# LAKE ST. MARTIN ACCESS ROAD

## ENVIRONMENTAL ASSESSMENT REPORT

Manitoba

May 2019

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**Prepared for: Environmental Approvals Branch**
**Manitoba Sustainable Development**

**Prepared by: Manitoba Infrastructure**

**May 2019**

# EXECUTIVE SUMMARY

The existing Lake St. Martin Emergency Outlet Channel is located in a semi-remote area of Manitoba on the north end of Lake St. Martin. Ground access to the Lake St. Martin Emergency Outlet Channel (EOC) is currently limited to the use of a winter road under frozen conditions, i.e., typically December to March. The existing winter road begins at the northern terminus of the Idylwild Road, a resource (forestry) road that extends north from Birch Lake Drive, a municipal road located east of the communities of Grahamdale and Spearhill (Map 1-1).

Due to seasonal access limitations and associated risks during an emergency flood situation wherein the EOC will need to be operated and/or maintained, Manitoba Infrastructure (MI) is proposing to upgrade the winter road to an all-season road standard. Upgrading the existing winter road to a 19.5 km long all-season road will allow for year-round vehicle, crew and equipment access for maintenance and operation of the Lake St. Martin Emergency Outlet Channel. The proposed Lake St. Martin Access Road (the Project) will also be used in the construction, operation and maintenance of future flood protection works currently being planned between Lake St. Martin and Lake Winnipeg, i.e., the proposed Lake St. Martin Outlet Channel.

Biophysical field studies comprised of onsite investigations of the aquatic and terrestrial environments, i.e., plant and wildlife studies. The geology, soils and groundwater conditions in the Project region is generally consistent with features in the Interlake region of Manitoba; there are no notable features that are unique to the Project Assessment Area (a 1 km buffer on either side of the proposed road alignment).

The Project is located in an area largely comprised of a mixture of open wetlands (i.e. peatlands), upland and lowland forests. The three small creek crossings were deemed to not support fish or fish habitat. There are no plant that are species at risk and no unique plant habitats or ecosystems identified within or near the Project development area. The general area supports a number of mammals, migratory birds, reptiles and amphibians, including protected species. Wildlife field studies identified two protected bird species, trumpeter swan (*Cygnus buccinator*) and the eastern wood peewee (*Contopus virens*) as well as two bat species, the little brown bat (*Myotis lucifugus*) and northern long-eared bat (*Myotis septentrionalis*) in close proximity to the PAA. There was no evidence of any critical habitat for any of the wildlife species at risk that potentially occur in the PAA or surrounding regions.

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. Regional land use activities consist mainly of agriculture, hunting, fishing, snowmobiling and other recreational activities.

Heritage-related fieldwork was conducted in the vicinity of the Project development areas. No heritage or cultural artifacts or sites were located along or adjacent to the proposed LSM Access Road.

This Environment Act Proposal Report for the proposed EOC Access Road follows the Environment Act Proposal (EAP) Report Guidelines and considers a range of potential physical, biophysical and socio-economic factors (Manitoba Sustainable Development 2018). Potential Project-related effects were evaluated in conjunction with mitigation measures to identify and assess any potential residual effects that may occur.

Overall, the construction and operation of the proposed Lake St. Martin Access Road is not likely to result in any measurable adverse environmental effects. Proposed mitigation measures are expected to effectively address potential effects by preventing, avoiding or minimizing impacts. Nonetheless, some minor adverse residual effects may persist, including:

- Minor overall increases in green house gas and dust emissions associated with vehicle/equipment during construction, operation and maintenance;
- Minor overall increases in noise and vibration attributed to construction and general operation of the Lake St. Martin Access Road over existing conditions;
- Permanent alteration of local terrain associated with the construction of an elevated road embankment and potential development of quarries or borrow pits;
- Permanent vegetation loss and minor changes to local plant community composition along the Lake St. Martin Access Road due to clearing, compaction of soils and possible unintentional introduction of non-native or invasive plant species;
- Minor permanent wildlife habitat loss within the Project Footprint;
- Minor potential for overall increase in wildlife mortality over current conditions associated with vehicle collisions; and,
- Potential minor permanent habitat loss for protected species within the Project Footprint.

The results of the analyses conducted on this Project indicate that there is no reason to not proceed with development of the Project. Manitoba Infrastructure will follow environmental protection measures outlined in the EA Report and will conduct monitoring during the operational period to assure that design measures (e.g., the gate) are working effectively in address long-term access-related issues.

# GLOSSARY OF ACRONYMS, UNITS AND TERMS

## ACRONYMS AND UNITS

| Acronym/ Abbreviation | Term |
|---|---|
| AADT | Annual Average Daily Traffic |
| AQHI | Air Quality Health Index |
| ASDT | Average Summer Daily Traffic |
| ASI | Area of Special Interest |
| ASR | all-season road |
| ATV | All Terrain Vehicles |
| °C | Degrees Celsius |
| CNR | Canadian National Railway |
| $CO_2$ | Carbon dioxide |
| CO | Carbon Monoxide |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| dB | Decibels |
| Dba Lex | Decibels over duration (in hours) |
| EA | Environmental Assessment |
| EAPF | Environmental Act Proposal Form |
| ECCC | Environment and Climate Change Canada |
| EOC | (Lake St. Martin) Emergency Outlet Channel |
| ESC | Erosion and sediment control |
| ESEA | Endangered Species and Ecosystems Act |
| ESS | Environmentally sensitive sites |
| FLIR | Forward looking infrared |
| FML | Forest Management License |
| FMU | Forest Management Units |
| FN | First Nations |
| GBHZ | Game Bird Hunting Zone |
| GERs | General Environmental Requirements |
| GHA | Game Hunting Area |
| GHG | Greenhouse gas |
| HVdc | High Voltage Direct Current |
| IBA | Important Bird Area |
| INR | Manitoba Indigenous and Northern Relations |
| IPEP | Indigenous and Public Engagement |

| | |
|---|---|
| Km/hr or Kph | Kilometres per hour |
| KPI | Key person interview |
| LCC | Land Cover Classification |
| LGD | Local Government District |
| LSM | Lake St. Martin |
| MBBA | Manitoba Breeding Bird Atlas |
| MCDC | Manitoba Conservation Data Centre |
| Mg/L | Milligrams per litre |
| MI | Manitoba Infrastructure |
| MSD | Manitoba Sustainable Development |
| Mt | Megaton |
| $NO_2$ | Nitrogen dioxide |
| $NO_x$ | Nitrogen oxides |
| $O_3$ | Ground level ozone |
| PAA | Project Assessment Area |
| PFN | Peguis First Nation |
| PSL | Permissible Sound Levels |
| PM | Particulate Matter |
| $PM_{10t}$ | particulate matter ≤10 microns |
| $PM_{2.5s}$ | particulate matter ≤2.5 microns |
| ppb | Parts per billion |
| ppm | Parts per million |
| PR | Public road |
| PTH | Public trunk highway |
| RCMP | Royal Canadian Mounted Police |
| RHA | Regional Health Authority |
| ROW | right-of-way |
| RTL | Registered Trap Line |
| SARA | Species at Risk Act |
| $SF_6$ | Sulphur hexafluoride |
| $SH_6$ | |
| $SO_2$ | Sulphur dioxide |
| TDS | Total dissolved solids |
| TLE | Treaty Land Entitlement |
| µ | Microns |
| $\mu g/m^3$ | micrograms per cubic meter |
| WMA | Wildlife Management Area |

## GLOSSARY TERMS

Aggregate – A mineral used for construction purposes or as a constituent of concrete other than in the manufacture of cement and includes sand, gravel, clay, crushed stone and crushed rock.

All-season road – A road that provides year-round vehicular access to the remote and isolated communities in the region.

Alvars – Uncommon habitats globally and are communities that are protected under the Manitoba Endangered Species and Ecosystem Act (MESEA Act reference). Alvars are characterized by the presence of a thin or absent layer of soil overlying limestone or dolomite bedrock pavement.

Amphibian – Cold-blooded animal of the Class Amphibia that typically lives on land but breeds in water (ex: frogs, toads, salamanders).

Aquatic – Relating to water; living in or near water, taking place in water.

Area of Special Interest – ASIs are identified through enduring features analysis and aid in prioritizing which areas are most critical for protection. Enduring features are combinations of soils and surficial geology that are used to represent the biodiversity within Manitoba's 18 natural regions. ASIs are further refined into protected areas proposals through a review process led by Manitoba Sustainable Development with participants from Water Stewardship and Industry, Economic Development and Mines.

Average Annual Daily Traffic – Measure used primarily in transportation planning and transportation engineering. It is the total volume of vehicle traffic of a highway or road for a year divided by 365 days. AADT is a useful and simple measurement of how busy a road is.

Bog – A wetland ecosystem characterized by water table at or just below the surface, an accumulation of peat, acidic conditions and a plant community dominated by Sphagnum moss.

Borrow area – A site where the existing soil/earth has been tested and determined suitable for road embankment construction. Located within the road right-of-way, where possible.

Carbon dioxide – $CO_2$ is a colorless gas with a density about 60% higher than that of dry air. It occurs naturally in Earth's atmosphere as a trace gas.

Carbon monoxide – CO is a colorless, odorless and tasteless gas that is slightly less dense than air.

Corridor – A designated strip of land between two locations used for infrastructure purposes.

Critical habitat – Habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified and included in recovery strategies or action plans.

Crown land – Land owned by the federal or provincial governments. Authority for control of these public lands rests with the Crown.

Culvert – A tunnel carrying a stream or open drain under a road.

Decommissioning – The process of removing something (ex: camp, staging area, access route) from service.

Ecodistrict – Part of an ecoregion characterized by distinctive assemblages of relief, geology, landforms and soils, vegetation, water, fauna and land use.

Ecoregion – Part of an ecozone characterized by distinctive regional ecological factors, including climatic, physiography, vegetation, soil, water, fauna and land use.

Ecosystem – A dynamic complex of plants, animals and micro-organisms and their non-living environment interacting as a functional unit. The term ecosystem can describe small scale units (e.g., water droplet) as well as large scale units (e.g., biosphere).

Endangered – A species that is seriously at risk of being permanently lost locally (extirpated) or globally (extinct).

Environment – Components of the earth including a) land, water and air, including all layers of the atmosphere, b) all organic and inorganic matter and living organisms and c) interacting natural systems that include components referred to in a) and b). Effectively described as air, land, water, plant life, animal life and humans.

Environment Act Proposal – An Environment Act Proposal is part of the environmental assessment and licensing process required to receive an Environment Act Licence for construction and operation of projects which are defined as developments under the Classes of Development Regulation (Manitoba Regulation 164/88). The process exists to ensure environmental and human health protection, encourage early consultation, allow for full public participation and ensure economic development occurs in an environmentally responsible manner.

Environmental Management Plan – Provides an overall environmental management framework for a project to address environmental risks associated with that project.

Environmental monitoring – Periodic or continuous surveillance or testing, according to a predetermined schedule, of one or more environmental parameters. Usually conducted to

determine the level of compliance with stated requirements, or to observe the status and trends of a particular environmental component over time.

Erosion and Sediment Control – Erosion and sediment control measures include silt fencing, erosion control blankets, straw wattles and geotextile with the intent to reduce the amount of erosion and control any eroded material from moving into adjacent watercourses.

Equalization culvert – Culvert placed to balance water head and elevation on both sides of an embankment and reduce possible water seepage flow.

Fen – A type of wetland fed by groundwater and runoff, containing peat below the waterline.

Follow-up – Includes activities such as monitoring and reporting and may occur at any stage in the lifespan of the Project. A Follow-up Program is a program for verifying the accuracy of the environmental assessment of a project and determining the effectiveness of any measures taken to mitigate the adverse environmental effects of that project.

Fragmentation – The breaking up of contiguous blocks of habitat into increasingly smaller blocks as a result of direct loss and/or sensory disturbance.

Fugitive dust – Generated from wind erosion caused by roadway construction activities such as rock quarrying or crushing, blasting, excavation, fill placement and road grading.

Furbearer –Furbearers are a diverse group of mammal species traditionally trapped/hunted for their fur, including both carnivores (meat eating predators) and rodents (gnawing animals).

Game Hunting Area – GHAs are geographic zones where certain regulations apply with regard to hunting a particular wildlife species or group of species. The basic regulations on hunting certain species, including season when a species can be hunted varies by GHA.

Geology – A science that deals with the history of the earth as recorded in rocks.

Geotextile material – Porous fabrics manufactured by weaving or bonding fibers made from synthetic materials for use in construction as separators, reinforcement, filtration and drainage and erosion control.

Greenhouse Gas – A gas that contributes to the greenhouse effect by absorbing infrared radiation (e.g., carbon dioxide and chlorofluorocarbons).

Groundwater – Water beneath the surface of the land.

Grubbing –Removing and disposing of all stumps, roots, non-merchantable trees and overburden material from a designated area.

Habitat – The place or type of site where an organism or population naturally occurs. Species may require different habitats for different uses throughout their lifecycle.

Hazardous materials – Any solid, liquid, or gas product that can harm people, other living organisms, property or the environment.

Heritage resources – A land or resource (ex: an artifact, object, place) that is considered as heritage or any structure, site or thing is distinguished from other lands and resource by the value placed on it.

Hydrocarbons – Organic compounds that contain only carbon and hydrogen (e.g., gasoline).

Hydrofluorocarbons – Any of a class of partly chlorinated and fluorinated hydrocarbons, used as an alternative to chlorofluorocarbons in foam production, refrigeration and other processes.

Indigenous people – Indigenous people is a collective name for the original peoples of North America and their descendants. The Constitution of Canada recognizes three groups of Indigenous people: First Nations, Inuit and Métis. These are three distinct peoples with unique histories, languages, cultural practices and spiritual beliefs.

Indirect effect – A secondary environmental effect that occurs as a result of a change that a project may cause on the environment. At least one step removed from a project activity in terms of cause-effect linkages.

Invasive species – Any species that has been introduced to an environment where it is not native and that has since become a nuisance through rapid spread and increase in numbers, often to the detriment of native species.

IOA Steering Committee – A committee comprised of the following groups to oversee the consultation process for the Project:

1. Manitoba Infrastructure
2. Manitoba Indigenous and Northern Relations
3. Manitoba Sustainable Development
4. Manitoba Justice

Maintenance – Keeping a structure, fixture or foundation in proper condition in a routine, scheduled or anticipated fashion and preventing its failure or decline.

Manitoba Conservation Data Centre – The MBCDC is a storehouse of information on Manitoba's biodiversity (its plant and animal species), as well as its natural plant communities. The MBCDC functions under the umbrella of NatureServe and NatureServe Canada, a network of over 80 similar centres throughout Canada, the United States and Latin America.

Manitoba Infrastructure – MI is the proponent and will continue to manage the proposed Project. MI is the department of the provincial government responsible for the development of transportation policy and legislation and for the management of the province's vast infrastructure network.

Manitoba Metis Federation – The MMF was founded in 1967. It promotes the interests and rights of its members in Manitoba and delivers programs and services for the Métis, including those related to child and family services, justice, housing, youth, education, human resources, economic development and natural resources.

Manitoba Sustainable Development – A department of the Government of Manitoba that oversees environmental stewardship, species at risk, forestry and related matters. The department is overseen by the Minister of Sustainable Development.

Manitoba Water Quality Standards, Objectives and Guidelines – MWQSOG are one of many tools used to protect, maintain and where necessary, rehabilitate water quality. On November 28th, 2011, the MWQSOG were enshrined in a regulation under Part Two of The Water Protection Act. They set out water quality conditions for over 100 materials that, if not exceeded, will protect water quality for various uses including fish and other aquatic life, sources of drinking water, irrigation and livestock watering and recreation.

Methane – $CH_4$ is a hydrocarbon gas at room temperature (20°C). It is often found as the main part of natural gas. Methane is a greenhouse gas 23 times more effective than carbon dioxide. It slowly oxidates by oxygen to carbon dioxide and water.

Métis – A people of North American Indian and European ancestry who coalesced into a distinct nation in the northwest in the late 18th century. The Métis are one of three distinct Indigenous peoples of Canada, recognized under section 35 in the 1982 Constitution Act.

Migratory bird – As defined by federal legislation, "migratory birds" are game, non-game and insectivorous birds native to Canada which show regular seasonal movement between breeding and wintering grounds.

Mitigation measures – Measures developed and implemented for the elimination, reduction or control of the adverse environmental effects of physical activities associated with a project.

Nitrogen Oxide – A family of poisonous, highly reactive gases that play a major role in the atmospheric reactions with volatile organic compounds that produce ozone (smog) on hot summer days.

These gases form when fuel is burned at high temperatures and are typically emitted by automobiles, trucks and various non-road vehicles as well as industrial sources such as power plants, industrial boilers, cement kilns and turbines.

Nitrous Oxide – Nitrous oxide, commonly known as laughing gas or nitrous, is a powerful oxidizer with an impact on stratospheric ozone comparable to that of CFCs. It is estimated that 30% of the $N_2O$ in the atmosphere is the result of human activity, chiefly agriculture.

Northern Affairs Community – Indigenous and Northern Relations under The Northern Affairs Act. Northern Affairs Communities are represented by a Mayor and Council or an administrator depending on the size of the community.

Nuisance Beaver Management Program – The NBMP includes measures for removal of nuisance beaver as well as for the removal of beaver dams to maintain culvert functionality.

Operations phase – Refers to the point at which construction is complete and the all-season road begins providing the intended transportation link.

Ozone – Ozone, or trioxygen, is an inorganic molecule formed from dioxygen by the action of ultraviolet light and also atmospheric electrical discharges and is present in very low concentrations throughout the Earth's atmosphere (stratosphere). Its concentration is highest in the ozone layer region of the atmosphere, which absorbs most of the Sun's ultraviolet radiation.

Physical environment – Refers to the terrain, geology, hydrogeology, hydrology, air and water of a project area.

Project – Unless otherwise stated, the Project refers to the Lake St. Martin (LSM) Access Road Project.

Project Assessment Area – The PAA is a 1 km buffer on either side of the proposed all-season road alignment.

Project Footprint –The physical space or directly affected area within which Project components and activities are located and the immediately adjacent area, which is the defined limits of the all-season road and right-of-way.

Provincial Road – Numbered PRs are the secondary highways in Manitoba.

Provincial Trunk Highway – Numbered PTHs are the primary highways in Manitoba.

Quarry – A mine established or operated by surface excavation for the purpose of removing consolidated quarry mineral.

Residual effect – An environmental effect that remains, or is predicted to remain, even after mitigation measures have been applied.

Respirable Particulate Matter – $PM_{10}$ are tiny particles (10 microns in diameter and less) small enough that they can get deep into the lungs and cause a broad range of health effects, in particular, respiratory and cardiovascular illnesses.

Riparian area – The area bordering streams, lakes and wetlands that links water to land. The blend of streambed, water, trees, shrubs and grasses in a riparian area provides fish habitat and directly influences it.

Riprap – A layer of durable quarried or field rock placed at both the inlet and outlet of culverts or around bridge abutments to stabilize fill slopes around the drainage structure and prevent water from eroding soil.

Right-of-way – The area along the road alignment which contains the road bed, ditches, side slopes and back slopes.

Road alignment – The route of a road, defined as a series of horizontal tangents and curves, as defined by planners and surveyors.

Rock fill – A fill, comprised of large, loosely placed rocks.

Runoff – Water flow that occurs when soil is infiltrated to full capacity and excess water from rain, snowmelt or other sources flows over the land.

Sediment – Any particulate matter that can be transported by fluid flow and which is eventually deposited.

Species at Risk – For the purpose of this Environmental Assessment, Species at Risk are defined as federal species listed under the Species at Risk Act or designated by COSEWIC for listing on Schedule 1 of SARA (extirpated, endangered, threatened and special concern); provincial species listed as Endangered or Threatened under the Manitoba ESEA; and species listed as very rare (provincial status of S1) or rare (provincial status of S2) throughout their range as listed by the MCDC.

Subgrade – The soil prepared to support a pavement structure or a pavement system. It is the foundation for the pavement structure.

Substrate – The composition of a streambed, including either mineral or organic materials.

Surface water – Water collecting on the ground or in a stream, river, lake, wetland or ocean; it is related to water collecting as groundwater or atmospheric water.

Sulfur oxides – Are compounds of sulfur and oxygen molecules, with sulfur dioxide ($SO_2$) being the greatest concern and most dominant form found in the lower atmosphere. The largest source of $SO_2$ in the atmosphere is the burning of fossil fuels. Short-term exposures to $SO_2$ can harm the human respiratory system and make breathing difficult.

Terrain – Refers to the lay of the land. Usually expressed in terms of the elevation, slope and orientation of terrain features. Terrain affects surface water flow and distribution.

Threatened – A species likely to become endangered if limiting factors are not reversed.

Traditional knowledge – Knowledge that is held by and unique to, Indigenous people.

Wetland – Land dominated by bogs/fens that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment.

Winter road – A seasonal road constructed each year and only used after ground is frozen.

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# EA REPORT SECTION 1

# INTRODUCTION

## LAKE ST. MARTIN ACCESS ROAD

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# 1.0 INTRODUCTION AND BACKGROUND

## 1.1 PURPOSE OF THE DOCUMENT

This Environmental Assessment (EA) Report for the proposed Lake St. Martin (LSM) Access Road Project (the Project) is being provided to the Environmental Approvals Branch of Manitoba Sustainable Development to obtain a license for a Class 2 development under The Environment Act of Manitoba. The Canadian Environmental Assessment Agency has reviewed pertinent information and made a determination that the Project is neither an incidental activity to the Lake Manitoba and Lake St. Martin Outlet Channel Project nor considered a designated activity under CEAA 2012.

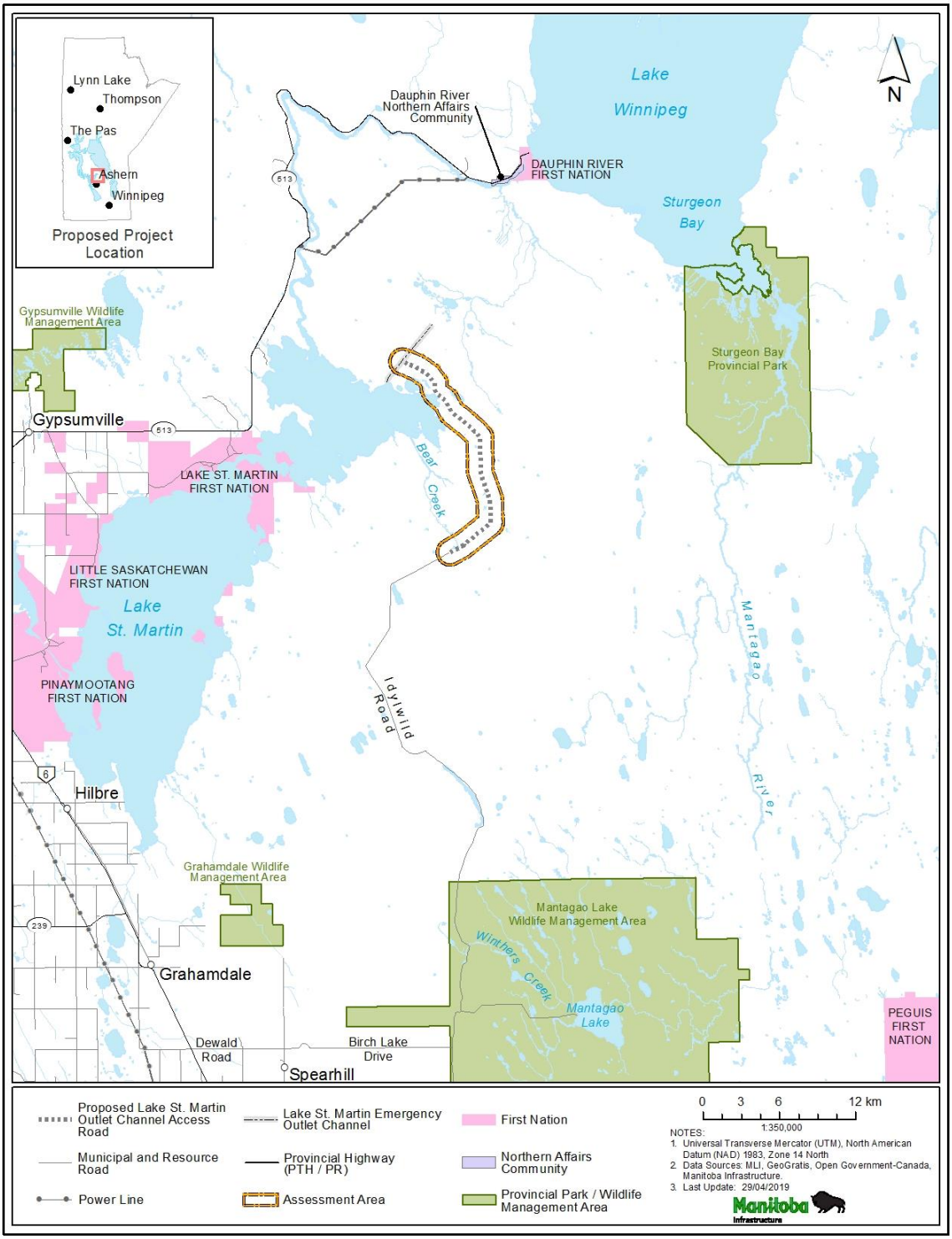
The Project refers to the proposed development of 19.5 km all season road (ASR) northeast of Lake St. Martin in Manitoba's Interlake. This Project EA Report describes the proposed development, public consultation (hereafter referred to as public engagement) that has occurred to date, assesses potential environmental effects on the existing environment and human health, proposes effective mitigations measures, evaluates and describes any follow-up plans including monitoring and reporting.

In addition to the public engagement information for the LSM Access Road Project outlined in this EA Report, information specific to Indigenous people and communities was gained through a separate Crown Consultation process. An initial assessment of potential impacts of the LSM Access Road on Aboriginal and Treaty Rights identified 9 communities that were subsequently consulted. The results of these Crown Consultation efforts are described in a separate document being developed by the Crown Consultation Steering Committee (MI 2019).

This report is accompanied by an Environment Act Proposal Form (EAPF), which is required as a component of the approval and licensing process. Upon receipt of an Environment Act Licence, MI will proceed with the Project in a manner described in the EA Report and summarized in the EAPF.

## 1.2 PROJECT SCOPE AND LOCATION

The proposed Project is a 19.5 km, two lane all season road (ASR) that would follow an existing winter road alignment that would extend from the northern terminus of the Idylwild Road to the Lake St. Martin Emergency Outlet Channel (Map 1-1). Associated works would also include the development and operation of temporary quarries, borrow pits and access roads (as required). The Project is located on previously cleared and developed Crown Land northeast of Lake St. Martin in Manitoba's Interlake.




**Map 1-1. Proposed Project Location**

## 1.3 NEED AND RATIONALE FOR DEVELOPMENT

The Lake St. Martin Emergency Outlet Channel (EOC) was constructed by the Province of Manitoba in 2011 as an emergency measure to alleviate flooding in the vicinity of Lake St. Martin in the Interlake region of Manitoba. Due to the semi-remote location of the EOC, a winter road was required to extend the pre-existing Idylwild Road to the construction site (Map 1-1). This winter road was first cleared and constructed in the winter of 2011/2012 and has been used every year since to mobilize and maintain equipment at the site (Photograph 1-1).

**Photograph 1-1. Winter Road Currently Used to Access the Lake St. Martin Emergency Outlet Channel**

Having been built as an emergency measure under extenuating circumstances, the EOC does not use a mechanical water control structure system to move water. Rather, the EOC uses a clay and aggregate berm, or plug, to prevent outflows when not operational (Photograph 1-2). Therefore, operation of the EOC relies on heavy equipment to mechanically remove the clay and aggregate berm and thereby permit the outflow of floodwaters from Lake St. Martin.

**Photograph 1-2. Lake St. Martin Emergency Outlet Channel Clay and Aggregate Berm**

Access to the EOC is currently comprised of: 20.8 km of municipal road (Dewald Road and Birch Lake Drive), 48.1 km of resource/forestry road (the Idylwild Road), and 19.5 km of winter road. The existing winter road has been instrumental in hauling materials and/or equipment in preparation for potential spring/summer operation and/or for ongoing maintenance of the EOC. Unfortunately, operation of the EOC, if required, occurs during the open water seasons when the winter road is not in use, i.e., the EOC is inaccessible by ground during non-frozen conditions. Continued reliance on the existing winter road is therefore problematic due to its limited and seasonal utility, which subsequently affects MI's ability to effectively and efficiently respond to flood events.

The structure of the current winter road is also substandard, with sharp turns and limited sightlines that create substantial safety concerns and, as such, will not accommodate large construction equipment or transport trucks. The current winter road is illustrated in Photograph 1-2. The availability of unimpeded site access is an important issue associated with effectively maintaining and operating the EOC. The existing access network is limited in use by the seasonal nature of the winter road segment. This seasonal restriction limits opportunities for conducting operational and maintenance activities on the EOC, which is currently a critical piece of emergency flood protection infrastructure for Manitoba and the region.

In addition to providing access to the EOC, the Project will also provide access to the site of the control structure channel associated with the proposed Lake St. Martin Outlet Channel; it will thus assist in the construction, operation and maintenance of future works in the area if they receive the necessary approvals and licence to proceed.

To address these access-related issues, Manitoba Infrastructure (MI) is proposing to upgrade 19.5 km of the current winter road to an all season road (ASR) standard to permit all season access to the EOC (Map 1-1). Upgrading the winter road to an ASR standard will allow for year-round vehicle and equipment access to the EOC, facilitating maintenance and operation of existing infrastructure and improving flood response. It will also provide the added benefit of facilitating access to the other potential future flood protection works proposed to occur between Lake St. Martin and Lake Winnipeg.

## 1.4 PROJECT ALTERNATIVES

Prior to selecting the preferred LSM Access Road alignment that is assessed in this EA Report, consideration was given to various alternative means of providing year-round access to the EOC while permitting access to the potential future water control structure site and associated Lake St. Martin Outlet Channel works, including:

- Crossing Lake St. Martin by use of a barge in summer months;
- Creating a new access route from Provincial Road (PR) 513, west of the Dauphin River;
- Creating alternative alignments from the terminus of the Idylwild Road; and,
- Using the existing winter road alignment in developing all season access.

The following sections provide an overview of the evaluation of potential Project alternatives leading to the selection of a preferred option. These potential alternatives were evaluated on the basis of engineering, estimated cost, and implications on the environment and people.

### 1.4.1 Crossing Lake St. Martin by Barge

This access option was employed for a portion of the EOC construction period during summer months in 2011. During this period, two barges were used to mobilize equipment to the EOC to initiate construction. However, the use of barges proved to be slow and costly and was only technically feasible due to the high water levels at that time. Use of a barge is therefore limited to summer months and largely dependent on daily weather conditions and water levels. For example, barges are typically not used on very windy days. As well, barges cannot be used on Lake St. Martin under normal or low water conditions without first conducting substantial additional work, i.e., dredging an approach channel to docking sites. This option was subsequently dismissed as it was deemed to be costly, not technically feasible and has issues pertaining to potential aquatic environment effects and associated requirements for approvals.

### 1.4.2 Access from PR 513

As a Provincial Road that is relatively close to the EOC and potential future works, creating a new access route from PR 513 was evaluated. The most likely routing option off of PR 513 is located approximately 15 km northwest of the EOC, on the opposite side of the Dauphin River. The road extension would need to travel through some wet peatlands comprised largely of black spruce muskeg (*Pice a mariana)*. Additionally, the need to cross the Dauphin River would require a bridge, which is very costly and presents additional environmental implications.

While this option provides the shortest routing alternative, being approximately 15 km from PR 513 to the EOC, it would increase the potential long-term environmental effects associated with providing unfettered access from a public highway across a bridge to the area north of Lake St. Martin. This option was dismissed largely due to the associated costs, as well as environmental and maintenance-related implications.

### 1.4.3 Creating Alternative Alignments from the Terminus of the Idylwild Road

Consideration was given to other alternatives involving development of an all season road that extends from the terminus of the Idylwild Road, but which does not follow the winter road to the EOC that was constructed in 2011. These alternative options were considered for a number of reasons. One option included constructing an access route that would travel further east and north of the existing winter road. Other options considered involved the development of an ASR that extends parallel to the current winter road, with a minor realignment where necessary.

