, school and teacherages are serviced by a piped sewage collection system. 47 houses have piped sewage service, 29 houses have trucked septic, and 10 houses have no service. Sewage treatment is provided by a Sequencing Batch Reactor (SBR) sewage treatment plant.	The community has a sewage treatment plant and all houses and community buildings are connected.
Garbage Disposal	One landfill site.	One landfill site.	One landfill site.	One landfill site.	One landfill site.	One landfill site.
Roads	No permanent access road to the community, access is provided by winter road. The community has internal gravel roads and distances are unknown at this time.	No permanent access road to the community, a winter road constructed annually provides access from Pine Dock on the west side of Lake Winnipeg. Pine Dock is accessible by all weather roads via highway #234. There are approximately 9km of internal roads in Bloodvein.	The community is accessible by an all-season road via PR 304. There are approximately 12km of internal roads on-reserve.	No permanent road access to Little Grand Rapids First Nation, winter roads are constructed annually to Bloodvein First Nation, connecting to another winter road heading south. The community has internal gravel roads; distances are unknown at this time.	No permanent access road to the Pauingassi First Nation, winter roads are constructed annually, that provide access either from Pine Dock on the west side of Lake Winnipeg to Bloodvein on the east side of the lake, continuing eastwards to Little Grand Rapids and Pauingassi. Access to the First Nation is from PR 304 on the east side of Lake Winnipeg, north east of the community. Pine Dock is accessible by all-season roads via PR 234. There are approximately 4km of internal roads.	No permanent access road to Poplar River, an annual winter road provides access to Poplar River for travel southwards. Pine Dock is accessible by all-season roads via highway #234. There are approximately 21km of internal roads on-reserve.
Recreation	Facilities include an outdoor skating rink, ball diamond, Pee-Wee Sports Club, Berens River Junior and Senior/Old Timers Hockey Club, playground and park.	No information available.	No information available.	No information available.	No information available.	No information available.
Electrical Service	Service is provided by land line.	Service is provided by land line.	Service is provided by land line.	No information available.	Service is provided by land line.	Service is provided by land line.

Infrastructure Services	Berens River	Bloodvein	Hollow Water	Little Grand Rapids	Pauingassi	Poplar River
Postal Service	Air mail service provided three times per week.	Air mail service provided three times a week from Winnipeg, by Northway Aviation.	Highway mail service to Wanipigow provided three times per week.	No information available.	Air mail is delivered three times per week to Little Grand Rapids, and collected by Pauingassi residents. Mail is directed to the school address in Pine Falls.	Air mail is delivered daily to Negginan.
Police Protection	The two constables stationed in Selkirk serve the area as well. There is one First Nation constable on-reserve.	The nearest RCMP detachment is in Selkirk. The First Nation employs one constable.	The nearest RCMP detachment is located in Powerview. The First Nation employs one constable.	The First Nation employs 3 constables who are responsible for both Little Grand Rapids and Pauingassi communities. There is an onsite RCMP Detachment at Little Grand Rapids.	Three are responsible for both the communities of Little Grand Rapids and Pauingassi. The nearest RCMP detachment is located in Little Grand Rapids.	The community employs two constables. The community is serviced by the RCMP detachment in Selkirk, where three constables are on staff.
Fire Protection	The First Nation has a fire truck and a converted water truck for fire protection.	The First Nation has limited fire fighting capabilities.	The community has a fire pumper truck, ancillary equipment and volunteer fire department.	The First Nation has pumper fire truck operated by a volunteer fire department. Approximately 70% of the community can access fire hydrants.	The First Nation has firefighting equipment and limited fire fighting capabilities.	The community has a fire truck and a volunteer fire department.

