Lake Manitoba and Lake St. Martin Outlet Channels Project

Response to IAAC Technical Review Information Requests, Round 3

October 27, 2023

Stantec

Manitoba
Transportation and Infrastructure

Table of Contents

Table of Contents
October 27, 2023

LIST OF TABLES

Table of Contents
October 27, 2023

LIST OF FIGURES

LIST OF APPENDICES

Abbreviations and Acronyms

ac	acre
AEMP	Aquatic Effects Monitoring Plan
AIS	aquatic invasive species
AMP	Access Management Plan
ARU	autonomic recording units
ATV	all-terrain vehicle
CCME	Canadian Council of Ministers of the Environment
CEA Agency	Canadian Environmental Assessment Agency
CEAA	*Canadian Environmental Assessment Act, 2012*
CEC	Clean Environment Commission
CEMP	Construction Environmental Management Program
CIA	Culturally Important Areas
Cl	chlorine
cm	centimetre
COSEWIC	Committee on the Status of Endangered Wildlife Species in Canada
CRP	Complaint Resolution Process
DFO	Department of Fisheries and Oceans Canada
DO	dissolved oxygen
EA	environmental assessment
EAC	Environmental Advisory Committee
ECCC	Environment and Climate Change Canada

Abbreviations and Acronyms
October 27, 2023

EHMP	Eastern Whip-poor-will Habitat Mitigation Plan
EIS	Environmental Impact Statement
EL	elevation
EMP	Environmental Management Program
EOC	Emergency Outlet Channel
EPP	Environmental Protection Plan
ESS	Environmentally Sensitive Site
EWPW	Eastern Whip-poor-will
F	fluorine
FPDI	First Peoples Development Inc.
FRWCS	Fairford River Water Control Structure
ft	feet
ft/s	feet per second
ft^3/s	cubic feet per second
ha	hectare
HADD	Harmful Alteration, Disruption, or Destruction
HRB	Historic Resources Branch
HRIA	Heritage Resource Impact Assessment
HRPP	Heritage Resources Protection Plan
IAAC	Impact Assessment Agency of Canada, the Agency
ICSER	Indigenous Consultation and Stakeholder Engagement Report
IK	Indigenous Knowledge
IMP	Ice Management Plan

Abbreviations and Acronyms
October 27, 2023

IMP	Ice Management Plan
in	inches
IR	Information Request
IRTC	Interlake Reserves Tribal Council
km	kilometre
LAA	local assessment area
LCC	Land Cover Classification
LMOC	Lake Manitoba Outlet Channel
LSM	Lake St. Martin
LSMOC	Lake St. Martin Outlet Channel
m	metre
M	million (dollars)
m/s	metres per second
m^3/s	cubic metres per second
mg/L	milligram per litre[1]
mi	mile
MNRND	Manitoba Natural Resources and Northern Development
MNRTA	Manitoba Natural Resources Transfer Act
NAC	Northern Affairs Communities
NRND	Natural Resources and Northern Development
PDA	Project development area

[1] Imperial conversion for mg/L has not been included in-text, however the oz/gal conversion factor is 1 mg/L = 0.00013 oz/gal

Abbreviations and Acronyms
October 27, 2023

PER	Project Environmental Requirements
PR	provincial road
PTH	Provincial Trunk Highway
QMP	Quarry Management Plan
RAA	regional assessment area
RHMP	Red-headed Woodpecker Habitat Mitigation Plan
RIA	Rights Impact Assessment
RM	Rural Municipality
ROW	right-of-way
RVMP	Revegetation Management Plan
SAR	species at risk
SCC	Supreme Court of Canada
SEWB	Socio-economic and Wellbeing
SMP	Sediment Management Plan
SWMP	Surface Water Management Plan
TDS	Total Dissolved Solids
TK	Traditional Knowledge
TLRU	traditional land and resource use
TOR	terms of reference
TSS	total suspended solids
TWCR	Temporary Winter Construction Road
UNESCO	United Nations Educational, Scientific, and Cultural Organization
VC	valued component

Abbreviations and Acronyms
October 27, 2023

WCP	Wetland Compensation Plan
WCS	water control structure
WetMP	Wetland Monitoring Plan
WMP	Wildlife Monitoring Plan
WPP	Watchorn Provincial Park
WSC	Water Survey of Canada
WSP	WSP Canada Group Limited

Question IAAC-R3-01
October 27, 2023

QUESTION IAAC-R3-01

Referenced Round 2 IR(s): IAAC-R2-01, IAAC-R2-07, IAAC-R2-08, IAAC-R2-09, IAAC-R2-10, IAAC-R2-11, IAAC-R2-14, IAAC-R2-26, IAAC-R2-29

Expert Dept. or group:
Berens River First Nation
Bloodvein First Nation
Dakota Tipi First Nation
DFO
Fisher River Cree Nation
IAAC
Interlake Reserves Tribal Council
Little Saskatchewan First Nation
Misipawistik Cree Nation
Norway House Cree Nation
Pinaymootang First Nation
Poplar River First Nation
RM of Grahamdale
Sagkeeng Anicinabe First Nation
Sandy Bay Ojibway First Nation
Tataskweyak Cree Nation

EIS Guideline Reference:
7.1.4 Groundwater and Surface Water

7.1.5 Fish and fish habitat

7.1.10 Indigenous Peoples

7.1.6 Aquatic Invasive Species

7.2.2 Changes to groundwater, surface water, and fluvial morphology

7.2.3 Changes to riparian, wetland and terrestrial environments

7.2.4 Aquatic Invasive Species

7.3.1 Fish and fish habitat

7.3.3 Indigenous Peoples

7.4 Mitigation measures

9. Monitoring and Follow up Programs

Question IAAC-R3-01
October 27, 2023

Context and Rationale

The Environmental Impact Statement (EIS) Guidelines require the Proponent to identify any potential adverse effects to fish and fish habitat due to changes in water quality and sediment quality as a result of storing water in, and releasing water from one lake to another and from the channels. The EIS Guidelines also require the Proponent to assess changes to the environment on Indigenous groups' socio-economic conditions, including commercial fishing, recreational use and food security.

Fish and Fish Habitat

The response to IAAC-R2-07 states that the changes to flow, water levels and water velocity during channel operations will have little effect on fish and fish habitat in the Narrows and north basin of Lake St. Martin. However, the water velocities through the Narrows during operations are expected to increase erosion and transport sediments into the downstream areas of the Narrows and north basin of Lake St. Martin. Indigenous groups have identified potential effects to fishing for food, social, ceremonial, and commercial purposes, and have stated that the Lake St. Martin Narrows and north basin of Lake St. Martin contain critical fish habitat that must be protected. An assessment of the Total Suspended Sediments (TSS) concentrations of the sediment plume expected to form as flow exits the Narrows into the north basin of Lake St. Martin is needed to assess the potential effects on fish and fish habitat, and to the current use of lands and resources for traditional purposes by Indigenous Peoples (current use).

To assess potential effects on fish and fish habitat, information is needed about the amount of fish habitat that would be lost due to the increased erosion, transport and deposition of sediment resulting from the higher water velocities.

The response to IAAC-R2-29 mentions project-related changes to resource use, including commercial activities that Indigenous people are engaged in such as fishing. PRFN noted that the Clean Environment Commission (CEC) Lake Winnipeg Regulation record includes maps to show where Indigenous fishing occurs.

Water and Sediment

The response to IAAC-R2-07 and IAAC-R2-10 relies on modeling for the initial commissioning event to assess potential residual environmental effects of the Project on valued components (VCs). Although understanding the severity of potential effects during initial commissioning is critical, less data has been compiled for sediment models during operation activities for future flood events. Potential effects to fish and fish habitat from sediment deposition and transport, including a discussion of potential death of fish related to project activities, has not been adequately assessed for initial commissioning and operation of the outlet channels. Further details on potential effects to whitefish and walleye spawning grounds located in Birch Bay and Sturgeon Bay, food sources including re-distribution of fish and the ability to forage for both benthic and pelagic food sources, and migration patterns are required. Additionally, the response to IAAC-R2-07 suggests that there may be circumstances in which quantities of sediment mobilized and measured during initial channel commissioning may be less or more than modeled, which introduces potential risk that sediment may be mobilized into receiving environments during subsequent operations.

Question IAAC-R3-01
October 27, 2023

Understanding the potential for deposition through sediment accumulation over multiple flood events is essential for assessing potential long-term effects to fish and fish habitat. Indigenous groups have identified potential long-term effects on fish and fish habitat and to current use due to the transport and deposition of sediment on the lakebed from the operation of flood management infrastructure. The Proponent has expanded monitoring plans to include McBeth Point and Reindeer Island, however additional monitoring locations are required to verify predictions about potential downstream effects.

A revised evaluation of sediment transport and deposition that considers operation beyond initial commissioning is required to understand potential effects to fish and fish habitat and current use. Mitigation measures for potential effects to fish abundance and the availability and efficiency of fishing practices are required.

Aquatic Invasive Species (AIS)

The EIS guidelines require the Proponent to describe potential adverse effects of the Project associated with the introduction and/or spread of AIS.

The response to IAAC-R2-27 asserts that mitigation measures are not necessary to reduce the potential spread of zebra mussels into Lake St. Martin, as zebra mussels will be “expected to colonize Lake St. Martin prior to commissioning of the outlet channels”. Given the potential for zebra mussels to colonize Lake St. Martin based on their existing presence in Lake Manitoba and considering that the proposed Project is likely to directly contribute to the speed and extent to which zebra mussels colonize Lake St. Martin, it is important to analyse the potential effects on fish and fish habitat as well as current use. Indigenous groups have identified concerns around the potential for flood events to convey zebra mussels and zebra mussel shells along the Lake Manitoba Outlet Channel (LMOC) and Lake St. Martin Outlet Channel (LSMOC), with shells likely to deposit at the outlet of each channel.

Information Requests

a. Describe the potential geographical extent and TSS concentrations of the sediment plume exiting the Lake St. Martin Narrows into the north basin of Lake St. Martin during initial commissioning and operation of the outlet channels.

b. Describe how the assessment of potential effects of sediment to fish and fish habitat in the Lake St. Martin Narrows and north basin of Lake St. Martin considered Indigenous Knowledge and was incorporated into the assessment of potential effects to Indigenous Peoples’ socio- economic conditions and current use.

   i. Provide a rationale for differences between quantitative assessments of potential effects of sediment deposition and transport on fish and fish habitat and Indigenous Knowledge shared on this subject.

   ii. Given the Indigenous Knowledge shared, provide an updated assessment of cumulative effects of sediment deposition and transport on fish and fish habitat in the Regional Assessment Area (RAA).

c. Provide an assessment of effects to fishing activities from the Project given the CEC Lake Winnipeg Regulation record.

d. Discuss whether fish harvesting and commercial fishing will be limited at the inlets and outlets of the LMOC and LSMOC.

e. Discuss potential effects of project operation resulting in more sediment mobilization than anticipated, and provide resulting effects to related VCs, including but not limited to, the effects of sediment deposition on fish and fish habitat, including spawning, rearing and migration patterns, and the ability to forage for benthic and pelagic food sources.

f. Describe monitoring programs that could include the following locations: Berens Island, Pigeon Bay, Sandy Bar, Black Island, Hecla Island (Icelandic River), and all bays (e.g., Goldeye Creek, Fisher Bay) and peninsulas that make up the “Narrows” connected to the North Basin of Lake Winnipeg Reservoir.

g. Describe the likelihood that not all of the sediment present in the outlet channels during construction and prior to commissioning is flushed out into receiving waterbodies during commissioning.

   i. Describe the likelihood that sediment concentrations would exceed Canadian Council of Ministers of the Environment (CCME) guidelines and describe the effects on fish and fish habitat, if sediment is flushed in operational events after the commissioning period.

   ii. Describe the full suite of technically and economically feasible mitigation measures to remove the maximum amount of sediment from the channels prior to commissioning activities.

h. Provide an assessment of the likelihood of project activities to result in fish mortality. Include risk of death of fish related to proposed mitigation measures that may not be fully effective, such as fish salvage efforts, fish stranding and winter oxygen levels in the outlet channels.

   i. Include details on dredging activities related to inlet and outlet construction for the LMOC and LSMOC. Calculate the potential for fish deaths due to dredging and the use of cofferdams.

   ii. Discuss potential sediment and contaminant deposits during dredging, construction, commissioning, and operation.

i. Provide details on how a flood event could affect the potential spread of zebra mussels, including introduction into Lake St. Martin.

   i. Discuss any input from Indigenous groups and provincial authorities on zebra mussels and their potential to spread in the RAA.

   ii. Assess the likelihood and timing of AIS spread for each phase of the Project to determine potential effects on fish and fish habitat, and Indigenous Peoples’ current use and socio-economic conditions.

   iii. Discuss the likelihood of deposition of zebra mussel shells at the outlets of the LMOC and LSMOC after a major flood operation.

iv. If shell deposition were to occur after flood operations within the LMOC and LSMOC, describe the potential effects on fish and fish habitat, and Indigenous Peoples' current use and socio-economic conditions.

j. Provide a description of any technically and economically feasible mitigation measures that could be utilized to prevent or reduce the spread of zebra mussels to Lake St. Martin. Provide a description of how these mitigation measures support Indigenous fishing rights.

Response IAAC-R3-01

a. **Potential geographic extent and TSS concentrations of the sediment plume exiting the Lake St. Martin Narrows into the north basin of Lake St. Martin during initial commissioning and operation of the outlet channels**.

Preamble

The Context and Rationale section states that the water velocities through the Lake St. Martin (LSM) Narrows during Project operations are expected to increase the potential for erosion and transport of sediments into the downstream areas of the LSM Narrows and north basin of Lake St. Martin, and concerns have been expressed regarding effects to fish and fish habitat and to the current use of lands and resources for traditional purposes by Indigenous Peoples.

As described in Volume 2, Section 6.3.2.2 of the Project Environmental Impact Statement (EIS), and in Appendix 6B, Figure 6.3.B-3, the LSM Narrows is located in an outcrop area of lower Paleozoic and Precambrian rocks, which have likely been the cause of the constriction in the lake. Issues concerning the LSM Narrows are discussed in Volume 2, Section 6.4.1 of the Project EIS, and in the May 2022 response to Information Request (IR) IAAC-R1-68, July 2023 responses to IRs IAAC-R2-10, IAAC-R2-22, and IAAC-R3-01. The response to IR IAAC-R1-68 states that based on a review of satellite imagery of the LSM Narrows, there are several distinct shoreline features that create the flow constrictions, which appear to have been stable for at least the last few decades. Aerial observations of the shoreline in the area indicate that large boulders are present along these shoreline features which would allow them to withstand relatively high velocities without eroding. Geomorphological processes influenced by centuries of flood events, windstorm events and ice interaction have contributed to erosion, deposition, and sorting of material through the LSM Narrows that occur naturally in the current environment. It is important to note that these are ongoing natural processes in the LSM Narrows.

This response provides additional information from previous IR responses on sediments in this area based on new field data and modeling. It is organized into an analysis of existing conditions, in terms of velocity, substrates and sediment movement, then deals with post-Project changes in velocity and ends with discussion on monitoring.

Question IAAC-R3-01
October 27, 2023

Current Conditions

As reported in the July 2023 response to IR IAAC-R2-31, mapping of bathymetry, substrate conditions, and aquatic vegetation distribution was developed in Lake St. Martin, including the LSM Narrows area, to document existing fish habitat. Results are shown on Figure IAAC R3-01-1.

Habitat Assessment
Lake St. Martin
Substrate Classification

515000 520000 525000 530000 535000 540000 545000 550000 555000 560000 565000 570000

5740000 5735000 5730000 5725000 5720000 5715000 5710000 5705000

Lake St. Martin Outlet Channel

Lake St.Martin (North Basin)

Lake St. Martin

Lake St.Martin (South Basin)

Pineimuta Lake

6

Fairford River

Fairford River Water Control Structure

Fairford

Portage Bay

Lake Manitoba Outlet Channel

Legend

- High Water Level
- Lake Manitoba Outlet Channel
- Lake St. Martin Outlet Channel
- Roadway
- Control Structure/Dam
- Community

Substrate Classification

- Cobble/Gravel/Boulder
- Gravel/Sand
- Sand/Gravel
- Silt/Sand/Gravel/Clay
- Silt/Clay
- Clay

DATA SOURCE:

Base Data: Manitoba Infrastructure and MLI, Canvec 1:50 000
Imagery: True Colour Composite Sentinel-2 Image, Date: 26 August 2022. Copernicus Sentinel Data (2022)
The High Water Level was mapped relative to a mean daily water surface elevation of 243.86 m (CGVD28) on October 30, 2022
The Low Water Level was mapped relative to a mean daily water surface elevation of 242.68 m (CGVD28) on November 9, 2021
Both were measured at Lake St. Martin near Hilbre (05LM005) (Water Survey of Canada)

CREATED BY:	DATE CREATED:	REVISION DATE:
North/South Consultants Inc.	28-FEB-2023	13-APR-2023

COORDINATE SYSTEM:	SCALE:
UTM NAD 1983 Zone 14N CGVD 28 (Vertical Datum)	0 1 2 3 Kilometres

File Location: W:\PROJECTS\MI Manitoba Infrastructure\MI-LMLSMOC - Channels_2020_FSV\GIS\Mxd\Report_Maps\Habitat Analysis 2023\Report Maps 13 Apr 2023\20230216_LakeStMartin_Substrate_Update_2023_jl.mxd

Figure IAAC-R3-01-1 Substrates of Lake St. Martin

In addition to this, a separate bathymetric and substrate survey of the LSM Narrows was carried out from July 18 to 20, 2023 to verify the substrate information previously presented with a specific focus on current conditions from an erosion potential perspective. In general, the results of this more recent substrate survey were similar to those reported in the response to IR IAAC-R2-31 and shown on Figure IAAC-R3-01-1. In general, substrates through the LSM Narrows range from clays/silts to large gravel and small cobbles (up to approximately 80 millimetres [mm] [3.15 inches (in)] diameter) depending on location. Large boulders and cobbles were also observed, particularly in the area surrounding the downstream constriction.

Additional two-dimensional hydraulic modeling of Lake St. Martin was recently completed in summer/fall 2023 to simulate various flow scenarios that occurred through the 2011 flood event including wind effects in the pre- and post-Project environment. Details are provided in Appendix IAAC-R3-01-1. When assessing the simulated pre-Project velocities through the LSM Narrows during 2011 flood conditions, it was noted that this channelized area of the lake (i.e., the two constrictions) generally functions like a short reach of river. In the LSM Narrows, investigations indicate that the channel bottom areas with higher velocities have generally coarser substrate (e.g., large gravel) while areas with lower velocities have generally finer substrate (e.g., silts/clays, till). These observations are generally consistent with rivers that have experienced several high flow and low flow years and would achieve an equilibrium of sediment movement with zero net erosion and deposition. During the period of time required to reach equilibrium, rivers go through minor erosion during high flow years and deposition during low flow years; but after a long period of time, an equilibrium is maintained that results in no net gain or loss of sediments.

Therefore, looking at the pre- and post-Project erosion and deposition at the LSM Narrows and at the north basin of Lake St. Martin, it is understood that sediment movement within the LSM Narrows will reach an equilibrium where the net gain or loss in sediment is negligible. Equilibrium in rivers is not governed by high flood years, such as the 2011 flood, or wind effects because these are relatively temporary events, and their impact diminishes through time. Rather, equilibrium is governed by a “Dominant Discharge” (Benson & Homas, 1966; Carling, 1988; Tan, Chen, Deng et al., 2019; Wolman and Miller, 1960; Simon, Dickerson and Heins, 2004). A dominant discharge is the discharge which transports most bed sediment in a stream that is close to equilibrium or steady-state conditions. In other words, the dominant discharge is a discharge that has a probability to occur almost every other year (50%) and this is the discharge that, eventually, controls erosion and sediment deposition at the LSM Narrows and in the north basin of Lake St. Martin.

The two-dimensional hydraulic modeling of Lake St. Martin indicated that at the 50th percentile flow condition, the pre- and post-Project difference between the average cross-sectional velocity at the constrictions due to operation of the Project is minor, with the average cross-sectional velocity at the upstream constriction being maintained at approximately 0.31 metres per second (m/s) (1.02 feet per second [ft/s]) and a small increase from approximately 0.20 m/s to 0.21 m/s (0.66 ft/s to 0.69 ft/s) at the downstream constriction. This indicates that, in the longer period of operation, the post-Project equilibrium will be very similar to the pre-Project equilibrium, which implies that the net gain or loss in erosion or sediment deposition is very minimal for pre- and post-Project conditions.

It is also recognized that the unique local geology in the region, in terms of bedrock type and depth to bedrock, may have also affected the substrate in the region. As indicated, the LSM Narrows is located on the periphery of the Lake St. Martin Impact Structure. This impact structure has an uplifted rim of bedrock along the margin, which is reflected in the local geology. The local geology has had a major influence on the geomorphology, substrate, and geometry of the LSM Narrows.

The satellite imagery shown as Figure IAAC-R3-01-2 appears to show sediment plumes throughout Lake St. Martin and being transported through the LSM Narrows under pre-Project conditions, which suggest this gradual sediment movement and redistribution (or erosion and deposition) will continue to occur. As the conveyance area increases downstream of the constrictions, flow decelerates, increasing the potential for deposition; however, the net erosion or deposition is balanced after a long period of time. This may explain the observed silt and clay substrate in this area, as indicated by the substrate map shown on Figure IAAC R3-01-01. As indicated in previous IR responses, finer sediments suspended in the water typically remain suspended during flood events as flows pass from the Fairford River and through Lake St. Martin into the Dauphin River and beyond. This is true in both the pre- and post-Project environments. The satellite image, taken on September 7, 2022, and shown in Figure IAAC-R3-01-2, illustrates the movement of suspended sediment through the system as described above. The south basin and north basin daily average water levels on this date were 244.065 m (800.7 ft) and 243.986 m (800.5 ft), respectively, which are between the proposed top of target range and flood stage for the Lake St. Martin south basin.

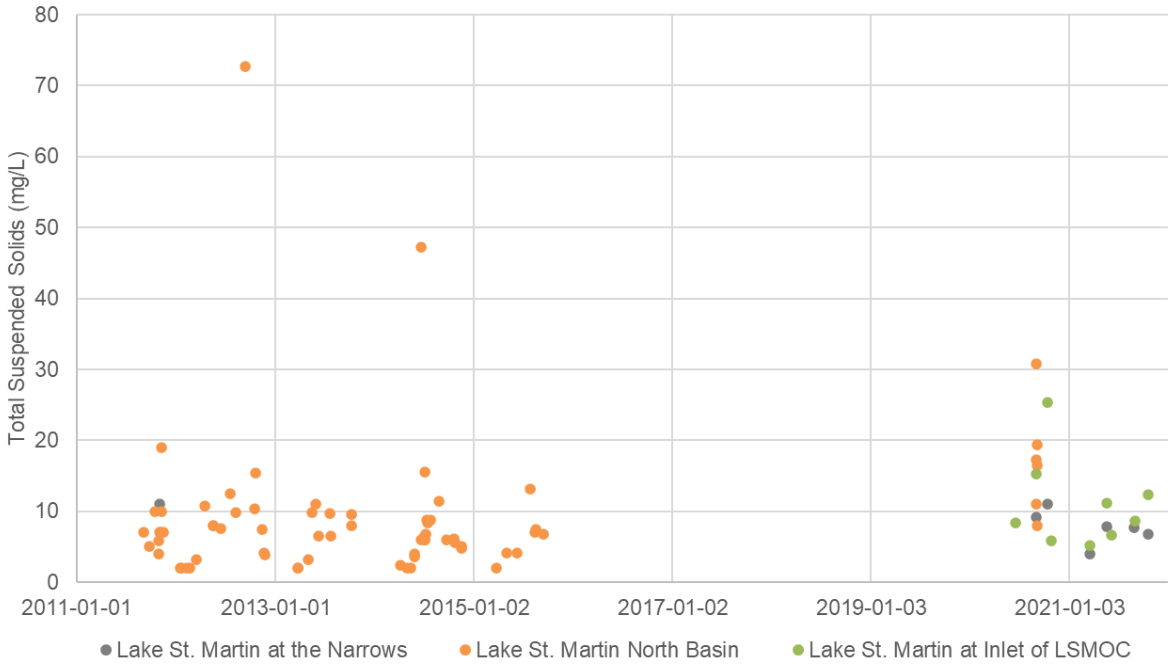
Figure IAAC-R3-01-2 Sediment Plumes in Lake St. Martin[2]

[2] Image from September 7, 2022, with Lake St. Martin south basin water level at El. 244.065 m (800.7 ft) and north basin water level at El. 243.986 m (800.5 ft) showing sediment movement and plumes in Lake St. Martin (ESRI Wayback).

The recent additional hydraulic modeling (see Appendix IAAC-R3-01-1) incorporates the effects of wind and wave action in Lake St. Martin to provide a more comprehensive representation of lake hydraulics. The analysis demonstrates that wind events can have a short-term impact on flows and velocities through the LSM Narrows, particularly during higher water level events, as they facilitate greater wind setup induced flow through the LSM Narrows. However, as noted above, the impact of wind in sediment movement (erosion and deposition) is temporary and will disappear as the wind effect disappears.

The available baseline total suspended solids (TSS) concentration data for the LSM Narrows and the north basin of Lake St. Martin (2011 to 2021) includes 88 TSS measurements from three different locations (Figure IAAC-R3-01-3). The mean TSS concentration for these data is 9.3 mg/L TSS and the 95th percentile is 19.3 mg/L TSS. It is likely that larger TSS concentrations in Lake St. Martin could occur naturally during wind events depending on the water levels in the lake. It should be noted that the TSS concentration may change temporarily due to wind, etc.

Figure IAAC-R3-01-3 Total Suspended Solid Concentrations in the North Basin of Lake St. Martin (2011-2021)



Question IAAC-R3-01
October 27, 2023

Project Effects

Potential changes to conditions in the Lake St. Martin Narrows were previously discussed in the response to IR IAAC-R1-68, and July 2023 response to IAAC-R2-07. These responses note that there would be some increases in velocities under higher (approximately greater than 80th percentile) flow conditions, which typically would occur when the Project is operating to manage flooding. Based on the outputs of modeling, at the *90th percentile flow condition*, the average cross-sectional velocity at the upstream constriction increases from approximately 0.34 m/s to 0.61 m/s (0.98 ft/s to 2.0 ft/s). At the downstream constriction, the 90th percentile (representing a relatively infrequent high) average cross-sectional velocity increases from approximately 0.24 m/s to 0.51 m/s (0.79 ft/s to 1.67 ft/s). Conversely, at the *50th percentile* flow condition, the pre- and post-Project difference between the average cross-sectional velocity at the constrictions due to operation of the Project is minor, with the average cross-sectional velocity at the upstream constriction being maintained at approximately 0.31 m/s (1.02 ft/s) and a small increase from approximately 0.20 m/s to 0.21 m/s (0.66 ft/s to 0.69 ft/s) at the downstream constriction. The maximum *average* cross-sectional water velocities at the upstream and downstream constrictions in the post-Project simulation increases from approximately 0.4 m/s (1.31 ft/s) and 0.3 m/s (0.98 ft/s) to 0.8 m/s (2.62 ft/s) and 1.1 m/s (3.61 ft/s), respectively. It should be noted that average cross-sectional velocities in locations away from the constrictions can be in the range of 0.1 m/s (0.33 ft/s) or less, within minimal differences between the pre- and post-Project environment.

As indicated, additional two-dimensional hydraulic modeling of Lake St. Martin was completed to simulate the 2011 flood event under pre- and post-Project conditions including wave action and wind setup effects in order to assess the change in flows and velocities at extremely rare flood conditions. This additional modeling assessed the 2011 flood event under pre- and post-Project conditions for the duration of the open water season. Details are provided in Appendix IAAC-R3-01-1. It was determined that wind events can have limited short-term impacts on flows and velocities through the LSM Narrows. The analysis also showed that the magnitude of both pre- and post-Project velocities, as well as the differences between them, are greatest through the upstream and downstream LSM Narrows constrictions, with increases less than 0.1 m/s (0.33 ft/s) observed throughout most of the LSM Narrows. It is worth noting that the probability of occurrence for the 2011 flood is 1 in 300 years and, as a result, these velocity changes at such an extreme event will have negligible impacts on the long-term operation of the Project.

The responses to IR IAAC-R1-68 and IAAC-R2-07 discuss the results of studies carried out to examine the potential for erosion and movement of materials from the LSM Narrows into downstream areas. In general, it is Manitoba Transportation and Infrastructure's understanding that under existing (pre-Project) conditions the potential for erosion of sands and gravels on the bed of the LSM Narrows is generally at equilibrium – with higher erosion/deposition during high flood years and lower erosion/deposition during low flood years.

Effects to Fish and Fish Habitat

Potential effects to fish from TSS and effects of erosion to aquatic habitat are discussed in responses to several IRs, including IAAC-R1-30, IAAC-R1-68, and IAAC-R2-07. In terms of TSS effects, fish are able to avoid areas of higher TSS concentrations, and likely require TSS levels in excess of 10,000 to 100,000 (milligram per litre) mg/L to cause instantaneous mortality (Lake and Hinch 1999, Servizi and Martens 1991, Servizi and Martens 1987, EIFAC 1964). As a result, sediment effects to fish relate to aspects such as disease susceptibility, hatching success, growth and development of eggs and larvae, reducing food abundance and ultimately, reductions in harvest (Coen 1995, EIFAC 1964). The Canadian Council of Ministers of the Environment (CCME) developed guidelines for the protection of aquatic life. These include a maximum TSS increase of 25 mg/L above background levels when those are 25- to 250 mg/L, and no more than 10% increase above background when those are greater than 250 mg/L (CCME 1999) to minimize risk to fish and fish habitat.

In terms of fish habitat effects, as discussed above, coarse substrates would be deposited as soon as water velocities drop past the constrictions in the LSM Narrows, resulting in some shifts in substrate but not an overall loss of habitat. As indicated, fine material (e.g., clay) is expected to remain in suspension under the higher flows associated with floods and be carried downstream into Lake Winnipeg and settle out in the depositional areas of the lake. The response to IR IAAC-R2-31 provides additional details on existing fish habitat for walleye, northern pike, and lake whitefish in the LSM Narrows under low and high lake level conditions, including mapping and estimates of area.

Project Initial Commissioning

Manitoba Transportation and Infrastructure underscores the importance of careful planning and operation of the Project during its initial commissioning (see responses to IRs IAAC-R1-14, IAAC-R1-30 and IAAC-R2-08) so that potential environmental impacts are controlled and mitigated. Manitoba Transportation and Infrastructure will conduct staged opening of the gates at the water control structures during initial commissioning of the Project to manage flows, velocities, and sediment mobilization, while continually monitoring for TSS concentrations at key locations in the lakes that may be potentially impacted by operation. Water quality testing will be conducted to monitor for any sediment that may be released during commissioning as discussed in the subsection below.

Similar staged gate openings will be conducted during future operation of the Project and Manitoba Transportation and Infrastructure will continue to implement the monitoring plans for the operational phase of the Environmental Management Program (EMP). Continual monitoring of water levels, flow rates, and water quality will be conducted to assess the potential adverse impact of flow, velocity and water level changes on the lakes and rivers in the system. Proper communication and coordination with Indigenous groups and local stakeholders will be maintained to facilitate sustainable and efficient operation of the Project.

Question IAAC-R3-01
October 27, 2023

Monitoring

The Aquatic Effects Monitoring Plan (AEMP), as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs, has been established to examine potential effects to fish and fish habitat and includes the establishment of monitoring sites to gather information on water quality (including TSS and turbidity) and substrates. During the engagement process concerns have been raised by Indigenous groups regarding the potential for increased erosion within the LSM Narrows associated with higher velocities during commissioning and operation compared to the pre-Project period. In response, the substrate, turbidity and TSS monitoring described in the AEMP will be expanded to include locations at the LSM Narrows.

The AEMP currently provides for the continuous monitoring of turbidity at key locations when the channels are in use during both commissioning and the initial operations for flood mitigation. Water samples will be collected periodically from each logger location and analyzed for turbidity and TSS concentration. This will allow for the development of site-specific turbidity/TSS relationships and allow the conversion of turbidity logger data to TSS and provide a continuous TSS record at each logger location. Loggers will be deployed during construction and before commissioning and the onset of channel operation to establish initial turbidity/TSS conditions and will remain in place until after channel operation has ceased and TSS concentrations have returned to pre-operation baseline conditions.

The AEMP currently identifies the following continuous turbidity monitoring locations:

- The Fairford River at Lake Manitoba.
- The Fairford River at Lake St. Martin.
- Watchorn Bay on Lake Manitoba at the LMOC.
- Outlet of the LMOC at Birch Bay on Lake St. Martin and a nearby reference location (to be selected based on field conditions).
- The Dauphin River at Lake St. Martin.
- The Dauphin River at Sturgeon Bay.
- The Lake St. Martin Outlet Channel (LSMOC) at Lake St. Martin.
- The outlet of the LSMOC at Sturgeon Bay and a nearby reference location (to be selected based on field conditions).

Additional sites to be deployed at the LSM Narrows include:

- Upstream of the first constriction where flow from the south basin of Lake St. Martin enters the LSM Narrows.

- Between the constrictions near the intake for the Lake St. Martin First Nation water treatment plant.
- Downstream of the second constriction where flow from the LSM Narrows exits into the north basin of Lake St. Martin.

Monitoring sites listed in the current AEMP, in conjunction with the additional proposed sites at the LSM Narrows, will allow the sediment concentration and load to be estimated at locations throughout the system and allow estimation of suspended sediment loads and changes between monitoring locations. They will also indicate whether there are areas of sediment deposition, as indicated by a decrease in sediment load.

The most recent version of the AEMP describes monitoring of substrates at selected shoals within the areas immediately downstream of the outlets in Lake St. Martin (Birch Bay) and Lake Winnipeg (Sturgeon Bay) where modeling has predicted that sediment deposition may occur during channel commissioning. It also contains a transect in the LSM Narrows to confirm the prediction that substrate composition in the vicinity of the Lake St. Martin Narrows will not change during operation of the LSMOC due to the incremental increase in velocity through the Narrows. These studies will address the fate of fine sediments transported during commissioning and operation of the channels, specifically whether there is long-term deposition of fine material over existing areas of coarse substrate. Sampling will occur immediately after commissioning and the first operation and, if sediment deposition is observed, it will be repeated three years later in conjunction with non-operational monitoring to determine whether sediments have re-mobilized. The requirement for additional monitoring will be evaluated following completion of monitoring for the first operation. To address concerns by Indigenous groups that erosion of fines due to increased water velocities through the LSM Narrows during commissioning and operation may also result in the deposition of fines over existing coarse substrates downstream of the LSM Narrows, the substrate monitoring will be expanded to include an additional site within the north basin of Lake St. Martin.

b. **How the assessment of potential effects of sediment to fish and fish habitat in the Lake St. Martin Narrows and north basin of Lake St. Martin considered Indigenous Knowledge and was incorporated into the assessment of potential effects to Indigenous Peoples' socio- economic conditions and current use**.

Volume 3, Section 7.2.1.3 of the Project EIS summarizes the Traditional Knowledge (TK), provided on fish and fish habitat, including information about existing conditions, potential effects, and mitigation measures. A summary of traditional land and resource use (TLRU) information obtained from each Indigenous group engaged on the Project, current to March 2022, is available in Table IAAC-122-1 in the May 2022 response to IR IAAC-R1-122. A summary of socio-economic information obtained from each Indigenous group engaged on the Project is available in Table IAAC-R2-29-1 in the July 2023 response to IR IAAC-R2-29. The Indigenous Consultation and Stakeholder Engagement Report (ICSER; provided in Attachment 2 of the June 2022 supplemental information response to IAAC IRs), provides an overview of consultation and engagement efforts, and summarizes information received to date from Indigenous groups. More recently, several Rights

Impact Assessments and Socio-economic and Well-being studies have been received from Interlake Reserves Tribal Council (IRTC) Nations, which have been reviewed against the results of the EIS for the Project and relevant IRs (see response to IR IAAC-R3-07).

Through the Indigenous consultation and engagement process, including Project-specific reports[3], Indigenous groups have identified concerns related to fish and fish habitat in the LSM Narrows and north basin of Lake St. Martin. The Interlake Reserves Tribal Council has expressed concerns about sediment transport and erosion, the reduction of lake levels in the north basin of Lake St. Martin and potential lake whitefish (*Coregonus clupeaformis*) migratory disruption through the Dauphin River, as well as heightened differential of lake levels between the south and north basins of Lake St. Martin during channel operations as a result of the LSM Narrows serving as a hydraulic control (IRTC 2022a). Hollow Water First Nation has noted that Birch Creek, Lake St Martin and the Dauphin River are important fish spawning grounds that sustain Lake Winnipeg fishery (HWFN 2020). Sagkeeng First Nation and Sandy Bay Ojibway First Nation have also expressed concerns that the Project will affect spawning success, especially for whitefish, at the LSM Narrows in Lake St. Martin (SAFN and SBOFN 2022). Tataskweyak Cree Nation is concerned that the increase in erodibility of the sediments forming the LSM Narrows will change the makeup of the sediments forming the bed of the LSM Narrows and cause a deepening of the bed and a coarsening of bed sediments, impacting the spawning habitats of fish (TCN 2022).

The inputs received from Indigenous groups helped to focus the studies and analyses carried out to examine Project effects, including developing the two-basin model of Lake St. Martin, and effects on the LSM Narrows and Dauphin River flows. The outputs of analysis are summarized in several responses to IRs, including the May 2022 responses to IAAC-R1-36, IAAC-R1-43, IAAC-R1-68, and July 2023 responses to IAAC-R2-07, and IAAC-R2-31.

In general, based on field studies and the modeling carried out, velocities in the LSM Narrows are not expected to impede upstream movement of fish. During Project operation, the increased velocities are expected to transport some sands and gravels from the center of the LSM Narrows channel further downstream, but this shift in substrates is not expected to affect the overall areas of spawning habitat, as suitable substrates are widespread along the margins of the constrictions, and along the many shoals and islands within and immediately downstream of the LSM Narrows. As discussed in the response to IR IAAC-R2-31, while suitable substrates are widespread in the north basin of Lake St. Martin, under existing conditions, most of the north basin of Lake St. Martin is not suitable for lake whitefish spawning because it is too shallow (<1.2 metres [m]); 3.9 feet [ft]). Lake whitefish eggs are deposited in the fall and remain on the substrate all winter until they hatch in early spring and therefore do not survive where ice reaches the lake bottom.

[3] Project- specific reports have been received from the IRTC (Olson et al. 2020a), Little Saskatchewan First Nation (Olson et al. 2020b), The Manitoba Metis federation (MMF 2021a), Lake St, Martin Fist Nation (LSMFN 2021), Fisher River Cree Nation (FRCN 2021h), Peguis First Nation (Peguis First Nation 2022), Pinaymootang First Nation (PFN 2021; Tam et al. 2022), Sandy Bay Ojibway First Nation (SBOFN 2021) and Sagkeeng First Nation (SAFN 2021).

Question IAAC-R3-01
October 27, 2023

The process of the design and planning of a major project involves iterative steps to test conclusions as more information becomes available, with adjustments in design, mitigation and monitoring added if/as required. The environmental assessment and regulatory approvals are important steps in the process, and the incorporation of new information that may affect Indigenous Peoples' socio-economic conditions and current use are a key input to the process. As new information becomes available, whether through field studies, modeling, or engagement with Indigenous groups, the pathways of effect are re-examined to confirm that assessment conclusions remain valid. The potential changes to the LSM Narrows and the north basin of Lake St. Martin are good examples of where more detailed examinations of effects of sediment to fish and fish habitat were carried out to respond to questions on potential consequences to Indigenous Peoples' socio- economic conditions and current use.

