EA REPORT SECTION 4

EXISTING ENVIRONMENT

LAKE ST. MARTIN ACCESS ROAD

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4.0 EXISTING ENVIRONMENT

The description of the exiting environment described in this chapter focuses on the Project Assessment Area (PAA) and the surrounding region illustrated in Map 1-1. The PAA is a 1 km buffer on either side of the proposed Project and is the physical space within which most direct and indirect Project-related effects are expected to occur; it is the spatial area in which the assessment of environmental effects is based (see Section 5 for details on the PAA and its selection). Sites that are outside the PAA, as illustrated in Map 1-1, encompass the regional area described in the following sections.

4.1 INFORMATION SOURCES

The sources of information used to identify and assess potential environmental effects of the proposed Project included the following:

- Baseline and other studies (including field studies) conducted for the proposed Project and other future works in the region. These include collecting site-specific information required for Project planning and the EA (i.e., wildlife, aquatic environment, vegetation and soils, geological resources);
- Land Use and Heritage Resources studies including those conducted in the region;
- Public, including Indigenous and stakeholder groups, engagement for the proposed Project;
    - Traditional knowledge is incorporated to the extent feasible; most of this information was gained through the Crown Consultation (s35 Consultation) that is reported separately;
- Advice from regulatory authorities provided to MI; and
- Existing information sources including government publications and general and scientific literature.

Fieldwork related to the LSM Access Road and surrounding areas was conducted in 2015 and 2016 for the various technical components as outlined in Table 4-1.

Table 4-1. Information Sources for the Environmental Assessment

Information Type	Source	Description
Baseline Studies: Physical Environment	KGS Group engineering & monitoring reports from 2013 to 2018	Information on geology, geochemistry, groundwater quantity, groundwater quality, surface water hydrology, surface water quality & conceptual designs for the POC
Aquatics	Lake St. Martin Outlet Channel Proposed All Season Access Road Fisheries and	Technical reports including desktop and field studies for fisheries and aquatic habitat along the proposed access road.

Information Type	Source	Description
Aquatics	Aquatic Habitat Assessment. 2016. AAE Tech Services Inc.	
	Lake Manitoba and Lake St. Martin Access Road and Outlet Channels Project – Bat Species at Risk Field Study Report. 2017. Ecologic Environmental Inc. Wildlife, Aquatic & Geomatics Consulting	Results of the desktop and baseline studies conducted for bats along the proposed all season access road
Wildlife	Lake St. Martin Outlet Channel Proposed All Season Access Road: Wildlife Technical Report. 2016. Ecologic Environmental Inc. Wildlife, Aquatic & Geomatics Consulting	Results of the desktop and baseline studies conducted for wildlife along the proposed all season access road
	Lake St. Martin Outlet Channel Proposed All Season Access Road. 2016. SG Environmental Services Inc.	Characterization of the vegetation in area of the proposed all season access road
Vegetation and Soils	Investigations and preliminary engineering for LMB Outlet Channels Options C and D summary report.	Bore hole log information provided in the engineering report, summarized physical characteristics of soils entered along the Lake Manitoba Outlet Channel
Heritage Resources	Northern Lights Heritage Services 2017b	Heritage Resources Characterization Study: Lake St. Martin Outlets and Proposed All Season Access Road
Study Summary	M. Forster Entreprises et. al. 2016	Lake St. Martin Outlet Channel Proposed All Season Access Road Summary of Existing Environment Final Report

4.2 PHYSICAL ENVIRONMENT

4.2.1 Atmospheric conditions

4.2.1.1 Climate

Climate can be defined as the generally prevailing weather conditions of a region throughout the year, and is typically described by variables such as air pressure, cloud cover, humidity, precipitation, hours of sunshine, temperature, wind speed and wind direction. Environment and Climate Change Canada (ECCC) has collected climate normals data for several areas within Canada from 1961 to 1990, 1971 to 2000 and 1981 to 2010. The ECCC weather station closest to the Project with the most recent climate normals data, i.e., from 1981 to 2010, is located approximately 108 km to the south, in Lundar, Manitoba. Table 4-2 summarizes the climate normals data for the Lundar weather station (Government of Canada 2016a), which is located at Latitude 50°45' N and Longitude 97°56' W at an elevation of 266.7 m.

The 30 year climate normals report an average annual temperature of 1.9 degrees Celsius (°C), with an average maximum of 18.3°C in July, and an average minimum of -18.1°C in January (Government of Canada 2016a). Mean annual precipitation is 1332.5 millimetres (mm), of which 385.5 mm falls as rain with the remaining 947 mm falling as snow (approximately 71 percent [%]). Precipitation falls primarily as snow during the winter months, with the greatest snowfalls occurring in November, December and January. Precipitation occurs mainly as rain during the spring, summer and fall seasons, with overall levels of precipitation peaking in June, July and August.

Table 4-2. Climate Normals Summary for Lundar, Manitoba (1981-2010)

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average Temp. (°C)	-18.1	-13.5	-6.6	3.3	10.9	16.4	18.3	17.7	11.3	4.4	-6.5	-14.6	1.9
Daily Max Temp. (°C)	-12.7	-8.0	-1.3	9.4	17.7	22.8	24.7	24.7	17.7	9.7	-2.1	-9.8	7.7
Daily Min Temp. (°C)	-23.6	-18.8	-11.9	-2.9	4.1	9.9	11.9	10.6	4.9	-1.1	-10.8	-19.4	-3.9
Rain (mm)	0.0	0.2	5.9	14.8	55.2	80.1	74.8	68.9	45.8	35.7	3.0	1.2	385.5
Snow (cm)	16.1	13.5	13.4	11.9	0.4	0.0	0.0	0.0	0.0	5.3	16.3	17.7	94.7
Precipitation (mm)	161	135.2	139.9	133.8	59.2	80.1	74.8	68.9	45.8	88.7	166	178.2	1332.5

Source: Government of Canada (2016a)

Wind data for the area was based on information collected at the station closest to the Project, at Dauphin, Manitoba. Average wind speeds are fairly constant throughout the year, ranging from approximately 14 kilometres per hour (km/hr) to 17 km/hr. There is an average of approximately 13 days per year when wind speeds exceed 50 km/hr, with maximum hourly wind speeds of between 71 km/hr and 89 km/hr and maximum gust speeds between 85 km/hr and 122 km/hr (Weather Network 2016).

The large lakes that surround the area have an influence on the climate and weather. The basin size and locations of Lake Manitoba, Lake Winnipegosis and Lake Winnipeg result in the creation of lake and land breeze circulations that can cause highly variable winds in the area (Environment and Climate Change Canada [ECCC] 2016a). The presence of the lakes also influence temperature and precipitation patterns in the area, with sudden storms and snow squalls that can produce strong winds over the land and water (ECCC 2016a). Manitoba's "big three" lakes are known for their rough waters and choppy waves, a feature of the large surface area but shallow depths of these lakes (ECCC 2016a).

4.2.1.2 Greenhouse Gas Emissions

Climate change has been linked to greenhouse gas (GHG) emissions that contribute to atmospheric increases in levels of CO_2 and other gases (e.g., methane [CH_4], nitrous oxide [N_2O]) that increase global temperatures, change climate and precipitation patterns, and increase the frequency of extreme weather events. Environment and Climate Change Canada (ECCC) currently tracks six GHG substances as part of Canada's efforts to identify, quantify and reduce sources of GHGs. The six substances are CO_2, CH_4, N_2O, sulphur hexafluoride (SH_6), perfluorocarbons and hydrofluorocarbons (ECCC 2016b).

Each GHG has a different global warming potential and persists for a different length of time in the atmosphere; as such, GHG emissions from different types of gaseous compounds are converted into CO_2 equivalents to be compared and tracked over time (Climate Change Connection 2016). Table 4-3 provides a summary of GHG emissions by Canadian province and territory for 1990, 2005 and 2014.

Based on the data in Table 4-3, Manitoba was the 7th largest emitter of GHGs in 1990 and 2005, and the 8th largest emitter of GHGs in 2014, in comparison to all other provinces and territories in Canada. Additional information on the relative amounts of each tracked substance for different GHG categories (i.e., energy, industrial processes, solvent and other product use, agriculture and waste) can be found in the annual National Inventory Reports (ECCC 2016c).

Table 4-3. GHG Emissions by Province and Territory for 1990, 2005 and 2014

Province or Territory	Greenhouse Gas Emissions (Mt of CO_2 Equivalent)		
	1990	2005	2014
Newfoundland and Labrador	9.6	10.2	10.6
Prince Edward Island (PE)	2.0	2.1	1.8
Nova Scotia (NS)	20.0	23.5	16.6
New Brunswick (NB)	16.4	20.5	14.9
Quebec (QC)	89.1	89.7	82.7
Ontario (ON)	181.8	210.6	170.2
Manitoba (MB)	18.7	20.7	21.5
Saskatchewan (SK)	45.1	69.6	75.5
Alberta (AB)	175.2	233.0	273.8
British Columbia (BC)	52.9	65.2	62.9
Yukon (YT)	0.5	0.5	0.3
Northwest Territories (NT)	1.6[A]	1.7	1.5
Nunavut (NU)	n/a	0.3	0.3

Notes: [A] 1990 emissions data for the Northwest Territories include emissions for Nunavut, which was part of the Northwest Territories until 1999; Mt = megatonnes; n/a = not applicable; Emission levels for some years have been revised in light of improvements to estimation methods and availability of new data.

Source: Environment and Climate Change Canada (2016c) National Inventory Report 1990–2014: Greenhouse Gas Sources and Sinks in Canada.

ECCC also monitors GHGs under the Greenhouse Gas Emissions Reporting Program, which is Canada's legislated, publicly accessible inventory of facility-reported GHG data and information. The most current data available at the time of this writing was the summary for the year 2016, provided in Table 4-4 (ECCC 2016d). In 2016, there were 11 facilities in Manitoba reporting under the Greenhouse Gas Emissions Reporting Program. These facilities are located about 200 to 600 km from the Project, with the exception of the Faulkner limestone and gypsum processing plant (owned by Graymont Western Canada Inc.), which is located on Provincial Trunk Highway (PTH) 239 between the towns of Steep Rock and Faulkner. The Faulkner Plant is located approximately 49 km southwest of the Project. This facility reported the 4th highest level of overall GHG emissions in Manitoba in 2016 (Table 4-4).

Other sources of GHGs in the broader area likely stem from: agricultural and recreational activities; vehicles travelling PTH 6, which is the main highway in the area and an important route between Winnipeg, Manitoba and Thompson, Manitoba; and vehicle use on the other municipal roads and trails throughout the area. Pollutants emitted from motor vehicles include NO_x (nitric oxide and nitrogen dioxide), CO (carbon monoxide), volatile organic compounds, and to a lesser extent SO_2 (sulphur dioxide) and particulate matter.

Within the immediate vicinity of the proposed Project, infrastructure is limited to existing municipal roads (Dewald Road and Birch Lake Drive), a resource road (Idylwild Road), and a winter road (Map 1-1). The community of Spearhill is the only human settlement located along the access road network which leads to the Project. Current GHG emissions within the PAA are limited to emissions produced by equipment within existing quarries (Map 2-2), All Terrain Vehicles (ATVs), snowmobiles or seasonal vehicle use when the winter road is open and operational.

Table 4-4. Summary of GHG Emissions Reported by Facilities in Manitoba 2016

Facility Name	City/Town	Greenhouse Gas (metric tonnes CO_2 equivalent)						
		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Total
Brady Road Resource Management Facility – City of Winnipeg, Water & Waste Department	Winnipeg		361,954					361,954
Faulkner Plant – Graymont Western Canada Inc.	Faulkner	130,421	72	132				130,624

Facility Name	City/Town	Greenhouse Gas (metric tonnes CO_2 equivalent)						
		CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Total
General Scrap - Winnipeg – General Scrap Partnership	Winnipeg	1,687	3	15				1,705
HBMS Metallurgical Complex – Hudson Bay Mining and Smelting Co., Limited	Flin Flon	27,281	17	508				27,805
Kilcona Landfill – City of Winnipeg, Water & Waste Department	Winnipeg		50,815					50,815
Koch Fertilizer Canada, ULC – Koch Fertilizer Canada, ULC	Brandon	606,146	34,919	47,094				688,159
Manitoba Kraft Papers Division – Tolko Industries Ltd.	The Pas	67,010	7,559	4,396				78,964
Minnedosa Ethanol Plant – Husky Oil Operations Limited	Minnedosa	74,890	36	326				75,252
Summit Road Landfill – City of Winnipeg, Water & Waste Department	Winnipeg		87,234					87,234
Thompson Operations – Vale Canada Limited	Thompson	59,784	20	811	26			60,641
TransCanada Pipeline, Manitoba – TransCanada PipeLines Ltd.	Winnipeg	244,450	10,814	3,295				258,559
Totals		1,211,669	553,441	56,576	23			1,821,713

Source: ECCC (2016d)

4.2.1.3 Air Quality

In Manitoba, air quality issues are mostly local in nature and are primarily related to odour and other pollutants such as wind-blown dust released from specific local sources or activities. Emissions from the metal smelters in Flin Flon and Thompson and smoke from forest fires tend to be the greatest sources of air pollution in northern Manitoba (Government of Manitoba 2009). Southern Manitoba has also experienced poor air quality on occasion due to smoke from forest fires or crop residue burning. Air quality throughout the broader area in which the Project is situated can be affected by commercial,

agricultural, recreational, rural, transportation and urban activities that occur in the region, as well as from naturally occurring forest fires.

The Province of Manitoba and Environment and Climate Change Canada operate air quality monitoring stations in the cities of Brandon, Flin Flon, Thompson, and Winnipeg, Manitoba.

The air quality monitoring stations closest to the Project are located in the City of Winnipeg at 65 Ellen Street and at 299 Scotia Street. Air quality parameters that are monitored include: carbon monoxide (CO); particulate matter less than or equal to (≤) 10 microns (PM10t); particulate matter ≤ 2.5 microns (PM2.5), nitric oxide (NO); nitrogen dioxide (NO_2); nitrogen oxides (NO_x); ground level ozone (O_3); sulphur dioxide (SO_2); wind direction; and wind speed (Government of Manitoba 2016b).

Table 4-5 provides a summary on air quality parameters for Winnipeg, Manitoba on November 1, 2016. Example of the available information.

Table 4-5. Air Quality Parameters for Winnipeg, Manitoba, November 01, 2016

Station	Date	Time	PM10t	PM	CO	O_3	NO	NO_2	NO_X	SO_2	Wind	
			µg/m³	2.5s	ppm	ppb	ppb	ppb	ppb	ppb	Direction (Degrees)	Speed (Kph)
Winnipeg Ellen St.	11/1/ 2016	7:00 AM	6.5	2.2	0.757	2.8	9.8	11.7	21.5	0	308	8
Winnipeg Scotia St.	11/1/ 2016	7:00 AM	-	2.5	-	1.8	10	3.8	13.9	-	342	4

Source: Government of Manitoba 2016b.

PM_{10t} = particulate matter ≤10 microns; µg/m³ = micrograms per cubic meter; $PM_{2.5s}$ = particulate matter ≤2.5 microns; ppm = parts per million; ppb= parts per billion; Wind Dir = wind direction in degrees; Wind Speed = wind speed in kilometers per hour

The Manitoba Ambient Air Quality Criteria (Government of Manitoba 2016c) provides the maximum tolerable, maximum acceptable and maximum desirable concentrations of air pollutants required to protect and preserve air quality for human health. Comparison of the air quality parameters provided in Table 4-5 to the Manitoba Ambient Air Quality Criteria indicates that the measured parameters on that date do not exceed the maximum acceptable level and meet the “maximum desirable” concentrations for parameters that have this value defined.

Environment and Climate Change Canada (ECCC) has also developed the “Air Quality Health Index” (AQHI), an index that is based on the relative risk to human health that can be caused by a combination of common air pollutants (ECCC 2016d). These pollutants include ground-level O_3, $PM_{2.5}$ and NO_2. The

AQHI is measured on a colour-coded scale from 1 to 10+ and the values are also grouped into risk categories (low, moderate, high, very high) to identify the level of risk. The higher the number, the greater the health risk associated with local air quality (ECCC 2016e). The Province of Manitoba states that "recent monitoring has shown that the health risks associated with air quality for the cities of Brandon and Winnipeg are generally low, with an average AQHI rating of around three or lower in both locations" (Government of Manitoba 2016d). Manitoba's Sustainability Report in 2009 indicates air quality as being stable in Manitoba based on the data from three reporting stations in Winnipeg, Flin Flon, and Brandon (Government of Manitoba 2009). The AQHI data summarized for Winnipeg for the period from 1987 to 2008 indicates good air quality for the majority of the time, with one episode of very poor air quality that occurred during 2002 that was likely due to smoke from burning crop residue in surrounding agricultural land (Figure 4-1) (Government of Manitoba 2009).