Source: 2004-2005 First Nation Community Profiles, Round 1 Community Visits

Table 7 - 25: Inventory of Infrastructure Forms and Services of NAC Communities

Infrastructure Services	Aghaming	Berens River	Little Grand Rapids	Loon Straits	Manigotagan	Pine Dock	Princess Harbour	Seymourville
Fire	Fire fighting capability is limited to forestry style portable equipment. Additional support is available from Manigotagan and Seymourville.	Fire fighting capability is based on a pumper truck from the community fire hall. Portable forest equipment is also available for grass and brush fires.	Fire fighting capability is limited to forestry-style portable equipment.	Fire fighting capability is limited to forestry-style portable equipment. The community has a small tractor and trailer to move the equipment around.	Fire fighting capability is based on a pumper truck and equipment from the community fire hall. Portable forestry equipment is also available for grass and brush fires.	Fire fighting capability is based on a small "fast-attack" vehicle with limited water supply, hoses and equipment. Addition portable forestry-style equipment is available for grass and brush fires.	Fire fighting capability is limited to forestry-style portable equipment, including a trailer to move equipment around. The trailer can be pulled by a half-ton truck.	Fire fighting capability is based on a small "fast attack" vehicle with limited water supply, hoses and equipment. Additional portable forestry-style equipment, including a water trailer, is available for grass and brush fires. Additional support is also available from the nearby community of Manigotagan.
Police	Police response is from Powerview detachment.	The community constable responds locally with back-up from the Selkirk detachment. Temporary detention facilities in the RCMP trailer in the community may be used until RCMP personnel arrive.	Police response is from the Little Grand Rapids detachment, RCMP, located on the reserve.	Police response is from the Selkirk detachment, RCMP.	Police are on call from Poweview detachment, RCMP. The community also has a part time constable.	Police response is from the Arborg detachment, RCMP.	Police response is from the Selkirk detachment, RCMP.	Police response is from the Powerview detachment, RCMP and the community has a community constable.
Medical	Medical services are provided at Pine Falls. Ambulance service is available from either Pine Falls or Bissett.	Medical response is provided by the staff of the federal nursing station located on the reserve. Serious cases will be airlifted to Winnipeg under the Northern Patient Transportation Program.	Medical response is from the federal nursing station, which is across the bay on the reserve. There is one community health worker. The nearest hospital is located at Pine Falls via float or ski plane.	No medical support other than basic first aid is available.	Medical response is based on ambulance service from Pine Falls or Bissett. The nearest hospital is in Pine Falls.	Medical response is based on ambulance service from Riverton, about one hour away. The nearest hospitals are at Arborg and Gimli.	Medical response is based on the nearest medical facilities at Gimli, served by float or ski plane.	Medical response for the community is based on ambulance service from either Bissett or Pine Falls. The nearest hospital is in Pine Falls.
Airstrip		Manitoba Transportation and Government services, Northern Airports operate a 2,900'x75' crushed rock strip with terminal building and remote controlled lighting on the edge of the community.	Manitoba Transportation and Government Services, Northern Manitoba Airports operate a 2,800'x75' crushed rock strip with terminal and remote-controlled lighting on the edge of the community.	During summer weather a non-licensed grass strip is available for small aircraft.	Manitoba Transportation and Government Services, Northern Airports operate a 2,900'x75' crushed rock strip with terminal building and remote controlled lighting on the edge of the community.			
Ferry Service`						Pine Dock has a ferry service	Manitoba Transportation and Government Services, Marine Services operate the ferry MV Edgar Wood on a Monday to Friday circuit including Islandview (Matheson Island), Princess Harbour and Bloodvein Reserve.	