However, these alternate routes would have been longer, with some requiring the clearing of new corridors without substantially improving the routing. These alternative routing options were thus dismissed largely on the basis of the environmental effects of clearing and constructing on previously undeveloped lands, in combination with projected costs. Additionally, the needs of the proposed Project do not require these additional road extensions/network(s). Substandard conditions crossed by these alternatives would also lead to increased challenges in engineering design.

### 1.4.4 Using the Existing Winter Road Alignment

The existing winter road alignment that was cleared in the winter of 2011/2012 for construction was assessed to be shorter than those alternative routes evaluated in Section 1.4.3 and did not require any substantial additional clearing. A key factor in the selection process is that developing the winter road option minimized the amount and distance of wetlands crossed; for engineering design and environmental reason, the best approach is to traverse wetlands at a $90^{o}$ angle – using 19.5 Km of the existing winter road will best meet this criteria when considering that most wetlands immediately north of Lake St. Martin are long, narrow features that extend southeast to northwest and are unavoidable without greatly extending road length.

This is the preferred option as it involves developing an ASR along an existing winter road alignment, is comparatively shorter than most other ASR options, and it minimizes wetland crossings. Subsequently, further developing the existing winter road is expected to have the lowest environmental effects, the lowest associated costs and fewer engineering design-related issues than other alternatives. This alternative was therefore selected as the preferred all-season road option.

# EA REPORT SECTION 2

# PROJECT DESCRIPTION

## LAKE ST. MARTIN ACCESS ROAD

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# 2.0 PROJECT DESCRIPTION

The proposed Project involves upgrading (including possible minor realignment to address road structure and sightline issues) of approximately 19.5 km of winter road to an all-season road (ASR) standard (Photograph 2-1). Key activities associated with construction of the ASR will include: clearing, waste excavation (peat removal), placement of geotextile, construction of the road embankment from crushed rock or composite borrow material, placement of traffic gravel, and culvert installation. The following sections address the requirements for information outlined in Manitoba Sustainable Development's (2018) Guide to Developing an EA Report.

**Photograph 2-1. Picture of the Winter Road**

The picture of the Forestry Road (Idylwild Road) before and after construction (Photograph 2-2) provides a perspective on how the LSM Access Road will look after construction.

**Photograph 2-2. Picture of the Forestry (Idylwild) Road: Prior to Construction in 2016 (left); and after Construction in 2018 (right)**

### 2.1 THE PROPONENT – MANITOBA INFRASTRUCTURE

Manitoba Infrastructure (MI) is the proponent and will manage the Project throughout the planning, construction, operation and maintenance periods.

## 2.2 FUNDING

The Project will be funded in whole by the Province of Manitoba. Following the receipt of the required regulatory approvals, funding will be used towards developing, managing operating and maintaining the Project.

## 2.3 ENVIRONMENTAL REGULATORY FRAMEWORK

The proposed All-Season Road Project is a Class 2 development under the Classes of Development Regulation and requires a Manitoba Environment Act Licence for the development and operation a two lane road at a new location.

In addition to the road, the project components include: culverts, quarry and borrow areas, temporary access roads and trails, laydown areas, and the temporary construction— camp are all subject to applicable provincial legislation, guidelines, codes and standards including the following acts and regulations identified in Table 2-1.

**Table 2-1. Legislation, Regulations and Policies Applicable to the Project**

| Act | Regulations/Policy with Potential Project Implications | Regulatory Objectives, Project Linkages and Permits |
|---|---|---|
| The Environment Act, C.C.S.M. c. E125 | Classes of Development Reg. 164/88 | Classifies developments and identifies requirements for provincial licencing and environmental assessment. |
| | Environment Act Fees Reg.168/96 | |
| | Licensing Procedures Reg. 163/88 | Defines information required to apply for licensing under *The Environment Act*. |
| | Notice and Reporting Reg. 126/2010 | Defines requirements regarding the notice of a licensing decision and reporting of releases to the environment. |
| | Onsite Wastewater Management Systems Reg. 83/2003 | Defines proper construction and disposal for onsite water management systems. |
| The Crown Lands Act, C.C.S.M. c. C340 | Crown Lands Fees Regulation 130/91 | Identifies requirement for and issuance of leases, permits, easements and rights-of-way for specified works on provincial Crown lands. Work permits will be required. |
| | Vehicle Use on Crown Lands Resource Roads Regulation 145/91 | |
| The Dangerous Goods Handling and Transportation Act, C.C.S.M. c. D12 | Dangerous Goods Handling and Transportation Fees Reg. 164/2001 | Identifies requirements for handling, containment and transportation of substances that could cause damage to personal safety or the environment. |
| | Dangerous Goods Handling and Transportation Reg. 55/2003 | |
| | Environmental Accident Reporting Reg. 439/87 | Outlines reporting requirements in the case of an accidental spill. |
| | Hazardous Waste Reg. 195/2015 | Defines categories of hazardous wastes and registration of generators of hazardous waste |
| | Licensing Regulation Storage and Handling of Petroleum Products and Allied Products Reg.188/2001 | Outlines requirements of storage systems for petroleum products. |

| Act | Regulations/Policy with Potential Project Implications | Regulatory Objectives, Project Linkages and Permits |
|---|---|---|
| The Contaminated Sites Remediation Act C.C.S.M. c. C205 | The Contaminated Sites Remediation Act Reg. 105/97 | Provides regulatory authority to designate and manage sites that have been exposed to environmental contaminants. They also address issues of liability and remediation of these sites. |
| The Endangered Species and Ecosystems Act, C.C.S.M. c. E111 | Threatened, Endangered and Extirpated Species Reg. 25/98 | Regulates the protection of Manitoba's threatened and endangered species. Conserves and protects threatened and endangered ecosystems in Manitoba and promotes their recovery. |
| The Forest Act (C.C.S.M. c. F150) | Forest Use and Management Regulation (227/88 R) | Defines conditions for harvesting merchantable timber and disposal of brush and debris. Directs conditions for issuance of a timber use permit. |
| The Fires Prevention and Emergency Response Act C.C.S.M. c. F80 | Any activities associated with combustible materials | Provides for control of activities regarding the prevention, detection and extinguishment of fires. Work camp occupancy permit required. |
| The Groundwater and Water Well Act C.C.S.M. c. G110 | Groundwater and Water Well (General Matters) Regulation 214/2015<br><br>Well Standards Regulation 215/2015 | The purpose of this Act is<br>(a) to provide for the protection and stewardship of Manitoba's aquifers and groundwater;<br>(b) to ensure that the construction, maintenance and sealing of wells and test holes meet standards that protect;<br>(i) the environmental quality of Manitoba's aquifers and groundwater, and<br>(ii) human health and safety; and<br>(c) to provide for the collection and sharing of well, aquifer and groundwater information to better understand, manage, conserve, protect, develop and use Manitoba's aquifers and groundwater. |

| Act | Regulations/Policy with Potential Project Implications | Regulatory Objectives, Project Linkages and Permits |
|---|---|---|
| The Heritage Resources Act, C.C.S.M. c. H39.1 | Heritage Resources Forms Regulation 99/86<br>Heritage Objects Designation Regulation 160/89<br>Heritage Sites Designation Regulation 122/88R | Designates heritage sites and identifies protections for heritage resources and heritage resource sites, including the requirement to conduct a Heritage Resource Impact Assessment (HRIA). A permit is required for the HRIA. |
| The Transportation Infrastructure Act, C.C.S.M. c. T147 | Transportation Infrastructure (General) Reg. 15/2019 | Construction and management/maintenance of transportation infrastructure. Permitting for access roads, signage and infrastructure. |
| The Highway Traffic Act, SM 1985-86, c. 3 | Designated Construction Zones Regulation<br>145/2014 | Provides guidelines and requirements for vehicles and driving on Manitoba highways. |
| The Mines and Minerals Act, C.C.S.M. c. M162 | Quarry Minerals Regulation, 1992, Reg.65/92<br>Drilling Regulation, 1992, Reg. 63/92 | Identifies and outlines requirements for sustainable development of mineral product exploration and production, including quarrying, in Manitoba. Quarry permits will be required. |
| The Noxious Weeds Act, C.C.S.M. c. N110 | Noxious Weeds Reg. 35/96 | Identifies noxious weeds that may adversely impact Manitoba's environment or economy, outlines responsibilities to control or destroy such weeds and prohibits their spread during construction works. |
| The Public Health Act, P210 | Relates to the preservation of health including conditions that may contaminate or pollute air, food or water | Food handling permit is required for construction camps if they have kitchen facilities. |
| The Climate and Green Plan Implementation Act | N/A | Provides a framework through which the government develops a plan to reduce greenhouse gas emissions, address the effects of climate change, promote sustainable development and protect Manitoba's water resources and natural areas. |

| Act | Regulations/Policy with Potential Project Implications | Regulatory Objectives, Project Linkages and Permits |
|---|---|---|
| The Drinking Water Safety Act SM 2002, c. 36 | Drinking Water Quality Standards Regulation 41/2007<br><br>Drinking Water Safety Regulation 40/2007 | Ensures that public water source meet the minimum standards for safety.<br><br>Permits construction or altering a water system and defines disinfection requirements. |
| The Water Protection Act, C.C.S.M. c. W65 | Aquatic Invasive Species Regulation 173/2015<br>Nutrient Management Regulation 62/2008 | Provides protection and stewardship of Manitoba's water resources and aquatic ecosystems. |
| The Water Rights Act, C.C.S.M. c. W80 | Water Rights Regulation 126/87 | Identifies rights and use of water in Manitoba and prohibitions against diversion of water or operation of water works and sets requirements for permitting and protections of aquatic ecosystems. Permits may be required for drainage works. |
| The Wildlife Act, C.C.S.M. c. W130 | General Hunting Regulation, Reg. 351/87<br>Hunting Areas and Zones Regulation, Reg. 220/86<br>Trapping Area and Zones Regulation, Reg. 149/2001<br>Wildlife Protection Regulation, Reg. 85/2003 | Designates provincial wildlife lands, regulates licenced harvest of wildlife, and identifies other protections for wildlife in Manitoba. |
| The Wildfires Act, C.C.S.M. c. W128 | Burning Permit Areas Regulation 242/97 | Outlines wildfire controls, duties and prohibitions. A permit is required to burn clearing debris. |
| The Workplace Safety and Health Act, C.C.S.M. c. W210 | Workplace Safety and Health Regulation 217/2006<br><br>Operation of Mines Regulation 212/2011 | Outlines safety related duties in the workplace and identifies measures to ensure that safe work practices are being followed to protect health and safety of workers. |

Following are some of the relevant permits that will be required through the Provincial licensing and approval process:

- Provincial work permits required under The Crown Lands Act for construction, and quarry and camp development on provincial Crown lands will be secured prior to construction of the proposed Project.
- Casual quarry permits required under Subsection 133(1) of The Mines and Minerals Act will be acquired prior to quarry development.
- Burning permits required under Section 19(1) of The Wildfires Act will be secured as needed.
- Permits for petroleum storage tanks over 5,000 litres (L) on Crown land are required under The Dangerous Goods Handling and Transportation Act (Storage and Handling of Petroleum Products and Allied Products Regulation) and will also be secured as needed.
- A water use license under The Water Rights Act is not expected to be required as water use (e.g., dust control) is not expected to exceed the 25,000 L per day threshold. Water for use during construction activities will be sourced from appropriate surface water sources adjacent to the Project Footprint and will be withdrawn in accordance with applicable regulatory guidelines and requirements.

This EA Report also considers the principles and guidelines of sustainable development related to the environment as outlined in the Climate and Green Plan Implementation Act.

### 2.3.1 Other Federal/Provincial/Municipal Approvals

The Federal Government of Canada reviewed key information on the proposed Project towards determining whether it needed to be assessed under the Federal review process. In a letter (dated June 24, 2016) to MI from the Canadian Environmental Assessment Agency, the Agency reviewed available information on the proposed road and concluded that the proposed Lake St. Martin Access Road is not an incidental activity to the Lake Manitoba and Lake St. Martin Outlet Channels Project or a designated physical activity under CEAA 2012. This was based in part on the expressed purpose of the road being that it is required for the Lake St. Martin Emergency Outlet Channel. The Agency also indicated that they recognize that the proposed all-season road is less than 50 km in length and therefore does not meet the threshold under Section 25(c) of the Regulations Designating Physical Activities under the Canadian Environmental Assessment Act (2012).

In addition to the Manitoba Environment Act Licence, the Project will require provincial approvals for the development and operation of temporary works such as quarries, access roads and borrow sites. Should these be required, they will be permitted individually.

Critical habitat for Eastern whip-poor-will (*Astrostomus vociferus*), as defined under Canada's Species at Risk Act (SARA), does intersect a portion of the proposed Project. A SARA permit for Project activities in

this area would only be required if construction activities within the critical habitat occur during their breeding period.

No municipal approvals are required for construction of the Project.

## 2.4 LAND USE AND COMMUNITY PLANNING AND ZONING

### 2.4.1 Existing Land Use

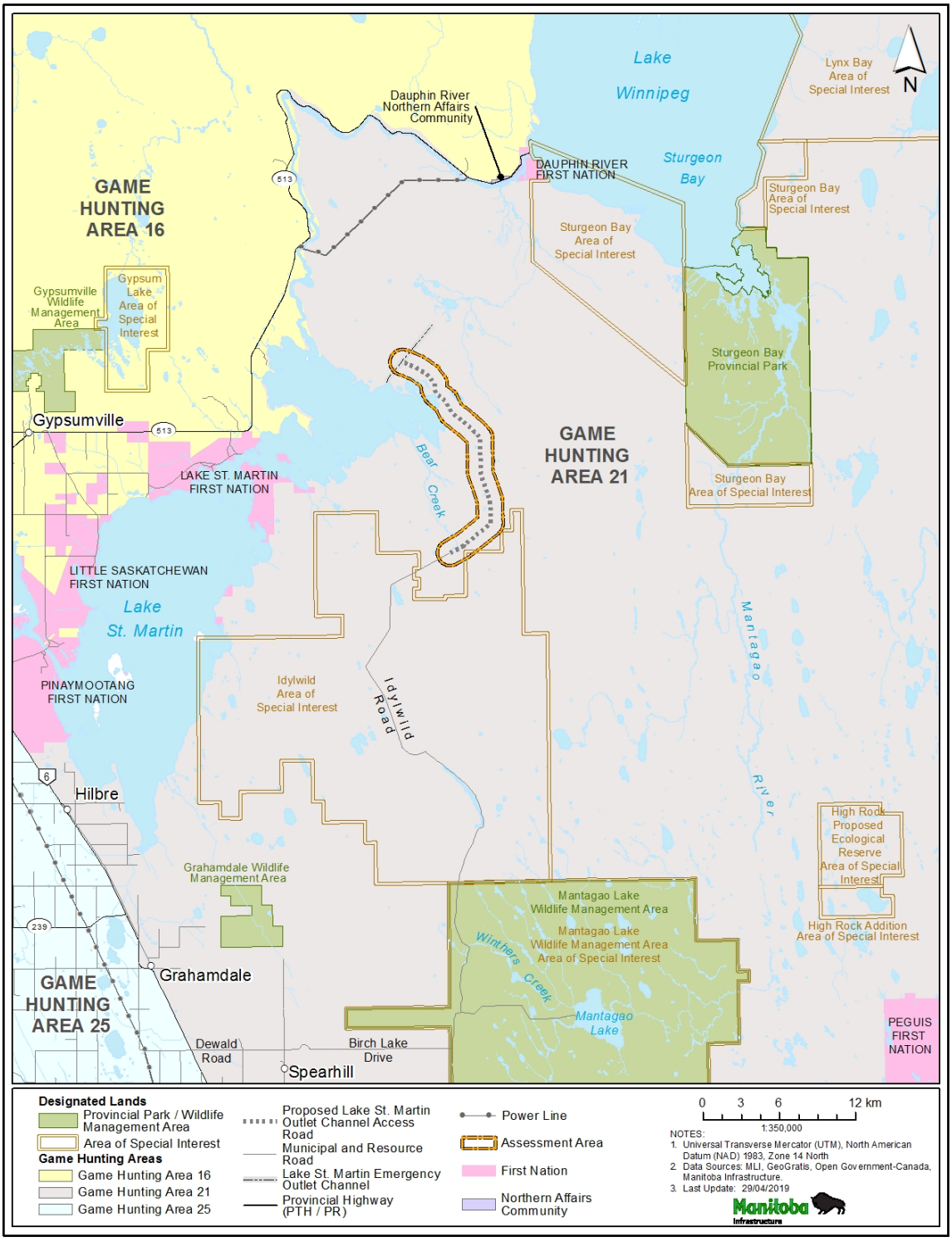
This section provides an overview of existing land use within the Project Assessment Area (PAA) illustrated in Map 1-1; additional detail is provided in Chapter 4 (Section 4.5.3). The Project follows the existing winter road alignment within an otherwise undeveloped area supporting natural vegetation cover. The Project is situated on Crown Land and not subject to by-law zoning or a development plan.

Resource use in the Project area consists mainly of hunting, trapping, fishing, camping, and recreation activities, e.g., snowmobiling. There are at least eight resource tourism operators in the Project region. There are no cottages or developments in the PAA. The Project is situated in Game Hunting Area (GHA) 21, Forest management Units 41 and 45 and located within an open trapping area (Map 2-1).

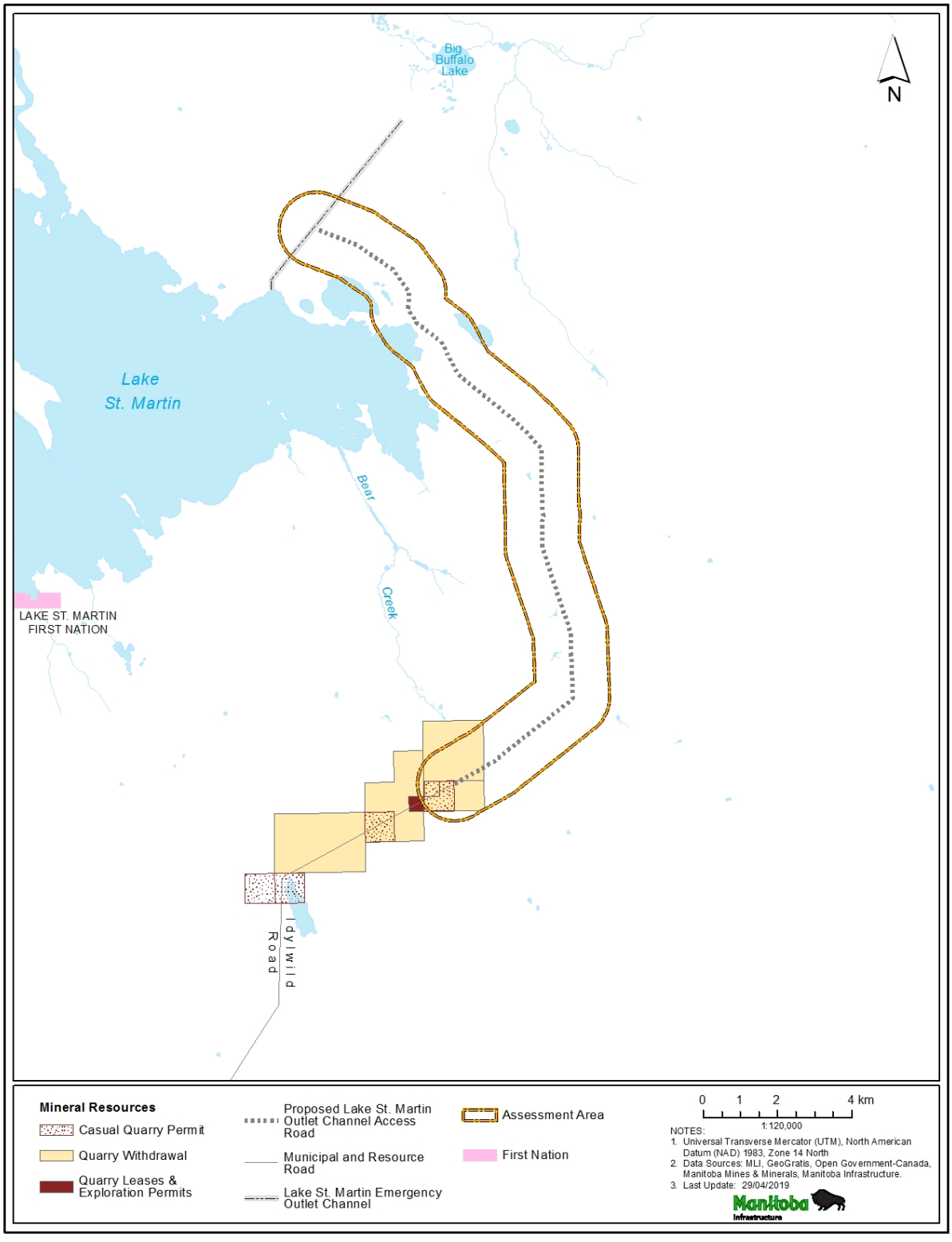
Aside from some recreational trails (possibly used for hunting purposes) identified during field studies conducted in association with this Project, the area is not known to support any other land uses. The PAA lies within the Open Trapping Zone 3 (Manitoba 2018). The only provincially or federally designated Area of Special Interest (ASI) in the PAA is the Idylwild Area of Special Interest (ASI).

Review of available information on mineral dispositions obtained from Manitoba Sustainable Development's Mineral Resources Branch identified three quarry withdrawals and one quarry lease in close proximity to the Project (Map 2-2). The quarry withdrawals were taken out by Manitoba Infrastructure in January 2015 and are noted as pending. The single quarry lease (QL-2987) was established in November 2014 and is also noted as pending. All mineral dispositions identified above are located near the southernmost extent of the Project, at the terminus of Idylwild Road (existing resource road) and the start of the Project.

The LSM Access Road is located entirely on Provincial Crown land that is currently only seasonally accessible. The nearest community is approximately 13.5 km to the west at the Lake St. Martin First Nation reserve boundary and 16 km to the northeast at the Dauphin River First Nation. (Map 1-1). The proposed Project crosses lands used for traditional purposes by Lake St. Martin First Nation, Little Saskatchewan First Nation, Dauphin River First Nation, Pinaymootang First Nation and Peguis First Nation.




**Map 2- 1. Game Hunting Areas, Parks, Protected Areas and Areas of Special Interest Located Near the Project**




**Map 2- 2. Quarry Leases, Permits and Withdrawals in Proximity to the Project**

### 2.4.2 Legal Description

The legal description for the lands traversed by the Project is identified in Table 2-2.

**Table 2-2. Legal Description of Project Lands**

| | | | | |
|---|---|---|---|---|
| NE-19-31-05-W | NW-33-31-05-W | NW-16-32-05-W | SE-30-32-05-W | SE-01-33-06-W |
| SE-30-31-05-W | SW-04-32-05-W | SW-21-32-05-W | NE-30-32-05-W | NE-01-33-06-W |
| SW-29-31-05-W | NW-04-32-05-W | NW-21-32-05-W | SW-31-32-05-W | NW-01-33-06-W |
| NW-29-31-05-W | SW-09-32-05-W | NE-20-32-05-W | SE-31-32-05-W | NE-02-33-06-W |
| NE-29-31-05-W | NW-09-32-05-W | SE-29-32-05-W | NW-31-32-05-W | SW-11-33-06-W |
| NW-28-31-05-W | SW-16-32-05-W | SW-29-32-05-W | NE-36-32-06-W | SE-11-33-06-W |
| SW-33-31-05-W | | | | |

### 2.4.3 Project Phases

The Project is comprised of four main phases:

1. Planning and design;
2. Construction;
3. Operation and Maintenance; and
4. Decommissioning.

#### *2.4.3.1 Planning and Design*

The Planning and Design Phase began in 2015 and has included the identification and confirmation of the Project alignment, land tenure, ownership and use, design details for the road embankment and culvert installations, and securement of funding. Other notable activities that took place during the planning and development phase are Indigenous and Public Engagement (IPEP) activities (Section 3.0), and environmental baseline studies that were initiated to better understand the existing environment surrounding the proposed Project and to identify and assess potential effects. Baseline environmental studies conducted in 2015 to 2016 with respect to the aquatic and terrestrial (wildlife and vegetation) environments and heritage resources are described in greater detail in Sections 4.4 and 4.5.14.

The Planning and Design Phase also considers the development of the current EA Report, which is required for Provincial regulatory review towards a determination of whether an Environment Act Licence will be issued for construction and operation of the Project. The Planning and Design Phase will be complete when the Project obtains an Environment Act Licence to construct the Project.

#### *2.4.3.2 Construction*

The Construction Phase will begin when the Project receives its Environment Act Licence, and will continue for a period of 1.5 years. The Construction Phase will include all activities associated with site preparation, Project construction and site rehabilitation.

#### *2.4.3.3 Operation and Maintenance*

The Operation and Maintenance Phase will formally begin when construction of the Project is complete. This phase will include the remainder of the Project's life cycle, and will include all activities related to Project maintenance.

#### *2.4.3.4 Decommissioning*

At the end of the Construction Phase, temporary facilities and work areas that will not be needed for future maintenance activities will be decommissioned or demobilized, i.e., quarry and borrow areas, laydown areas and construction camps.

Post-operations decommissioning refers to the process after the Operation Phase whereby there is planned removal of infrastructure, such as the proposed ASR, from further operation. It is currently not anticipated that decommissioning of the Project will be required. If it ever becomes necessary to decommission the Project in the future, a decommissioning plan that adheres to the legislation and permitting at that time will be developed.

## 2.5 PROJECT COMPONENTS AND ACTIVITIES

This section provides a description of the different Project facilities and how they will be designed, constructed, commissioned, operated and (if required) decommissioned. The components associated with the Construction and Operational phases of the Project are:

- All season road;
- Gate;
- Culverts;
- Temporary access;
- Temporary construction camps and laydown areas; and
- Quarries and borrow areas.

The following sections discuss Table 2-3 regarding the components and the activities associated with their development and, wherever appropriate, their maintenance and decommissioning.

## Table 2-3. Project Activities Expected During Construction and Operation and Maintenance Project Phases

| Project Component | Project Activities | | | | |
|---|---|---|---|---|---|
| | Construction | | | Operation and Maintenance | |
| All-Season Road | • Clearing ROW<br>• Salvaging<br>• Windrowing<br>• Burning<br>• Drilling<br>• Blasting<br>• Excavating<br>• Stockpiling<br>• Grading<br>• Contouring | • Filling<br>• Controlling erosion<br>• Producing aggregate<br>• Coffer damming<br>• Excavating<br>• Filling<br>• Contouring<br>• Controlling erosion | • Restoring<br>• Transporting equipment<br>• Operating equipment<br>• Operating machinery<br>• Operating vehicles<br>• Signing<br>• Refueling | • Grading<br>• Operating equipment<br>• Operating vehicles<br>• Maintaining<br>• Producing aggregate | • Stockpiling<br>• Controlling vegetation Controlling dust<br>• Clearing snow<br>• Inspecting |
| Gate | • Drilling | • Contouring | • Installation | • Maintaining | • Inspecting |
| Culverts | • Excavating<br>• Filling | • Contouring<br>• Controlling erosion | • Restoring | • Maintaining<br>• Inspecting | • Steaming<br>• Cleaning |
| Temporary Access Routes | • Clearing<br>• Grubbing (only for quarries and temporary camps) | • Grading Gravelling<br>• Closing | • Restoring<br>• Demobilizing | • Inspecting | • |
| Temporary Construction Laydown Areas | • Clearing<br>• Stockpiling materials | • Operating equipment<br>• Storing fuels<br>• Dispensing fuels | • Storing explosives<br>• Demobilizing<br>• Restoring | • Testing for contamination | • Inspecting |
| Temporary Construction Camps | • Clearing<br>• Operating equipment<br>• Operating generator<br>• Housing workers | • Storing foods<br>• Sourcing water<br>• Disposing solid wastes<br>• Disposing liquid wastes | • Demobilizing<br>• Drilling<br>• Testing soil<br>• Restoring | • Testing for contamination | • Inspecting |
| Quarries and Borrow Areas | • Clearing<br>• Grubbing<br>• Excavating<br>• Stockpiling soils | • Blasting<br>• Crushing rock<br>• Stockpiling rock<br>• Operating equipment | • Transporting materials<br>• Closing<br>• Restoring | • Testing for contamination<br>• Inspecting<br>• For those retained<br>• Operating equipment | • Operating vehicles<br>• Maintaining<br>• Producing aggregate<br>• Stockpiling |

### 2.5.1 Construction

The Project activities that are expected to occur during the Construction, Operation and Maintenance phases of the proposed all season road are described in the following sections and summarized in Table 2-3. Some of the Project components will include the development of temporary works such as access, laydown areas, and a camp. An existing construction camp located near the terminus of the Idylwild Road will be used by the workforce during the construction period.

Prior to the onset of construction, potential development sites were accessed and surveyed. Other activities that have or may occur during the Planning and Design Phase include exploratory drilling, minor clearing and testing of substrates to confirm the suitability of project design.

A description of the key activities associated with development of project components are described in the following sections.

#### *2.5.1.1 Clearing*

The proposed Project is located on undeveloped Crown Land and will follow an existing winter road corridor. The cleared width for the Project will vary from a minimum of 24 m (12 m in both directions from the centreline of the road) for areas where there is no design ditch, and up to 30 m for areas with a design ditch or an inside curve of the road to improve sight lines. Clearing activities are expected to be limited and will primarily involve the removal of overgrown trees and shrubs along the edge of the existing winter road corridor in key locations to correct curve geometry, improve sight lines, and address other driver safety issues. The total estimated area that will be cleared is 30 ha.

#### *2.5.1.2 All Season Road Construction*

The intent is to construct the road in winter months under frozen conditions. Construction methods in areas with peat depths greater than 0.3 m will utilise woven geotextile placed under the road embankment prior to the placement of crushed rock and composite borrow material. The geotextile will act to stabilize and strengthen the road embankment and will help reduce material loss over the peat material.

Typical cross sections of the road embankment, including culvert installation and construction method (e.g. use of geotextile in peat areas), are included in Appendix A. Road construction activities will be used to construct the road fill, bed and surface. The top-face of the roadbed will typically be 7 m wide to allow for two lanes and composed of traffic gravel (limestone) to a nominal thickness of 150 mm, with composite material used as fill to the road base. The side slopes will be graded to a 3:1 or 4:1 slope, depending on location.

The equipment that will be used in constructing the road and associated infrastructure is outlined in Table 2-4. It is currently estimated that four to six labourers would be needed in addition to equipment operators.

### Table 2-4. Construction Equipment and Vehicles for the Project

| Equipment / Vehicle | Estimated Number |
|---|---|
| Mechanical Brushers | 2 or 3 |
| Rock Trucks | 6 to 10 |
| Hydraulic Excavators | 4 to 6 |
| Crawler Tractor w/ Dozer | 4 to 6 |
| Compaction equipment | 2 or 3 |
| Semi Trucks | 4 to 6 |
| Wheel Loaders | 2 |
| Rock drill | 1 |

Construction of the proposed Lake St. Martin Outlet Channel Road Project will require various quantities of materials. Table 2-5 provides an estimate of the type of material and estimated quantities required.

### Table 2-5. Materials Required to Develop the Project

| Material Required | Estimated Quantity | Unit |
|---|---|---|
| Composite Excavation | 300,000 | $m^3$ |
| Culverts | 215 | m |
| Crushed Rock | 85,000 | tonnes |
| Traffic Gravel | 50,000 | tonnes |
| Geotextile | 250,000 | $m^2$ |

It is anticipated that vehicle usage of the LSM Access Road during construction will be limited to construction equipment and vehicles only. Appropriate signage will be used, where appropriate, during and following construction.

A gate will be installed near the southern terminus of the LSM Access Road after the road is fully constructed. The gate will be located near the wetland north of and closest to the quarry located at the northern terminus of the Idylwild Road. The gate will have a lock and provide MI-permitted access onto the LSM Access Road.

*2.5.1.3 Culverts*

No fish-bearing streams were identified as to be crossed by the LSM Access Road alignment (Section 4.3). Installation of appropriately sized equalization culverts is expected to maintain the natural drainage patterns at each site and surrounding terrain.

Culverts will be embedded to ensure drainage connectivity on either side of the road embankment. Since no fish habitat is present within the Project Footprint (see Section 4.3), hydraulic sizing to facilitate fish passage is not required. Table 2-6 provides additional detail related to culvert location, sizing, and embedment.