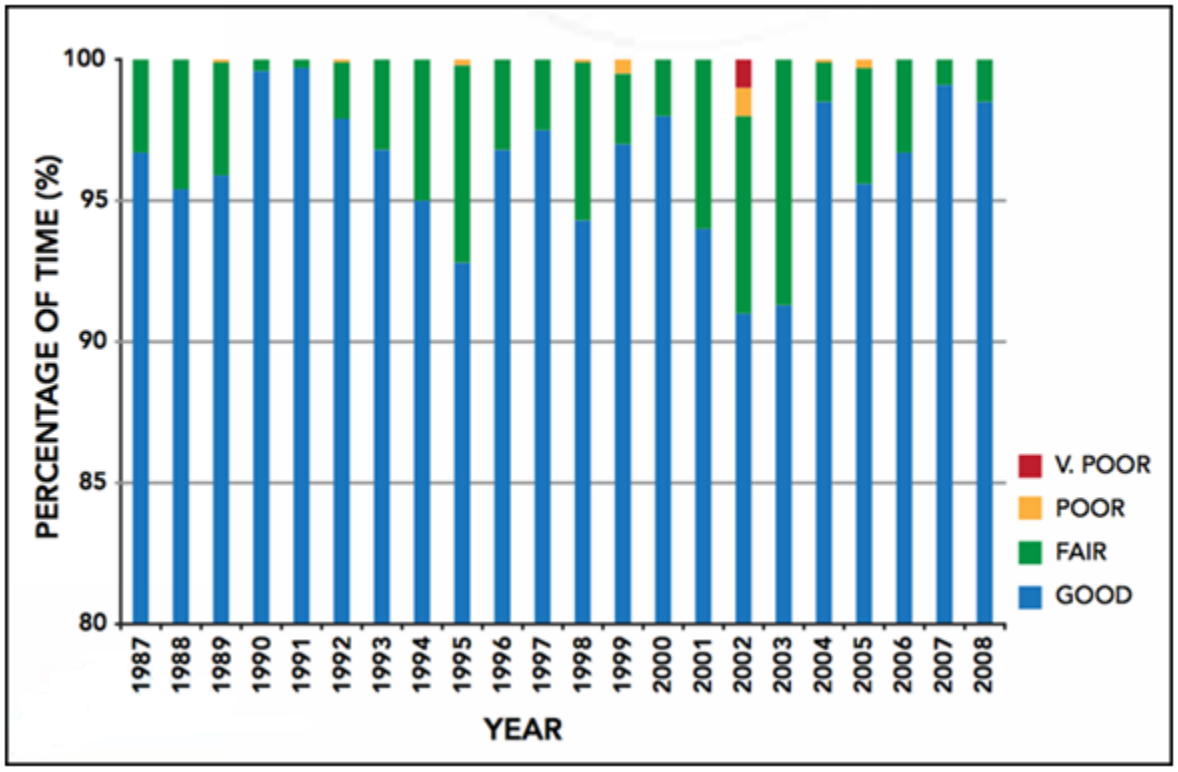


Figure 4-1. Winnipeg (Downtown) Air Quality Index, 1987-2008 (source Government of Manitoba 2009)

The Project is located approximately 200 km northwest of the City of Winnipeg and supports a much lower density of population and development. It is expected that the ambient air quality within the PAA is of similar or higher quality than that of the City of Winnipeg and surrounding area.

4.2.1.4 Noise and Vibration

Existing noise and vibration levels in the PAA are expected to be typical of an area that is relatively undeveloped and under natural cover (forest, wetland etc.). Existing sources of noise and vibration in the PAA likely consist of seasonal snowmobile and ATV traffic, and equipment used to establish the existing winter road on an annual basis. The PAA also experiences periodic noise and vibration from trucks (light duty and transport) and equipment using the winter road to access the Lake St. Martin Emergency Outlet Channel for maintenance and operation purposes.

Despite seasonal, periodic vehicle and equipment use, the PAA is generally assumed to be in an environment of low ambient noise and vibration. Anthropogenic noises and vibrations are expected to be primarily limited to the winter months and associated with the occasional and periodic use of the winter road. Traffic noise objectives have not been established in Manitoba for provincial highways; however, highway traffic noise is indirectly controlled by Transport Canada under the Motor Vehicle Safety Regulations (C.R.C., c. 1038) Schedule V.1 – Noise Emissions (Standard 1106), which defines maximum permissible sound levels (PSL) for individual categories of vehicles (Government of Canada 2016b). Common noise levels and typical human reactions are summarized in Table 4-6.

Table 4-6. Common Noise Levels and Typical Human Reactions

Source	Decibels (dB)	Effect
Quarry production blast at 500 m	128	-
Car horn/propeller aircraft/air raid siren	120	Threshold of pain
Amplified rock band	110	Maximum vocal effort
Rockbreaker breaking at 7 m	100	
Running train	100	Discomfort
Reversing alarm at 4 m	92	
Heavy truck at 15 metres (m)/ Busy city street	90	Very annoying - Hearing damage (8 hr)
Paver at 15 m	89	-
Jackhammer at 15 m	88	-
Concrete mixer at 15 m	85	-
Bulldozer, Grader or Loader at 15 m	85	-
Pneumatic tool at 15 m	85	-
Generator at 15 m	81	-
Backhoe at 15 m	80	-
Factory floor	80	Annoying
Concrete vibrator at 15 m	76	-
Pump at 15 m	76	-

Source	Decibels (dB)	Effect
Passenger car at 65 miles per hour at 8 m	70	Telephone use difficult
Normal conversation	60	Intrusive
Noisy office	50	Speech interference
Light automobile traffic at 30 m	50	-
Public library	40	Quiet
Soft whisper at 5 m	30	Very quiet
Rustle of leaves	10	Just audible
Threshold of hearing	0	-

Sources: Beranek (1988); Canadian Mortgage and Housing Corporation (1981); Explosives and Rockwork Technologies Ltd. (2002); HMMH (2014).

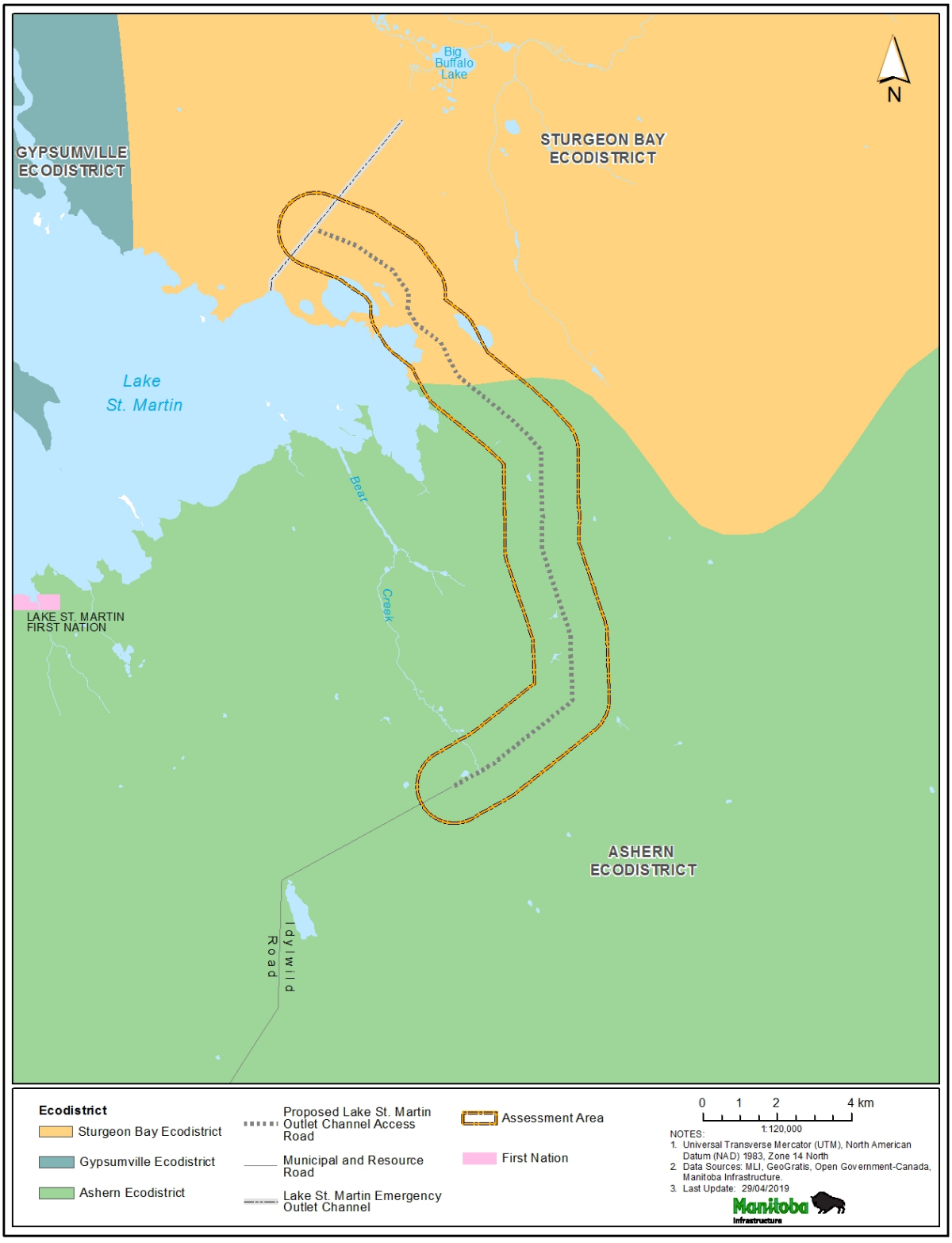
As shown in Table 4-6, noise levels in the vicinity of a highway can be in the range of 50 to 70 decibels (dB), although actual noise levels would be dependent on the volume of traffic, speed of the traffic and the receptor's distance from the roadway. Typical road construction equipment noise ranges between about 77 dB and 125 dB from the operator's position (Ontario Ministry of Labour 2017).

Regulation of noise in Manitoba is intended for management of worker exposure to noise levels in occupational environments, and local municipal bylaws established for noise nuisance management. Noise control guidelines for land use planning are provided through Manitoba's published Guidelines for Sound Pollution for daytime and night-time acceptable and desirable noise levels in residential areas (MCWS 1992). For residential areas, the maximum desirable level is 55 dB during the day and 45 dB at night. For road construction, the industrial maximum desirable level would be used, which is 70 dB day or night. Lake St. Martin First Nation is the closest community to the Project and is located more than 15 km away from the nearest point of construction.

D. J. Martin (1977) conducted a study on ground vibrations due to construction noise generated by different types of equipment on different types of soils and surfaces. The study found that the major sources of vibration in road construction were the tracked earthmoving equipment, compaction equipment and intermittent impacting equipment. Rubber-tired equipment did not generate ground surface vibration levels high enough to be detected by human subjects. At distances greater than 10 m, ground attenuation effects may reduce the vibration levels to values below human sensitivity.

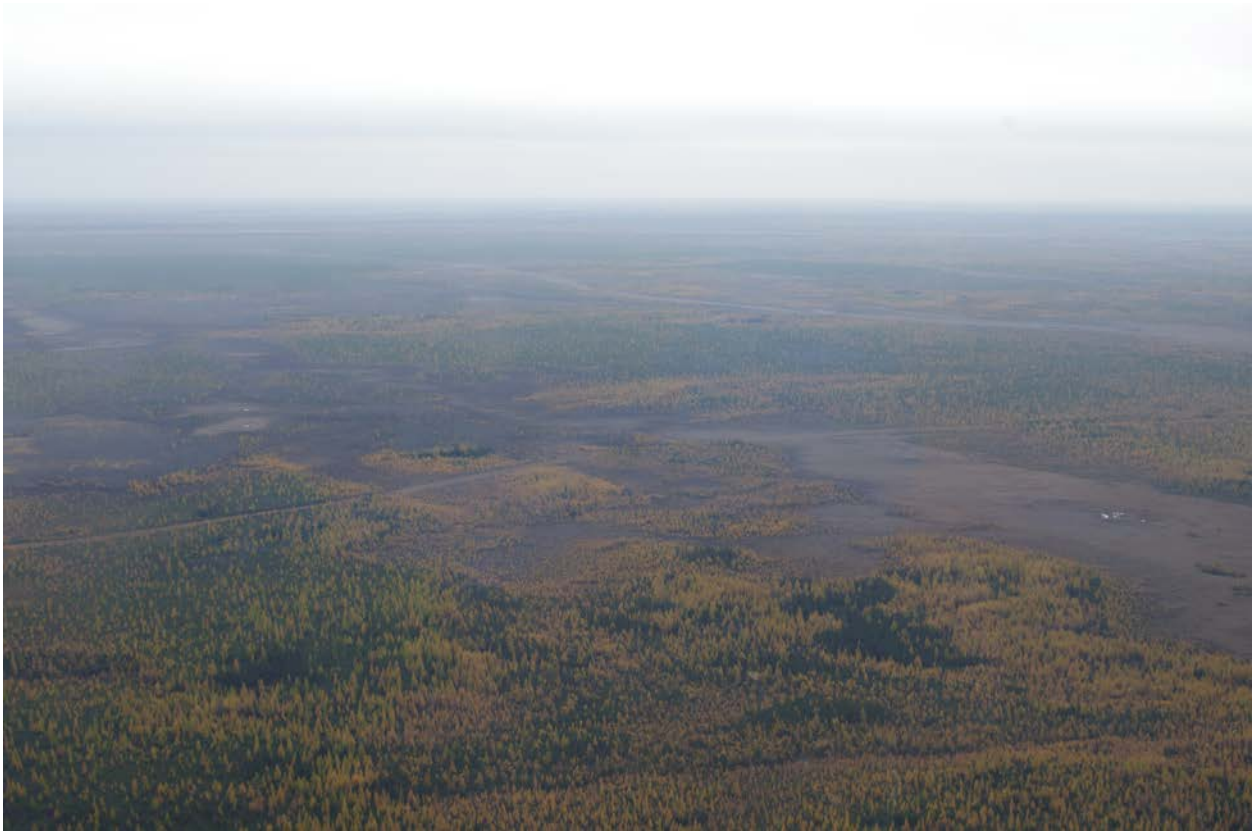
4.2.2 Terrain and Soils

The Project crosses portions of both the Sturgeon Bay (676) and Ashern (723) Ecodistricts (Map 4-1). The Ashern (723) Ecodistrict is located in Manitoba's Interlake region and is situated between Lake Manitoba to the west and Lake Winnipeg to the east (Smith et al. 1998). The Ashern Ecodistrict has a gently sloping topography oriented toward Lake Winnipeg and westward toward Lake Manitoba (Smith et al. 1998).



Map 4-1. Ecodistricts Encompassing the Proposed LSM Access Road

The physiography of the region is apparently the outcome of Glacial Lake Agassiz's retreat; wave action and iceberg scouring resulted in ridges of coarse-textured small rock (cobble and gravel) and finer-textured depressions (Smith et al. 1998). This area is contains ridges interspersed by poorly drained depressions supporting wetlands. Photograph 4-1 provides an aerial view of a portion of the PAA.



Photograph 4-1. Representative Terrain and Topography in the Project Assessment Area

The Sturgeon Bay (676) Ecodistrict encompasses most of the North Basin of Lake Winnipeg and slopes gently northeast toward Lake Winnipeg (Smith et al. 1998). Similar to the Ashern Ecodistrict the topography has been shaped by Glacial Lake Agassiz's retreat; wave action and iceberg scouring. There are extensive bogs/fens (peatlands) and poorly-drained mineral soils (transitional areas) (Smith et al. 1998). Groundwater is the principal source of water in the Sturgeon Bay Ecodistrict and is associated with sand and gravel aquifers stemming from glacial till deposits.