Infrastructure Services	Aghaming	Berens River	Little Grand Rapids	Loon Straits	Manigotagan	Pine Dock	Princess Harbour	Seymourville
Hydro	Manitoba Hydro provides electricity via land lines. Residential rates are: Basic charge: $6.25/month First 175 kWh: 5.78 cents/kWh Balance: 5.16 cents/kWh	Manitoba Hydro provides electricity via land lines, with limited emergency diesel power. Residential rates are: Basic charge: $6.25/month First 175 kWh: 5.78 cents/kWh Balance: 5.16 cents/kWh	Manitoba Hydro provides electricity via land lines, with limited emergency diesel power. Residential rates are: Basic charge: $6.25/month First 175 kWh: 5.78 cents/kWh Balance: 5.16 cents/kWh	Manitoba Hydro provides electricity via land lines, with limited emergency diesel power. Residential rates are: Basic charge: $6.25/month First 175 kWh: 5.78 cents/kWh Balance: 5.16 cents/kWh	Manitoba Hydro provides electricity via land lines, with limited emergency diesel power. Residential rates are: Basic charge: $6.25/month First 175 kWh: 5.78 cents/kWh Balance: 5.16 cents/kWh	Manitoba Hydro provides electricity via land lines, with limited emergency diesel power. Residential rates are: Basic charge: $6.25/month First 175 kWh: 5.78 cents/kWh Balance: 5.16 cents/kWh	Manitoba Hydro provides electricity via land lines, with limited emergency diesel power. Residential rates are: Basic charge: $6.25/month First 175 kWh: 5.78 cents/kWh Balance: 5.16 cents/kWh	Manitoba Hydro provides electricity via land lines, with limited emergency diesel power. Residential rates are: Basic charge: $6.25/month First 175 kWh: 5.78 cents/kWh Balance: 5.16 cents/kWh
Telephone	Manitoba Telecom Services (MTS) provides individual line service and digital switching with toll free calling to Bissett and Pine Falls.	MTS provides individual line service and digital switching with toll-free calling to Little Grand Rapids and Poplar River.	MTS provides individual line service and digital switching with toll-free calling to Berens River and Poplar River.	Loon Straits is served by the Pine Dock Exchange. MTS provides individual line service and digital switching with toll-free calling to Arborg, Hecla, Poplarfield, Riverton and Vidir.	MTS provides individual-line service and digital switching with toll-free calling to Bissett and Pine Falls.	MTS provides individual line service and digital switching with toll-free calling to Arborg, Riverton, Vidir, Hecla and Poplarfield.	Princess Harbour is served by the MTS Pine Dock Exchange. MTS provides individual-line service and digital switching with toll-free calling to Arborg, Hecla, Poplarfield, Riverton and Vidir.	Seymourville is part of the MTS Manigotagan Exchange. MTS provides individual line service and digital switching with toll-free calling to Bissett and Pine Falls.
Water	Treated water is supplied from a pump house on the Hollow Water Reserve to a standpipe in the community, and to five of the housing units.	Two basic water supply systems have been installed to provide potable water to the community on both sides of Berens River. Water pumped from Lake Winnipeg is filtered, chlorinated and distributed to pressurized standpipes. Some homes on the south side are directly connected to the distribution system. The reserve water system is independent of the community system.	A water treatment plant capable of providing chlorinated water is located in the community.	Water is obtained from Lake Winnipeg by private systems. There is no treatment.	Water is pumped from the Manigotagan River to the treatment plant, receives nano-filtration and is piped to the individual residences.	Water supply is based on a membrane water treatment plant supplied with well water. The water is treated, chlorinated and stored in a reservoir. Approximately 95% of the community is connected to the new system. Others may be connected to a specific well or lake intake.	Water is obtained from Lake Winnipeg by individual household set-ups.	Water is drawn from Lake Winnipeg into the pump house where a chemical feed treatment plant treats the water and distributes water throughout the community via pipelines.
Waste Disposal	At the Hollow Water Waste Disposal Site. Solid wastes are individuals' responsibility and liquid wastes transported to the site or to the Seymourville lagoon by private pump-out trucks.	Solid waste is trucked to a disposal site on the reserve. Sewage is hauled by pump-out truck to a sewage lagoon, located on the reserve, north of the river.	A solid-waste disposal site is located near the community. Each person is responsible for their wastes.	A solid-waste disposal site is near the community.	A shared solid-waste disposal site is located between Manigotagan and Seymourville. 90 % of the sewage from the community is piped to a Sequencing Batch Reactor (SBR) plant. The balance is handled by commercial sewage pumpout truck and delivered for treatment to the SBR plant.	A solid-waste disposal site is near the community, along with a limited access pit for controlled liquid-wastes.	A solid-waste disposal site is located near the community.	Seymourville shares a solid-waste disposal site with Manigotagan. Sewage is collected by a low-pressure sewage line and pumped into a lagoon for treatment.