As no effects are predicted beyond the Project local assessment area (LAA) and Lake St. Martin is within the LAA, based on currently available information, mitigation efforts will be focused on managing effects so that they do not extend beyond the LAA. The AEMP includes monitoring sites in Lake St. Martin, including in the LSM Narrows and north and south basins, and including upstream (Watchorn Bay of Lake Manitoba) and downstream at several sites in Lake Winnipeg. Locations of sites have been influenced by the inputs gathered through the engagement process, including current use. The spatial extent of the AEMP study area is considered to be sufficient to document Project-related effects, and results will be examined after the first post-Project round of sampling. If effects are of greater magnitude than anticipated, the spatial extent of monitoring would be modified to document unanticipated changes if there is a risk that effects extend beyond the monitoring area. Through implementing these plans and ongoing engagement, including through the Project Environmental Advisory Committee, it is anticipated that issues and potential Project effects relating to Indigenous current use of Lake St. Martin can be addressed. Additional information about fish and fish habitat, and Indigenous current use of all areas of Lake. St. Martin, as well as proposed mitigation and monitoring programs can be found in Table IAAC-122-1 in the response to IR IAAC-R1-122 and Table IAAC-R2-29-1 in the response to IR IAAC-R2-29.

i. Rationale for differences between quantitative assessments of potential effects of sediment deposition and transport on fish and fish habitat and Indigenous Knowledge shared on this subject.

Through the Indigenous consultation and engagement process, including Project-specific reports[1], as well as recently received Socio-Economic and Well-Being (SEWB) Studies and Rights Impact Assessment (RIA) Studies[4], Indigenous groups have identified concerns related to sediment deposition and transport on fish and fish habitat. While information from the recently received Socio-Economic and Well-Being Studies and Rights Impact Assessment Studies received from Interlake Reserves Tribal Council in September 2023 has been reviewed, these studies do not provide any new additional information related to sediment deposition and transport on fish and fish habitat that has not already been considered for the Project.

Tataskweyak Cree Nation is concerned that the increase in erodibility of the sediments forming the LSM Narrows will change the makeup of the sediments forming the bed of the LSM Narrows and cause a deepening of the bed and a coarsening of bed sediments, impacting the spawning habitats of fish (TCN 2022). The IRTC is concerned about flow velocity and turbidity changes at the LSM Narrows and impacts to whitefish spawning habitat as well as the potential loss of fish larvae to the LSMOC right after hatching (IRTC 2022a). Pinaymootang First Nation has reported that the major whitefish spawning ground in Lake St. Martin is on the shoals at the LSM Narrows between the south and north basin of the lake and emerging whitefish, because of the change in flow path, will tend to be carried into the LSMOC and directly into Lake Winnipeg rather than being able to use their traditional migratory route to the lake which is the Dauphin River. Those larvae that have not emerged from the substrates in the LSM Narrows when flood flows occur may be subject to scouring because of the predicted substantial increase in flow velocities through the LSM Narrows during flood and channel operations (PFN 2022c). Little Saskatchewan First Nation expressed concerns about changes in sedimentation patterns and water quality resulting in substantial, long-term impacts to commercial and subsistence fishing on Lake St. Martin (Olson et al. 2020b). In their RIA studies, Lake St. Martin First Nation, Lake Manitoba First Nation, Little Saskatchewan First Nation and Kinonjeoshtegon First Nation have expressed concern regarding impacts to spawning areas in Lake St. Martin arising from sediment outflows from the channels during operations.

[2] Project written responses from drafts of the EMP plans have been received from Norway House Cree Nation (Luttermann and A.L. Ecologic. 2021), Fisher River Cree Nation (FRCN 2021a; FRCN 2021b; FRCN 2021c; FRCN 2021d; FRCN 2021e; FRCN 2021f; FRCN 2021g), Hollow Water First Nation (HWFN 2021a; HWFN 2021b), Loon Straits Northern Affairs Community (LSNAC 2021), Pine Dock Northern Affairs Community (PDNAC 2021) and Interlake Reserves Tribal Council (IRTC 2021), Little Saskatchewan First Nation (LSFN 2021), Manitoba Metis Federation (MMF 2023), Pimicikamak Okimawin (Luttermann and A.L. Ecologic. 2021a), Pinaymootang First Nation (PFN, SBOFN, & SFN 2021), Pine Dock Northern Affairs Community (PDNAC 2021), Sagkeeng First Nation (PFN, SBOFN, & SFN 2021), Sandy Bay Ojibway First Nation (PFN, SBOFN, & SFN 2021), and Tataskweyak Cree Nation (TCN 2021a, 2021b).

A summary of TLRU information obtained from each Indigenous group engaged on the Project, current to March 2022, is available in Table IAAC-122-1 in the response to IR IAAC-R1-122. A summary of socio-economic information obtained from each Indigenous group that was engaged on the Project is available in Table IAAC-R2-29-1 in the response to IR IAAC-R2-29. The ICSER provides an overview of consultation and engagement efforts, and summarizes information received to date from Indigenous groups.

As indicated, Manitoba Transportation and Infrastructure has also relied on Indigenous experience in the Project region, where Indigenous perspectives have been shared in observing changes in the landscape, including those that have occurred during and after flooding events; particularly in relation to the efforts to manage the 2011 flood, through the construction and operation of the Emergency Outlet Channel (EOC). Manitoba Transportation and Infrastructure has also obtained Indigenous knowledge related to observations of past land use practices and operation of the existing Provincial flood control network. In addition to carrying out engagement to listen and document these concerns, Manitoba Transportation and Infrastructure has reviewed the past and ongoing effects from flooding and measures to manage flooding as part of the design, planning and environmental assessment for the Project. This enabled the incorporation of previously successful measures, and lessons learned from effects that occurred. A good example is the effects associated with constructing and operating the EOC. This was built during emergency flood conditions, but subsequent studies of the effects on sediment mobilization, transport and deposition on fish and fish habitat have been invaluable inputs to understanding potential Project effects and have shaped the baseline studies and modeling that has been carried out to further understand potential effects. Manitoba Transportation and Infrastructure is also aware that Indigenous groups have had adverse experiences with other channels constructed in Manitoba (e.g., Two- and Eight-Mile Channels) in the north basin of Lake Winnipeg and taken these adverse effects into consideration in the design of the Project.

The May 2022 response to IRs IAAC-R1-30 and IAAC-R1-68, July 2023 response to IAAC-R2-07, and Part a above, describe the technical assessment for potential changes in substrate in the Narrows as a result of elevated velocities during Project operation for flood management. As noted in these IRs, substrates suitable for spawning are widespread upstream, within and downstream of the LSM Narrows and include gravel and cobble shoals. Elevated velocities may result in some shifting of the location of gravel shoals, but based on the information presented, the shoals are expected to remain available as spawning habitat. Areas in the north basin of Lake St. Martin that are currently depositional environments where silts may settle would not currently be used for spawning as they are expected to have a silt substrate and not be suitable for fish species that use gravel and cobble substrates.

Manitoba Transportation and Infrastructure is aware of Indigenous knowledge that generally identifies concerns with potential effects of sediment transport and deposition on fish habitat but none that specifically addresses the technical/quantitative assessment summarized above. The potential for excess sediment to adversely affect fish habitat is well known, and Manitoba Transportation and Infrastructure has shared this concern with Indigenous groups and therefore

has incorporated management of sediment releases into the Project design. The challenge for Manitoba Transportation and Infrastructure is to demonstrate to Indigenous groups (as well as regulators and stakeholders) that the potential effects have been accurately predicted and effectively mitigated. As a result, the Project Environmental Management Program includes monitoring programs designed to verify predictions and address any unanticipated effects. Manitoba Transportation and Infrastructure is committed to sharing these results and discussing any issues and discrepancies with Indigenous groups, including through mechanisms such as the Environmental Advisory Committee.

ii. Updated assessment of cumulative effects of sediment deposition and transport on fish and fish habitat in the Regional Assessment Area (RAA) given the Indigenous Knowledge shared.

While additional information has been provided by Indigenous groups on the LSM Narrows and north basin of Lake St. Martin since the Project Environmental Impact Statement was completed, an updated assessment of cumulative effects is not required. This is because no changes to, or new physical activities, based on available information, are known within the RAA that may cause changes or new potential cumulative interactions with effects associated with physical hydraulic changes in the LSM Narrows.

The following points address specific concerns raised by the Indigenous groups with respect to lake whitefish spawning at the LSM Narrows:

- IRTC (2022a) noted impacts to whitefish spawning habitat as well as the potential loss of fish larvae to the LSMOC.
    - Manitoba Transportation and Infrastructure's response: The LSM Narrows are a complex area with two narrow constrictions where water velocities will increase and wider areas with extensive islands and shoals where little change in velocity will occur. Lake whitefish are believed to spawn on shoals in these wider areas where there will be little change. As noted above, in higher velocity areas there may be some shifts in the location of the shoals. The environmental assessment noted that if the LSMOC is operated during April/early May at the time of whitefish hatch, larvae could drift to Sturgeon Bay via the LSMOC rather than the Dauphin River, but this effect was not considered adverse. Lake whitefish larvae can currently be captured along the shore of Sturgeon Bay close to the site of the LSMOC outlet suggesting larvae currently disperse along the shore of Sturgeon Bay.

- Pinaymootang First Nation (2022c) has reported that the major whitefish spawning ground in Lake St. Martin is on the shoals at the LSM Narrows and larval whitefish would be carried to Sturgeon Bay via the LSMOC.
    - Manitoba Transportation and Infrastructure's response: It is agreed that the LSM Narrows are an important spawning area, though it should be noted that spawning has also been recorded in the south basin of Lake St. Martin. Based on the field work and modeling carried out to-date, increased water velocity, which is most pronounced in the constrictions of the LSM Narrows, is not expected to affect the overall suitability of the LSM Narrows as spawning habitat. As noted above, regardless of whether larvae are carried to Sturgeon Bay via the Dauphin River or the LSMOC, this is not expected to affect their survival.
- Little Saskatchewan First Nation expressed concerns about changes in sedimentation patterns and water quality resulting in substantial, long-term impacts to commercial and subsistence fishing on Lake St. Martin (Olson et al. 2020b).
    - Manitoba Transportation and Infrastructure's response: Based on the field work and modeling carried out to-date, changes to sediment patterns and water quality are expected to be confined to areas downstream of the channel outlets. Therefore, as described in the response to IR IAAC-R1-30, mitigation measures have focused on confining effects to the immediate construction area and outlet areas, through a series of monitoring and mitigation measures described in the Project Environmental Requirements (PERs), Surface Water Management Plan (SWMP), Sediment Management Plan (SMP) and Revegetation Management Plan (RVMP). Manitoba Transportation and Infrastructure has committed to specific mitigations to reduce effects to water quality and also committed to water quality and sediment monitoring in areas upstream and downstream of the Project, as part of the AEMP, which is designed to confirm that effects are confined to the LAA.
- The Manitoba Metis Federation reported that even short-term sedimentation in spawning beds can lead to reproductive failure (MMF 2021b).
    - Manitoba Transportation and Infrastructure's response: If operation of the channels is initiated in April/early May prior to ice-off, there is a potential that some areas of gravel or sand may shift over locations where eggs are present, but this is expected to occur rarely if at all due to the limited need to operate the channels under ice cover conditions.

c. **Assessment of effects to fishing activities from the Project given the CEC Lake Winnipeg Regulation record.**

The May 2022 response to IR IAAC-R1-76 discusses the relationship between fish and potential effects to the socio-economic conditions of Indigenous groups engaged on the Project. It notes that Volume 4, Section 10.2.4.4 of the Project EIS explains that the Project could lead to changes in fish habitat for traditionally used resources which support activities such as fishing, and that many of the Indigenous groups in the Project regional assessment area (RAA) rely on fishing for sustenance and income. It also notes that Volume 4, Section 10.2.4.4 of the Project EIS recognizes that unmitigated effects to fish spawning areas could affect the availability of fish species traditionally harvested by Indigenous groups.

The May 2022 response to IR IAAC-R1-14 summarizes concerns expressed by Indigenous groups about potential effects from Project sediment to fish nets and subsequent fish harvest. It notes that Volume 3, Section 7.2.1.2 of the Project EIS describes concerns from multiple Indigenous groups that the channels would lead to an increase in sediment and debris in surface waters downstream of the Project, and lists additional concerns expressed following submission of the Project EIS.

In the Context and Rationale section above, it states that Poplar River First Nation had identified that the Clean Environment Commission (CEC) record includes maps showing locations of Indigenous fishing activities. However, mapping information shared during hearings for these topics does not appear to be publicly available. Manitoba Transportation and Infrastructure contacted the community directly and was informed that Poplar River First Nation had actually not participated in the CEC process for the Lake Winnipeg Regulation. The CEC process was requested by the Minister of Conservation (now the Minister of Environment and Climate Change), in which public hearings were carried out as part of the Manitoba Environmental Approvals Branch environmental review of the final application for an *Environment Act* Licence for Manitoba Hydro's Lake Winnipeg Regulation. Presentations were made by organizations, residents and Indigenous groups, and included topics such as fishing areas and concerns about fish populations relating to sediment, algae blooms and the eutrophication of Lake Winnipeg. The CEC noted that these concerns are likely linked to the large inflows of nutrients resulting from land-use changes, high precipitation and population growth within the larger Lake Winnipeg watershed. The public hearings were held in 2015 to gather information on Lake Winnipeg and downstream areas (http://www.cecmanitoba.ca/hearings/lake-winnipeg-regulation-mb-hydro/index.html).

In the absence of community information pertaining to traditional use, the Project EIS conservatively assumes that TLRU is practiced throughout the Project area, including near the inlets and outlets of the LMOC and LSMOC. Through the Indigenous consultation and engagement process, Indigenous groups have reported that fish harvesting, and commercial fishing occurs near the inlets and outlets of LMOC and LSMOC (Olson et al. 2020a; Olson et al. 2020b; Golder Associates 2018; Tam et al. 2022; Peguis 2022; MMF 2021a: LSMFN 2021; FRCN 2021h; FRCN 2023; Malone et al. 2023;). Several Indigenous groups provided maps showing fishing locations that included Birch Bay, Sturgeon Bay and Watchorn Bay, and Table IAAC-R1-122-1 in the response to IR IAAC-122 provides

descriptions of those that fished in these areas. Manitoba Transportation and Infrastructure will continue to accept information from Indigenous groups and review any subsequent information provided for incorporation into the Project, as appropriate.

A summary of TLRU information obtained from each Indigenous group engaged on the Project, current to March 2022, is available in Table IAAC-R1-122-1 in the response to IR IAAC-R1-122. A summary of socio-economic information obtained from each Indigenous group engaged on the Project is available in Table IAAC-R2-29-1 in the response to IR IAAC-R2-29. The ICSER, provides an overview of consultation and engagement efforts, information received to date by Indigenous groups.

The July 2023 response to IR IAAC-R2-26 discusses one of the primary concerns expressed by Indigenous groups – the potential effects from Project sediment to fish nets and subsequent fish harvest. It notes that much of the concern appears to stem from observations following operation of the EOC, when there was an increase in fine sediment noted around McBeth Point of Lake Winnipeg and other areas within traditional fishing grounds, resulting in sediment build-up in fishing nets and reduced fish harvest. As has been noted in past submissions, the EOC was constructed under emergency conditions to manage the 2011 and 2014 floods and specific mitigation measures were not incorporated into the design to manage sediment and debris. Additionally, the EOC discharged floodwaters from Lake St. Martin directly into the Big Buffalo bog complex and subsequently through Buffalo Creek. This flow path created many new sources of debris and sediment, which ultimately discharged to Lake Winnipeg.

Unlike the EOC, the design of the LMOC and LSMOC integrates measures to address concerns with sediments and debris. The designs include components to minimize sediment introduction from the channels. Designs include armouring the channels with rock to prevent erosion within the channels and subsequent sediment deposition within downstream waters (i.e., Lake St. Martin and Sturgeon Bay of Lake Winnipeg). As has been described in past submissions (e.g., May 2022 response to IR IAAC-R1-30 and July 2023 response to IR IAAC-R2-10), Manitoba Transportation and Infrastructure recognizes that the initial operation (commissioning) of the Project is likely to have the greatest likelihood of releasing sediment into receiving waterbodies, as residual sediments from construction activities could be available for mobilization and transport. As a result, flows will be managed during the initial commissioning of the Project (i.e., initial operation in non-flood conditions, timed to occur outside fish spawning windows) to allow any residual sediment from construction to be moved slowly in a controlled and monitored condition out of the channels (see response to IR IAAC-R1-30 for details). Based on modeling performed of the commissioning, operational controls will maintain downstream water quality within water quality guidelines (see May 2022 response to IR IAAC-R1-14 and July 2023 response to IAAC-R2-08 for details), while clearing the channel of most remaining sediments from construction. Subsequent operational events (i.e., in response to a flood) are therefore not expected to mobilize quantities of sediments from the channels that will affect fish and fish habitat in the future.

Overall, channel armouring is expected to minimize sediment and debris such as soils, peat or terrestrial and aquatic vegetation inputs from the channels and minimize potential effects to fishing nets and fishing success. Operation of the channels is therefore not expected to mobilize peat or terrestrial and aquatic vegetation, as observed during operation of the EOC. As stated earlier, the majority of the EOC flow passed through natural waterways (i.e., the wetlands surrounding Big Buffalo Lake, Big Buffalo Lake, and Buffalo Creek), which carried flow through peatland and heavily vegetated waterways. Flows through the EOC therefore removed a large amount of organic material which discharged into Sturgeon Bay, after which such material may have been carried over time into Lake Winnipeg, including the area around McBeth Point. The use of constructed and armoured channels, as proposed by the Project, to convey flood flows, rather than small natural streams, is expected to substantially reduce the mobilization of inorganic and organic materials.

The response to IR IAAC-R2-26 describes the commitment to monitoring sediment and debris. This includes monitoring the movement of organic materials and sediments along the lake bottom, and monitoring levels of debris in commercial fishing nets between periods of channel operation and non-operation. It should be noted that one of the challenges in monitoring of debris in nets is that it may be difficult to distinguish between effects related to natural flooding and diversion of flood waters through the channels. In addition, other material that fouls nets, such as algae and aquatic plants, vary in amounts depending on location and water currents, as well as seasonally and between years. Under current (pre-Project) conditions, high water levels during floods typically increases the quantity of debris in lakes due to mobilization of dead vegetation and trees from shorelines, as well as erosion of riverbanks and lake shorelines. To assist in interpretation of results of debris monitoring in nets, the channels and inlet and outlet areas will be inspected after operation. If there are observable areas of scour or slumping, then these may be a source of debris and Manitoba Transportation and Infrastructure will address this issue; however, if no scour or slumping is observed, then debris observed during and after flood conditions is more likely to have originated from other sources, rather than caused by the Project.

The debris monitoring results will be shared with communities and will likely be an agenda topic for the proposed Environmental Advisory Committee (EAC). On an individual basis, the Complaint Resolution Process (CRP), as filed as part of the June 2022 supplemental information response to IAAC IRs, will create a formal venue to document concerns, with a requirement for Manitoba Transportation and Infrastructure to follow up on issues. Any accommodation related to unanticipated effects from the Project such as sediment or debris found on fish nets or subsequent fish harvest will have to be assessed and evaluated on a case-by-case basis, based on monitoring results. However, impacts to commercial fishing activities would be assessed within the context of the individual's provincially issued license. Manitoba Natural Resources and Northern Development's Fisheries Branch is responsible for managing fisheries resources in the province, including commercial fishing quotas and recreational fishing licencing and identifying and enforcing fishing restrictions. It participates in the Coordinated Aquatic Monitoring Program with Manitoba Hydro, which includes monitoring debris in nets and has sites in the Project region.

Effects to fishing activities regarding proximity to channel inlet and outlet areas is discussed in Part d. These would be the areas most exposed to sediments and debris, and there would also be limitations to accessing these areas.

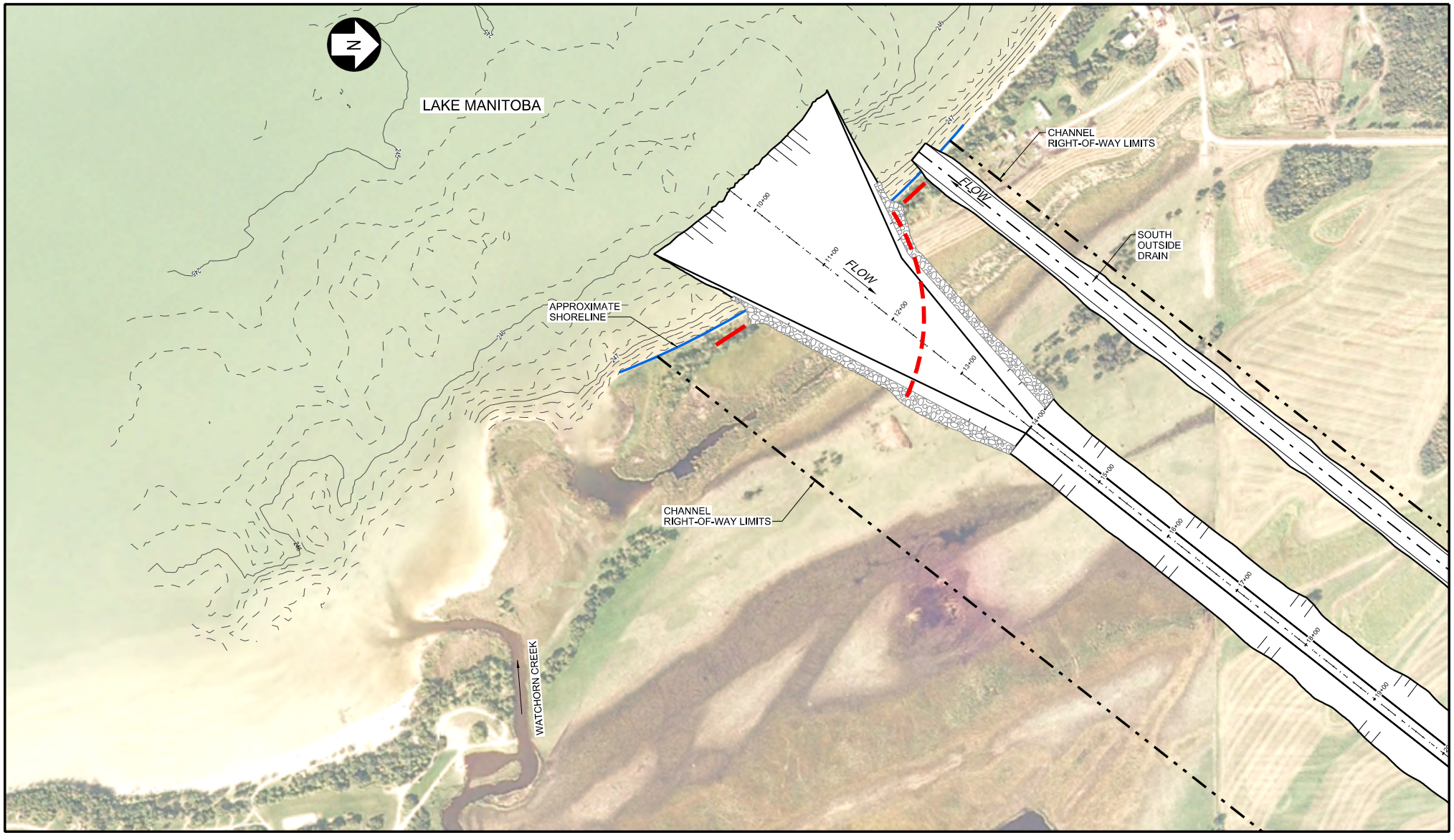
d. **Limitations to fish harvesting and commercial fishing at the inlets and outlets of the LMOC and LSMOC**.

The response to IR IAAC-R2-26 notes that the physical area temporarily removed from fish harvesting at the inlet and outlet areas will be negligible in proportion to the overall sizes of Lake Manitoba, Lake St. Martin, and Lake Winnipeg. During construction, the presence of cofferdams and/or silt curtains will prevent access to nearshore areas where the channel inlets and outlets are being excavated. In addition to comprising a relatively small area of the total potential area available for fish harvesting, excavation in these areas is planned to occur for only one open water season. While there will be a loss of fish habitat, this is predicted to be relatively small compared to the remaining habitat available in the RAA. As indicated in the response to IR IAAC-R2-26, Manitoba Transportation and Infrastructure is working with the Department of Fisheries and Oceans Canada (DFO) to determine the type and quantity of habitat affected so that offset measures can be developed. After mitigation, there is no expectation of noticeable residual effects on fish abundance and therefore recreational, subsistence, and commercial fishing should be able to continue with minimal disruption to Indigenous groups engaged on the Project.

As indicated in the May 2022 response to IR IAAC-R1-120, for reasons of public safety, it is anticipated that the immediate inlet and outlet areas on Lake Manitoba, Lake St. Martin and Lake Winnipeg will be unavailable for use throughout the life of the Project, and that measures such as signage, buoys and safety booms will be implemented to inform and protect boaters from potential hazards and prevent access to these areas. Manitoba Transportation and Infrastructure will monitor these controls after commissioning of the channels and adjust or augment as required to maintain public safety. Figures IAAC-R3-01-4 (LMOC inlet), IAAC-R3-01-5 (LMOC outlet), IAAC-R3-01-6 (LSMOC inlet) and IAAC-R3-01-7 (LSMOC outlet) show the likely locations of safety buoys and safety booms.

During channel operation when the Project is conveying floodwater, it is expected that fishers would avoid the immediate areas of the inlets and outlets where water velocities will increase, as this would disrupt gill nets. In addition, ice conditions would be unsafe where water velocities are increased at the inlets and outlets, which would affect winter fisheries (e.g., Lake St. Martin) in these areas. Manitoba Natural Resources and Northern Development Fisheries Branch has indicated that commercial fishing is not currently feasible at the proposed LMOC inlet or outlet locations due to shallow water depth and fact that there is only winter commercial fishing in those areas. In terms of the LSMOC, Sturgeon Bay has both open water and winter commercial fishing but there is no currently known use of the area immediately downstream of the proposed LSMOC outlet location by commercial fishers.

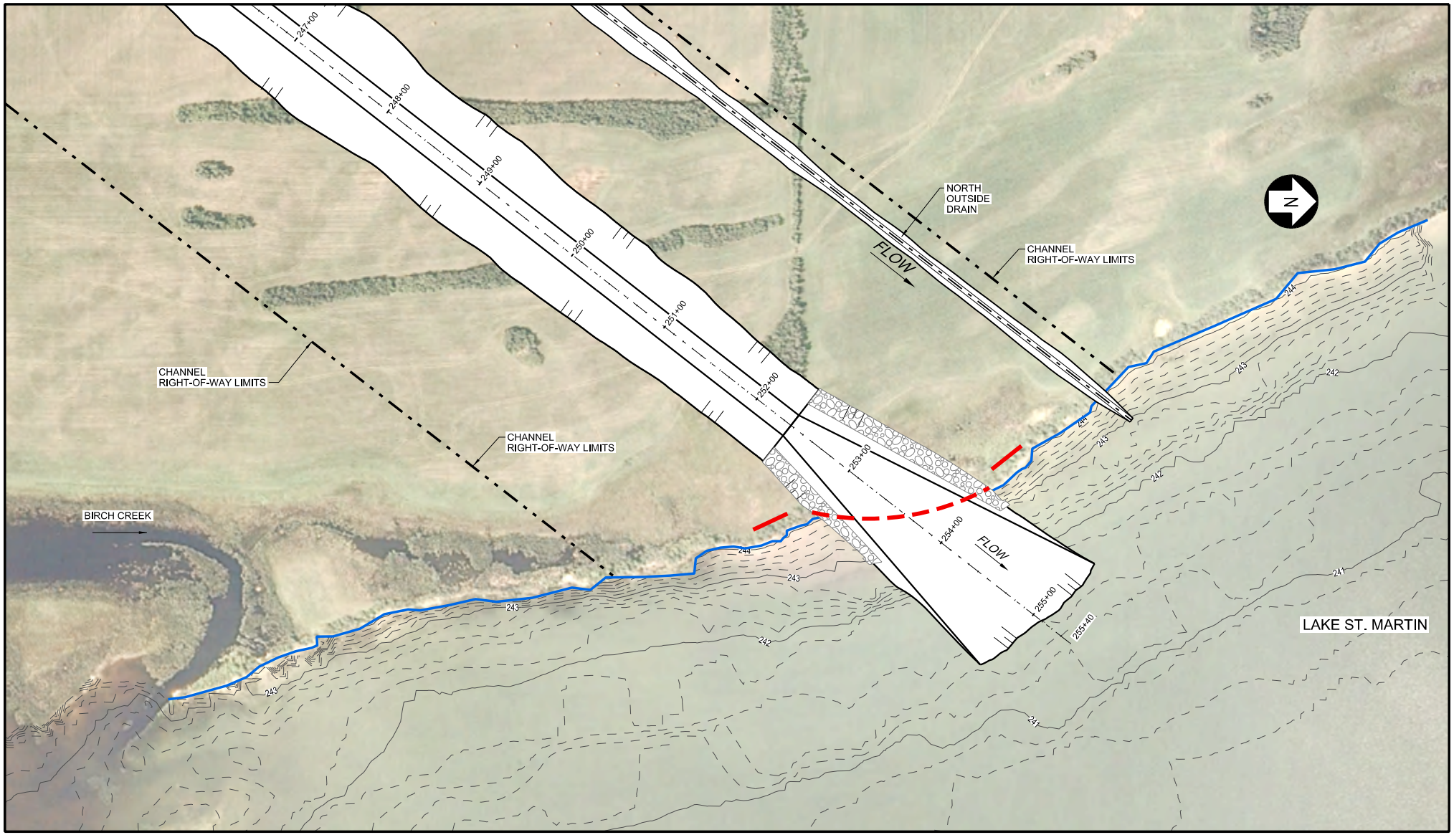
As indicated in the response to Part e, Natural Resources and Northern Development's Fisheries Branch is responsible for managing fisheries resources in the province, including commercial fishing quotas and recreational fishing licencing and identifying and enforcing fishing restrictions. The Manitoba Fishery Regulations of the provincial *Fisheries Act* (Clause 51 - Restricted Waters) states that "No person engaged in commercial fishing shall, unless authorized by licence, fish by means of a net in any lake within 1.5 kilometres (km) (0.93 miles [mi]) of the location where a stream or river enters the lake." Based on this regulation, the 1.5 km (0.93 mi) buffer restriction to recreational and commercial fishing are typically put in place in the vicinity of any constructed structures (e.g., inlet and outlet channels) from a safety perspective, if the structure is operating year-round. However, in the case of the Project inlet and outlet channels where the water does not flow year-round, Manitoba Natural Resources and Northern Development's Fisheries Branch (K. Casper, Pers. Comm.) has indicated that the 1.5 km (0.93 mi) buffer would not apply. If there are structures in place to manage flow, then a 25 m (82 ft) buffer would apply to both recreational and commercial fishers.



NOTE: SPOIL PILES NOT SHOWN.

0 30 60 90 120 150
SCALE IN METRES

Figure IAAC-R3-01-4 Navigation Safety Measures at LMOC Inlet



NOTE: SPOIL PILES NOT SHOWN.

0 20 40 60 80 100
SCALE IN METRES

Figure IAAC-R3-01-5 Navigation Safety Measures at LMOC Outlet

WEST BANK

WEST MAINTENANCE ROAD

WATER CONTROL STRUCTURE

PEAT SPOIL

SPOIL PILE LIMITS

OUTSIDE DRAIN

CONSTRUCTION ACCESS ROAD

EXISTING BORROW AREA

400m R.O.W.

SIGNAGE:
DANGER - KEEP OUT

SAFETY BOOM TO PREVENT ACCESS TO CHANNEL FROM WATERCRAFT

**FINAL LOCATION TO BE DETERMINED

EAST MAINTENANCE ROAD

PEAT SPOIL

SPOIL PILE LIMITS

15m BENCH

400m R.O.W.

EXISTING ACCESS ROAD

SIGNAGE:
DANGER - KEEP OUT

℄ LSMOC

EAST BANK

FLOW

550m

LAKE ST. MARTIN

245.0

244.0

243.0

242.0

16+00

14+00

12+00

10+00

8+00

6+00

4+00

2+00

0+00

-2+00

-4+00

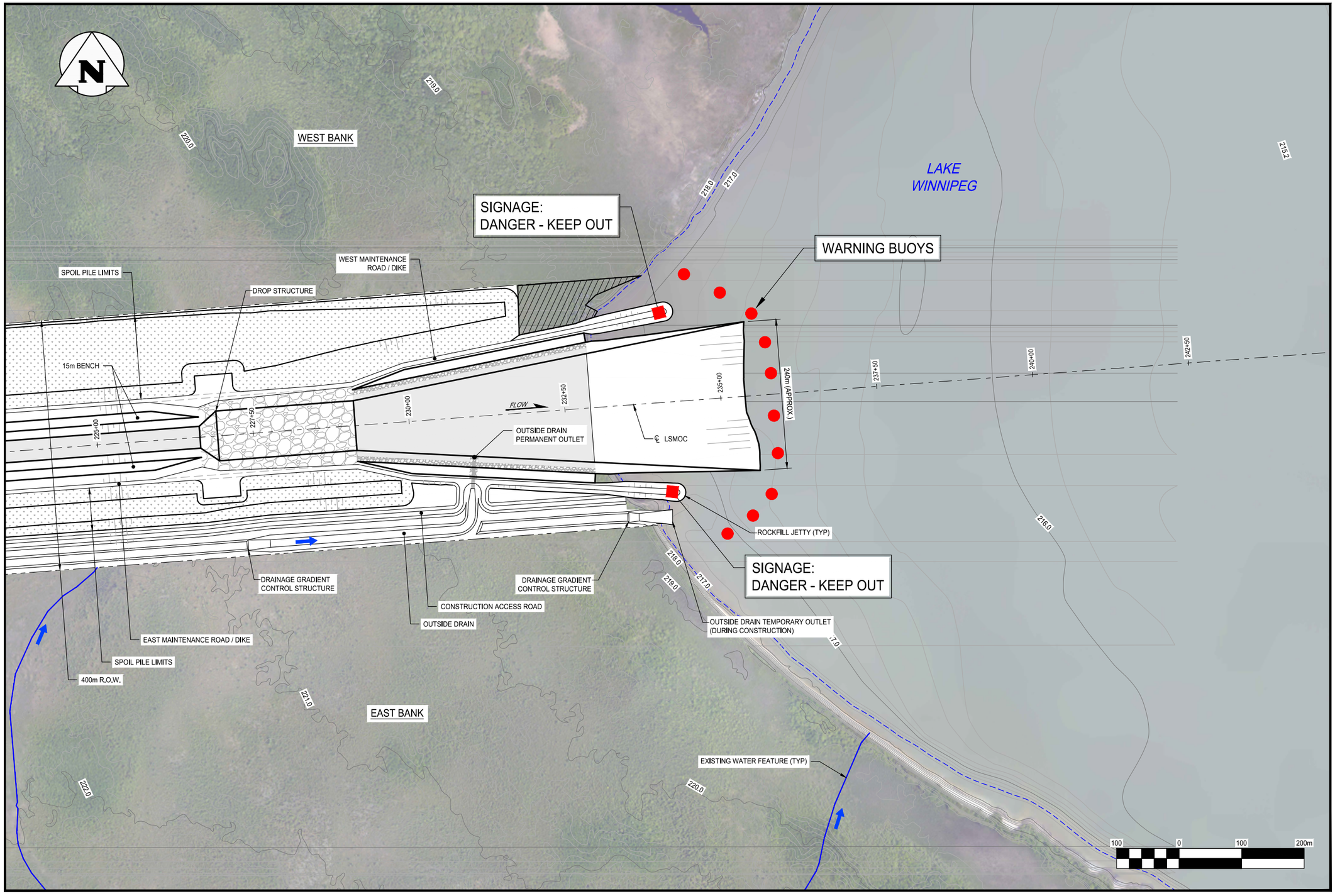
-5+00

STA 1+00

100 0 100 200m

LSMOC INLET PLAN

Figure IAAC-R3-01-6 Navigation Safety Measures at LSMOC Inlet



LSMOC OUTLET PLAN

Figure IAAC-R3-01-7 Navigation Safety Measures at LSMOC Outlet

e. **Potential effects of project operation resulting in more sediment mobilization than anticipated, and provide resulting effects to related VCs, including but not limited to, the effects of sediment deposition on fish and fish habitat, including spawning, rearing and migration patterns, and the ability to forage for benthic and pelagic food sources**.

The response to IRs IAAC-R1-30, IAAC-R2-08 and IAAC-R2-10 discuss sediments in areas downstream of the channels and associated water quality guidelines, based on the results of sediment modeling for the commissioning scenario. Based on the sediment modeling that was carried out for the Project commissioning scenario, it is likely that not all of the sediment that would be available in the channels after construction would be mobilized during commissioning.

For the LMOC, the Closed to Fully Open Controlled Gate Opening Sequence showed that approximately 4,100 metric tonnes (4,035 imperial tons) to 7,700 metrics tonnes (7,578 imperial tons) of sediment, out of an estimated 16,000 metric tonnes (15,747 imperial tons) of sediment that might be available for mobilization, would be expected to be transported from the channel over the modeled 33-day Project commissioning simulation period. The range of transported material is based on the two predominant particle sizes that were modeled, medium silt and very fine sand. The sediment that would not be flushed out during Project commissioning would remain in lower velocity zones along the upper side slopes of the LMOC channel.

For the LSMOC, the gradual gate opening sequence showed that approximately 7,600 metric tonnes (7,480 imperial tons) out of an estimated 12,200 metric tonnes (12,007 imperial tons) of sediment that might be available for mobilization, would be expected to be transported from the channel over the modeled 28-day Project commissioning simulation period.

The estimated 16,000 metric tonnes (15,747 imperial tons) of sediment in the LMOC and 12,200 metric tonnes (12,007 imperial tons) tonnes of sediment in the LSMOC that might be available for mobilization was based on an assessment of fine sediments in the outlet channels that might result from the mass of fines within the armour layer, from earth plug removal activities, and from the excavation of the in-lake portions of LMOC and LSMOC inlet and outlet. The means and methods employed by the contractor during construction may result in a different total mass of sediment available for mobilization during commissioning.

The sediment flushed from the channels during Project commissioning may also be discharged at a lower rate than estimated, should a gate opening scenario be adopted during commissioning that involves smaller incremental gate openings than were considered in the modeling in order to control the sediment concentrations flowing into Birch Bay or Sturgeon Bay. However, the total amount of sediment mobilized from the channel and transported/deposited into Birch Bay and Sturgeon Bay is anticipated to be the same over the entire commissioning period, regardless of duration.

As discussed in the response to IR IAAC-R1-30 and IAAC-R2-10, a sediment deposition threshold of 2 millimetres (mm) (0.08 inches [in]) was deemed appropriate to evaluate effects to downstream fish habitat, as this was considered the amount above which there may be measurable effects. For LMOC outflows, sediment deposition is predicted to occur into a smaller, shallower lake environment in Birch Bay compared to the LSMOC, which empties into a large body of water at Sturgeon Bay.

The Project Aquatic Offsetting Plan that will be developed for the *Fisheries Act* Authorization Application will include offsetting measures for the deposition of sands from Project commissioning in areas predicted to exceed 2 mm (0.08 in) in thickness. If all of the sediment is not mobilized during commissioning, then effects observed during commissioning could occur again during a subsequent operation (i.e., deposition of fines on a small (0.9 hectares [ha] [2.2 acres (ac)]) area of coarse substrate and a larger (12 ha [29.7 ac]) area of fine substrate). As discussed in the response to IR IAAC-R2-10 (Part c-i), these effects represent a negligible amount of the total amount of habitat in Lake St. Martin and would not affect fish populations. In addition, offsetting for habitat effects due to sediment deposition are being developed to address DFO's requirements under the *Fisheries Act*.