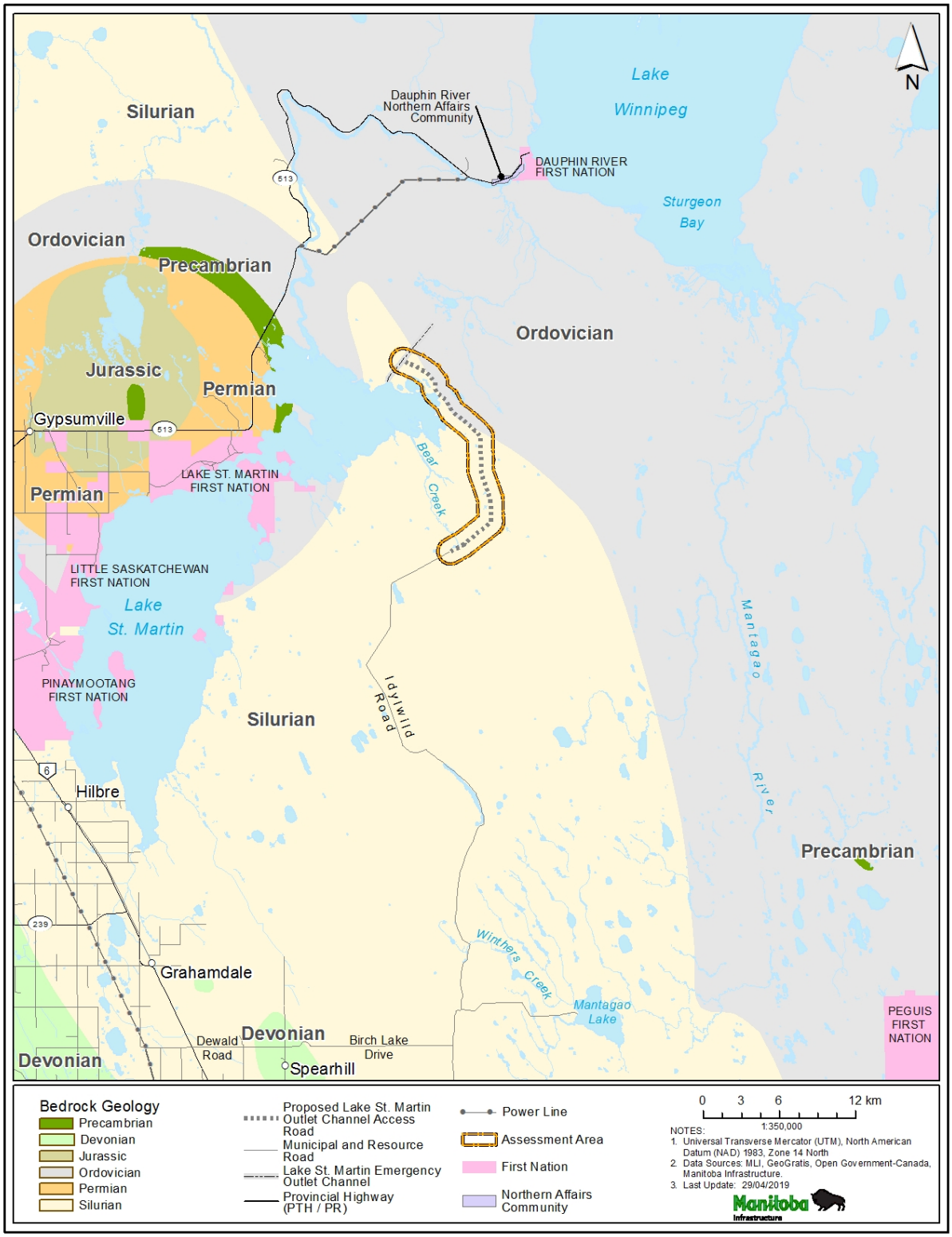
4.2.3 Geology and Soils

As shown in Map 4-2, the geology of the Interlake region is composed of layers of Devonian, Silurian and Ordovician carbonates and sandstone formed during the Paleozoic era that overly or onlap with Precambrian granites or gneisses (Leybourne et al 2007). This is a region of geological interest as it was struck by a meteor during the Jurassic, Triassic or Permian period (Lapenskie and Bamburak 2015; Leybourne et al 2007; McCabe 1971). The meteorite impacted dolomitic Ordovician to Devonian carbonates, basal sandstones and underlying Precambrian rock formations (Lapenskie and Bamburak 2015; Leybourne et al 2007; McCabe 1971).

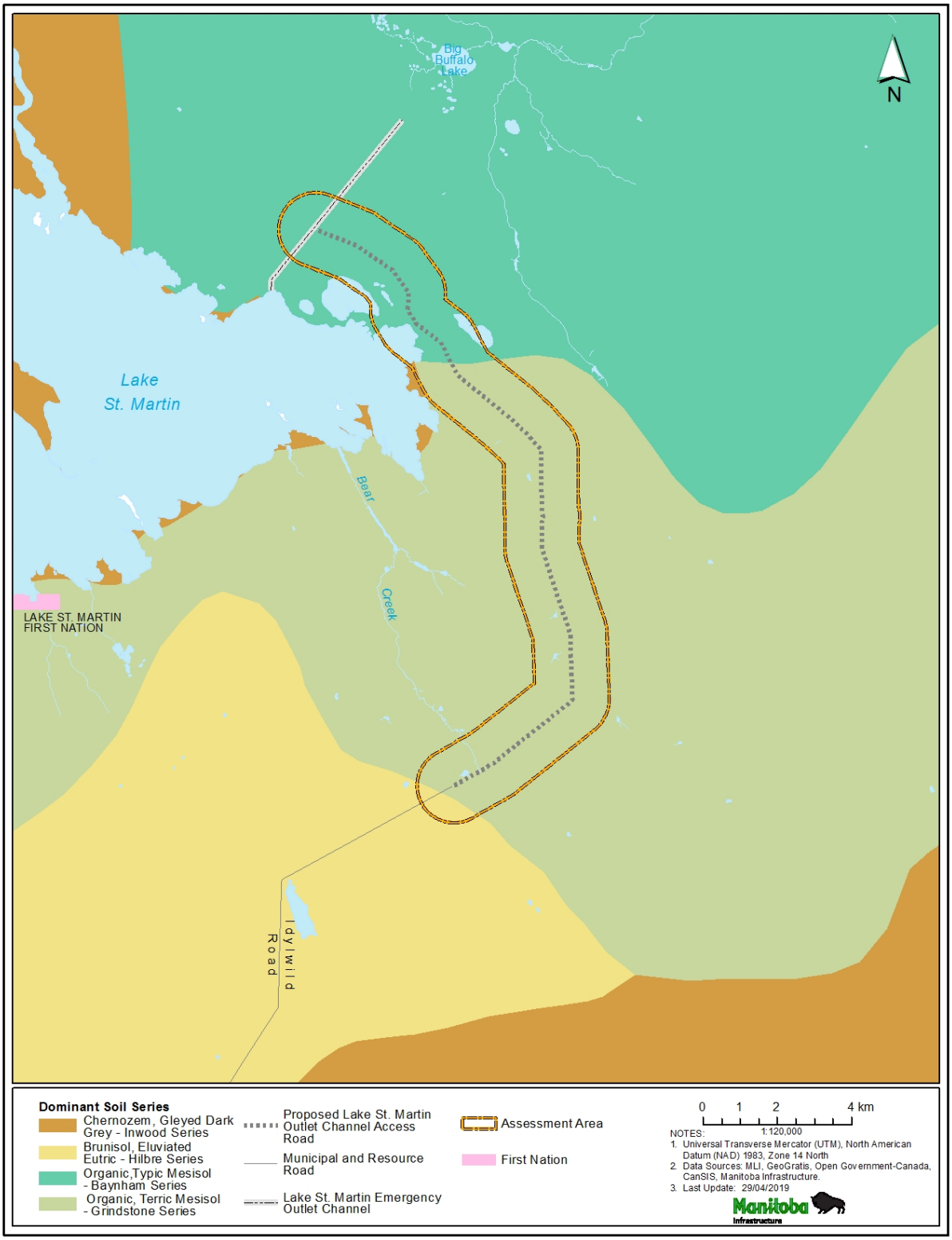
The meteor impact structure was described by McCabe (1971) as a crypto-explosion crater consisting of a crater or hole 14 miles (22.4 km) in diameter and more than 1,000 feet (about 350 m) deep. Its central core is two to three miles (3.2 to 4.8 km) in diameter, consisting of highly shock-metamorphosed Precambrian gneiss that was uplifted by at least 700 feet (about 213 m), and is exposed in the centre of the crater. At the crater rim, lower Paleozoic and Precambrian rocks have been uplifted by 700 feet (about 213 m) or more and are exposed in outcrop near The Narrows of Lake St. Martin; beyond the crater rim is a structurally uplifted belt extending for about 14 miles (22.4 km) (McCabe 1971). The geological history of the area also resulted in large deposits of limestone, dolomite and gypsum, many of which have been mined for use as foundations and building structures, aggregate materials, cement, wallboard and Plaster of Paris (Government of Manitoba 2016e).

Over time, areas within the limestone, dolomite and gypsum deposits become dissolved, forming what is referred to as karst topography, which produces a variety of features such as underground drainage systems, sinkholes and caves (Bilecki 2003). These sinkholes and caves can provide wildlife habitat for a variety of species as dens, hibernacula and resting areas (Bilecki 2003). The Paleozoic boundaries mainly encompass the Interlake Plain (155), Mid-Boreal Lowlands (148), and a small portion of the Lake Manitoba Plain (162) Ecoregions, as defined by Smith et al. (1998). The PAA is located just south of the localized permafrost zone (Lockery 1984). The surficial geology can be described as very calcareous, stony (cobble or gravel), water-worked glacial till that is deep to shallow (20-30 m) over limestone bedrock (Smith et al. 1998).

Soils throughout the broader area in which the Project is situated are heavily influenced by the surrounding geology. Review of available geographic information on the distribution of soils throughout Manitoba (Government of Canada 2013a) shows that the area traversed by the Project is dominated by organic, typic mesisol (Baynham series) and terric mesisol (Grindstone series) soils (Map 4-3). The Grindstone soil series is very poorly drained and sits atop morainal till (Government of Canada 2013b) whereas the Baynham soil series, although also very poorly drained, sits atop other undifferentiated organic soil types (Government of Canada 2013c). Both soil series have such poor drainage that the water table is constantly present within the soils (Government of Canada 2013b; 2013c)



Map 4-2. Regional Bedrock Geology



Map 4-3. Dominant Soil Series in the Vicinity of the Project

Soil surveys were conducted for MI in 2015 along the Project alignment. Results of the test pitting activities revealed that in addition to peat and organic matter, subsurface soils along the route generally consist of clay (high/low pacticity), sandy/gravelly silts, and in some cases fine sands. The results of MI's soil survey investigations can be found in Appendix E.

4.2.4 Groundwater

Surficial soils throughout the area consist mainly of organic layers, glacial till as well as sand and gravel deposits. The availability and quality of groundwater is dependent upon the presence of shallow aquifers, which are generally sand or sand and gravel lenses (Rutulis 1973). The depth to these aquifers may range from less than 6 m where the sand and gravel deposits are at ground surface, to more than 60 m in low-lying areas where thick clay beds cover the aquifer (Rutulis 1973). Water quality in the sand and gravel aquifers range from fair to excellent (Betcher et al. 1995; Rutulis 1973). Areas where the sand and gravel deposits are at or close to the surface are areas of probable or existing groundwater sources which may be susceptible to contamination from surface activities (Rutulis 1973). Flowing artesian well conditions are somewhat common in the vicinity of Lake St. Martin (KGS Group 2016). Flowing artesian well conditions also occur in the Dauphin River area and are consistent with the 2011 and 2015 field investigation results where artesian flow conditions were encountered up to 1 m above ground surface (KGS Group 2016).

KGS Group (2016) reported that the regional groundwater flow is easterly towards Lake Winnipeg, as well as westerly toward Lake Manitoba and Lake St. Martin (and Lake Winnipegosis). Discharge from the aquifer occurs as seepage and flows into streams, marshes, and lakes found throughout the Interlake. KGS Group (2016) also reported that sparse data available in the northeast, near Dauphin River, show regional piezometric levels in the order of El 220 m to El 230 m (721 ft to 755 ft).

Well yields are highly variable in the region, which is a direct result of fractured condition of underlying bedrock. Water yields are dependent on the number of fractures intersected by the aperture size, extent, and interconnection to other fractures (KGS Group 2016). East of Lake Manitoba, the water quality is generally fresh, with Total Dissolved Solids (TDS) <1,000 mg/L, and water quality generally of the Mg-Ca-HCO_3 type, with TDS in the order of 400 mg/L to 650 mg/L (KGS Group 2016). KGS Group (2016) noted that this water quality is reflective of the effects of the meteor impact described in Section 4.2.3 and aquifer recharge zone noted within the Interlake area. Due to more complex geology and evaporate mineralogy in the Gypsumville area, water quality varies and is locally poorer with TDS concentrations up to 4,550 mg/L (Betcher 1987).

Review of available information on registered groundwater wells revealed the presence of two wells near the existing EOC. The closest is located approximately 20 m from the Project centerline and was drilled in 2011; the other is located approximately 3 km from the Project centerline and was drilled in

1967. A third registered groundwater well was identified near the terminus of the Idylwild Road. This well was also drilled in 2011 and is located approximately 300 m southwest of the Project.

4.2.5 Surface Water

Surface waters within the PAA are primarily limited to those associated with low lying wetland, fen and bog habitats. Bogs are organic peatlands that are stagnant, non-flowing systems and receive water only through precipitation. They have a thick sphagnum moss layer and have a low diversity of plants due to the low nutrient availability. Fens are peatlands that receive water from a combination of precipitation, surface runoff and groundwater. Fens have a complex hydrology and can transport large volumes of water and nutrients across the landscape, often connecting wetland systems over large distances. Fens are more nutrient-rich than bogs and have greater plant diversity (Ducks Unlimited 2014). The northern portion of the Project also skirts Lake St. Martin itself, which supports marshes along it its periphery. Marshes often serve as a transition between open water and shoreline and can be heavily influenced by stream inflow and fluctuate seasonally.

4.2.6 Water Quality

AAE Tech Services (2016) conducted an initial site inspection was completed on October 6, 2015 to assess the Project alignment prior to field investigations. Additionally, an aerial survey was performed on October 9, 2015 to observe the extent of the roadway enhancements and to delineate the sampling efforts prior to the initiation of fieldwork. Crossings were identified during the aerial survey of the roadway by use of the following criteria:

- Whether a culvert was present at or near the potential crossing site;
- Whether a defined or partially defined watercourse or creek bed was identifiable within the landscape surrounding the crossing site; and
- Whether apparent or potential connectivity existed between the water crossing the road and the surrounding creek systems.

The aforementioned criteria, and aerial inspections identified three creek crossings (Table 4-7) (AAE Tech Services Inc. 2016); however, all were located further south along the Idylwild Road, ie., none were located within the PAA.

Table 4-7. Creek Crossing Site Locations Sampled in 2015

Site	Location
1	51.392390° -98.145460°
2	51.404130° -98.140520°
3	51.673674° -98.183877°

Water quality samples were obtained from the three true creek crossing sites along the Idylwild Road as well from Mantagao Lake (AAE Tech Services Inc. 2016; Tables 4-8 and 4-9; Map 4-4). The three creek crossing sites were located along the existing Idylwild Road. No creek crossings were identified along the proposed Project alignment (AAE Tech Services Inc. 2016).

Table 4-8. Water Quality Measurements Taken at Creek Crossing along Project Sites

Site[1]	Water Temperature (°C)		Turbidity (NTU)[2]		Water Velocity (m/s) [3]		Conductivity (µS)	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
1	6.5	11	3.01	1.08	0	0	212	201
2	7	10	0.63	1.14	0.18-0.28[b]	0	210	207
3	7	12.8	2.29	0.91	0	0	231	225
Mantagao Lake	-	24	-	1.7-3.8[a]	-	-	-	388

[1] Site locations are provided in Table 4-7 and illustrated in Map 4-4

[2] Turbidity was measured near shore (high turbidity) and off shore (low turbidity)

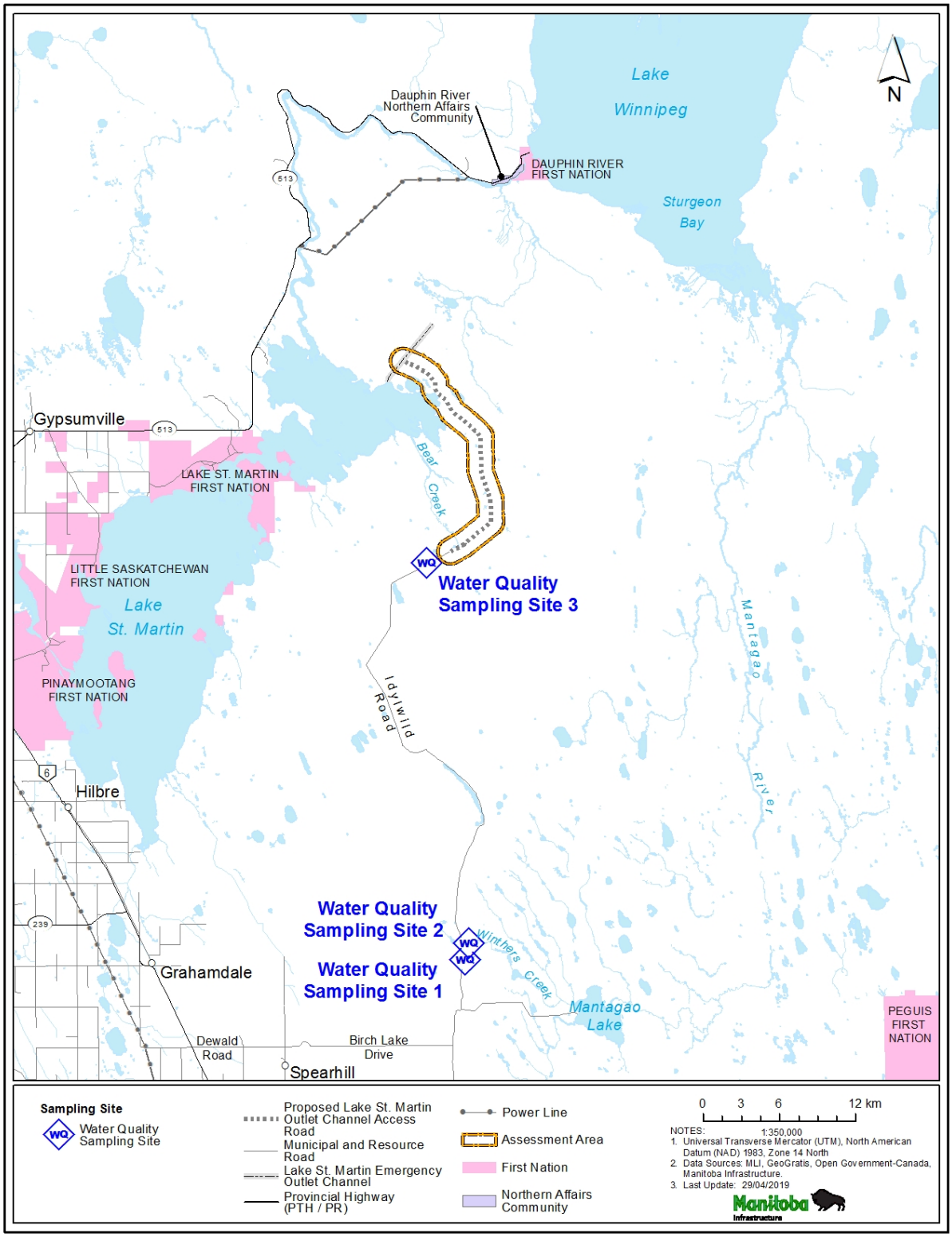
[3] Water velocity was measured before and after cleaning out of a culvert