Infrastructure Services	Aghaming	Berens River	Little Grand Rapids	Loon Straits	Manigotagan	Pine Dock	Princess Harbour	Seymourville
Schools	Children attend the Wanipigow School, located on the Hollow Water Reserve, operated by the Frontier School Division, in addition to students from Manigotagan, Seymourville and Wanipigow.	Frontier School Division operates the Berens River School. It is a consolidated school for both community and reserve students, and is located on reserve land. The Principal supervises 23 teachers and eight or more support staff.	Children attend the Little Grand Rapids Reserve School operated by the South East Tribal Council School Division.	The school has been closed for a number of years. No students live in the community.	Students attend Wanipigow School on the Hollow Water Reserve, operated by Frontier School Division, in addition to students from the Reserve, Aghaming and Seymourville.	Frontier School Division operates the Pine Dock School with two teachers and three support staff.	Students receive education services through the Home Placement Program.	Children are transported to the Wanipigow School along with children from Aghaming, Manigotagan, and the Hollow Water Reserve. The Principal and Vice-principal supervise a large teaching and non-teaching staff.
Recreation Facilities	Mini-gymnasium.	Arena; community hall.	None.	None.	Ball field; Community hall, 3100 sq ft; Curling rink; Open side picnic shelter.	Ball field; 2900 sq. ft Community hall, Outdoor rink with change-house.	The former school building is operated by the community for meetings and recreational gatherings.	Ball diamond and additional field; Basketball court; Outdoor rink; Playground area and structures; 5760 sq. ft Recreation building; and office, Volley ball court.

Source: Community Profiles, 2003, Round 1 Community Visits

7.4.11 Recreation and Tourism

The land on the east side of Lake Winnipeg is part of the Canadian Shield, a massive rock formation that is millions of years old, that is covered by vast boreal forests. The current landscape dramatically illustrates the pattern left by retreating Wisconsin glaciers, as evident by:

- elongated lakes with rivers rushing between them;
- erratic drainages with sudden changes in elevation;
- thin soils;
- bedrock outcrops; and
- massive boulders strewn randomly.

The area's most important natural features include:

- habitat for several animal species which are either uncommon, rare, threatened, or endangered elsewhere in Canada;
- many uncommon and surprisingly diverse plant species; and
- a high-quality river and lake system, habitat for the rare chestnut lamprey, found only in Manitoba and for sports fish in abundance.

According to the *Promises to Keep*, there is a general consensus among communities of the WNO that there is a high potential for eco-tourism and recreation on the East Side of Lake Winnipeg, more specifically within in the study area. However, any development must be regulated and approved by east side communities. Recreational opportunities are high for wilderness and ecotourism, cultural tourism, and backcountry camping and canoeing.

No data was available with respect to the amount of tourists which visit the area. However, there are several campgrounds, outfitter camps and caches, and numerous commercial lodges throughout the southern portion of the study area. There are fewer facilities north of the Poplar/Nanowin Rivers Park Reserve. Most of these facilities are focused on hunting and fishing activities that require air access.

Licenses are issued to lodges and outfitter camps by the Licensing Advisory Committee, a committee internal to the government, formed under the Resource Tourism Operator's Act. A description of known tourist locations and accommodation, in each community with the study area is presented below:

- **Berens River:** Berens River possesses a pristine and untouched natural environment for potential tourist development. Pigeon River in Berens River provides good canoe routes travelling west inland. This area is also known for fishing, primarily sturgeon. Berens River has two tourist lodges, the Berens River Lodge and North Country Lodge.