It should be noted that the amount of sediment available for mobilization during operation will be less than during commissioning, and over time will decrease to negligible amounts. For LSMOC outflows, sediment deposition is into Sturgeon Bay, where the area and depths are larger, and it is unlikely that deposition would exceed the 2 mm (0.08 in) threshold from commissioning, other than in very isolated locations within the excavated outlet. Deposition of sediment in Sturgeon Bay was shown to be well distributed for the Mitigation Case simulation, which considered the effects of wind and wave action. Therefore, if less is mobilized during commissioning, then less deposition would be expected during subsequent operations, especially given the existing turbulence and variability in this area. Therefore, sediment deposition would not be expected to affect fish use or invertebrate production, and no measurable effects on fish populations are anticipated.

Contaminant deposits associated with sediments were discussed in the July 2023 response to IR IAAC-R2-09. The response notes that the main sources of sediment during commissioning are fine dust on armouring rock dust and till/lake sediments disturbed during inlet and outlet excavation, which are expected to be relatively inert and not measurably affect surface water quality.

As discussed in previous responses to IRs (e.g., IAAC-R1-30, IAAC-R2-08 and IAAC-R2-10), Manitoba Transportation and Infrastructure is using an adaptive management approach to address downstream sediment issues during commissioning and subsequent operations. The Sediment Management Plan includes an appendix where sediment management protocols are described, including real-time monitoring and adjustments of water control structure gates to manage sediment outputs within established thresholds. The greatest amount of sediment is expected to be generated during commissioning, as it is not feasible to remove all sediments from the channels after construction and this approach is expected to manage effects from sediment mobilization. Sediments generated during operations could be greater than anticipated but it is unlikely they would be greater than generated from commissioning, and the channel armouring will manage risks of erosion. As a result, effects to VCs would be as described in the IR responses referenced above.

As noted in the Context and Rationale section, concerns have been raised that sediments from multiple flood events might accumulate over time, resulting in adverse effects to fish habitat greater than those discernible after initial commissioning, even though sediment releases during commissioning are anticipated to be greater than during subsequent floods. As described above, there is the potential that sediment deposition in the channel outlet areas could occur over time during subsequent operations; however, as noted, these downstream areas are heavily influenced by wind and wave action and any changes would be difficult to discern among current variability. In addition, at some point, all sediment from the channels will be mobilized and there will no longer be this risk. As a result, incremental changes to fish habitat in downstream areas of both channels, including areas downstream of the LMOC in Lake St. Martin, are not anticipated.

f. **Monitoring programs that could include the following locations: Berens Island, Pigeon Bay, Sandy Bar, Black Island, Hecla Island (Icelandic River), and all bays (e.g., Goldeye Creek, Fisher Bay) and peninsulas that make up the "Narrows" connected to the North Basin of Lake Winnipeg Reservoir.**

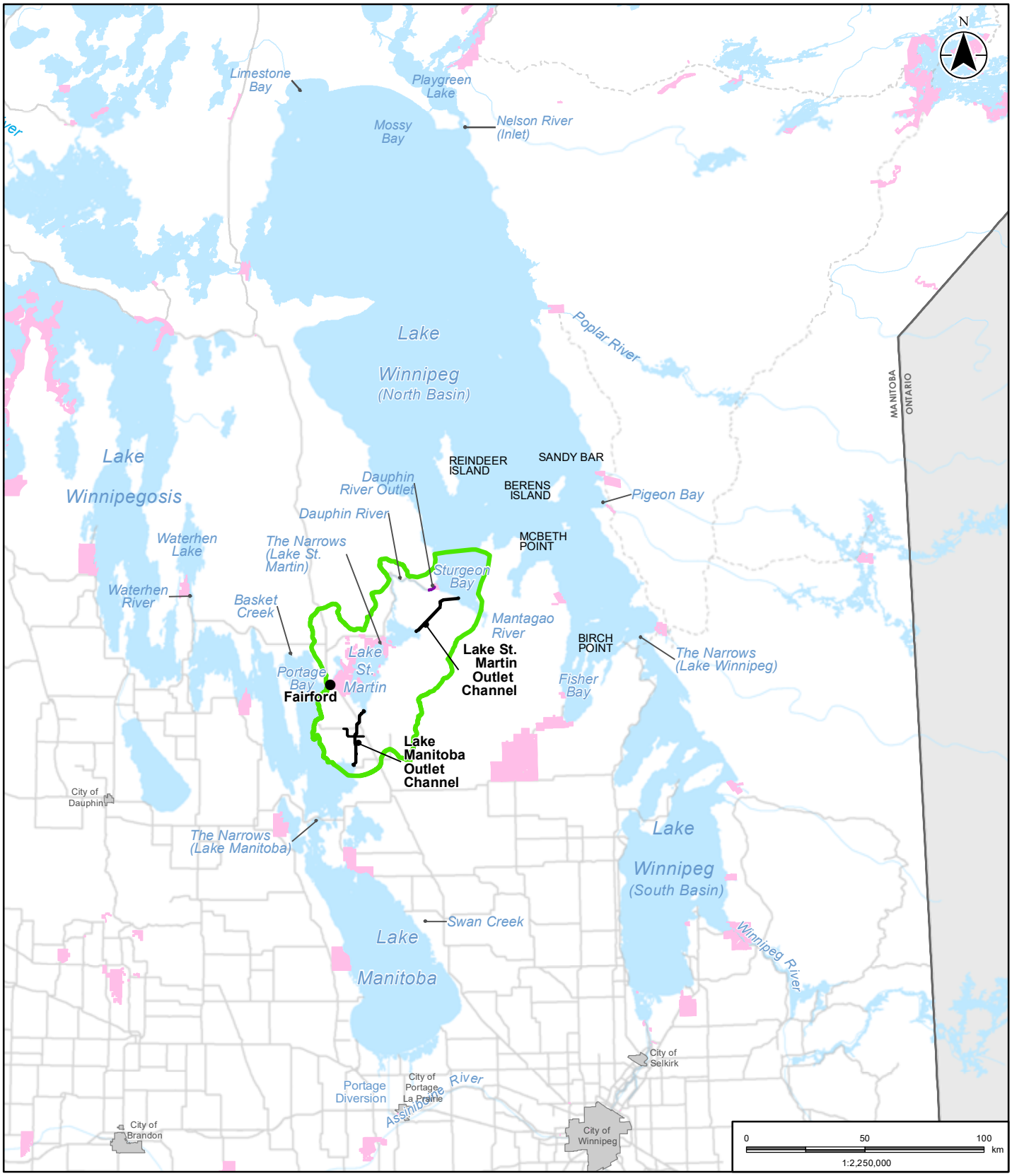
As described in Section 4, Volume 1 of the Project EIS, the assessment of potential Project effects involved the establishment of a LAA for each Valued Component (VC), which defines the boundaries of predicted effects. A larger RAA was established to facilitate comparisons of potential Project effects to conditions (including trends and variability) in areas outside of Project effects and to examine any potential cumulative effects. The LAA for the Fish and Fish Habitat VC included the outlet areas of both channels, where effects from sediments are anticipated. The AEMP is established to gather information on surface water quality, fish and fish habitat in areas within and outside the LAA to determine if potential Project-related effects are being adequately managed by the various mitigation measures that will be in place.

The AEMP provides for the monitoring of the deposition of fines over coarse substrates in areas close to the outlets of the LMOC and LSMOC where some sediments would initially be deposited. Suspended sediments in the water column will also be monitored, including the use of turbidity loggers to provide a continuous record of sediments in the water column that are being transported downstream. In the event that either the suspended or deposited amounts of sediment are much greater than predicted and have the potential to cause a detectable change in fish habitat as they are remobilized and transported downstream, then monitoring would be adjusted to extend further downstream. Given the prevalence of wind-generated waves at the outlet of the LSMOC and in Sturgeon Bay, it is unlikely that sediments from multiple flood events could accumulate in nearshore areas where coarse substrates currently occur. However, monitoring of substrate type will be conducted along the same transects over multiple years and will indicate whether there is a long-term transition in substrate type.

As noted in the Context and Rationale section, concerns have been raised that sediments originating from the channels will eventually be transported downstream of the LAA and adversely affect fish habitat further into lake areas. To assist in addressing these concerns, some adjustments have been made to the AEMP. For example, in response to concerns raised by members of the Fisher River Cree Nation with respect to increases in sediments in fishing nets at McBeth Point in the years immediately following operation of the EOC, monitoring described in the AEMP was extended to include sites at the mouth of Sturgeon Bay. Modeling studies do not predict that increases in suspended sediments or sediment deposition on the lakebed would be detectable at this point, but these sites have been added in case of greater than anticipated mobilization of sediments. It should be noted that the EOC was constructed under emergency conditions to address an extreme flood event, and that channel was not designed to avoid the mobilization of mineral sediments or organic material. As such, the degree of effects that were experienced following the EOC operation are not expected to occur after commissioning of the LMOC and LSMOC. However, in the event that sediment releases from operation of the LMOC and LSMOC are greater than predicted, and these sediments are transported downstream to Lake Winnipeg, then effects should be discernible at monitoring sites at the mouth of Sturgeon Bay more readily than at sites further downstream. Therefore, monitoring at the mouth of Sturgeon Bay effectively addresses concerns with the potential of unanticipated effects in Lake Winnipeg as a whole.

Manitoba Transportation and Infrastructure has established a network of monitoring locations that will effectively facilitate the identification and management of potential Project effects. While there is some flexibility in specific locations to address specific concerns, establishing monitoring programs further away from the LAA boundary would not yield any further insight regarding Project effects, or the ability to manage those effects. Any post-Project changes in monitoring results over the pre-Project baseline at these locations could not be confidently attributed to Project effects and could be due to other changes occurring in the downstream lakes, including Lake Winnipeg.

Based on concerns expressed about downstream movement of sediment over time, the request is for an assessment of the following monitoring locations to address sediment mobilization from the Project: Berens Island, Pigeon Bay, Sandy Bar, Black Island, Hecla Island (Icelandic River), and all the bays (e.g., Goldeye Creek, Fisher Bay) and peninsulas that make up the “Narrows” connected to the north basin of Lake Winnipeg. These locations are shown on the Figure IAAC-R3-01-8 below. It should be noted that these are well beyond planned monitoring sites at the mouth of Sturgeon Bay (e.g., McBeth Point). As indicated, the AEMP has established sites to compare Project effects in the LAA to areas further downstream in the RAA that are currently experiencing ongoing variability and trends. The AEMP has been established to screen out these non-Project-related changes, to focus on changes attributed to the Project. As indicated, including additional sites further away from the Project may identify issues of concern, but it would be unlikely that these would be Project-related. To provide additional context on this issue, additional information of regional sediment transport is provided below.



Legend

- Project Development Area (PDA)
- Fish & Water Quality Local Assessment Area (LAA)
- Major Highway
- Winter Road
- Waterbody
- Cities
- Northern Affairs Community (NAC)
- First Nation

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure
3. Last Update: 10/12/2023 9:47:46 AM

Manitoba Stantec

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Monitoring locations for sediment mobilization in The Narrows of Lake Winnipeg

Figure IAAC-R3-01-8

\CA0045-PBAGP01\gis_GIS_Project_Folder\114751 20\figures\ReS\Surface Water\Fig_IAAC_R3_01_7_Monitoring_For_Sediment_Mobilization.mxd

Lake Winnipeg is a large, relatively shallow lake developed in glacial deposits with a long fetch in a north/south direction. As such, sediments are mobilized and transported within the lake as a result of wind-generated waves and water currents. Brunskill and Graham (1979) conducted a study of the sediments of Lake Winnipeg and reported several depositional basins in the north basin of Lake Winnipeg, including one off the eastern shore of Reindeer Island where the authors stated that sediments transported from shallows to the west, including Sturgeon Bay, would be deposited. Therefore, sediments originating from Sturgeon Bay are not expected to be transported southwards to sites within the Narrows or the south basin, or across to the eastern shoreline of Lake Winnipeg.

Due to the natural transport of sediments in Lake Winnipeg, it is expected that both the deposition and mobilization of sediments would likely be recorded at many of the sites listed above; however, these sediments could not be attributed to the Project. Goharrokhi (2022) developed a sediment budget for Lake Winnipeg. Sediments enter Lake Winnipeg from shoreline erosion and transport from rivers. The Dauphin River carries 0.7% of the total estimated annual sediment load entering the lake, and inputs from channel commissioning are predicted to be substantially less than this amount. Therefore, it would not be possible to detect sediments that originated via the LSMOC or LMOC within the total sediment loads mobile within Lake Winnipeg.

g. **Likelihood that not all of the sediment present in the outlet channels during construction and prior to commissioning is flushed out into receiving waterbodies during commissioning.**

The response to IRs IAAC-R1-30, IAAC-R2-08 and IAAC-R2-10 discuss sediments in areas downstream of the channels and associated water quality guidelines, based on the results of sediment modeling for the commissioning scenario. Based on the sediment modeling that was carried out for the Project commissioning scenario, it is likely that not all of the sediment that would be available in the channels after construction would be mobilized during commissioning.

For the LMOC, the Closed to Fully Open Controlled Gate Opening Sequence showed that approximately metric tonnes (4,035 imperial tons) to 7,700 metrics tonnes (7,578 imperial tons) of sediment, out of an estimated 16,000 metric tonnes (15,747 imperial tons) of sediment that might be available for mobilization, would be expected to be transported from the channel over the modeled 33-day Project commissioning simulation period. The range of transported material is based on the two predominant particle sizes that were modeled, medium silt and very fine sand. The analysis of modeling outputs suggests that the sediment that would not be flushed out during Project commissioning would remain in lower velocity zones along the upper side slopes of the LMOC channel.

For LSMOC, the gradual gate opening sequence showed that approximately 7,600 metric tonnes (7,480 imperial tons) out of an estimated 12,200 metric tonnes (12,007 imperial tons) of sediment that estimated to be available for mobilization, would be expected to be transported from the channel over the modeled 28-day Project commissioning simulation period. The analysis of modeling outputs suggests that sediment that would not be flushed out during Project commissioning would remain in

lower velocity zones such as along the upper side slopes of the LSMOC channel or upstream of drop structures.

The estimated 16,000 metric tonnes (15,747 imperial tons) of sediment in the LMOC and 12,200 metric tonnes (12,007 imperial tons)of sediment in the LSMOC that are estimated to be available for mobilization was based on an assessment of fine sediments in the outlet channels that could result from the mass of fines within the armour layer, from earth plug removal activities, and from the excavation of the in-lake portions of LMOC and LSMOC inlet and outlet. The means and methods employed by the contractor during construction may result in a different total mass of sediment available for mobilization during commissioning. Temporary and permanent sediment and erosion control measures described in the response to IR IAAC-R2-06 will mitigate the amount of suspended sediment present in the channel waters prior to commissioning. The estimated quantities of sediment presented above should be considered conservative. Further discussion on the mitigation measures and their impact on the estimated sediment quantities is included in Part g-ii of the response below.

For both the LMOC and LSMOC, the quantity of material remaining in the channels from construction and available for mobilization will decrease after commissioning and with each subsequent operation. Therefore, the risk of mobilization of the sediment remaining from construction activities sediment mobilization will decrease over time until there is there no longer any construction related sediment mobilizing downstream from construction mobilizing downstream.

As discussed in the response to IR IAAC-R1-30 and IAAC-R2-10, and in the response to Part h-i. below, a sediment deposition threshold of 2 mm (0.08 in) was deemed appropriate to evaluate effects to downstream fish habitat. For LMOC outflows, sediment deposition is into a smaller, shallower lake environment in Birch Bay compared to the LSMOC, which empties into a large body of water at Sturgeon Bay. If all of the sediment is not mobilized during commissioning, there is the potential that future flood events resulting in greater than 2 mm (0.08 in) of sediment deposition could occur during subsequent operations (i.e., deposition of sand on a small (0.9 ha [2.2 ac]) area of coarse substrate and silt on a larger (12 ha [29.7 ac] area of fine substrate). It should be noted that future Project operations, based on available information, are not anticipated to contribute new sources of sediment and that deposition would occur on the same areas of substrate in Birch Bay that were previously impacted during commissioning. As discussed in the response to IR IAAC-R2-10 (Part c-i), these effects represent a negligible amount of the total amount of habitat in Lake St. Martin and would not affect fish populations. The Project Aquatic Offsetting Plan that will be developed as a part of the *Fisheries Act* Authorization application[5] will include offsetting measures for the deposition of sands greater than 2 mm (0.08 in) from Project commissioning. As the deposition areas will be the same for future Project operation, no further offsetting will be required.

[5] The Project is also requires authorization under the *Fisheries Act* and other environmental approvals, subsequent to the *Canadian Environmental Assessment 2012* Process.

For LSMOC outflows, sediment deposition is into Sturgeon Bay, where the area and depths are larger, and it is unlikely that deposition would exceed the 2 mm (0.08 in) threshold from commissioning, other than in very isolated locations. Based on the analysis of modeling outputs, deposition of sediment in Sturgeon Bay was shown to be well distributed for the Mitigation Case simulation, which considered the effects of wind and wave action. If all of the sediment is not mobilized during commissioning, there is the potential for sediment deposition into Sturgeon Bay to occur during subsequent operations. However, similar to commissioning, when considering controlled gate opening sequence as well as the effects of wind and wave action, deposition of sediment is anticipated to be well distributed and it is unlikely that deposition would exceed the 2 mm (0.08 in) threshold, other than in very isolated locations. Therefore, sediment deposition would not be expected to affect fish use or invertebrate production, and no measurable effects on fish populations are anticipated.

Manitoba Transportation and Infrastructure continues to identify potential offsetting measures in discussions with communities, regulators, and other interested parties and based on professional advice. One potential offsetting measure that could be implemented in Sturgeon Bay is the creation of an offshore reef to provide additional habitat diversity. This measure has been described in the Fish and Fish Habitat Offsetting Plan Initial Concepts for Discussion[6] (November 2020) previously submitted to and shared in various presentations to communities and regulators.

i. **Likelihood that sediment concentrations would exceed Canadian Council of Ministers of the Environment (CCME) guidelines and describe the effects on fish and fish habitat, if sediment is flushed in operational events after the commissioning period.**

   As discussed in the response to IR IAAC-R1-30 and IAAC-R2-08, commissioning sediment modeling for the LMOC and LSMOC has demonstrated that it is possible to effectively manage sediment concentrations below a target level by controlled gate openings. As discussed in the SMP, the procedures to be followed to initially open the water control gates for commissioning involve real-time sediment monitoring linked with manipulation of water control structure gates to manage TSS concentrations to within management thresholds based on water quality guidelines. As a result, short-term increases in suspended sediment concentration entering Birch Bay and Sturgeon Bay that exceed the Canadian Environmental Quality Guideline or Manitoba Tier III water quality guideline for TSS are not anticipated.

[6] Fish and Fish Habitat Offsetting Plan Initial Concepts for Discussion is located at https://www.gov.mb.ca/mti/wms/lmblsmoutlets/environmental/pdf/aquatics_offset.pdf

As noted in the response to IR IAAC-R2-08, as there is a likelihood that not all sediment in the channels would be mobilized during commissioning, controlled gate operations and monitoring may be required to control TSS concentrations when the channel is operated in the future. The AEMP describes the turbidity monitoring proposed to be repeated for at least two periods when the channels are operated for flood mitigation, after the channels have been commissioned. In the event that unacceptable short-term sediment concentration increases occur from the channels during channel operations, a controlled gate opening procedure will be implemented based on sediment concentration levels and forecasted peak flood levels for Lake Manitoba.

ii. Full suite of technically and economically feasible mitigation measures to remove the maximum amount of sediment from the channels prior to commissioning activities.

The response to IR IAAC-R2-06 describes the mitigation measures that will be implemented to control erosion and sediment during construction. The measures employed by contractors during construction are considered temporary and will be specified and monitored by Manitoba Transportation and Infrastructure to facilitate conformance with the Environmental Management Program; specifically, the SWMP and the SMP. In addition to the measures described in these plans, mitigation measures expected to be used to reduce the amount of sediment that may be left in the channels prior to beginning commissioning activities include the following:

- Implementing a phased removal methodology when any earth plugs need to be removed “in-the-wet,” so as to allow as much of the material as possible to be removed “in-the-dry.” It should be noted that the planned approach would involve full completion of excavation and placement of armouring rock downstream of any earth plug (complete up to the next downstream earth plug) before removal of the earth plug would commence. The earth plug removal methodology would involve:
    - Removal of material from the crest of plug, likely to within 0.3 m (1 ft) of the prevailing lake level on the wet (upstream) side of the plug, followed by removal of material from the dry (downstream) side of the plug. The objective of this being to reduce its width as much as safely possible.
    - The earth plug will be removed gradually to allow the water to release slowly and to prevent sediment from being released downstream. As the water levels drop in the upstream area, the size of the opening will be increased.
    - Turbidity curtains would be installed prior to removal of the earth plug to prevent migration of sediment beyond the local plug removal zone and the remainder of the plug removed “in-the-wet” after the water level has equalized on both sides of the earth plug. Since there would be no water level differential across the plug, there would be no flow generated that could further mobilize sediment material.

- Specifying an armour stone gradation that has a small percentage of fines present:
    - Note that laboratory testing of samples representative of the proposed limestone armouring material indicated that 0.18% to 0.68% (by weight) of the total mass of armour may include fine material that could be available for resuspension and transport under flowing conditions. As such, Manitoba Transportation and Infrastructure does not plan to require washing of the armour material as part of the production process.
    - other mitigation options such as minimizing the double handling of armour material to limit creation of additional “rock dust” fines, or consideration of producing material earlier and stockpiling it within a containment area to allow rain to wash away some of the dust will be considered.
- Excavated materials (both wet and dry) will be placed in spoil piles areas away from waterbodies and managed with erosion and sediment control measures (as discussed in the SMP) to mitigate loss of spoil pile material.

The above measures will be incorporated in the construction contract specifications. Some other measures may potentially be able to be implemented by contractors as part of their construction methodologies associated with in-water excavation and earth plug/cofferdam removal. Such measures would need to be further explored to assess their suitability with respect to applicability/ constructability in the field, environmental suitability, construction schedule implications, and cost to implement. These measures could potentially include the following:

- Remove Deposited Sediment after Plug Removal:
    - Earth plug removal will be conducted behind turbidity curtains. Following plug removal and settling of suspended fine sediment, the settled material can be collected via pumping into a GeoTube (i.e., filter bag) or a containment cell area within the spoil pile area. Alternatively, a hydrovac could be used to remove the settled sediments rather than by pumping.
- Use of Alternative Equipment for Earth Plug/Cofferdam Removal and In-Lake Excavation:
    - Alternative earth removal equipment such as open clamshells, watertight clamshells and bucket dredges, which can result in lower sediment resuspension factors could be considered for in-the-wet excavation instead of a hydraulic excavator. For example, the sediment resuspension factors would likely range from about 0.3% to 1% for open clamshells, and from about 0.3% to 2% for watertight clamshells as well as for bucket dredges, compared to 0.6% to 5% for hydraulic excavators (USACE, “Technical Guidelines for Environmental Dredging of Contaminated Sediment”, September 2008).

- Install Cofferdam Upstream of Inland Earth Plug:
    - Prior to earth plug removal, a cofferdam that contains minimal or no earthfill could be installed upstream of an inland earth plug and the area between the cofferdam and plug dewatered to facilitate plug removal in the dry. Once complete, the area would be rewatered to equalize the pressure and the cofferdam removed. Since the plug would be removed in the dry, this would be expected to greatly reduce the amount of fine sediment available for mobilization and transport. However, the adequacy of the seal that could be achieved to allow the work behind it to be performed safely would need to be investigated.
- Use of Chemical Agents for Coagulation and Flocculation of Suspended Sediments:
    - These could be used at inland plug locations to facilitate faster settlement of suspected fine sediment via the clumping of suspended particles together into larger heavier particles. The settled material would then be removed via pumping or hydrovac. The environmental suitability/acceptability and local soil conditions would need to be considered and pH monitoring would be required when undertaking the work.

h. **Likelihood of project activities to result in fish mortality, including risk of death of fish related to proposed mitigation measures that may not be fully effective, such as fish salvage efforts, fish stranding and winter oxygen levels in the outlet channels.**

Effects to fish and fish habitat are discussed in Volume 3 of the Project EIS, with information on fish health and mortality located in Section 7.2.4.4. In addition, fish mortality is discussed in response to several IRs, such as IAAC-R1-14, IAAC-R1-33, and IAAC-R2-11. The current Project design incorporates measures to reduce the risk of fish stranding and mortality (e.g., provision of baseflows, low flow notched in LSMOC drop structures, etc., but it is recognized that there are still risks that need to be managed. Potential fish mortality resulting from construction and sedimentation during commissioning/ operation is discussed in the various subsections below. In addition, fish mortality may also occur during channel shutdown, or from over winter oxygen depletion and stranding in the channels.

During channel shutdown, there is a potential for fish to become stranded – in particular, on the drop structures of the LSMOC outside of the low flow notch, as flows in the channel are decreased. Stranding is not expected to occur in the LMOC because the channel will remain connected to upstream and downstream lakes, and for most of the channel's length upstream of the water control structure (WCS), water depth will increase when the WCS gates are closed. As described in the AEMP, monitoring for stranded fish will occur along the LSMOC when the WCS is closed. A protocol for a staged shutdown, with a rapid decrease in flow when water depth on the drop structure is less than 0.3 m (0.98 ft), will be implemented with the intent of reducing the period during which fish may become stranded. The drop structures will be monitored, and large-bodied fish salvaged if/as required. Based on planned mitigation, the likelihood of the death of large-bodied fish is considered low.

In terms of over winter oxygen depletion and stranding in the channels, the channels will generally receive baseflow at all times when the channels are not in operation for flood mitigation. It is anticipated that very low levels in Lake Manitoba or Lake St. Martin will coincide with drought conditions, and that baseflow/riparian flow in the channels would be discontinued at the same time, but this would be a very rare occurrence based on historical lake levels. If these low water levels occur during the winter months, then there is a risk that fish in the channels would experience critically low concentrations of oxygen and be subject to mortality.

Although fish mortality within the channels due to stranding is not expected to occur, adaptive management measures have been identified in the AEMP to avoid and reduce mortalities should they occur, such as adjusting ramping rates (the speed of opening/closing WCS gates) as discussed above, and fish salvage. Monitoring during and after the channels are shut down will be conducted concurrently with the fish salvage to provide an estimate of the species and numbers of mortalities, if any. Monitoring for fish mortality as a result of winterkill would occur in the early spring at ice-off if measurements of dissolved oxygen under ice indicate that concentrations declined to unanticipated critically low levels. The offsetting plan submitted to address the requirement for the Project to receive an Authorization under the *Fisheries Act* will include provision for stocking of walleye (*Sander vitreus*) fry to offset fish mortalities, if they occur.

i. Details on dredging activities related to inlet and outlet construction for the LMOC and LSMOC. Calculate the potential for fish deaths due to dredging and the use of cofferdams.

Inlet and outlet construction (for both the LMOC and LSMOC) will involve the excavation of intact bed materials, which is envisioned to be performed via hydraulic excavator and not by suction. The excavation will either be completed in wet conditions utilizing turbidity barriers to isolate the excavation areas and manage suspended sediments, or in relatively dry conditions using cofferdams that will fully isolate and contain the excavation areas.

Cofferdams will be planned, designed and specified considering the Department of Fisheries and Oceans Interim Code of Practice for Temporary Cofferdams and Diversion Channels (https://www.dfo-mpo.gc.ca/pnw-ppe/codes/cofferdams-batardeaux-eng.html). Monitoring of sediments that may become re-suspended in the lakes during excavation will be completed according to the SMP and monitoring of fish and fish habitat will be completed according to the AEMP.

For in-water excavation that will be completed within areas isolated by turbidity curtains, the curtains will be installed from the shoreline and progressively extended out into the lakes to minimize the number of fish that may be present within the excavation areas. One of the primary mitigation measures to address potential effects to fish will be avoidance of in-water construction during sensitive fish timing windows (e.g., spawning periods).

Fish salvage operations will be conducted where site isolation and/or dewatering occurs in fish bearing waterways as outlined in the PERs. Monitoring of the area will be conducted by fish biologists during installation of the turbidity curtains to assess the need and extent of fish salvage prior to and during excavation.

Given the timing of instream construction to avoided sensitive periods, the location of construction activities in habitats where large numbers of fish are not expected to be present, and planned mitigation including isolation of the work sites and provision for fish salvage, fish mortality associated with instream construction is expected to be negligible.

ii. Potential sediment and contaminant deposits during dredging, construction, commissioning, and operation.

Construction Effects

While no dredging of the channels is anticipated, dredging may be a method selected during construction of the inlet and outlet areas. A range of 0.6% to 5% of the excavated material is estimated to be entrained in suspension in the lake water during in-water excavation but will be contained within the turbidity curtains. This quantity of sediment has been accounted for in the commissioning analysis. Continued monitoring for fish within the area isolated by the turbidity curtains will be required during excavation to assess the need for fish salvage and mitigate fish mortality. Wet excavated materials will be transported and placed in designated spoil pile areas away from waterbodies so that runoff from these areas can be managed using sediment control measures to prevent sediment-laden runoff from entering any natural waterbodies.

Commissioning and Operation Effects

As discussed in the response to IR IAAC-R1-30 and IAAC-R2-10, a sediment deposition threshold of 2 mm (0.08 in) was deemed appropriate to evaluate effects to downstream fish habitat. Depositions of less than this amount were not expected to have adverse effects on spawning success.

For LMOC outflows, sediment deposition is predicted to occur into a smaller, shallower lake environment in Birch Bay compared to the LSMOC, which empties into a large body of water at Sturgeon Bay. The Project Aquatic Offsetting Plan will include offsetting measures for the deposition of sands greater than 2 mm (0.08 in) from Project commissioning. If all the sediment is not mobilized during commissioning, then effects observed during commissioning could occur again during a subsequent operation (i.e., deposition of fines on a small [0.9 ha] area of coarse substrate and a larger [12 ha] area of fine substrate). As discussed in IAAC-R2-10 (Part c-i), these effects represent a negligible amount of the total amount of habitat in Lake St. Martin and would not be expected to affect fish populations. In addition, offsetting for habitat effects due to sediment deposition are being developed to address DFO's requirements under the *Fisheries Act*. It should be noted that the amount of sediment available for mobilization during operation will be less than during commissioning, and over time will decrease to zero.

For LSMOC outflows, sediment deposition is into Sturgeon Bay, where the area and depths are larger, and it is unlikely that deposition would exceed the 2 mm (0.08 in) threshold from commissioning, other than in very isolated locations within the excavated outlet. Deposition of sediment in Sturgeon Bay was shown to be well distributed for the Mitigation Case simulation, which considered the effects of wind and wave action. Therefore, if less is mobilized during commissioning, then less deposition would be expected during subsequent operations, especially

given the existing turbulence and variability in this area. Therefore, sediment deposition would not be expected to affect fish use or invertebrate production, and no measurable effects on fish populations are anticipated.

Contaminant deposits associated with sediments were discussed in the response to IR IAAC-R2-09. This response noted that the main sources of sediment during commissioning are fine dust on armouring rock dust and till/lake sediments disturbed during inlet and outlet excavation, which are expected to be relatively inert and not measurably affect surface water quality.

i. **Details on how a flood event could affect the potential spread of zebra mussels, including introduction into Lake St. Martin.**

The July 2023 response to IAAC-R2-27 summarizes the types of effects anticipated from zebra mussels (*Dreissena polymorpha*), including those that may affect current use of land and resources for traditional purposes and the socio-economic conditions of Indigenous groups. Additional information on this issue was also provided in Round 1, in May 2022 responses to IRs IAAC-R1-77 and IAAC-R1-132. In general, flooding can increase the spread of aquatic invasive species (AIS) by connecting previously unconnected waterbodies, as well as generally increasing flows. The Project will increase velocities between lakes but decrease the amount of flooded land. As a result, it is not feasible to accurately predict the differences in spread related to the Project; zebra mussels will spread throughout the area regardless of the Project - likely via human activities and certainly downstream via water flows.

i. Input from Indigenous groups and provincial authorities on zebra mussels and their potential to spread in the RAA.

Input From Indigenous Groups

As described in the response to IR IAAC-R2-27, zebra mussels are designated as an AIS in Manitoba and are currently present in Lake Winnipeg and Lake Manitoba. Lake St. Martin is naturally connected to Lake Manitoba via the Fairford River, and it almost certain that zebra mussels will be found in Lake St. Martin in the near future before construction would start if approvals for the Project are granted. On May 26, 2023, the province of Manitoba announced the establishment of new control zones to help prevent the spread of AIS (https://www.manitoba.ca/stopais/spread/controlzone.html#mb). This includes the designation of a new Lake Manitoba/Fairford River/Lake St. Martin control zone to control the spread of zebra mussels.

As reported in the response to IR IAAC-R1-77, Volume 3, Section 7.2.1.3 of the Project EIS summarizes input from Indigenous groups on the potential for the channels to lead to further introduction of invasive species, such as zebra mussels, through engagement and provided by Indigenous groups through Project-specific Traditional Knowledge studies (FRCN 2018, MMF 2018, Golder Associates 2018). Since the Project EIS was filed, several Indigenous groups, including the IRTC, Black River First Nation, Brokenhead Ojibway Nation, Dauphin River First Nation, Ebb and Flow First Nation, Hollow Water First Nation, Kinonjeoshtegon First Nation, Lake

Manitoba First Nation, Lake St. Martin First Nation, Little Saskatchewan First Nation, Norway House Cree Nation, Pimicikamak Okimawin, Peguis First Nation and Pinaymootang First Nation, Sagkeeng First Nation, Sandy Bay Ojibway First Nation, Skowan First Nation and the Manitoba Metis Federation identified a concern about the appearance of zebra mussels in Lake Winnipeg and other local waterbodies and effects on Indigenous fishing (Olson et al. 2020a; BRFN, BON and HWFN 2019; Olson et al. 2020b; A.L. Ecologic 2021; PFN 2021; SAFN 2021, SBOFN 2021; Manitoba Transportation and Infrastructure Indigenous Engagement for this Project; MMF 2021a, 2021b). Norway House Cree Nation reported that invasive species such as zebra mussels have moved north at a rapid rate (Luttermann and A.L. Ecologic. 2021). The Manitoba Metis Federation noted that Manitoba Transportation and Infrastructure has not verified that monitoring of invasive species will be a part of the AEMP and has requested that the Manitoba Metis Federation is given an opportunity to review any invasive species monitoring plans prior to the commencement of Project construction (MMF 2021a, 2021b). Pinaymootang First Nation, Sandy Bay Ojibway First Nation, Sagkeeng First Nation, Manitoba Metis Federation, and the IRTC have also expressed concern about the potential for the Project to elevate the risk of aquatic invasive species introduction, spread, and colonization including zebra mussels and Prussian carp (PFN 2022a; SAFN & SBOFN 2022; Mandrak and Smith 2021; IRTC 2022b). Manitoba Metis Federation is concerned that armouring the channels will make the channels more suitable for invasive species (MMF 2021a, 2021b). Fisher River Cree Nation recommended that they should be informed of any invasive species identified through the various water, fish, and benthic aquatic invertebrate monitoring programs and fish salvages, as Fisher River Cree Nation relies heavily on Lake Winnipeg fishery for sustenance and income (FRCN 2022). In their RIA studies, Dauphin River First Nation has observed increased incidences of invasive species such as zebra mussels in Lake Winnipeg and Kinonjeoshtegon First Nation has reported that fishing has also been made more difficult by the increasing presence of zebra mussels.

Potential effects of the Project on the spread of invasive species are addressed in Volume 3, Section 7.2.4.2 of the Project EIS. Additional information about Indigenous concerns regarding AIS, as well as proposed mitigation and monitoring programs current to March 2022, is available in Table IAAC-122-1 in the response to IR IAAC-R1-122. A summary of socio-economic information obtained from each Indigenous group engaged on the Project is available in Table IAAC-R2-29-1 in the response to IR IAAC-R2-29. The ICSER, provides an overview of consultation and engagement efforts, information received to date by Indigenous groups.

Input from Provincial Authorities

As reported in the response to IR IAAC-R2-27, the Province of Manitoba (Manitoba 2023) provides the following information for the first records of zebra mussel:

- Lake Winnipeg in 2013.
- The Manitoban portion of the Red River in 2015.
- Cedar Lake in 2015 and 2021.
- The upper reaches of the Nelson River in 2019.

- The middle reaches of the Nelson River to Limestone in 2020.
- The lower reaches of the Nelson River to Hudson Bay 2021.
- Assean Lake, northwest of Split Lake in 2020.
- Lake Manitoba in 2021.
- Ebb and Flow Lake in 2022.

Zebra mussel were first reported in Lake Manitoba in 2021 and now occur throughout the lake (Figure IAAC-R3-01-9, current as of September 2021). Zebra mussels have been present in Lake Winnipeg for a decade. Distinguishing effects of the establishment of zebra mussels from other environmental changes in the lake is not possible. Kevin Casper (Section Manager - Fisheries Management, Manitoba Fisheries Branch) noted that immediately prior to the arrival of zebra mussel, a die-off of invasive rainbow smelt (*Osmerus mordax*) in the north basin of Lake Winnipeg led to declines in walleye stocks and growth rates. After arrival of zebra mussels, bait fish populations in the south basin began to decline, further adding to the change in walleye stock status. However, during this time lake whitefish and cisco (*Coregonus artedi*) stocks increased. Fisheries management changes and a reduction in overall quotas supported recovery of walleye stocks and currently there are strong stocks for both lake whitefish and walleye. Baitfish numbers are also again strong. Overall, there has been no consistent adverse effect of zebra mussels on fish stocks observed to date. An increase in water clarity has been observed, which may have resulted in more algae in the water and fouling of fishing nets, adversely affecting catch rates.

Zebra Mussel Invaded Water Bodies

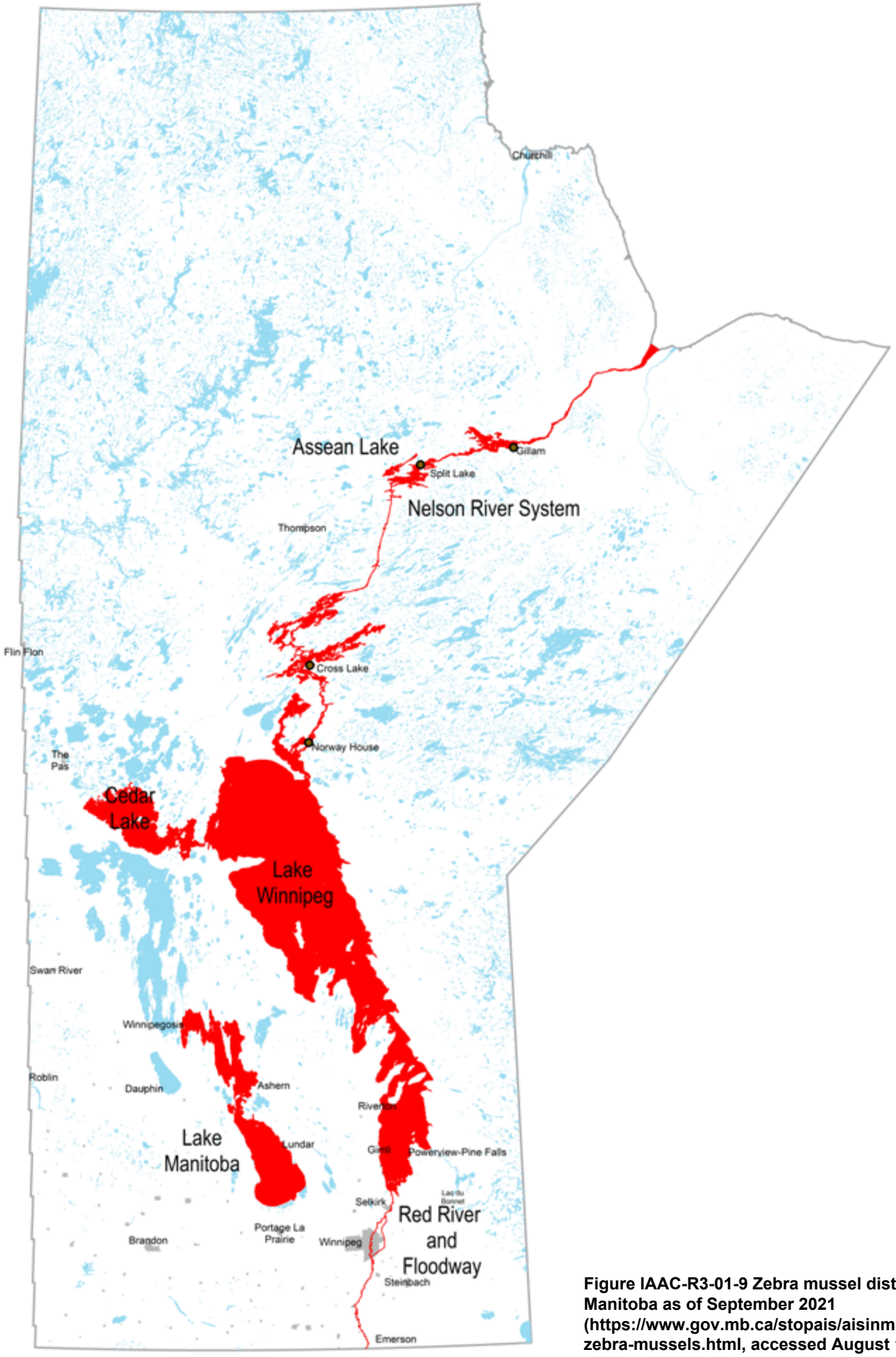


Figure IAAC-R3-01-9 Zebra mussel distribution in Manitoba as of September 2021 (https://www.gov.mb.ca/stopais/aisinmanitoba/zebra-mussels.html, accessed August 16, 2023).