Table 4-9. DO and pH Measurements at Water Quality Sampling Sites

Site[1]	Dissolved Oxygen (mg/L)		pH	
	Fall	Spring	Fall	Spring
1	9.18	8.88	6.31	6.12
2	9.31	8.94	6.33	6.09
3	9.77	9.10	6.65	6.51
Mantagao Lake	-	8.79	-	8.82

[1] Site locations are provided in Table 4-7 and illustrated in Map 4-4

Results of the measured water quality parameters were within the Manitoba Tier II Water Quality Objectives and Tier III Water Quality Guidelines, with the exception of pH (Manitoba Water Stewardship 2011). The Tier III Water Quality Guideline for Surface Water for the Protection of Freshwater Aquatic Life for pH is 6.5 to 9.0 (Manitoba Water Stewardship 2011). The pH measurements at Sites 1 and 2 were found to be beyond the Tier III Water Quality Guideline, with results ranging from 6.09 to 6.33. The pH measurements for Site 3 were found to be within the Tier III Water Quality Guidelines.



Map 4-4. Water Quality Sampling Sites in Proximity to the Project

The pH of natural waters is influenced by the geology, soils and vegetation that the water flows over, through or around. The lower pH level in Winthers Creek could be a result of lower alkalinity that occurs in the absence of carbonate sources such as limestone or dolomite; it could also reflect the presence of peat or Sphagnum moss, as water in peat bogs typically have a pH range of 3.3-5.5, and transitional bog waters have a pH in the range of 4.5 to 6.0 (Upper Thames River Conservation Authority 2016).

4.3 AQUATIC ENVIRONMENT

4.3.1 Fish and Fish Habitat

Studies to identify fish and fish habitat associated with the proposed Project consisted of a combination of desktop review and fieldwork. A desktop study was completed prior to the start of fieldwork to determine those fish species likely to inhabit potential crossings along the Project alignment. Fish distribution maps published by Stewart and Watkinson (2007), were used to generate a list of fish species potentially inhabiting the broader study area. Of the forty potential fish species identified in the desktop review as being likely to occur in the Project region, only 11 have the potential to occupy the habitats in the regional area(Table 4-10).

Table 4-10. Fish Species Potentially Found in the Regional Area

Common Name	Species	Family	SARA Status	COSEWIC Status
Golden Shiner	*Notemigonus crysoleucas*	Cyprinidae	Not Listed	Not Listed
Emerald Shiner	*Notropis atherinoides*	Cyprinidae	Not Listed	Not Listed
Blacknose Shiner	*Notropis heterolepis*	Cyprinidae	Not Listed	Not Listed
Northern Redbelly Dace	*Phoxinus eos*	Cyprinidae	Not Listed	Not Listed
Finescale Dace	*Phoxinus neogaeus*	Cyprinidae	Not Listed	Not Listed
Fathead Minnow	*Pimephales promelas*	Cyprinidae	Not Listed	Not Listed
Northern Pike	*Esox lucius*	Esocidae	Not Listed	Not Listed
Central Mudminnow	*Umbra limi*	Umbridae	Not Listed	Not Listed
Brook Stickleback	*Culaea inconstans*	Gasterosteidae	Not Listed	Not Listed
Yellow Perch	*Perca flavescens*	Percidae	Not Listed	Not Listed
Walleye	*Sander vitreus*	Percidae	Not Listed	Not Listed

Source: adapted from AAE Tech Services Inc. (2016)

Initial site inspections were conducted to identify potential creek crossings, but none were identified within the PAA (Section 4.2.6). Further field study findings did not identify potential fish bearing crossings along the proposed Project alignment (AAE Tech Services Inc. 2016). Although equalization culverts will be installed at key locations along the Project alignment (Table 2-6), these have no direct connectivity to other watercourses.

Equalization culverts are being designed to allow for the passage of surface drainage, manage wetland water levels and/or to prevent structural degradation or washout of the roadway.

4.3.2 Species at Risk

As there were no fish bearing waters crossed by the LSM Access Road alignment, there are not expected to be any aquatic species at risk, species of conservation concern (S1 or S2 species listed under the Manitoba Conservation Data Centre, or MCDC), or any unique or sensitive habitat.

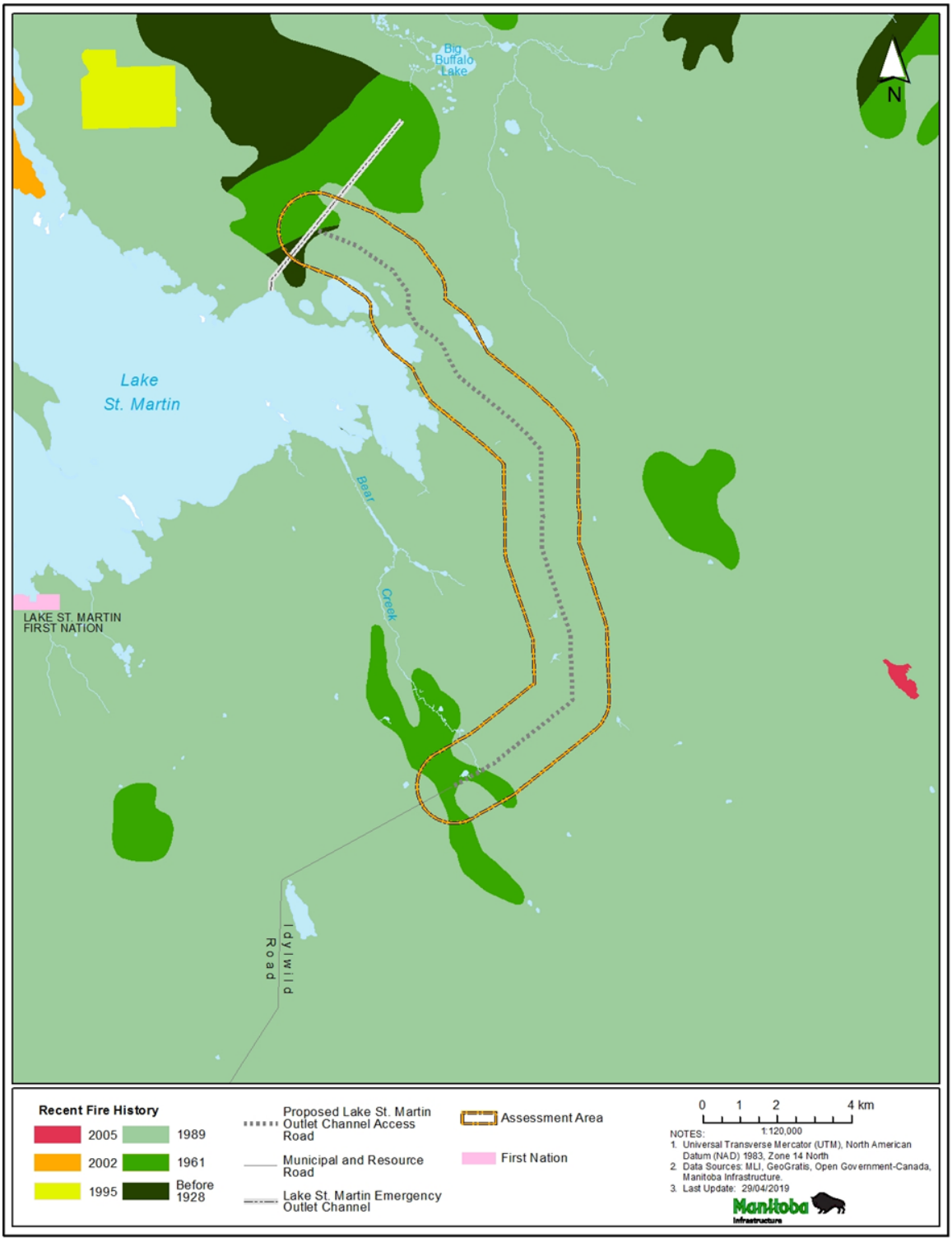
4.4 TERRESTRIAL ENVIRONMENT

4.4.1 Vegetation

Forest stand vegetation is dominated by trembling aspen (*Populus tremuloides*) in the ridge areas, but often associated with balsam poplar (*Populus balsamifera*) and white spruce (*Picea glauca*) whose distribution is much affected by forest fires (Smith et al. 1998). Map 4-5 illustrates the distribution and size of forest fires that have occurred in the region encompassing the Project. Willow (*Salix* spp.), sedge (e.g. *Carex* spp.), and meadow grass (e.g. *Poa* spp.) occur in the poorly-drained depressions.

Black spruce (*Picea mariana*) tends to dominate forest stands and can be associated with the presence of extensive bogs/fens (peatlands) and poorly-drained mineral soils (transitional areas) (Smith et al. 1998). Other dominant vegetation types also include mosses (e.g. Sphagnum.), ericaceous shrubs, swamp birch (*Betula pumila*), sedge, willow, and tamarack (*Larix laricina*).

To determine the existing baseline vegetation and habitat types along the Project alignment, qualitative vegetation surveys were conducted in spring (June 7, 2016 to June 10, 2016) and summer (August 3, 2016 to August 5, 2016) to capture species with different emergence periods. Sampling methods involved recording all species identified within specific survey plots and was deemed to be the most effective way to capture the species composition and distribution within the study area. Sample sites were pre-selected and stratified based on habitat-type encountered along the proposed Project alignment. Using Land Cover Classification (LCC) data, Ducks Unlimited wetland classification system, and information gathered during an aerial survey of the area in 2015. A handheld Garmin Oregon 450 GPS pre-loaded with the tracks of the Project alignment were used to navigate to the survey locations. Because wetland habitats pose a constraint to ground access, the sample sites were accessed by helicopter. Table 4-11 provides a summary of habitats encountered during the Project vegetation surveys.



Map 4-5. Historical Distribution of Forest Fires in the Project Region

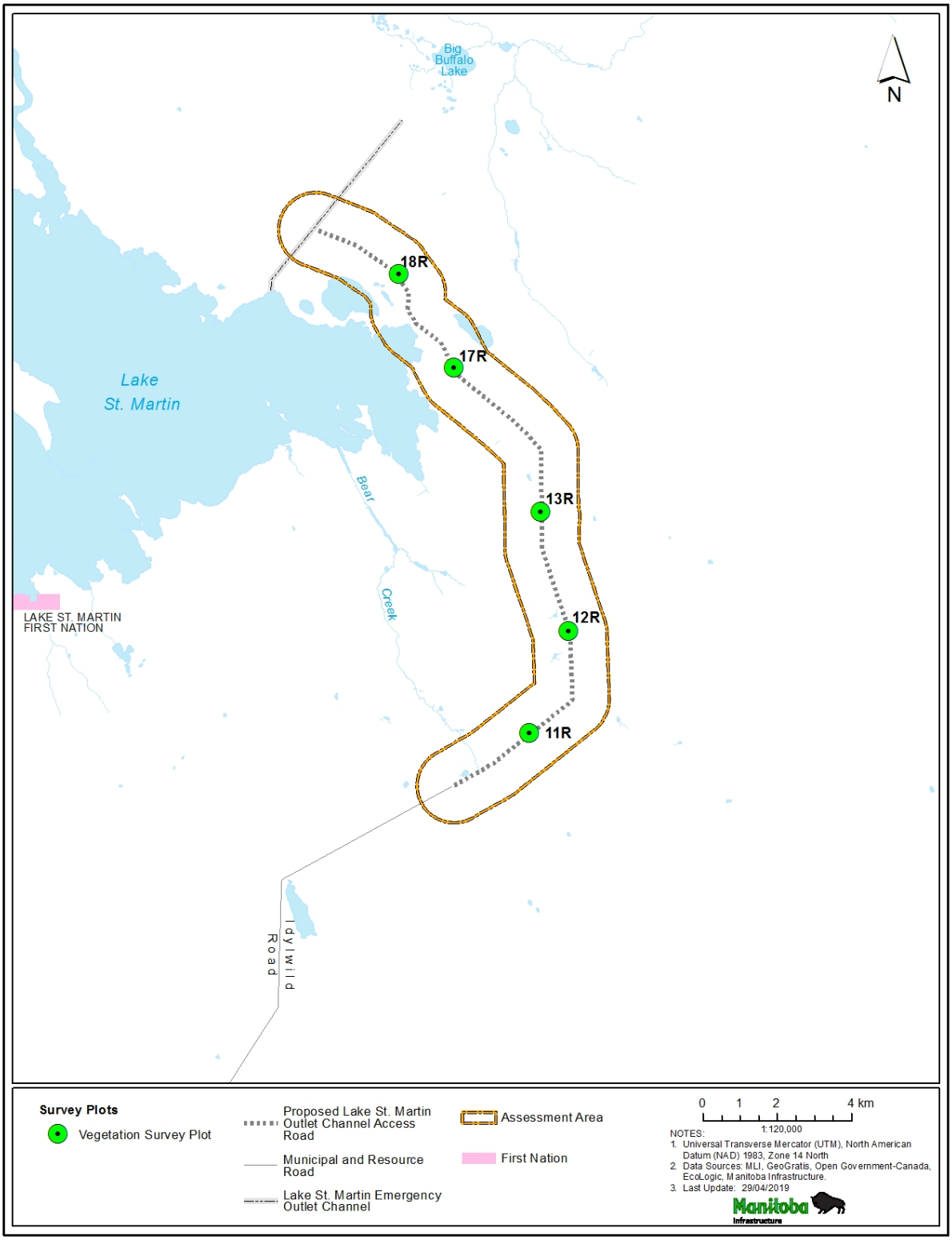
Table 4-11. Summary of Habitats Encountered Along Project Alignment during Vegetation Surveys

Plot	LCC Data	Habitat Type (FEC V-Type)	Wetland Classification (DU system)
Plot 11	Wetland Shrub (82)/Coniferous Dense (211)	Wetland	Shrubby Poor Fen
Plot 12	Wetland Shrub (82)/Coniferous Dense (211)	Black Spruce / Labrador Tea / Feather Moss (Sphagnum) (V30)	Shrubby Bog/Treed Bog
Plot 13	Wetland Herb (83)	Black Spruce / Labrador Tea / Feather Moss (Sphagnum) (V30)	Shrubby Bog
Plot 17	Wetland Shrub (82)	Trembling Aspen Mixedwood/ Tall Shrub (V8)	N/A
Plot 18	Coniferous Dense (211)	Trembling Aspen Mixedwood/ Tall Shrub (V8)/Wetland	N/A

Source: adapted from SG Environmental Services Inc. (2016)

A total of 5 sample plots with different habitat types were selected along the Project alignment and each site was surveyed during both the spring and summer. As described in SG Environmental Services Inc. (2016), each plot was comprised of two 100 m transects placed perpendicular on either side of the centerline of the Project alignment. Transects were walked and all vascular plants and mosses observed (within a 5 m visual radius) were recorded and identified to species. Immature plants or plants missing structures (e.g., fruiting bodies, etc.) that could not be identified to species were identified to genus or family. Map 4-6 shows the location of the sample plots. Summary results of the vegetation survey plots along the proposed Project alignment can be found in Appendix F.