**Table 2-6. Project Culvert Locations and Associated Details**

| Site No.[1] | Station | Northing | Easting | Diameter (mm) | Length (m) | Embedment (mm) |
|---|---|---|---|---|---|---|
| 40 | 627+00 | 5726231 | 558619 | 1050 | 14.5 | 200 |
| 41 | 635+70 | 5726679 | 559362 | 900 | 14 | 200 |
| 42 | 641+00 | 5727010 | 559776 | 900 | 15 | 200 |
| 43 | 647+00 | 5727384 | 560245 | 750 | 16 | 200 |
| 44 | 653+20 | 5727770 | 560730 | 2-1050 | 14 | 200 |
| 45 | 659+00 | 5728133 | 561183 | 750 | 16 | 200 |
| 46 | 668+00 | 5728927 | 561413 | 1050 | 15 | 200 |
| 47 | 680+60 | 5730185 | 561359 | 900 | 17 | 200 |
| 48 | 696+80 | 5731721 | 560845 | 750 | 16 | 200 |
| 49 | 712+40 | 5733245 | 560616 | 900 | 16 | 200 |
| 50 | 715+60 | 5733565 | 560611 | 900 | 17 | 200 |
| 51 | 718+50 | 5733855 | 560605 | 1050 | 16 | 200 |
| 52 | 727+65 | 5734771 | 560590 | 1050 | 14 | 200 |
| 53 | 736+13.7 | 5735482 | 560208 | 750 | 16 | 200 |
| 54 | 758+53.7 | 5736908 | 558488 | 900 | 17 | 200 |
| 55 | 760+53.7 | 5737079 | 558354 | 750 | 17 | 200 |
| 56 | 765+13.7 | 5737466 | 558144 | 750 | 16 | 200 |
| 57 | 774+03.7 | 5738275 | 557615 | 750 | 18 | 200 |
| 58 | 785+93.7 | 5739286 | 557191 | 900 | 15 | 200 |
| 59 | 803+33.7 | 5740373 | 555883 | 750 | 14 | 200 |
| 60 | 813+13.7 | 5740675 | 554971 | 750 | 17 | 200 |

[1]Site numbers are based on winter road segments

The potential location of these sites are illustrated in Map 2-3. Site photographs of the culvert crossing locations are provided in Appendix B.

Temporary erosion protection and sediment control measures, following installation of culverts, will be adopted where appropriate and be consistent with site requirements (see General Environmental Requirements, or GERs, in Appendix C). This may include the use of geotextile material overlain by riprap at culverts (Appendix A).

The culvert sites will be rehabilitated by natural revegetation and seeding and/or planting with native species, as required. Seeding and/or planting may also be undertaken on a site-specific basis at other locations deemed vulnerable to erosion and sedimentation.

Requirements for seeding will be identified by substantial and total performance inspections that are required to close out individual construction contracts.

#### *2.5.1.4 Temporary Sites and Facilities*

**Temporary Access**

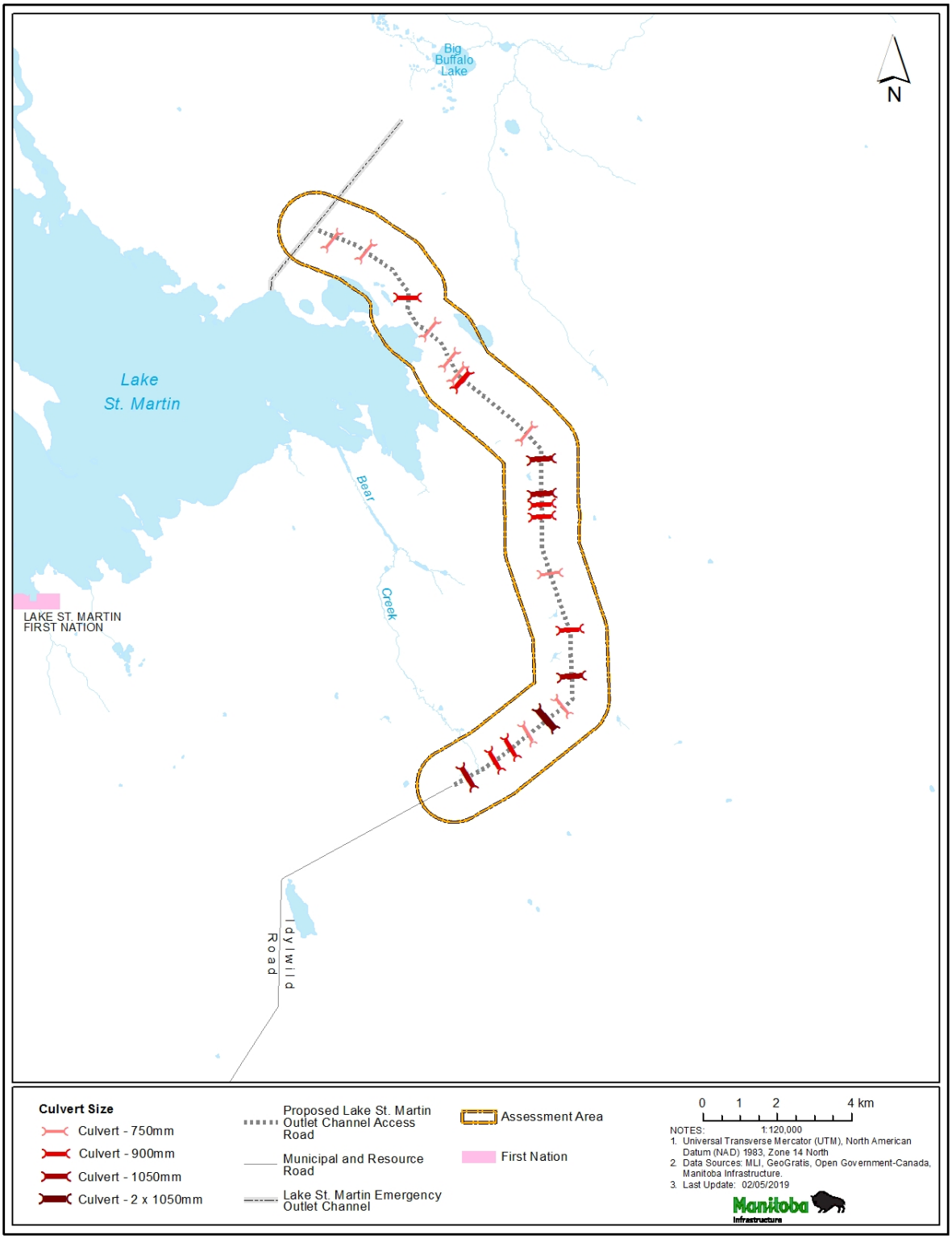
Temporary access will almost exclusively be associated with construction of the proposed LSM Access Road right-of-way (ROW) and associated works such as quarries and borrow areas. There is no anticipated requirement for construction decommissioning as the temporary access routes will be developed fully during the construction period.

**Construction Laydown Areas**

All works, including laydown areas, are intended to be contained within that ROW and/or on disturbed habitat associated with the existing infrastructure, e.g., the Idylwild Road and borrow areas. Site selection and area development will be consistent with the Environmental Protection measures including associated General Environmental Requirements (Section 2.7, Appendix C). In advance of construction, MI will provide the Contractor(s) with a plan identifying the laydown areas and other development sites; MI will work with Contractor(s) in developing the Construction Environmental Management Plan (CEMP as described in Section 2.7.1, and confirm their compliance with the GERs, and existing site-specific environmental information.

**Construction Camp**

MI anticipates that an existing construction camp located near the terminus of the Idylwild Road will be used to house the workforce for the duration of construction.




**Map 2- 3. Potential Location of Culverts along the All Season Road**

**Quarries and Borrow Pits**

Quarries and borrow pits may be required in order to source suitable construction material for the road embankment. MI will seek to avoid disturbance around the ROW and use existing quarry and borrow pits to their maximum potential. If required, MI will seek quarry or borrow areas adjacent to the proposed road alignment. The proposed road alignment and any adjacent quarry/borrow site will be separated by a 50 m to 100 m vegetated buffer. A temporary access road, with associated clearing, will extend to each quarry/borrow site.

*2.5.1.5 Waste Disposal*

Solid, liquid and hazardous wastes from the Project will be collected, stored, transported, disposed of and/or treated in accordance with The Environment Act (Waste Disposal Grounds Regulation) and The Dangerous Goods Handling and Transportation *Act* (Dangerous Goods Handling and Transportation Regulation, Environmental Accident Reporting Regulation and Storage and Handling of Petroleum Products and Allied Products Regulation). If contaminated soil is discovered during the life of the proposed Project, the affected site will be assessed and any soil determined to be contaminated will be removed to an approved treatment site.

The Contractor(s) is responsible for managing wastes associated with their construction and/or maintenance contracts and is required to provide a waste management plan prior to construction. Small quantities of domestic solid waste will be collected in appropriate on-site containment for transport to the closest landfill, e.g., R.M. of Grahamdale – Municipal Waste Disposal Grounds. If, at the time of construction, a community landfill does not meet regulatory requirements, then the solid waste would be transported to the nearest licenced disposal grounds, such as those located in Winnipeg.

Wastewater (sewage and grey water) from work camps and construction sites will be collected in approved holding tanks and will, upon agreement with the community, be hauled to the nearest community for disposal and treatment. If this is not possible, waste will be stored and transported to Winnipeg.

The fuels and hazardous material expected to be produced during Project construction are identified in Table 2-7. Waste petroleum products (e.g., lubricants, oils, greases) from construction vehicles and equipment will be collected and stored in designated areas and containers until they can be removed for recycling or disposal through a licensed waste disposal/treatment company. Fuel handling and storage areas will be located a minimum of 100 m from a waterbody (Appendix C). Fuel storage containers will incorporate secondary containment to minimize the potential for contamination in the event of an unexpected spill or container leak. Materials and equipment for the containment and recovery of accidental hazardous material spills will be available at all construction sites.

**Table 2-7. Expected Fuels and Hazardous Materials List**

| Project Component | Fuel/Materials | Purpose |
|---|---|---|
| All-Season Road; Temporary Access; and Quarries and Borrow Areas | Diesel | Construction equipment/vehicle fuel |
| | Gasoline | Construction equipment/vehicle fuel |
| | Propane | Construction equipment/vehicle fuel<br>Heating trailers/structures |
| | Oil | Construction equipment/vehicle motor lube |
| | Hydraulic fluid | Construction equipment |
| Culverts and Temporary Waterbody Crossing Structures During Construction | Diesel | Construction equipment/vehicle fuel |
| | Gasoline | Construction equipment/vehicle fuel |
| | Propane | Construction equipment/vehicle fuel<br>Heating trailers/structures<br>Heating under hoarding |
| | Oil | Construction equipment/vehicle motor lube |
| | Hydraulic fluid | Construction equipment |
| | Acetylene | Cutting steel |
| Temporary Construction Laydown Areas and Temporary Construction Camps | Diesel | Construction equipment/vehicle fuel<br>Electrical generator |
| | Gasoline | Construction equipment/vehicle fuel |
| | Propane | Construction equipment/vehicle fuel<br>Heating/cooking<br>Heating trailers/structures |
| | Oil | Construction equipment/vehicle motor lube |
| | Hydraulic fluid | Construction equipment |

## 2.5.2 Operation and Maintenance

### *2.5.2.1 Equipment Requirements*

During operation and maintenance activities, the type of equipment and vehicles that will typically be required include: excavators, graders, snow plows, sprayer trucks, pick-up trucks, tractors, riding mowers and weed-eaters. If additional equipment is required to be stored in the area, the quarry or construction camp could be retained as a maintenance yard. The specific use of the equipment for the project components is outlined in more detail in the following sections.

#### *2.5.2.2 Water Management*

Ditch maintenance will be carried out on an on-going basis to maintain drainage to original design standards and as a means to prevent sub-grade saturation and erosion. This activity will consist of excavating, filling, trimming and shaping to maintain required roadside ditch profiles including ditch slopes, inverts and the functioning of riprap areas. Work will typically occur in summer or fall. Ditch maintenance activities will also include the removal of sediment and debris from culverts inlets and outlets, where conveyance may be impeded. Water management may also involve pumping water around an area if required during ditch maintenance.

MI implements a Nuisance Beaver Management Program (NBMP) as part of the maintenance program as a supplementary measure where standard beaver control structures, such as beaver cones, are ineffective at reducing the risk of road washout. The NBMP includes measures for removal of nuisance beaver as well as for the removal of beaver dams.

#### *2.5.2.3 Snow Clearing*

Plowing snow from the road surface will be undertaken on an as required basis with motor graders, truck plows or rotary plows. Transporting and stockpiling of plowed snow is not anticipated.

#### *2.5.2.4 General Road Maintenance*

MI currently anticipates that requirements for road maintenance will be sporadic and localized to the road and infrastructure. This is largely due to the infrequent usage of the road during the operational period, when semi-annual inspections will be used to identify maintenance requirements. Grading of the finished LSM Access Road surface will be a sporadic and ongoing maintenance activity to promote a safe and reliable all-season road. MI currently anticipates that additional traffic gravel and grading/re-contouring the road may be required about every 20 to 30 years after flood control works are completed in the Lake St. Martin area. Where necessary, washout repair will be completed in the event that the road sub-grade, surface, shoulders or culverts are damaged by flooding, erosion, or debris. These repairs will be undertaken as soon as possible and as soon as conditions permit safe site access. Traffic controls may be required to provide safe travelling alternatives until repairs can be completed. The stockpile site adjacent to the existing camp site along Idylwild Road is anticipated to be the site that will be used to temporarily store materials, such as traffic gravel or crushed rock, to be used for road maintenance.

Application of water and/or magnesium chloride for dust control will be undertaken, as required, to minimize the amount of dust generated by road traffic to promote a safe and reliable all-season road.

Only chemicals approved for use on similar roads in Canada may be used and applied as specified by the manufacturer and only if and where necessary (e.g., not beyond the road surface). Chemicals such as magnesium chloride used for dust control will not be applied within 100 m of a stream crossing. Water will be drawn from a local waterbody and a provincial water rights licence will be obtained where required.

Mowing of short vegetation (e.g.: grasses) on road shoulders is currently not anticipated to be required. If required, it typically occurs during the summer months to improve visibility for driver safety and control noxious weeds while native vegetation becomes established. Generally, MI conducts mowing within 4.5 to 9 m of road surfaces. Various types of mowing equipment may be used including tractors, riding mowers and weed-eaters.

The removal of brush and small trees growing in the road ROW will be completed by mechanical brushing in late summer/fall to improve or maintain driver sight lines, maintain proper drainage and to reduce the cost of snow removal. The majority of mechanical brushing will take place in areas of abundant tree growth or where conventional mowing equipment cannot access ditch slopes due to rock outcrops or wetland areas.

Native seed mixes will be used where required in the disturbed area of the proposed road ROW to stabilize disturbed soils and minimize erosion. Where tree and/or shrub planting is required to adequately rehabilitate temporarily disturbed sites in sensitive areas, locally-appropriate native species will be used.

The gate will be checked regularly to assure it is functioning as designed and that the lock is working properly.

#### *2.5.2.5 Culvert Maintenance*

Seasonal inspections of culverts and bridge crossings will be conducted to assess the potential build-up of debris caught on piers or at the inlets of culverts to prevent upstream flooding, reduce stress on the structure and, although not anticipated to be required, allow for fish passage. Inspections will typically occur in the summer, but may occur in fall or spring as well as following heavy run-off events to confirm their condition and proper function. Beaver cones used on culverts will be checked and cleaned of debris.

Additional management measures, such as enhancing the existing erosion control (e.g., adding riprap) will be implemented wherever necessary. As required, maintenance crew will be dispatched to locations where the accumulation of debris represents a potential risk to the structure or the environment.

Culvert maintenance and erosion control activities will be undertaken in accordance with MI standards that, regardless of there being fish, include following the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat (Fisheries and Oceans Canada and Manitoba Natural Resources 1996).

#### *2.5.2.6 Aggregate Material Handling and Storage*

Aggregate material will be required during operation for road maintenance activities such as topping the road and washout repair. Any quarry established during construction will remain open for on-going maintenance of the all-season road. Surplus aggregate materials, processed during construction, will be stockpiled at the quarry areas for usage during maintenance activities. Any additional aggregate materials that may be required in the future would be drilled, blasted, crushed and sorted.

### 2.5.3 Decommissioning

The proposed Project is being developed as permanent infrastructure. Key components such as the road and culvert crossings will be used to maintain and operate existing and potential future flood prevention infrastructure well into the future. Temporary sites and facilities not required for road operation will be decommissioned after the Construction Phase.

MI has no plans to decommission the Project. If it ever becomes necessary to decommission the Project in the future, a decommissioning plan that adheres to the legislation and permitting at that time will be developed.

## 2.6 SCHEDULE

Construction of the Project will commence in winter under frozen conditions and is currently scheduled to begin in winter of 2019/2020. Construction is expected to take approximately 1.5 years, with completion of the Project anticipated by August 2021.

## 2.7 ENVIRONMENTAL PROTECTION

### 2.7.1 Construction

Environmental protection will be incorporated into the construction phase through the development and implementation of a Construction Environmental Management Plan (CEMP) that addresses site specific requirements of the Contractor(s). MI will work with the Contractor(s) in developing the CEMP in manner consistent with the General Environmental Requirements provided in Appendix C. Construction contract specifications detail the technical design as well as project-specific restrictions in

how the work is to be completed. The GERs will be among the information that will accompany the tender document(s) to be provided to prospective Contractor(s).

The site-specific measures that are likely to be addressed in the CEMP to assure protection of the environment may relate to the following:

- Access and staging;
- Clearing, grubbing and excavating;
- Erosion and sediment control measures and their installation;
- Blasting and explosives management;
- Noise and vibration;
- Dust and particulate control;
- Waste management, including its handling, storage and disposal;
- Working near waterbodies;
- Revegetation;
- Any environmentally sensitive sites (ESS), such as heritage resources or any unique habitat (e.g., mineral lick) or species of concern that may be affected by the Project; and
- Emergency response planning in the event of unanticipated emergency situations.

MI is responsible for incorporating the appropriate environmental protection measures, including best management practices, into the design of project components. Worksite specific environmental contract documents will be prepared and added to MI's standard specifications. MI will also monitor construction contract compliance with environmental specifications and legislated health and safety requirements. MI will also conduct an environmental audit of the construction work being done.

The Contractor will be responsible for implementing the environmental protection measures specified in the contract documents and providing specific plans for approval by MI. The plans will detail how the Contractor will meet the specifications (e.g., sediment management measures). The Contractor is also responsible to develop a plan to construct the all season road that incorporates measures outlined in the CEMP and GERs. This plan will identify where and how they will establish temporary sites, excavation areas, etc.

In cases where the CEMP does not identify specific measures for construction activities, the Contractor will provide that information following the review of the CEMP. In these situations, additional effort and level of detail will be required to provide a thorough plan that identifies and manages environmental risks associated with Project development. MI will be responsible to assure that the proposed steps outlined by the Contractor are appropriate and environmentally responsible. For example, the CEMP will not provide site-specific information on where the stockpile sites or the equipment laydown and staging sites will be located; there will, however, be general guidance in the GERs (Appendix C) to assist the

Contractor in selecting appropriate sites (such as stockpile locations) during the process of formalizing the construction site plan that will be provided to MI for review and approval prior to construction.

Any approvals that MI receives (e.g., Manitoba Environment Act Licence) will be integrated into the CEMP to accompany contract documents. In other cases, MI expects Contractors to obtain relevant permits in order to conduct their work (Crown Lands work permit, quarry permits etc.). It is MI's expectation that the Contractor will review the requirements of all approvals and demonstrate how they will be addressed as part of the work. Environmental permits or approvals obtained by the Contractor and any amendments will be identified and submitted to MI for compliance and record keeping purposes.

MI will frequently meet with the Contractor and require that regular updates be provided regarding progress on the environmental components of the work. Early and ongoing communication between MI and the Contractor is expected. In cases where a Contractor suggests means to achieve a particular goal or objective that differ from their original site plan (i.e. component of the work such as managing erosion and sedimentation), approval must first be obtained through MI before any modification is allowed.

The environmental protection measures also incorporates best practices for compliance monitoring – the step that verifies whether the site plan (including the GERs) are being followed during construction and whether required mitigation measures are being effectively implemented. MI will assure that effective environmental oversight of Project development through implementing MI's compliance monitoring process; MI will provide ongoing oversight of the Project during the Construction Phase and coordinate with the Contractor.

### 2.7.2 Operation and Maintenance

During the operations and maintenance phase of the Project, standard operating procedures and environmental best management practices will be implemented to promote the protection of environmental values along the all-season road and surrounding areas. Project-specific environmental protection measures may be developed for implementation during the Operations Phase.

# EA REPORT SECTION 3

# ENGAGEMENT PROCESS

## LAKE ST. MARTIN ACCESS ROAD

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# 3.0 ENGAGEMENT PROCESS

## 3.1 OVERVIEW

Public engagement includes all communications with people with respect to the Lake St. Martin (LSM) Access Road Project environmental assessment process. This primarily involves MI providing Project-related information on, and receiving relevant feedback through public comments. Three rounds of public open houses for the proposed Lake Manitoba and Lake St. Martin Outlet Channel Project were held between July 2017 and July 2018. These included open house discussions with the public on the separate LSM Access Road Project. As a result, the public engagement information provided in the following sections was largely obtained during activities that were also associated with the Lake Manitoba and Lake St. Martin Outlet Channel Project (Section 3.2). There were also specialized meetings with government agencies, such as the RM of Grahamdale, and stakeholder groups such as trappers and outfitters.

With potentially affected communities identified, engagement activities were developed with the intention to provide meaningful opportunities to inform potentially affected communities and to provide them with the opportunity to hear, understand and voice their thoughts regarding the proposed Project. Discussion with some of the aforementioned communities regarding access to the EOC, in some cases, began as early as 2011. Project information sharing meetings with communities began in 2015, and were followed by a number of subsequent meetings and correspondence until March of 2018. Thoughts expressed by affected communities and possible accommodation measures proposed by MI were documented and summarized.

## 3.2 OPEN HOUSES

### 3.2.1 Round One Open House

MI held two public open houses during the first round of the public engagement. The open houses were held in Moosehorn at the community hall on June 29, 2017 and in Winnipeg at the Delta Hotel on July 13, 2017. The open house in Moosehorn was held from 11 am to 8 pm while the open house in Winnipeg was held form 5 to 8 pm.

At the open houses, MI displayed storyboards around the hall for attendees to view— an example of a story board relating to the LSM Access Road Project includes a project map illustrating road alignments (Appendix D-1). MI personnel were available to explain information displayed on the storyboards, to answer questions and engage in discussions with attendees.

#### *3.2.1.1 Moosehorn Public Open House (June 29, 2017)*

One hundred and fifty seven people signed the sign-in sheet at the open house. The open house presented the proposed locations of the proposed LSM Access Road as well as proposed flood mitigation and associated infrastructure works in the region. No comments were received from the open house attendees specific to the proposed LSM Access Road or any associated road works.

**Photograph 3-1. Moosehorn Open House July 2017**

#### *3.2.1.2 Winnipeg Public Open House (July 13, 2017)*

Twenty three people signed the sign-in sheet at the open house. The open house presented the same content as in Moosehorn. The locations of the proposed LSM Access Road as well as the proposed flood mitigation works and associated infrastructure in the region, and the proposed relocation of existing infrastructure were shown.

### 3.2.2 Round Two Open House

MI held two public open houses during the second round of the public engagement. The open houses were held in Moosehorn at the community hall on March 6, 2018 and in Winnipeg at the

Canad Inns Destination Centre on Pembina Highway on March 8, 2018. The open houses were held from 2 to 4 pm and 6 to 8 pm. The information shared at the public open houses included: the proposed locations of the Lake St. Martin Access Road as well as the Lake Manitoba and Lake St. Martin Outlet Channels, information regarding the EA, and land use in the area.

The open houses were advertised in eight newspapers (Winnipeg Free Press, Winnipeg Sun, Grassroots News, Interlake Spectator, Express Weekly News, and Around Town. An email list compiled from previous open houses was used in identifying and inviting an additional 138 people to attend the open houses. Twenty-eight local landowners received notice of the open house via letter mail, while four RM's (RM of Alonsa, RM of Grassland, RM of Shellmouth Boulton and RM of Sifton), one city (Brandon), and one town (Russell) received the same letter.

At the public open houses, MI displayed storyboards regarding the ASR and Lake Manitoba and Lake St. Martin Outlet Channel Project around the hall for the attendees to view. The boards displayed background information on the proposed LSM Access Road, and information regarding the EA. MI personnel were available to explain information displayed on the storyboards, to answer questions and engage in discussions with attendees. Attendees were encouraged to ask questions during and following the presentation provided by MI staff.

The following sections outline the results from discussions and questionnaires associated with the open houses.

#### *3.2.2.1 Moosehorn Public Open House (March 6, 2018)*

Eighty-seven people from more than eight communities signed the sign-in sheet for the public open House in Moosehorn. A total of 9 comments and questions relating to the LSM Access Road were recorded during the open house.

The following is a record of the comments related to the access road were received during the open house comment period. Note that most meeting attendees at this open house were referring to the road extending from PTH 6 to the Lake St. Martin Emergency Outlet Channel (EOC) when using the term "access road". Manitoba Infrastructure Staff took note of all the questions as they were delivered and addressed questions where possible. Results of this correspondence are provided in Table 3-1.

#### *3.2.2.2 Winnipeg Open House (March 18, 2018)*

Fifty-six people from more than six communities signed the attendance sheet at the Winnipeg Public Open House. A total of three comments and questions relating to the LSM Access Road were recorded during the open house.

**Table 3-1. Questions and Comments at the Moosehorn Open House on March 6 2018**

| Public Question/Comment | MI Response |
|---|---|
| Access road will be expensive to build, but at least there is already a road for most of the way. Bigger work will be required at the winter road. In summer you can travel all the way to the winter road by 2wd truck. | These comments were noted. |
| Contracts for the road were awarded today? (Referring to the existing Idylwild Road extending to PTH 6) | No – the Minister said we will award contracts to proceed with road development. |
| Road access to Lake St. Martin – what is the distance and what type of road? | 80 km – 60 km of forestry road and about 20 km of new road. Gravel all weather road. |
| Will the RM have to maintain the road? | Some negotiations of the new road will need to be discussed. |
| There were questions regarding the recent road construction project done without going through the normal tendering process. (Referring to Idylwild Road to PTH 6):<br>• How do I know you are doing your job when elsewhere you are not transparent about tendering? Note that four other people indicated they have a similar concern.<br>• Was the road gifted without a bid?<br>• Previously there was a preliminary estimate of the cost. What was this estimate?<br>• Clarify the bid process. You gave this contract on the RM land without consultation. | These points were addressed and explained |
| One person pointed out that there about six moose in the area. Wolves cleaned out the deer in the region. The fire in 1989 chassed a lot of the big game out. About 3-4 years ago, game by the access road were hunted out; among the wildlife seen in that area in the past year were muskrat, beaver but no moose. | These comments were noted. |

Table 3-2 provides a record of the comments related to the proposed LSM Access Road were received by MI during the open house event. Provincial representatives took note of all the questions as they were delivered and addressed questions where possible.

**Table 3-2. Questions and Comments at the Winnipeg Open House on March 18, 2018**

| Public Question/Comment | MI Response |
|---|---|
| The access road invites ATVs, dirt bikes, etc. Why not access [the LSMOC] from PR513? | That was considered but would require a bridge. The proposed access route alignment is pre-existing, and only requires limited new construction and upgrading for the project. |
| The access road does not need a licence? | No. Upgraded portions do not need a licence, but an internal review was done. New construction along the winter road does need a licence. |
| How many different approvals will the project require? | Road requires provincial approvals only. It is not long enough for CEAA consideration. |

### 3.2.3 Round Three Open House

MI held a series of Public Open Houses during their third round of public engagement in July 2018. The open houses were held from 2 to 5 pm and 6 to 8 pm at the:

- Moosehorn community hall on July 19, 2018;
- St. Laurent Recreation Centre on July 20,2018
- Portage la Prairie Canad Inns Destination Centre on July 21, 2018; and,
- Winnipeg Canad Inns Destination Centre of Pembina Highway on July 27, 2018.

Information on the LSM Access Road was shared at the public open houses alongside information related to the Lake Manitoba and Lake St. Martin Outlet Channel projects: its spatial boundaries of the EA, and preliminary proposed mitigation measures being considered. Methods of obtaining feedback included attendees viewing storyboards and engaging in discussion with MI staff, and the question period of during and following MI's presentation regarding the proposed Project.

In total, eight newspapers (i.e., Winnipeg Free Press, Winnipeg Sun, Brandon Sun, Grassroots News, Interlake Spectator, Portage CP Herald, Express Weekly News, and Around Town) advertised the open houses. Twenty-eight landowners received notice of the open houses via mail while four RM's (RMs of Alonsa, Grassland, Shell-mouth-Boulton, Sifton), one city (Brandon), and one town (Russell) received the same letter. An email list compiled from previous open houses was used in identifying

and inviting an additional 138 people to attend the open house of their choice. In addition to these 138 people, 12 First Nations communities were also emailed about the public open houses (Appendix D-2). The Public Open Houses were also advertised on MI's website for the Project.

MI presented storyboards around the hall for the attendees to review. The boards displayed background information on the proposed LSM Access Road, other flood control works proposed in the Lake St. Martin area, and information regarding the EA. In the community of St. Laurent, a French version of the poster boards were available to accommodate the Metis community. MI personnel were available to explain information displayed on the storyboards, to answer questions and engage in discussions with attendees. Attendees were encouraged to ask questions during and following the presentation provided by MI staff.

#### *3.2.3.1 Moosehorn Open House (July 19, 2018)*

Sixty-four people from over seven communities signed the sign-in sheet for the Public Open House in Moosehorn. Of the sixty-four participants, 72% of them identified themselves as an affected landowner or permanent resident. No comments or questions relating to the LSM Access Road were received during this open house.

#### *3.2.3.2 St. Laurent Open House (July 20, 2018)*

Twenty-four people representing ten communities signed the sign-in sheet for the public open house held in St. Laurent. No comments or questions relating to the LSM Access Road were received during this open house.

#### *3.2.3.3 Portage la Prairie Open House (July 21, 2018)*

Twenty-five people from nine communities signed the attendance sheet during the Portage la Prairie Open House. No comments or questions relating to the LSM Access Road were received during this open house.

#### *3.2.3.4 Winnipeg Open House (July 27, 2018)*

Forty-five people representing ten communities attended the open house in Winnipeg during Round 3 of the public engagement. A total of two questions relating to the LSM Access Road were recorded during the open house.

**Photograph 3-2. Presentation at Winnipeg Open House July 2018**

Table 3-3 provides a record of the comments related to the proposed access road were received during the open house. MI took note of all the questions as they were delivered and addressed questions whenever possible. The comments provided by meeting attendees relate to access management once the road is developed. Manitoba Infrastructure had not decided at that time as to whether the road would be gated, for example, and could only advise that this is being considered and would be addressed through the environmental assessment process.

**Table 3-3. Questions and Comments at the Winnipeg Open House on July 27, 2018**

| Public Question/Comment | MI Response |
|---|---|
| How will vehicle access be managed? | Comment/question was noted. |
| It sounds like the objective is to limit access? | Comment/question was noted. |

## 3.3 GOVERNMENT

### 3.3.1 Province of Manitoba

Engagement with provincial and federal government representatives relevant to the proposed Project has been ongoing for several years. MI maintains close contact with Manitoba Sustainable Development (MSD) staff of various branches.

In October 2015, a digital presentation of the conceptual project components and an accompanying survey was distributed to regulators. The survey is provided in Appendix D-3. Details of the survey questions and regulator responses specifically referring to the access road are included in Table 3-4.