Updated September 2021

Manitoba

ii. Likelihood and timing of AIS spread for each phase of the Project to determine potential effects on fish and fish habitat, and Indigenous Peoples' current use and socio-economic conditions.

Likelihood and Timing of Spread and Potential Effects on Fish and Fish Habitat

As indicated above, zebra mussels were first reported in Lake Manitoba in 2021 and now occur throughout the lake (Figure IAAC-R3-01-9). In May 2023, the Province of Manitoba issued a press release indicating that the Fairford River and Lake St. Martin were now within a zebra mussel control zone (i.e., zebra mussels are present). Given that zebra mussels are present in waters flowing into Lake St. Martin and the ability of this species to spread rapidly downstream, it is expected that mussels will invade the Lake St. Martin within the next year, if they are not already present. It is expected that zebra mussel will spread rapidly throughout Lake St. Martin along the primary path of water flow from the south to the north basins as well as by wind driven currents, as was observed in Lake Winnipeg and Lake Manitoba.

As indicated, AIS such as zebra mussels typically spread through passively floating downstream or through transportation in bait pails or boat bilgewater. As a result, flooding can increase the spread of AIS by connecting previously unconnected waterbodies, as well as generally increasing flows. The Project will increase velocities between lakes but decrease the amount of flooded land. Therefore, it is not feasible to accurately predict the differences in spread related to the Project; AIS such as zebra mussels will spread throughout the area regardless of the Project.

The effects of zebra mussel on fish and fish habitat vary depending on specific characteristics of the fish and fish habitat of the lake in question. Vanderbush et al. (2021) reviewed effects of zebra mussel on fish and fish habitat with emphasis on findings that would be relevant to South Dakota. The authors noted that the effect of zebra mussels has varied from a dramatic change in trophic state to almost no effect at all. Zebra mussels often cause an increase in water clarity, but this is not observed in all lakes. Phytoplankton and zooplankton communities may experience a change in species composition and abundance, but effects are highly variable. Most native mussels are negatively affected by zebra mussels, and this effect has been observed in most areas invaded by zebra mussel. In contrast, the arrival of zebra mussels often increases the abundance of many other types of benthic invertebrates (Vanderbush et al. 2021). The authors noted that the evidence of zebra mussel impacts on fish is limited and varies from a decrease in walleye abundance in Lake St. Claire which was attributed to increased water clarity, to an increase in the growth rate of yellow perch (*Perca flavescens*), which was attributed to an increased abundance of invertebrate prey.

Nienhuis et al. (2014) conducted a multivariate analysis of 63 lakes in southern Ontario to determine whether fish assemblages in lakes with zebra mussel were significantly different from those with no mussels. Target species included walleye and northern pike (*Esox lucius*), which are an important component of the fish assemblage in Lake St. Martin. The relative abundance of walleye in lakes with zebra mussels was lower but the authors noted that this may have been confounded by greater fishing pressure (i.e., accessible lakes were more likely to have both anglers and zebra mussel). The author noted that other studies have demonstrated no adverse

effects to spawning grounds but did note that walleye fry and juveniles might have experienced food limitation, as evidenced by lower condition in these life stages in lakes with zebra mussel. northern pike relative abundance and condition, in contrast, did not differ between lakes with and without zebra mussels.

Zebra mussels have been present in Lake Winnipeg for a decade. Distinguishing effects of the establishment of zebra mussels from other environmental changes in the lake is not possible. As indicated, Kevin Casper (Section Manager - Fisheries Management, Manitoba Fisheries Branch) noted that immediately prior to the arrival of zebra mussel, a die-off of invasive rainbow smelt in the north basin of Lake Winnipeg led to declines in walleye stocks and growth rates. After arrival of zebra mussels, bait fish populations in the south basin began to decline, further adding to the change in walleye stock status. However, during this time whitefish and cisco stocks increased. Fisheries management changes and a reduction in overall quotas supported recovery of walleye stocks and currently there are strong stocks for both whitefish and walleye. Baitfish numbers are also again strong. Overall, there has been no consistent adverse effect of zebra mussels on fish stocks observed to date. An increase in water clarity has been observed, which may have resulted in more algae in the water and fouling of fishing nets, adversely affecting catch rates.

Given that the fish assemblage in Lake St. Martin is similar to that in Lake Winnipeg, and that the lakes all share many chemical and physical similarities, effects of zebra mussel in Lake St. Martin may be similar to effects observed in Lake Winnipeg. However, given that Lake St. Martin is much smaller than Lake Winnipeg and zebra mussel colonize nearshore areas, changes due to zebra mussel may have a relatively greater effect in Lake St. Martin.

Potential Effects on Indigenous Peoples' Current Use and Socio-economic Conditions

Potential effects on Indigenous peoples' current use and socio-economic conditions are discussed in the response to IR IAAC-R2-27 and are repeated below. The Province of Manitoba has identified the following potential adverse effects in waters affected by zebra mussel:

- Impact fish populations by consuming organisms at the base of the aquatic food chain.
- Clogging water intake systems and increasing costs to operate water treatment plants.
- Reducing water-front property values of homes and cottages.
- Blocking watercraft engine cooling systems.
- Killing endemic mussel species by attaching themselves to their shells in large numbers.
- Increasing water clarity and therefore the photic zone, thereby potentially allowing the spread of rooted aquatic vegetation in lakes and rivers.
- Potentially supporting larger and more frequent algal blooms.
- Accumulation of dead shells on shorelines, in particular beaches, which affects swimming and other beach-going activities.

Some of the above-stated effects have already been observed in Lake Winnipeg (e.g., accumulation of mussels on the beaches) while other effects (e.g., impacts to fish populations) are more difficult to discern from the many other factors that affect fish populations. In addition to effects to fish and fish habitat, the above list includes effects to current use of land and resources for traditional purposes and the socio-economic conditions of Indigenous groups.

As reported in the response to IR IAAC-R1-77, Volume 3, Section 7.2.1.3 of the Project EIS summarizes input from Indigenous groups on the potential for the channels to lead to further introduction of zebra mussels. As stated in the above section, Indigenous groups engaged on the Project have identified concerns about the appearance of zebra mussels in Lake Winnipeg and other local waterbodies and effects on socio-economic conditions (Olson et al. 2020a; BRFN, BON and HWFN 2019; Olson et al. 2020b; A.L. Ecologic. 2021; PFN 2021; SAFN 2021, SBOFN 2021; Manitoba Transportation and Infrastructure Indigenous Engagement for this Project; MMF 2021a, 2021b). The Manitoba Metis Federation has reported that commercial fishers have expressed concerns about the water quality in Lake Manitoba and the effects of zebra mussels on fish and fish habitat (MMF 2023). Pinaymootang noted that Project infrastructure, such as the armoured outlet channels, may support colonization by zebra mussels and they are concerned about potential impacts to food, social, ceremonial, and economic harvesting opportunities as a result of introduction and spread of zebra mussels associated with the Project (PFN 2022b). The IRTC has expressed concerns about negative potential impacts to water quality and fish habitat due to the introduction of invasive species such as zebra mussels, within Lake St. Martin and Lake Winnipeg (Malone et al. 2023). Dauphin River First Nation has reported the occurrence of zebra mussels in fishing nets, noting that zebra mussels compete for food and oxygen with local species.

Additional information regarding Indigenous concerns about zebra mussels and impacts on the availability of the traditional resources for current use, as well as proposed mitigation and monitoring programs can be found in Table IAAC-122-1 in the response to IR IAAC-R1-122. Additional information regarding concerns about potential effects from zebra mussels on Indigenous health and socio-economic conditions, as well as proposed mitigation measures, is available in the response to IR IAAC-R2-29, Table IAAC-R2-29-1.

iii. and iv. Likelihood of deposition of zebra mussel shells at the outlets of the LMOC and LSMOC after a major flood operation, including potential effects on fish and fish habitat, and Indigenous Peoples' current use and socio-economic conditions if shell deposition were to occur after flood operations within the LMOC and LSMOC.

Zebra mussels will likely colonize the channels and the downstream outlet areas – primarily as larvae (veligers), through passively floating from upstream areas and other locations in the lake and settling out in lower velocity areas as they absorb calcium from the water to develop shells. After a major flood operation adult zebra mussels will become detached and if not overly damaged may have the ability to reattach once the velocity allows them to settle out (Cary Institute of Ecosystem Studies nd). It is likely that within a relatively short time, these downstream

areas in the vicinity of the outlets would have zebra mussels present regardless of the Project. Those that settle out and colonize fish habitat may reduce the quality of these areas for use by fish (DFO 2021, Blakely 2020, Marsden and Chotkowski 2001, Trout Unlimited Canada 2016, Oregon Sea Grant n.d). Such reductions in the quality of fish habitat may also result in adverse effects on the availability of fish for both subsistence (current use) and commercial fishing by Indigenous groups (see above Part i-ii), which, as previously mentioned, is anticipated to occur with or without the Project. They will also wash up on beaches and the sharp shells would be difficult to walk on for any recreational use of these areas. However, the outlet areas where shells may deposit will have safety measures already in place to keep people away from these areas, so people should not be walking along the shores in this area regardless. Deposition of zebra mussel shells may also impede current use of these areas by Indigenous groups. However, as mentioned the response to Part d, and in Volume 4, Section 10.2.4.4 of the EIS for the Project, the direct and indirect loss of habitat for harvested species is relatively small compared to the remaining wildlife habitat available in the RAA, and the habitat reclaimed by reversing the effects of flooding (See also Table IAAC-122-1 in the response to IR IAAC-R1-122 and Table IAAC-R2-29-1 in the response to IR IAAC-R2-29).

j. **Description of any technically and economically feasible mitigation measures that could be utilized to prevent or reduce the spread of zebra mussels to Lake St. Martin. Provide a description of how these mitigation measures support Indigenous fishing rights.**

Mitigation measures to prevent or reduce the spread of zebra mussels is discussed in the response to IR IAAC-R2-27 and is repeated below. The response notes that there are not any technically and economically viable means of preventing the downstream colonization of zebra mussels from Lake Manitoba through the Fairford River due the combination of high-water volumes and the microscopic life stage of zebra mussels. As indicated in the response to IR IAAC-R1-77, while it will be difficult to control the spread of zebra mussels, the Project has measures to reduce the likelihood as much as is feasible. Construction equipment moving from Lake Winnipeg and any zebra mussel invaded area to Lake St. Martin presents a potential mode of transmission that could increase the rate of spread. However, adherence to provincial AIS regulations in *The Water Protection Act* will mitigate this potential effect. Measures prescribed in the Project EMP plans, as filed as part of the June 2022 supplemental information response to IAAC IRs, will confirm that AIS regulations are followed. Key documents in the EMP are the Construction Environmental Management Program (CEMP) that builds on Section 2.5.13 of the PERs and outlines the following preventative measures for transfer of invasive species that must be implemented by the contractor:

- The contractor shall properly clean equipment which has previously been in contact with a waterbody, including but not limited to rivers, lakes, and marshes, to prevent the spread of AIS.
    - equipment of particular concern includes water tanks, tank trucks, pumps, hoses, intake screens, boats and motors, and fish and water monitoring equipment

  - equipment coming in contact with a waterbody must be cleaned and drained completely, dried, and inspected before and after contact. Cleaning is defined as the removal of all aquatic plants, animals, and mud
  - equipment that has or will come in contact with listed control zones must be decontaminated. (See MNRND's website: https://www.gov.mb.ca/stopais/ for details)
  - in the event that AIS are discovered during inspection before moving the equipment from an area (i.e., away from the shoreline of a waterbody), the contractor shall inform the contract administrator and shall clean the equipment according to the provincial AIS regulation. The Province of Manitoba shall also be notified by the contract administrator per the website above

- According to the website, documentation of measures to prevent the spread of aquatic and terrestrial invasive species shall be incorporated into Project plans and will include:
  - history of equipment, work locations, and potential sources of contamination
  - details of cleaning / decontamination plan and procedures (methods)
  - documentation of cleaning and decontamination (date, personnel, confirmation of methods used)

As indicated, on May 26, 2023, the province of Manitoba announced the establishment of new control zones to help prevent the spread of AIS (https://www.manitoba.ca/stopais/spread/controlzone.html#mb). This includes the designation of a new Lake Manitoba/Fairford River/Lake St. Martin control zone to control the spread of zebra mussels. The announcement included a notice of a) amending the aircraft control zone provision so that any float plane using a zebra mussel control zone must have its underwater surfaces such as floats treated with anti-fouling paint, and b), that set fines for AIS offences are in effect year round and carry a range of penalties, depending on the offence, including a $672 fine for failing to stop at a watercraft inspection site and a $2,542 fine for removing watercraft or water-related equipment from a water body in a control zone and placing it into another water body without proper decontamination.

These proposed mitigation measures to prevent or reduce effects of the spread of zebra mussels are anticipated to support the exercise of Indigenous fishing rights to the extent that they serve to avoid or reduce effects to traditionally harvested fish species or traditional fishing sites and areas. Manitoba Transportation and Infrastructure anticipates that participation in the proposed EAC will support the meaningful participation of Indigenous groups in environmental monitoring for the Project, including recommendation or advice on the refinement and implementation of mitigation measures outlined in EMP plans that support the exercise of Indigenous rights. Furthermore, EAC participation in construction compliance monitoring will enable ongoing input and dialogue on the implementation and efficacy of certain measures related to construction activities, such as cleaning of equipment and adherence to AIS decontamination processes. Additional information regarding the EAC is available in the July 2023 response to IR IAAC-R2-30.

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QUESTION IAAC-R3-02

Referenced Round 2 IR(s): IAAC-R2-02, IAAC-R2-13, IAAC-R2-14

Expert Dept. or group: Berens River First Nation
Bloodvein First Nation
Dakota Tipi First Nation
DFO ECCC
Fisher River Cree Nation
IAAC
Interlake Reserves Tribal Council
Misipawistik Cree Nation
NRCan
Pinaymootang First Nation
Poplar River First Nation
RM of Grahamdale
Sagkeeng Anicinabe First Nation
Sandy Bay Ojibway First Nation

EIS Guideline Reference: 7.1.4 Groundwater and Surface Water

7.1.5 Fish and fish habitat

7.1.7 Riparian, Wetland and Terrestrial Environments

7.1.8 Migratory birds and their habitat

7.1.9 Species at Risk

7.1.10 Indigenous Peoples

7.2.2 Changes to groundwater, surface water, and fluvial morphology

7.2.3 Changes to riparian, wetland and terrestrial environments

7.3.2 Migratory birds

7.3.5 Species at risk

7.4 Mitigation measures

9. Monitoring and Follow up

Question IAAC-R3-02
October 27, 2023

Context and Rationale

A portion of this groundwater is sourced from the recharge zone to the south of the LSMOC. Groundwater collected within the channel would have otherwise discharged to surface within the Buffalo Creek Complex and the wetlands to the north/northwest of the channel. This redirection of groundwater directly to Lake Winnipeg has the potential to impact the water balance for the Buffalo Creek Complex and the surrounding wetlands. The quantitative assessment of baseline water balances was based on conceptual and geochemical modelling, while the quantitative assessment of groundwater discharge to the channel was based on analytical modelling.

Previous estimates of groundwater flow into the LSMOC based on analytical modelling were provided in the KGS LSMOC Bedrock Aquifer Depressurization Estimates Memorandum (May 2022). Calculated long-term groundwater inflow rates were on the order of 0.025 cubic metres per second (m^3/s) based on this analysis. However, recent field measurements on Reach 3 discussed in IAAC-R2-02 suggest groundwater inflows to the channel can seasonally be an order of magnitude higher, at 0.18 m^3/s for Reach 3 alone. Based on these observations, the analytical calculation of groundwater inflow into the channel should be updated to ensure that the annual average calculation of total inflow reflect these seasonally high observed flows.

Given the distributed nature of groundwater discharge to surface to the north of the LSMOC it is understood that efforts to quantify this discharge, and to quantify the overall water balance for the system are uncertain. IAAC-R2-02 represents and attempts to quantify these flows using conceptual modelling, and geochemical modelling.

Geochemical modelling was completed for Big Buffalo Lake. The results of the modelling suggest that 25% of the total flow to the lake is groundwater (with a range of 5% to 40%) during a wet year. During a dry year, groundwater is a smaller component of the lake water balance, arriving via direct discharge to upstream tributaries to the lake. No further quantification was completed for Buffalo Creek and the associated wetlands downstream of the lake; however, it is suggested that these waterbodies are primarily groundwater fed. This quantification was requested in IAAC-R2-02 because it is these waterbodies that are most proximal to the portion of the channel with the highest groundwater inflow. In the absence of a baseline quantification of the groundwater flow to Buffalo Creek and the associated wetlands (the Buffalo Creek Complex), it is not possible to assess the change in groundwater flow to surface water resulting from the construction and operation of the LSMOC.

Effects to Wildlife

IAAC-R2-14 documents a decision not to re-water the Buffalo Creek Complex, and the information provided in the response does not include specific assessments for wildlife species. Pathways associated with potential effects to wildlife and wildlife habitat for waterfowl, marsh birds and least bittern, yellow rail, and northern leopard frog require further assessment to support the Agency's drafting of the Environmental Assessment Report.

Question IAAC-R3-02
October 27, 2023

In the response to IAAC-R2-14, the Proponent indicated that the rewatering of Birch Creek and the Buffalo Creek Complex (i.e., Buffalo Creek, Big Buffalo Lake and adjacent wetlands) are no longer being considered due to the potential effects to the systems caused by the spread of AIS (specifically zebra mussel) and related cost concerns to treat water releases. The response states that rewatering is not feasible for either location. As a result, offsetting would be provided for project-related harmful alterations to fish habitat in Birch and Buffalo creeks and for loss of wetlands west of the LSMOC. The response states that post-construction monitoring (Wetland Monitoring Plan, Surface Water and Groundwater Management Plans) will help determine the extent of project-related effects. Given that wetlands enhance water quality by intercepting and filtering surface runoff, and reducing levels of sediments, nutrients and pollutants, the potential for residual effects to water quality resulting from loss of these wetlands should be considered. Based on the response, it is not clear whether the potential effects to water quality from removal of wetland rewatering has been quantified or are just intended to be monitored. To better understand potential effects to migratory birds and species at risk, additional information on mitigations, including offsetting, is required to address loss or alteration of habitat.

Changes due to the Project to the Buffalo Lake Complex may have considerable effects on country foods and furbearers of importance to Indigenous groups. While Indigenous groups have not identified specific fishing sites or locations in Buffalo Creek, both the Buffalo Creek Complex and Birch Creek have been readily identified by Indigenous groups as “breadbaskets” for wildlife, and areas central to hunting and trapping practices (e.g., moose, muskrat, beaver, mink, and otter). Effects to forage species may therefore constitute effects to Indigenous Peoples’ current use. The response to IAAC-R2-14 expects the effects to be mitigated by offsetting but does not clarify offsetting options.

Wildlife Habitat

The EIS Guidelines require the Proponent to assess changes to riparian, wetland and terrestrial environments, including changes to key habitat, habitat connectivity and shorelines and riparian areas. The EIS Guidelines require the Proponent to assess the modifications of hydrological and hydrometric conditions on fish habitat and the fish species’ life cycle activities, as well as potential effects on riparian areas that take into account any anticipated modifications to fish habitat. The EIS Guidelines also require the Proponent to assess current use, including project-related changes to the quantity, quality and availability of resources used.

The recent confirmation by the Proponent that the supplementary flow option to mitigate potential flow losses in Birch Creek and Buffalo Creek is not feasible based on AIS and cost concerns to treat water releases requires a consideration of the potential effects from the reduced flow on fish and fish habitat. The Proponent has provided estimates on flow reduction to these areas and has determined that the reduced flow (approximately 27% and up to 50% reduced flow between Goodison Lake and Lake St. Martin, and 50% reduction to Buffalo Creek flow) will result in a harmful alteration, disruption or destruction (HADD) of fish and fish habitat. However, the absence of comprehensive data and analysis on how this flow reduction may affect existing fish and fish habitat in the creeks makes it challenging to make an informed decision about protection and preservation requirements of species that fall under the *Fisheries Act*. Adequate knowledge about the habitat and the potential consequences of the flow

reduction is required to determine potential residual effects from the project and related offsetting requirements.

Information Requests

a. Reassess the analytical modelling used to calculate the long-term flow of groundwater into the LSMOC to ensure consistency with the recent seasonally high field observations in Reach 3 presented in IAAC-R2-02.

b. Quantify baseline groundwater discharge to the creeks and wetlands to the north/northwest of the LSMOC (Buffalo Creek Complex and the associated wetlands).

c. Reassess the change in groundwater discharge to surface water within the wetlands and creeks to the north/northwest of the LSMOC based on the updated assessment of groundwater inflow to the channel, and the updated baseline groundwater discharge estimates.

d. Clarify whether removing the rewatering element from the Project would alter the Environmental Assessment (EA) predictions or conclusions regarding water quality, aquatic biota and species at risk habitat.

    i. Describe the nature and extent of any such changes to EA predictions and conclusions resulting from the decision not to rewater and provide supporting information.

e. Describe how loss or alteration of habitat around Birch and Buffalo Creeks due to the Project would be mitigated or offset using a precautionary approach.

    i. Describe how Indigenous consultation and input would be considered in the decision-making process regarding mitigation or offsetting for Birch Creek and the Buffalo Creek complex.

f. Describe the mitigation or offsetting measures for the Buffalo Creek Complex that are being considered to mitigate effects to country foods and furbearers of importance to Indigenous groups.

g. Characterize how the change in flow in the Birch Creek and Buffalo Creek Complex systems may affect fish spawning, in terms of the change in flow at the time of spawning and how this could impact spawning success.

    i. Include information about the historic and current use of the channels by Indigenous groups and others, including fishing, hunting, trapping, and gathering uses of the areas.

h. Discuss specific fish habitat offsetting opportunities for the potential reduction in flow to Birch Creek and the Buffalo Creek Complex.

    i. Describe how Indigenous Knowledge has been used to determine offsetting opportunities.

Question IAAC-R3-02
October 27, 2023

Response IAAC-R3-02

a. **Reassessment of the analytical modelling used to calculate the long-term flow of groundwater into the LSMOC to ensure consistency with the recent seasonally high field observations in Reach 3**

Based on the Context and Rationale provided in Information Request (IR) IAAC-R3-02, the Impact Assessment Agency of Canada (IAAC) and other Federal agencies are primarily concerned that redirection of groundwater directly into the Lake St. Martin Outlet Channel (LSMOC) instead of into the wetlands adjacent to the channel has the potential to impact the water balance for the Buffalo Creek Complex and its surrounding wetlands. Analytical modeling completed for the July 2023 response to IR IAAC-R2-03 calculated that long-term groundwater inflow rates into the LSMOC were approximately 0.025 cubic metres per second (m^3/s) (0.88 cubic feet per second [ft^3/s]) under normal seasonal conditions. Geochemical modeling completed for Big Buffalo Lake Complex, which used data representative of relatively normal (2019) and wet (2022) groundwater aquifer and wetland conditions at the LSMOC, indicate that surface water in these areas is comprised of approximately 75% overland runoff (generated by overland drainage from precipitation events, and diffuse, regional surface water/groundwater blends that form part of the surface water flow regime in the region of the LSMOC) and approximately 25% groundwater (direct flowing artesian discharge from the bedrock aquifer).

Baseline water quality monitoring completed for the Project has shown that the groundwater contribution varies depending on annual and seasonal variability, with relatively increased groundwater upwelling contributions to the surface water drainage system during wet years (e.g., 2022), and much less during dry years (e.g., 2021), based on isotopic signatures from surface water samples recovered in the region of the LSMOC. Theoretical percentages of direct groundwater contribution to surface water were estimated between 5% groundwater and up to 40% groundwater, depending on the minimum and maximum observed concentrations of groundwater solutes used as the groundwater “end member” in the mixing analyses. Solute concentrations in groundwater, and observed in surface waters at Big Buffalo Lake Complex, vary depending on whether a year is relatively wet as in 2022, or dry, such as 2021. This variability is important to note as it indicates that groundwater discharge to surface water in the wetlands is highly variable in its natural state. Analysis of modeling results suggest that groundwater discharge to the wetlands will remain within these observed ranges post-Project.

The recent (2022) higher flow conditions that were measured and documented at Reach 3 of the Emergency Outlet Channel (EOC) (referred to as Reach 3 throughout the response) and described in the July 2023 response to IR IAAC-R2-02 was a combination of groundwater from Reach 3 and surface water/upwelling groundwater from Creek 3 with a total flow of 0.18 m^3/s (6.37 ft^3/s). Isotopically, surface water sampled at Reach 3 and at Creek 3 at this time had a signature of groundwater, and a mix of overland runoff, which would be expected at that time, and which followed a very wet period with substantial rain in the region of the LSMOC. Additional mixing calculations were completed to determine the mixture of groundwater and overland runoff in the surface water at

Reach 3 and documented in the October 12, 2023, Memorandum entitled “Lake St. Martin Outlet Channel Round 3 Information Request – IAAC-R3-02 Mixing Calculations for Groundwater and Surface Water to Buffalo Creek and Existing Reach 3 Channel.” This is attached to this IR Response as Appendix IAAC-R3-02-1. A summary of the key results is provided below.

In June 2022, it was observed that overtopping of the Creek 3 plug located near the upstream end of Reach 3 was contributing surface waters to the lower reaches of Reach 3. It should be noted that the Creek 3 surface water source has a component of groundwater upwelling in it, as demonstrated by the isotopic signature of the Creek 3 surface water at that time. The Creek 3 surface water input to the LSMOC pooled downstream and mixed with direct groundwater discharge from the bedrock exposed area of the channel. The total surface water flow measured at this time downstream of the bedrock exposed area of the LSMOC was 0.18 m^3/s (6.37 cubic feet per second (ft^3/s)) with approximately 0.009 cubic metres per second (m^3/s) (0.32 ft^3/s) (5%) of this flow being direct groundwater discharge into the channel at Reach 3, based on mixing calculations. June 2022 is considered a relatively wet period with very high local rainfall contributing to overland runoff draining into Creek 3 and groundwater recharge that increased the confined piezometric pressures in the bedrock aquifer at that time. During normal and dry periods, the surface water and groundwater contribution into Reach 3 is reduced, for example, it was measured at 0.004 m^3/s (0.14 ft^3/s) in 2019. Again, it should be noted that the surface water in Reach 3 also includes groundwater contributions from upwellings into Creek 3 upstream of Reach 3, so the total groundwater percentage in the LSMOC surface water is actually greater than 5%. The mixing analysis completed applies Creek 3 surface water (which isotopically contains some groundwater) and bedrock pumping well sampled groundwater at Reach 3 as the “end members” applied in the mixing calculations.

Geochemical mixing analyses of surface water in Reach 3 does not match well with previous mixing calculations for Big Buffalo Lake, as documented in the response to IR IAAC-R2-02 (approximately 75% overland runoff and 25% groundwater) but appears to fall within the conceptual lower (5%) and upper (40%) limits of groundwater contribution to surface water in the area. Part of this discrepancy is that trying to apply Big Buffalo Lake Complex groundwater chemistry as a surface water “end member” to the mixing analysis at LSMOC is not effective. First, the geochemistry of the Big Buffalo Lake Complex surface waters is very different than that of the surface waters observed to at least periodically enter Reach 3 (i.e., Creek 3), and secondly, there is not a connection for flow of Big Buffalo Lake Complex surface waters to the LSMOC.

Water quality indicator parameters, including chlorine (Cl), fluorine (F) and Total Dissolved Solids (TDS) from monitoring data, combined with isotope results, indicate that isotopically stronger groundwater signals are present in surface waters during wet periods when the groundwater dilutes the concentrations of these surface water indicator parameters. During dry periods, the surface water has relatively increased Cl, F and TDS concentrations, combined with a weakened isotopic groundwater signal in surface waters when this groundwater dilution is not occurring. Results of the current and previous geochemical mixing calculations indicate that surface waters at Big Buffalo Lake, Buffalo Creek, the wetlands upgradient of Buffalo Creek, and Reach 3 behave similarly based on this observation.

Post-Project, the primary source of surface water flowing into the LSMOC is from Lake St. Martin (LSM), with only minor overland runoff from channel side slopes. Surface water from LSM is isotopically somewhat different from surface waters in the region of the LSMOC area because its groundwater contributions are different, and in particular because during dry periods, its geochemistry is subject to inputs from the adjacent LSM impact crater hydrogeological system. However, increases in the groundwater isotopic signal within Lake St Martin are observed during wet periods (i.e., 2022), which is reasonable considering there are observed artesian groundwater spring sites which drain directly into the lake, along the southeast shore, near the LSM Narrows. Groundwater discharge into the LSMOC from exposed bedrock at the water control structure and at Reach 3 is less than the baseflow/riparian flow that will be introduced into the channel at the water control structure during non-operational periods. Thus, groundwater discharge into the LSMOC post-Project is expected to have limited impact on the surface water quality in the channel, based on the proportioning of flows currently observed (i.e., 5% direct groundwater discharge). In addition, while the existing surface water flows to Buffalo Creek from areas upgradient and east of the LSMOC will be reduced post-Project, the groundwater contributions to the surface water system overall will be similar to pre-Project conditions, because the estimated bedrock aquifer piezometric pressure declines in the vicinity of these groundwater upwelling sources is predicted to be less than the overall aquifer piezometric pressure variability observed naturally within the region of the LSMOC.

The analytical modeling used to calculate the long-term flow of groundwater into the LSMOC is consistent with the recent seasonally high field observations in Reach 3, as supported by the discussion above.

b. **Quantification of baseline groundwater discharge to the creeks and wetlands to the north/northwest of the LSMOC.**

Based on the analysis of isotopic results and major ion geochemistry of the surface water and groundwater, the groundwater to surface water relationship at Buffalo Creek, as observed at the five surface water sampling sites along the Buffalo Creek system, is similar to other areas around the LSMOC. Therefore, the dynamics of groundwater discharge at Buffalo Creek is similar to the groundwater discharge to the springs, creeks and wetlands to the north/northwest of the LSMOC, and in areas west of the LSMOC as well. As described in the response to IR IAAC-R2-02, there will be less groundwater contribution to surface water during dry periods than during wet periods, when the aquifer piezometric pressures are less. This is confirmed by the isotopic signature of the surface water, which has characteristics more similar to a mix of surface water and lesser of groundwater during dry (lower aquifer piezometric pressure) periods, though at these times there remains an observable groundwater isotopic signature. During wet periods when the bedrock aquifer piezometric pressures are high, the isotopic signature is much stronger toward groundwater. This observation is the same at Buffalo Creek, at all five surface water sampling sites. The prior assessment of groundwater impacts on the area are based on groundwater contributions that range from 5% to 40%, even though the typical or “baseline” groundwater contribution has been observed to be approximately 25% based on major ion water quality data analysed to date and as reported in the response to IR IAAC-R2-02. More specific water quality analyses related to Buffalo Creek indicate

that approximately 80% of the water (based on mean June 2022 water quality) is from surface water/groundwater upwelling source sites to the Buffalo Creek flow system (namely UC-1, UC-2, Big Buffalo Lake flow through, and Creek 3 - all of which flow into Buffalo Creek [see Appendix IAAC-R3-02-1]). The remaining is 20% has characteristics typical of groundwater (based on mean groundwater quality conditions during June 2022), confirming a very good, modeled match for overall water chemistry sampled at Buffalo Creek, with the benchmark F concentrations nearly matching exactly. Indicator parameters Cl, F, and TDS are distinct at this time when looking at groundwater concentrations and surface water concentrations at Buffalo Creek, supporting the model result that the largest proportion of water within this portion of Reach 3 during June 2022 was groundwater/surface water mix typical of upwelling discharges originating at all the sites which ultimately feed into Buffalo Creek.

As a result, the prior estimate of groundwater contributions that range from 5% to 40%, with a typical or “baseline” groundwater contribution of approximately 25% is still relevant.

c. **Reassessment of the change in groundwater discharge to surface water within the wetlands and creeks to the north/northwest of the LSMOC based on the updated assessment of groundwater inflow to the channel, and the updated baseline groundwater discharge estimates.**

Based on past monitoring and analysis of the groundwater aquifer, the recent data fits within the overall monitoring data that was collected in both low recharge (dry) and high recharge (wet) conditions in the regional assessment area. During wet periods when bedrock aquifer pressures are high and groundwater discharges increase in the region, water features (i.e., Big Buffalo Lake, Buffalo Creek, wetlands, Reach 3) surrounding the LSMOC have a strong isotopic groundwater signature, whereas during drier periods with lower bedrock aquifer pressures, the surface water features isotopically have a stronger signature of surface water in the region of the LSMOC, though in many cases (not at all locations) still with a weak groundwater signal. The Big Buffalo Lake Complex reverts to an isotopic signature of surface water during dry periods, as do some of the five sample sites along Buffalo Creek. Therefore, the surface water system located to the north/northwest of the LSMOC receives groundwater in a “flow through” condition (with groundwater upwellings originating at sites UC-1, UC-2, and Creek 3, to name a few) versus a direct baseflow/riparian flow interconnection. This is based on available data analysed to-date, and as described within the response to IR IAAC-R3-02, and the attached October 12, 2023, Memorandum entitled “Lake St. Martin Outlet Channel Round 3 Information Request – IAAC-R3-02 Mixing Calculations for Groundwater and Surface Water to Buffalo Creek and Existing Reach 3 Channel” and attached to this IR Response as Appendix IAAC-R3-02-1. The range of groundwater inflows to the channel and wetlands, and the typical baseline groundwater discharge estimates remain unchanged and have been considered in our assessment of impacts. As a result, of this updated analysis, no reassessment is required.

d. **Clarification of whether removing the rewatering element from the Project would alter the Environmental Assessment (EA) predictions or conclusions regarding water quality, aquatic biota and species at risk habitat.**

   i. **Nature and extent of any such changes to EA predictions and conclusions resulting from the decision not to rewater and supporting information.**

   As discussed in the May 2022 response to IR IAAC-R1-53, the Project design recognized that there would be changes in downgradient hydrology and wetlands with the construction of the channels, and a variety of mitigation measures were incorporated during Project design for use during construction and operation. Minimizing effects to wetlands was considered early in Project development, as the routing of the channels included efforts to reduce environmental effects by avoiding wetlands and undeveloped areas as much as possible (Project Environmental Impact Statement [EIS] Volume 2, Section 2.4.2.5). In addition, as the designs for each channel were advanced (prior to Project EIS submission) the use of outside drains was incorporated to help reduce changes in upgradient wetland hydrology. Rewatering of downstream areas was not proposed during the assessment documented in the Project EIS and therefore the conclusions made in the Project EIS were not based on the use of rewatering as a mitigation. Rewatering was later identified as a potential mitigation measure to help address some of the uncertainties in the assessment for the Birch Creek and Buffalo Creek watersheds but was not used to update the conclusions of the Project EIS. Therefore, even with the removal of dewatering, predictions or conclusions regarding water quality, aquatic biota and species at risk (SAR) habitat are expected to remain as reported in the Project EIS. Uncertainties for Birch Creek will be addressed through monitoring associated with fish habitat offsetting under the *Fisheries Act*, whereas uncertainties related to the Buffalo Creek watershed will be addressed through monitoring performed as part of the Wetland Monitoring Plan (WetMP), adaptive management, and the Wetland Offsetting Program, where or if required.

e. **How loss or alteration of habitat around Birch and Buffalo Creeks due to the Project would be mitigated or offset using a precautionary approach.**

Mitigation to reduce the loss or alteration of habitat for migratory birds and SAR was provided in the May 2022 response to IR IAAC-R1-54. Several important measures were described and apply to other wildlife such as upland gamebirds, raptors, furbearers, and ungulates such as moose (*Alces alces*), and white-tailed deer (*Odocoileus virginianus*). The grassland reclamation approach consisting of a native and agronomic seed mix will be used to revegetate the upper portion of the channel side slopes, as well as the buffer between the channel and the spoil piles, dikes, and spoil piles (see Revegetation Management Plan [RVMP]). Establishing grassland communities in Lake Manitoba Outlet Channel (LMOC) and LSMOC components of the Project development area (PDA) will benefit grassland birds (e.g., northern harrier [*Circus hudsonius]*, savannah sparrow [*Passerculus sandwichensis*], western meadowlark [*Sturnella neglecta])*, including SAR (e.g., bobolink *[Dolichonyx oryzivorus]*, barn swallow [*Hirundo rustica*], short-eared owl [*Asio flammeus*]). Adding shrubs along select edges of the PDAs will benefit birds that use shrubs and/or forest edges such as song sparrows and eastern whip-poor-will [*Antrostomus vocife*rous]), as well as grouse, furbearers, and

ungulates (moose and white-tailed deer). In addition to planting vegetation that provides habitat, installation of snags, and/or nest boxes in select areas of LMOC right-of-way (ROW) will provide nesting habitat for red-headed woodpecker (*Melanerpes erythrocephalus*). Additional details can be found in the Red-headed Woodpecker Habitat Mitigation Plan and the response to IR IAAC-R1-54. Where mitigation is not applied, no-net-loss offsetting may be applied to address loss or alteration of wetland habitat for migratory birds and SAR in a manner described in the July 2023 response to IR IAAC-R2-13. Effects to wetlands adjacent to the creeks that provide habitat for species such as yellow rail (*Coturnicops noveboracensis*) are being addressed through the Wetland Compensation Plan (WCP), which describes offsetting for Class III, IV, and V wetlands using ratios that reflect a precautionary approach. As described in the responses to IRs IAAC-R3-04 and IAAC-R3-05, Classes III and IV represent areas having the greatest probability of occupancy by yellow rail and other wetland SAR (e.g., northern leopard frog [*Lithobates pipiens*]), largely due to greater water permanence and preferred vegetation structure. Wetland offsetting will also benefit other wildlife including small mammals, furbearers (e.g., mink (*Mustela vison*), red fox (*Vulpes vulpes*), moose, white-tailed deer and black bear (*Ursus americanus*). In addition to the measures identified above, Manitoba Transportation and Infrastructure is currently working with Environment and Climate Change Canada to understand the implications, implementation and permitting requirements of regulatory updates to the *Migratory Birds Convention Act, 2022* and specific protections for SAR and other species. Discussions have, and will continue to include, compliance with regulations regarding year-round protection of pileated woodpecker nests (unless shown to be abandoned) and upcoming residence description for red-headed woodpecker under the *Species at Risk Act*.

i. **How Indigenous consultation and input would be considered in the decision-making process regarding mitigation or offsetting for Birch Creek and the Buffalo Creek complex.**

   The Indigenous Consultation and Stakeholder Engagement Report (ICSER), which was included as Attachment 2 of Manitoba Transportation and Infrastructure's response to the Round 2 IRs in July 2023, describes how information received from Indigenous groups throughout the consultation and engagement process has been incorporated into the proposed Project. This includes input during the following steps in the process: Project planning and design; the environmental assessment, Project EIS, and associated regulatory processes; the development of mitigation measures and monitoring plans; and proposed accommodations. With respect to the Birch Creek and Buffalo Creek wetland complexes, Manitoba Transportation and Infrastructure heard concerns from Indigenous groups that Project effects to Birch Creek, Buffalo Creek, and adjacent wetlands may impact wildlife, vegetation and migratory birds, which in turn could impact traditional land use, hunting and harvesting, and Indigenous and treaty rights. Indigenous groups also expressed concern that reduced water flow into the Birch Creek wetlands system may negatively affect aquatic habitat and the size of the wetlands; the availability of medicinal plants; fish spawning habitat and fisheries; and the overall health and functionality of wetlands. The Summary of Concerns Tables for each Indigenous group engaged on the Project included as Appendix 1 of the ICSER provides additional details on concerns related to the Birch Creek and the Buffalo Creek wetlands.

