

EA REPORT SECTION 5

ENVIRONMENTAL EFFECTS ASSESSMENT

LAKE ST. MARTIN ACCESS ROAD

TABLE OF CONTENTS

5.0	ENVIRONMENTAL EFFECTS ASSESSMENT	5-1
5.1	ASSESSMENT APPROACH	5-1
5.2	OVERVIEW OF PREDICTED CHANGES.....	5-4
5.3	PHYSICAL ENVIRONMENT	5-10
5.3.1	Greenhouse Gases & Air Quality	5-10
5.3.2	Noise and Vibration	5-12
5.3.3	Terrain and Topography	5-14
5.3.4	Geology and Soils	5-15
5.3.5	Groundwater	5-17
5.3.6	Surface Water	5-18
5.4	BIOLOGICAL ENVIRONMENT.....	5-19
5.4.1	Fish and Fish Habitat	5-19
5.4.2	Terrestrial Vegetation.....	5-20
5.4.3	Wildlife and Wildlife Habitat	5-24
5.4.4	Species at Risk and Unique Features.....	5-29
5.5	SOCIO-ECONOMIC ENVIRONMENT	5-32
5.5.1	Resource Use	5-32
5.5.2	Parks, Protected Areas and Areas of Special Interest	5-34
5.5.3	Culture and Heritage Resources.....	5-34
5.5.4	Human Health and Safety.....	5-35
5.6	FOLLOW-UP.....	5-37
5.6.1	Construction	5-37
5.6.2	Operation.....	5-38
5.7	CONCLUSIONS.....	5-38

LIST OF TABLES

Table 5-1. Factors and Criteria Used to Characterize Potential Residual Effects	5-2
Table 5-2. Key Potential Environmental Effects Interaction Assessment Matrix	5-5
Table 5-3. Summary of Potential Project-Related Environmental Effects	5-6
Table 5-4. Trumpeter Swan and Eastern Wood-Pewee Habitat Loss	5-30

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:

<u>Physical Environment</u>	<u>Biological Environment</u>	<u>Socio-Economic Environment</u>
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

¹See 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 patterns 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. 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. .
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. 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. 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 mortality from vehicle collisions.	Vehicular and equipment traffic during construction may increase the potential for wildlife mortality 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. 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
Protected Species	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.
	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. 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.
Protected Species	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. Bat hibernacula was not identified in the Project Assessment Area. No further mitigation is proposed at this time.	No residual effects.
	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 interest are expected to occur as a result of 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 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 Health 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' manage 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-Pewee 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 (MCDRC 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 Health 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 used 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. Secondly, 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.