**Table 3-4. Questions and Responses from a Regulatory Survey from October 2015**

| MI Question | Regulator Response |
|---|---|
| What are the approvals that are required (e.g. Environment Act License, WMA Use Permit, Crown Land Work Permit etc.)? | • Environment Act Licence<br>• Meet requirements of the Fisheries Act<br>• Crown Land Work Permits<br>• WMA Use Permits<br>• Commercial Timber/Peatland Permit |
| Who is going to own the road and ROW and be responsible for the ongoing maintenance? | • MI should own the road given the upgrades that are being planned. This should also reduce the need for permits and approvals that would be required regularly in the future<br>• The changes to the existing road as well as the additional upgrades are being driven by MI and therefore ownership of the road should also fall with MI |
| Are there any access control measures planned? If so then what is the specific access plan that will be implemented? | • If access is going to be managed will it apply to all or some portions of the road and how will access be managed?<br>• The concern to the Forestry Branch is, with increase access by the general public to the land base, there a higher level of fire risk. Being that it was mentioned that we are currently in a wet cycle, it will become a greater issue as we return to drier conditions<br>• Forestry Branch will also like to reserve the right to use the road network for access to future Forestry and Peatland activities. Being that the original intent for the Idylwild Road was for increased access to these resources |
| How will the road be designated as it relates to hunting to help manage healthy wildlife populations? | • This may depend on how MI classifies the road |

| MI Question | Regulator Response |
|---|---|
| How will the old roads be re-claimed as a result of realignment? | • Access should be restricted at both ends of the reclaimed portions of the road to allow for vegetation establishment<br>• Soil should be worked and ground cover and trees should be planted to facilitate establishment |
| Should the WMA boundary be altered or stay as is to reduce the need for permitting in the future? | • There are no plans now to alter the WMA boundary but this may be considered in the future |
| What resource concerns do we have as a result of this project? | • Timber, peat, aggregate, ungulates (moose, elk, deer), sharp-tailed grouse, snake hibernacula, bat hibernacula, impacts on wetlands, access improvement, fish, endangered Species, etc. |
| What are critical data for inclusion in the Permit and Licence application documents? | • Commercial Timber/Peatland Permit (will take a couple weeks to administer):<br>• The proponent is required to have a permit from Forestry & Peatlands allowing resource harvest or extraction prior to operations start up<br>• Conditions may be placed on where and how the depleted resources will be utilized (i.e. fuelwood, lumber, peat, etc.). Therefore, it would be beneficial to provide the planned utilization of the resources as part of the project development plan. In the event that the resources are stockpiled, these location will need to be identified the Integrated Resources and Environmental Management Team (IRMT) for review<br>Wildlife:<br>• Locations of ungulates (moose, elk, deer) within twelve kilometres of the construction corridor<br>• Sharp-tailed grouse elks, snake hibernacula, bat hibernacula, endangered flora and fauna need to be identified and an avoidance or mitigation plan developed<br>• Identification of wetlands that may be impacted by the Project and how these potential impacts will be mitigated<br>• Crown Land Work Permits, WMA Use Permits and Commercial Timber/Peatland Permits are administered in the region and it will be important that the appropriate information can be provided for these documents |
| What monitoring requirements will be in place? | Wildlife:<br>• A monitoring plan is required that ensures that inferences can be made about the effects of the project on ungulate populations (moose, elk, deer). Two years of pre-disturbance data and a minimum of five years of post-construction data would be preferable. The monitoring plan must be reviewed by the Wildlife and Fisheries Branch |

| MI Question | Regulator Response |
|---|---|
| | • The intention to implement access controls (or lack thereof) needs to be clarified at the EA licence stage<br>Vegetation:<br>• Monitoring of re-establishment of vegetation will have to occur to ensure it is successful |

MI conducted site visits and an overflight of the Lake St. Martin region that includes the proposed Access Road area with representatives from the Manitoba Sustainable Development (MSD) on August 28, 2016.

MI held a meeting with provincial government representatives on March 14, 2018. A presentation regarding the proposed Project was provided by MI, followed by a question and answer period, and focus group sessions involving specialists from different sectors (e.g., wildlife, water, socio-economics) discussing various technical topics relating to the LSM Access Road, the Lake Manitoba and Lake St. Martin Outlet Channel Projects. A follow-up meeting was held with MSD to discuss wildlife on April 19, 2018. The topics that were discussed that relate to the Access Road are included in Table 3-5.

### Table 3-5. Questions and Responses Regarding the LSM Access Road Project-Regulatory Meeting Held on March 14, 2018

| Regulator Question/Comment | MI Response |
|---|---|
| Is Idylwild Road a part of the project? | • Upgrade and improvements to the curve are not part of the Project<br>• The new section (winter road) is going forward as part of the provincial Environmental Act Proposal (EAP) |
| Why is road coming from the south? | • Big barrier is the Dauphin River. There was some exploration of options, but this would have required a bridge<br>• There is no sense to do that when considering cost/benefit of different options |
| The indicated road will upgraded and constructed. Is that for the construction phase or will it be indefinite? | • There is no plan to decommission the road. One thing being explored is trying to manage access. From where the winter road occurs, restricting access is an issue<br>• If you think about how likely the roads will be used – the channels will be used during flood situations; the intention would not be to plow the road yearly – with exception of the municipal portion. We need to visit the Project annually. Not attempting to increase the accessibility |

| Regulator Question/Comment | MI Response |
|---|---|
| There will be Increased access to hunters and trappers. | • Noted |
| The road is not an ASR right now - there are flooded out chokepoints and only four-wheel drives can be allowed. It would be good to keep the chokepoints. | • Noted |
| It might be low maintenance but there will be improvements to the road. | • Noted |
| A regulator was on the road 40 years ago. Over time there were certain chokepoints that deteriorated – so for the improvements keeping that in mind would be helpful. He showed the first chokepoint just north of Mantagao WMA. That significantly stops people travelling up there. | • The standard of the road is dictated by the specifications. We need to plan for the increased accessibility |
| Try using a temporary bridge (steel span during construction) – then remove it. If they can be incorporated, it would be appreciated. | • There will be liability issues and we need maintenance of the road<br>• Not much can be done on the forestry road component. A few of the curves are treacherous. There were issues when developing the emergency channel<br>• Perhaps the most significant is to put a barrier to the winter road<br>• The Forestry road is treacherous – may be able to access with ATVs and Argos<br>• May be able to block vehicle traffic. If that is done as soon as possible |

### 3.3.2 RM of Grahamdale

A series of monthly meetings were held with the RM of Grahamdale to discuss the LSM Access Road Project and the status of other MI-related works that were ongoing or proposed in the region. The meeting dates and key outcomes of those meetings with the council for the RM of Grahamdale are summarized in Table 3-6.

**Table 3-6. RM of Grahamdale Meetings Regarding Lake St. Martin Access Road**

| Date | Key Road-Related Topics |
|---|---|
| July 27, 2017 | • There was a discussion on the recent open houses<br>• Status of the contractors working on the Lake St. Martin Outlet Channel Access Road (i.e., existing municipal connections) being back to work<br>• MI staff provided the RM of Grahamdale Council with:<br>o Copies of Dewald Rd cross sections<br>o Hard copy stockpile site<br>o Video of Dewald Rd |
| February 22, 2018 | • There was a discussion on the recent open houses and upcoming open houses on March 6 and 8, 2018<br>• While there was no direct discussion on the LSM Access Road, MI provided a Memorandum of Understanding regarding the Birch Lake Drive to the Council for review (note that this was followed by a meeting on the topic held with the RM on March 15, 2018) |
| March 22, 2018 | • Status of the Access Road was discussed: equipment has been brought to the proposed development areas (municipal roads)<br>• Questions by the Council regarding the methods to be used in construction were answered by MI staff |
| April 26, 2018 | • Status of the Access Road was discussed |
| June 28, 2018 | • There was a discussion on the recent open houses<br>• Status of the contractors working on the Lake St. Martin Outlet Channel Access Road (i.e., existing municipal connections) being back to work<br>• MI staff provided the RM of Grahamdale Council with:<br>o Copies of Dewald Rd cross sections<br>o Hard copy stockpile site<br>o Video of Dewald Rd |
| July 26, 2018 | • Safety and signage along existing haul roads was discussed<br>• Dust control was applied by MI at the intersection of Spearhill Road and Dewald Road and contractors using roads were advised on additional safety measures to follow<br>• Public engagement requirements and general maintenance on existing roads in the region was discussed |
| August 30, 2018 | • An update was provided on the status of the haul roads (i.e., roads connecting to the proposed LSM Access Road location) – namely regarding stockpiling material and ongoing maintenance and status of any works |
| October 3, 2018 | • An update was provided on the status of the haul roads, including the roads connecting to the LSM Access Road – the road is travelable and on track for completion by seasonal shutdown |
| November 22, 2018 | • There was a discussion on work started on an access road into the LSM Outlet Channel and is ongoing on the RM portion of Birch Lake Drive |

| Date | Key Road-Related Topics |
|---|---|
| | • The next steps will be to connect the two sections that have been build up and build a new section (the LSM Access Road) to connect to the Lake St. Martin Emergency Channel |
| January 24, 2019 | • Recent changes in MI project management was discussed<br>• Grade improvements on Birch Lake Drive was discussed |
| February 28, 2019 | • An update was provided on the status of the haul roads, namely regarding proposed hauling of materials for road maintenance and tree clearing |
| April 4, 2019 | • MI's Engineering & Operations will administer the roadway construction projects<br>• Future meetings to be open to the public |

## 3.4 OTHER ORGANIZATIONS/GROUPS

MI held individual meetings in Ashern with seven stakeholders from the following organizations/groups on May, 10 2017 to discuss the LSM Access Road and associated access (i.e., Idylwild Road, Birch Lake Drive, and Dewald Road) that connect the road network to PTH 6:

- Plum Lake Outfitters;
- Log Cabin Riders;
- Bear Track Outfitters;
- a RM Leaser; and
- three local trappers;

MI personnel provided a presentation on the LSM Access Road (referred in the presentation as "Area 5") as well as other interconnected access such as the Idylwild Road (Appendix D-4). The key comments received during the discussions are seen below in Table 3-7. MI staff addressed any questions and concerns at that time and informed stakeholders that they would be notified before any work commences on the proposed LSM Access Road.

**Table 3-7. Feed Back Received from Stakeholders on May 10, 2017**

| Topic | No. Responses |
|---|---|
| Potential Project Issues:<br>• They have no issue with the project | 5 |
| Road Operation:<br>• They want to see a good plan in place for controlling beaver populations.<br>• Will the road have any signage?<br>• Will the road be opened once the Project is complete? | 3 |
| Hunting:<br>• The area is used for bear hunting.<br>• Hunters typically join outfitters from May to June and from September to October | 2 |
| Access:<br>• Will a gate be installed? An outfitter requested a key if there is going to be a locked gate.<br>• Accessibility for snowmobile travel over the banks is preferable. | 2 |
| Other comments:<br>• Stakeholders want to be notified when work commences on the road.<br>• Concern was expressed by an outfitter as to the money that they spent on the road previously to make it passable to hunters and how the project will affect their business.<br>• There was a low natural drain by Lake Road that could use a thru gate.<br>• Halfway between Lake Road and Bob's corner is the divide for the watershed in the area.<br>• Two people asked about the status of the emergency channel use, e.g., what is the likelihood that Reach 1 would be opened? | 5 |

In addition to the information gained from the public engagement program for the Project, information specific to Indigenous people and communities was gained through a separate Crown Consultation process. The Government of Manitoba recognizes that it has a duty to consult in a meaningful way with First Nation people, Métis communities and other Aboriginal communities when any proposed provincial law, regulation, decision or action may infringe upon or adversely affect the exercise of an Aboriginal or Treaty Right. In accordance with the Section 35 of the Constitution Act, (1982), any expressed concern about potential effects of a proposed development on Aboriginal and Treaty rights such as hunting, trapping and fishing require that the Province of Manitoba undertake a Crown Consultation process.

## 3.5 INDIGENOUS CONSULTATION/ENGAGEMENT

Indigenous consultation and engagement activities were developed to meaningfully inform potentially affected communities and to adequately provide them with the opportunity to hear, understand and voice their thoughts and understand concerns regarding the proposed LSM Access Road Project. In addition to the information in this section, further detail on the communities is provided in Section 4.5.

### 3.5.1 Consultation/Engagement Approach

An assessment to identify First Nations, Métis communities and other Indigenous communities that may be affected by the proposed LSM Access Road was conducted. Communities were identified using the Project's area of scope, knowledge from the historic and ongoing use of the existing portions of the access road current understanding and best available knowledge with respect to community use of the areas in proximity to the ASR and an assessment of potential impacts of the proposed Project on Aboriginal and Treaty Rights. The assessment resulted in the identification of nine Indigenous Communities:

- Dauphin River Northern Affairs Community;
- Dauphin River First Nation;
- Lake St. Martin First Nation;
- Little Saskatchewan First Nation;
- Pinaymootang First Nation;
- Peguis First Nation;
- Fisher River Cree Nation;
- Kinonjeoshtegon First Nation; and
- Lake Manitoba First Nation.

Manitoba's initial communications on the LSM Access Road began in September of 2015 (an Information Sharing Meeting). Initial letters from July 2016 identified the ASR as a component part of the Lake Manitoba and Lake St. Martin Outlet Channel Project. Initial meetings on the Lake St. Martin Outlet Channel Project included specific discussions on the critical need for an all-season road.

Information used to assess community use included: Traditional use areas and territory, proximity to the LSM Access Road, recorded issues from previous use of the winter road and adjoining existing all-season access roads, in-person meetings, and knowledge of community use by provincial

government staff. The results of these discussions are described in Section 3.5.2 and more fully in a separate document being developed by the Crown Consultation Steering Committee.

### 3.5.2 Consultation/Engagement Results

This section summarizes the results of the Indigenous Consultation/Engagement efforts described in Section 3.5.1. In total, nine communities were consulted during this process. Due largely to confidentiality issues, specific details on meetings with those communities are not being shared in this EA Report.

Table 3-8 provides a summary of the results received from the nine communities and their members during meetings held between spring 2016 and early 2018. In sum, most of the questions and concerns expressed by the First Nation communities related to:

- Access – purpose, design and controls to be applied;
- Timing and tendering process for the work;
- Potential effects of the road development on hunting and fishing in the region; and
- Potential effects of the Lake Manitoba and Lake St. Martin Outlet channels on the environment.

Details on the timing of these meetings and any associated communications is provided in the following subsections.

**Table 3-8. Issues and Concerns Identified by Nine First Nation Communities**

| Issue/Concern | MI Response |
|---|---|
| Economic Opportunities for First Nations | • Currently, an open tendering process will be used for the work associated with the access road (will include Indigenous involvement) |
| What is controlled access for the road? We hunt and trap in that area | • The intent is to control vehicle access on the new portion of the access road (winter road). There will be no changes to the use of the existing resource road. It is intended to keep vehicles and people off the control structure. Winter access would be available |
| Increase access into traditional area – impacts to hunting | • 2017 – Manitoba Sustainable Development eliminated licenced moose hunting in GHA 21 |

| Issue/Concern | MI Response |
|---|---|
| Why is this the access road you want to build?<br>Why not come from the other side?<br>What are the upgrades? | • This is an existing road that was used previously.<br>• Currently the road has a 5 meter top the plan is to make it a 6 meter top |
| Is there going to be gate on the road?<br>I did not know the road existed. | • Access control for where the new road starts has been discussed with First Nations. Some agree with some form of access control others do not. The control is to restrict vehicle access on the new road that access control site. ATV's and snow machines would continue to have access.<br>• The road is an old forestry road built in the 60's. |
| When are you going to start work on the road? | • After environmental license has been granted. |
| What are the impacts on road maintenance? | • Typical road maintenance. If the access to the emergency road is not required, winter road maintenance will not occur. |
| Will the channels have an effect on Bear Creek and LSM narrows spawning areas? | • The LSM Access Road will not affect Bear Creek or the LSM narrows. |

#### *3.5.2.1 Dauphin River Northern Affairs Community*

Discussions with the Dauphin River Northern Affairs Community began in winter 2016. A series of meetings occurred with community members until spring 2018. Issues and concerns were identified by the community members in attendance.

#### *3.5.2.2 Dauphin River First Nation*

Discussions with the Dauphin River First Nation began in spring 2017. A series of meetings, in which any issues and concerns were identified by the Chief-in-Council and community members, occurred until fall 2017. There was also a site visit by helicopter. Traditional knowledge work was received from the community.

#### *3.5.2.3 Lake St. Martin First Nation*

Discussions with the Lake St. Martin First Nation began in summer 2016. A series of meetings occurred with Chief-in-Council and community members until late winter 2017. Issues and concerns were identified by the community members in attendance.

#### *3.5.2.4 Little Saskatchewan First Nation*

Discussions with the Little Saskatchewan First Nation began in spring 2017. A series of meetings, in which any issues and concerns were identified by the Chief-in-Council and community members, occurred until fall 2017. There was also a site visit by helicopter. Traditional knowledge work was received from the community.

#### *3.5.2.5 Pinaymootang First Nation*

Discussions with the Pinaymootang First Nation began in spring 2017 and continued until late winter 2017. Issues and concerns were identified by the community members in attendance. A consultation report was submitted to Manitoba Infrastructure in early 2018. Traditional knowledge work was received from the community.

#### *3.5.2.6 Peguis First Nation*

Discussions with the Peguis First Nation began in spring 2018. A series of meetings, in which any issues and concerns were identified by the Chief-in-Council and community members, occurred until early 2018. There was also a site visit by helicopter.

#### *3.5.2.7 Fisher River Cree Nation*

Discussions with the Fisher River Cree Nation began in the spring 2017. A series of meetings, in which any issues and concerns were identified by the Chief-in-Council and community members, occurred until fall 2017. There was also a site visit by helicopter. A consultation report has been submitted to Manitoba Infrastructure.

#### *3.5.2.8 Kinonjeoshtegon First Nation*

Discussions with the Kinonjeoshtegon First Nation began in spring 2017. A meeting was held with the Chief-in-Council and community members in early winter 2018; any issues and concerns were identified discussed and documented. Traditional knowledge work has been received by Manitoba Infrastructure.

#### *3.5.2.9 Lake Manitoba First Nation*

Discussions with the Lake Manitoba First Nation began in the spring 2017. A subsequent meeting with Chief-in-Council and community members was held in fall 2017, at which issues and concerns were identified. Traditional knowledge work has been received by Manitoba Infrastructure.

# 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).

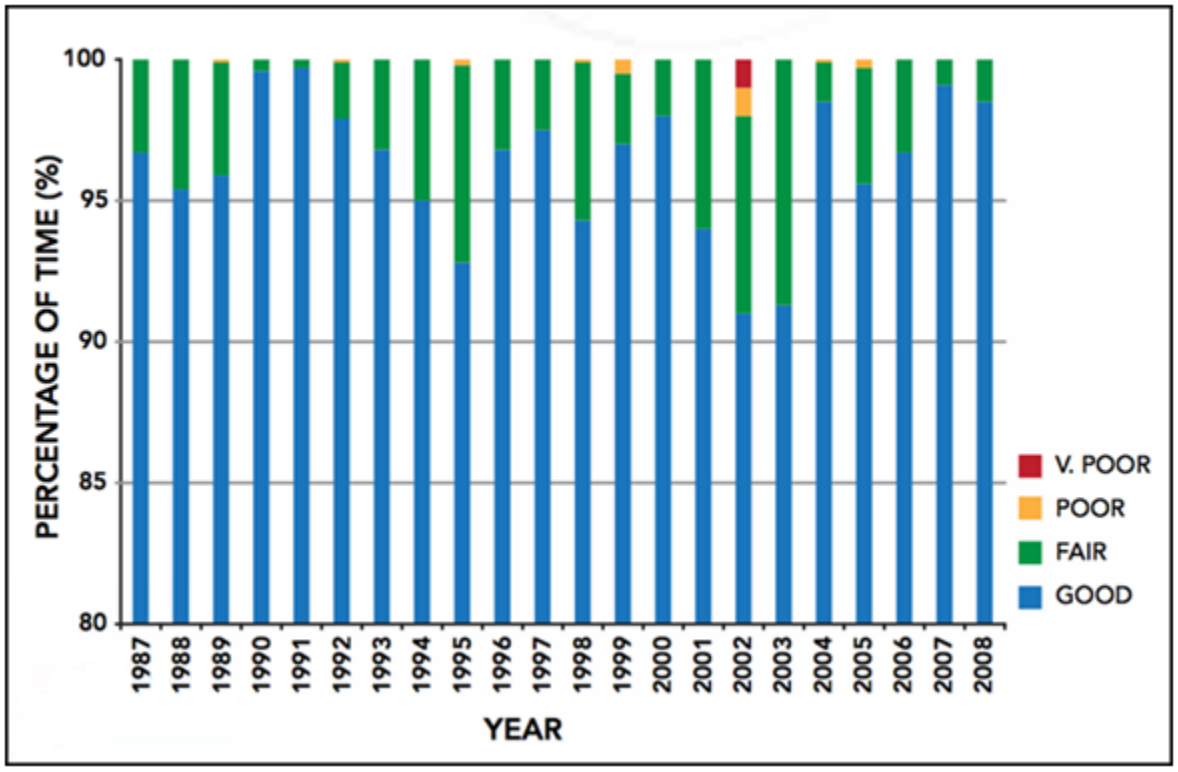



**Figure 4-1. Winnipeg (Downtown) Air Quality Index, 1987-2008 (source Government of Manitoba 2009)**

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).

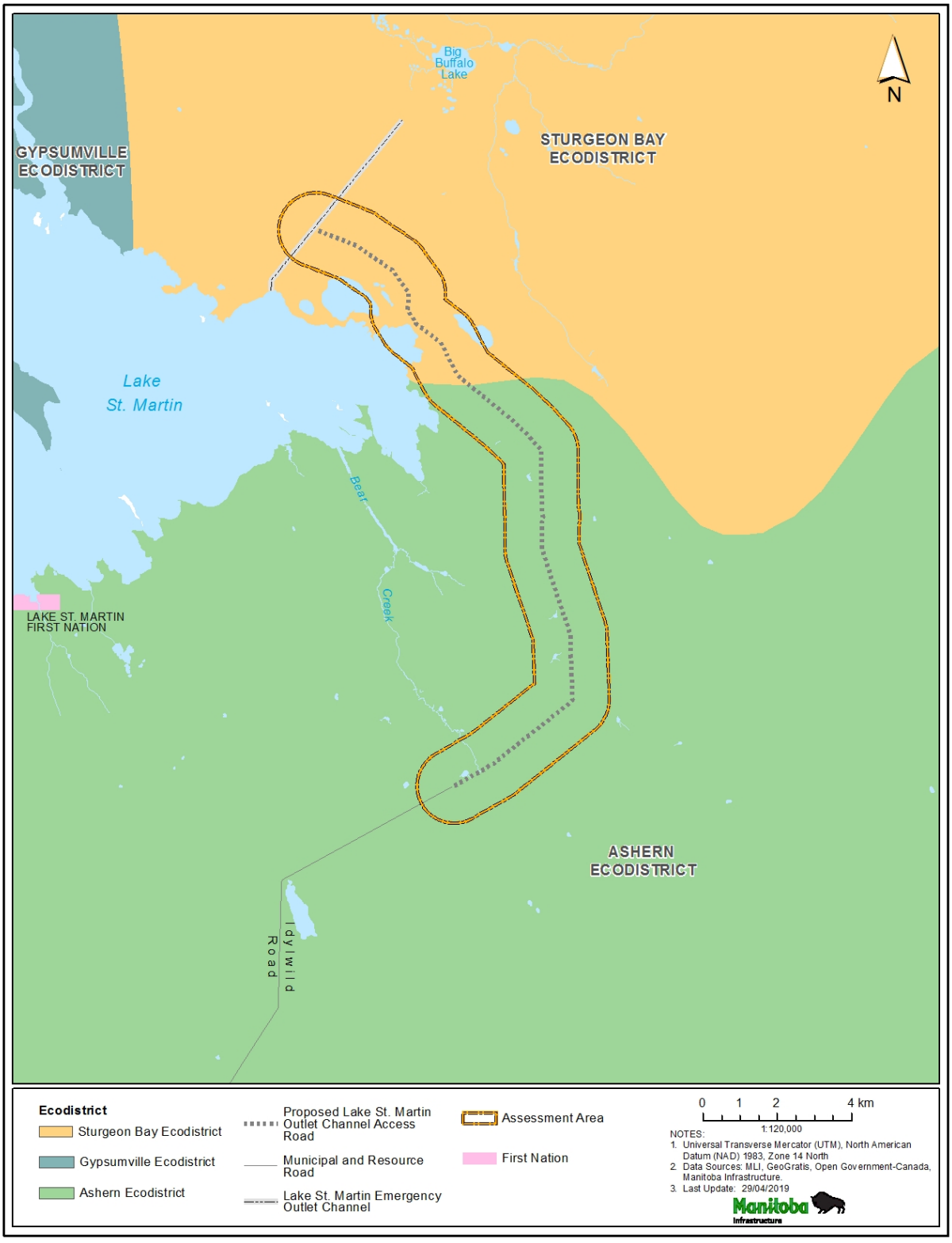
As shown in Table 4-6, noise levels in the vicinity of a highway can be in the range of 50 to 70 decibels (dB), although actual noise levels would be dependent on the volume of traffic, speed of the traffic and the receptor's distance from the roadway. Typical road construction equipment noise ranges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

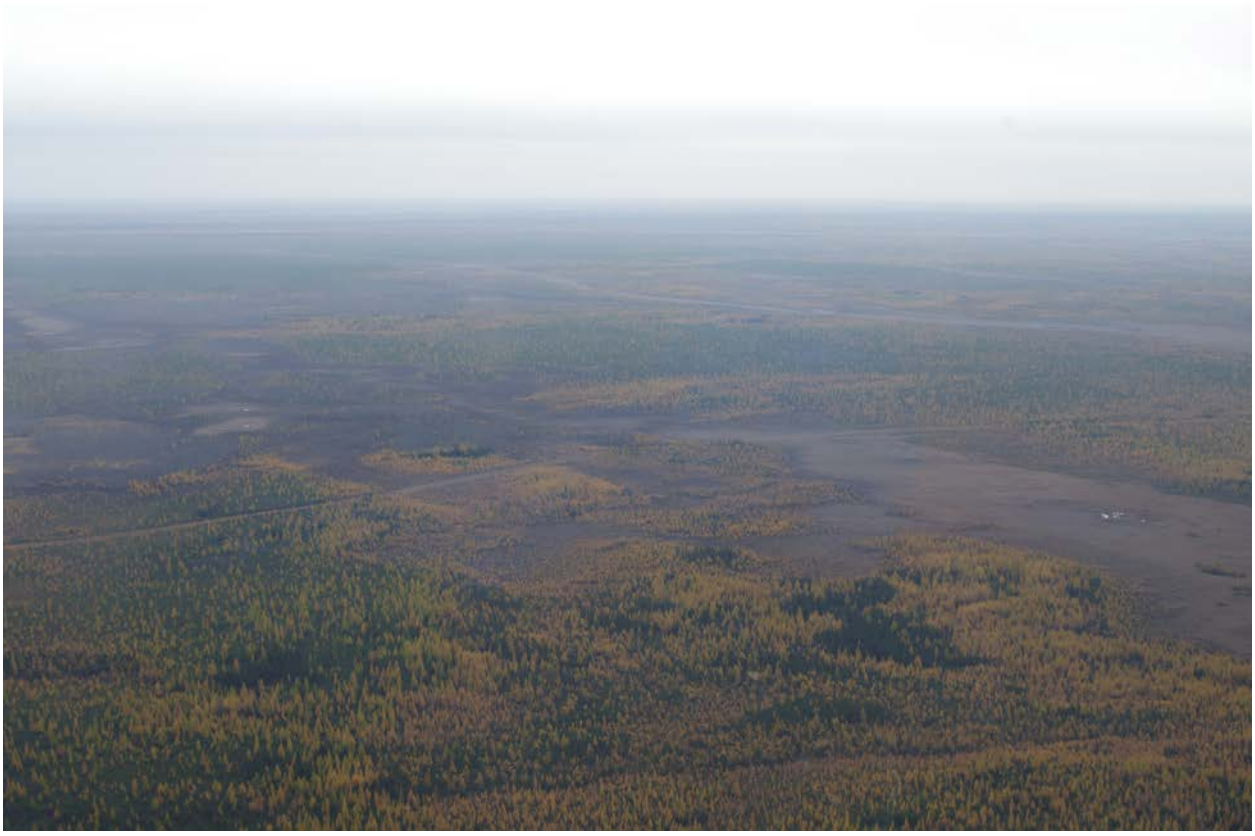
### 4.2.2 Terrain and Soils

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.

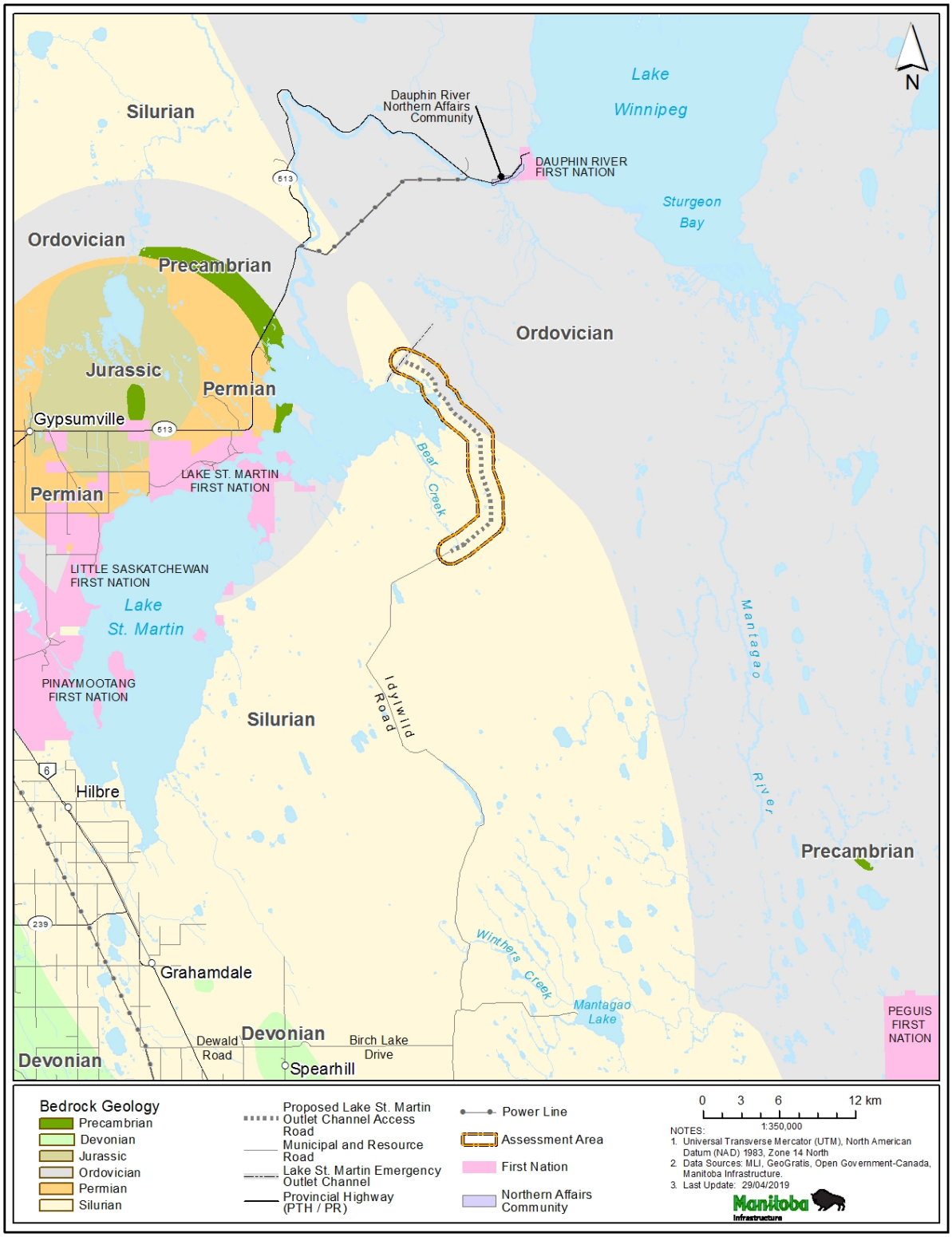
### 4.2.3 Geology and Soils

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).