Review of the survey results did not reveal the presence of any vegetation species protected under Manitoba's Endangered Species and Ecosystems Act (ESEA), or Canada's Species at Risk Act (SARA) (SG Environmental Services Inc. 2016). One observation of Canada thistle (*Cirsium arense*) was noted near the terminus (plot 18) of the proposed LSM Access Road alignment. Canada thistle is considered as moderate invasive species by Environment Canada (1999). Minor and moderate invasive species such as Canada thistle can often be found in roadside ditches and other disturbed areas. Invasive species vary in aggressiveness and are well adapted to a variety of habitats.



Map 4-6. Vegetation Survey Plot Locations

4.4.2 Wildlife

The proposed Project is located within the Mid-Boreal Lowland and Interlake Plains Ecoregions (Smith et al. 1998). Both ecoregions cover relatively broad areas which include a variety of habitat types that support a broad range of species. Appendix G includes a listing of mammals, birds, reptiles and amphibians known to occur in the Mid-Boreal Lowland and Interlake Plains Ecoregions.

Wildlife studies were conducted to further define exiting environmental conditions related to the Project, and included a combination of desktop reviews and field studies. Desktop reviews included the compilation of historical and current wildlife (mammalian, avian, reptile, and amphibian) distribution data obtained from Manitoba Sustainable Development (MSD), the Manitoba Herps Atlas, Important Bird Area (IBA) databases, and the Manitoba Breeding Bird Atlas (MBBA).

Wildlife field studies were conducted within an area designated as the total length of the proposed road alignment with a width of 5 km to either side of the centerline for a 10 km total width (Wildlife Study Area) (Ecologic Environmental Inc. 2016). The following sub-sections provide summary results of the desktop review and field study findings relating to mammals, reptiles and amphibians, birds, protected species, and environmentally sensitive sites. Field study components employed to collect data were as follows:

- Aerial moose (*Alces americanus*), elk (*Cervus elaphus manitobensis*), and white-tailed deer (*Odocoileus virginianus*) survey;
- Aerial multispecies survey;
- Avian Point Count survey;
- Incidental bird nest (egg) searches;
- Raptor nest and heron rookery survey;
- Amphibian Point Count survey;
- Reptile Hibernacula survey;
- Bat Hibernacula survey; and
- Ecologically Sensitive Site investigations (mammal dens, mineral licks etc.).

4.4.2.1 Reptiles and Amphibians

The only amphibian identified during the wildlife field studies was the wood frog (*Lithobates sylvaticus*) (Ecologic Environmental Inc. 2016), but other species are expected to occur in the area (Appendix G). Wood frogs occur in various forest types, marshes and even grasslands. They don't require permanent waterbodies and can be found almost anywhere. As such, wood frogs are considered a common species that is considered widespread and abundant throughout Manitoba (S5) (Nature North 2014).

A single red-sided garter snake (*Thamnophis sirtalis*) observation was documented within the region (Ecologic Environmental Inc. 2016), but none were observed in the PAA. Similarly, two potential snake hibernacula sites were identified, but were also located well outside the PAA boundary.

4.4.2.2 Birds

Wildlife field studies revealed a large number of bird species as being present throughout the PAA. Table 4-12 provides a summary listing of bird species identified within the wildlife study area that extends beyond the PAA. Of the 39 bird species identified only the trumpeter swan (*Cygnus buccinator*) (Photograph 4-2) and Eastern wood-pewee (*Contopus virens*) were noted as having legal protection under MESEA (2015) and SARA (2018a) and are discussed further in Section 4.4.3.2.

Photograph 4-2. Aerial Photograph of Trumpeter Swans Taken Outside the PAA

Located near, but not within the PAA, the Lake St. Martin Islands have been designated (Global IBA Criteria A4, see Birdlife International 2018) as an Important Bird Area. IBA's are designated because they are known or suspected to hold congregations of more than 1% of the global population of one or more species on a regular or predictable basis.

Table 4-12. Bird Species Identified within 10 Km of Project Alignment

Species			Status		Regulatory Protection	
Common Name	**Scientific Name**	**Observed**	**Provincial (S)**	**Global (G)**	**MESEA**	**SARA**
Alder flycatcher	*Empidonax alnorum*	visual	S5B	G5	-	-
American robin	*Turdus migratorius*	visual/ auditory	S5B	G5	-	-
Bald eagle	*Haliaeetus leucocephalus*	visual	S5B/SUN	G5	-	-
Black-capped chickadee	*Poecile atricapillus*	auditory	S5	G5	-	-
Great blue heron	*Ardea herodias*	visual	S5B	G5	-	-
Blue jay	*Cyanocitta cristata*	visual/ auditory	S5B	G5	-	-
Blue winged teal	*Anas discors*	visual/ auditory	S4B	G5	-	-
Canada goose	*Branta canadensis*	visual	S5B	G5	-	-
Caspian tern	*Sterna caspia*	visual	S3B	G5	-	-
Cedar waxwing	*Bombycilla cedrorum*	visual/ auditory	S5B/SUN	G5	-	-
Clay-colored sparrow	*Spizella pallida*	visual/ auditory	S5B	G5	-	-
Common merganser	*Mergus merganser*	visual	S5B	G5	-	-
Common raven	*Corvus corax*	visual/ auditory	S5B	G5	-	-
Common sandpiper	*Actitis hypoleucos*	visual/ auditory	-	G5	-	-
Common tern	*Sterna hirundo*	visual/ auditory	S5B	G5	-	-
Common yellowthroat	*Geothlypis trichas*	visual/ auditory	S5B	G5	-	-
Eastern wood-pewee	*Contopus virens*	auditory	S4B	G5	-	– Special Concern
Franklin's gull	*Leucophaeus pipixcan*	visual/ auditory	S4B	G5	-	-
Green-winged teal	*Anas carolinensis*	visual	S4B	G5	-	-
Hawk	*Unknown Species*	visual	-	-	-	-

Species			Status		Regulatory Protection	
Common Name	**Scientific Name**	**Observed**	**Provincial (S)**	**Global (G)**	**MESEA**	**SARA**
Killdeer	*Charadrius vociferus*	visual/ auditory	S5B	G5	-	-
Least flycatcher	*Empidonax minimus*	visual/ auditory	S5B	G5	-	-
Lesser scaup	*Aythya affinis*	visual	S5B	G5	-	-
Mallard	*Anas platyrhynchos*	visual	S5B	G5	-	-
Marsh wren	*Cistothorus palustris*	visual/ auditory	S5B	G5	-	-
Ovenbird	*Seiurus aurocapilla*	visual/ auditory	S5B	G5	-	-
Red-eyed vireo	*Vireo olivaceus*	visual/ auditory	S5B	G5	-	-
Red-winged blackbird	*Agelaius phoeniceus*	visual/ auditory	S5B	G5	-	-
Rough legged hawk	*Buteo lagopus*	auditory	S3B/SUM	G5	-	-
Sora	*Porzana carolina*	auditory	S5B	G5	-	-
Swainson's hawk	*Buteo swainsoni*	visual	S4B	G5	-	-
Swamp sparrow	*Melospiza georgiana*	visual/ auditory	S5B	G5	-	-
Tree swallow	*Tachycineta bicolor*	visual	S4B	G5	-	-
Trumpeter swan	*Cygnus buccinator*	visual	S1B	G4	Endangered	-
Veery	*Catharus fuscescens*	visual/ auditory	S5B	G5	-	-
Vesper sparrow	*Pooecetes gramineus*	auditory	S5B	G5	-	-
White throated sparrow	*Zonotrichia albicollis*	auditory	S5B	G5	-	-
Wilson's snipe	*Gallinago delicata*	visual/ auditory	S5B	G5	-	-
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	visual	S4B	G5	-	-

4.4.2.3 Mammals

Twelve (12) mammal species were identified during wildlife field studies (Table 4-13). They were identified and documented through visual observations, vocalizations, or other sign (e.g. moose, *Alces americanus*) during aerial and/or ground surveys. Mammalian species occurring in the region are typical of the Boreal Plains Ecoregion (Smith et al. 1998). One the most recognizable species in the area are moose. Although known as being common or widely distributed across boreal regions, moose populations in GHA 21 have been in decline. GHA 21 is now closed to licenced moose hunting. Similarly, aerial surveys conducted by Ecologic Environmental Inc. in 2016 only identified 14 moose within the much broader Wildlife Study Area (Photograph 4-3). At least 10 furbearer species also occur in the region (Table 4-13).

Table 4-13. Summary of Mammal Species Observed During Wildlife Field Studies

Common	Scientific Name
American Beaver	*Castor canadensis*
Snowshoe Hare	*Lepus americanus*
Marten	*Martes americana*
Otter	*Lontra canadensis*
Coyote	*Canis latrans*
Lynx	*Lynx canadensis*
Black Bear	*Ursus americanus*
Fox	*Unknown species*
Muskrat	*Ondatra zibethicus*
Wolf	*Canis lupis*
Moose	*Alces americanus*
Deer	*Odocoileus virginianus*

Source: adapted from Ecologic Environmental Inc. (2016)

Photograph 4-3. Moose observed during Aerial Survey outside PAA

Many of the identified bat hibernacula in Manitoba are located within the Interlake and Gypsumville areas (McRitchie and Monson 2000). Bat recorders were deployed to document species present in the area. In all, recorders documented a total of 5 bat species: the silver-haired bat (*Lasionycteris noctivagans*), the hoary bat (*Lasiurus cinerus*), the big brown bat (*Eptesicus fuscus*), the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*) (Ecologic Environmental Inc. 2017).

4.4.3 Species at Risk

4.4.3.1 Plants

No plant species listed by the Manitoba Endangered Species and Ecosystem Act, the Species at Risk Act, or the Committee on the Status of Endangered Wildlife in Canada were observed in the PAA or surrounding region during fieldwork. There are no known plant species at risk, species of conservation concern, or any unique or sensitive plant habitats in the PAA. Based on records from the MBCDC, three species of conservation concern are known to occur within about 10 km of the proposed LSM Access Road alignment. These include ram's-head lady's-slipper (*Cypripedium arietinum*, S2S3), long-fruited parsley (*Lomatium macrocarpum*, S3), and hairy-fruited parsley (*Lomatium foeniculaceum*, S3). Other

data sources (KGS 2013) identified two further species of conservation concern in the assessment area, green adder's mouth orchid (*Malaxis unifolia*, S2) and eelgrass (*Zostera marina*, S2). During fieldwork in 2016, the Dragon's mouth orchid (*Arethusa bulbosa*, S2) was observed outside the PAA (Photograph 4-4).

Photograph 4-4. Photograph of Dragon's Mouth Orchid Observed Outside the PAA

Alvars are uncommon habitats globally and are communities that are protected under the Manitoba Endangered Species and Ecosystem Act (MESEA 2019). Alvars are characterized by the presence of a thin or absent layer of soil overlying limestone or dolomite bedrock pavement (Reschke *et al*. 1999, Catling & Brownell 1995).No locations identified as Alvar communities from the study were found to be located in the Project region (Manitoba Alvar Initiative. 2012) and the potential for alvars to be located in the PAA is considered low to none (M. Forester et. al. 2016)).

4.4.3.2 Wildlife

Wildlife field studies identified two protected bird species, trumpeter swan and the Eastern wood peewee as well as two bat species, the little brown bat and northern long-eared bat in close proximity to the PAA (Ecologic Environmental Inc. 2016).

Trumpeter swans are a migratory water bird. They are not listed under SARA but are identified as being very rare in Manitoba (S1B) (MCDC 2018) and as Endangered under The Endangered Species and Ecosystem Act (Manitoba) (MESEA 2019). Despite its rarity, a number of sightings have occurred in Manitoba in recent years (MBBA 2015). All of the trumpeter swans now breeding in Manitoba are likely the offspring of birds from captive release programs in the northern U.S.A and Ontario (MBBA 2018a).

The trumpeter swan prefers nesting in shallow wetlands with stable water levels, abundant and elevated nest sites, abundant and diverse aquatic invertebrates and/or plants, and low levels of human disturbance. Preferred breeding sites for the trumpeter swan can also include small ponds (including beaver and farm ponds), lakes, marshes, bogs, glacial potholes, and quiet stretches of river. According to the Cornell lab of Ornithology (2018a), trumpeter swans are also extremely sensitive to human disturbance at their breeding sites and will abandon nests and cygnets if disturbed. Within central Manitoba where the Project is situated breeding dates for the trumpeter swan can occur between April 1st and September 1st (MBBA 2018a).

The trumpeter swan observation occurred in 2015 along the Idylwild Road (existing resource road) approximately 750 m south from the Project Assessment Area. Recognizing that the potential for trumpeter swan may exist within the region, and possibly the Project Assessment Area, habitat modeling for the species was conducted on behalf of MI along the Project alignment. A model was used to estimate the cumulative total of breeding and other habitat types (foraging, staging, loafing etc.; Ecologic Environmental Inc. 2016); the 0.54 ha of potential swan habitat within and adjacent to the Project footprint (i.e., within 30 m of the alignment) represents 0.22% of the total of 247.5 hectares (ha) of trumpeter swan habitat present in the Project Assessment Area and 0.013% of the total PAA. There was one observation of a trumpeter swan in 2016 and no evidence of suitable nesting habitat. For trumpeter swans, MCDC (2015) recommends a 1000 m (1km) setback distance to nest sites in order to offset impacts to the species stemming from high disturbance activities such as road construction.

The Eastern wood-pewee is a migratory songbird which is considered common in Manitoba (S4B) (MCDC 2018), but is listed under SARA as Special Concern under Schedule 1 (SARA 2018a). SARA species with a Schedule 1 Special concern designation do not receive the full legal protection under the Act but do have requirements for the establishment of management plans and reporting. Review of the SARA public registry revealed that the Eastern wood-pewee has been included as part of 7 multispecies action plans at various locations in Canada. However, no such management plans have been established in

Manitoba for the species. This is likely attributable to the S4 subnational ranking for the species in the Province; S4 ranking indicates that the species is widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but of long-term concern. Although listed under SARA Schedule 1 the Eastern wood-pewee is not of local conservation concern in Manitoba.

Habitat preferences for the Eastern wood-pewee include deciduous forests, aspen stands and edges of fairly open woods. It also occurs in riparian forests, beach ridge forests, and occasionally in well-wooded urban and rural parks, southern boreal transitional forest with a deciduous component, or jack pine (*Pinus banksiana*) and more open boreal forest types (MBBA, 2018b). Within central Manitoba, where the Project is situated, the breeding period for the Eastern wood-pewee spans from May 25th to August 25th of any given year (MBBA 2018c). The MCDC (2015) recommends a 300 m setback distance from known Eastern wood-pewee nest sites in order to protect against disturbance activities such as road construction. The habitat model (Ecologic Environmental Inc. 2016) revealed that 1.66 ha (1.3%) of potential habitat occurs within the Project Footprint of the total of 132.60 ha of potential Eastern wood-pewee habitat in the PAA and 0.039% of the entire PAA; the amount of potential habitat within the Project Footprint.

Of the bat species documented in the area, the little brown bat and northern long-eared bat are both listed as Endangered under SARA (2018a) and MESEA. Both the little brown bat and northern long-eared bat are non-migratory, and hibernate during winter months (McRitchie and Monson 2000). The presence of these species in the fall, prior to hibernation, warranted further investigation to determine whether hibernacula sites were present in the area. In March of 2017, a forward looking infrared (FLIR) survey was flown in an attempt to identify potential bat hibernacula in the area by locating potential subterranean heat sources. Although the FLIR survey identified a number of potential sites, all were ruled out when surveyed on the ground (Ecologic Environmental Inc. 2017).

Provincially, the northern leopard frog (*Lithobates pipiens*) is considered abundant and widespread (S4) (MCDC 2018); however, the western boreal/prairie population is listed as being of special concern under SARA (2018a). The northern leopard frog utilizes a variety of habitat types for different life stages, including breeding, foraging and overwintering. Overwintering sites in particular must be well oxygenated waterbodies which are deep enough so as to not freeze completely (SARA 2015).

Eastern whip-poor-will (*Antrostomus vociferous*) (S3B) is listed as Threatened under SARA and MESEA. Although Critical Habitat for the species has been identified in the area (ECCC 2018), and will be intersected by the proposed LSM Access Road, eastern whip-poor-will were not documented during baseline field studies conducted by Ecologic Environmental (2016).

Environmentally Sensitive Sites

Wildlife field studies revealed two environmentally sensitive sites (ESS) in the general vicinity of the Project. A goose nest and an eagle's nest were identified along the shores of Lake St. Martin. Although a portion of the proposed Project does skirt the northern extent of Lake St. Martin, both of these ESS's are located approximately 3.5 and 4.5 km away from the nearest portion of the Project alignment.

4.5 SOCIO-ECONOMIC ENVIRONMENT

4.5.1 Overview

The following sections describe existing environment in relation to socio-economic, land use and heritage components of the Project. The description focuses on sites in or adjacent to the PAA but also expands to include those communities and infrastructure within a larger region illustrated in Map 4-7. Most land in the PAA is Crown Land with the remaining areas comprised of a mix of private and municipal ownership. In addition to the few communities in the RM of Grahamdale, there are First Nation communities in the region. Infrastructure within the PAA is currently limited to a winter access road that interconnects with the Idylwild Road. Within the larger region illustrated on Map 4-7 includes infrastructure such as roadways (PTHs, PRs, and municipal roads), waste disposal sites, quarries, a railway line and Manitoba Hydro transmission lines. Regional land use activities consist mainly of agriculture, hunting, fishing, snowmobiling and other recreational activities.