Manitoba Transportation and Infrastructure has proposed establishing an Environmental Advisory Committee (EAC) to facilitate information sharing and provide opportunities for local communities to provide advice or recommendations to Manitoba Transportation and Infrastructure on the refinement and implementation of the Environmental Management Program (EMP) for the Project in a coordinated and collaborative manner. Manitoba Transportation and Infrastructure anticipates that opportunities for Indigenous input on mitigation or off-setting for the Birch Creek and Buffalo Creek complex would be primarily facilitated through the EAC, in accordance with any applicable regulatory conditions or requirements. As discussed in the response to IR IAAC-R2-13, in terms of wetland offsetting, the primary output from the EAC is anticipated to be written advice and/or recommendations to Manitoba Transportation and Infrastructure with respect to wetland-related aspects of the Wetland Offsetting Program (e.g., wetland sites evaluated for their potential development of an offset). The EAC Terms of Reference contemplate a process by which the EAC would provide written advice to Manitoba Transportation and Infrastructure directly on a range of topics. These EAC-related advisory key topics are expected to include wetland offsetting, mitigation, and monitoring plans. For example, the EAC may help identify sites for wetland offsetting or have specific recommendations pertaining to the wetland offsetting planning and implementation. The involvement of provincial regulators in this process would further provide an avenue for the EAC to share advice or findings directly with the relevant regulatory authority. Additional information regarding the EAC is available in the July 2023 response to IR IAAC-R2-30.

As outlined in the ICSER, Manitoba Transportation and Infrastructure will provide opportunities for Indigenous groups to provide input and feedback on monitoring plans and follow up studies described in the EMP, including the RVMP and spoil pile design with respect to the Birch Creek and Buffalo Creek complex.

f. **Mitigation or offsetting measures for the Buffalo Creek Complex that are being considered to mitigate effects to country foods and furbearers of importance to Indigenous groups.**

As stated in Volume 4, Section 10.2.4.4 of the Project EIS, the availability of and access to country foods within the local assessment area (LAA) is currently limited by the effects of periodic flooding and the purpose of the Project is to lessen these effects. While the Project is designed to address flooding and alleviate some of these effects on a regional basis, the construction and operation of the Project is also expected to result in local effects requiring mitigation, such as the removal of plant species harvested for country foods from the PDA and affecting the distribution of wildlife species of importance to Indigenous groups in the traditional land and resources use (TLRU) LAA, including within the Buffalo Creek complex. This could occur through the direct or indirect loss or alteration of habitat due to vegetation clearing, sensory disturbance (e.g., avoidance), and/or edge effects; vehicular collisions, human-wildlife conflicts, and indirect change in mortality risk (due to enhanced predator and hunter access), change in movement (during active operation), and changes in habitat due to changing hydrology.

The potential effects to country foods and furbearers of importance to Indigenous groups, as well as a summary of mitigation measures to address these effects, on a community-by-community basis, is presented in the response to IR IAAC-R1-122 on Table IAAC-122-1 and response to IAAC-R2-29, Table IAAC-R2-29-1. Relevant mitigation measures that have been developed to address potential adverse effects to wildlife and wildlife habitat and for vegetation and wetlands may also serve to avoid or reduce effects on country foods and furbearers of importance to Indigenous groups. These mitigation measures are discussed below.

Wildlife Movement and Access

As described in the May 2022 response to IR IAAC-R1-38 and the Wildlife Monitoring Plan, channel design mitigations to enhance wildlife movement include shallow (4:1) side slopes, use of small diameter rock armouring, and addition of cover plantings (to reduce edge effects) on upland portions of the ROW. Configuration of spoil piles is currently being reviewed to enhance wildlife movement across the channels at select locations. As discussed in the response to IR IAAC-R3-06b-iv, this is an ongoing process, and some locations currently being evaluated for spoil pile modifications will likely be screened out as being unfeasible from a technical perspective. A subset of locations will be brought forward for discussions with Indigenous groups as part of a mapping exercise to further examine existing trails and priority locations that maximize benefits to wildlife. Potential wildlife crossing locations at the outlet channels were initially identified by mapping game trails identified by recent studies and following their paths to the PDA boundary, and by identifying other potential movement corridors such as trails visible in Google Earth, cutlines and other human-made features, and forest edges that intersect the PDA. Potential wildlife crossing locations identified along the PDAs would avoid areas where larger-sized rock (i.e., 'riprap') would be applied, as these were identified as being less permeable for wildlife movement. These locations are primarily at the inlet, outlet, bridge crossing locations, water control structures and at the LSMOC between the first drop structure and Lake Winnipeg. Where feasible, potential crossing locations would be aligned with armoured sections of the channels. Although it has yet to be determined how many locations will receive spoil pile modifications, a total of five potential wildlife crossing locations have been identified at the LSMOC, with varying degrees of estimated suitability for wildlife crossing. These locations are being considered as options by the Project engineers to configure spoil piles for safe and easier wildlife crossings. Further details can be found in the response to IR IAAC-R3-06b-iv, which notes that this is an ongoing process, and some locations currently being evaluated for spoil pile modifications will likely be screened out as being unfeasible from a technical perspective.

Hunting Movement and Access

Various measures will be implemented to mitigate effects on furbearers resulting from increased hunter access to the Buffalo Creek Complex. As described in the Project Access Management Plan, Project-related traffic will be restricted to the Project ROW and associated access routes required during Project construction, operation and maintenance. Where access routes are accessible by the public, signage will be erected limiting access to authorized personnel. Safe passage will be provided at identified crossing locations. Mitigation for reducing mortality risk to furbearers in the Buffalo Creek

Complex includes wildlife awareness signs to reduce potential for vehicle collisions and a gated access road to limit hunter access. Project workers will not be permitted to possess, transport, use, or store firearms within the PDA. Some exceptions may be made for Indigenous peoples who intend to carry out traditional activities in the area if the activity does not present a safety risk and if approval is granted by Manitoba Transportation and Infrastructure in advance. Signs will be posted at various locations indicating areas where public access is restricted, where firearms are not allowed, and in areas where people need to be informed about potential safety issues and hazardous areas, such as at the inlets, outlets, and water control structures, as a further precautionary measure.

Protecting Sensitive Sites and Habitat

As described in the Project Environmental Requirements and Environmental Protection Plan, exclusionary fencing will be installed around open excavations near wetlands when and where there is potential for entrapment of amphibians or other wildlife species, or as directed by Manitoba Transportation and Infrastructure or the Contract Administrator. Terrestrial buffers, as identified by the Manitoba Conservation Data Centre's *Recommended Development Setback Distances from Birds and/or Manitoba Sustainable Development's Forest Management Guidelines for Terrestrial Buffers* shall be adhered to for all applicable sites.

Vegetation control will occur through mechanical methods where feasible, and hand clearing will occur along shorelines, which would serve to mitigate effects to plant harvesting. Chemical vegetation control will only be used for weed control/suppression, and not as a method of clearing. Where chemical control is used, the least toxic, least persistent and most target-specific pesticides pre-approved for use by Provincial legislation are preferred. The applications are targeted to the season where the pest is most susceptible to treatment, applied by trained personnel who meet provincial licensing requirements, and applied using methods and equipment designed to minimize potential for drift and overspray (Manitoba Transportation and Infrastructure 2016). The Agricultural Biosecurity Management Plan describes measures to manage the potential spread of weeds from construction vehicles and equipment.

Natural revegetation will be encouraged. Disturbed lands such as in areas vulnerable to erosion and sedimentation will be seeded and/or planted in accordance with the RVMP. It identifies locations and methods for restoration of vegetation cover in disturbed areas. The RVMP includes objectives for restoration of natural conditions, erosion protection, sediment control, non-native and invasive plant species management, and wildlife habitat restoration. The hard or abrupt edges formed during clearing of the PDA will eventually be 'softened' as transitional vegetation (e.g., forbs, shrubs, young trees) re-establishes along the ROW edges.

Replacing Lost Habitat

The Wetland Offsetting Program includes offsetting for most wetland types directly affected by the proposed Project (see response to IR IAAC-R2-13 and Wetland Offsetting Plan). Manitoba Transportation and Infrastructure is exempt from providing offsetting under *The Water Rights Act* (Manitoba), where wetland offsetting is a provincial requirement of some proponents developing in

Class III habitats; regardless, based on concerns expressed by several Indigenous groups, Manitoba Transportation and Infrastructure is voluntarily complying with the intent of *The Water Rights Act* requirements by providing offsetting for the loss or alteration of 239 hectares (ha) (590.6 acres [ac]) of Class III, IV, and V wetlands that are directly affected by the proposed Project. In addition, 769 ha (1,900 ac) of other wetlands (peatlands) that will be directly affected by the proposed Project will receive offsetting. The inclusion of providing offsetting for peatlands affected by the proposed Project is a recent addition identified in 2023 (as outlined in IAAC-R2-13 submitted to IAAC on July 24, 2023) and is being included as an accommodation measure for Indigenous groups.

Depending on the outcome of the WetMP, additional no-net-loss offsetting may be provided for wetlands that are demonstrated to be affected by the proposed Project (where effective mitigation cannot be applied). Wetland offsetting will mitigate Project-related changes to the quantity, quality and availability of plant resources (e.g., berries, medicinal plants, plants used for ceremonies), and will offset the loss of wetland habitats having potential to support upland game birds, waterfowl, furbearers (e.g., lynx, fisher, mink, weasel, beaver, muskrat), moose and other wildlife resources used by Indigenous groups.

g. **Characterize how the change in flow in the Birch Creek and Buffalo Creek Complex systems may affect fish spawning, in terms of the change in flow at the time of spawning and how this could impact spawning success.**

Preamble

The analysis of effects to fish and fish habitat in the Birch Creek and Buffalo Creek Complex due to Project-related loss of flow was discussed in the July 2023 responses to IR IAAC-R2-10 and IR IAAC-R2-14. This response provides additional information about the effects. It should be noted that the residual effects conclusion also considers that the Department of Fisheries and Oceans Canada (DFO) will require Manitoba Transportation and Infrastructure to offset any harmful alteration, disruption or destruction of fish habitat (Section 35 of the *Fisheries Act*) for construction and operation of the Project, and the unavoidable loss of fish (Section 34 of the *Fisheries Act*) during operation of the Project to manage flooding. As indicated in the response to Part h, Manitoba Transportation and Infrastructure has engaged DFO to discuss the criteria to offset fish and fish habitat-related effects and those discussions are ongoing as a part of the *Fisheries Act* Authorization process. Manitoba Transportation and Infrastructure is committed to offsetting habitat loss through efforts that will enhance existing habitat or the creation of new habitats through the *Fisheries Act* authorization process. With the implementation of offsetting measures, it is expected that the productive capacity of fish habitat in the region will be maintained.

Birch Creek

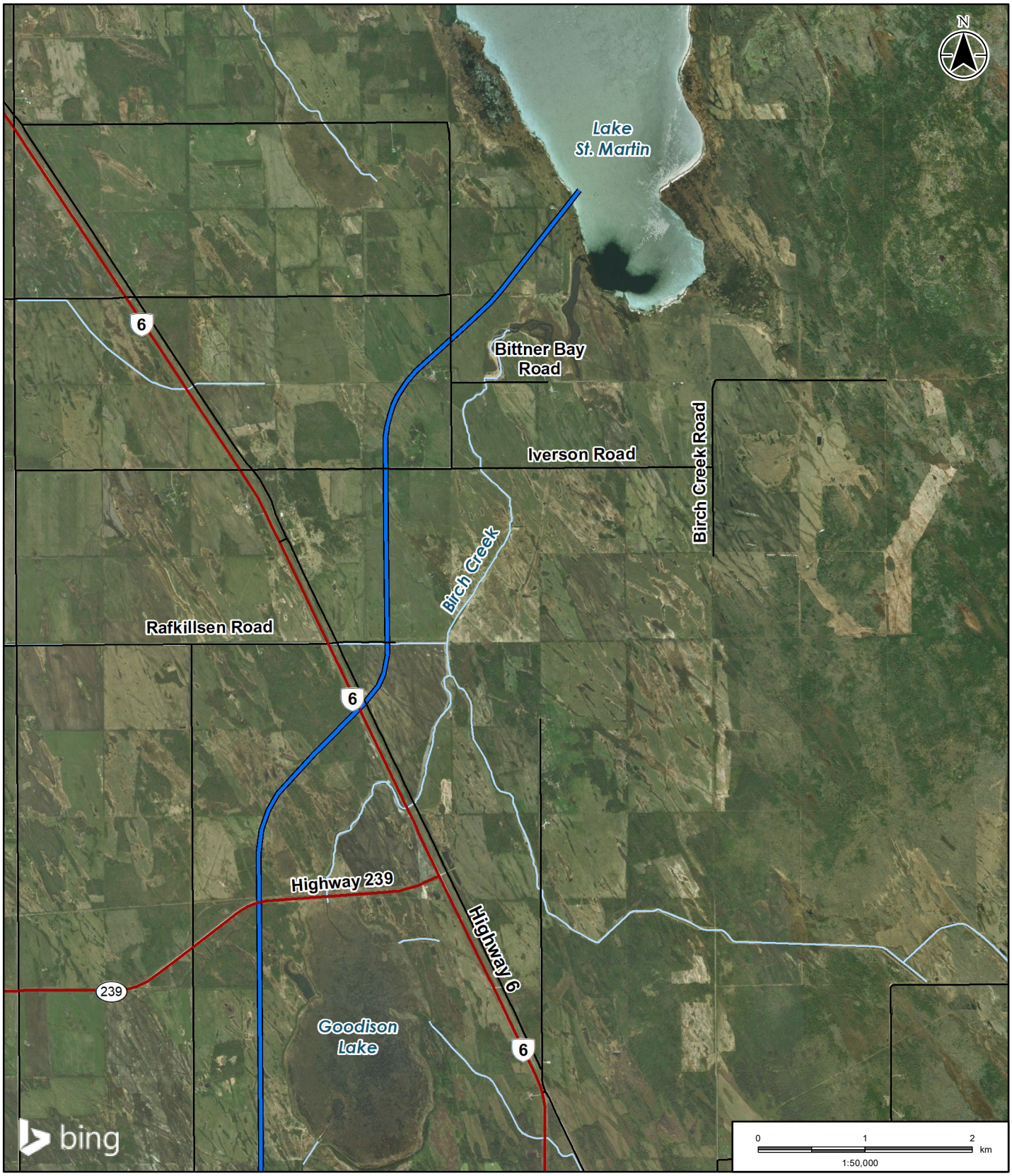
The Birch Creek watershed drains north into LSM and encompasses an area of 29,477 ha (72,893 ac) (see Figure IAAC-R3-02-1). The lower portion of the watershed comprises Birch Creek proper, an 8.6 kilometres (km) (5.3 miles [mi]) reach of creek originating at Goodison Lake, which is fed by Goodison and other headwater lakes and agricultural drains (see Figure IAAC-R3-02-2). These headwater lakes are a series of shallow, intermittent lakes (Goodison Lake [260 ha (642 ac)], Water Lake [100 ha (247 ac)] and Clear Lake [25 ha (62 ac)]) that are connected by drains that ultimately allow water to enter Birch Creek at the outlet of Goodison Lake. The size and depth of the lakes varies annually and seasonally depending on local precipitation. In general, the lakes are shallow and heavily vegetated. Passage of large-bodied fish from LSM into these lakes would occur only during high flow events in Birch Creek. Regardless of groundwater input, these lakes likely become anoxic during winter due to their shallow depth and abundance of aquatic vegetation.

For much of its length, Birch Creek is channelized and has a consistent U-shaped cross-sectional profile, with an average width of 9.5 metres (m) (31.2 feet [ft]) and a maximum depth of about 1.0 m (3.3 ft). Substrate composition is variable and includes patches of silt, sand, gravel, and cobble with some boulders. Riparian habitat is comprised of grasses and cattails and adjacent land use is almost exclusively livestock grazing and hay. The lower 1.8 km (1.2 mi) of the creek flows through a dense, grass and cattail marsh before entering Birch Bay.

Flow in Birch Creek results mainly from surface runoff and as such the spring freshet is closely dependent on snow melt and precipitation in spring and varies considerably from year to year, resulting in large variations in available habitat (Figure IAAC-R3-02-3). After the spring freshet, flow in the creek may cease entirely during the summer (Figure IAAC-R3-02-4). Construction of the LMOC will reduce the drainage area of Birch Creek by 27.4%, which is predicted to result in a decrease in the average wetted width of 0.21 m (0.69 ft) in the channelized portion. As noted in the response to IR IAAC-R2-10 (Table IAAC-R2-10-2, showing updated estimates of HADD) this flow reduction is predicted to result in a decrease in the wetted area of the creek under median flows of 0.18 ha (0.44 ac).

Birch Creek is used in the spring for spawning by suckers (*Catostomidae* spp.), and to a small extent by northern pike (*Esox Lucius*) and even fewer walleye (*Sander vitreus*). It may also provide summer foraging habitat for small-bodied fish when water is present. The use of the creek by spring-spawning fish was determined recently under low water (2021) and high water (2022) conditions. In both years many larval sucker and fewer larval pike were captured. Adult fish were observed upstream to the PR 239 crossing during high flows in 2022 but not under low flow conditions in 2021. Observations of adult fish indicated that many more were present during high water years, but it is not known whether there was a concomitant increase in the production of larval fish as differences in the timing of the 2021 and 2022 surveys precluded a direct comparison of results.

The reduction in the drainage area of the creek will reduce the freshet and baseflows/riparian flows in the creek. The presence of spawning runs in smaller drainages and in Birch Creek under drought conditions (e.g., 2021) suggests that Birch Creek will continue to provide spawning habitat in spring months even with lower flows, albeit the total number of spawners is expected to be reduced. Spawning habitat for these species is also present in the Dauphin and Fairford rivers and LSM so the changes are not expected to affect fish populations. Considering fish habitat in Birch Creek in isolation from the remainder of the system for the *Fisheries Act* Authorization, the reduction in flow will result in a small magnitude (2%) change in median wetted area that is long-term and occurs continuously and is not reversible. In terms of fish populations in the local assessment area, effects will be negligible due to the presence of alternate spawning habitats (i.e., habitats for these species is not limiting in the LAA).



Legend

- Highway
- Minor Road
- Watercourse
- Proposed Lake Manitoba Outlet Channel

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure
3. Aerial Imagery Source: Microsoft product screenshot reprinted with permission from Microsoft Corp.
4. Last Update: 10/20/2023 4:03:09 PM

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MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Aerial View of Birch Creek

Figure IAAC-R3-02-1

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Figure IAAC-R3-02-2 The Birch Creek channel into Goodison Lake on May 4, 2018 (upper left), Birch Creek downstream of Highway 239 on May 4, 2018 (upper right), and Birch Creek downstream of Highway 6 on May 16, 2021 (lower)

Figure IAAC-R3-02-3 Birch Creek upstream of the Bitner Bay Road crossing on May 8, 2022 (left) and May 6, 2021 (right)

Figure IAAC-R3-02-4 Birch Creek on September 30, 2021

Buffalo Creek

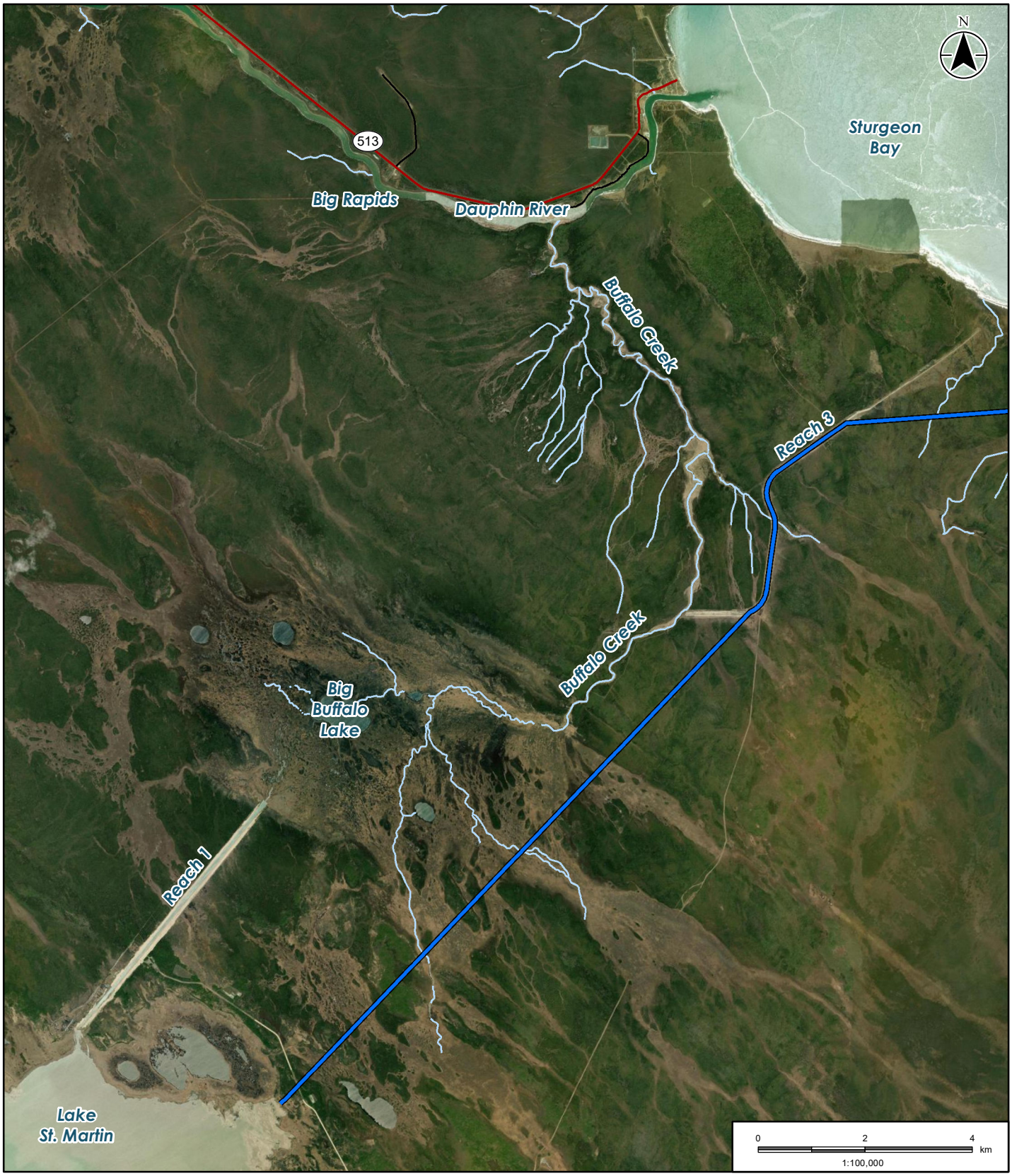
Buffalo Creek is the outflow of Big Buffalo Lake and the primary drainage in an extensive bog with a drainage area of 38,700 ha (96,630 ac) that is fed by local runoff and groundwater inputs (Figure IAAC-R3-02-5). Buffalo Creek flows for approximately 17 km (10.6 mi) to its confluence with the Dauphin River. For approximately the first 4 km (2.5 mi) downstream of Big Buffalo Lake, the creek flows through a sparsely treed wetland/bog complex before becoming a more defined creek channel with greater gradient and habitat diversity. Operation of the EOC in 2011 and 2014 resulted in large changes in the habitat within the creek (Figure IAAC-R3-02-6). Prior to operation of the EOC, the system was an isolated bog drainage, supporting resident populations of yellow perch (*Perca flavescens*) and small forage species. Access by large-bodied species from the Dauphin River was generally prevented by the presence of several well-established beaver dams. Operation of the EOC removed organic substrate and riparian vegetation, as well as the beaver dams from Buffalo Creek and allowed access by large-bodied species from the Dauphin River. Prior to operation of the EOC, overwintering habitat in the system was limited as low concentrations of dissolved oxygen (DO) occurred in Big Buffalo Lake during winter. During operation of the EOC, large numbers of large-bodied fish moved upstream through Buffalo Creek and Reach 1 into LSM. Measurements of DO in Buffalo Lake during winter 2013 when the EOC was not in operation recorded severe DO depletion, indicating that over-wintering habitat in the system was still limited despite the removal of organic matter.

Habitat in Buffalo Creek is currently dominated by a gravel/cobble substrate with generally shallow water depth. In the lower-most reach, backwater from the Dauphin River wets the majority of the channel, even under low flow conditions (Figure IAAC-R3-02-7) but further upstream, much of the stream bed is dewatered under low flow conditions (Figure IAAC-R3-02-8).

Surveys for spring use by fish in Buffalo Creek were conducted in 2021 (extreme low flows) and 2022 (high flows). Beaver dams present prior to operation of the EOC in 2011 have not become re-established across Buffalo Creek. Fish surveys under low flows in 2021 indicated that sucker, yellow perch and northern pike, as well as forage species including longnose dace (*Rhinichthys cataractae*), finescale dace (*Chrosomus neogaeus*), fathead minnow (*Pimephales promelas*), blacknose shiner (*Notropis heterolepis*), brook stickleback (*Culaea inconstans*) and ninespine stickleback (*Pungitius pungitius*) were present, but there was no evidence of a substantial spawning migration of large-bodied fish from the Dauphin River. Under high flow conditions in 2022, substantial numbers of larval sucker and fewer northern pike were captured drifting in the lower section of the creek. Surveys of adult fish were not conducted in 2022.

The 51.5% reduction in the drainage area of Buffalo Creek is expected to result in a 57% reduction in the 1:2 year flood flow. As noted in the response to IR IAAC-R2-10 (Table IAAC-R2-10-2 showing updated estimates of HADD for *Fisheries Act* Authorization process) under mean annual flows the wetted area of the creek will be reduced by 11% (17.5 ha [43.2 ac]). The reduction in flows in Buffalo Creek and associated reduction in wetted area is expected to affect habitat use by resident fish and spring spawning species such as sucker in years of high snow melt and spring precipitation. As noted

for Birch Creek, spring spawning species have habitat available in the Dauphin and Fairford rivers and LSM and effects to fish populations are not expected. Considering fish habitat in Buffalo Creek in isolation from the remainder of the system for the *Fisheries Act* Authorization, the reduction in flow will result in a large magnitude (>10%) change in mean wetted area, that is long term and occurs continuously, and is not reversible. In terms of fish populations in the LAA, effects will be negligible due to the presence of alternate spawning habitats (i.e., habitats for these species is not limiting in the LAA).



Legend

- Highway
- Minor Road
- Watercourse
- Proposed Lake St. Martin Outlet Channel

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure
3. Aerial Imagery: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
4. Last Update: 10/20/2023 4:03:35 PM

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MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Aerial View of Buffalo Creek

Figure IAAC-R3-02-5

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Figure IAAC-R3-02-6 Buffalo Creek Before (Left) and After (Right) Operation of the EOC

Figure IAAC-R3-02-7 Aquatic Habitat in Lower Buffalo Creek, Spring 2021

Figure IAAC-R3-02-8 Aquatic Habitat in Upper Buffalo Creek, Spring 2021

i. Historic and current use of the channels by Indigenous groups and others

As indicated, the analysis of effects to historic and current use of the channels by Indigenous groups and others, associated with the Birch Creek and Buffalo Creek Complex due to Project-related loss of flow was discussed in the response to IR IAAC-R2-14. There is no additional relevant information available, and so the key information from the response to IR IAAC-R2-14 is repeated below for ease of reference.

Birch Creek

Effects on the current use of lands and resources for traditional purposes are primarily related to change in the availability of resources for current use. Through the Indigenous consultation and engagement program for the Project, including Project-specific TLRU studies, Birch Creek was generally not identified as a harvesting location by Indigenous groups. Pinaymootang First Nation, the Interlake Reserves Tribal Council (IRTC) and Little Saskatchewan First Nation mapped fishing values demarcated by polygons that included Birch Creek (Tam et al. 2022; Golder 2018; Olson 2020). Hollow Water First Nation has noted that Birch Creek, Lake St Martin and the Dauphin River are important fish spawning grounds that sustain Lake Winnipeg fishery (HWFN 2020). Manitoba Transportation and Infrastructure acknowledges that lack of information about current use in a particular area should not be taken to indicate a lack of interest or use by Indigenous groups. Manitoba Transportation and Infrastructure has conservatively assumed that there is the potential for current use to occur at Birch Creek.

As discussed above, decreased flow in Birch Creek is unlikely to result in changes to the long-term sustainability and production of focal fish populations that are important to commercial, recreational, and Indigenous fisheries. Changes in wetland function may result in drier conditions, which may change the abundance of plants of interest to Indigenous groups, with upland plants such as berries, sage or birch becoming more prevalent (see also the July 2023 response to IAAC-R2-15). However, the area traversed by Birch Creek is classified mostly as tame pasture

and haylands with some natural wetlands. Therefore, the assessment of effects to the availability of traditional resources for current use remains unchanged from Volume 4, Section 10.2.4.4 of the Project EIS.

Buffalo Creek

Effects on the current use of lands and resources for traditional purposes are primarily related to change in the availability of resources for current use. Through the Indigenous consultation and engagement program for the Project, including Project-specific TLRU studies, Buffalo Creek was identified as an area where harvesting occurs. Dauphin River First Nation, Fisher River Cree Nation, and Peguis First Nation reported hunting and trapping areas along Buffalo Creek, with good wildlife habitat including for moose and deer. Hollow Water First Nation and Lake St. Martin First Nation expressed concerns that effects to Buffalo Lake, Buffalo Creek and adjacent wetlands will affect the fishery. Dauphin River First Nation, Hollow Water First Nation, Manitoba Metis Federation, Norway House Cree Nation and Pimicikamak Okimawin have shared concerns that the Project will affect Buffalo Creek ecosystem and impact wildlife habitat. Dauphin River First Nation, Kinonjeoshtegon First Nation and Lake Manitoba First Nation have stated that changing the water drainage in the Buffalo Creek watershed may have adverse impacts on Indigenous land use. Lake St. Martin First Nation is concerned that modification of the terrestrial and wetland habitat adjacent to the LSMOC impacts Lake St. Martin First Nation traditional land usage, hunting and harvesting, and cultural practices. Manitoba Transportation and Infrastructure acknowledges that lack of information about current use in a particular area should not be taken to indicate a lack of interest or use by Indigenous groups. Manitoba Transportation and Infrastructure has conservatively assumed that there is the potential for current use to occur at Buffalo Creek.

As noted above, although changes in wetted area may change fish habitat and spring spawning in some years for species such as sucker, these changes are unlikely to result in changes to the long-term sustainability and production of focal fish populations that are important to commercial, recreational, and Aboriginal fisheries, or to forage fish species that may provide food for wildlife species such as mink and otter. In addition, it is recognized that these areas provide habitat for species such as moose, muskrat, and beaver, which are all harvested by Indigenous groups. Similar to effects on SAR described above in Part e, a decrease in wetted area downgradient of LSMOC may reduce habitat suitability for some traditionally harvested species (e.g., ducks, geese), while increasing it for others (e.g., sharp-tailed grouse [*Tympanuchus phasianellus*]). Change in wetland wetted area may result in drier conditions, which may affect surface water flow, vegetation cover and wildlife habitat.

Manitoba Transportation and Infrastructure is proposing a no-net-loss offsetting of many directly affected wetland types to address potential effects that cannot be mitigated (see response to IR IAAC-R2-13). This is intended to address biophysical effects to the Buffalo Creek peatland complex, including adverse effects to the availability of resources for current use by Indigenous

groups and others. Therefore, the assessment of effects to the availability of traditional resources for current use remains unchanged from Volume 4, Section 10.2.4.4 of the Project EIS.

h. **Fish habitat offsetting opportunities for the potential reduction in flow to Birch Creek and the Buffalo Creek Complex**

As a part of the *Fisheries Act* Authorization process, various potential fish habitat offsetting options have been presented to DFO and Indigenous communities since the submission of a preliminary offsetting plan in late 2020; additional information on consultation is provided in Part i, below. Current potential options for fish habitat offsetting projects within Birch and Buffalo creeks proper are presented below; these are recently identified concepts and have not yet been discussed in depth with DFO or the Indigenous communities.

Birch Creek Offsetting

Current concepts for offsetting in Birch Creek include habitat improvements at the Provincial Trunk Highway (PTH) 6 crossing, encompassing approximately 140 m (459 ft) of stream length (Figure IAAC-R3-02-9). Spring surveys indicated that spawning sucker and northern pike were present but that conditions could have been improved. Habitat use in Birch Creek is limited by large inter-annual variations in flow. The following measures are under consideration:

- Improving the culvert crossing:
  - the culvert under PTH 6 is currently an open arch. The new culvert under the access road would be sized the same as the one under PTH 6 and also be an open arch to permit fish passage under all flow conditions, including under low flows in later summer when young of the year fish should move downstream to LSM.
- Removal of the railway bridge:
  - this would reduce the number of in-water structures.
- Creation of resting pools:
  - this would allow fish to stage during upstream migrations under high flow conditions.
- Creation of shallow vegetated habitat:
  - this would improve availability of northern pike spawning habitat.
- Placement of spawning substrate:
  - this would be selected to be suitable for spawning by sucker and walleye within the stream.
- Excavation of the stream bed at locations where flow is restricted under low flows:
  - this would reduce the potential for stranding of young of the year fish.

Figure IAAC-R3-02-9 Birch Creek at the Highway 6 crossing, May 16. 2021. Flow is from left to right. Proposed enhancement work would encompass the approximately 150 m reach from upstream of PTH 6 to downstream of the access road

Buffalo Creek Offsetting

Buffalo Creek is currently an open channel with shallow water depth and little cover. Proposed offsetting includes construction of low head rock weirs/riffles at natural constrictions in the channels to re-create pool habitat that was present prior to the operation of the EOC as a result of beaver dams. It is expected that these pools would be used by forage fish, and juveniles of large-bodied species such as sucker and northern pike.

i. Describe how Indigenous Knowledge has been used to determine offsetting opportunities.

Background

As discussed in the response to Part g above, much of Birch Creek runs through tame hayland areas with fish use mainly limited to spawning runs of sucker, and with limited habitat for walleye and northern pike. Buffalo Creek is located in a wetland area, with the presence of beaver dams historically blocking fish movement and limiting most areas to forage fish species. The response to Part g-i also summarizes input provided by Indigenous groups on these two creeks. There has been limited information provided on Birch Creek regarding traditional use. Information has been provided on the value of the Buffalo Creek area in terms of wildlife species, but not for fish;

however, as noted in the Context and Rationale section, it is recognized that forage fish species can help to support wildlife species such as mink and otter.

As discussed in the response to IR IAAC-R2-10, Manitoba Transportation and Infrastructure has been working with DFO for several years to address potential Project-related fish HADD, and to quantify the amount and type of habitat to offset. The response to IR IAAC-R2-10 also summarizes input received from Indigenous groups. As additional information has been gathered, through engagement, additional field studies, and advancement of engineering/design, the HADD calculations have been updated. As indicated in the response to IR IAAC-R2-10, final estimates of HADD will be developed through the *Fisheries Act* Authorization process with DFO. In addition, the Aquatic Offset Plan will include monitoring and adaptive management/follow-up measures to assess the effectiveness and performance of the offsets. Monitoring reports developed for offsetting measures will be submitted to DFO.

The following sections summarize the opportunities provided to Indigenous groups to provide input to this process, and the information provided to-date.

Engagement Opportunities

Manitoba Transportation and Infrastructure has shared information regarding fisheries impacts with Indigenous groups at every step of the assessment process. The response to IAAC-R2-10 references Volume 3, Section 7.2.1.3 of the Project EIS as the location where Traditional Knowledge (TK) was provided on fish and fish habitat, including information about existing conditions, potential effects, and mitigation measures. While initial estimates of the areas of potential HADD did not directly incorporate TK (as the estimates are based largely on engineering design and modeling), TK was incorporated into an understanding of fish use of the natural system (e.g., lake whitefish migration into the Dauphin River and use of habitats in LSM and further upstream in the Fairford River).

Since 2020, Manitoba Transportation and Infrastructure has continued to meet with communities to share information and receive feedback about ongoing Project planning as documented in the ICSER. In many meetings, Manitoba Transportation and Infrastructure has specifically asked if communities had any offset project ideas that they would like Manitoba Transportation and Infrastructure to consider for this Project. The initial estimates of the HADD and initial offsetting concepts were provided in a draft offsetting plan (Fish and Fish Habitat Offsetting Plan Initial Concepts) developed in 2020 to form the basis of discussion with Indigenous groups.

The Fish and Fish Habitat Offsetting Plan Initial Concepts document included discussion on the effects from the loss of flow to Birch Creek and Buffalo Creek. It proposed that offsetting reductions in fish habitat could be focused on improving habitat in streams affected by agricultural land use in the Lake Manitoba watershed, potentially including sites on Mercer Creek. Specific potential measures include the creation of spawning habitat for sucker species in Mercer Creek, and general watershed improvement projects in the area, such as fencing streams to reduce cattle effects and improving riparian habitat. Other measures, such as the creation of spawning

reefs in Birch Bay and Sturgeon Bay were also proposed. Copies of the Fish and Fish Habitat Offsetting Plan document[7] describing initial concepts for discussion and a questionnaire were provided to Indigenous groups in November 2020 for their review and feedback. Manitoba Transportation and Infrastructure granted requests for extensions to allow groups more time to review and provide comment and reviewed and considered the feedback that was received.

Effects to fish and fish habitat, mitigations, monitoring and *Fisheries Act* offsetting were discussed in meetings with Indigenous groups (see ICSER, Section 2.8.6). Feedback received from Indigenous groups includes a request from Fisher River Cree Nation to be involved in all wetland offset funding decisions as well as identifying and selecting wetland and fish habitat offset projects. While Manitoba Transportation and Infrastructure cannot commit to involving Fisher River Cree Nation in all wetland offset funding decisions, Manitoba Transportation and Infrastructure has committed to continuing its ongoing consultation and engagement with Fisher River Cree Nation. Indigenous groups including Fisher River Cree Nation will have an opportunity to review and provide recommendation to Manitoba Transportation and Infrastructure on the WCP and opportunities to identify wetland and fish and fish habitat offset projects through participation in the EAC.