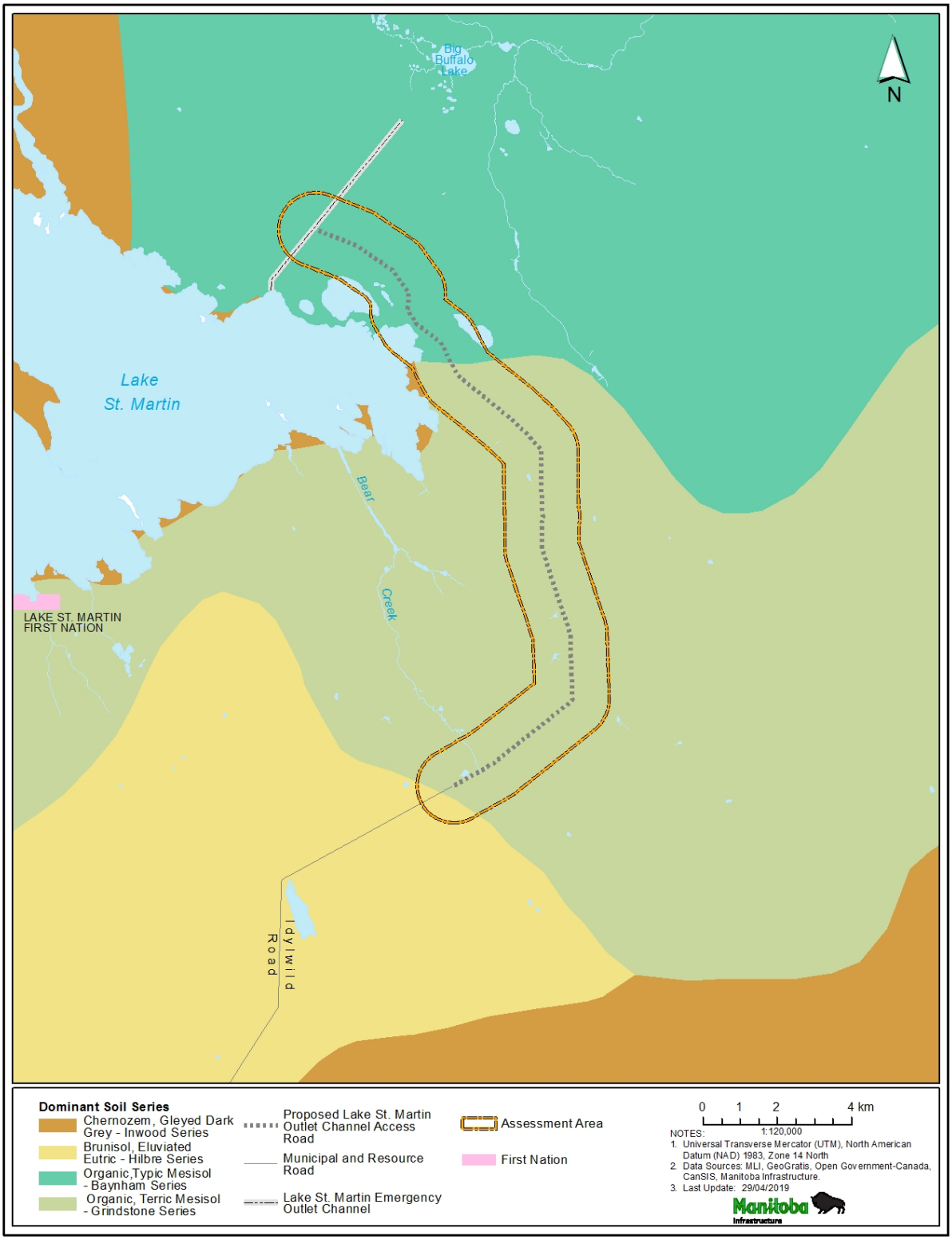
The meteor impact structure was described by McCabe (1971) as a crypto-explosion crater consisting of a crater or hole 14 miles (22.4 km) in diameter and more than 1,000 feet (about 350 m) deep. Its central core is two to three miles (3.2 to 4.8 km) in diameter, consisting of highly shock-metamorphosed 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)

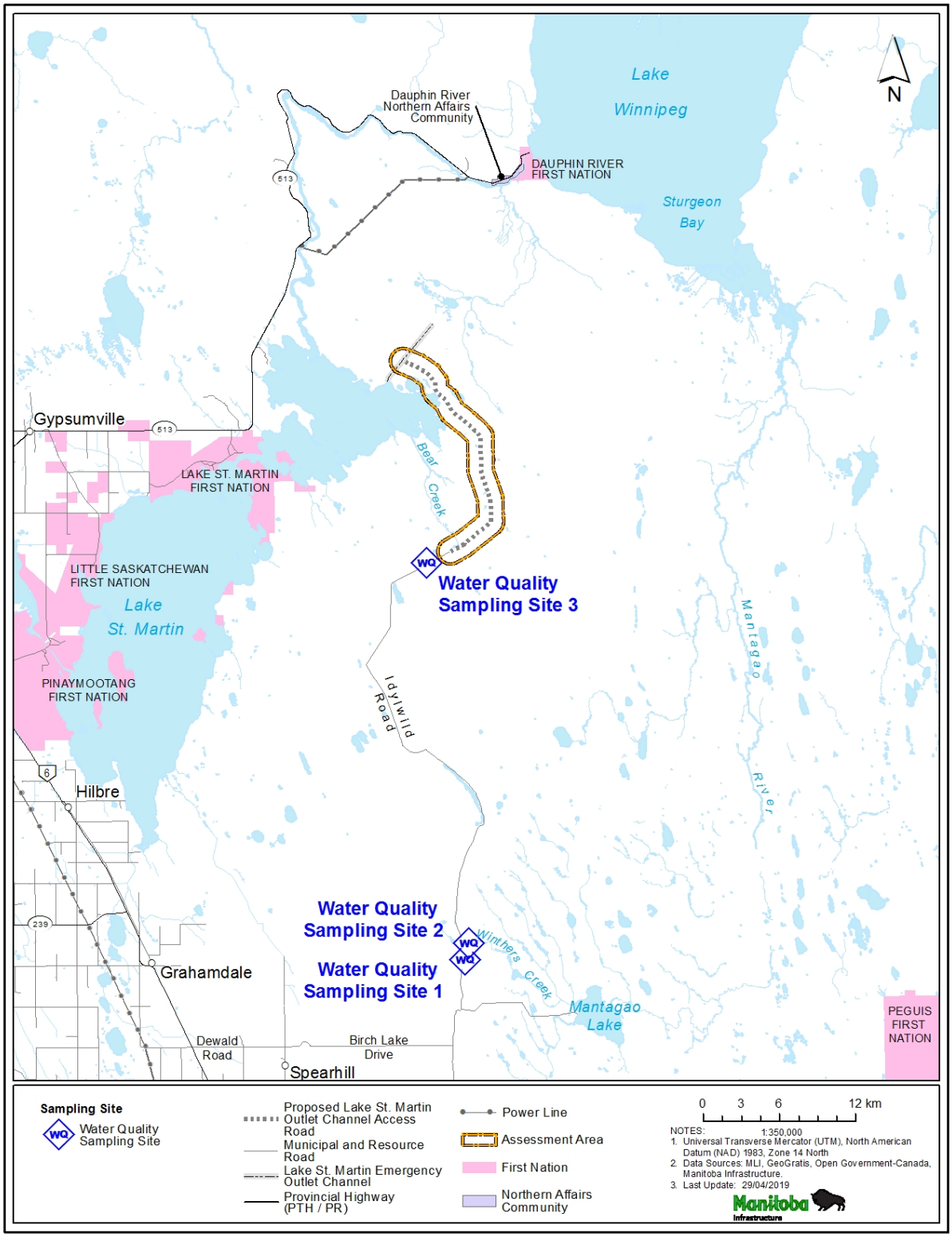
[3] Water velocity was measured before and after cleaning out of a culvert

### 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.

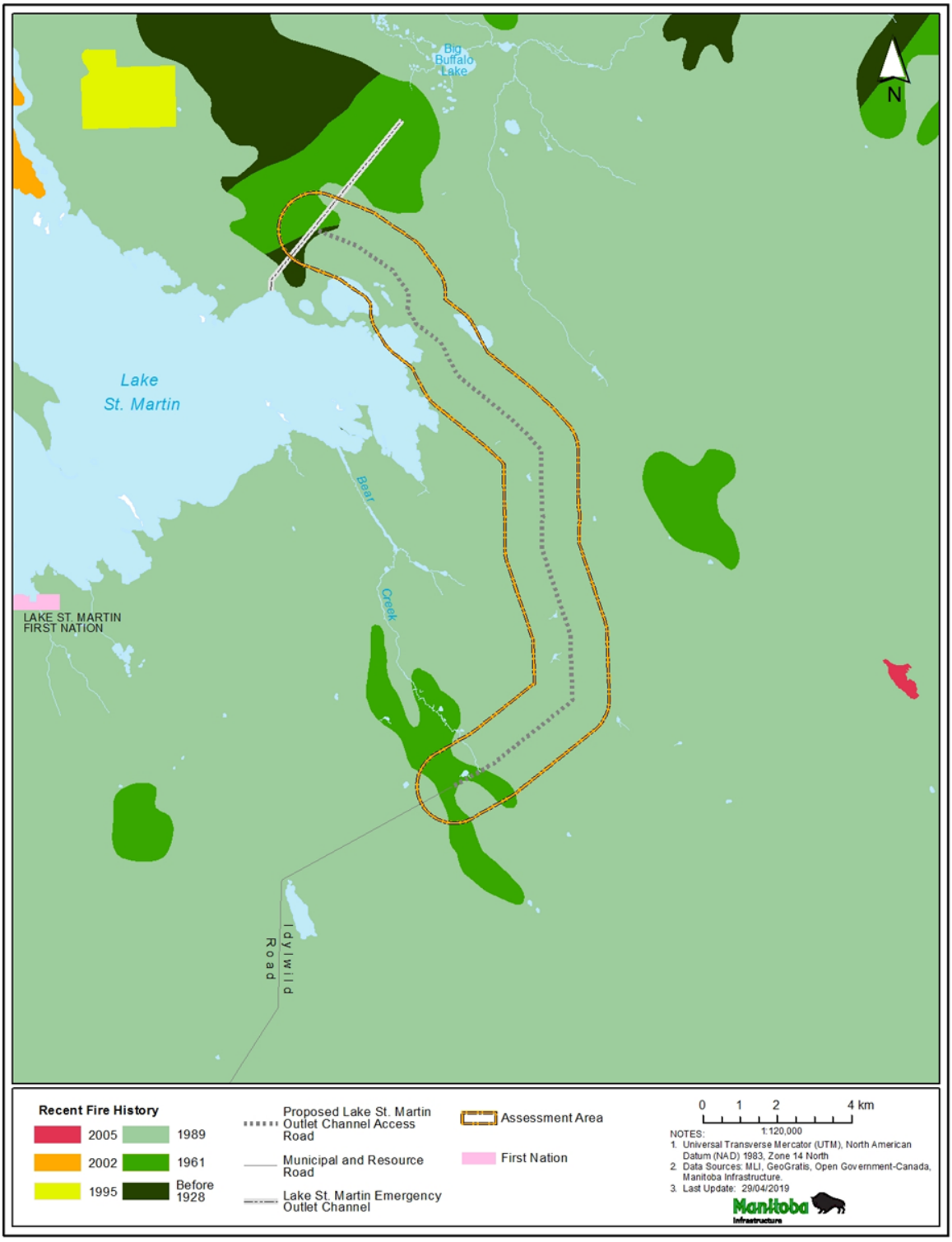
## 4.4 TERRESTRIAL ENVIRONMENT

### 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**

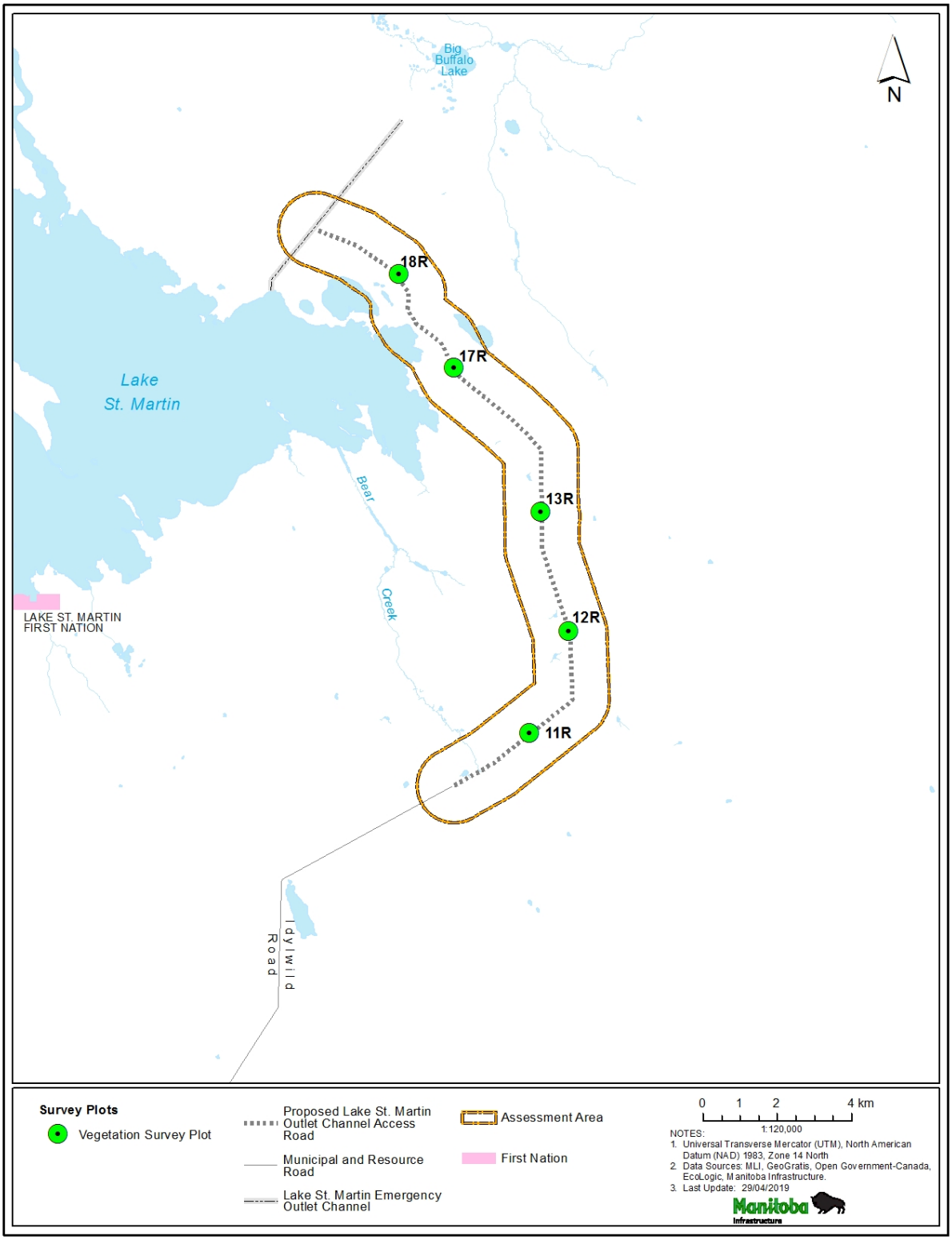
**Table 4-11. Summary of Habitats Encountered Along Project Alignment during Vegetation Surveys**

| 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.

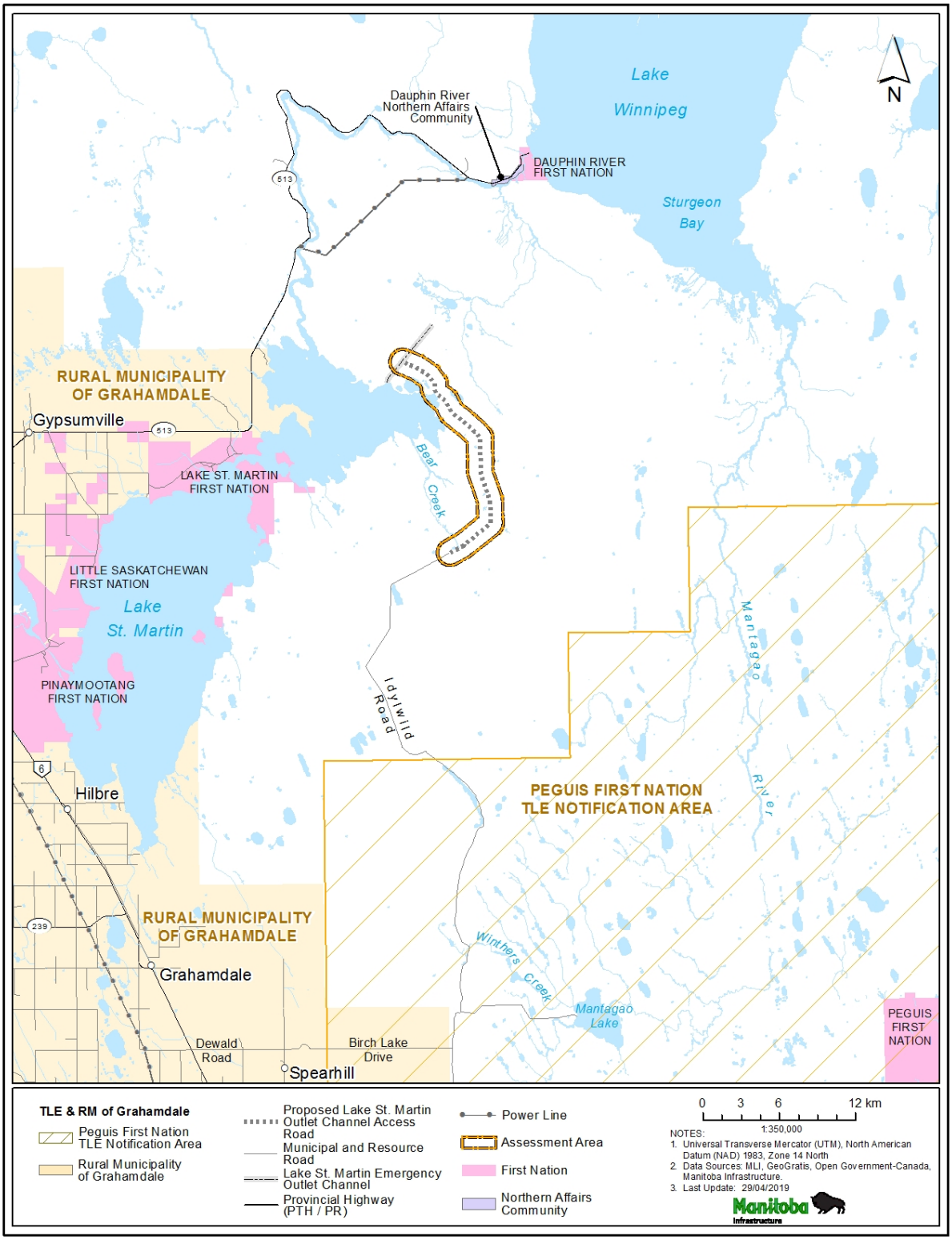
### 4.5.2 Communities, Municipalities and Population

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**

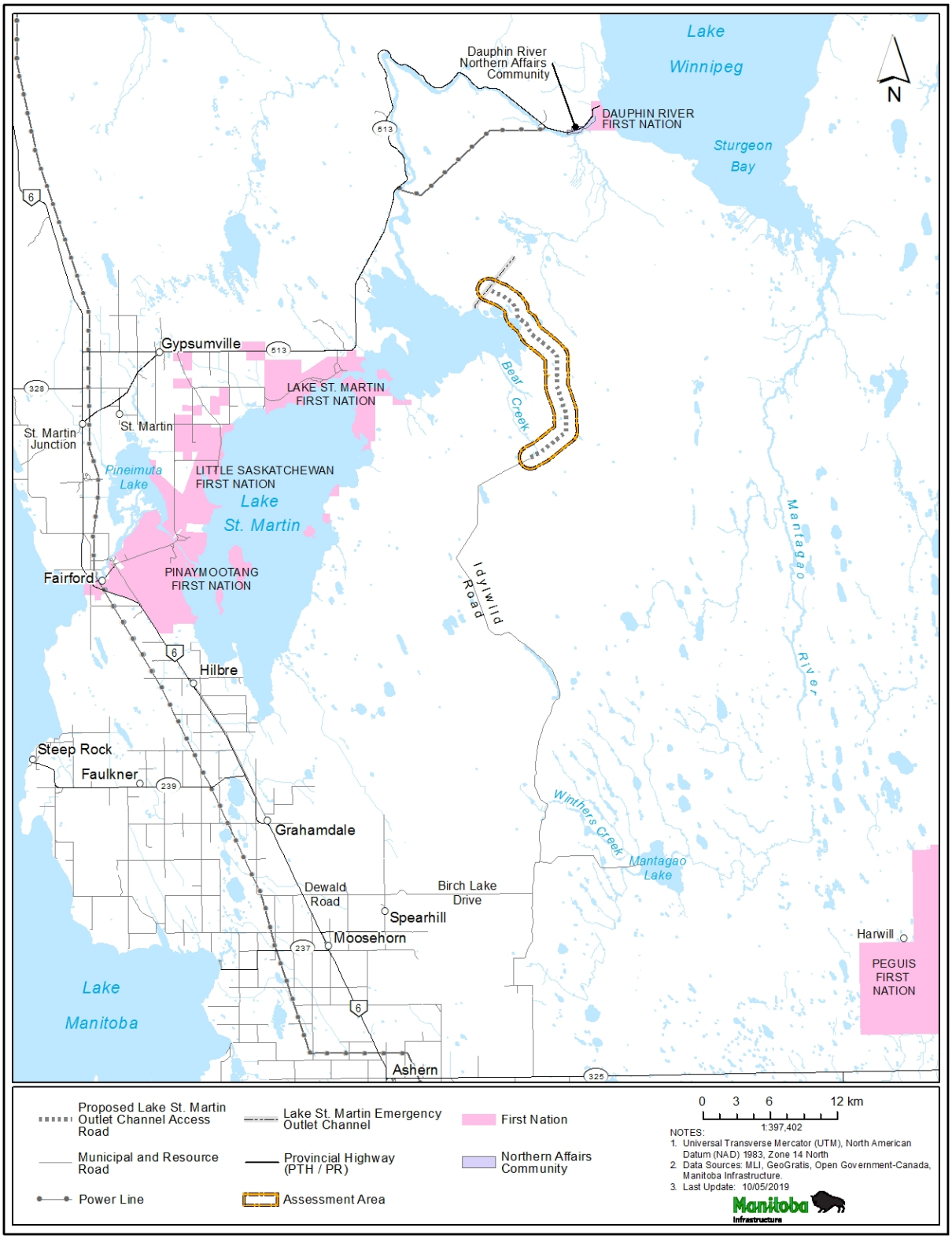
| Year | Total Private Dwellings | Average Number of Rooms/Dwelling | Population Density per km$^2$ |
|---|---|---|---|
| 2016 | 1,125 | 6.4 | 0.6 |
| 2011 | 891 | - | 0.6 |
| 2006 | 864 | 6.1 | 0.6 |

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

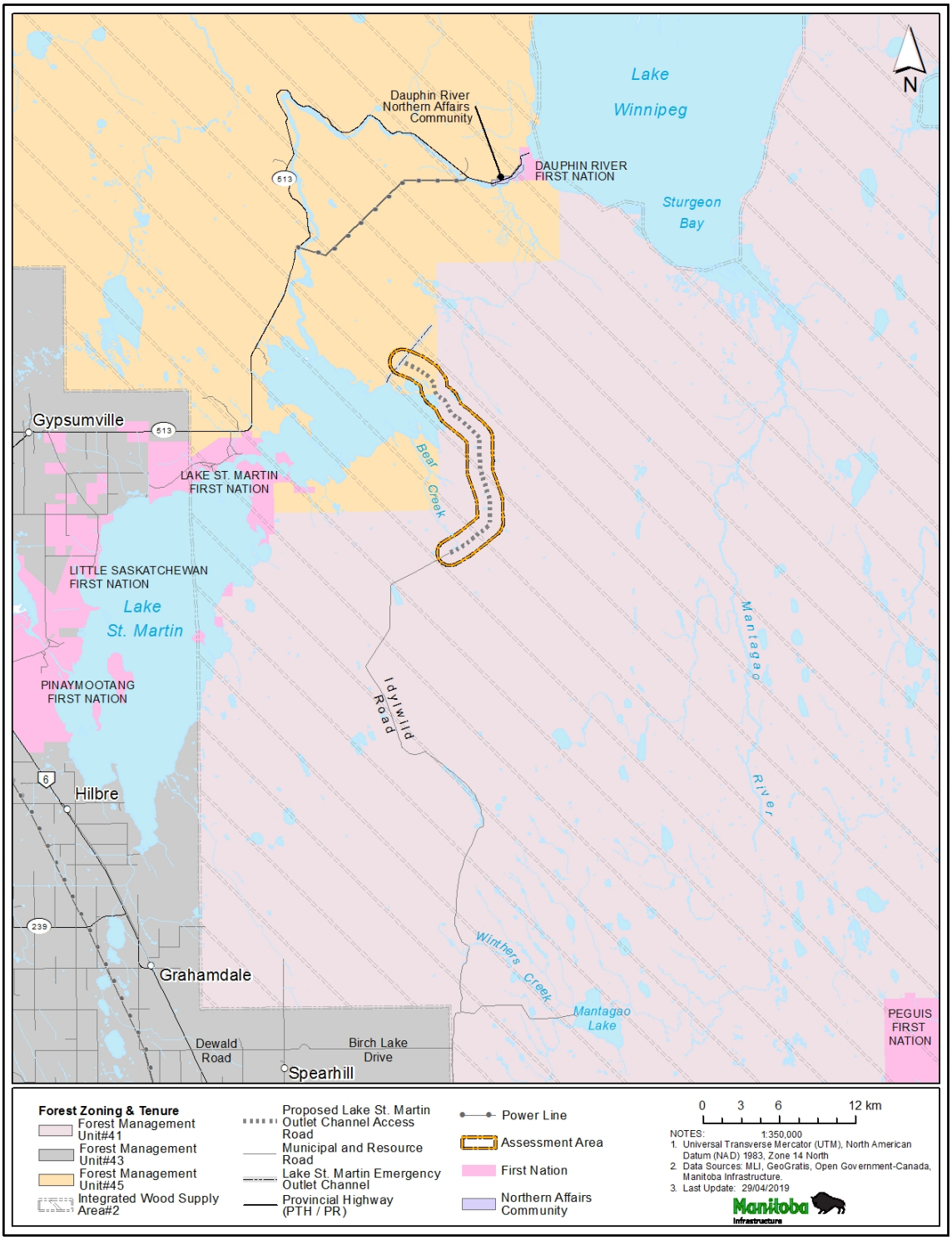
Map 4-10 shows the locations of quarry and mining activity in the PAA and adjacent areas. There are other existing quarrying sites in the region but none in close proximity to the PAA (Map 4-10). Most of the mineral deposits in the region are quarry withdrawal sites and the remainder are quarry lease,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

### 4.5.8 Cottages

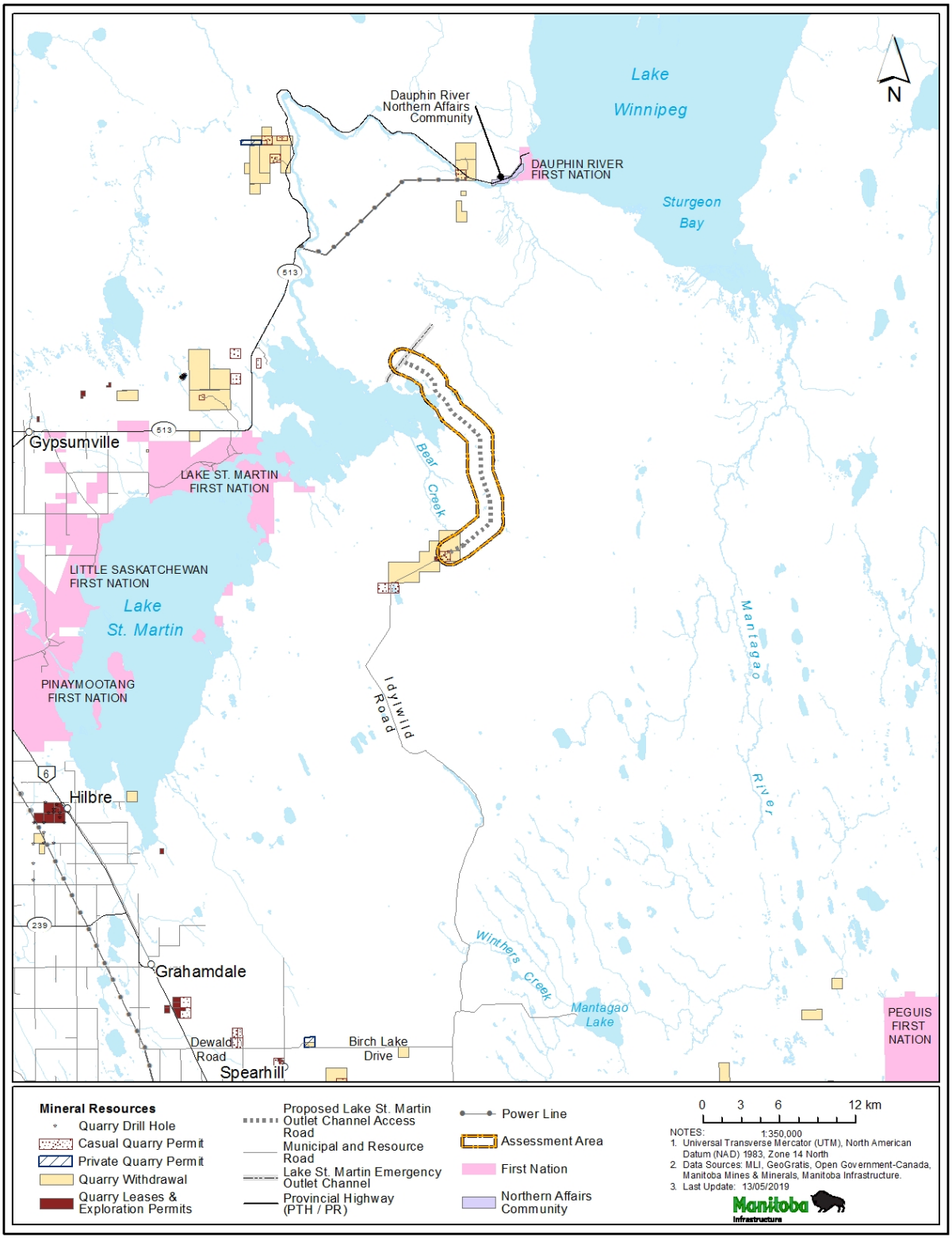
There are no cottages in the PAA or surrounding region. There are cottages developments on eastern shores of Lake Manitoba in the RM of Grahamdale – the largest are in the vicinity of Steep Rock along PR 239 where there are three developments.

### 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.

# EA REPORT SECTION 5

# ENVIRONMENTAL EFFECTS ASSESSMENT

## LAKE ST. MARTIN ACCESS ROAD

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# 5.0 ENVIRONMENTAL EFFECTS ASSESSMENT

## 5.1 ASSESSMENT APPROACH

This environmental assessment for the Lake St. Martin Access Road Project considers the potential effects associated with construction, operation and maintenance of the Project on the physical, biological and socio-economic environments. The overall assessment approach involves determining the nature of residual effects that would remain on the environment if the LSM Access Road is developed. Residual effects are those measurable effects that remain after application of appropriate mitigation. Potential effects that are sufficiently abated through mitigation are not-residual effects and are deemed to have no measurable persisting effect to the environment. However, potential effects that do persist after the application of mitigation measures are defined as residual effects and form the basis of the assessment conclusion.

This assessment considers appropriate mitigation measures to minimize or avoid potential Project-related effects. Manitoba Infrastructure has developed standardized mitigation measures in the form of General Environmental Requirements (GERs) for the Project (Section 2.7, Appendix C). The GERs outline timing restrictions and other work-related requirements that aim to avoid or minimize potential effects of Project activities. Where necessary, additions and/or modifications to the GERs are identified throughout the environmental effects analysis in order to accommodate site or Project-specific concerns.

Characterizing the potential effects involves an evaluation of the following factors outlined in Table 5-1 and defined as follows:

- Direction – the trend of a residual environmental effect;
- Magnitude – the amount of change in a measurable parameter relative to existing conditions ;
- Geographic extent – the area in which a residual environmental occurs;
- Duration – the period in which a residual effect is expect to occur;
- Frequency – how often the effect will occur;
- Reversibility – the likelihood that a measurable parameter will recover from an environmental effect; and
- Resiliency – the ability that an environmental parameter has in recovering from an effect.