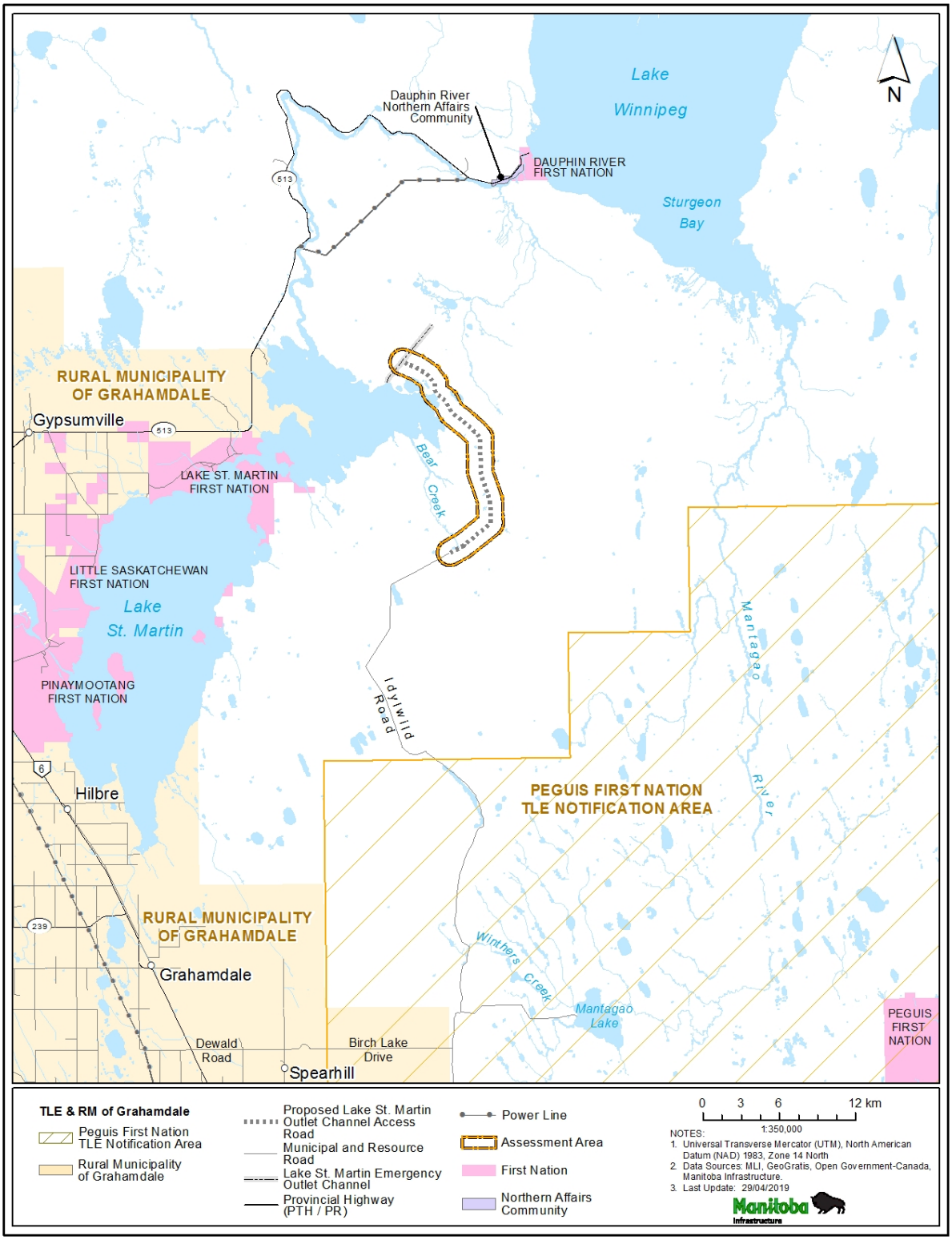
4.5.2 Communities, Municipalities and Population

The proposed Project is located on Crown land within an unincorporated area. The nearest Municipality is the RM of Grahamdale (Map 4-7), located within about 9 km of the LSM Access Road centreline at its closest point. Communities within the RM of Grahamdale include: Mulvihill, Camper, Moosehorn, Spearhill, Grahamdale, Faulkner, Steep Rock, Fairford, St. Martin and Gypsumville. The 2016 census data for the RM of Grahamdale showed a population of 1,359 people in the 2384.62 km^2 area of the RM, a 0.4% change since 2011 (Table 4-14; Statistics Canada 2016, 2017). Population growth in the Province of Manitoba over the same period was 5.8%.

Table 4-14. RM of Grahamdale: Population 2016 and 2011

Population in RM of Grahamdale	Population
Population in 2016	1,359
Population in 2011	1,354
% Change (2011-2016)	0.4%

Source: Statistics Canada. (2017)



Map 4-7. Communities, Municipalities and First Nations in the Project Area

Most of the communities in the RM of Grahamdale and considered within the overall regional map (Map 4-7, i.e., Gypsumville, St. Martin, Hilbre, Grahamdale and Spearhill) are typically small hubs providing local services to the regional population and tourists. Occupations in entire bounds of the RM of Grahamdale (which also encompasses Moosehorn, Fairford, Faulkner, and Steep Rock) include farming, ranching, fishing and operation of the businesses such as gas stations, hotels/motels, grocery stores, building materials stores, agricultural equipment stores, vehicle sales and repairs, credit unions, government and municipal services, restaurants, beach resorts, hunting and fishing outfitters, and campgrounds. The major economic sector in the region continues to be agriculture, which is focused mainly on ranching and feedlots for cattle (RM of Grahamdale 2016).

The closest readily accessible community to the Project is Spearhill (Map 4-7). Limestone was historically quarried from sites near Spearhill, and the Winnipeg Supply and Fuel Company operated a limestone processing plant there from 1969-1972 (Government of Manitoba 2016g).

4.5.3 Land Use

4.5.3.1 Land Use Planning

The RM of Grahamdale Development Plan (By-law No. 936/2005, RM of Grahamdale, 2005a) designates the majority of lands in the RM as “Agriculture Rural Area”. Other designations include “Agriculture Restricted Area”, “General Development Area”, “Recreation Area”, “Rural Residential Area” and “Wildlife Management Area” (WMAs). There are parcels of land designated as “Agricultural Restricted Area” around Moosehorn and Steep Rock, the latter being located along Lake Manitoba. Communities in the RM are designated as “General Development Area”.

Under the RM of Grahamdale Zoning By-Law (No. 937/2005, RM of Grahamdale, 2005b), most of the RM is zoned “Agriculture General Zone”. Communities in the RM are zoned “General Development Zone” with lands zoned “Agriculture Restricted Zone” surrounding them.

4.5.3.2 Land Use

While land in the PAA is Crown-owned, privately-owned and or Crown-lease lands occur in the larger region. Lands in the RMs of Grahamdale (Map 4-7) are predominantly privately-owned while lands outside of the RMs are primarily Crown-owned or leased. Rural farm dwellings occur throughout the RMs as part of agricultural development.

Table 4-15 shows data on occupied private dwellings in the RMs of Grahamdale from 2006 to 2016. The RM of Grahamdale had over a 30% increase in the number of private dwellings between 2006 and 2016. The population density in the RM has remained steady at 0.6 people per km^2.

Table 4-15. Occupied Private Dwellings in the RM of Grahamdale, 2006 to 2016

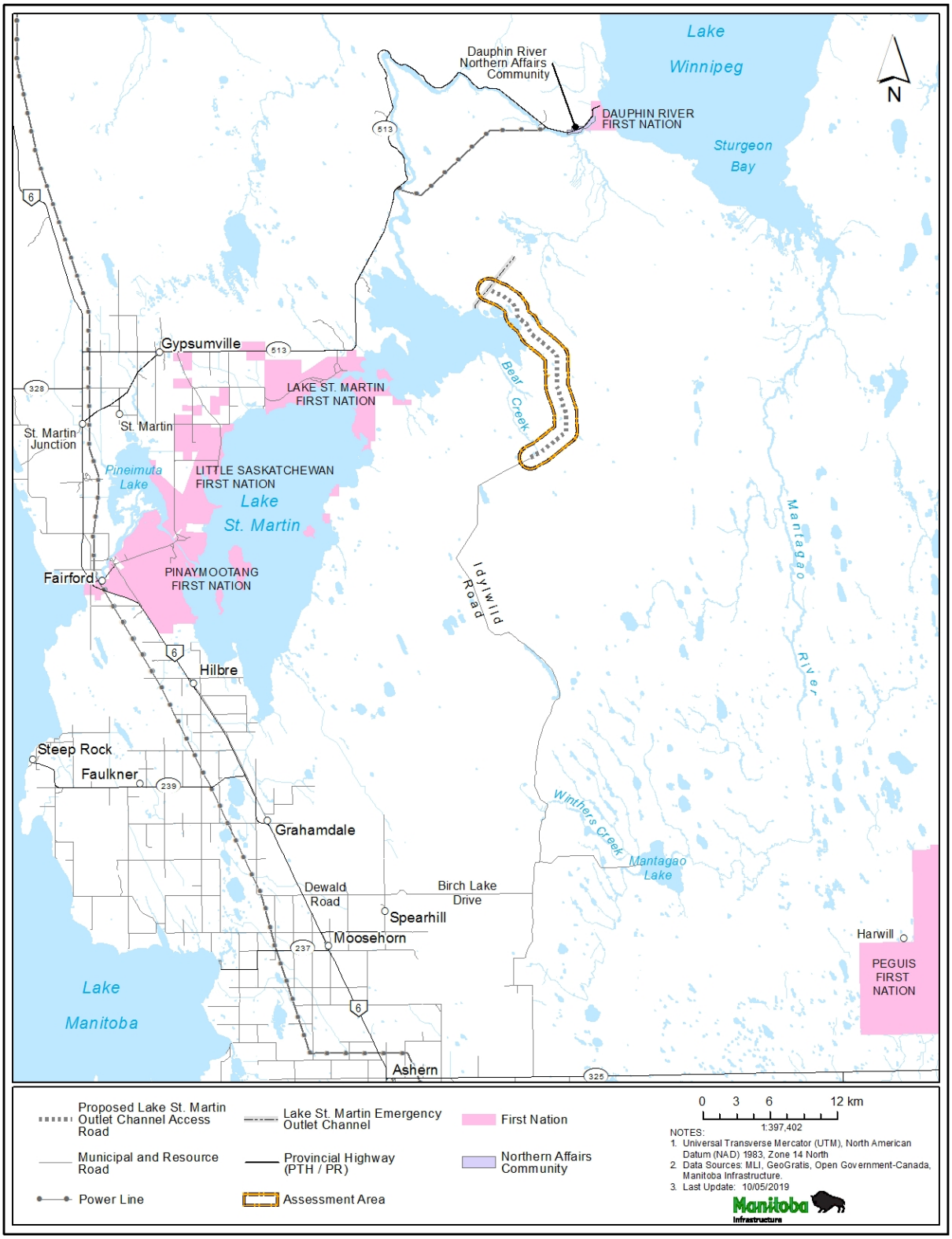
Year	Total Private Dwellings	Average Number of Rooms/Dwelling	Population Density per km^2
2016	1,125	6.4	0.6
2011	891	-	0.6
2006	864	6.1	0.6

Source: Statistics Canada 2007, 2012, 2017.

4.5.3.3 Traffic and Infrastructure

Map 4-8 provides the location of infrastructure and services in the larger region encompassing the PAA. PTH 6 is a major road in the region and one of the main traffic arteries to northern Manitoba. PR 513 is a paved road, well north of the PAA that extends from PTH 6 to Gypsumville and a gravel surface to the community of Dauphin River on the shore of Lake Winnipeg. PTH 6 is located in the western part of the region, with Dewald Road extending easterly to Spearhill and Birch Lake Drive continuing to Idylwild Road that extends through the Mantagao Lake WMA northward to it's terminus at the proposed LSM Access Road. This comprises a network of municipal roads, an existing forestry road and the winter road sections to access the emergency outlet channel (M. Forster et. al. 2016).

Table 4-16 outlines Annual Average Daily Traffic (AADT) counts and Average Summer Daily Traffic (ASDT) counts for PTH 6 and PRs in the region. AADT counts along PTH 6 north bound, south of the south junction of PR 325, were 760 in 2012 and 870 in 2017. This compares to 760 counts south bound in 2010 and 860 in 2017. AADT counts along PR 237 west of PTH 6 ranges from 220 in 2010 to 115 in 1015. East of PTH 6 along PR 237, AADT counts were 70 in both 2010 and 2015. West of PTH 6 along PR 239, AADT counts ranged were 310 in 2010 and 400 in 2015. Along PR 513, 3.2 km south of Gypsumville, AADT counts were 320 in 2015.



Map 4-8. Infrastructure in the Lake St. Martin Region

Table 4-16. Average Annual Daily Traffic and Average Summer Daily Traffic Counts for PTH 6 and PRs in the Project Region, 2010-2017

Highway Number	Direction	Location Description[1]	Year	AADT	ASTD%[1]
PTH 6	North Bound	South of south JCT. PR 325	2012	760	115
	North Bound	South of south JCT. PR 325	2013	740	115
	North Bound	South of south JCT. PR 325	2014	770	115
	North Bound	South of south JCT. PR 325	2015	830	118
	North Bound	South of south JCT. PR 325	2016	840	114
	North Bound	South of south JCT. PR 325	2017	870	115
	South Bound	South of south JCT. PR 325	2010	760	115
	South Bound	South of south JCT. PR 325	2011	760	115
	South Bound	South of south JCT. PR 325	2012	750	115
	South Bound	South of south JCT. PR 325	2013	730	115
	South Bound	South of south JCT. PR 325	2014	760	115
	South Bound	South of south JCT. PR 325	2015	820	119
	South Bound	South of south JCT. PR 325	2016	820	115
	South Bound	South of south JCT. PR 325	2017	860	115
PR 237	Combined(C)	0.8 km east of Lake Manitoba	2010	50	109
	C	0.8 km east of Lake Manitoba	2015	30	-
	C	West of PTH 6	2010	220	109
	C	West of PTH 6	2012	170	111
	C	West of PTH 6	2015	115	123
	C	East of PTH 6	2010	70	109
	C	East of PTH 6	2012	50	111
	C	East of PTH 6	2015	70	123
PR 239	C	West of PTH 6	2010	310	127
	C	West of PTH 6	2012	440	131
	C	West of PTH 6	2015	400	125
PR 513	C	3.2 km south of Gypsumville	2010	370	109
	C	3.2 km south of Gypsumville	2012	380	111
	C	3.2 km south of Gypsumville	2015	320	123
	C	3.2 km east of Gypsumville	2010	200	109
	C	3.2 km east of Gypsumville	2015	320	123

[1] ASDT - The average summer daily traffic is the number of vehicles passing a point on an average day during the period May 1 through September 30. The ASDT% is expressed as a percentage of the AADT.

Source: University of Manitoba Traffic Information Group, 2018.

There is one rail line in the region that parallels PTH 6. The 104 km long line segment for the Warren to Steep Rock Junction route was operated by the Canadian National Railway (CNR) but was abandoned in 1997. Several spur lines connected to the route were also abandoned including the spurs to Spearhill and Steep Rock (M. Forster et. al. 2016). There is one active airport in the region which is located at Ashern. The Anama Bay-Dauphin River and Pineimuta airports are no longer active (M. Forester et. al. 2016).

There are four waste disposal grounds located within the larger region that are in operation (RM of Grahamdale 2019, RM of West Interlake 2019). These waste disposal grounds are located in proximity to the communities of Ashern, Faulkner, Moosehorn and Pineimuta. Dauphin River has a waste transfer station. There are no waste disposal grounds in the PAA.

There are seven wastewater treatment lagoons in operation in the region. They are located in proximity to the communities of Ashern, Faulkner, Moosehorn, Pineimuta, Lake St. Martin FN, Little Saskatchewan FN, Pinaymootang FN and Dauphin River First Nation. There are no wastewater treatment plants in the PAA.

Electrical services are provided to communities in the region by Manitoba Hydro. Transmission lines located within the region include a section of the Bipoles I and II High Voltage Direct Current (HVdc) lines that pass through the region in a ROW adjacent to PTH 6, and sections of two 230 kV transmission lines that connect to communities in the region (Map 4-8). There is a transformer station located at Ashern. There are no natural gas, oil, water or other pipelines located in the region.

4.5.4 Parks, Protected Areas, and Areas of Special Interest

Manitoba's Protected Areas Initiative is a government program dedicated to developing and managing land to protect Manitoba's enduring features and biodiversity, in terrestrial, marine and freshwater environments. In Manitoba, protected areas fall under one of several designations and levels of protection including Areas of Special Interest (ASIs), Ecological Reserves, Parks and Park Reserves and WMAs. ASIs are not afforded any legal protection in Manitoba, but do form a preliminary basis for the provincial Protected Areas Initiative whose goal is to establish a network of protected lands that represents the biodiversity in each of Manitoba's 16 ecoregions. WMAs are designated and managed by the Province of Manitoba.