Recognizing the COVID-19 pandemic and the need to limit in-person meetings, Manitoba Transportation and Infrastructure offered virtual meetings in early 2021 with 18 Indigenous groups potentially affected by the Project, to discuss the EMP plans and the offsetting concepts and feedback on the plans. A virtual engagement portal was also established until July 2021, which provided summaries of each plan and questionnaires to provide opportunities for specific feedback and input on plan adequacy, contents, clarity, and methodology. Manitoba Transportation and Infrastructure also produced various tools and services to support Indigenous groups' review of these plans, including: providing printed and electronic copies of the documents as mentioned above; posting them online; developing virtual open houses that were accessible through the Outlet Channels Project page on EngageMB[8]; and developing questionnaires that were included with the EMP plans online.

In addition to opportunities Manitoba Transportation and Infrastructure extended to Indigenous groups to provide feedback on the offsetting concepts document, input was sought on offsetting through the process of reviewing Manitoba Transportation and Infrastructure's responses to IAAC IRs. For the Round 1 IAAC IR process, information on the proposed Aquatic Offsetting Plan being developed for the *Fisheries Act* Authorization process was included in Manitoba Transportation and Infrastructure's May 2022 response to IR IAAC-R1-37, including additional information on Birch and Buffalo creeks. Manitoba Transportation and Infrastructure provided draft responses to the Round 1 IRs to Indigenous groups, to provide an opportunity for early issue identification, facilitate discussion on substantive issues, and identify matters requiring continued

[7] Fish and Fish Habitat Offsetting Plan Initial Concepts for Discussion is located at https://www.gov.mb.ca/mti/wms/lmblsmoutlets/environmental/pdf/aquatics_offset.pdf

[8] Outlet Channels Project page on EngageMB is located at: https://engagemb.ca/lake-manitoba-and-lake-st-martin-outlet-channel-project

dialogue and resolution. Similar early opportunities for input were provided in the Round 2 IAAC IR process, including in the response to IR IAAC-R2-10. Manitoba Transportation and Infrastructure provided IAAC with a preliminary Round 2 IR response package to share with Indigenous groups for their review and input in advance of the formal review process, in order to give Indigenous groups and regulators more time outside the legislated timelines to review and provide comment. While several Indigenous groups provided some offsetting ideas, such as fencing off cattle access to LSM, improving fish access to a small stream on LSM, and dredging the mouth of the Fisher River to improve access to migrating fish in early spring when there is still an ice cover on Lake Winnipeg, others requested additional information on how Manitoba Transportation and Infrastructure was calculating the HADD, which is reflected in IR IAAC-R2-10.

Engagement Input

As indicated, in many meetings since 2020, Manitoba Transportation and Infrastructure has asked if communities had any offset project ideas that they would like Manitoba Transportation and Infrastructure to consider for this Project. No formal input has currently been provided specifically on offsetting to Birch and Buffalo creeks. The response to IR IAAC-R2-13 describes the Indigenous knowledge received and the process to work cooperatively to address the effects to wetland areas through the development of the WCP. In terms of offsetting for the losses to fish habitat, Manitoba Transportation and Infrastructure has made efforts to engage Indigenous groups early on starting in the initial planning of the offsetting projects required for *Fisheries Act* Authorization of the Project. Some general feedback on the offsets themselves were provided, such as the following comments provided by Norway House Cree Nation, “all of the suggested [offset] measures are worthwhile to pursue given the amount of degraded fish habitat in the region as a whole; however, habitat enhancement measures often are not monitored adequately in order to determine how effective they are in meeting the objectives […] if enhancement measures work well in one area, they may be useful to apply in other areas of this watershed.” They also cautioned that it was possible that the placing of artificial reefs, while increasing habitat diversity, could degrade existing habitats.

In feedback provided on Round 2 IRs, Fisher River Cree Nation stated that they had no concerns with the proposed wetland offsets, provided that wetland offsets are local, benefit local communities, and either increased wetland benefits or resulted in no net loss of wetland benefits. Fisher River Cree Nation also stated that they expect to be fully engaged and informed on HADD offsets and for DFO to undertake a meaningful Crown consultation process. As indicated, the response to IR IAAC-R2-10 provides updates to the initial HADD estimates, including those for Birch and Buffalo creeks, based on additional field studies and analysis. The response to Part h, above, provides the current list of potential fish habitat offsets.

Information received from Indigenous groups has informed and influenced the Project design, Project planning, and offsetting planning. Input related to effects to fish and fish habitat included requests for more information on effects and mitigation, and concepts such as hatchery with fish stocking, fencing at LSM, Beaver Creek access on LSM and dredging the Fisher River. Interest

was also expressed in shoreline cleanup in LSM (particularly at the Narrows). Hollow Water First Nation and Lake St. Martin First Nation expressed concern about the effectiveness of the Mercer Creek spawning bed for offsetting because Mercer Creek is a very small watershed.

Manitoba Transportation and Infrastructure has considered and endeavored to address these requests and has provided responses to questions and rationales for decisions made to date via written responses and in discussions during follow up meetings with Indigenous groups. Manitoba Transportation and Infrastructure will continue this practice as the identification and selection of potential fish habitat offset projects advances and Indigenous engagement continues.

Ongoing Engagement

As outlined in the ICSER, Manitoba Transportation and Infrastructure is committed to ongoing consultation and engagement with Indigenous groups and will continue to engage with Indigenous groups on fish habitat offsetting opportunities for Birch Creek and the Buffalo Creek Complex. An EAC has been formed for the Project to facilitate information and sharing and for communities to provide advice or recommendations to Manitoba Transportation and Infrastructure on the ongoing refinement and implementation of the EMP. Manitoba Transportation and Infrastructure anticipates that the EAC will provide opportunities for Indigenous groups to provide input on fish habitat offsetting. In both the EAC and ongoing community meetings, Manitoba Transportation and Infrastructure would be prepared to present and discuss the offsetting ideas that Manitoba Transportation and Infrastructure would like to move forward with, what ideas are not being moved forward, and rationale. Recommendations and information provided by the EAC and Indigenous groups will be reviewed and considered in updating and finalizing the Fish Habitat Offset Plan, which will be submitted to DFO in application for authorization under the *Fisheries Act*. Offset projects that are being considered, locations, implementation and scheduling may change based on input from Indigenous groups and the EAC. Meeting notes will be prepared and circulated to participants and also shared with DFO to inform their engagement/ consultation processes. Additional information regarding the EAC is available in response to IAAC-R2-30.

Ongoing Development of the Fish and Fish Habitat Offsetting Plan

Manitoba Transportation and Infrastructure is continuing to refine the Offsetting Plan as more information is obtained from field and other studies, concepts are discussed with regulators, and input is received from Indigenous groups. Initial concepts with respect to improving habitat in agricultural streams including Mercer Creek are not currently being pursued due to uncertainty with the long-term maintenance of enhancement measures on privately owned lands. Construction of a spawning shoal in Birch Bay is not being pursued because detailed habitat surveys have indicated that natural shoals are widespread in this region of LSM. New measures that are being considered, include various community-based opportunities for stocking of walleye into areas where they are not abundant (e.g., Dauphin River); multi-year shoreline cleanup efforts directed primarily at removing ghost nets from LSM (this could also be a community-based initiative); and, research studies to address questions from Indigenous groups and individuals

with respect to regional movements of key fish species such as lake whitefish (*Coregonus clupeaformis*) and walleye.

References

Golder (Golder Associates Ltd.). 2018. Proposed Lake Manitoba and Lake St. Martin Outlet Channels Project. Interlake Reserves Tribal Council October Phase 1 Traditional Land Use and Traditional Knowledge Report.

HWFN (Hollow Water First Nation). 2020. Information Request Responses - Technical Review: Optional Feedback Form- Hollow Water First Nation

Manitoba Transportation and Infrastructure. 2016. MTI Integrated Pest Management Plan (IPM), 11pp

Olson and Firelight Research Inc., R. 2020. Little Saskatchewan First Nation Knowledge and Resource Use Study for MTI's Proposed Lake Manitoba and Lake St. Martin Outlet Channels Project.

Tam, Jordan, Firelight Research Inc. with Pinaymootang First Nation. 2022. Traditional Knowledge and Resource Use Study Specific to Manitoba Infrastructure's Proposed Lake Manitoba and Lake St. Martin Outlet Channels Project. Prepared for Pinaymootang First Nation.

QUESTION IAAC-R3-03

Referenced Round 2 IR(s): IAAC-R2-25, EA of LSMOC Temporary Winter Construction Road

Expert Dept. or group: IAAC
Interlake Reserves Tribal Council
Pinaymootang First Nation
Poplar River First Nation
Sagkeeng Anicinabe First Nation

EIS Guideline Reference: 7.1.5 Fish and fish habitat

7.1.7 Riparian, Wetland and Terrestrial Environments

7.1.8 Migratory birds and their habitat

7.1.9 Species at Risk

7.1.10 Indigenous Peoples

7.2.3 Changes to riparian, wetland and terrestrial environments

7.3.2 Migratory birds

7.3.5 Species at risk

7.4 Mitigation measures

7.6.3 Cumulative effects assessment

9. Monitoring and Follow up

Context and Rationale

The EIS Guidelines require the Proponent to assess the Project's potential cumulative effects on the VCs most likely to be affected by the Project and other projects and activities, including fish and fish habitat, migratory birds, species at risk, surface water and groundwater quality and quantity, and Indigenous Peoples' current use and rights. The Proponent is required to identify the sources of potential cumulative effects and specify other projects or activities that have been or that are likely to be carried out that could cause effects on each selected VC within the boundaries defined, and whose effects would act in combination with the residual effects of the Project. Water management systems and natural and controlled flood events, including flooding that occurred in the Interlakes Region in 2011, are required to be considered as projects or activities that are sources of potential cumulative effects.

Question IAAC-R3-03
October 27, 2023

The EIS Guidelines require the Proponent to assess plant and animal species (abundance, distribution and diversity) and their habitats, with a focus on species at risk or with special status that are of social, economic, cultural or scientific significance. The EIS Guidelines also require the Proponent to describe changes to critical habitat for federally listed species at risk, changes to habitat connectivity, and changes to shorelines and riparian areas. The EIS Guidelines require the Proponent to identify any potential direct and indirect adverse effects to migratory birds or their habitat, including staging and nesting areas, foraging grounds, and landing sites. The assessment should consider changes to the environment that may affect local movement and seasonal habitat use, any direct habitat loss, the potential for habitat fragmentation, loss of connectivity or other change causing a reduction of habitat quality. The EIS Guidelines require the Proponent to assess the potential effects of the Project on federally listed species at risk and their critical habitat, including the direct and indirect effects on the survival or recovery of federally listed species.

Emergency Outlet Channel

The Proponent states in the response to IAAC-R2-25 that the Emergency Outlet Channel (EOC) has never been considered a component of the Project, however, there remains uncertainty in terms of the spatial and temporal boundaries of the EOC components that are considered either a part of the Project scope (for example, portions of Reach 3, and the Temporary Winter Access Road originally built to access Reach 3), or a separate foreseeable future project.

The Proponent states that “the final decision on EOC decommissioning and reclamation activities, or other possible outcomes, will depend on input from consultation.” The Proponent expects that follow-up program objectives for the EOC decommissioning and post-construction reclamation of the LSMOC could be coordinated, however there is uncertainty about the reclamation plan or timing, and its cumulative effect on fish and fish habitat, migratory birds, species at risk, surface water and groundwater quality and quantity, and Indigenous Peoples’ current use and rights. While the Proponent notes that decommissioning the EOC is intended to result in a positive change by returning the EOC’s disturbed lands to a natural state, the positive effects pathway is not elaborated or connected to attributes of planned reclamation activities.

Temporary Winter Construction Road

In the Environmental Assessment of the LSMOC Temporary Winter Construction Road (TWCR), the Proponent states that “while use of the TWCR would result in some very local, long term, but reversible changes to wetland hydrology due to peat compression, and some temporary sensory disturbance to wildlife, the local environment would begin reverting back to pre- Project conditions once use of the road ceased at the end of Year 1 of construction”. Uncertainty remains as to the timing of reclamation activities and mitigations for the fragmentation of wildlife habitat, in connection with the timing of LSMOC construction after Year 1 and during commissioning. The Proponent notes that the TWCR does not cross any reserves or lands identified for Treaty land entitlement and no Crown-leased land parcels are crossed by the TWCR, and therefore minimal disruption to the ability to exercise Indigenous rights is anticipated.

Question IAAC-R3-03
October 27, 2023

Uncertainty remains as to the duration of disruption, and the management of access before and during use and reclamation of the TWCR.

Clarification of Foreseeable Future Project Timing

It is unclear if rehabilitation of Provincial Trunk Highway 6 (PTH 6) and upgrades to the Lake St. Martin access road listed as reasonably foreseeable future projects have been completed as of now, as this information is not readily available from publicly available sources. If those projects are currently completed, they should be noted as past/present physical activities.

Information Requests

a. Clarify the planned disposition and timing of activities related to the EOC and provide an updated cumulative effects assessment incorporating the current and future condition of the channel and any activities associated with it.
    i. Provide timelines and details of how engagement with Indigenous groups and the public will be carried out, and how information gained during engagement may be used to guide decommissioning and reclamation work.
b. Provide information about the positive effects pathway associated with reclamation of the EOC, including details of the reclamation plan that support associated effects criteria.
c. With respect to the duration and extent of habitat fragmentation within the LSMOC Local Assessment Area (LAA), provide further information about coordination of EOC decommissioning and post-construction reclamation of the LSMOC, including anticipated timing and spatial extent.
d. With respect to the duration and extent of habitat fragmentation, and effects to current use and rights within the LSMOC LAA, provide further information about the timing of decommissioning of the TWCR (located to the south of the LSMOC Right of Way [ROW], and aligned with Reach 3 of the EOC), and provide information about decommissioning activities that will be undertaken.
e. Provide an updated list of reasonably foreseeable future projects.

Question IAAC-R3-03
October 27, 2023

Response IAAC-R3-03

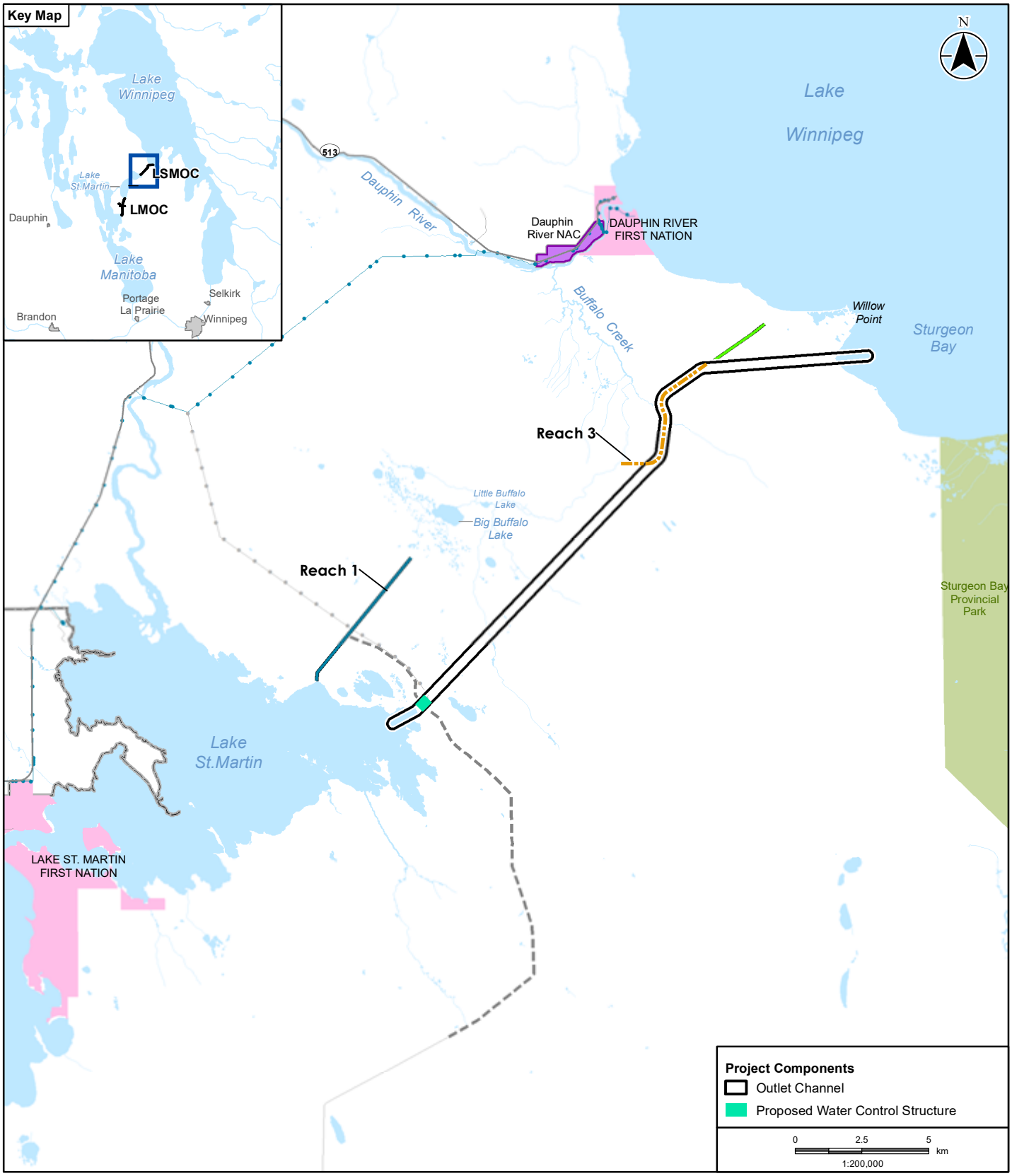
a. **Planned disposition and timing of activities related to the EOC and updated cumulative effects assessment incorporating the current and future condition of the channel**

Preamble

In addition to the July 2023 response to Information Request (IR) IAAC-R2-25, information about the decommissioning of the Emergency Outlet Channel (EOC) is discussed in the May 2022 response to IR IAAC-R1-29 and IAAC-R1-130. The EOC is also discussed in Volume 1, Section 2 of the Project Environmental Impact Statement (EIS), and in Section 3 it is noted that the Project scope does not include decommissioning of the existing upstream (Reach 1) portion of the EOC Reach 1, and that the downstream portion of the Lake St. Martin Outlet Channel (LSMOC) will pass through a portion of the EOC (Reach 3). Section 3 also notes that it is assumed that the EOC would only be used in the future under exceptional declared emergency conditions, but it would not form part of the operational Project regime. Figure IAAC-R3-03-1, reproduced from Figure IAAC-130-1, is provided below to assist understanding here of the location of the EOC relative to that of the LSMOC.

The responses to IR IAAC-R1-29 and IAAC-R1-130 explain that a decision has been made by Manitoba Transportation and Infrastructure that the EOC is to be decommissioned following commissioning of the LSMOC and reiterates that it would be available as required, on an emergency basis, to manage flooding prior to this time. The response to IR IAAC-R1-130 summarizes decommissioning and reclamation activities to the extent of details currently available, including the spatial extent of components to be decommissioned. It also provides an assessment of potential effects.

The response to IR IAAC-R2-25 notes that the details on decommissioning and reclamation activities would be finalized based on input from engagement activities and confirms that decommissioning of the EOC's Reach 1 and portion of Reach 3 would not occur until after the Project is commissioned. It also notes that the physical activity of this decommissioning is intended to result in a positive change by returning the disturbed lands to a natural state reflective of the surrounding environment.



Legend

- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Emergency Outlet Channel (Reach 3)
- Reach 3 Emergency Outlet Channel Deflector Dike
- Lake St.Martin Access Road
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Municipal Road
- Rural Municipality
- Northern Affairs Community (NAC)
- First Nation
- Provincial Park

Notes

1. Coordinate System: WGS 1984 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure
3. Last Update: 9/8/2021 3:49:45 PM

Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Location of Lake St.Martin Emergency Outlet Channel in Relation to the Proposed Permanent Outlet Channel

Figure IAAC-R3-03-1

G:_GIS_Project_Folder\11475120\figures_IR\Surface Water\MI_Map_IAAC_130-1_EmergencyOutletChannel.mxd

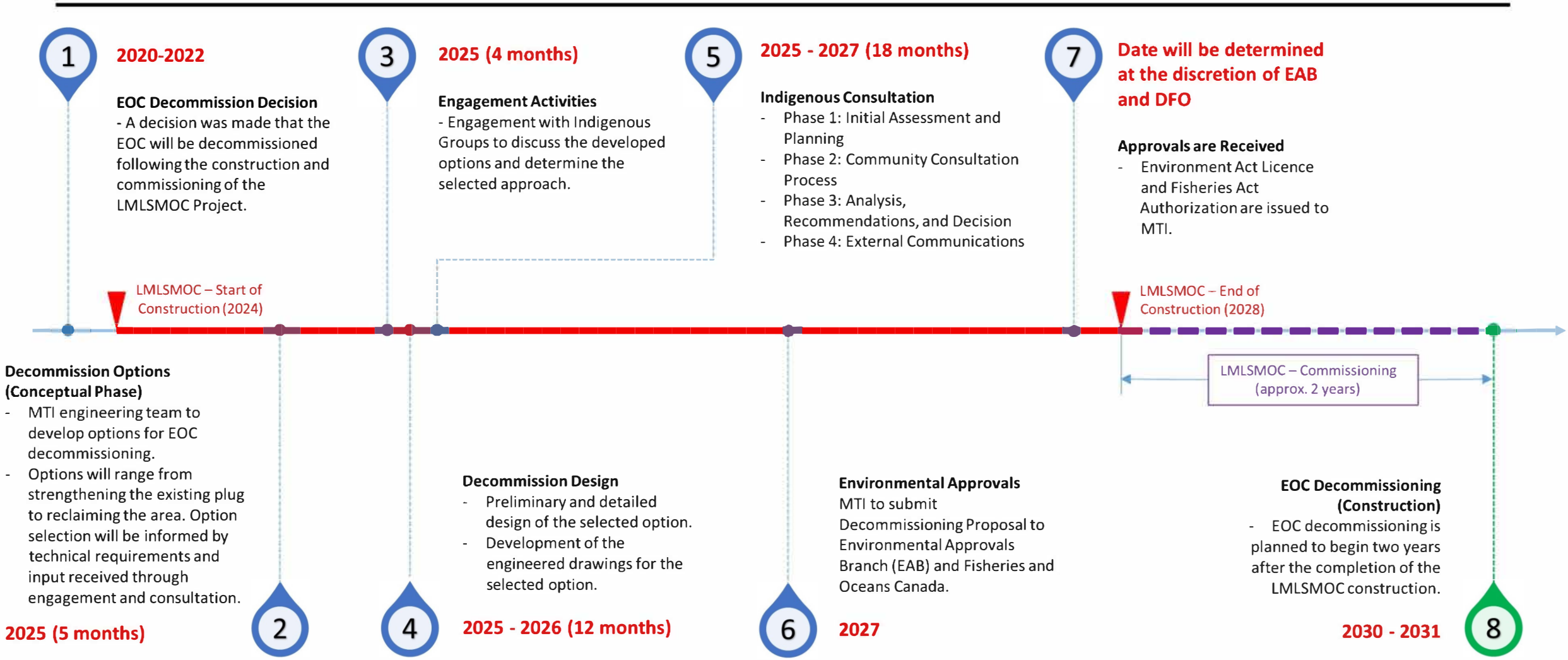
Disposition and Timing of Activities

Figure IAAC-R3-03-2 provides a summary of the current plan for the decommissioning of the EOC. Decommissioning options will be developed in 2025 in preparation for an engagement process that will help to shape the scope of the decommissioning activities. At the present time, the descriptions of various decommissioning activities remain as provided in the response to IR IAAC-R1-130. The end land use objective of the decommissioning is to reclaim to current conditions representative of the adjacent landscape. An existing access road will be used to access the EOC Reach 1, with vehicle traffic being similar to that for the LSMOC construction. It is expected that the EOC bottom would be filled with till and peat from the dikes and spoil stockpiles adjacent to the EOC. Fill material would be graded to level with surrounding terrain and to restore natural drainage, to the extent possible. Options ranging from enhancement to reclamation of the EOC will be identified and assessed through engagement and consultation processes with local Indigenous groups. These enhancements may include the construction of wetlands and ponds for wildlife habitat and strategic planting of traditional medicinal plants and herbs, as well as trees for birds.

As indicated, further details on the various decommissioning activities will be developed through 2025, as input on options is gathered in the engagement process, with a preliminary design intended to be developed in 2026 that will be used for the Indigenous Consultation process.

Once a final decision has been reached, the last phase will involve Manitoba Transportation and Infrastructure sharing the results with the impacted Indigenous groups from the engagement process and explain whether and how each specific concern raised was and/or will be addressed. This may include follow-up meetings with Indigenous groups to discuss the decision and accommodation measures.

The Consultation process is expected to conclude in 2027, at which time, if required, an application for a provincial licence under *The Environment Act* would be made. EOC decommissioning will not commence until the proposed Project has been successfully commissioned so the EOC can be available to manage a flooding emergency, if required, prior to the proposed Project being ready. Assuming the proposed Project receives approvals in early 2024, the Project commissioning is anticipated to be complete in spring 2027. EOC decommissioning is anticipated to take approximately 16 months and finish in the fall of 2031.



* Listed above are tentative dates based on MTI's most accurate estimate based on similar projects.

** Decommissioning of the EOC is contingent upon receipt of provincial and federal environmental approvals for the Lake Manitoba and Lake St. Martin Projects and environmental approvals for the decommissioning of the Emergency Outlet Channel (EOC) and dates below are subject to change depending on the timelines of those approvals.

*** The EOC is not a component of the proposed Lake Manitoba and Lake St. Martin Outlet Channels (LMLSMOC) Project.

Figure IAAC-R3-03-2 Anticipated EOC Decommissioning Timeline

Updated Cumulative Effects Assessment

Other than the information provided above, there is no further information currently available to update the cumulative effects assessment described in the response to IR IAAC-R1-130. A dominant factor in minimizing potential cumulative effects is the lack of temporal overlap between Project activities and EOC activities, other than some minor operation activities in the LSMOC that, due to spatial separation, also remain unlikely to contribute to cumulative effects. As indicated, this separation in time is by design, from a flood protection perspective. The proposed Project will be a feature of the baseline environment during the potential provincial environmental assessment of the EOC decommissioning and any potential adverse effects and any cumulative effects will be addressed at that time.

i. Provide timelines and details of how engagement with Indigenous groups and the public will be carried out, and how information gained during engagement may be used to guide decommissioning and reclamation work.

Engagement Activities

Engagement is an integral component of effective planning, particularly for complex projects. The primary goal of the engagement process is to provide meaningful opportunities to generate dialogue and exchange information about the proposed activity and potentially affected Indigenous groups. The engagement process with Indigenous groups usually consists of the following three phases:

1. Introduction and discussion of conceptual design options, selection criteria, and engagement, consultation, and regulatory processes.

2. Review and discuss the options, benefits, and costs of each, as well as comments and concerns from Indigenous groups.

3. Present results of the selection process (preferred option) and rationale. Gather any feedback and discuss consultation process to follow.

It is important to note that the steps above describe a standard engagement process; however, Manitoba Transportation and Infrastructure is committed to maintaining respectful and meaningful engagement with Indigenous groups throughout the Project lifecycle. Manitoba Transportation and Infrastructure recognizes the importance of building trust and understanding between parties and believes that early engagement is key to achieving that goal. Having meaningful conversations and engaging with Indigenous groups throughout all phases of the Project lifecycle is critical so that the interests and concerns of Indigenous groups and potentially affected stakeholders are heard and addressed.

Consultation Activities

As shown in Figure IAAC-R3-03-2 (Step 5), the consultation process for the EOC decommissioning will involve the following four phases.

a. Phase 1 (Initial Assessment and Planning) will involve the following steps:

   1. develop initial assessment and plan for the EOC decommissioning
   2. establish Steering Committee for the decommissioning (if required)
   3. Steering Committee will determine scale and scope of consultation (if required)
   4. conduct an initial contact for Indigenous groups that are potentially affected
   5. of those groups contacted, leadership for each Indigenous groups will determine their interest in participation and will consider Manitoba Transportation and Infrastructures assessment of impacts to Aboriginal or treaty rights

   Phase 1 would begin with Manitoba Transportation and Infrastructure developing an Initial Assessment to evaluate anticipated adverse effects of the Project on Aboriginal and treaty rights of the Indigenous groups and plan for the appropriate level of consultation going forward. This process evaluates whether the Province of Manitoba's Duty to Consult is triggered and establishes a path forward to assess the consultation protocols held by the province or jointly signed with the Indigenous groups. If the Duty to Consult is triggered, and using the Initial Assessment as a roadmap, Manitoba Transportation and Infrastructure will propose a timeline, consultation process, budget, and records management plan for the consultation.

b. Phase 2 (Community Consultation Process) will involve the following steps:

   1. share information and begin discussions to build an understanding of Indigenous concerns regarding the decommissioning of the EOC
   2. develop and implement consultation plans and budgets with Indigenous groups and leaders
   3. engage in two-way dialogue with the Indigenous groups regarding concerns and proposed accommodations for EOC decommissioning
   4. document concerns and propose accommodations for EOC decommissioning

   In Phase 2, depending on the level of consultation, a community-specific consultation process with each Indigenous group is planned and carried out. These processes range from low level engagement to high levels of consultation.

c. Phase 3 (Analysis, Recommendations and Decision) will involve the following steps:

   1. review and analysis of information collected during the consultation and/or engagement for the EOC decommissioning

   2. further engagement and consultation dialogue (if required) with Indigenous groups to verify and respond to community concerns and proposed accommodations

   3. conduct internal reporting of results of consultation processes to Crown decision-makers for the EOC decommissioning

   4. Crown will make a decision regarding adequacy of consultation and whether the proposed action for decommissioning the EOC will be approved

   Phase 3 is an analysis and reporting phase wherein Manitoba Transportation and Infrastructure will review concerns and prepare a final report for the Crown decision-maker. Within this report, Manitoba Transportation and Infrastructure will compile all the concerns and match those impacts to proposed accommodation/mitigations.

d. Phase 4 (External Communications) will involve the following steps:

   1. communicate with each Indigenous group, the results of the decision

   2. communicate with each Indigenous group regarding concerns heard in the consultation process

   3. address how each Indigenous group's input was incorporated into the decision

   4. address how the concerns were (or will be) addressed or accommodated

b. **Provide information about the positive effects pathway associated with reclamation of the EOC, including details of the reclamation plan that support associated effects criteria.**

As noted above and in the response to IR IAAC-R1-130, the currently intended end land use objective of the decommissioning of the EOC is to reclaim to current conditions representative of the adjacent landscape. That response indicates that the physical activity of decommissioning the EOC is intended to result in a positive change by returning its disturbed lands to a natural state, which is noted again in the response to IR IAAC-R2-25. It is generally understood and accepted that such actions constitute a benefit or "positive effect" in the parlance and practice of environmental assessment. As stated above, there are no further details available on the reclamation plan until an EOC-specific engagement process is carried out. It is anticipated that the overall goal would be to establish positive changes to the environment relative to current conditions, an outcome to be confirmed or modified as the aforementioned decision-making process further refines the scope of decommissioning/reclamation activities.

c. **With respect to the duration and extent of habitat fragmentation within the LSMOC Local Assessment Area (LAA), provide further information about coordination of EOC decommissioning and post- construction reclamation of the LSMOC, including anticipated timing and spatial extent.**

A new (relative to the previous response) reclamation detail exists between the Project and EOC decommissioning activities. Manitoba Transportation and Infrastructure originally considered using peat moss from Project excavation for subsequent use in EOC decommissioning. However, according to the timeline provided in part a above, decommissioning of the EOC is expected to take place two years after construction of the Project is complete. This means that there will be an approximately 6-to-8-year gap between the Project peat moss excavation and the revegetation phase of the proposed EOC decommissioning. This gap may render the peat moss from the Project unsuitable for EOC decommissioning since that material loses its integrity over time (i.e., degrades in quality acceptable for reclamation use). However, peat moss material resulting from Project excavation will be used for revegetation required for that same Project. A revegetation plan for the EOC decommissioning will be advanced in the preliminary and detailed design phases as shown in the timeline provided for part a.

d. **Further information about the timing of decommissioning of the TWCR (located to the south of the LSMOC Right of Way [ROW], and aligned with Reach 3 of the EOC), and information about decommissioning activities that will be undertaken. With respect to the duration and extent of habitat fragmentation, and effects to current use and rights within the LSMOC LAA.**

The July 24, 2023, Cover Letter to Impact Assessment Agency of Canada (IAAC) introducing the responses for the Round 2 IRs noted that one of the design updates was to use an existing temporary construction road located east of the LSMOC to access the northern portion of the LSMOC for clearing and excavation work. Attachment 1 to that submission provides a screening level assessment of the planned temporary use of the LSMOC Temporary Winter Construction Road (TWCR) and confirms that this activity would not change conclusions already stated in filings to-date.

The May 2023 (and March 2020) Project Description Update provides a list of Associated Works and Activities that includes temporary access routes via existing roads, which would include the TWCR. The aforementioned environmental screening references Section 3.4.3.8 of the May 2023 Project Description Update, which states that the existing 14 km (8.7 miles (mi)) TWCR located several kilometers east of the LSMOC will be used for a single season during the first year of construction to access the northern portion of the LSMOC for clearing and peat excavation, but only during winter months. It also notes that it is not anticipated that this TWCR will be maintained for long-term operation or maintenance uses once the roads within the Project rights-of-way (i.e., paralleling the LSMOC channel) are established.

The TWCR was constructed starting in December 2011 to facilitate construction of the downstream portion (Reach 3) of the EOC to address the regional flooding that was occurring. After Reach 3 of the EOC was constructed, the TWCR was blockaded with large boulders in March 2012. No

development or construction has occurred northwards on the remaining length of the TWCR. A drone flyover in June 2021 verified that the TWCR was suitable for winter use without requiring further clearing. It has appeared on previous Project-related figures (in the Project EIS and IR responses) as a feature on the landscape but is not a Project component.

As indicated, there are no plans to use the TWCR after that first winter use after which the barricade boulders will be returned. As its construction was part of the Reach 3 of the EOC, details regarding decommissioning activities would be defined through the process described above. This process will involve input from Indigenous groups and would define the duration and extent of habitat fragmentation, and effects to current use and rights, including those within the LSMOC component of the Project local assessment area. As indicated above, the EOC decommissioning would not occur until the Project is commissioned, but it has been evaluated as part of the Project cumulative effects assessment in the response to IR IAAC-R1-130.

e. **Updated list of reasonably foreseeable future projects.**

Table IAAC-R3-03-1 below provides an updated list of reasonably foreseeable projects from the version provided in the May 2022 response to IR IAAC-R1-124, Table IAAC-124-1 Other Projects and Physical Activities for Consideration of Cumulative Environmental Effects. Table IAAC-124-1 provided information on the Cumulative Effects Project Inclusion List, which also includes Past and Present projects. Table IAAC-R3-03-1 is a subset of this previous table, reflecting deletion of two Roads and Trails projects; specifically, Rehabilitation of Provincial Trunk Highway 6, and, Upgrade of Lake St. Martin Access Road. These have been removed because those projects are now complete.

Confirmation of the extent of changes to reasonably foreseeable projects was made by Manitoba Transportation and Infrastructure following a review of various relevant sources of information regarding public, industry, municipal and other project proponent activities within the regional assessment areas (RAAs) for this Project. These sources included Manitoba Transportation and Infrastructure's current and planned activities, and other provincial, federal and municipal ministries and governments. No reasonably foreseeable projects were identified that were not previously identified as a completely new physical works or new physical activities. Some minor physical activities were identified; however, they constituted typical repair, maintenance and upgrades on existing public infrastructure. Due to their immediate proximity to those physical works and application of routine and/or conventional mitigation, they are not expected to cause measurable effects that may cumulatively interact with the Project, and no update to the Project cumulative effects assessment reflecting these is therefore deemed necessary.

Table IAAC-R3-03-1 Updated Reasonably Foreseeable Future Projects

General Category of Projects or Physical Activity	Specific Project or Activity	Description
Reasonably Foreseeable Future		
Infrastructure	Flood Control	Replacement of the fish ladder at the Fairford River Water Control Structure Maintenance and repairs on the Portage Diversion Channel.
	EOC Decommissioning	The EOC will be decommissioned once the LSMOC is commissioned.
Quarries and Borrow Pits	Borrow and Rock for Construction	Locations and timing are not defined but there are potential sites in the RAA. Some are expected to be used during construction of the Project. Proponents are currently unknown.

QUESTION IAAC-R3-04

Referenced Round 2 IR(s): IAAC-R2-02, IAAC-R2-04, IAAC-R2-13, IAAC-R2-16, IAAC-R2-17

Expert Dept. or group: ECCC
Fisher River Cree Nation
IAAC
Interlake Reserves Tribal Council
Misipawistik Cree Nation
Poplar River First Nation
RM of Grahamdale
Sagkeeng Anicinabe First Nation
Sandy Bay Ojibway First Nation

EIS Guideline Reference: 7.1.7 Riparian, Wetland and Terrestrial Environments

7.1.8 Migratory birds and their habitat

7.1.9 Species at Risk

7.2.3 Changes to riparian, wetland and terrestrial environments

7.3.2 Migratory birds

7.3.5 Species at risk

7.4 Mitigation measures

9. Monitoring and Follow up

Context and Rationale

The EIS Guidelines require the Proponent to assess plant and animal species (abundance, distribution and diversity) and their habitats, with a focus on species at risk or with special status that are of social, economic, cultural or scientific significance. The EIS Guidelines also require the Proponent to describe changes to critical habitat for federally listed species at risk, changes to habitat connectivity, and changes to shorelines and riparian areas. The EIS Guidelines require the Proponent to identify any potential direct and indirect adverse effects to migratory birds or their habitat, including staging and nesting areas, foraging grounds, and landing sites. The assessment should consider changes to the environment that may affect local movement and seasonal habitat use, any direct habitat loss, the potential for habitat fragmentation, loss of connectivity or other change causing a reduction of habitat quality. The EIS Guidelines require the Proponent to assess the potential effects of the project on federally listed species at risk and their critical habitat, including the direct and indirect effects on the survival or recovery of federally listed species.

Question IAAC-R3-04
October 27, 2023

Wetland Habitat and Offsetting

IAAC-R2-02 refers to EIS Section 8.3.6.2 which discusses overall wetland habitat reduction and potential effects to a broad range of wildlife (including waterfowl, marsh birds and Least Bittern, Yellow Rail and Northern Leopard Frog). The Proponent states that water quality monitoring will be coordinated between the Surface Water and Groundwater Management Plans and Aquatic Effects Monitoring Plan and that the Wetland Monitoring Plan will monitor for changes in wetland function in IAAC-R2-04. The Proponent notes that "threshold exceedances will be cause for notification to the wetlands monitoring team for incorporation into their assessment and to inform recommendations made to Manitoba Transportation and Infrastructure for decision-making". The Wetland Monitoring Plan discusses monitoring changes in wetland habitat form and function to assess changes to wildlife habitat suitability for species at risk. All wetland-associated species at risk and migratory birds should be included in the Wetland Monitoring Plan, including details on thresholds and associated actions for these species.

The response to IAAC-R2-13 states that the Wetland Offsetting Program includes measures taken to enhance, restore or preserve those wetlands that cannot be effectively mitigated and are either:
a) defined under the provincial The Water Rights Act as Class III, Class IV and V, or; b) peatlands that are affected by the proposed Project. The proposed Project will directly affect 239 ha of Class III, IV, and V wetlands and 531 ha of peatlands. The Proponent commits to achieving no net loss of Class III wetlands and peatlands and plans to provide offsetting for Class IV and V wetlands.