## Table 5-1. Factors and Criteria Used to Characterize Potential Residual Effects

| Factor/Criteria | Characterization of Potential Effect |
|---|---|
| **Direction** | |
| Positive | Beneficial or desirable change to the environmental parameter |
| Neutral | No expected change |
| Adverse | Negative or undesirable change |
| **Magnitude** | |
| Low | No definable or measurable effect or within the range of natural variability |
| Moderate | Measurable effect that could be determined with a well designed monitoring program or marginally beyond the range of natural variability |
| High | Readily observable effects or well beyond the natural range of variability |
| **Geographic Extent** | |
| Footprint | The development areas physically disturbed by the Project |
| Local | The Project effects area (PAA) in which direct or indirect impacts are likely to occur |
| Region | The area encompassing the PAA that has relevance to the environmental factor, e.g., watersheds intersecting the PAA in the area illustrated in Map 1-1 |
| **Duration** | |
| Short term | The time required to complete a discrete component during construction, maintenance, or rehabilitation activities, i.e., a timeframe of several months up to about 2 years |
| Long term | The potential effect persists beyond the completion of construction and rehabilitation activities into the operations and maintenance, i.e., more than 2 years |
| **Frequency** | |
| Infrequent | Effect occurs once during the life of the Project |
| Sporadic | Effect occurs occasionally, typically without predictability, during the life of the Project |
| Regular/Continuous | Effect occurs periodically or continuously during the life of the Project |
| **Reversibility** | |
| Reversible | Effect can be reversed during the life of the Project |
| Irreversible | Effect can not be reversed during the life of the Project |
| **Resiliency** | |
| High | Very resilient to change |
| Moderate | Reasonably resilient to change – may require management and/or monitoring |
| Low | Very susceptible to change – likely requires management and/or monitoring |

The spatial boundaries, particularly the determination of the Project effects assessment area (PAA), is one of the key factors used in the characterization of residual effects. 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. The PAA is of equal size to the area used for baseline vegetation studies (SG Environmental Services Inc. 2016). The PAA boundary is an area that encompasses sites in which measurable effects to migratory birds (Benitez-Lopez et al. 2010), denning bears (Linnell et al. 2000) moose (Laurian et al. 2008) are expected. For example, Manitoba Conservation Data Centre's (2015) maximum recommended development setback distances (if it is the highest form of disturbance, such as blasting) for the 28 bird species that have potential to occur within or near the PAA extends up to a maximum of (Appendix E):

- 200-450 m maximum setback for high disturbance activities for 12 bird species;
- 500-650 m maximum setback for 9 bird species; and
- 1000 m maximum setback for 7 bird species.

The PAA also includes the area in which direct socio-economic and heritage-related effects may occur. As with the description of the biophysical environment, the effects assessment extends to any direct or indirect that may extend beyond the PAA, e.g., to local stakeholders and Indigenous communities in the region surrounding the PAA.

With respect to duration of an effect, the definition of "long-term" includes the concept of potential future decommissioning of the Project. Project decommissioning, including the removal of the road and taking steps towards returning the environment to its pre-existing conditions, will not occur in the foreseeable future; it is currently anticipated that future flood protection works proposed in the Lake St. Martin area will not be decommissioned. As such, decommissioning of the LSM Access Road is not considered as part of the environmental effects analysis. If it ever becomes necessary to decommission the Project in the future, a decommissioning plan that adheres to the legislation and permitting at that time will be developed.

## 5.2 OVERVIEW OF PREDICTED CHANGES

The following parameters were assessed with respect to the potential effect of the environment:

| Physical Environnent | Biological Environnent | Socio-Economic Environnent |
|---|---|---|
| Greenhouse Gases & Air Quality | Vegetation | Land Use |
| Noise and Vibration | Wildlife & Wildlife Habitat | Resources Use |
| Terrain and Topography | Fish & Fish Habitat | Protected Areas, ASI's |
| Geology and Soils | Protected Species | Culture & Heritage Resources |
| Groundwater | | Human Health & Safety |
| Surface Water | | |

The potential effects assessed in this section are identified through the use of an interaction matrix that links Project activities or components to environmental receptors (Table 5-2). This interaction table is used to direct the effects assessment. Wherever there is an "X" in Table 5-2, this EA Report characterizes and provides an evaluation of the potential environmental effect. Each of the key project activities listed in Table 5-2 have an associated direct effect on the environment. For example, clearing and grubbing will require personnel to travel to the construction site using existing road access; at the site, people will use equipment that generates noise and may have an associated air-related emission. The potential effects assessed in this EA Report considers all anticipated outputs from Project components and activities on the abovementioned environmental parameters.

The following sections describe the assessment of potential effects to the physical, biological and socio-economic environment in conjunction with the application of mitigation measures, assessment of residual effects, determination of significance, and (any necessary) follow-up and/or monitoring. The potential residual effects that are discussed in the following sections are summarized in Table 5-3.

**Table 5-2. Key Potential Environmental Effects Interaction Assessment Matrix**

| Activity | Physical Environment | | | | | | Biophysical Environment | | | | Socio-Economic Environment | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Greenhouse Gasses & Air Quality | Noise & Vibration | Terrain & Topography | Geology & Soils | Groundwater | Surfacewater | Vegetation | Wildlife & Wildlife Habitat | Fish & Fish Habitat | Protected Species | Land Use | Resource Use | Protected Areas & ASI | Cultural & Heritage Resources | Human Health & Safety |
| **Construction Phase** | | | | | | | | | | | | | | | |
| Mobilisation of Equipment and Supplies | X | X | | | | | | X | | X | | | | | X |
| Temporary Access Roads and Trails | X | X | X | X | | | X | X | | X | X | X | | X | X |
| Clearing & Grubbing | X | X | X | X | | X | X | X | | X | | X | | X | X |
| Rock Quarries & Borrow Sites (sand and gravel materials) | X | X | X | X | X | | X | X | | X | X | X | | X | X |
| Road Construction (grading, fill placement, road bed exaction, gate etc.) | X | X | X | X | X | X | | X | X | X | X | X | | X | X |
| Culvert Installation | X | X | X | | | X | X | X | X | | | | | X | X |
| Construction Site Restoration/ Revegetation | X | X | | X | | X | X | X | X | X | | | | | |
| Accidents & Malfunctions | X | X | | X | X | X | X | X | X | X | X | X | | X | X |
| **Operation Phase** | | | | | | | | | | | | | | | |
| Road Usage | X | X | | | | X | | X | | X | X | X | | | X |
| Maintenance | X | X | | X | | X | X | X | X | X | X | X | | | X |

[1]See Table 2-3 for list of detailed Project activities

**Table 5-3. Summary of Potential Project-Related Environmental Effects**

| Parameter | Construction | Operation and Maintenance | Mitigation Measures | Residual Effects |
|---|---|---|---|---|
| **Physical Environment** | | | | |
| Air Quality/ Greenhouse Gases | Greenhouse gas emissions will be released from the operation of equipment and machinery used in constructing of the Project. | Greenhouse gas emissions will be released from vehicles and equipment used during operational and maintenance activities. | Ensure that all equipment is good operating condition and is maintained or serviced regularly. Access restrictions will limit use of the Project to authorized personnel only, minimizing emissions to the extent possible. | Residual Greenhouse gas emissions stemming from operation of vehicles and equipment may be released into the atmosphere. |
| | Dust emitted as a result of road construction activities (i.e. blasting, haul, fill placement and grading) may result in locally reduced air quality. | Dust emitted as a result of road operation and maintenance (i.e. vehicular traffic or grading) may result in locally reduced air quality. | Application of dust palliative as required. | Minor residual raising of dust into the atmosphere. |
| Noise and Vibrations | Increased local noise levels and vibration associated with construction activities. | Short-term, temporary and infrequent increases of localized noise and/or vibration stemming from sporadic use (vehicle/maintenance equipment) of the Project. | Adherence to MI GERs regarding noise/vibration | Overall increase in short-term, temporary and localized noise and/ or vibration associated with sporadic use of access road. |
| Terrain and Topography | Construction of a permanent elevated road embankment. | Permanent elevated road embankment. | None required. | Construction and use of an elevated road embankment will be a localized permanent landscape alteration. |
| | Potential alteration of local drainage patterns associated with construction of road embankment through wetland/marsh/fen areas. | Potential for alteration of local drainage patterns due to plugged or collapsed culverts. | Design mitigation measures including the installation and maintenance of appropriately sized equalization culvert in order to maintain local drainage patters through road embankment. | No residual effects. |
| Geology and Soils | Local extraction or processing of soils and aggregates associated with quarry and material development. | Local extraction or processing of soils and aggregate for maintenance operations may be required. | Contractors will be required to adhere to casual quarry permit conditions. | No residual effects. |
| | Potential erosion of exposed soils associated with vegetation removal and construction activities (e.g. hauling and placement of fill). | Erosion potential exists for soils exposed during periodic maintenance activities (e.g. grade repairs). | Application of MI GERs regarding erosion and sediment control measures, revegetation, clearing/grubbing and brushing and riprap.<br><br>Localized erosion of exposed soils may occur during construction, but will be prevented or minimized with the implementation of mitigative action and recurring inspection and maintenance of erosion and sediment control measures. | No residual effects.<br>. |
| Groundwater | Potential groundwater contamination through infiltration of fuel and/or other hazardous substances stemming from the use of equipment/machinery and/or storage/handling of substances used in access road construction is possible if a exposed to groundwater sources such as quarries or uncapped wells. | Potential groundwater contamination through infiltration of fuel and/or other hazardous substances stemming from the use of equipment/machinery and/or storage/handling of substances used in access road construction is possible if a exposed to groundwater sources such as quarries or uncapped wells. | Application of MI GERs concerning machinery, fuel handling and storage, emergency response plan, disposal of materials, and contractor development of an accepted Construction Environmental Management Plan. | No residual effects. |
| Surface Water | Potential changes in localized quality of surface water from erosion or sedimentation, accidents and malfunctions. | Potential for changes in localized quality of surface water as a result of erosion or sedimentation, accidents and malfunctions. | Application of MI GERs for Contractor submission of an accepted Construction Environmental Management Plan, erosion and sediment control, in-water work (i.e. Site isolation), machinery, fuel storage and handling, revegetation, and disposal. | No residual effects. |

| Parameter | Construction | Operation and Maintenance | Mitigation Measures | Residual Effects |
|---|---|---|---|---|
| | Potential for surface water quality contamination from spill of hazardous substances such as fuel or oil due to the use of heavy equipment. | Some minor potential for surface water quality contamination for fuel leaks and related hazardous materials stemming from vehicles using the access road or equipment during maintenance activity. | Application of MI GERs for Contractor sub-mission of an accepted Construction Environmental Management Plan, erosion and sediment control, in-water work (i.e. Site isolation), machinery, fuel storage and handling, revegetation, and disposal. | No residual effects. |
| **Biological Environment** | | | | |
| Fish and Fish Habitat | No fish or fish habitat were identified within the Project Assessment Area. No construction related impacts to fish and fish habitat are anticipated. | No fish or fish habitat were identified within the Project Assessment Area. No operation and maintenance related impacts to fish and fish habitat are anticipated. | No mitigation measures are proposed. | No residual effects. |
| Vegetation | Permanent loss of vegetation within the existing winter road corridor. | Mowing and clearing of vegetation if required to maintain required sightlines. | Revegetation of disturbed areas and the Project corridor with an appropriate seed mix in accordance with MI GERs. | Permanent vegetation loss within the Project Footprint. |
| | Potential changes to species composition and introduction and establishment of invasive and/or non-native plant species. | Potential changes to species composition and introduction and establishment of invasive and/or non-native plant species. | Implementation and ensured adherence to MI GERs relating to revegetation, dust and particulate control, machinery, equipment and fuel storage. | Potential residual change in vegetative composition as a result of soil compaction and possible establishment of non-native or invasive species. |
| Wildlife | Noise, vibration and dust associated with construction activities may result in avoidance of work areas by wildlife. | Noise, vibration and dust associated with operation and maintenance may result in avoidance of work areas by wildlife. | Noise and vibrations will be minimized to the extent possible. Contractors will be required to adhere to MI's GERs. Use of the Project will be restricted to authorized personnel only, limiting operational noise.<br><br>Potential sensory disturbance resulting in avoidance of the Project Footprint is expected to be short-term and sporadic in nature. | No residual effects. |
| Wildlife | Permanent habitat loss will occur in association with clearing and road constructions. | Operation and maintenance activities are not anticipated to result in any further habitat loss. | Revegetation of disturbed areas and the Project corridor with an appropriate seed mix and in accordance with MI GERs.<br><br>No further mitigation for habitat loss is proposed. | Habitat loss will be limited to the Project Footprint, but will be permanent. |
| | Potential exists for the destruction of migratory bird nests during clearing operations for road construction. | Mowing and brushing as part of maintenance operations within the Project Footprint have potential to destroy migratory bird nests. | Clearing activities will be restricted to the fall and winter months in accordance with MI's GERs for clearing, grubbing and brushing. | No residual effects. |
| | Increased vehicular and equipment traffic during construction may increase the potential for wildlife morality from vehicle collisions. | Vehicular and equipment traffic during construction may increase the potential for wildlife morality from vehicle collisions. | The Project will be limited to use by authorized personnel. Speeds will be limited during construction. In combination with enhanced sight lines, these should reduce the risk of wildlife-vehicle collisions during construction.<br><br>Similarly, the road is being designed to a 70 km/h standard, this will serve to reduce travel speeds during operation, and in combination with maintained sightlines should reduce the risk of wildlife-vehicle collisions during operation. | Potential increase in wildlife mortality over current conditions due to wildlife-vehicle collisions. |
| | Members of the public may attempt to utilize the LSM Access Road corridor for hunting during construction, increasing local hunting pressures. | The presence of a completed road surface has the potential to increase hunting effort and pressure in the area. | Access to the Project will be restricted to authorized personnel and is not intended for public use. The roadway will be blocked with a physical barrier. Should individuals manage to access the Project, they will be restricted to the same area as the existing winter road corridor. | No residual effects. |
| | The LSM Access Road corridor may provide a travel route for predators such as wolves. | Once constructed and operational, predators such as wolves may use the roadway as a travel corridor in search of prey, which may result in increased predation of ungulates and small mammals. | No mitigation measures are being proposed. The corridor is pre-existing and terrain adjacent to the road is not being altered. Predator movement within the greater environment is not anticipated to change. | No residual effects. |

| Parameter | Construction | Operation and Maintenance | Mitigation Measures | Residual Effects |
|---|---|---|---|---|
| | Potential erosion and sedimentation associated with exposed soils during construction could impact survival or success of amphibian eggs and larvae in surface water adjacent to work sites. Accidents, spills and leaks affecting surface waters may also impact amphibians. | Potential erosion and sedimentation associated with exposed soils during maintenance activities could impact survival or success of amphibian eggs and larvae in surface water adjacent to work sites. Accidents, spills and leaks affecting surface waters may also impact amphibians. | Application of MI GERs related to Construction Environmental Management Plans, Erosion and Sediment Control, In-Water Work, Rip Rap, Revegetation, Machinery, Fuel Storage and Handling, Emergency Response Plan for Spills, Disposal, Other, will help prevent and minimize potential impacts to amphibians. | No residual effects. |
| Wildlife | Garbage produced during construction may act as an attractant for some species and may encourage some animals to become habituated or dependant on human waste as food. | Garbage produced during operation may act as an attractant for some species and may encourage some animals to become habituated or dependant on human waste as food. | Application of MI GERs related to wildlife and machinery, fuel storage and handling will be applied. | No residual effects. |
| Environmentally sensitive Sites | No environmentally sensitive sites were identified in close proximity to the Project. No construction related impacts to environmentally sensitive sites are anticipated. | No environmentally sensitive sites were identified in close proximity to the Project. No operation and maintenance related impacts to environmentally sensitive sites are anticipated. | No mitigation measures are proposed. | No residual effects |
| | Permanent loss of potential Eastern Wood-Pewee, Trumpeter Swan, northern leopard frog, little brown bat and northern long-eared bat habitat is possible in association with clearing and road constructions within the Project Footprint. | Operation and maintenance activities are not anticipated to result in any further habitat loss. | MI GERs associated clearing, grubbing and brushing will be implemented The Project corridor will be revegetated with an appropriate seed mix and in accordance with MI GERs. | Habitat loss will be limited to the Project Footprint, but will be permanent. |
| Protected Species | Noise, vibration and dust associated with construction activities may result in avoidance of the Project Footprint by some protected species. | Noise, vibration and dust associated with operation and maintenance activities may result in avoidance of the Project Footprint by some protected species. | Sensory disturbance resulting from noise, vibration and dust is anticipated to be localized, and short term during construction, and localized, short-term and sporadic during operation and maintenance. This may result in avoidance of the immediate area by protected species, but is not anticipated to impact use of other habitat in the surrounding area.<br><br>Application of MI GERs associated clearing, grubbing and brushing as well as noise and with noise and noise limitations. Clearing activities will only take place during the fall/winter months. | No residual effects. |
| | If not mitigated, clearing and grubbing activity during construction has potential to destroy migratory bird nests or impact bat hibernacula. | If not mitigated, clearing and grubbing activity during construction has potential to destroy migratory bird nests or impact bat hibernacula. | Application of MI GERs associated clearing, grubbing and brushing will restrict clearing activities to fall and winter months to avoid the migratory bird nesting period.<br><br>Bat hibernacula was not identified in the Project Assessment Area. No further mitigation is proposed at this time. | No residual effects. |
| Protected Species | Potential erosion and sedimentation associated with exposed soils during construction could impact survival or success of northern leopard frog eggs and larvae in surface water adjacent to work sites. Accidents, spills and leaks affecting surface waters may also impact northern leopard frog. | Potential erosion and sedimentation associated with exposed soils during maintenance activities could impact survival or success of northern leopard frog eggs and larvae in surface water adjacent to work sites. Accidents, spills and leaks affecting surface waters may also impact northern leopard frog. | Application of MI GERs related to Construction Environmental Management Plans, Erosion and Sediment Control, In-Water Work, Rip Rap, Revegetation, Machinery, Fuel Storage and Handling, Emergency Response Plan for Spills, Disposal, Other, will help prevent and minimize potential impacts to northern leopard frog. | No residual effects. |

| Parameter | Construction | Operation and Maintenance | Mitigation Measures | Residual Effects |
|---|---|---|---|---|
| **Socio-Economic Environment** | | | | |
| Resource Use | No potential effects on land use (e.g. forestry, hunting, trapping) are expected to occur as a result of Project construction. | Once constructed, and if left un-mitigated, the Project has the potential to provide increased access for resource use activities. | No mitigation measures are being proposed. The Project is not intended for public use. Access will be restricted to authorized personnel only, and will be blocked by use of a physical barrier. | No residual effects. |
| Parks, Protected Areas and Areas of Special Interest | No potential effects on parks, protected areas, and areas of special interested are expected to occur as a result construction. | No potential effects are expected to occur on parks, protected areas, and areas of special interest during operation and maintenance. | No mitigation measures are being proposed. | No residual effects. |
| Culture and Heritage Resources | No known heritage resources were identified in the immediate vicinity of the Project. | No potential Project-related effects are expected to occur on heritage resources during operation and maintenance. | No specific mitigation measures are being proposed. However, in the event that historic/cultural resources are encountered MI will contact Manitoba's Historic resources Branch in accordance with the GERs. | No residual effects. |
| Human Health & Safety | Increases in vehicular traffic has the potential to cause risk to human safety as a result of dust emissions, noise, and vehicular collisions during construction. | Increases in vehicular traffic has the potential to cause risk to human safety as a result of dust emissions, noise, and vehicular collisions during operation. | Safe work practices and signage will be implemented in all construction and maintenance activities. Public access to the roadway will be restricted by use of a physical barriers and appropriate safety measures, such as sightlines will be maintained. | No residual effects. |

## 5.3 PHYSICAL ENVIRONMENT

### 5.3.1 Greenhouse Gases & Air Quality

#### *5.3.1.1 Construction Effects*

The Project activities and equipment use associated with construction will generate increased fugitive dust and exhaust emissions over ambient conditions. Specific dust emission sources include quarrying activities, equipment and vehicle traffic, as well as material hauling, placement and grading. Project-related dust emissions from vehicle and equipment traffic are expected to be limited, or negligible in winter months due to snow cover and frozen ground conditions. Fugitive dust emissions from traffic would occur during the summer and fall, with the greatest likelihood of emissions in dry and windy conditions. Quarrying activities, particularly blasting and crushing, will result in dust emissions year-round.

Air quality may be locally affected by dust and particulates, with the possibility of subsequent effects to human health (e.g., respiratory issues with dust) (Section 5.5.4.1), and vegetation (dust deposition) if receptors are present in the immediate vicinity of the activities. This effect is expected to be limited to the road and adjacent sites.

Exhaust emissions will be generated from vehicle traffic and equipment mobilized to the project development area (Footprint) and used in clearing, excavation and aggregate production, transport and placement (Table 5-2). Construction equipment used for the work will primarily include mechanical brushers, rock/haul trucks, excavators, a crawler tractor with a dozer, compaction equipment (graders and packers), semi trucks and wheel loaders, and a rock drill (Table 2-4). Emissions released from 25 to 37 pieces of heavy equipment during construction could decrease air quality through the release of carbon monoxide, carbon dioxide, particulate matter, and nitrogen oxides with potential for subsequent effects on human health (Section 5.5.4.1). Project-related emissions during the 18 month construction period are expected to be sporadic, temporary and short-term.

#### *5.3.1.2 Operation Effects*

Although access will be improved, the intensity of fugitive dust and exhaust emissions during the Project's operational phase is expected to be less than that of the construction period. It is expected to primarily be associated with infrequent road use during the operation period that will be often associated with inspection and maintenance of the road and flood control works in the Lake St. Martin area (Table 5-2).

Once construction of the Project is complete, vehicle and equipment use along the alignment is anticipated to be greatly reduced and limited to sporadic, infrequent and short-term maintenance operations. The Project will also be restricted to authorized personnel by use of a gate and will not be open for public use. Only in the event that additional flood control infrastructure is constructed would traffic volumes along the Project be anticipated to increase.

#### *5.3.1.3 Mitigation*

Dust and exhaust emissions will be mitigated through the application of MI's GERs (Appendix C). Specifically, contractors will be required to adhere to Dust and Particulate Control requirements as well as a Construction Environmental Management Plan that would specify any additional measures.

Access to the Project will be restricted to authorized individuals by use of a gate. Restricting access to the area will serve to minimize vehicle or equipment use along the roadway and further reduce effects associated with GHG emissions and dust.

#### *5.3.1.4 Residual Effects*

Although mitigation measures are anticipated to minimize GHG emissions and effects to air quality from dust, the Project will result in an overall increase of GHG emissions and suspended dust particulate in the area. These residual effects will primarily stem from the overall minor increase in GHG and dust emissions linked to vehicle and equipment use for construction and operation of the Project.

The potential residual environmental effects related to air quality, particularly those associated with dust emissions, will mainly be localized to the immediate work areas in the PAA, be moderate in magnitude, short-term in duration and sporadic in frequency during the construction period. While there will be personnel in the vicinity of the road during construction, travel speeds and dust are expected to be minimized. The number of people in proximity to emissions during the operational period is small and their exposure times are expected to be negligible. The emission-related effects associated with road use during the operational period are expected to be local, long-term and sporadic. The maximum acceptable levels of concentration for GHGs and fugitive dust listed in the Manitoba Ambient Air Quality Criteria (2005) are not anticipated to be exceeded (Table 5-3).

### 5.3.2 Noise and Vibration

#### *5.3.2.1 Construction Effects*

Project-related noise and vibration levels are expected to be highest throughout the 18 month construction phase and concentrated in and adjacent to active construction sites. Sources of noise and vibration during construction are expected to result primarily from the use of 25 to 37 pieces of heavy equipment such as graders, excavators, loaders, compactors, and haul trucks (Tables 2-4 and 5-2). Blasting of rock and gravel crushing also emit noise and vibration and are typically limited to areas established for material production.

Noise levels associated with all-season road construction, as measured during safety and health audits associated with construction of an all-season road between Hollow Water and Berens River (Smith *pers. comm.* 2019) ranged from 80 to 110 dB. Drilling was the loudest at 110 dB, with rock crushing being as high as 103 dB; most heavy equipment (e.g., excavator, dozer, rock truck, grader, and bobcat) ranged from 83 to 100 dB, with the generator the lowest at 80 dB.

While there is no known risk of hearing loss associated with sound levels below 70 dBA, the duration of daily exposure becomes an important risk factor for hearing loss. Generally, the louder the noise, the shorter the exposure time before hearing protection is required. Road construction site noise typically ranges from 85 to 100 dBA when heavy equipment is operating or blasting is occurring (Eaton 2000). For environments where a worker is likely to be exposed to a noise that exceeds 85 dBA Lex 9, standard construction practices would mitigate risk to workers.

The closest human receptors to construction noise and vibration will be the workforce at the Project site. The Project is located in an otherwise remote area with no communities or human habitation within 12 km of the proposed road. Construction noise and vibration may also affect wildlife present in the immediate area, causing temporary displacement or sensory disturbance (Section 5.4.3). Noise and vibration levels will decrease with distance from the point source.

#### *5.3.2.2 Operation Effects*

During the operation phase, sources of noise will primarily include maintenance vehicles/equipment (i.e. graders, compactors, loaders, haul trucks, etc.) and small powered hand-held tools (i.e. chain saws, plate compactors, etc.; Table 5-2). Maintenance is expected to occur sporadically on an as-required basis. Semi-annual inspection will likely involve only a vehicle for a single day, two to three times per year.

As with construction, the closest human receptors will be the workforce present on site. Peak noise and vibration levels during operation are anticipated to be less than during construction, with exception of noise and vibration resulting from maintenance activities. These may be similar to those emitted during construction (depending on the source), but the frequency would be greatly reduced. The magnitude and frequency of noise associated with vehicles during the winter months may be less than for the pre-existing winter access road.

#### *5.3.2.3 Mitigation*

To mitigate disturbances related to noise and vibration, MI will implement MI's GERs related to Construction Environmental Management Plan and Noise and Noise Limitations (see Appendix C). The Construction Environmental Management Plan will detail how the Contractor(s) will adhere to noise and vibration requirements, and detail any additional measures. The Noise and Noise Limitations requirements stipulate that equipment be "sound reduced" (by use of mufflers, silencers or other means), that noise by-laws be adhered to (where applicable), and that equipment not be operated beyond regulated operating hours unless authorized in writing (where applicable). MI staff are required to wear protection gear and undertake regular hearing assessments. In addition to the GERs, the proposed Project will be restricted to use by authorized construction and maintenance personnel only and will not open for public use. As such, despite improved access, the additional noise and vibration generated via use and maintenance of the Access Road will be sporadic and localized to the PAA.

Where a worker is likely to be exposed to a noise that exceeds 85 dbA Lex, standard construction practices such as informing the worker about the hazards of the level of noise and providing workers with hearing protector that complies with CAN/CSA Z94.2-02, as required by the Manitoba Workplace Safety and Health Regulation 217/2006 part 12, would mitigate the effects on workers. Given that construction sites are closed to non-construction workers for safety reasons, others are not at risk. Regulations that would be followed regarding worker exposure to noise are provided in the Workplace Safety and Heath Regulation of Manitoba's Workplace Health and Safety Act 1993 and would include the use of appropriate personal protective equipment (including hearing protection) and coordinating the timing of blasting with the period

#### *5.3.2.4 Residual Effects*

Noise and vibration levels in the area are expected to increase overall as a result of the Project. There is expected to be a net decrease in noise and vibration in the region from vehicle travel during the months when the winter road access would, without the proposed all-season road (ASR), otherwise have typically been in use.

Residual effects will include an overall increase in temporary, short-term and transient levels in noise and vibration linked to the periodic use of the Project (Table 5-3). Access will be restricted to MI, contractor employees and other authorized individuals by use of a gate; this will minimize vehicle or equipment use and further reduce residual effects associated with noise and vibration.

Considering the mitigation measures, residual effects are expected as a result of the construction, operation and maintenance phases of the Project and be moderate to high in magnitude, local, short term, sporadic, and reversible.

### 5.3.3 Terrain and Topography

#### *5.3.3.1 Construction Effects*

Construction of the road embankment, excavations including quarries and borrow pits will affect local terrain and topography (Table 5-2). Terrain in the area surrounding the Project is generally flat, consisting of treed areas, wetlands and bogs (Section 4.1.5, Photograph 4-1). A right-of-way had previously been cleared for the winter road that is used annually. Any portions of the winter road that will not be used and maintained in the future, are expected to naturally revegetate over time. Regardless, construction of the proposed 19.5 km ASR will create a permanent landscape feature that will be present in all seasons and continue indefinitely. If left unmitigated, the raised road embankment could alter or impede local drainage patterns.

Similarly, quarries and borrow pits will be critical for sourcing construction materials and will result in permanent alterations to site-specific terrain. Other temporary terrain alterations may result from clearing, grubbing and brushing activities or construction of temporary access roads.

#### *5.3.3.2 Operation Effects*

The potential effects on terrain associated with constructing the LSM Access Road will continue throughout the operational phase of the Project. Temporary infrastructure such as construction-related access trails are expected to revegetate naturally over time and return the landscape to pre-Project conditions. Quarries and borrow sites that continue to be used during operation will have a longer term terrain-related effect until they are decommissioned.

#### *5.3.3.3 Mitigation*

Design mitigation measures to maintain drainage through the road embankment includes the installation of equalization culverts to maintain surface water movement across the landscape.

Table 2-6 includes a listing of culvert sizes, locations for the Project in order to maintain existing drainage patterns. Appendix A includes typical cross section of the proposed Project.

Additional mitigation measures associated with potential Project-related effects to terrain and topography (including culvert installations and clearing and grubbing) include the application of MI's GERs (Appendix C) for the following:

- Construction Environmental Management Plan;
- Erosion and Sediment Control;
- Clearing, Grubbing and Brushing;
- In-Water Work;
- Revegetation; and,
- Other.

The above listed sections of MI's General Environmental Requirements (GERs) include measures to minimize terrain and topography effects which could result from construction and operation activities — with the exception of the raised road embankment, which as mentioned above is integral to construction of the roadway.

#### *5.3.3.4 Residual Effects*

Following the application of appropriate mitigation measures, adverse residual effects on terrain and topography will remain as a result of construction and operation of the Project. The primary residual effect to terrain and topography will be the permanent alteration resulting from construction of the elevated access road embankment and the development of quarries and borrow pits (Table 5-3). These long-term effects will continue throughout the operational period and be associated closely with the Project footprint. These effects may be somewhat offset if and when the remaining segments of the winter road are no longer used and maintained, in which case natural vegetation would re-establish and return to pre-disturbance conditions.

### 5.3.4 Geology and Soils

#### *5.3.4.1 Construction Effects*

Construction of the Project will require the use of borrow pits and quarries as sources of materials for construction. Temporary quarry permits will be obtained from Manitoba Mineral Resources by MI's contractor for the work and permitting requirements will be met. Other than the potential

extraction of rock and the production of aggregate materials in localized sites (Table 5-2), the Project is not expected to have a large adverse effects on bedrock geology.

Soil may mobilize during the construction phase due to exposure and erosion (runoff, wind and precipitation). Key construction activities during which soils are exposed and erosion may occur include clearing, grading, excavating, stockpiling, site restoration, and movement of equipment.

#### *5.3.4.2 Operation Effects*

Maintenance of the Project during the operational phase may periodically and infrequently require the use of borrow pits and potentially quarries to generate traffic gravel and other material needed for the ongoing maintenance of the road. Source material will likely be extracted from existing borrow areas and quarries in proximity to the LSM Access Road. The Project is not expected to have a large adverse effects on bedrock geology.

If the borrow and quarry areas used during operation are expanded in a manner that requires stripping soils or blasting, there is a potential that soils may mobilize.

#### *5.3.4.3 Mitigation*

Mitigation measures include maximizing construction during winter months in which the ground is frozen. This will facilitate minimizing the potential for soil erosion. Additionally, specific measures related to erosion control are included in MI's GERs as follows (Appendix C):

- Construction Environmental Management Plan;
- Erosion and Sediment Control; and
- Revegetation were appropriate.

Aside from meeting permitting requirements for quarries and borrow pits, no additional mitigation measures or monitoring is proposed.

#### *5.3.4.4 Residual Effects*

Given the nature of the effects in conjunction with the application of mitigation measures, residual effects on geology and soils are not anticipated beyond the footprint of the road, quarries or borrow pits (Table 5-3). Potential effects beyond the road will be mitigated through the application of erosion and sediment control measures and revegetation and are expected to be temporary and short-term.

### 5.3.5 Groundwater

#### *5.3.5.1 Construction Effects*

Although no groundwater investigation or studies have been completed specific to the Project, groundwater resources in the area are known to be close to the surface. Should clear access to groundwater exist (e.g. open wells, or open excavations), there is the possibility of groundwater contamination resulting from spills, leaks, accidents or malfunctions. None of the identified wells are in the PAA or surrounding region are anticipated to interact with the Project, and no other wells are known to exist in the immediate area.