The proposed Project does not transect any Parks, Protected Areas, or Areas of Special Interest (ASIs) (Map 2-1). The closest Park is Sturgeon Bay Provincial Park which is located approximately 16 km to the northeast.

While there are no WMAs within the PAA, the four WMAs in the region include the Grahamdale, Hilbre, Mantagao Lake, and Gypsumville WMAs (Map 2-1). The southern section of the Idylwild Road, a former forestry road, is located within the Mantagao Lake WMA.

The existing Idylwild Road does cross through the Mantagao Lake Wildlife Management Area (WMA). The Mantagao Lake Wildlife Management Area (WMA) includes ridge-and-swale topography, eskers, beach ridges and end moraines (MSD 2018b). The vegetation is varied and includes coniferous forests and lakeshore marshes. Most of the Mantagao Lake WMA burned over in the late 1980s and is in the process of regenerating. The northern red-bellied snake (*Storeria occipitomaculata occipitomaculata*) is abundant here. Moose, elk (*Cervis canadensis*) and white-tailed (*Odocoileus virginianus*) deer are found throughout the area. The Mantagao Lake WMA was the site of a successful elk transplant between 1969 and 1973 (MSD 2018b).

One ASI is located within the general vicinity of the Project (Map 2-1). The Idylwild ASI is located immediately south of the Project. The Idylwild ASI falls within the PAA, but is not transected by the proposed roadway. Within the larger region is the Sturgeon Bay ASI and the Lynx Bay ASI, which are located northeast of the Project and near the Sturgeon Bay Provincial Park. The Gypsum Lake ASI is located northeast of the PAA.

4.5.5 Agriculture

Agriculture does not occur along the LSM Access Road alignment. However, a large portion of the land in the region is designated for agricultural use. There are no Class 1 lands in the region and only about 1% or less of the area is rated as Class 2 or 3. The soils are generally not highly productive due in part to their level of stoniness and/or due to the presence of wetlands or general wetness where soil landscapes are poorly drained. These land and soil characteristics along with the poor drainage and surface water pooling found in several areas has resulted in moderate to severe limitations for production of agricultural crops in the region. As a result, the majority of agricultural activities are related to cattle production, with some areas used for pastures and forage crops where the land is suitable for these practices.

4.5.6 Forestry

The Province of Manitoba manages and regulates forestry activities in Manitoba through the establishment of administrative boundaries. Forest Management Units (FMUs) and Integrated Wood Supply Areas are used to delineate and manage harvestable timber areas and wood supply areas. While the proposed Project is located in the Interlake Forest Management Section and crosses FMU 41 and 45, it is also located within Integrated Wood Supply Area-2 (Map 4-9).

The general area in which the Project occurs is not subject to a Forest Management Licence (FML) Agreement. FML-2 and FML-3 are the only two Forest Management Licence Agreements currently in place within Manitoba.

Forest Management License-2 (FML) was originally established with Repap Manitoba Inc. in 1989 but is now managed by Canadian Kraft Paper Industries Limited and supplies timber to the kraft paper mill in The Pas. FML-3 was established with Louisiana-Pacific Canada Ltd. in 1994 and is currently managed by LP Canada Ltd. and supplies timber to the oriented strand board mill in Minitonas. Neither of the FMLs currently operating within the Province of Manitoba are located in close proximity to the Project.

In addition to the management of forest resources on Crown Land, a number of Provincial forests have also been established under The Forest Act C.C.S.M. c. F150. However, no Provincial forests are located in close proximity to the Project. The closest Provincial Forest to the Project is Moose Creek Provincial Forest located on Lake Winnipeg approximately 68 km to the east.

Review of available geographic information revealed that the general area in which the Project is situated has been subject to a number of forest fires throughout the years. Data indicates that 26 forest fires have occurred between 1933 and 2005. The largest of these occurred in 1961 and 1989 respectively (Map 4-5). The area surrounding Ashern, MB was subject to forest fires in the summer of 2018, but no forest fires have occurred in the immediate area surrounding the Project since 2005.

4.5.7 Mineral and Aggregate Resources

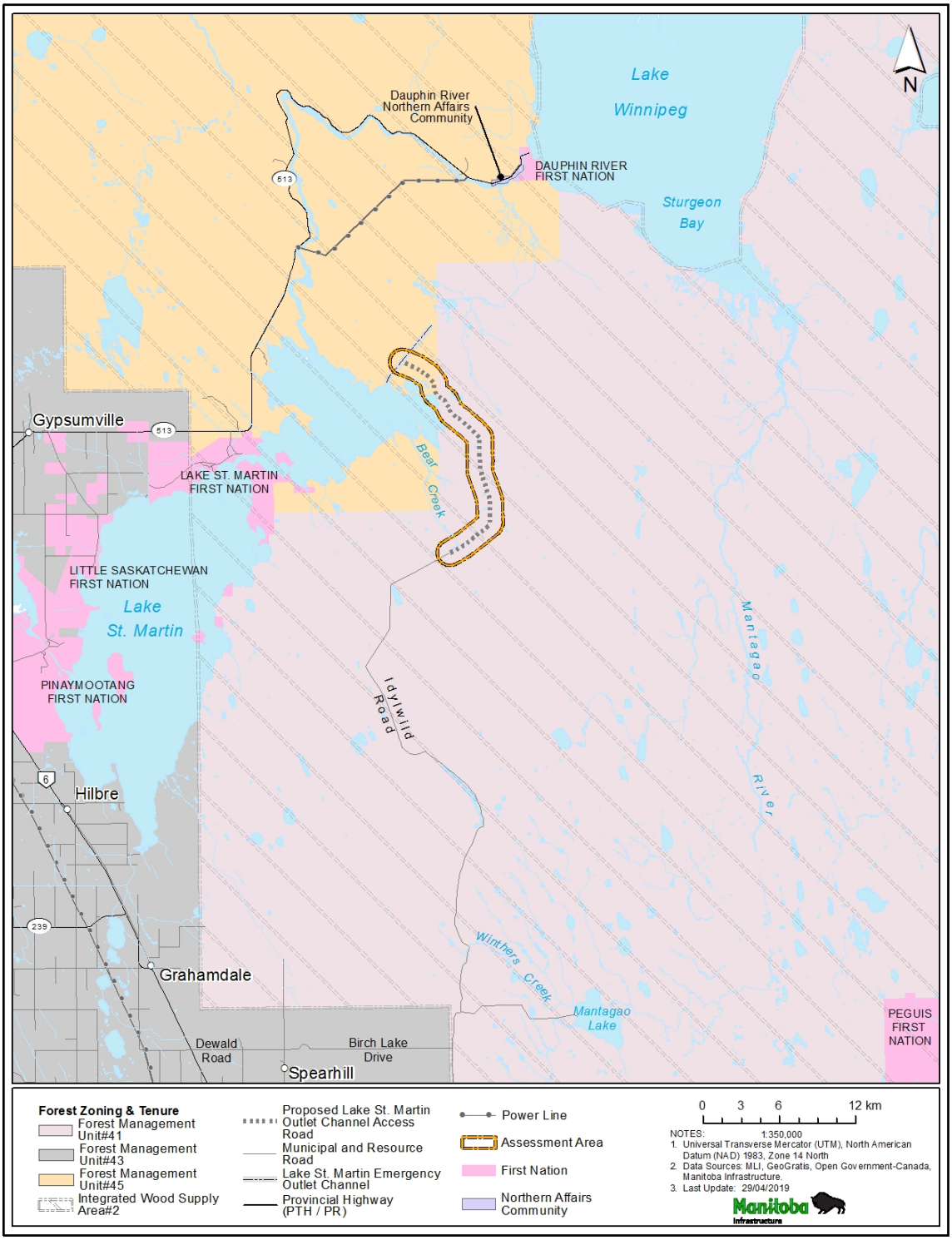
Map 4-10 shows the locations of quarry and mining activity in the PAA and adjacent areas. There are other existing quarrying sites in the region but none in close proximity to the PAA (Map 4-10). Most of the mineral deposits in the region are quarry withdrawal sites and the remainder are quarry lease, private quarry permit, mining claims and casual quarry permits.

4.5.8 Cottages

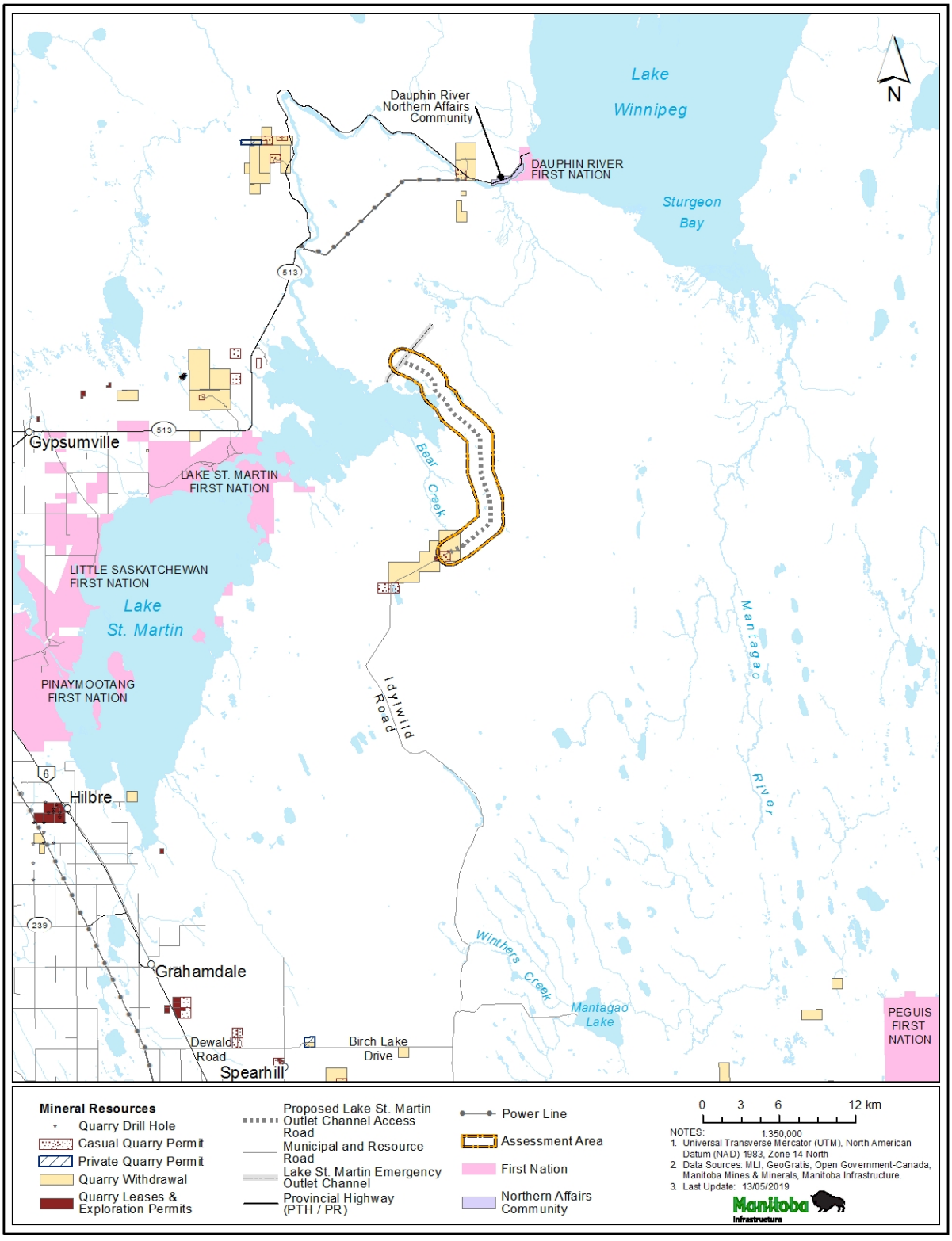
There are no cottages in the PAA or surrounding region. There are cottages developments on eastern shores of Lake Manitoba in the RM of Grahamdale – the largest are in the vicinity of Steep Rock along PR 239 where there are three developments.

4.5.9 Lodges and Outfitters

There are no lodges or outfitters in PAA. The two lodges or outfitters in the region include Einarsson's Guide Service near Dauphin River and Bear Track Outfitters located northeast of Gypsumville.



Map 4-9. Forest Management Units and Integrated Wood Supply Areas in the Project Region



Map 4-10. Quarries and Leases in the Project Region

4.5.10 Hunting

Manitoba Sustainable Development (MSD) is responsible for the allocation and regulation of wildlife resources for recreational purposes. Regulations are reviewed annually, and include the establishment of season dates, bag limits and vehicle restrictions. There is annual review of non-resident big game hunting quotas and area allocations for lodges and outfitters as non-residents of Canada must utilize the services of a lodge or outfitter. MSD also restricts lodge and outfitter big game allocations to specific areas where no conflicts with First Nations or resident hunters exist. All non-Indigenous/licensed hunters must obtain a Province of Manitoba hunting license for the Game Hunting Area (GHA) and species under The Wildlife Act (Manitoba) in order to harvest animals. The current season's bag limits for resident and non-resident hunters have remained relatively constant from year to year.

The proposed Project is located in GHA 21 on the west side of Lake Winnipeg (Map 2-1); GHA 16 is to the northeast and GHA 25 to the southeast. GHAs are defined management units used to regulate hunting in the Province of Manitoba. Harvest numbers, hunting methods and seasons can be managed for individual GHAs based on a number of important factors, including wildlife populations. Moose hunting seasons in GHA 21 and 21A are now closed to licenced hunting.

Moose are important big game animals for hunting within the region. Moose are valued for licensed hunting and rights-based subsistence hunting. Currently, licensed moose hunting is closed in GHA 21 as the population is lower than desired levels (MSD 2018a). Elk are valued for rights-based subsistence harvesting and licenses for recreational hunters can be purchased from MSD during certain times of year for GHAs 21 and 25 (MSD 2018a). GHAs 20, 21 and 25 season dates are late-September to mid-October for one bull elk in the general rifle draw (resident only). GHAs 21 and 25 also have a mid to late December season for one elk by general (rifle) draw (resident only). The archery draw is active in GHAs 21 and 25 extend from late August to mid-September.

White-tailed deer are valued for rights-based subsistence harvesting and licenses for recreational hunters can be purchased from the MSD for Zone B, which is open to deer harvest during certain times of year for GHA 16, GHA 21 and GHA 25 and Zone C for GHA 16. An archery season for resident, non-resident and foreign resident hunters is open for parts of August and September and again in late October to early November for the GHAs (MSD 2018a). A general rifle season for white-tailed deer in Zones B and C for resident, non-resident, and foreign resident hunters is open from mid-November to early December.

MSD licenses hunters for resident and non-resident bear hunting, along with registered outfitters for foreign resident bear hunting in GHAs 16, 21 and GHA (MSD 2018a). GHAs 16 and 21 are part of black bear hunting Zone B, where licensed hunting is allowed between late April to end of June and late August to early October for one adult black bear (not female with cubs).

GHA 25 is a part of Zone C where licensed hunting is allowed between late April to the end of June and then again from late August to early October.

One outfitter was identified as operating near Spearhill and maintains a few hunting shacks in the vicinity of Birch Lake Drive (municipal road) and the southern portion of Idylwild Road (Ecologic Environmental Inc. 2016). The area surrounding the Project also includes a number of bear hunting allocation areas. Additional details regarding hunting activities in the immediate vicinity of the Project are currently unknown.

MSD licenses hunters for resident, non-resident, and foreign resident wolf hunting in GHAs 16, 20, 21, and 25 (MSD 2018a). GHAs 16, 20 and 21 are part of grey wolf and coyote Zone B for licensed-based hunting between late August and late March for one wolf. GHA 25 is a part of Zone C for grey wolf and coyote season between the same dates. Coyotes have been designated for recreational hunting by MSD and licenses for hunters can be purchased for certain dates in GHAs 16, 20, 21 and 25.

GHAs 16, 21 and 25 are a part of Game Bird Hunting Zone 3 (GBHZ3) which has a grouse (ruffed grouse [*Bonasa umbellus*], spruce grouse (*Falcipennis canadensis*), and sharp-tailed grouse [*Tympanuchus phasianellus*]) hunting season between the beginning of September and early January with a possession limit of 12. Other birds that can be hunted within GBHZ3 include ducks such as mallard (*Anas platyrhynchos*), coots such as American coot (*Fulica americana*), snipe, such as the common snipe (*Gallinago gallinago*), geese such as the Canada goose (*Branta canadensis*), and sandhill crane (*Grus canadensis*) (M. Forester et. al. 2016).