Table IAAC-R2-13-1 'Wetland Dependent Species Anticipated to be Affected by Potential Loss and/or Alteration to Wetlands within the Project Development Area (PDA), and Acts the Species are Protected Under' lists four species at risk that will be impacted by wetland habitat loss/alteration. To better understand potential effects to migratory birds and species at risk, additional information is required including how loss of Class II wetlands habitat for Yellow Rail will be mitigated, and how the Proponent will accomplish no net loss of wetlands.

The Proponent indicates that the Wetland Monitoring Plan will be used to determine if mitigation is not feasible for specific wetland sites and if so, offsetting may be considered in these cases. The Proponent states that the selected sites for wetland offsetting will be protected, enhanced, or restored. To better understand potential effects to migratory birds and species at risk, additional information on wetland offsetting ratios is required to achieve the objective of no net loss. It is unclear whether re-watering techniques are considered as a mitigation for the Wetland Offsetting Program. The Agency agrees with Environment and Climate Change Canada's recommendation regarding offsetting Class II wetlands, in addition to Class III, IV, V wetlands and peatlands. When determining appropriate offsetting ratios, functionality of the wetlands in question needs to be factored in and documented.

Appendix IAAC-R2-20-1 Wetland Monitoring Report, Table 1-1 'Standards and Benchmarks for Monitoring Parameters' outlines the mechanisms that will trigger adaptive management for wetlands that could be indirectly impacted by the Project. More detail is required for each wetland-dependent species at risk to all assessment of potential effects. The Wetland Monitoring Plan highlights Least Bittern, Yellow Rail, and Northern Leopard Frog as the species at risk most likely to be impacted by the Project.

However, detail on thresholds and associated actions for all wetland-associated species at risk and migratory birds is critical to understanding the effectiveness of the Wetland Monitoring Plan.

Northern Leopard Frog Habitat

The Proponent states in the response to IAAC-R2-16 that the LMOC Project Development Area (PDA) will directly affect some Northern Leopard Frog habitat in the LAA, potentially reducing western movements of Northern Leopard Frog from overwintering sites in the east. The Proponent states that the impact is not significant as all habitats continue to be abundant and contiguous in the landscape. The Proponent does not provide mitigation for habitat fragmentation and the physical barriers during operations that will be caused by the proposed Project. The Proponent has not provided evidence that the smaller armouring material will not impact the ability of Northern Leopard Frog to move across the channel in non-use years.

The Proponent states that the effects of extending the inlet and outlet structures will have negligible effects on species at risk and migratory birds. The Proponent concludes the effects of increasing the inlet and outlet structures on habitat availability are localized, low in magnitude, and not significant (i.e., effects are not expected to threaten the viability of a species at risk or migratory bird species in the regional assessment area). The Proponent has determined that there is overwintering habitat for Northern Leopard Frogs near the LMOC inlet and the Agency notes that advice from Environment and Climate Change Canada indicates a potential for snapping turtles to be within the same area. To better understand potential effects to species at risk, additional information is required on how the expansion of the inlet/outlet structures may impact overwintering habitat and how it may alter the compensation area considered for wetland offsetting.

Information Requests

a. Quantify Class II wetlands directly affected by the Project.

b. Describe how loss of Yellow Rail habitat (Class II wetlands) will be mitigated.

c. Update the Wetland Compensation Plan to include offsetting for peatlands, Class II wetlands, and other details provided in the response to IAAC-R2-13.

    i. The offsetting ratios for Class II, III, IV, and V wetlands, as well as peatlands, should be included in an update to the response to IAAC-R2-13, as well as in an updated version of the Wetland Compensation Plan. Taking into consideration the functionality of wetlands where mitigation is not feasible, factor in and document appropriate offsetting ratios to meet the objective of no net loss.

d. Quantify habitat suitability and produce habitat maps in the Wetland Monitoring Plan for all wetland-dependent species at risk prior to construction (i.e., similar to Figure IAAC-R2-16-1, Figure IAAC-R2-16-2 and Figure IAAC-R2-16-3 for Northern Leopard Frog).

e. Provide mitigation measures to address the effects of habitat fragmentation and physical barriers impacting Northern Leopard Frog.

    i. Provide information about the feasibility of providing periodic vegetated access points in the rock armouring to improve wildlife passage across the channel.

f. Provide a table in the Wetland Monitoring Plan or Wetland Monitoring Report that describes the decision points and benchmarks that will be used to monitor effects to each wetland-dependant species at risk (wildlife and plant species) impacted by the Project (i.e., for each species, what changes in wetland and water quality conditions will signal that adaptive management should be implemented). Include all wetland-dependent species at risk and migratory birds in addition to Least Bittern, Yellow Rail, and Northern Leopard Frog, which are already identified in the Wetland Monitoring Plan. Plant species assessments need to be ecologically relevant to species at risk and migratory bird species already listed who share the same habitat.

g. Explain if the revised shoreline near the channel inlets and outlets alters the compensation areas identified for wetland offsetting (Wetland Monitoring Plan, Table 2). If so, revise the Wetland Compensation Plan as needed.

Response IAAC-R3-04

a. **Quantification of Class II wetlands directly affected by the Project.**

The total amount of Class II wetlands directly affected by the Project is 73.4 hectares (ha) (181.4 acres [ac]).

b. **Description of how loss of Yellow Rail habitat (Class II wetlands) will be mitigated.**

As noted in the May 2022 response to IR IAAC-R1-54, the Project was designed to avoid wetlands and species at risk (SAR) habitat for species such as yellow rail (*Coturnicops noveboracensis*), where feasible. Volume 1, Section 2.4.2.1 and 2.4.2.2 of the Project Environmental Impact Statement (EIS) describes the process, including the alignment of the Lake St. Martin Outlet Channel (LSMOC) to avoid much of the Buffalo Lake Bog, and the movement of a proposed alignment of the Lake Manitoba Outlet Channel (LMOC) to reduce the potential interaction with these wetland complexes and yellow rail habitat.

The Stewart and Kantrud Wetland Classification System (Stewart and Kantrud 1971), which is associated with *The Water Rights Act*, characterizes Class I and II wetlands as being short-lived wetlands. Class I wetlands are those retaining water for one week or less, mainly existing in spring after winter snow melts or large rain events, and typically supporting vegetation such as Kentucky bluegrass, goldenrod, and forbs. Class II wetlands are those retaining water for one week to one month, mainly existing in spring after winter snow melts or large rain events, and typically supporting vegetation such as fine-stemmed grasses, sedges, and forbs (Stewart and Kantrud 1971).

Question IAAC-R3-04
October 27, 2023

Volume 3, Section 8.2.1 of the Project EIS notes that in Manitoba the construction of water control works that temporarily or permanently alter the level or flow of water in a waterbody, including wetlands is regulated by *The Water Rights Act*, and that it was amended in 2018 to include wetland offsetting requirements for wetland loss (Government of Manitoba n.d.). The alteration or loss of Class III (seasonal) wetlands would require a license and a restoration or enhancement plan prior to disturbance for some proponents. The proposed Project is exempt from the licensing requirement in *The Water Rights Act* under clause 3(2)(a), since the Act does not apply to a person exercising a right under any other Act of the Legislature.

In the July 2023 response to IR IAAC-R2-13, Manitoba Transportation and Infrastructure notes that the Project is exempt under *The Water Rights Act* from offsetting (enhancement, restoration or preservation; also known as wetland compensation) for the loss or alteration of any wetlands. Regardless, Manitoba Transportation and Infrastructure is voluntarily providing offsetting in alignment with the intent of the Act by incorporating compensation for Class III, as well as for IV and V wetland habitat (not specified in the Act); for more information, see the Wetland Compensation Plan (WCP), as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs. The WCP addresses wetland sites that are directly affected by the Project and cannot be fully mitigated, consisting of a total of 1,008 ha, comprised of 239 ha (590.6 ac) for Class III, IV, V wetlands (199.1, 39.6, and 0.8 ha [492.0, 97.9, and 2.0 ac] respectively), plus 769 ha (1,900 ac) for peatlands.

The response to IR IAAC-R2-13 states that results arising from the Wetland Monitoring Plan (WetMP), which was filed as part of the June 2022 supplemental information response to IAAC Round 1 Information Requests (IRs), will be used to evaluate whether functional changes to wetlands adjacent to the Project are occurring; if changes are occurring, there will be an evaluation to determine whether appropriate mitigation options for Project-related effects are required. No-net-loss offsetting for identified wetland types will not be provided for Class I and II wetlands largely because they have very short-term surface water retention times and are not identified in legislation as requiring mitigation or follow-up. While it was mentioned in IAAC-R1-54 that yellow rail prefers Class II wetlands, this needs to be qualified by identifying that yellow rail may only potentially use this habitat in certain years and under certain water conditions as this species occurrence is highly influenced by water levels (COSEWIC 2009). Yellow rail require marsh habitat that remains wet throughout the breeding season and that typically comprises sedges, grasses, and rushes (COSEWIC 2009). The lead hydrologic forecaster for Manitoba indicated that in 90% of years, snow melt in Manitoba's Interlake region is complete by April 30 or May 1 (Unduche pers. Comm. 2023). Yellow rails migrate into Manitoba in June (Environment Canada 2013). Class II wetlands, therefore, will typically dry up before yellow rail initiate nesting in the region in 90% of years. For an estimated 10% of the time, there will be wet spring seasons where Class II habitat may retain water into the breeding season. Class II wetlands may be suitable for Yellow Rail in wet years (less than 10% of the time); however, they provide lower suitability breeding habitat for yellow rail and other migratory birds compared to graminoid marsh associated with Class III, IV, and V largely due to greater water permanence and preferred vegetation structure. This is supported by recent monitoring conducted as part of Manitoba Transportation and Infrastructure's Wetland Monitoring Program which only detected

yellow rail in Class IV wetlands (WSP 2023). These survey results were submitted with Round 2 responses on July 24, 2023.

As such, mitigation or offsetting of potential effects on ephemeral Class I and temporary Class II wetlands are not being provided. Offsetting will focus on Class III, IV and V wetland habitats for reasons outlined above. Classes III and IV, in particular, represent areas having the greatest probability of occupancy by yellow rail and other wetland SAR (e.g., northern leopard frog [*Lithobates pipiens*]).

c. **Updates for the Wetland Compensation Plan that include offsetting for peatlands, Class II wetlands, and other details provided in the response to IAAC-R2-13.**

   i. **The offsetting ratios for Class II, III, IV, and V wetlands, as well as peatlands and an updated version of the Wetland Compensation Plan.**

   The response to IR IAAC-R2-13 was updated in the version sent to IAAC on July 24, 2023. It did not include an offsetting ratio for Class II wetlands due to their highly ephemeral nature. Use of Class II wetlands by SAR can be highly variable, with greater potential for SAR occupancy during wet years and lower potential during normal to dry years. As such, Class II wetlands are not being offered as an accommodation (see response to part a and b). As noted in the response to part b, efforts were made during Project planning to mitigate potential effects to wetland areas. The Wetland Offsetting Program addresses wetland sites that are directly affected by the Project in a way that cannot be fully mitigated. As indicated, this includes a total of 1,008 hectare (ha) (2,491 acres (ac)), consisting of 239 ha (590.6 ac) for Class III, IV, V wetlands plus 769 ha (1,900 ac) for peatlands. The responses to Part a and b provide the rationale for excluding Class II wetlands in the Wetland Offsetting Program. Results arising from the WetMP will be used to evaluate functional changes to adjacent waterbodies and to determine if there are appropriate mitigation options to address Project-related effects such as drawdown and whether additional offsetting may be required.

   For wetlands that are receiving offsetting in a manner consistent with *The Water Rights Act*, the ratio of offsetting will depend on whether the Class III, IV, or V wetland directly affected by the Project is being restored, enlarged, enhanced or receiving permanent protection. Ratios that are listed in the WCP are as follows:

   - Restore or enlarge an existing wetland – offset at a ratio of 2:1.
   - Enhance or permanent legal protection – 3:1.

   In addition, peatland offsetting will be applied at a 3:1 ratio in a manner defined by Manitoba Natural Resources and Northern Development (MNRND). Peatlands are a predominant wetland type (bogs, fens and swamps) in the Project region that are not regulated under *The Water Rights Act.* The *Peatland Stewardship Act* does regulate peatlands for resource users such as peat harvesters. While neither Act require Manitoba Transportation and Infrastructure to provide any form of offsetting for wetlands, Manitoba Transportation and Infrastructure has decided to provide peatland offsetting for wetlands that would be affected by the Project.

Manitoba Transportation and Infrastructure recognizes the ecological and environmental significance of peatlands and is providing this additional offsetting in recognition of concerns expressed by Indigenous groups and the request of the Federal government to provide sufficient offsetting for wetlands that will not receive an effective level of mitigation otherwise. Considerable discussions and planning with MNRND and others have led to the determination that any offsetting for peatlands would most appropriately be done in a manner consistent with the Boreal Wetlands Conservation Codes of Practice. This is the most appropriate guidance for Manitoba Transportation and Infrastructure to follow.

Manitoba Transportation and Infrastructure will update the WCP, which is one component of the overall Wetland Offsetting Program described earlier. This will occur after the receipt of the Federal Decision Statement and provincial Licence for the Project (i.e., prior to Project construction). As with the environmental management plans, the next version of the Wetland Offsetting Program (formerly called WCP) will incorporate any new information received through the engagement or regulatory process, e.g., conditions associated with licencing.

d. **Quantification of habitat suitability and habitat maps in the Wetland Monitoring Plan for all wetland-dependent species at risk prior to construction (i.e., similar to Figure IAAC-R2-16-1, Figure IAAC-R2-16-2 and Figure IAAC-R2-16-3 for Northern Leopard Frog).**

Habitat suitability for wetland-dependent SAR is quantified in Table IAAC-R3-02-1 below. This includes horned grebe (*Podiceps auritus*), least bittern (*Ixobrychus exilis*), snapping turtle (*Chelydra serpentina*), and yellow rail. For each SAR, habitat classes having the potential to support the species were queried from the reconciled landcover mapping (wetland classes based on field surveys and refined Project EIS landcover data). Reconciled landcover mapping includes wetland classes mapped during field surveys (Class I-V as per Stuart and Kantrud 1971, and bog and fen types) and Project EIS landcover data, which consists of broader land cover classes (e.g., wetland-herb, grassland) for all other areas. Discrepancies between metrics reported in recent IRs verses the Project EIS are due to the refinement of wetland data (see WSP 2023). For example, some of the patches of 'marsh' identified in the Project EIS landcover data were refined or reclassified to 'basin swamp – shrubby' by the WSP Canada Group Limited (WSP) wetland mapping. Some areas identified as wetland in the Project EIS were also reclassified to upland and areas classified as upland reclassified to wetland based conditions observed in the field.

As requested by Environment and Climate Change Canada, Table IAAC-R3-04-1 identifies how much habitat will be removed for each wetland-dependent SAR in the Project development area (PDA). All (100%) of the habitat within the PDA will be removed during construction. The direct loss (percentage) of each habitat class in the local assessment area (LAA) was calculated by dividing the area (ha) of that habitat affected in the PDA by the area (ha) of that habitat available in the LAA.

Question IAAC-R3-04
October 27, 2023

Figures IAAC-R3-04-1 to IAAC-R3-04-6 provide habitat mapping for the wetland-dependent SAR in the LAA, and will be included in the WetMP. These maps were developed using the habitat classes identified in Table IAAC-R3-04-1 and represent potential habitat for SAR based on land cover data and the attributes that each species selects.

Question IAAC-R3-04
October 27, 2023

Table IAAC-R3-04-1 Wetland-dependent Species at Risk Habitat in the Lake Manitoba and Lake St. Martin Outlet Channel Wildlife Assessment Areas

Wetland-dependent Species at Risk[1]	Habitat Class	Area of Habitat[1] in the PDA (ha)	Area of Habitat in the LAA (ha)	Area of Habitat in the RAA (ha)	Direct Loss (% of habitat in PDA)	Direct Loss (% of habitat in LAA)	Direct Loss LMOC (ha)	Direct Loss LSMOC (ha)
Horned grebe[2]	Class IV Wetland	38.6	623.4	739.8	100	6.2	38.6	0
	Class V Wetland	**0**	19.7	20.5	100	0	0	0
	Marsh	**0**	35.5	35.5	100	0	0	0
	Wetland-herb	**0**	3929.8	35596.9	100	0	0	0
	Total	**38.6**	**4,608.4**	**36,392.7**	**100**	**0.8**	**38.6**	**0**
Least bittern[2]	Class IV Wetland	38.6	623.4	739.8	100	6.2	38.6	0
	Class V Wetland	0	19.7	20.5	100	0	0	0
	Marsh	0	35.5	35.5	100	0	0	0
	Swamp - shrub	44.9	236.8	373.4	100	18.9	31.2	13.7
	Wetland-herb	0	3929.8	35596.9	100	0	0	0
	Total	**83.4**	**4,845.2**	**36,766.1**	**100**	**1.7**	**237.7**	**43.9**
Yellow rail[2]	Class III Wetland	199.2	1069.7	1268.8	100	18.6	199.2	0.1
	Class IV Wetland	38.6	623.4	739.8	100	6.2	38.6	0
	Fen - Graminoid	264.0	1,564.9	1,956.3	100	16.9	0	264.0
	Marsh	0	35.5	35.5	100	0	0	0
	Wetland-herb	0	3,929.8	35596.9	100	0	0	0
	Total	**501.8**	**7,223.3**	**39,597.3**	**100**	**6.9**	**272.2**	**204.6**

Wetland-dependent Species at Risk[1]	Habitat Class	Area of Habitat[1] in the PDA (ha)	Area of Habitat in the LAA (ha)	Area of Habitat in the RAA (ha)	Direct Loss (% of habitat in PDA)	Direct Loss (% of habitat in LAA)	Direct Loss LMOC (ha)	Direct Loss LSMOC (ha)
Northern leopard frog[2]	**BREEDING HABITAT**							
	Class III Wetland	199.2	1,069.7	–	100	18.6	199.1	0.1
	Class IV Wetland	38.6	623.4	–	100	6.2	38.6	0
	Shallow Open Water	21.2	340.4	–	100	6.2	4.0	17.2
	Total	**259.0**	**2,033.5**	**–**	**100**	**12.7**	**241.7**	**17.3**
	FORAGING HABITAT							
	Hayland	333.8	2,811.8	–	100	11.9	333.8	0
	Hayland and Pasture	0	38.7		0	0	0	0
	Grassland	6.8	372.6	–	100	1.8	0.1	6.7
	Tame Pasture	26.1	170.5	–	100	15.3	26.1	0
	Total	**366.7**	**3,393.6**	**–**	**100**	**10.8**	**360.0**	**6.7**
	OVERWINTERING HABITAT							
	Class V Wetland	0	19.7	–	0	0	0	0
	Lakes	0.4	136.1	–	100	0.3	0.4	0
	River/Streams/Creeks	0.1	18.1	–	100	0.6	0.1	0
	Water	0	97.4	–	0	0	0	0
	Total	**0.6**	**271.2**	**–**	**100**	**0.2**	**0.6**	**0**

Question IAAC-R3-04
October 27, 2023

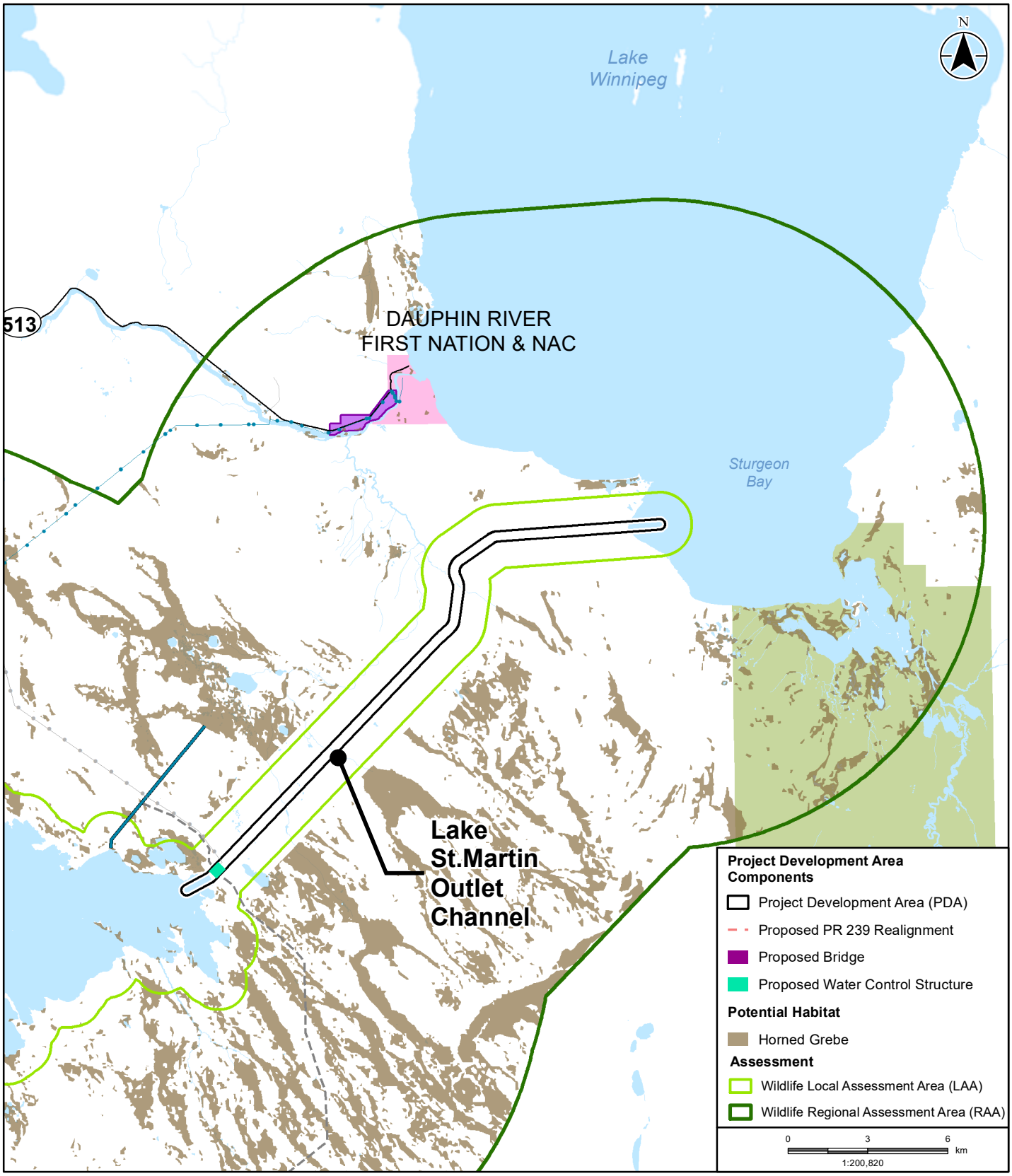
Wetland-dependent Species at Risk[1]	Habitat Class	Area of Habitat[1] in the PDA (ha)	Area of Habitat in the LAA (ha)	Area of Habitat in the RAA (ha)	Direct Loss (% of habitat in PDA)	Direct Loss (% of habitat in LAA)	Direct Loss LMOC (ha)	Direct Loss LSMOC (ha)
Snapping turtle[3]	Lakes	6.5	180.2	180.2	100	3.6	4.3	2.3
	River/Streams/Creeks	0.5	37.7	37.7	100	1.3	0.5	0
	Shallow Open Water	39.3	510.9	510.9	100	7.7	22.0	17.3
	Water	87.0	34,449.0	39,099.7	100	0.3	39.7	47.3
	Total	**133.3**	**35,177.7**	**39,828.5**	**100**	**0.4**	**66.5**	**66.8**

Notes:

1 Does not include metrics for piping plover due to lack of Project interaction (Project EIS Volume 3, Section 8.3.6.2; see also IAAC-R1-46.

2 Habitat metrics based on revised PDA mapping from Preconstruction Environmental Fieldwork - Wetlands (WSP 2020) to identify Class I-V wetlands and refined Project EIS mapping (Project EIS Volume 3, Section 8.2.2.1) for the LAA to identify all other classes. Wetland mapping was revised using additional desktop review and 2020 field survey data, but only within the PDA and LAA.

3 Habitat metrics developed using refined Project EIS mapping (Volume 3, Section 8.2.2.1).



Legend

- Fairford Water Control Structure
- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Access Road
- Existing Transmission Line
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Municipal Road
- Northern Affairs Community (NAC)
- First Nation
- Wildlife Management
- Provincial Park

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure, Environment and Climate Change Canada
3. Last Update: 10/16/2023 10:22:42 AM

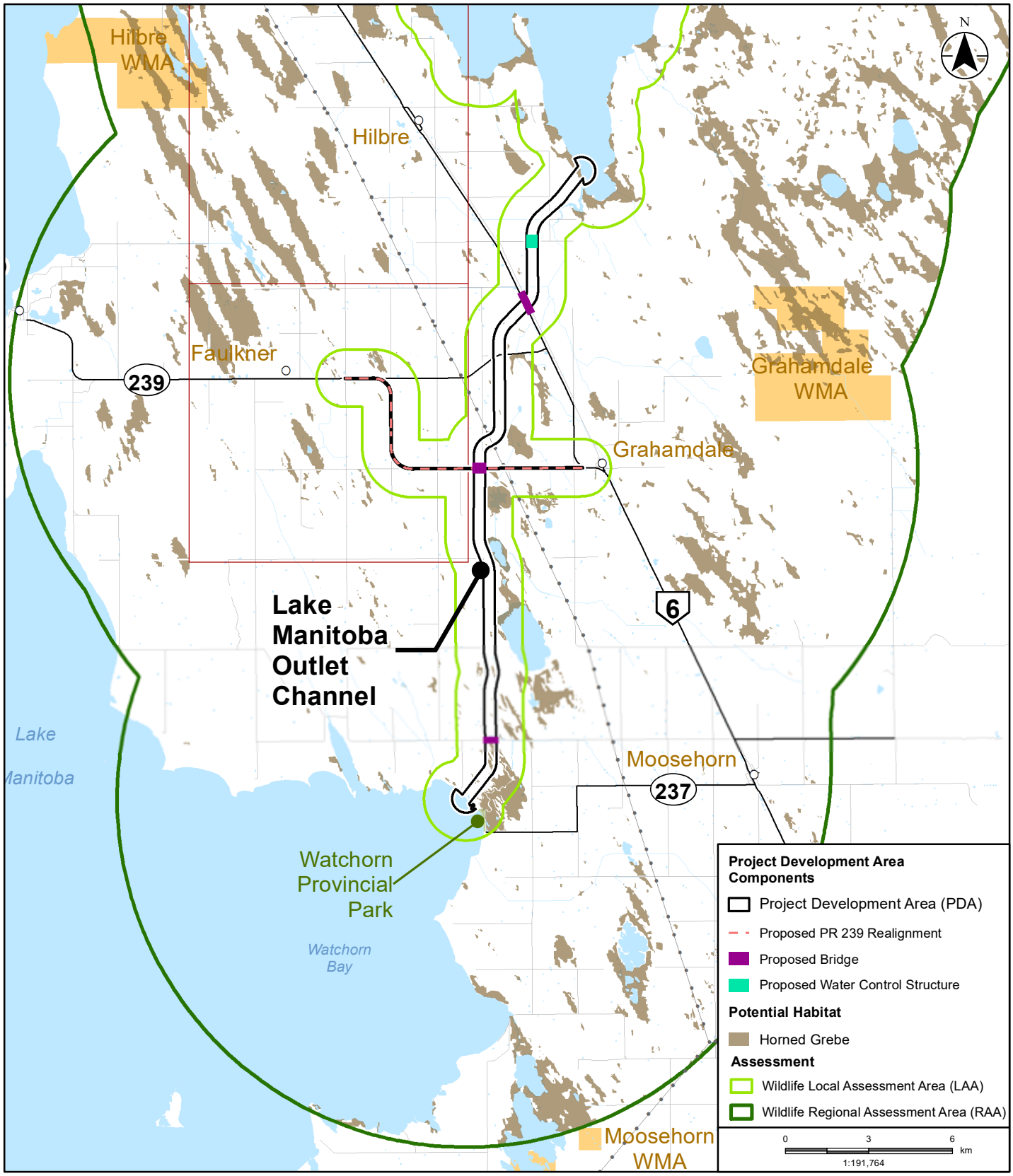
Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Potential LSMOC Habitat for Horned Grebe

Figure IAAC-R3-04-1

G:_GIS_Project_Folder\11475120\figures_IRs\Wildlife\11475120_IIAAC-P2-13_REVC_HornedGrebeHabitat_LSMOC.mxd



Legend

- Fairford Water Control Structure
- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Access Road
- Existing Transmission Line
- Existing Distribution Line
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Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure, Environment and Climate Change Canada
3. Last Update: 10/16/2023 10:22:09 AM

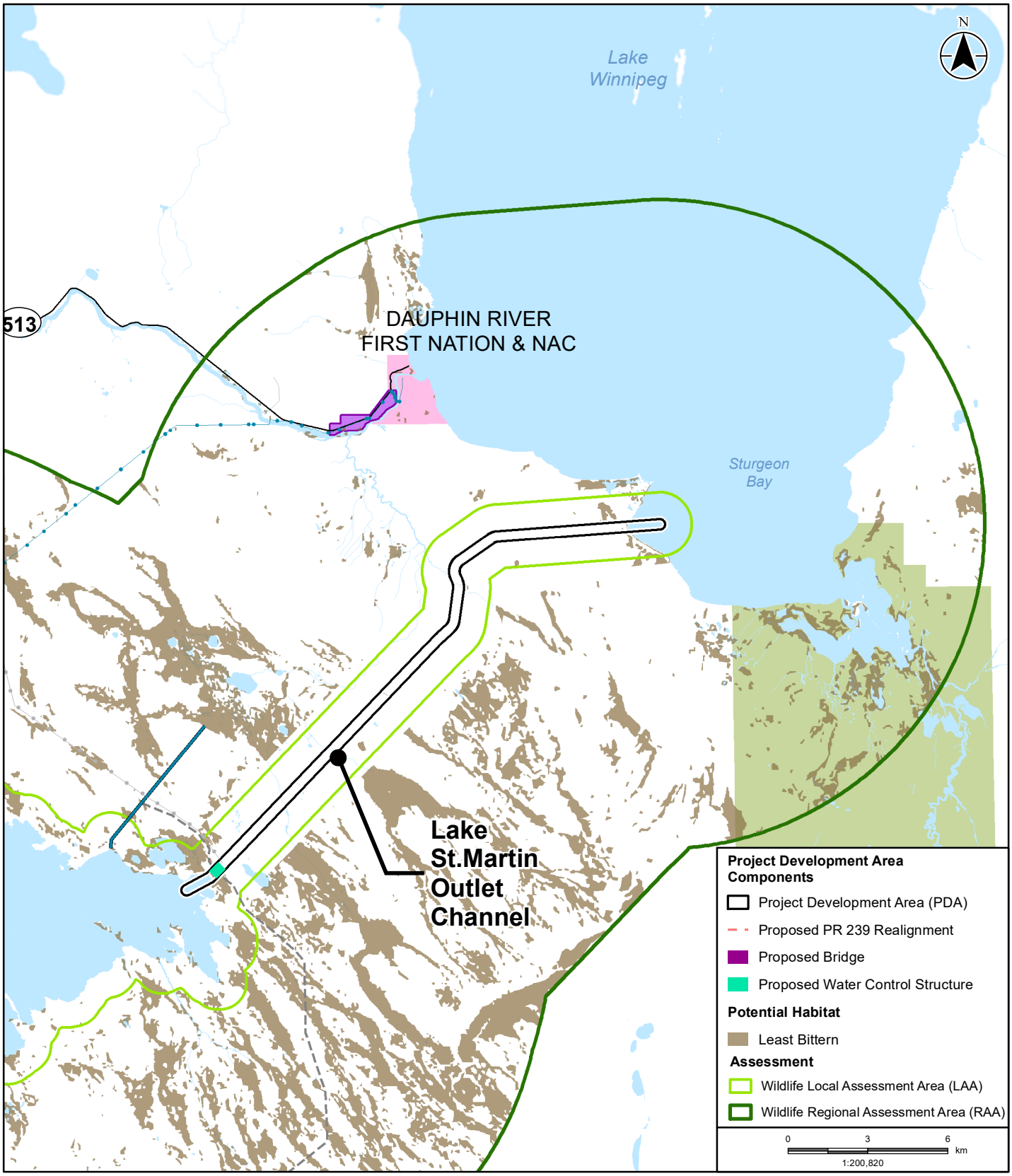
Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project E

Potential LMOC Habitat for Horned Grebe

Figure IAAC-R3-04-2

G:_GIS_Project_Folder\11475120\figures\RsWildlife\11475120_IIAAC-P2-13_REVC_HornedGrebeHabitat_LMOC.mxd



Legend

- Fairford Water Control Structure
- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Access Road
- Existing Transmission Line
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Municipal Road
- Northern Affairs Community (NAC)
- First Nation
- Wildlife Management
- Provincial Park

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure, Environment and Climate Change Canada
3. Last Update: 10/16/2023 10:19:04 AM

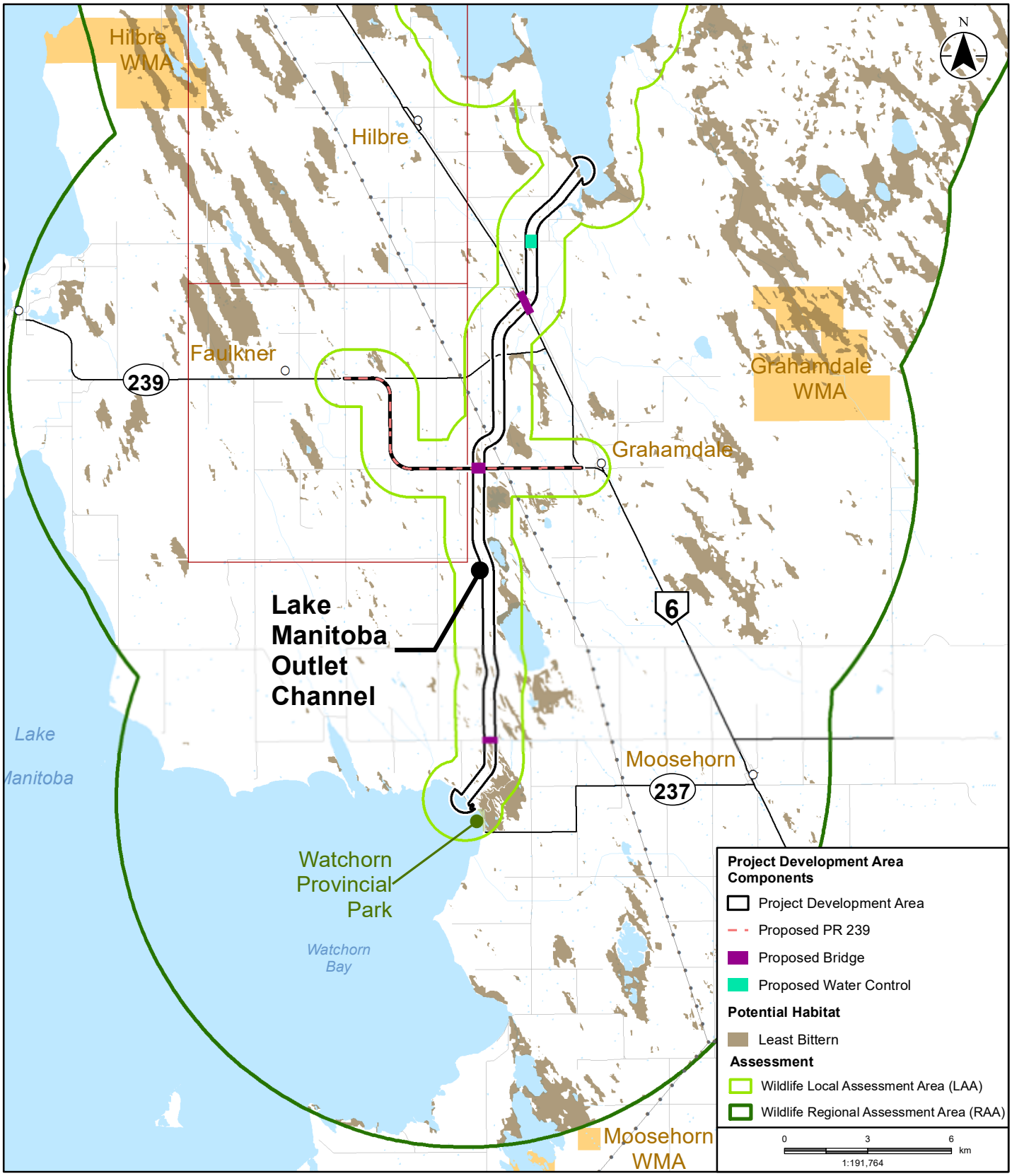
Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Potential LSMOC Habitat for Least Bittern

Figure IAAC-R3-04-3

G:_GIS_Project_Folder\11475120\figures_IRs\Wildlife\11475120_IIAAC-P2-13_REVC_LeastBittern Habitat_LSMOC.mxd



Legend

- Fairford Water Control Structure
- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Access Road
- Existing Transmission Line
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Municipal Road
- Northern Affairs Community (NAC)
- First Nation
- Wildlife Management
- Provincial Park

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure, Environment and Climate Change Canada
3. Last Update: 10/16/2023 10:19:54 AM

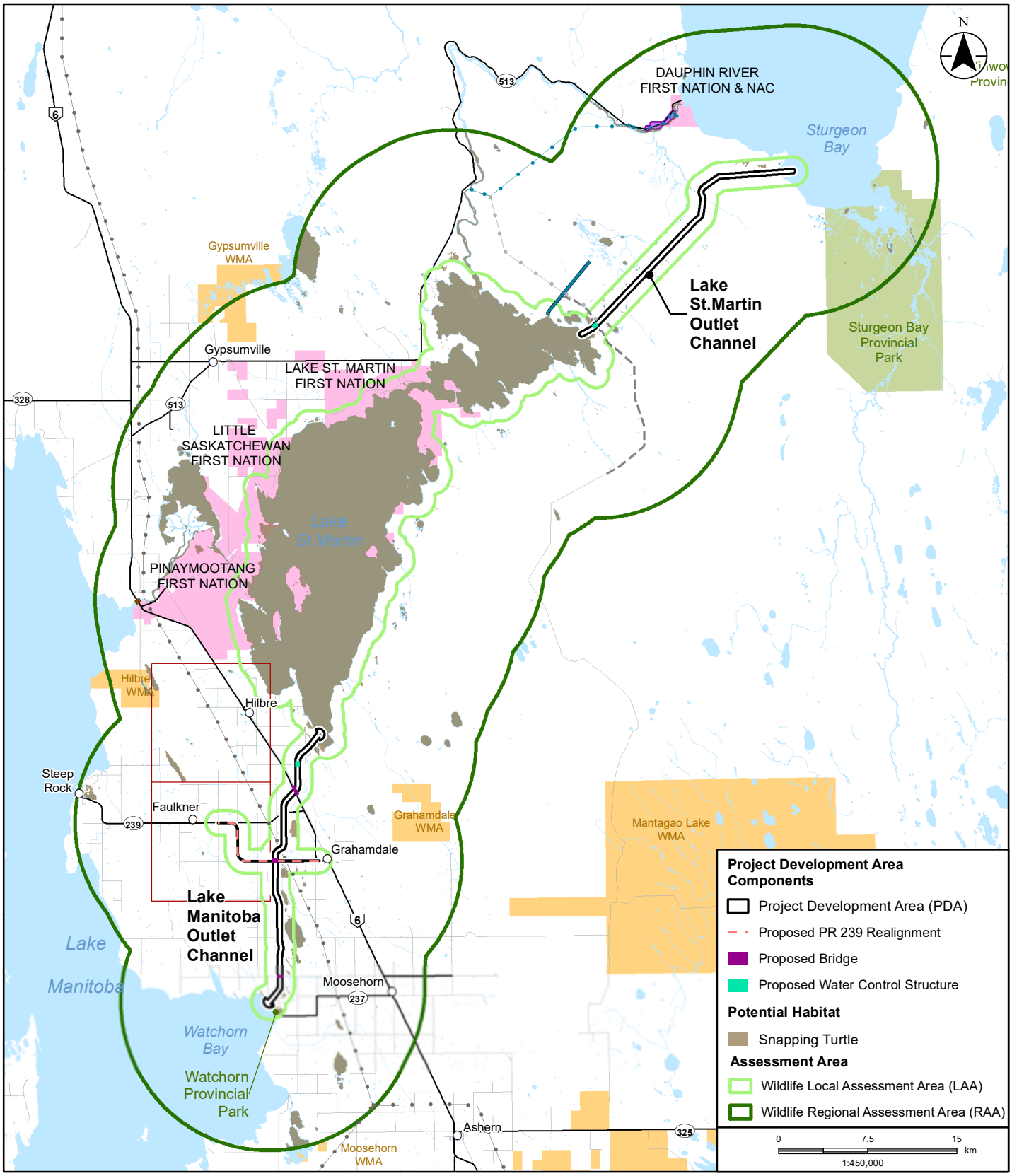
Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Potential LMOC Habitat for Least Bittern