Additional impacts to groundwater could result from groundwater extraction (i.e. drilling of drinking water wells) or related to the installation of septic or holding tanks (Table 5-2). However, these activities are not anticipated to be required. Work crews are expected to use an existing temporary camp facility near the terminus of the Idylwild Road (forestry road) which already has septic holding tanks and a drinking water well. No further well drilling, septic or holding tank installations are anticipated as a result of the Project.

There is some small potential for spills and leaks to occur during the construction period. However, there is no known pathway to groundwater on or immediately adjacent to the road and mitigation measures will further reduce or avoid potential effects on groundwater.

#### *5.3.5.2 Operation Effects*

There are no notable groundwater effects expected to be associated with operation of the LSM Access Road. There is a negligible chance for accidents and malfunctions to occur along the road in association with vehicles and equipment used to inspect and maintain the road. These activities will be sporadic and, if they occur, there is no known pathway to groundwater on or immediately adjacent to the road.

#### *5.3.5.3 Mitigation*

The following mitigation measures found in MI's GERs (Appendix C) will be implemented in order to reduce the impacts of construction, operation and maintenance of the proposed Project on groundwater resources.

- Construction Environmental Management Plan;
- Machinery, Fuel Handling and Storage;
- Emergency Response Plan for Spills; and
- Disposal.

#### *5.3.5.4 Residual Effects*

Given the nature of the effects in conjunction with the application of mitigation measures, the limited depth of excavation for road construction, and limited quarrying activity related to construction and operation of the proposed Project is not likely to result in any residual effects on groundwater resources.

### 5.3.6 Surface Water

#### *5.3.6.1 Construction Effects*

Although no streams transect the road or associated infrastructure, the LSM Access Road does cross through an area of expansive surface water that consists of fens, bogs, and marshes. There is a potential for surface water quality to be affected during construction and operation due to erosion and sediment runoff from exposed soils, or from fuel and/or hazardous substance spills or leaks associated with equipment usage (Table 5-2). Improper storage and disposal of waste material and other chemicals, solvents or fluids used to repair, maintain or operate equipment also have the potential to affect surface water quality if not managed appropriately. These effects, if they occur, are expected to be small and limited to the Footprint and immediately adjacent sites.

#### *5.3.6.2 Operation Effects*

There is a small chance for spills and leaks to both occur along the road in association with vehicles and equipment used to inspect and maintain the road and migrate into surrounding surface waterbodies. These activities will occur very sporadically at sites that have direct contact with surface waters and may seldom or never require equipment, e.g., ongoing culvert maintenance such as clearing debris.

#### *5.3.6.3 Mitigation*

To reduce potential impacts to surface water quality the following mitigation measures identified in MI's GERs (Appendix C) will be implemented:

- Construction Environmental Management Plan;
- Erosion and Sediment Control;
- In-Water Work;
- Clearing, Grubbing and Brushing;
- Revegetation;
- Machinery, Fuel Handling and Storage;
- Emergency Response Plans for Spills; and,
- Disposal.

#### *5.3.6.4 Residual Effects*

Considering the mitigation measures, the construction and operation/maintenance of the proposed Project is not expected to result in any residual effects on surface water quality (Table 5-3).

## 5.4 BIOLOGICAL ENVIRONMENT

### 5.4.1 Fish and Fish Habitat

#### *5.4.1.1 Construction Effects*

Field studies did not reveal any direct fish habitat as being present along the Project alignment (Section 4.2.11.). Culverts have not been sized for fish passage, but have been designed to maintain existing drainage through the access road embankment and will not result in reduced surface water flows to other potentially fish bearing waters.

#### *5.4.1.2 Operation Effects*

As there is no known fish habitat that transects the road, there is currently not expected to be any long-term effects of the Project on fish and fish habitat.

#### *5.4.1.3 Mitigation*

As there is no known fish habitat, no mitigation measures are being proposed specific to fish and fish habitat (Table 5-2). Nonetheless, general provisions to protect surface and groundwater quality will still apply, including the application of MI's GERs (Appendix C) as follows:

- Construction Environmental Management Plan;
- Erosion and Sediment Control;
- In-Water Work;

- Rip Rap;
- Revegetation;
- Machinery, Fuel Handling and Storage;
- Emergency Response Plans for Spills;
- Disposal; and,
- Other.

#### *5.4.1.4 Residual Effects*

No residual or notable adverse effects on fish habitat are expected to result from construction, operation and maintenance of the proposed Project.

### 5.4.2 Terrestrial Vegetation

#### *5.4.2.1 Construction Effects*

The potential environmental effects from construction, maintenance and operation of the Project include:

- The loss and disturbance of vegetation and wetlands due to clearing;
- Increased risk of invasive species spread;
- Impairment of vegetation due to spills and hazardous materials; and,
- Increased risk of forest fire.

Potential effects associated with construction and operation of the proposed. Project on vegetation are primarily related to clearing, grubbing and brushing and general changes to species composition in the Project Footprint (Table 5-2). These potential effects are discussed in this section and Section 5.4.2.2.

Vegetation clearing for the all-season road ROW, temporary access roads, quarries, borrow pits, work areas and camps during construction and maintenance would result in the loss of plant communities, alteration of the composition, diversity and structure as well as fragmentation. Clearing will be limited to the all-season road alignment to minimize the disturbance, loss, reduced diversity and fragmentation of plant communities. Since the Project is located along an existing winter road alignment, much of the corridor was already cleared for construction of the existing winter road. Some additional vegetation (i.e. trees, shrubs, etc.) will need to be removed in order to allow for construction activities, improve road design (curvature) and sight lines for motorist safety. Approximately 30 ha will be cleared for the LSM Access Road (Section 2.5.1.1). The total corridor footprint for the Project alignment is anticipated to be no more than 58.5 ha.

No further clearing is expected for camps or staging areas. These will be located within existing sites near the terminus of the Idylwild Road. Vegetation to be cleared consists primarily of mixed deciduous/coniferous and shrubby forest (Section 4.4.1).

The Project would result in the disturbance and loss of wetlands (e.g., bog, fen, marsh, swamp, shallow water) due to clearing and construction of the all-season road. Wetlands in region are connected systems that transport water and nutrients across the landscape. Water balances that have been altered in wetlands may result in increased drainage (drier moisture regime) or flooding that could affect species abundance and composition (Ecological Land Surveys Ltd. 1999). Without the installation of the equalization culverts, road development has the potential to impede water flow resulting in long-term vegetation changes (Ducks Unlimited Canada et al. 2014). A large proportion of the Project Footprint consists of wetland vegetation, with the various types being bog-fen complexes, as previously described in Section 4.4.1.

The mobilization of construction equipment and vehicles for the LSM Access Road could potentially transport seeds of non-native or invasive plant species to the PAA. Equipment and granular material used for construction and maintenance activities could potentially be a source of non-native and invasive plant species; the potential effect is expected to be greatly lessened as the Contractor(s) is expected to use local sources. Without implementation of the mitigation measure outlined in Section 5.4.2.3, this could subsequently displace native plants and modify plant community composition and structure in the area. A change in plant composition adjacent to the road is may subsequently occur, thereby facilitating a result non-native and invasive species introduction. The potential effects associated with the transfer of seeds and propagules for invasive plants will be greatly reduced through maximizing the clearing and construction to the winter months. Although vegetation surveys identified the presence of one generalist weed species Canada thistle, the area is largely remote and undisturbed.

Nonetheless, there is potential for an increased number of invasive and/or non-native plants to establish themselves in the area through seed transport from equipment, and/or by providing favourable conditions for establishment. Soil compaction resulting from construction equipment in particular can alter conditions and make it easier for invasive plants establish. Resulting soil compaction and removal of established vegetation during construction can therefore lead to localized changes in plant species composition within the Project Footprint.

Vegetation may be lost or impaired due to the accidental spills or releases of deleterious substances such as oil, fuel (diesel and gasoline) or hydraulic fluids during construction, maintenance and operation. A spill or release of deleterious substances may have measurably effects on vegetation

species or communities and could occur when vegetation is trying to establish or flower. This would be primarily associated with use of construction and maintenance equipment or vehicles near waterbodies but could also occur from vehicular accidents during operation. The release of fuels or other hazardous substances can result in the loss or impairment of vegetation due to toxicity. It is difficult for plants and plant communities to recover after an oil spill (Walker et al. 1978). The potential for spills would, however, be limited to the Project Footprint where construction and maintenance activities are occurring. The potential impairment to vegetation may occur sporadically during discrete spills or accidents. Vegetation loss and impairment is reversible over a long period.

#### *5.4.2.2 Operation Effects*

Prior to the implementation of mitigation measures, there are long term negative effects associated with the loss, disturbance, reduced diversity and fragmentation of plant communities due to clearing of native vegetation within the ROW, temporary access roads, quarries, borrow pits, work areas and camps. There is expected to be a long-term change in plant species and community structure within and, to a much lesser extent, adjacent to the right-of-way. Clearing would occur initially during construction and infrequently during maintenance. The effect of clearing is reversible over a long period as native vegetation would grow back in areas not maintained for sightlines.

The LSM Access Road will have a gate to limit access to sites north of Idylwild Road. As construction and maintenance crews will limit their activities to the constructed road, there is not anticipated to be notable off-road disturbance of habitat adjacent to the proposed ASR ROW.

The effect associated with potentially introducing invasive and non-native plant species will be associated with vehicle use during operation and maintenance. Displaced native plant communities and modified vegetation composition and structure in the area is considered reversible over a long period with control of the invasive species.

There is a very small potential for accidents and spills to be associated with vehicles and equipment used along the LSM Access Road and ROW during the operation and maintenance phase of the Project.

#### *5.4.2.3 Mitigation*

The following mitigation measures found in MI's GERs (Appendix C) will be implemented in order to reduce the impacts of the construction, operation and maintenance of the proposed Project on vegetation.

- Construction Environmental Management Plan;
- Clearing, Grubbing, and Brushing;
- Revegetation;
- Dust and Particulate Control;
- Machinery, Fuel Storage and Handling; and,
- Other.

Clearing will be restricted to the ASR ROW to the extent possible. Clearing is planned to occur in the winter months. Vegetative buffers will be maintained between the ROW and any development, including borrow areas, quarries, laydown areas and camps, as required. Grubbing would not occur within 2 m of trees that would be left standing in order to prevent damage to their root systems. Trees would be felled towards the centre of the ROW and woody debris would not fall or be pushed into adjacent standing timber that would not be cleared. Construction vehicle and equipment use would be restricted to the site, existing roads, or approved access routes that have been cleared.

Areas disturbed by construction that are not required for Project maintenance and operation would be decommissioned and rehabilitated once construction activities are completed in accordance with the GERs. This consists of restoring disturbed areas to their original condition. Access trails that are no longer required and which are not deemed to revegetate naturally would be blocked using rocks, timbers or other barriers to impede access and the road would be removed as soon as possible following the completion of work.

Temporary site locations would be left in a condition that promotes natural re-vegetation of the site. In cases where seeding is required for revegetation, seeding would commence as soon as appropriate growing conditions occur after completion of grading. When conditions do not permit immediate seeding MI would ensure seeding is completed within the next growing season. Seeding operations would not be carried out under adverse conditions of high winds, or ground covered with snow, ice or standing water. If an area is to be re-seeded, an approved seed mix consisting of locally and regionally compatible species (native) would be used.

In addition to the application of MI's GERs noted above, revegetation efforts will also include the use of a seed mix which will be appropriate to the local area. Further, the proposed Project is not intended for public use and access will be restricted to MI and contractor employees or other authorized individuals. These actions will minimize vehicle use and further reduce the potential for changes to local plant species composition, particularly with respect to the introduction of invasive and non-native species.

Adequate cleaning measures for equipment consistent with the GERs (Appendix C) will be a requirement prior to entering a construction site to assure that seeds and propagules from invasive plants are not transferred onto the site.

If monitoring of access reveals any unforeseen activities near the LSM Access Road (Section 5.6), particularly during the growing season, then additional measures to minimize or further avoid effects on plants and plant communities will be taken at that time.

#### *5.4.2.4 Residual Effects*

Residual effects will include the permanent loss of vegetation within the cleared Project Footprint (Table 5-3). There may also be minor changes to species composition along the alignment related to clearing and soil compaction. However, changes to species composition will be tempered with the use of an appropriate seed mix for revegetation. Use of an appropriate seed mix will further reduce the risk of invasive or non-native plant species becoming established in the area, and will help maintain the area's natural vegetative composition. Considering the effective implementation of mitigation measures, the potential effects on plants, plant habitats and ecosystems are expected to high, restricted to the footprint and adjacent habitat, long term, continuous, and reversible.

### 5.4.3 Wildlife and Wildlife Habitat

#### *5.4.3.1 Construction Effects*

Potential environmental effects from construction, maintenance and operation of the Project include the long term alteration, fragmentation or loss of habitat, sensory disturbance, increased hunting pressure, increased vehicular collisions, and increased predation. These potential effects are discussed in this section and section 5.4.3.1.

Some permanent local habitat loss is expected to occur as a result of site clearing to enhance road structure and assure safe sight lines for motorists (Section 5.4.2). For example, potential effects associated with the construction include the destruction or disturbance of bird nests due to clearing, grubbing and brushing. However, the Project is located along an existing winter road alignment where much of the clearing has already been completed. As a result, additional habitat loss will be minimal. Clearing activities will be restricted to winter months (September 1 – March 30 of any given year) in accordance with MI's GERs related to Clearing, Grubbing and Brushing (Appendix C) and will serve to mitigate against potential impacts to breeding and nesting habitat for migratory birds.

If not mitigated, clearing, grubbing and brushing activities risk destroying bird nest or eggs. However, such activities will only take place between September and April of any given year, avoiding the primary bird nesting season; this is consistent with application of MI's GERs, and specifically those related to submission of a Construction Environmental Management Plan, and Clearing, Grubbing and Brushing (Appendix C).

Noise generated from construction, maintenance activities and traffic may result in sensory disturbance or avoidance of the area by wildlife species. Construction of the Project is expected to take approximately 18 months, and will be conducted in a staged manner. Noise and vibration generated by construction activities will be concentrated in active work locations and closely affiliated with the road alignment. Sensory effects and temporary avoidance of the immediate area by wildlife is anticipated to be short-term, temporary, and adjacent to work areas as the work progresses. MI's GER related to Noise and Noise Limitations (Appendix C) will be applied to construction works.

Vehicle and equipment traffic during the construction and operation/maintenance phases will increase the risk of wildlife mortality from vehicle-wildlife collisions. Some wildlife such as moose, if present, may avoid roads, but will on occasion cross roads resulting in potential for vehicle collisions. Laurian et al. (2008) indicated that both forestry roads and highways were crossed by a few collared moose, mostly between May and July – indicating that moose tend to avoid road corridors, which in the long term likely reduces their chance of mortality by wolves, hunters and vehicles (Laurian et al. 2008, Shanley and Pyare 2011). However, the road is only being designed to a 70 km/h standard and expected to have low traffic volumes, particularly during the operational phase. As such, traffic moving along the Project will be moving at reduced rates of speed during both construction and operational phases. Reduced speeds in combination with improved sightlines and MI's GER related to Dust and Particulate Control (Appendix C) are expected to minimize the risk of vehicle-wildlife collisions.

If not mitigated, enhanced access to people resulting from construction of the Project can translate into improved hunting access and subsequently greater hunting pressures on species such as moose, white-tailed deer, upland game birds and waterfowl. However, the proposed Project is not intended for public use, with access north of Idylwild Road being restricted to authorized personnel only. The LSM Access Road will be a designated construction area during the construction phase of the Project. Unauthorized personnel will not be allowed to enter the area or travel along the road.

The conversion of 19.5 km of winter road to an all-season road may allow predators such as wolves and foxes to access new areas outside of the winter, thereby affecting existing local predator-prey dynamics. This could potentially lead to an increase in a wolf's travel speed—increasing their distribution and travel routes north of the Idylwild Road during the spring to fall period, and their potential interactions with prey species such as ungulates (James and Stuart-Smith 2000; Courbin et al. 2009). Literature has suggested that there is potential for access roads, such as the one being proposed, to facilitate the movement of predators such as wolves (Kunkel and Pletscher 2000). This may subsequently result in increased predation of ungulates and small mammals. The all season road (ASR) can result in decreased search times for prey, increased predation efficiency and increase access to areas where prey were previously safe due to low access. However, the Project will largely be constructed within an existing winter road alignment that has already been cleared. Constructing a permanent road embankment could result in a minor increase in predator movement along the alignment, but the surrounding habitat is expected to remain unaltered and is comprised of low lying fens and bogs. Therefore, predator movement into areas adjacent to the road are not anticipated to increase measurably.

Beaver is a semi-aquatic furbearer species commonly found in aquatic and riparian habitat throughout the Project region; they often inhabit lakes, ponds, creeks, rivers and other waterbodies. Preferred food resources for beaver include trembling aspen (*Populus tremuloides*), paper birch (*Betula papyifera*), a variety of willows (*Salix* spp.) and numerous other woody shrubs (Jenkins 1980; Gallant et al. 2004). During the growing season, more than 55% of their annual diet is comprised of aquatic vegetation (floating and emergent). The foraging requirements of beaver extends beyond requirements for food in that beaver also must process woody vegetation for construction of lodges, dams and winter food storage. The effective use of culverts to facilitate flow of water through the PAA is expected to limit the amount of water retention on either side of the LSM Access Roads. Without effective mitigation, beavers may attempt to block the flow of water through the culverts potentially creating ponding over the road.

Amphibians are known to be very sensitive to environmental change. If not mitigated, erosion and sedimentation associated with exposed soils during construction may reduce reproductive success of amphibians in wetlands located adjacent to work areas by impacting eggs or larva. Furthermore, spills or leaks from accidents and malfunctions can also be detrimental to amphibians in the immediate area. The Project is located in an area that includes many wetlands, marshes, bogs and fens. Implementation of MI's GERs such as Construction Environmental Management Plans, Erosion and Sediment Control, In-Water Work, Rip Rap, Revegetation, Machinery, Fuel Storage and Handling, Emergency Response Plan for Spills, Disposal, and Other during both construction and operation/maintenance phases of the Project will mitigate the potential effects on amphibians.

Improperly stored food waste and garbage at temporary facilities such as camps and equipment maintenance areas have the potential to attract some wildlife species. Wildlife species such as black bears (*Ursus americanus*) may be attracted to work sites and become habituated or dependant on waste. Some animals that become habituated to, or dependant on, garbage as food sources may become a hazard to human safety. To prevent animals from becoming habituated or food-conditioned, MI's GER for Wildlife and Machinery, Fuel Storage and Handling (Appendix C) will be applied for all construction and maintenance activities.

#### *5.4.3.2 Operation Effects*

Most of the construction-related effects will continue on during the operational phase. While the effects will be longer term during operation, the magnitude of those effects are generally expected to be much lessened. The habitat-related effects that occurred during construction will continue during the operational life of the Project. Noise associated with vehicles are expected to be primarily limited to the semi-annual road inspection and maintenance, whenever required. While the habitat-related fragmentation effects already occurred during construction, the amount of vehicle use (to add to those effects) during operation is expected to be much less than during construction.

Noise and vibration during the operational phase of the Project will be greatly reduced in comparison to the construction phase. Noise and vibration may result from sporadic road maintenance activities, but these will be short-term, infrequent and localized. Traffic noise will be present once the road is operational; however, the proposed Project is not intended for public use, and access will be restricted to authorized individuals only. Use of the Project during the operational phase will be sporadic. Potential effects on wildlife immediately adjacent to the road during the operations and maintenance phases of the Project-include noise and vibration and will be short-term, temporary and sporadic.

Once operational, the presence of a gate and (if required) additional barriers is expected to effectively block most vehicle use during non-winter months. Furthermore, the Project will not be maintained over winter months unless required, i.e. it will not be cleared of snow. If unauthorized individuals' mange to access the LSM Access Road to hunt or conduct other resource-related activities, they will be limited to the same area as is currently accessible via the existing winter road corridor. The surrounding environment will not be altered and will still prove difficult to traverse by ground, limiting accessibility to adjacent areas by hunters.

There is a potential that unmitigated access would have an increased potential to facilitate hunting and other resource use activities in the region. Increased hunting pressure on moose and white-tailed deer, for example, could potentially result in an increase in wildlife mortality.

#### *5.4.3.3 Mitigation*

The following are mitigation measures included in MI's GERs (Appendix C) that will be employed to offset potential effects on wildlife:

- Construction Environmental Management Plan;
- Erosion and Sediment Control;
- In-Water Work;
- Rip Rap;
- Revegetation;
- Clearing, Grubbing, and Brushing;
- Machinery, Fuel Storage and Handling;
- Emergency Response Plan for Spills;
- Disposal;
- Noise and Noise Limitations;
- Wildlife; and
- Other.

Hunting and access of the LSM Access Road to resource users will not be permitted during the construction phase of the project. Following construction, a gate will be installed in a location near the southern boundary of the LSM Access Road to block movement of vehicles north of Idylwild Road. There will also be signage indicating that the area is not accessible and restricted to authorized personnel only.

Any additional measures that may be taken to further restrict unpermitted access along the LSM Access Road will be guided by the results of monitoring proposed for this Access Road (Section 5.4.6) in combination with MI's ongoing inspection program and information obtained from local resource users.

#### *5.4.3.4 Residual Effects*

Although the majority of the roadway is being constructed within an existing corridor, residual effects associated with the construction and operation/maintenance of the proposed Project includes a minor amount of permanent habitat loss within the Project Footprint. It is also possible that the Project may result in some minor permanent increases in wildlife mortality over current conditions due to vehicle collisions. All other effects are anticipated to be restricted to the

construction phase and will be mitigated by implementation of MI's GERs (Appendix C) and through restricting use of the roadway to only authorized personnel.

In considering the potential Project-related effects on wildlife and the application of mitigation measures and restriction of public access, no notable direct adverse effects on wildlife stemming from construction and operation/maintenance of the proposed Project are expected to occur (Table 5-3). Should unanticipated Project-related effects to wildlife arise, MI will work with Manitoba Sustainable Development to determine the need and nature of any follow-up. Considering the mitigation measures, potential effects on wildlife and wildlife habitats are expected to be moderate to high, mostly contained to the local area, long term, sporadic to continuous, and reversible.

### 5.4.4 Species at Risk and Unique Features

#### *5.4.4.1 Construction Effects*

There is no fish or fish habitat expected to be affected by the Project and no known rare or unique species or habitat in the PAA. As well, there are no plant species at risk known to occur in the PAA.

However, there is some potential for an effect of the Project on terrestrial wildlife. Two protected bird species were identified during field studies within 10 km of the Project alignment: the Eastern wood-pewee and trumpeter swan. Although neither species were present within the PAA, there is a potential that they may be present and as such were assessed for potential Project-related effects. Potential Project-related effects to the Eastern wood-pewee and trumpeter swan include habitat loss and disturbance due to noise and vibration stemming from construction or maintenance activities. Minor clearing that may be required to further enhance road design and sightlines may result in minor habitat loss.

Disturbance related to noise and vibration during construction activities has the potential to affect both the Eastern wood-pewee and trumpeter swan. Construction activities for the Project are expected to occur in a staged and staggered manner and generally following the existing winter road alignment. Avoidance of the Project by Eastern wood-pewee and trumpeter swan is anticipated to be short-term, localized and limited to the construction phase of the Project. Should either species be temporarily displaced due to construction noise and vibration, extensive habitat is present in the surrounding area. Furthermore, most of the Project will generally be built along a pre-existing winter road corridor. Any additional clearing, grubbing or brushing will be conducted in accordance with MI's GERs for Clearing, Grubbing and Brushing, and will therefore avoid the nesting season and thereby prevent the destruction or disturbance of nests. Additional disturbance from dust emissions will be limited through the application of MI's GER for Dust and Particulate Control.

There is potential that construction of the Project may result in minor habitat loss for trumpeter swan and Eastern wood-pewee. However, as shown in Table 5-4, an assessment of modelled habitat (developed by Ecologic Environmental Inc. 2016) shows that the Project alignment comprises only 0.22% and 1.26% of available habitat in the PAA for trumpeter swan and Eastern wood-pewee respectively. No further habitat removal (i.e. clearing) is expected to occur post-construction, except for periodic mowing and brushing in order to maintain driver sightlines when and where required.

### Table 5-4. Trumpeter Swan and Eastern Wood-Peewee Habitat Loss

| Location | Total Area (ha) | Modelled Trumpeter Swan Habitat (ha) | Modelled Eastern Wood-Pewee Habitat (ha) |
|---|---|---|---|
| Project Assessment Area | 4232.56 | 247.47 | 132.60 |
| Project Footprint (30m corridor) | 58.97 | 0.54 | 1.66 |
| Habitat Loss | | 0.22% | 1.26% |

Two species of bat, the little brown bat and northern long-eared bat, were also detected in the general vicinity of the Project. Their presence warranted additional detailed investigation to document whether bat hibernacula was present in the area (Ecologic Environmental Inc. 2017). Additional investigations, however, did not identify any potential hibernacula. As such, no Project-related effects are anticipated.

Similarly, northern leopard frog (*Lithobates pipiens*) were not documented during wildlife field studies, but may be present in the area. Possible permanent habitat loss or impacts to surrounding surface water from erosion and sedimentation or accidents, spills or malfunctions may result during construction or operation. Since the Project primarily follows an existing winter road corridor, northern leopard frog habitat loss is expected to be limited, and important areas such as deep pools for overwintering are not expected to be affected. Additionally, mitigation measures will include the application and implementation of MI's GERs such as: Construction Environmental Management Plans, Erosion and Sediment Control, In-Water Work, Rip Rap, Revegetation, Machinery, Fuel Storage and Handling, Emergency Response Plan for Spills, Disposal. Other measures taken during both construction and operation/maintenance phases of the Project will mitigate such potential effects to northern leopard frog.

No environmentally sensitive sites (ESS) were identified in the PAA. Baseline surveys revealed the presence of two environmentally sensitive sites in the region: an eagle and a goose nest were observed during field investigations within 10 km of the proposed Project, along the shores of Lake St. Martin. Given their location, the geographic distance of these sites to the Project, and the fact that the Project is not anticipated to have any impact to Lake St. Martin, no adverse environmental effects are expected. Given that the Project will primarily follow an existing corridor, additional environmentally sensitive sites are not anticipated to be encountered. No mitigation measures are being proposed for environmentally sensitive sites (ESSs).

#### *5.4.4.2 Operation Effects*

Potential effects on rare species during the operational phase are expected to be primarily restricted to the period of construction of the LSM Access Road and any other future works in the area. There remains a small chance of long-term mortality associated with vehicle use along the road during operation. This may potentially have an affect on northern leopard frogs (if present), particularly after the courtship period when they distribute to summering areas and in the late summer/fall when they return to hibernation sites. Considering the road speeds and the infrequency of road use, there is not expected to be notable change to habitat quality for amphibians and birds and limited potential for bird-vehicle collisions.

#### *5.4.4.3 Mitigation*

In addition to timing and staging of construction activities, mitigation measures that will be employed in order to offset potential impacts to the Eastern wood-pewee and the trumpeter swan include application of MI's GERs (Appendix C) as follows:

- Construction Environmental Management Plans;
- Clearing, Grubbing and Brushing;
- Noise and Noise Limitations; and,
- Other.

If critical habitat is identified for any species at risk during construction and will potentially be affected, construction activities at those sites will cease until the MI Environmental Services Section and the regulators develop an effective plan to proceed. For example, if an active trumpeter swan nest is located immediately adjacent to the Project Footprint, construction will stop until a plan is established and approved by MI and MSD. This plan may, for example, include not conducting any blasting or any other high disturbance constructions activities within the recommended 1 Km set-back distance (MCDC 2015)

#### *5.4.4.4 Residual Effects*

Potential minor loss of habitat for protected species could possibly occur. No further residual effects on protected species are likely to occur as a result of the construction and operation/maintenance of the Project. Potential effects will be largely mitigated through the application of MI's GERs (Appendix C). Considering mitigation, the overall effect on species at risk are expected to be negligible or low, local, medium term, sporadic, reversible and having low resilience.

There are not expected to be any measurable residual effect on environmental sensitive sites in the PAA.

## 5.5 SOCIO-ECONOMIC ENVIRONMENT

### 5.5.1 Resource Use

#### *5.5.1.1 Construction Effects*

Potential land uses in close proximity to the proposed Project include hunting and trapping (Table 5-2). No forestry activities are currently known to occur in the immediate vicinity of the Project. Specific information regarding the number of hunters along the Project is not known. An individual that attended one of the open houses indicated that they do some hunting off the Idylwild Road. Hunting activity is expected to be limited due to the general inaccessibility of the area, but the Project does fall within black bear outfitter operating areas.

Restrictions that will be imposed during the Project construction phase which will include prohibiting contractors and their employees from hunting during working hours or in the immediate vicinity of work sites in the interest of safety. Prior to construction demobilization, a gate will be installed just north of the intersection with Idylwild Road; the location of the gates currently planned to be near a wetland site and (if required) the addition of adjacent barriers to limit access around the gate will facilitate the restriction of access to authorized personnel only, i.e., public use of the roadway will not be allowed.

The proposed Project is located in an open trapping area. The use of the area in the immediate vicinity of the Project for trapping is currently unknown. Access to the Project is limited in the same manner it is for resource users wanting to hunt along or off the proposed LSM Access Road. Most trapping in the area is expected to occur in more accessible areas south of the proposed LSM Access Road. In the event that existing resource trails are encountered, MI will ensure that they are not blocked as a result of construction activities.

As the Project is not intended for public use, access through the construction area will not be permitted. Access will be restricted to authorized personnel only, and is not meant to enable further trapping in the area.

There is also potential for recreational and/or commercial fishers and other resource users to want to access the northern extent of Lake St. Martin by road. Travel along the LSM Access Road will be limited by the gate and any associated barrier. If an individual somehow manages to gain access to the LSM Access Road they will be restricted to the same corridor as the existing winter road.

#### *5.5.1.2 Operation Effects*

During operation, use of the proposed Project will be restricted to authorized personnel only. The Project will be blocked by use of a physical barrier, and public use of the roadway will not be allowed. Should individuals manage to gain access to the Project, they will still be restricted to the same area as is currently accessible via the existing winter road corridor.

Access restrictions may be less effective in winter when snow machines are typically used. Should individuals manage to gain access to the Project, they will still be restricted to the same area as is currently accessible via the existing winter road corridor.

#### *5.5.1.3 Mitigation*

Mitigation measures to offset potential impacts to trapping include adherence to MI's GERs (Appendix C) as follows:

- Construction Environmental Management Plan; and,
- Clearing, Grubbing and Brushing.

Access to resource users such as hunters, trappers, and fishers will not be permitted during the construction phase of the project and restricted during the operational period. The gate and associated access blockage measures is expected to be effective from the late winter to early winter period in effectively limiting the LSM Access Road to block movement of vehicles north of Idylwild Road. Any additional measures that may be taken to further restrict unpermitted access along the LSM Access Road will be guided by the results of monitoring proposed for this Access Road (Section 5.4.6) in combination with MI's ongoing inspection program and information obtained from local resource users.

#### *5.5.1.4 Residual Effects*

No residual effects on resource use are likely to occur as a result of the construction and operation/maintenance of the proposed Project (Table 5-3). Should unanticipated Project-related effects to resource use arise, MI will work with Manitoba Sustainable Development to determine the need for and nature of any follow-up.

### 5.5.2 Parks, Protected Areas and Areas of Special Interest

#### *5.5.2.1 Construction Effects*

The Project does not intersect any parks, protected areas, or areas of special interest, nor does it interfere with the management or operation of such sites (Table 5-2). As such, the Project's construction, operation and maintenance activities are not expected to have any adverse effects to such features or areas.

#### *5.5.2.2 Operation Effects*

There are not expected to be any potential Project effects on any parks, protected areas, or areas of special interest as there is no intersection of the PAA with these features and no potential construction-related effects (Table 5-2).

#### *5.5.2.3 Mitigation*

No mitigation measures are proposed for potential Project-related effects on Parks, Protected Areas, or ASI's. No residual effects to parks, protected areas and areas of special interest are likely to occur as a result of the construction and operation or maintenance of the proposed Project.

#### *5.5.2.4 Residual Effects*

There are not expected to be any Project-related residual effects on any parks, protected areas, or areas of special interest (Table 5-3).

### 5.5.3 Culture and Heritage Resources

#### *5.5.3.1 Construction Effects*

The biggest potential for an effect on heritage resources would be associated with construction activities, particularly grubbing and excavating.