- **Bloodvein: Bloodvein** possesses similar natural environmental characteristic as that of Berens River. Bloodvein is situated within close proximity to the Bloodvein River, and recognized canoe route. The Bloodvein River flows into the east side of lake Winnipeg and is named for its red granite veins evident in the rocks along the shore; and is a historical Native travel and fur trader route and has been designated as a Heritage River. This area is also famous for sport fishing, primarily sturgeon, northern pike, 'walleye' pickerel, lake trout, whitefish, and channel catfish. There is currently one tourist lodge in Bloodvein, the Bloodvein River Lodge.
- **Hollow Water:** The community hosts an annual event, called Black Island Days, held at a designated sacred site located on Black Island that brings tourists to the area. Hollow Water is situated directly across from Hecla/Grindstone Provincial Park, and close to Manigotagan Park Reserve. Tourists visiting the Provincial Parks can stay at local accommodations provided by Wood-N-Bell Hotel, North Star Hotel, and Bisset-San Antonio Motel. Little Grand Rapids: Little Grand Rapids is located within close proximity to Atikaki Provincial Park, this could attract more tourists to the area in future. Little Grand Rapids is reputable for fishing.
- **Pauingassi:** Pauingassi is also located within close proximity to Atikaki Provincial Park that could attract more tourists to the area in future. Pauingassi is reputable for fishing. Pauingassi is the most inaccessible community within the study area. Accommodations are available at Little Grand Rapids Lodge, approximately 30 minutes away via water taxi from Little Grand Rapids.
- **Poplar River**: Poplar River's Poplar/Nanowin River Park Reserve is a large protected area covering the majority of the northern section of the study area. This area is rich in natural ecosystems that can be used for eco-tourist development in the future. This area currently has a recognized canoe route on the Poplar River. The Sagatay Lodging is the only known bed and breakfast currently operating in the community.
- **Manigotagan NAC:** The Manigotagan River is a challenging white-water river which draws a lot of tourists to the area. The Manigotagan River Provincial Park is located about 150 kilometres northeast of Winnipeg. Manigotagan is located adjacent to Hollow Water First Nation, thus accommodations are shared between the two communities, in addition to Aghaming and Seymourville. Accommodation are: North Star Hotel, the Wooden' Bell Motel, English Brook campground and Manigotagan campground facilities. Local guides are available for hunting and fishing parties (Manitoba Aboriginal and Northern Affairs, 2003).
- **Loon Straits NAC**: There are no commercial accommodations available at Loon Straits (Manitoba Aboriginal and Northern Affairs, 2003).
- **Princess Harbour NAC:** There is no commercial accommodation available in the community (Manitoba Aboriginal and Northern Affairs, 2003).
- **Seymourville NAC:** Seymourville shares tourist accommodation with Hollow Water, Manigotagan, and Aghaming, namely North Star Hotel, the Wooden' Bell

Motel, English Brook campground and Manigotagan campground facilities (Manitoba Aboriginal and Northern Affairs, 2003).

- **Aghaming NAC:** Aghaming shares tourist accommodation with Hollow Water, Manigotagan, and Aghaming, namely North Star Hotel, the Wooden' Bell Motel, English Brook campground and Manigotagan campground facilities (Manitoba Aboriginal and Northern Affairs, 2003).
- **Berens River NAC:** The study area possesses a pristine and untouched natural environment for potential tourist development. Within close proximity to the community, the Berens and Pigeon Rivers provide good canoe routes travelling west inland. These rivers are also known for fishing; primarily sturgeon Berens River also has two tourist lodges; the Berens River Lodge and North Country Lodge (East Side Aboriginal Sustainable Tourism Inc., 2007).
- **Pine Dock NAC:** The area surrounding Pine Dock attracts many tourists and residents for fishing and fishing getaways. The Biscuit Harbour Resort is the only accommodation for tourists locally that also attracts many people to the Pine Dock area (Manitoba Aboriginal and Northern Affairs, 2003).
- **Little Grand Rapids NAC:** Little Grand Rapids NAC is reputable for fishing, and is second most inaccessible community (after Pauingassi)within the study area,. Accommodations are available to visitors at Little Grand Rapids Lodge. Little Grand Rapids NACC is located within close proximity to Atikaki Provincial Park that can attract more tourists to the area in future.