MSD also enforces vehicle restrictions to increase the quality of the hunting experience, decrease illegal hunting from vehicles and provide undisturbed areas for big game animals (MSD 2018a). Vehicles may not be used while hunting elk, moose or white-tailed deer, except to travel to or from a hunting area, or to retrieve a kill by the most direct route. GHA 16 lies within the 'Northern Zone', and therefore the use of off-road vehicles as transportation from one hunting site to another is allowed. GHAs 21 and 25 are within the 'Roads, Trails and Waterways Zone', where all vehicles operated by elk, moose or white-tailed deer hunters are restricted to roads, established trails and waterways. For example, an off-road vehicle may be used to access a hunting area along an established trail, but hunters may not establish their own trails or venture off existing trails.

4.5.11 Trapping

Commercial trapping of furbearers is administered by MSD through the Registered Trap Line (RTL) system. The proposed Project is situated within an open trapping area identified as Open Block #3. MSD does not track production within an open block. Therefore, production data for Open Block #3 is not available.

4.5.12 Fishing

This section provides an overview of fishing within the PAA and surrounding region. As there are no fish bearing streams in the PAA, there is not expected to be any fishing in that area. The current winter road may be used to access sites that can be fished in the region.

Commercial, subsistence and recreational fishing in the region take place primarily in the Lake St. Martin, Dauphin River, Mantagao River, Sturgeon Bay and some tributaries. Lake St. Martin provide fisheries resources and/or income to Indigenous communities, permanent and seasonal residents, tourists, farmers, and recreational and commercial fishermen within the region.

Commercial, subsistence and recreational fishing takes place in the open water and winter seasons. Fish species of commercial and domestic importance known to occur in Lake St. Martin are: northern pike (*Esox lucius*), walleye (*Sander vitreus*), and lake whitefish (*Coregonus clupeaformis*); with common carp (*Cyprinus carpio*), goldeye (*Hiodon alosoides*), burbot (*Lota lota*), longnose sucker (*Catostomus catostomus*), white sucker (*Catostomus commersonii*), yellow perch (*Perca flavescens*), sauger (*Sander canadensis*) and cisco (*Coregonus artedi*) composing a smaller portion of the Lake St. Martin commercial fishery (NSC 2012). Lake St. Martin supports a winter commercial fishery for walleye, lake whitefish, and sauger; and a year-round fishery for rough fish (carp and suckers only) (NSC 2012). Commercial fishing for white suckers is also practiced in Birch Creek, which drains into the Dauphin River to the north, during the open water season (M. Forster et. al. 2016). Some areas of Lake St. Martin and the large rivers (Dauphin, Fairford, Mantagao) in the region are popular recreational fishing areas with angling for freshwater drum (*Aplodinotus grunniens*), northern pike, sauger, walleye, and yellow perch and bow fishing for carp in the spring (M. Forster et. al., 2016).

The Dauphin River supports commercial, domestic and sports fishing in the area; commercial and domestic fish species captured include mainly lake whitefish, walleye and cisco, as well as common carp, northern pike, sauger, and yellow perch (North/South 2012). Commercial fishing in Sturgeon Bay has been an important source of income to the residents of Dauphin River, as well as providing employment to residents of other nearby communities. In Lake Winnipeg, there are two open-water fisheries (summer and fall) and a winter fishery (NSC 2012).

4.5.13 Public Safety and Human Health

The Project is located in in a relatively remote and undeveloped area. The proposed Project will meet MI's departmental design standards for a 70km/h roadway. Traffic counts for the PAA are not available but assumed to be limited to periodic use during the winter and associated with operation and maintenance the EOC and the Lake St. Martin Outlet Channel. Primary infrastructure related human health and safety concerns in the PAA relate to road safety and vehicle collisions during the operational period for the existing winter road.

Other than potential operational or maintenance activities related to the Idylwild Road or EOC, there are no known regular or recurring sources of dust emissions, industrial noise, blasting or other activities in the PAA which might affect human health and safety.

The Interlake-Eastern Regional Health Authority (RHA) is responsible for the administration and operation of health care in the region. The RHA is divided into six zones and 15 districts. The region is in the North Zone, District 14 which includes the RM of Grahamdale, Pinaymootang First Nation, Little Saskatchewan First Nation, Lake St. Martin First Nation, the RM of Siglunes (now part of the RM of West Interlake), Lake Manitoba First Nation and the RM of Eriksdale (outside of the region) (Province of Manitoba 2014). Table 4-17 outlines rates of health care utilization in the Interlake-Eastern RHA and Manitoba as a whole for 2011/12 and for 2017/18. In terms of physician use, the percentage of residents is similar for the Interlake-Eastern RHA and Manitoba. In 2017 to 2018, 78.5% of Manitoba residents saw a physician at least once during the year while in the RHA rates were 77.1% (Province of Manitoba 2018).

In 2011 to 2012, the rates of ambulatory visits per resident are also very similar: 4.49 for the Interlake-Eastern RHA and 4.51 for Manitoba. In 2017 to 2018, there was an average of 4.7 visits to physicians per Manitoba resident compared to 4.3 in the RHA (Province of Manitoba 2018). In 2011 to 2012, the in-patient hospitalization rate per 1,000 residents is much higher in the RHA: 100 versus 90.6 for Manitoba as are hospitalization rate for ambulatory care sensitive conditions. In 2017 to 2018, the hospitalization rate for ambulatory care sensitive conditions were similar: 7.1 for the RHA compared to 6.8 for Manitoba.

The prevalence of mood and anxiety disorders are lower in the RHA: 21.5% compared to 23.5% for Manitoba. From 2013/14 to 2017/18, the age-sex adjusted mood and anxiety disorders were 22% in the RHA and 23.1% in Manitoba (Province of Manitoba 2018).

Table 4-17. Rates of Health Care Utilization in the Interlake-Eastern RHA and Manitoba, 2011/12 and 2017/18

Description	Interlake-Eastern RHA		Manitoba	
	2011/12	2017/18	2011/12	2017/18
Physician use (age-sex adjusted % of residents who used services)	79.7%	77.1%	79.4%	78.5%
Ambulatory visits (age-sex adjusted rate of visits to a physician per resident)	4.49	4.3	4.51	4.7
Use of hospitals (age-sex adjusted % of residents with at least one in-patient hospital stay per year)	6.9%	6.4%	6.46%	6.1%
In-patient hospitalization (age-sex adjusted rate per 1,000 residents)	100	N/A	90.6	N/A

Description	Interlake-Eastern RHA		Manitoba	
	2011/12	2017/18	2011/12	2017/18
Hospitalization rates for ambulatory care sensitive conditions (age-sex adjusted rate per 1,000 residents age 0-74)	9.12	7.1	6.81	6.8
Mood & Anxiety Disorders Prevalent among residents 10+ (age-sex adjusted % of residents)	21.5%	22%[1]	23.5%	23.1%[1]

[1] Note: data is from 2013/14 to 2017/18

Source: Manitoba Centre for Health Policy, October 2013; Province of Manitoba 2018

In 2017 to 2018, there were 8,984 hospitalizations related to injury among Manitoba residents, which is a rate of 6.6 injury hospitalizations per 1,000 population which is the same as the rate in the RHA (Province of Manitoba 2018). In 2016 to 2017, there were 662 deaths due to injury for Manitoba residents which is a rate of 0.49 deaths per 1,000 population. The age-and sex-adjusted death rate in the RHA for 2016 to 2017 was much higher at 0.59 deaths per 1,000 population.

The Lakeshore General Hospital, which is a 14 bed acute care hospital, is the only hospital in the region and is located in the community of Ashern (Interlake-Eastern RHA 2019). The hospital has an emergency room that is open 24 hours a day, 7 days a week and has ambulance services which includes transporting patients to and from Winnipeg and Dauphin. There are community health offices in Ashern and St. Laurent, the latter which is approximately 95 km from Ashern and is outside of the region. Both communities also have emergency medical service stations. In addition, a mobile clinic visits Gypsumville once a week.

The Interlake-Eastern RHA provides services to communities located outside of FN communities. The federal government provides most services to residents living on reserve in FN communities. FN members living on reserve do access regional hospitals and programs that are off reserve in the region (Province of Manitoba 2014).

Shock Trauma Air Rescue Society is contracted by the provincial government to provide rapid and emergency medical care and air transport for critically ill and injured patients. The Winnipeg RHA oversees the Shock Trauma Air Rescue Society. In addition, the province has a Southern Air Ambulance Program which provides inter-facility transportation to patients in southern Manitoba where land transportation would take over 2.5 hours.

Table 4-18 outlines maximum response times for catchment areas in the region from October 1 to December 31, 2018. Fifty percent of the time an ambulance reaches the incident in the catchment area for Ashern in 31.83 minutes or less for priority 1, 2 or 3 calls (emergent) compared to 31.43 minutes or less for Gypsumville. The response time is 29.9 minutes for Ashern when priority 4 and 5 calls (non-

emergent) are included. For Gypsumville, the response time increases to 32.08 minutes or less. Ninety percent of the time, an ambulance reaches the incident in the catchment area for Ashern in 43.65 minutes or less for priority 1, 2 or 3 calls compared to 56.13 minutes or less for Gypsumville. When priority 4 and 5 calls are included, the response time increases to 46.60 to 49.78 minutes or less for Ashern's catchment area but increases to 62.52minutes or less for Gypsumville's catchment area.

Table 4-18. Maximum Response Times for Emergency Medical Services in Communities in the Region, October 1- December 31, 2018

Community	Maximum Response Time (Minutes)				Total Calls
	50th percentile		90th percentile		
	Priority 1-3	Priority 1-5	Priority 1-3	Priority 1-5	
Ashern	31.83	29.90	43.65	46.60	118
Gypsumville	31.43	32.08	56.13	62.52	185

Source: Manitoba Health, Seniors and Active Living (No Date)

There are two Royal Canadian Mounted Police (RCMP) detachments in the region – in Ashern and Gypsumville. There are fire departments in Ashern, Grahamdale, Gypsumville, Moosehorn, Fairford, and Faulkner.

4.5.14 Heritage Resources

Review of potential cultural and historic resources in the vicinity of the Project was conducted by Northern Lights Heritage Services (NLHS 2017). Study methods included a combination of desktop review and field investigation along the Project alignment. Existing data for the region were reviewed prior to field studies to gain an understanding of the area and provide information to focus the field studies on sites and/or areas in need of investigation. The Provincial Archaeological Site Inventory for the broader area noted six registered archaeological sites. Four of the sites were identified as historic period and included sites of fur trade and homestead influence; the two remaining sites were identified as Middle to Late Woodland Period (ca. 2,000 to 350 years ago) based on the stone tools and Native ceramics. Five of the sites are located within or adjacent to the Pinaymootang (Fairford) First Nation. The sixth site is located within the Dauphin River First Nation lands. All registered archaeological sites are located outside the Project Assessment Area. No Provincial commemorations were noted, with the exception of a private plaque commemorating the community of Spearhill (NLHS 2017).

Due to the prevalence of bog and fen habitat and lack of truck or ATV access along the Project alignment, field investigations used a helicopter to access and assess potential sites of interest during the summer of 2016. Ground and aerial surveys did not reveal any further archaeological evidence or heritage resources in the area. Field investigations also indicated that the heritage resources study area

for the proposed Project is considered to be of low potential for archaeological sites (i.e. prevalence of low and swampy lands) (NLHS 2017).

4.5.15 Indigenous Communities and Population

There are no Indigenous communities within the PAA. However, there are a total of 9 communities, including 8 First Nations that are located within the broader region and are potentially affected by the Project. Map 4-7 identifies the location of Dauphin River First Nation, Dauphin River Northern Affairs Community (NAC), Lake St. Martin First Nation, Pinaymootang (Fairford) First Nation, Little Saskatchewan First Nation, and Peguis First Nation. The remaining communities are Fisher River Cree Nation, Kinonjeoshtegon First Nation and Lake Manitoba First Nation, which are located further afield and beyond the area shown in Map 4-7.

Peguis First Nation has a Treaty Land Entitlement (TLE) Notification Area that includes a portion of Spear Hill Drive to the south of the Project. There are also a number of people of Métis descent that reside in the area. Map 4-7 shows the location of the four First Nations and the TLE Notification Area. Information on these communities was gathered from the 2011 Census data prepared by Statistics Canada (2016).

4.5.15.1 Dauphin River First Nation

Dauphin River First Nation is located along the north shore of the Dauphin River where it enters Sturgeon Bay on Lake Winnipeg (Photograph 4-5; Map 4-7). The First Nation has a land area of 325.8 ha. Access is by gravel road on PR 513 running east from Gypsumville to Dauphin River.

As of April 2019, Dauphin River First Nation's total registered population was 388 (INAC 2019a). Statistics Canada data is unavailable for the First Nation in 2011 and 2016 as a result of the flooding and evacuation.

4.5.15.2 Dauphin River Northern Affairs Community

Dauphin River is also a Manitoba Northern Affairs Community (NAC) under provincial administration provided by the Aboriginal and Northern Affairs department. The Dauphin River First Nation is composed of two adjacent communities: one section is located on the Dauphin Indian Reserve and the other section is located on Crown land called Anama Bay. The 2011 census data indicated a population of 30 (Statistics Canada 2016).

Photograph 4-5. Aerial View of PR 513 and the Dauphin River Community

4.5.15.3 Lake St. Martin First Nation

Lake St. Martin First Nation is located on the north shore of Lake St. Martin west of The Narrows (Map 4-7). Lake St. Martin First Nation has two parcels, The Narrows 49 and The Narrows 49A. The First Nation has a land area of about 3,600 ha. Access to the First Nation is by PR 513 east from Gypsumville. The population was recorded as 826 in the 2011 census (Statistics Canada 2016).

4.5.15.4 Little Saskatchewan First Nation

Little Saskatchewan First Nation is located along the shoreline of Lake St. Martin (Map 4-7). The First Nation is composed of two land parcels, Little Saskatchewan 48 and 48B. The community is accessible from the north by PR 513 or from the south through the Pinaymootang First Nation. The Little Saskatchewan First Nation population was recorded as having 399 people in 2011 (Statistics Canada 2016).

4.5.15.5 Pinaymootang (Fairford) First Nation

Pinaymootang First Nation is located on the Fairford River at PTH 6 (Map 4-7). The First Nation includes Dunsekikan Island in Lake St. Martin, and has a land area of 7,412 ha. Access to the first Nation is via PTH 6. The population in 2011 was recorded as 989 people (Statistics Canada 2016).

4.5.15.6 Peguis First Nation

The community of Peguis First Nation is located approximately 58 km southeast of the Project. However, the First Nation has a large TLE Notification Area in the region as shown in Map 4-7. TLE Notification Areas are areas of land selected by First Nations as part of Treaty Land Entitlement negotiations and processes with the Province of Manitoba (Treaty Land Entitlement Committee 2016). The TLE process has several steps and requires time for selection, assessment and acquisition of the land; as such, the 1997 Treaty Land Entitlement Framework Agreement stipulates that the province must provide notification to the community if there are any other interests or proposed changes to the lands within a TLE Notification Area (Treaty Land Entitlement Committee 2016). As of April 2019, Peguis First Nation's total population was 10,339 (INAC 2019b).

4.5.15.7 Fisher River Cree Nation

Fisher River Cree Nation is located approximately 60 km southeast of the Project along the Fisher River and on the shores of Lake Winnipeg. The First Nation has a total land area of 6,319 ha (INAC 2019c) and a total registered population of 3,993 as of April 2019 (INAC 2019d).

4.5.15.8 Kinonjeoshtegon First Nation

Kinonjeoshtegon First Nation is located approximately 60 km east of the Project on the shore of Lake Winnipeg. The First Nation has a total land area of 1,346.4 ha (INAC 2019e) and a total registered population of 784 as of April 2019 (INAC 2019f).

4.5.15.9 Lake Manitoba First Nation

Lake Manitoba First Nation is located approximately 90 km south of the Project on the shore of Lake Manitoba. The First Nation has a total land area of 3,770.6 ha (INAC 2019g) and a total registered population of 2125 as of April 2019 (INAC 2019h).

4.5.15.10 Métis

The 2011 Statistics Canada Census showed that Métis people made up 6.7% of the population of Manitoba (Statistics Canada 2016). The 2006 Manitoba Bureau of Statistics Census data for the RM of Grahamdale indicated that 285 of the 1415 residents identified as Métis, which represented 20% of the total population of the RM (Manitoba Bureau of Statistics 2008a). The 2006 Manitoba Bureau of Statistics Census data for the RM of Siglunes indicated that 200 of the 1,460 residents identified as Métis, which represented 14% of the total population of the RM (Manitoba Bureau of Statistics 2008b).

Based on rulings in 2012 by the Supreme Court of Canada involving Aboriginal rights for Métis people, the Government of Manitoba and Manitoba Métis Federation (MMF) agreed to recognize Métis rights to

harvest natural resources for food and domestic use in Manitoba within a Métis Natural Resource Harvesting Zone that was identified based on the established GHAs for the Province (Government of Manitoba 2012b, MMF 2015) as shown in Map 2-1. The Project is located in GHA 21.