No known heritage resources were identified in the immediate vicinity of the Project, and the probability of identifying new sites is low (NLHS 2015; Table 5-2). As such, Project-related effects are not expected to occur on cultural or heritage resources during the construction and operation/maintenance of the proposed Project.

#### *5.5.3.2 Operation Effects*

There is negligible potential that operation and maintenance activities might have an effect on heritage resources, if they are present in or adjacent to the proposed LSM Access Road.

#### *5.5.3.3 Mitigation*

Specific mitigation measures for culture and heritage resources are not being proposed. However should any artifacts be uncovered during Project construction, operation or maintenance, work will be temporarily ceased and Manitoba's Historic Resources Branch will be contacted in accordance with MI's GER for Heritage Resources (Appendix C).

#### *5.5.3.4 Residual Effects*

No residual effects on culture and heritage resources are likely to occur as a result of the construction and operation or maintenance of the proposed Project.

### 5.5.4 Human Health and Safety

#### *5.5.4.1 Construction Effects*

Potential environmental effects of Project construction, maintenance and operation largely include direct and indirect human health effects from local changes to air quality and noise. Potential effects from construction and operation/maintenance of the Project include safety hazards associated with traffic and road use, such as vehicle collisions, or other accidents and malfunctions. Similarly, dust emissions, noise, and blasting activities have the potential to affect human health and safety as well.

Public access to the Project will not be permitted. As such, there will be no public exposure to construction, blasting or other heavy equipment risks or hazards. Similarly, permanent settlements are located well beyond the PAA and are not expected to be affected by dust, noise or blasting.

The proposed Project will be designed to a 70km/h roadway standard for safety and visibility.

This will help minimize the potential for collisions (including wildlife collisions), rollovers and other traffic related concerns. During construction, proper safety standards and requirements will be in place, including appropriate signage in order to minimize human health and safety concerns.

#### *5.5.4.2 Operation Effects*

Traffic volumes are expected to be low, short-term and sporadic during the operational phase of the Project. As a result, the potential for accidents or collisions with other vehicles is expected to be negligible.

#### *5.5.4.3 Mitigation*

Mitigation measures to address potential effects to human health and safety are similar to many of those listed earlier to mitigate potential effects associated with the corresponding physical and biological environments. Mitigation measures will include the implementation of safe work practices, including signage at the construction site. Mitigation measures to reduce the potential effects of the Project on community member and worker safety risk during construction include MI providing regular construction progress updates to the local communities; sites along the all-season road route under construction would be identified and thereby help assure that emergency service providers are aware of the Project construction schedule and status.

Public access to construction areas would be restricted to only the approved workforce. Signage, barricades and notices provided to the local communities would be employed to keep people away from active construction areas.

Construction workers would be trained in safe practices, including the use of Personal Protective Equipment, would abide by Health and Safety Plans and would attend regular construction site safety briefings. Construction contractors would develop and implement appropriate Health and Safety Plans, conduct regular safety training and inspections, use trained and certified blasting crews (if blasting is required) and equip and maintain construction equipment, machinery and vehicles with appropriate safety features (e.g., back-up warning devices). Spill response and remediation would occur in accordance with the GERs, thereby minimizing the potential effects of hazardous materials and limiting them to a small area that would be quickly cleaned up.

For environments where a worker is likely to be exposed to a noise that exceeds 85 dbA Lex, standard construction practices such as informing the worker about the hazards of the level of noise and providing workers with hearing protection that complies with CAN/CSA Z94.2-02 as required by the Manitoba Workplace Safety and Health Regulation 217/2006 part 12 would mitigate the effects on workers.

Given that construction sites are closed to non-construction workers for safety reasons, others are not at risk. Regulations that would be followed regarding worker exposure to noise are provided in the Workplace Safety and Heath Regulation of Manitoba's Workplace Health and Safety Act 1993 and would include the use of appropriate personal protective equipment (including hearing protection) and coordinating the timing of blasting with the period of fewest on-site workers.

Mitigation measures to reduce the risk of potential effects of the Project on community member safety during operation are factored into the road design. The proposed Project is not intended for public use and will be restricted to authorized users only. The posted speed limit would be 70 km/h or less where required for safety. Traffic volumes on the proposed all-season road is expected to be less than 2-4 vehicles annually for the purpose of inspection of the road and associated infrastructure. The road will likely be used considerably more during the 2.5 years of construction of the Lake St. Martin Outlet Channel, particularly when the road is needed to access the proposed control structure and channel site.

The line of sight would be maintained and signage installed where required to facilitate the safety of those using the road. Dust suppression may be used sparingly when the road is use for construction-related purposes. It is unlikely that dust suppression actions will be warranted during the operation period of the LSM Access Road. If required, dust suppression would be conducted as necessary using water or other approved dust suppressants.

#### *5.5.4.4 Residual Effects*

No residual adverse effects on public health and safety are likely to occur as a result of the construction and operation/maintenance of the proposed Project (Table 5-3).

## 5.6 FOLLOW-UP

Follow up includes activities such as monitoring and reporting and may occur at any stage in the lifespan of the Project. This section describes proposed follow-up to be conducted by MI during the construction and operational phases of the Project.

### 5.6.1 Construction

The principle follow-up activities conducted during Project construction will be compliance monitoring and reporting. Compliance monitoring will be performed through site inspections by MI personnel (or representatives) to assure that environmental specifications, regulations, permits and approvals are adhered to in the construction of the Project. MI personnel and representatives,

including project managers, contract administrators, and construction inspectors will be present on the worksite as construction is underway and will assure that commitments made in this EA Report and supporting documentation such as the GERs and Manitoba Environment Act Licence are adhered to, and that other corrective measures are applied as required.

Additional site inspections may also be conducted by MI environmental staff. Manitoba Infrastructure will assure that field inspections are properly conducted and documented. These reports will be provided to Manitoba Sustainable development, likely within construction progress documentation.

### 5.6.2 Operation

Access-related issues are the primary source of potential environmental effects related to the operation of the Project. To address this, a gate (with a lock) will be installed near the terminus of the Idylwild Road to restrict access to unauthorized personnel. It is expected that this will sufficiently deter most motorized vehicles. However, ATVs and snow machines may be able to circumvent the gate. To address this potential circumstance, MI will place the gate in a location, such as adjacent to a wetland, which will provide a natural barrier to most all terrain vehicles. If necessary, additional steps such as extending fencing or other obstructions to the wetland or obstruction may be required to further restrict unpermitted access onto the LSM Access Road.

Monitoring will occur after installation of signage, the gate and any other obstructions, to assure the efficacy of access restrictions and determine whether and what additional mitigation measures are required. MI will place and maintain motion sensing cameras (trail cameras) at select point along the LSM Access Road. This monitoring will extend for at least the initial three years of operation and assist in determining the effectiveness of the gate in restricting unpermitted access. Secondarily, it will help to determine whether and where any unpermitted access is occurring, e.g., to confirm whether snow machines are moving onto adjacent wetlands and then back on the LSM Access Road a few hundred metres north of the gate. Thirdly, the monitoring will assist to confirm the EA Report predictions as to frequency and usage of the road. Should access monitoring and follow-up demonstrate that the gate is not providing adequate access restriction, MI will explore additional measures and discuss proposed/preferred strategies with MSD.

## 5.7 CONCLUSIONS

The potential physical, biological and socio-economic effects of the proposed Project have been evaluated, with consideration given to the effectiveness of mitigation measures and the resulting

likelihood of occurrence of residual effects. The proposed mitigation measures outlined in this EA Report are expected to effectively prevent, avoid or minimize potential effects. Nonetheless, some minor residual effects were identified as part of the analysis, they are:

- Minor overall increases in GHG and dust emissions associated with vehicle/equipment during construction, operation and maintenance;
- Minor overall increases in noise and vibration attributed to construction and general operation of the Project over existing conditions;
- Permanent alteration of local terrain associated with the construction of an elevated road embankment and potential development of quarries or borrow pits;
- Permanent vegetation loss and minor changes to local plant community composition along the Project due to clearing, compaction of soils and possible unintentional introduction of non-native or invasive plant species;
- Permanent wildlife habitat loss along the Project Footprint; and
- Small potential for overall increase in wildlife mortality over current conditions primarily associated with vehicle collision risks.

These residual effects are somewhat offset by the positive effects associated with developing all season access needed to operate and maintain the Lake St. Martin Access Road, Emergency Outlet Channel and other future flood protection infrastructure in the region.

With consideration of this positive benefit of the LSM Access Road and the associated adverse residual effects, Manitoba Infrastructures advises that we see no reason why an Environment Act Licence could not be issued for the LSM Access Road Project.

# EA REPORT SECTION 6

# REFERENCES

## LAKE ST. MARTIN ACCESS ROAD

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# 6.0 REFERENCES

## 6.1 LITERATURE CITED

AAE Tech Services Inc. 2016. Lake St. Martin Access Road Fisheries and Aquatic Habitat Assessment. Prepared for M. Forster Enterprises for submission to Manitoba Infrastructure. Winnipeg, Manitoba.

Benitez-Lopez, A., R. Alkemade and P.A. Verweij. 2010. The impacts of roads and other infrastructure on mammal and bird populations: A meta-analysis. Biological Conservation 143: 1307-1316.

Beranek, L.L. 1988. Book Review: Noise and Vibration Control. 1988 edited by L. L. Beranek (revised edition). Washington, D.C.: Institute of Noise Control Engineering.

Betcher, R., G. Grove and C. Pupp. 1995. Groundwater In Manitoba: Hydrogeology, Quality Concerns, Management. NHRI Contribution No. CS-93017. March, 1995

Bezener. K., and A. De Smet. 2000. Manitoba Birds. Lone Pine Publishing, Edmonton, AB.

Birdlife International. 2018. Data Zone. Lake St. Martin Islands (CA156). Available at http://datazone.birdlife.org/site/factsheet/lake-st.-martin-islands-iba-canada. Access February 23, 2018.

Bilecki, L. C. 2003. Bat Hibernacula in the Karst Landscape of Central Manitoba: Protecting Critical Wildlife Habitat While Managing for Resource Development. Natural Resources Institute, University of Manitoba. Winnipeg, Manitoba. August 25, 2003.

Canadian Mortgage and Housing Corporation. 1981. Road and Rail Noise: Effects on Housing. Available at: ftp://ftp.cmhc-schl.gc.ca/chic-ccdh/Research_Reports-Rapports_de_recherche/Older13/CA1%20MH110%2081R56_w.pdf.

Caras, R.A. 1967. North American Mammals –Fur-bearing Animals of the United States and Canada. Meredith Press. University of Minnesota, MN.

Catling, P.M. and V.R. Brownell. 1995. A review of the alvars of the Great Lakes region: distribution, composition, biogeography and protection. Canadian Field-naturalist 109: 143-171.

Climate Change Connection. 2016. $CO_2$ Equivalents. Available at: http://climatechangeconnection.org/emissions/co2-equivalents/. Accessed October 31, 2016.

Conant, R. and J.T. Collins. 1991. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. Houghton Mifflin Co. Boston, MA.

Courbin, N., D. Fortin, C. Dussault and R. Courtois. 2009. Landscape management for woodland caribou: the protection of forest blocks influences wolf-caribou co-occurrence. Landscape Ecology, 24, 1375–1388.

Ducks Unlimited Canada, Louisiana Pacific, FP Innovations, Spruce Products Ltd. and Weyerhaeuser. 2014. Operational Guide, Forest Road Wetland Crossings, Learning from Field Trials in the Boreal Plains Ecozone of Manitoba and Saskatchewan, Canada. Version 1.0. 44 pp.

Eaton, S. 2000. Construction Noise. Workers' Compensation Board of BC, Engineering Section. 21 pp.

Ecologic Environmental Inc. 2016. Lake St. Martin Outlet Channel Access Road – Terrestrial Wildlife Technical Report. Prepared by Ecologic Environmental Inc., Winnipeg, Manitoba.

Ecologic Environmental Inc. 2017. Lake Manitoba and Lake St. Martin Access Road and Outlet Channels Project – Bat Species at Risk Field Study Report. Prepared by Ecologic Environmental Inc., Winnipeg, Manitoba.

Ecological Land Surveys Ltd. 1999. Botanical, Vegetation and Ecological Resource Survey of the Proposed Coal Valley II Mine Extension. Prepared for Luscar Ltd. Calgary, Alberta.

Environment and Climate Change Canada (ECCC). 2016a. Marine Topics: Prairies Regional Guide: Part 4 Manitoba. Available at: https://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=779FD5BA-1&offset=5&toc=show#sec7.1. Accessed November 3, 2016.

Environment and Climate Change Canada (ECCC). 2016b. Facility Greenhouse Gas Reporting. Greenhouse Gas Emissions Reporting Program. Available at: http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=040E378D-1. Accessed October 31, 2016.

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

Environment and Climate Change Canada (ECCC). 2016d. Reported Facility Greenhouse Gas Data. Available at: https://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=8044859A-1. Accessed October 31, 2016.

Environment and Climate Change Canada (ECCC). 2016e. Air Quality Health Index: Winnipeg, Manitoba. Available at: http://weather.gc.ca/airquality/pages/mbaq-001_e.html. Accessed November 01, 2016.

Environment Canada. 1999. Invasive Plants of Natural Habitats in Canada. An Integrated Review of Wetland and Upland Species and Legislation Governing their Control. Wildlife Habitat Conversation,

Canadian Wildlife Service. Available at: https://www.ec.gc.ca/eee-ias/78D62AA2-55A4-4E2F-AA08-538E1051A893/invasives.pdf. Accessed May 2016.

Environment and Climate Change Canada (ECCC). 2018. Recovery Strategy for the Eastern Whip-poor-will (*Antrostomus vociferus*) in Canada. Species at Risk Act Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. vi + 107 pp

Fisheries and Oceans Canada and Manitoba Natural Resources 1996. Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat.

Forester, M. et. al. 2016. Lake St. Martin Outlet Channel Proposed All Season Access Road Summary of Existing Environment Final Report

Explosives and Rockwork Technologies Ltd. 2002. Vibration Assessment Eagle Rock Quarry Project. Prepared for Polaris Minerals Corporation, Vancouver, BC.

Gallant, D., C.H. Berube, E. Tremblay and L. Vasseur. 2004. An extensive study of the foraging ecology of beavers (*Castor canadensis*) in relation to habitat quality. Canadian Journal of Zoology 82(6):922-933.

Government of Canada. 2013a. Soils of Manitoba. Available at: http://sis.agr.gc.ca/cansis/soils/mb/soils.html. Accessed August 2018.

Government of Canada. 2013b. Description of Soil MBGDT: Grindstone. Available at: http://sis.agr.gc.ca/cansis/soils/mb/GDT/~~~~~/N/description.html. Accessed August 2018.

Government of Canada. 2013c. Description of Soil MBBYH: Baynham. Available at: http://sis.agr.gc.ca/cansis/soils/mb/BYH/~~~~~/N/description.html. Accessed August 2018.

Government of Canada. 2016a. Canadian Climate Normals 1981-2010 Station Data. Available at: http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnName&txtStationName=lundar&searchMethod=contains&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongMin=0&txtCentralLongSec=0&stnID=3815&dispBack=1. Accessed October 31, 2016.

Government of Canada. 2016b. Justice Laws Website. Available at: http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._1038/index.html. Accessed November 01, 2016.

Government of Manitoba. 2009. Provincial Sustainability Report for Manitoba 2009. http://www.gov.mb.ca/conservation/pdf/sustainabilty_report_2009.pdf Accessed December 5, 2015.

Government of Manitoba 2012b. News Release September 29, 2012. Available at: http://news.gov.mb.ca/news/?archive=&item=15364. Accessed May 29, 2019.

Government of Manitoba. 2016b. Manitoba Air Quality. https://web31.gov.mb.ca/EnvistaWeb/Default.ltr.aspx. Accessed November 01, 2016.

Government of Manitoba. 2016c. Ambient Air Quality Criteria. Updated July 2005. Available at: http://www.gov.mb.ca/conservation/envprograms/airquality/aq-criteria/ambientair_e.html. Accessed November 01, 2016.

Government of Manitoba. 2016d. Air Quality Health Index. Available at: http://www.gov.mb.ca/conservation/envprograms/airquality/aq-health/. Accessed November 01, 2016.

Government of Manitoba. 2016e. Mineral Resources. Mineral Inventory Cards. Mineral Inventory File No. 924. Gypsumville. Available at: https://www.gov.mb.ca/iem/min-ed/mbhistory/mininv/924.htm. Accessed November 02, 2016.

Government of Manitoba. 2016g. Mineral Resources. Mineral Inventory Cards. Mineral Inventory File No. 937. Faulkner. Available at: https://www.gov.mb.ca/iem/min-ed/mbhistory/mininv/937.htm. Accessed November 02, 2016.

HMMH (Harris, Miller, Miller and Hanson Inc.). 2014. Noise and Vibration during Construction. Available at: http://www.hmmh.com/cmsdocuments/FTA_Ch_12.pdf. Accessed January 24, 2014.

INAC (Indigenous and Northern Affairs Canada). 2019a. Dauphin River First Nation: Registered Population. Available at: http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=316&lang=eng. Accessed May 29, 2019.

INAC (Indigenous and Northern Affairs Canada). 2019b. Peguis First Nation: Registered Population. Available at: http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=269&lang=eng. Accessed May 29, 2019.

INAC (Indigenous and Northern Affairs Canada). 2019c. Fisher River Cree Nation: Reserves/Settlements/Villages. Available at: http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNReserves.aspx?BAND_NUMBER=264&lang=eng. Accessed May 29, 2019.

INAC (Indigenous and Northern Affairs Canada). 2019d. Fisher River Cree Nation: Registered Population. Available at: http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=264&lang=eng. Accessed May 29, 2019.

INAC (Indigenous and Northern Affairs Canada). 2019e. Kinonjeoshtegon First Nation: Reserves/Settlements/Villages. Available at: http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNReserves.aspx?BAND_NUMBER=268&lang=eng. Accessed May 29, 2019.

INAC (Indigenous and Northern Affairs Canada). 2019f. Kinonjeoshtegon First Nation: Registered Population. Available at: http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=268&lang=eng. Accessed May 29, 2019.

INAC (Indigenous and Northern Affairs Canada). 2019g. Lake Manitoba First Nation: Reserves/Settlements/Villages. Available at: http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNReserves.aspx?BAND_NUMBER=271&lang=eng. Accessed May 29, 2019.

Indigenous and Northern Affairs Canada (INAC). 2019h. Lake Manitoba First Nation: Registered Population. Available at: http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=271&lang=eng. Accessed May 29, 2019.

Interlake-Eastern Regional Health Authority. 2019. Ashern Lakeshore General Hospotal. Available at: https://www.ierha.ca/default.aspx?cid=6340&lang=1. Accessed May 7, 2019.

James, A. and K.A. Stuart-Smith. 2000. Distribution of caribou and wolves in relation to linear corridors: Journal of Wildlife Management 64, no.1 (2000): 154-159.

Jenkins, S.H. 1980. A size-distance relation in food selection by beavers. Ecology 61:740-746.

KGS Group. 2016. Assiniboine River & Lake Manitoba Basins - Flood Mitigation Study LMB & LSM Outlet Channels Conceptual Design - Stage 2. KGS Group Project 12-0300-011. Final Report. January 2016.

Kunkel, K. E. and D.H. Pletscher. 2000. Habitat factors affecting vulnerability of moose to predation by wolves in southeastern British Columbia. Canadian Journal of Zoology 157*:* 150-157.

Lapenskie, K. and Bamburak, J.D. 2015: Preliminary results from geological investigations into gypsum, Harcus area, southwestern Manitoba (NTS 62J10); in Report of Activities 2015, Manitoba Mineral Resources, Manitoba Geological Survey, p. 106–114.

Laurian, C., C. Dussault, J.-P. Ouellet, R. Courtois, M. Poulin, and L. Breton. 2008. Behavior of Moose relative to a road network. Journal of Wildlife Management 72(7): 1550.

Leybourne, M. I, R.E. Denison, B.L. Cousens, R.K. Bezys, D. C. Gregoire, D. R. Boyle and E. Dobrzanski. 2007. Geochemistry, geology, and isotopic (Sr, S, and B) composition of evaporites in the Lake St. Martin impact structure: New constraints on the age of melt rock formation. G3 Geochemistry, Geophysics, Geosystems. An Electronic Journal of the Earth Sciences. Published by American Geophysical Union and the Geochemical Society. Volume 8, Number 3. 3 March 2007.

Linnell, J.D., J.E. Swenson, R. Andersen and B. Barnes. 2000. How vulnerable are denning bears to disturbance? Wildlife Society Bulletin. 28(2): 400-413

Lockery, A.R. 1984. The Post-Glacial Period: Manitoba's Present Landscape; in Teller J. T. (ed.). Natural Heritage of Manitoba: Legacy of the Ice Age. ISBN 0-920704-14-X. Manitoba Museum of Man and Nature, and Manitoba Nature Magazine. Winnipeg, Manitoba.

Manitoba Bureau of Statistics. 2008a. 2006 Census Profile Grahamdale, RM. September 2008.

Manitoba Bureau of Statistics. 2008b. 2006 Census Profile Siglunes, RM. September 2008.

Manitoba Water Stewardship. 2011. Manitoba Water Quality Standards, Objectives, And Guidelines. Manitoba Water Stewardship Report 2011-01. November 28, 2011. Winnipeg, Manitoba.

Manitoba Avian Research Committee. 2003. The Birds of Manitoba. Manitoba Naturalists Society, 401-63 Albert Street, Winnipeg, Manitoba. Friesens Printers. Winnipeg, Manitoba.

Manitoba Endangered Species and Ecosystems Act (MESEA). 2019. Endangered and Threatened Ecosystems Regulation. Available at: http://web2.gov.mb.ca/laws/regs/current/_pdf-regs.php?reg=70/2015. Accessed June 2018.

Manitoba Health, Seniors and Active Living. No Date. Response Compliance Report. Available at: https://www.gov.mb.ca/health/ems/docs/quarterly/octdec2018.pdf. Accessed May 2019.

Manitoba Infrastructure. 2019. Final Report on Crown Consultation for the 19.4 Kilometer All Season Road for the Lake St. Martin Outlet Channel. Finalized by the IOA Steering Committee. *In prep*. Manitoba Infrastructure, Winnipeg, Manitoba.

MBBA (Manitoba Breeding Bird Atlas). 2015. Manitoba Species at Risk. Available at http://www.birdatlas.mb.ca/speciesatrisk/master.htm. Accessed October 10, 2015.

MBBA (Manitoba Breeding Bird Atlas). 2018a. Trumpeter Swan. Manitoba Species at Risk. Available at http://www.birdatlas.mb.ca/speciesatrisk/species/TrumpeterSwan/species.htm Accessed February 21, 2018.

MBBA (Manitoba Breeding Bird Atlas). 2018b. Eastern Wood-Pewee. Manitoba Species at Risk. Available at http://www.birdatlas.mb.ca/speciesatrisk/species/EasternWoodPewee/species.htm. Accessed February 22, 2018.

MBBA (Manitoba Breeding Bird Atlas). 2018c. Manitoba Breeding Bird Atlas – Safe Dates. Available at https://www.birdatlas.mb.ca/download/safedates.pdf. Accessed February 22, 2018.

McRitchie, W.D. and Monson, K.M. 2000. Caves and Karts in Manitoba's Interlake Region from survey conducted by the Speleological Society of Manitoba 2nd Edition.

MCDC (Manitoba Conservation Data Centre). 2015. Recommended Development Setback Distances from Birds. Available at http://www.gov.mb.ca/sd/cdc/pdf/mbcdc_bird_setbacks.pdf. Accessed February 23, 2018.

MCDC (Manitoba Conservation Data Centre). 2016a. Interlake Plain Ecoregion list of species of conservation concern. Available at: http://www.gov.mb.ca/conservation/cdc/ecoreg/interlake.html. Accessed October 2015.

MCDC (Manitoba Conservation Data Centre). 2018. Vertebrate Conservation Status ranks. Available at: http://www.gov.mb.ca/sd/cdc/pdf/animal_ranks.pdf. Accessed May 2018.

MCDC (Manitoba Conservation Data Centre). No Date. Conservation Data Centre Ranks (Global and Provincial). Available at: http://www.gov.mb.ca/sd/cdc/consranks.html. Accessed June 2018

MCWS (Manitoba Conservation and Water Stewardship). 1992. Guidelines for Sound Pollution. Environmental Approvals Branch. Winnipeg, Manitoba.

MMF (Manitoba Metis Federation). 2015. Available at: http://www.mmf.mb.ca. Accessed December 10, 2015.

MSD (Manitoba Sustainable Development). No Date. The Registered Trapline System and the Lineholder. Available at: http://www.gov.mb.ca/sd/wildlife/trapping/rtl_lines.html. Accessed July 2018.

MSD (Manitoba Sustainable Development). 2018. Information Bulletin – Environment Act Proposal Report Guidelines. March 2018. Available at: https://www.gov.mb.ca/sd/eal/publs/eap_report_guidelines_march_2018.pdf

MSD (Manitoba Sustainable Development). 2018a. Manitoba Hunting guide 2018. Available at: https://www.gov.mb.ca/sd/pubs/fish_wildlife/huntingguide.pdf. Accessed May 29, 2019.

MSD (Manitoba Sustainable Development). 2018b. Habitat Conservation. Wildlife Management Areas: Interlake Region. Available at http://www.gov.mb.ca/sd/wildlife/habcons/wmas/interlake.html. Accessed February 26, 2018.

McCabe, H.R. 1971. Stratigraphy of Manitoba, An Introduction and Review. The Geological Association Of Canada, Special Paper Number 9, 1971.

Martin. D.J. 1977. Ground Vibrations Caused By Road Construction Operations. Environment Division Transport Systems Department. Transport and Road Research Laboratory Crowthorne, Berkshire, UK. Supplementary Report 328.

Nature North. 2014. The Manitoba Herps Atlas. Available at http://www.naturenorth.com/Herps/Manitoba_Herps_Atlas.html. Accessed October 8, 2015.

Northern Lights Heritage Services Inc [NLHS]. 2017. Characterization Study of the Heritage Resources within the Lake Manitoba/St. Martin Outlet Channels and Access Roads. Report prepared for M. Forster Enterprises and Manitoba Infrastructure.

North/South Consultants Inc. (NSC) 2012. Emergency Reduction of Lake Manitoba and Lake St. Martin Water Levels: Existing Aquatic Environment, Potential Impacts, and Work Plan. Prepared for Manitoba Infrastructure and Transportation. December 2012.

Ontario Minitstry of labour. 2017. Appendix D: Noise Exposures in Construction, Mining, Farming and Firefighting Operations. Available at: https://www.labour.gov.on.ca/english/hs/pubs/noise/gl_noise_6.php#fn1. Accessed March 20, 2019.

Peterson, R.T. and V.M. Peterson. 2002. A Field Guide to the Birds of Eastern and Central North America. Houghton Mifflin Harcourt. New York, NY.

Province of Manitoba, Interlake-Eastern Regional Health Authority. 2014. 2014 Community Health Assessment. Available at: https://www.ierha.ca/default.aspx?cid=11205. Accessed 2019.

Reid, F.A. 2006. A Field Guide to the Mammals of North America. Houghton Mifflin Harcourt. New York, NY.

Reschke, C., R. Reid, J. Jones, T. Feeney, and H. Potter. 1999. Conserving Great Lakes Alvars: Final Technical Report of the International Alvar Conservation Initiative. Available at: https://archive.epa.gov/ecopage/web/pdf/alvar-technical-report-199903.pdf. Accessed May 2019.

RM of Grahamdale. 2016. Development Plan. Available at: http://cms.grahamdale.ca/_docs/DevPlanOriginalText_954c647325.pdf. Accessed November 05, 2016.

RM of Grahamdale. 2005a. Development Plan By-law No. 936/2005. Available at: http://cms.grahamdale.ca/_docs/DevPlanOriginalText_954c647325.pdf. Accessed may 2019.

RM of Grahamdale. 2005b. Zoning By-Law No. 937/2005. Available at: http://cms.grahamdale.ca/_docs/GrahamdaleZoningBy-lawNov30_9c230f54f3.pdf. Accessed May 2019.

RM of Grahamdale. 2019. http://www.grahamdale.ca/. Accessed May 7, 2019.

RM of West Interlake. 2019. Available at: http://www.rmofwestinterlake.com/. Accessed May 7, 2019.

Rutulis, M. 1973. Groundwater Availability in the Municipality of St Clements. In: Water Resources of the Winnipeg Region.

SARA (Species At Risk Act). 2015. Species Profile: Northern Leopard Frog Western Boreal/Prairie Populations. Available at: https://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=552. Accessed August 2018.

SARA (Species At Risk Act). 2018a. Species at Risk Public Registry. Available at: https://sararegistry.gc.ca/search/SpeciesSearch_e.cfm. Accessed June 2018.

SARA (Species At Risk Act). 2018b. Species At Risk Act. Available at: http://laws-lois.justice.gc.ca/PDF/S-15.3.pdf. Accessed June 2018.

SG Environmental Services Inc. 2016. Lake St. Martin Outlet Channel Proposed All Season Access Road – Vegetation Technical Report.

Shanley, C. S. and S. Pyare. 2011. Evaluating the road-effect zone on wildlife distribution in a rural landscape. Ecosphere 2(2):art16. doi:10.1890/ES10-00093.1. Accessed on May 21, 2019 at: https://esajournals.onlinelibrary.wiley.com/doi/pdf/10.1890/ES10-00093.1

Smith R.E., H. Veldhuis, G.F. Mills, R.G. Eilers, W.R. Fraser, and G.W. Lelyk. 1998. Terrestrial Ecozones, Ecoregions, and Ecodistricts of Manitoba, An Ecological Stratification of Manitoba's Natural

Landscapes. Technical Bulletin 1998-9E. Land Resource Unit, Brandon Research Centre, Research Branch, Agriculture and Agri-Food Canada. Winnipeg, Manitoba.

Statistics Canada. 2007. Grahamdale, Manitoba (Code4618060) (table). 2006 Community Profiles. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007. http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E (accessed March 1, 2019).

Statistics Canada. 2012. Grahamdale, Manitoba (Code 4618060) and Siglunes, Manitoba (Code 4618057) (table). Census Profile. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released October 24, 2012. http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E (accessed March 1, 2019)

Statistics Canada. 2016. 2011 Census Profiles. Available at: http://www12.statcan.gc.ca/census-recensement/index-eng.cfm?HPA=1. Accessed November 04, 2016.

Statistics Canada. 2017. Grahamdale, RM [Census subdivision], Manitoba and West Interlake, MU [Census subdivision], Manitoba (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed March 1, 2019).

Statistics Canada. 2017. Grahamdale, RM [Census subdivision], Manitoba and Division No. 18, CDR [Census division], Manitoba (table). Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed March 16, 2018).

Stewart, K.W. and D.A. Watkinson. 2007. The freshwater fishes of Manitoba. University of Manitoba Press, Winnipeg, MB. 276 pp.

The Cornell Lab of Ornitology. 2018a. All About Birds: Trumpeter Swan. Available at https://www.allaboutbirds.org/guide/Trumpeter_Swan/overview. Accessed February 22, 2018.

The Cornell Lab of Ornithology. 2018b. All About Birds: Eastern Wood-Pewee. Available at https://www.allaboutbirds.org/guide/Eastern_Wood-Pewee. Accessed February 21, 2018.

Treaty Land Entitlement Committee TLEC. 2016. Treaty Land Entitlement Framework Agreement. http://tlec.ca/wp-content/uploads/2012/01/TLE-Framework-Agreement-_1997__7.pdf. Accessed November 05, 2016.

University of Manitoba Transport Information Group. 2018. Traffic on Manitoba Highways. Available at: http://umtig.eng.umanitoba.ca/. Accessed 2019.

Upper Thames River Conservation Authority. 2016. Sifton Bog ESA Conservation Master Plan 2009 to 2019. Section 4: Raised Bog Water Chemistry (Geochemistry). London, Ontario.

Weather Network. 2016. Statistics: Dauphin, Manitoba. Available at: http://www.theweathernetwork.com/forecasts/statistics/wind/cl5040680/camb0046. Accessed October 31, 2016.

## 6.2 PERSONAL COMMUNICATIONS

Smith, Jaime. 2019. Senior Environmental Coordinator. Manitoba Infrastructure. Comment provided to Blair McMahon on draft LSM Access Road EA Report, Manitoba Infrastructure, Winnipeg, Manitoba, April 2019