Figure IAAC-R3-04-4

G:_GIS_Project_Folder\11475120\figures\RsWildlife\11475120_IIAAC-P2-13_REVC_LeastBitternHabitat_LMOC.mxd



Legend

- Fairford Water Control Structure
- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Access Road
- Existing Transmission Line
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Municipal Road
- Northern Affairs Community (NAC)
- First Nation
- Wildlife Management Area
- Provincial Park

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure, Environment and Climate Change Canada
3. Last Update: 8/10/2023 9:43:56 AM

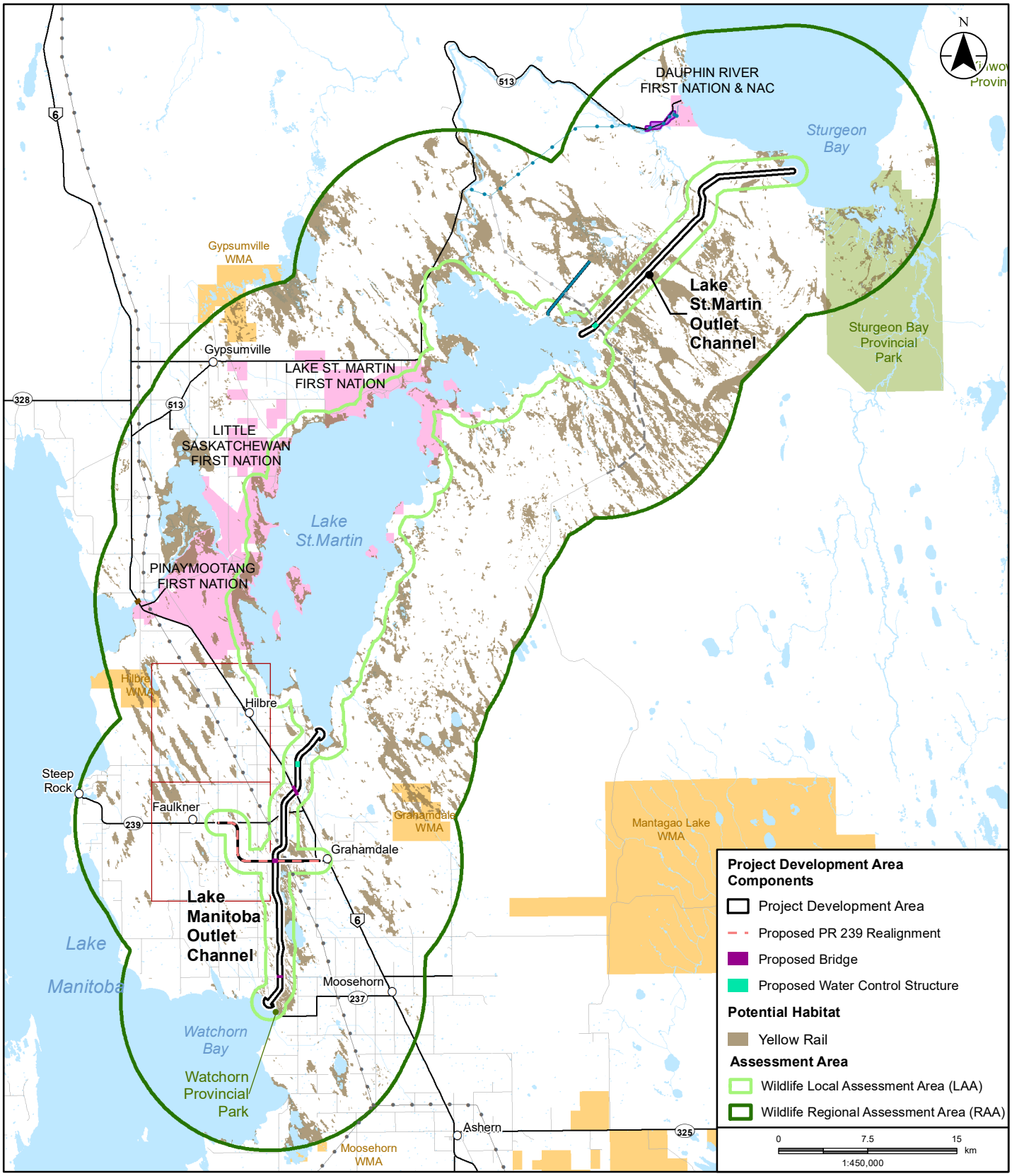
Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Potential Habitat for Snapping Turtle

Figure IAAC-R3-04-5

G:_GIS_Project_Folder\11475120\figures\RevWildlife\11475120_IAAC-P2-13_REVA_SnappingTurtleHabitat.mxd



Legend

- Fairford Water Control Structure
- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Access Road
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- First Nation
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Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure, Environment and Climate Change Canada
3. Last Update: 10/16/2023 10:23:50 AM

Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Potential Habitat for Yellow Rail

Figure IAAC-R3-04-6

G:_GIS_Project_Folder\11475120\figures\RptWildlife\11475120_IAAC-P2-13_REVE_YellowRailHabitat.mxd

e. **Mitigation measures to address the effects of habitat fragmentation and physical barriers impacting Northern Leopard Frog.**

As discussed in the May 2023 response to IR IAAC-R2-16, reduced northern leopard frog movement due to the presence of the LMOC is not expected to have a measurable effect on northern leopard frog populations (provincially listed as S4 [Apparently Secure]) as overwintering, breeding, and forage habitat remains abundant and contiguous on the eastern, upgradient side of LMOC (Figure IAAC-R2-16-2). Species habitat mapping did not reveal an abundance of potential breeding (e.g., Class III and IV wetlands) and/or overwintering habitat (e.g., Class V wetlands) on the western side of LMOC (Figure IAAC-R2-16-2).

Although the Project will have minimal fragmentation effects on northern leopard frog habitat, locations along the LMOC near potential northern leopard frog overwintering habitat are currently being evaluated for spoil pile modifications (see response to IR IAAC-R3-06b-iv). Reducing spoil pile height or creating breaks in spoil piles may facilitate the movement of northern leopard frog and other wildlife across the LMOC. Necessary additions or revisions to the Project Environmental Requirements (PERs) regarding spoil piles and to other related environmental management plans (such as the Environmental Protection Plan [EPP]) will be outlined in those pertinent plans after the issuance of the Federal Decision Statement and provincial Licence for the Project.

i. **Information about the feasibility of providing periodic vegetated access points in the rock armouring to improve wildlife passage across the channel.**

As discussed in the May 2022 response to IR IAAC-90, there are a limited number of mitigation measures that can be applied to reduce Project-effects on wildlife and wildlife habitat as they relate to change in movement, particularly during operation, due to engineering constraints of the outlet channels. Vegetated breaks were considered in the design of channel armouring but deemed not feasible due to challenges associated with maintaining permanency of vegetation at the water line. For example, wet-tolerant plant species added to the edges of LMOC would likely perish during active operation due to a decrease in channel water levels south of the water control structure. In other areas of the LMOC and LSMOC, vegetated portions of the wetted channel would likely die-off following periods of inundation. Nonetheless, cover plantings to break up sightlines and provide cover along edges of the PDAs have been incorporated into the revegetation prescription (see the Revegetation Management Plan, as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs).

While the feasibility of providing periodic vegetated access points in the rock armouring to improve wildlife passage across the channel is limited, other measures have been developed or are being investigated to improve wildlife passage across the channel. In the May 2022 responses to IR IAAC-R1-30 and IAAC-R1-38, consideration was made regarding concerns expressed during the engagement and consultation process, as well as additional risks identified during the ongoing modeling and design process. Manitoba Transportation and Infrastructure committed to armouring the channel base and lower side slopes of the LMOC and LSMOC to alleviate concerns associated with erosion and sediment release from the till substrates. As discussed in the May 2022 response to IR IAAC-93, to accommodate animal movement along

channel shorelines, outside of riprapped areas, armouring along the LMOC and LSMOC lower side slopes will consist of smaller diameter rock and smaller rock sizes (i.e., less than 100 millimetres [3.9 inches] diameter rock, not riprap). The objective is to provide a relatively smooth surface that protects against erosion of the channel, and which reduces surface irregularities, risk of injury and/or visual obstacles to promote safe wildlife crossing.

In addition to the configuration of shoreline materials, as discussed in the response to IR IAAC-R3-02f, measures to enhance wildlife movement across the PDA through modification of spoil pile design are currently being reviewed. Measures may include modifying the design of spoil pile height and/or creating breaks in the spoil piles at select wildlife crossing locations. Potential wildlife crossing locations at the outlet channels were initially identified by mapping existing game trails identified by recent studies, and by identifying other potential movement corridors such as game trails visible in Google Earth, cutlines and other human-made features, and forest edges that intersect the PDA. Potential wildlife crossing locations identified along the PDAs would avoid areas where larger-sized rock (i.e., 'riprap') would be applied, as these were identified as being less permeable for wildlife movement. Riprap locations are primarily at the inlet, outlet, bridge crossing locations, water control structures and at the LSMOC between the first drop structure and Lake Winnipeg. Where feasible, spoil pile modifications will be aligned with armoured sections of the channels. Although final number and location of crossings have yet to be determined, a total of nine potential wildlife crossing locations were identified at the LMOC and five potential wildlife crossing locations were identified at the LSMOC, with varying degrees of estimated suitability for crossing. These locations are currently being considered as options by the Project engineers to configure spoil piles for safe and easier wildlife crossings. Necessary additions or revisions to the PERs regarding spoil piles and to other related environmental management plans (such as the EPP) will be outlined in those pertinent plans after the issuance of the Federal Decision Statement and provincial Licence for the Project.

f. **Provide a table in the Wetland Monitoring Plan (WetMP) and/or Wetland Monitoring Report that describes the decision points and benchmarks that will be used to monitor impacts to each wetland-dependant species at risk (wildlife and plant species) impacted by the proposed Project, including all wetland-dependent SAR and migratory birds and ecologically relevant plant species assessments**

A table outlining benchmarks has been provided in the WetMP. Table 13 in the WetMP describes benchmarks and associated response actions. It integrates information on wetland-dependent SAR and migratory birds in addition to information on least bittern, yellow rail, and northern leopard frog already identified. While not specific to individual species, the approach outlined in the WetMP includes consideration of wetland classes, vegetation community composition, wildlife occurrence (including SAR), and water quality.

The table and associated WetMP text outline the decision points and benchmarks that will be used to monitor impacts to each wetland-dependent species at risk (wildlife and plant species) potentially impacted by the proposed Project. For each species, changes in water quantity and quality within wetlands will be among the key metrics that alter habitat quality for SAR and other species (i.e., water characteristics are a key driver in changes to wetland form, function and extent, thereby affecting wetland-dependant species). Monitoring of these key parameters will facilitate determination of the need for and nature of adaptive management measures.

The wildlife biodiversity index integrates species at risk and the percentage change relative to control sites – whether it is less than 10%, 10 to 20% or greater than 20%. Less than a 10% change in the proportion of wildlife species diversity (including SAR) compared to control sites will signal a change notification, and the exceedance response will be to expand survey effort and assess whether the causes are natural or operational. A 10 to 20% change in the proportion of wildlife species diversity (including SAR) compared to control sites will trigger an early warning, and the exceedance response will be a comparison with vegetation community and health results as an indicator of habitat changes. Follow-up will include investigation of climate variables and external factors, and water flow mitigation will be evaluated. More than a 20% change in the proportion of wildlife species diversity (including SAR) compared to control sites will indicate a management threshold. If impacts to wetlands are observed or are expected (i.e., drying down of wetlands, increased soil wetness, changes to vegetation community), local water management will be reviewed, and changes will be implemented per the proposed mitigation plan.

Further revisions to the WetMP, including Table 13, will likely occur following the issuance of Federal Decision Statement and provincial Licence for the Project. This pre-construction evaluation will include consideration of the benchmarks that are currently selected and outlined in Table 13 of the WetMP, as well as other potential indicators (e.g., if identified by Indigenous groups and regulators).

g. **Wetland offsetting for revised shoreline near channel inlets and outlets**

Wetland offsetting is being offered near channel inlets and outlets where they meet the criteria outlined in the response to IR IAAC-R2-13 and characterized in the response to Part a and b of the current question.

The July 2023 response to IR IAAC-R2-20 notes that that there is overwintering habitat for northern leopard frog near the LMOC inlet and there is the potential for snapping turtle to be within the same area. While both species inhabit wetland areas, the extension of the inlets and outlets will have a negligible effect on species at risk such as snapping turtle and northern leopard frog, as well as bird species at risk (e.g., trumpeter swan [*Cygnus buccinator*], least bittern, horned grebe) and migratory birds (e.g., ducks, geese, shorebirds, gulls, terns, herons) because extended excavation into the lakes will affect open water habitats, not shoreline breeding and/or, nesting habitat for species at risk and migratory birds. As discussed in the July 2023 response to IR IAAC-R2-34, the inlet and outlet areas of both channels consist of excavated transitions from the channel proper to the natural lakebed areas. In terms of potential effects to Lake Manitoba and Lake St. Martin shorelines, most

incremental effects caused by the Project will be positive due to reduction of floodwater elevation (that being the purpose of the Project).

As indicated in the May 2022 response to IR IAAC-R1-49 and in the Wildlife Monitoring Plan, mitigation measures will consist of establishing species-specific setback distances and activity restrictions for species at risk around known habitat. Where setbacks from known northern leopard frog breeding habitat and/or snapping turtle breeding habitat cannot be implemented, alternate measures such as amphibian and reptile exclusionary fencing may be employed.

References

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2009. COSEWIC assessment and status report on the Yellow Rail Coturnicops noveboracensis in Canada. Committee on the Status of Endangered Wildlife in Canada. Accessed at https://species-registry.canada.ca/index-en.html#/species/574-1

Environment Canada. 2013. Management Plan for the Yellow Rail (Coturnicops noveboracensis) in Canada. Species at Risk Act Management Plan Series. Environment Canada, Ottawa. iii + 24 pp. Available at: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/management-plans/yellow-rail-2013.html#_docInfo.

Government of Manitoba. Date Unknown. Water control works project registration and wetlands compensation regulatory framework. Available at: https://reg.gov.mb.ca/detail/840521. Accessed June 2019.

Stewart, R.E. and H.A. Kantrud. 1971. Classification of Natural Ponds and Lakes in the Glaciated Prairie Region. Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Washington, D.C., USA. Resource Publication 92. 57 pp.

Unduche, Fisaha. 2023. Email correspondence between Blair McMahon (Director, Environmental Services, MTI) and Fisaha Unduche (Executive Director of Hydrologic Forecasting and Water Management at Government of Manitoba) regarding snow melt in the Interlake region (July 26, 2023). Winnipeg, MB.

WSP (WSP Canada Group Limited). 2020. Lake Manitoba and Lake St. Martin Outlet Channel Project. Preconstruction Environmental Fieldwork - Wetlands (CONS15843).

WSP. 2023. 2022 Wetland Monitoring Report. Lake Manitoba and Lake St. Martin Outlet Channels Project. Manitoba Interlake Region.

QUESTION IAAC-R3-05

Referenced Round 2 IR(s): IAAC-R2-19, IAAC-R2-20

Expert Dept. or group: ECCC
IAAC
Interlake Reserves Tribal Council
Pinaymootang First Nation
Poplar River First Nation
Sagkeeng Anicinabe First Nation
Sandy Bay Ojibway First Nation

EIS Guideline Reference: 7.1.7 Riparian, Wetland and Terrestrial Environments

7.1.8 Migratory birds and their habitat

7.1.9 Species at Risk

7.2.3 Changes to riparian, wetland and terrestrial environments

7.3.2 Migratory birds

7.3.5 Species at risk

7.4 Mitigation measures

9. Monitoring and Follow up

Context and Rationale

The EIS Guidelines require the Proponent to describe changes to critical habitat for federally listed species at risk, changes to habitat connectivity, and changes to shorelines and riparian areas. The EIS Guidelines require the Proponent to identify any potential direct and indirect adverse effects to migratory birds or their habitat, including staging and nesting areas, foraging grounds, and landing sites. The assessment should consider changes to the environment that may affect local movement and seasonal habitat use, any direct habitat loss, the potential for habitat fragmentation, loss of connectivity or other change causing a reduction of habitat quality. The EIS Guidelines require the Proponent to assess the potential effects of the Project on federally listed species at risk and their critical habitat, including the direct and indirect effects on the survival or recovery of federally listed species.

Question IAAC-R3-05
October 27, 2023

Red Headed Woodpecker Mitigation Measures

The response to IAAC-R2-19 states that clearing, and removal of Red Headed Woodpecker habitat will occur outside of the breeding bird nesting window (Apr 1- Aug 31) in the first year of construction and installation of salvaged decadent trees/nest boxes will be completed 1-2 years after clearing. The Proponent states that information regarding the scheduling of habitat mitigation measures will be included in a revised version of the Red Headed Woodpecker Management Plan. Scheduling of mitigation measures is critical to understanding their effectiveness in mitigating potential significant adverse environmental effects.

Habitat Quantification

The response to IAAC-R2-20 provides updated information on habitat conditions with species- specific mitigation measures including results from new surveys. However, inconsistencies were noted between the hectares and percentage of habitat loss within the habitat tables and there are outstanding gaps for species-specific mitigation measures.

Species-specific Mitigation Measures

The Proponent provided a table of species-specific mitigation measures during construction and operation/maintenance (Table IAAC-R2-20-8: Species at Risk, Migratory Birds, and Species of Cultural Importance Mitigation for the Lake Manitoba and Lake St. Martin Outlet Channels Project), however there are outstanding gaps for species-specific mitigation measures that should be provided in this table. Table IAAC-R2-20-8 ‘Species at Risk, Migratory Birds, and Species of Cultural Importance Mitigation for the Lake Manitoba and Lake St. Martin Outlet Channels Project’ describes avoidance periods for Project activities. However, mitigation measures during operation of the channels are not provided (i.e., effects to nesting Species at Risk and Migratory Birds if operation occurs during the breeding bird season). The Proponent provided maps with locations of potential breeding, overwintering, and foraging habitat for Northern Leopard Frog (Figures IAAC-R2-16-1, -2, -3). The Proponent’s proposed mitigation is to exclude frogs from entering overwintering areas using exclusion fencing (Table IAAC-R2-20-8). As the Proponent has determined that there is overwintering habitat for Northern Leopard Frog near the LMOC inlet, there then is potential for snapping turtles to be within the same area. Snapping turtles also have vulnerability to winter disturbance, as well as nesting habitat. Mitigation measures to avoid or lessen the effects of the Project to snapping turtles and their habitat have not been provided. To better understand potential effects to species at risk, migratory birds and species of cultural importance, additional information on species-specific mitigation measures to avoid, lessen and monitor effects to species at risk and migratory birds should be provided.

In Tables IAAC-R2-20 2 and IAAC-R2-20 3, the Proponent has quantified habitat types that have the potential to support migratory birds during the breeding season, while habitat for species at risk and culturally important species have been quantified for the PDA and LAA in Tables IAAC-R2-20-4 and 5.

Question IAAC-R3-05
October 27, 2023

A Northern Leopard Frog survey was completed in 2022, however the Proponent stated that the survey was conducted under conditions that were not ideal due to significant flooding and wet spring conditions. Additionally, the autonomic recording units (ARUs) that were set up at wetland monitoring sites had not been analyzed at the time the report was written (Appendix IAAC-R2-20-2: 2022 WSP Northern Leopard Frog Survey).

The Proponent notes that pre-construction surveys for species at risk were conducted in 2022. Eastern Whip-Poor-Will (EWPW) have been detected within critical habitat as identified in the *Species at Risk Act* (SARA) Recovery Strategy both within the LSMOC PDA and LAA. It is not clear if the EWPW Management Plan, submitted in June 2022, has been updated based on the results of the 2022 species at risk surveys. Appendix IAAC-R2-20-1: 2022 WSP Wetland Monitoring Report states that, despite ARU malfunctions, data collected in 2022 was sufficient for baseline characterization but not sufficient for the detailed comparisons required to inform if observed changes are attributable to the project. The 2022 WSP Wetland Monitoring Report states that supplemental baseline data collection in 2023 would provide a more robust data set for future monitoring purposes.

Table IAAC-R2-20-3 'Wetland Cover Types in the Lake Manitoba and Lake St. Martin Outlet Channel Wildlife Local Assessment Area' does not use the Stewart and Kantrud wetland classification regime that was used throughout the rest of the EIS. In order to better understand potential effects to migratory birds, species at risk, and wetlands from the Project, additional information and clarifications on the surveys completed is required and additional baseline studies may need to be conducted due to the poor weather conditions and equipment malfunctions experienced during the previous survey periods.

Information Requests

a. Revise the Red Headed Woodpecker Management Plan with the schedule for habitat mitigation measures.

b. Verify and revise that areas of habitat and loss of habitat percentages are accurate and consistent throughout the habitat tables provided in IAAC-R2-20.

c. Provide additional information on species-specific mitigation measures in Table IAAC-R2-20-8, particularly during operations and maintenance, including, but not limited to:

    i. Barn Swallow – detail measures that will be used during construction to mitigate risk of nesting on equipment or infrastructure.

    ii. Bank Swallow – include mitigation for aggregate piles/quarries both during construction and operation/maintenance.

    iii. Common Nighthawk - detail measures that will be used to avoid risk associated with the Common Nighthawk's propensity to nest on roadways or gravel trails.

    iv. Least Bittern – detail how loss of habitat will be mitigated. Detail measures that will be used to avoid risk of nests being flooded when channel is in operation.

    v. Yellow Rail – detail how loss of class II wetland habitat will be mitigated.

vi. Snapping Turtle – provide mitigation measures to avoid and lessen the effect of disturbance to snapping turtles including nesting habitat and nests. Detail how disturbance of overwintering habitat (and effects to overwintering turtles) during winter construction will be mitigated.

vii. Short-eared owl – detail measures that will be used to avoid or mitigate against nest disturbance or destruction due to mowing or other maintenance activities.

viii. Eastern Whip-poor-will (EWPW) - include mowing and clearing date restrictions during maintenance and operations as per EWPW Management Plan. Add additional details and mitigations for when operations begin after the breeding bird season has begun.

ix. Add mowing and clearing date restrictions to the Operation and Maintenance column for additional species including but not limited to Golden-winged warbler, Bobolink and Least Bittern.

x. Cross reference and identify any species listed in Schedule 1 of the Migratory Bird Regulations 2022 that have been identified as having year-round nest protection that may be impacted by the proposed Project.

xi. Include wetland offsetting mitigation for wetland dependent species such as Least Bittern, Yellow Rail, Northern Leopard Frog etc.

xii. In Table IAAC-R2-20-8, in the first row ‘American badger’ under the ‘Operations and Maintenance’ column, the term nests should be updated to dens. The column currently reads ‘buffers/setbacks will be applied to active nests’.

d. Provide detail regarding how effects to nesting species at risk and migratory birds will be mitigated if operation of the channels is initiated after the breeding bird nesting season has started.

e. Include mitigations for effects due to mowing and clearing activities for each species affected during operation and maintenance.

f. Revise and update appropriate Environmental Management Plans with the revised mitigation table to ensure all of the necessary mitigations for migratory birds and species at risk are included.

g. Detail mitigation measures that will be in place to protect migratory bird nesting islands in Lake St. Martin and Lake Winnipeg from flooding during operation of the channels.

h. Revise Table IAAC-R2-20-3 so that the Wetland Cover Class column uses the same classification system (Stewart and Kantrud) as is used throughout the EIS and include Class II wetlands in the table.

i. Confirm if additional baseline data is being collected in 2023 for the Wetland Monitoring Plan. If additional baseline is being collected, provide a plan for incorporation of this data into the Wetland Monitoring Plan and providing the updated plan to the Agency and relevant authorities.

j. Clarify how the detection of multiple EWPW in the LSMOC and within EWPW critical habitat affects the EWPW Habitat Management Plan.

k. Confirm if the area of critical habitat that overlaps the PDA contains the biophysical attributes required by EWPW. If so, detail the plan to mitigate effects to EWPW critical habitat in the project area.

l. Revise the EWPW Habitat Management Plan as needed based on the detection of EWPW in the LSMOC PDA.

m. Include a description to accompany Table IAAC-R2-20-5 that describes which habitat types are included as 'habitat' for each species listed in the table.

Response IAAC-R3-05

a. **Revision to the Red Headed Woodpecker Management Plan with the schedule for habitat mitigation measures.**

The Red Headed Woodpecker Habitat Management Plan, as filed as part of the June 2022 supplemental information response to Impact Assessment Agency of Canada (IAAC) Round 1 Information Requests (IRs), will be revised with relevant information after federal and provincial environmental regulatory approvals are received, and prior to the start of Project construction. Revisions will include the schedule for habitat mitigation measures that was provided in the July 2023 response to IR IAAC-R2-19.

b. **Verification and revisions so that areas of habitat and loss of habitat percentages are accurate and consistent throughout the habitat tables provided in IAAC-R2-20.**

In the July 2023 response to IR IAAC-R2-20, Table IAAC-R2-20-3 “Wetland Cover Types in the Lake Manitoba and Lake St. Martin Outlet Channel Wildlife Local Assessment Area,” there was an error in the total direct loss (% of habitat class in local assessment area [LAA]) of wetland habitat reported. The correct value is 6.7%, not 15.0% of total direct loss of wetland habitat. This does not affect the assessment of habitat loss in the Project Environmental Impact Statement (EIS) or in the response to IAAC-R2-20 because the area (ha) of wetland habitat loss in Table IAAC-R2-20-3 is correct and the percentage of wetland habitat affected in the LAA is accurate in Table IAAC-R2-20-2 “Lake Manitoba and Lake St. Martin Outlet Channel Wildlife Habitat by Land Cover Class.” Other small (0.1 hectares [ha] [0.25 acres]) differences in area of habitat and habitat loss in Tables IAAC-R2-20-2 to IAAC-R2-20-6 are due to rounding and do not affect the direct loss percentages. For clarity, the corrected version of Table IAAC-R2-20-3 has been added below (Table IAAC-R3-05-1).

Table IAAC-R3-05-1 Wetland Cover Types in the Lake Manitoba and Lake St. Martin Outlet Channel Wildlife Local Assessment Area

Wetland Cover Class[1]	Area of habitat in the PDA (ha)	Area of habitat in the LAA (ha)	Direct Loss (% of habitat in PDA)	Direct Loss (% of habitat class in LAA)	Direct Loss LMOC (ha)	Direct Loss LSMOC (ha)
Bog	5.2	28.4	100%	18.3%	0	5.2
Graminoid Fen	196.7	1,186.8	100%	16.6%	0	196.7
Marsh	280.2	1,658.9	100%	16.9%	272.2	7.9
Other Fens	279.8	1,621.1	100%	17.3%	0	279.8
Shallow Open Water	40.1	518.4	100%	7.7%	22.8	17.3
Swamp	210.7	1,717.5	100%	12.3%	0	210.7
Other Wetlands[2]	-	8,421.6	-	-	-	-
Total	1,012.6	15,152.6	100%	6.7%	295.0	717.6

Notes:

[1] Based on refined Land Cover Classification (LCC) used in the Project EIS (Project EIS Volume 3, Section 8.2.2.1; this dataset does not provide metrics for listed wetland cover class types beyond the LAA)

[2] Wetland areas surrounding Lake St. Martin (LSM) were not mapped to detail in Project EIS land cover mapping ('other wetlands' therefore include broad wetland classes such as wetland-herb, wetland-shrub, and wetland-treed as per LCC)

c. **Additional information on species-specific mitigation measures in Table IAAC-R2-20-8, particularly during operations and maintenance, including, but not limited to:**

i. **Barn Swallow – measures that will be used during construction to mitigate risk of nesting on equipment or infrastructure.**

Barn swallows (*Hirundo rustica*) are tolerant of human disturbance and build cup nests on human-made horizontal or vertical structures with overhead protection, including buildings, culverts, bridges, and open structures such as picnic shelters and carports (OMNRF 2017). Noise and activity associated with bridge construction is not anticipated to affect barn swallows as bridge infrastructure will be constructed outside of the breeding bird window (April 1 to August 31). If bridge repairs are required during the operation and maintenance period, potential effects on barn swallow will be assessed and mitigated. Mitigation may include measures that Manitoba Transportation and Infrastructure currently implements for barn swallows, including timing repairs or maintenance works to occur outside of the breeding period, or temporarily applying exclusionary netting ahead of the bird nesting window (April 1 to August 31) to keep birds from nesting in work areas. If required, removal of any barn swallow nests will be completed outside of the nesting window (April 1 to August 31), or the date when a bird is last seen at the nest, whichever is later (Government of Canada 2019).

Ancillary buildings (e.g., to house electrical equipment) will be constructed near or attached to the water control structures (WCS) for both channels. These buildings are not expected to attract swallows as they will consist of masonry exterior walls and single-slope roofs with parapets (i.e., they will lack overhang for nesting). If maintenance staff find barn swallows becoming a nuisance with their droppings and impeding entrance to ancillary buildings, measures may be applied to further reduce the attractiveness of structures to barn swallows. The inside of buildings will be investigated for nests before blocking access to the interior of the ancillary buildings. If no nests are found, access may be blocked by keeping all doors and windows closed; covering all holes larger than 2.5 centimetres (cm) (1 inch [in]) and repairing cracks, broken windows, and gaps around window frames; and installing industrial curtains or "strip doors" on doors that cannot always close will be considered. Manitoba Transportation and Infrastructure will follow federal permitting requirements where there are species at risk (SAR) (and other migratory birds) that require special measures such as nest removal during the breeding season.

During Project construction, machinery mobilized to site will be under regular or continual use. It is not anticipated that active and/or mobile equipment would be utilized by barn swallows for nesting. Furthermore, given that barn swallows take between six and 26 days to construct a nest (COSEWIC 2021a), neither planned or unplanned construction shutdowns (e.g., staff shift rotations, holidays) are anticipated to be of sufficient duration to allow barn swallows to construct nests on inactive or parked equipment.

Monitoring of equipment and infrastructure for bird nests will occur on a regular basis during the bird nesting window (April 1 to August 31). For machinery or equipment, monitoring for bird nests will occur as part of daily equipment checks (as part of the Certificate of Recognition Program), whereas infrastructure monitoring will be completed every five days by the Environmental Monitor as per the Environmental Protection Plan. Should barn swallow nests be identified on machinery or structures, they will be documented and dealt with in a manner consistent with the requirements of the *Migratory Birds Convention Act, 2022*, the *Species at Risk Act,* and *The Wildlife Act* (Manitoba).

ii. **Bank Swallow – mitigation for aggregate piles/quarries both during construction and operation/maintenance.**

Bank swallow (*Riparia riparia*) nest by digging burrows in sand and gravel pits, soil and sand piles, and sandy riverbanks (Environment and Climate Change Canada [ECCC] 2022). While the Project will require limestone quarrying, this substrate is less desirable for swallow nesting. Mitigation measures for bank swallow are listed in the response to IR IAAC-R2-20, Table IAAC-R2-20-8 "Species at Risk, Migratory Birds, and Species of Cultural Importance Mitigation for the Lake Manitoba and Lake St. Martin Outlet Channels Project," and are described for SAR in the Quarry Management Plan (QMP). The QMP is consistent with Manitoba Transportation and Infrastructure protocol for other projects, where blasting and quarry work has been stopped where active bank swallow nesting colonies were identified by site inspectors.

Additionally, sand/ gravel/ soil/ aggregate piles in active quarries during construction and operation will be contoured prior to and during the breeding bird season (April 1 to August 31) to have a slope of less than 60 degrees, to reduce their attractiveness to bank swallows (ECCC 2022). The bank swallow prefers vertical banks (90 degrees) but will use slopes 70 to 110 degrees (Government of Ontario 2022). As described in the QMP, if inactive quarries are reactivated during the breeding bird season (April 1 to August 31), the area will be surveyed by qualified professionals for the presence of breeding bank swallow beforehand, and buffers/setbacks applied to reduce the risk of disturbing any active nests.

iii. **Common Nighthawk - measures that will be used to avoid risk associated with the Common Nighthawk's propensity to nest on roadways or gravel trails.**

Common nighthawk (*Chordeiles minor*) nest and rest on the ground in clearings, including gravel roads and quarries (Environment Canada 2016). They can be difficult to detect, particularly at night (Environment Canada 2016). Project access roads and trails will be in use during construction, which is expected to deter common nighthawk from nesting in these areas. In addition to the mitigation measures listed for common nighthawk in the response to IR IAAC-R2-20, Table IAAC-R2-20-8 "Species at Risk, Migratory Birds, and Species of Cultural Importance Mitigation for the Lake Manitoba and Lake St. Martin Outlet Channels Project," indicates that reduced speed limits on access roads and trails may reduce the risk of collisions with vehicles and nest destruction during construction, and vehicles will adhere to reduced speed limits along maintenance roads during operation. If quarries are reactivated during the breeding bird season (April 1 to August 31), nest searches will be completed within 7 days of any active work at the site by qualified professionals for common nighthawk, and buffers/setbacks applied to reduce the risk of disturbing any active nests identified in the quarry.

iv. **Least Bittern – how loss of habitat will be mitigated, including measures that will be used to avoid risk of nests being flooded when channel is in operation.**

Least bittern (*Ixobrychus exilis*) breed in marshes with tall vegetation, relatively stable water levels, and small vegetated areas within open water (e.g., hemi-marsh; Committee on the Status of Endangered Wildlife in Canada [COSEWIC] 2009a). As described in the July 2023 response to IR IAAC-R2-13, the Wetland Offsetting Program will address over 1,000 ha (2,471 ac) of wetland sites that are directly affected by the Project in a way that cannot be fully mitigated (including 239 ha [590.6 ac] of Class III, IV, V wetlands and 769 ha [1,900 ac] of peatlands). The results arising from the Wetland Monitoring Plan (WetMP), as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs, will evaluate functional changes to adjacent waterbodies to determine if there are appropriate mitigation options to address Project related effects such as drawdown, or whether additional no-net-loss wetland offsetting would be applied. It is anticipated that wetland offsetting provided through the Project's Wetland Offsetting Program will help mitigate potential Project effects to least bittern. No flooding of least bittern nests is anticipated as a result of Project operations because the habitat within the outlet channels or outside drain will not be suitable breeding habitat for least bittern. Furthermore,

during a flood event, effects to SAR and migratory birds nesting in the region will be reduced because floodwaters that would otherwise overwhelm wetlands near the Project development area (PDA) will be diverted through the outlet channels.

v. **Yellow Rail – how loss of Class II wetland habitat will be mitigated.**

The yellow rail (*Coturnicops noveboracensis*) requires marsh habitat that remains wet throughout the breeding season and that typically comprises sedges, grasses, and rushes, including wet meadows and fields, grassy marshes, bogs, and floodplains (COSEWIC 2009b). The yellow rail initiates egg-laying in June and prefers breeding habitat containing short dense vegetation (e.g., sedges, rushes) and surface water that does not exceed 15 cm (5.9 in) (Environment Canada 2013) but remains wetted for the duration of the breeding season (COSEWIC 2009b). While it is mentioned in the May 2022 response to IAAC-R1-54 that yellow rail prefers Class II wetlands, this needs to be qualified by identifying that yellow rail may only potentially use this habitat in certain years and under certain water conditions as this species occurrence is highly influenced by water levels (COSEWIC 2009b).

As described in the response to IAAC-R3-04, Class II wetlands in Manitoba's Interlake region will typically dry up before yellow rail initiate nesting, rendering Class II wetlands less suitable for breeding by yellow rail. Class I and II wetlands are typically dry by late May to mid-June within southwestern Manitoba (Stewart and Kantrud 1971; Ducks Unlimited Canada 2019), making them unavailable as habitat in normal to dry years. As described in meetings with the IAAC in August 2023, regional Class II habitat typically retains water into late May and June (during the breeding season of wetland-dependent species) only 10% of all years (Unduche pers. comm. 2023). Class II wetlands may be suitable for yellow rail in wet years (i.e., 10% of the time); however, they provide lower suitability breeding habitat for yellow rail and other migratory birds compared to graminoid marsh associated with Class III and IV, largely due to greater water permanence and preferred vegetation structure. This is supported by recent monitoring conducted as part of Manitoba Transportation and Infrastructure's WetMP which only detected yellow rail in Class IV wetlands (WSP 2023). These survey results were submitted with Round 2 responses on July 24, 2023.

As such, mitigation or offsetting of potential effects on ephemeral Class I and temporary Class II wetlands are not being provided. Offsetting will focus on Class III, IV and V wetland habitats for reasons outlined above. Classes III and IV represent areas with the greatest probability of occupancy by yellow rail and other wetland SAR (e.g., northern leopard frog [*Lithobates pipiens*]).

vi. **Snapping Turtle – mitigation measures to avoid and lessen the effect of disturbance to snapping turtles including nesting habitat and nests, as well as how disturbance of overwintering habitat (and effects to overwintering turtles) during winter construction will be mitigated.**

Snapping turtle (*Chelydra serpentina*) typically lay their eggs between late May and late June in areas near water with sparse or no vegetation, on sand and gravel banks (ECCC 2020). Snapping turtle nesting habitat was not identified in the LAA, and the outlet channels (including maintenance roads) and outside drain, or road and bridge embankments are not expected to provide suitable nesting habitat for this species as these will be vegetated and compacted. As indicated in the response to IR IAAC-R2-20, Table IAAC-R2-20-8 “Species at Risk, Migratory Birds, and Species of Cultural Importance Mitigation for the Lake Manitoba and Lake St. Martin Outlet Channels Project,” mitigation for snapping turtle includes clearing outside of the bird nesting period, as this period overlaps with most of the snapping turtle nesting period (May 1 to Sept 30). Reduced speed limits on access roads and trails would also benefit the species by reducing traffic disturbance and mortality risk.

As indicated in the response to IR IAAC-R1-49 and in the Wildlife Monitoring Plan filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs, activity will be restricted around known snapping turtle nest sites from March 15 to June 30, and setbacks of 400 metres (m) (1, 312 feet [ft]) will be applied in areas of medium and high levels of disturbance. Where setbacks from known northern leopard frog breeding habitat, and by extension snapping turtle breeding habitat, cannot be implemented, alternate measures such as amphibian and reptile exclusionary fencing may be employed.

Snapping turtle overwinter in water that is shallow enough that the surface can be reached but deep enough that it does not freeze to the bottom, with mud that they can bury themselves in (ECCC 2020). Approximately 0.8 ha [2.0 ac] of potential snapping turtle overwintering habitat (Class V wetlands, lakes) will be affected. Exclusionary fencing to restrict movement of snapping turtle into potential overwintering locations in the PDA is expected to mitigate the effects of disturbance on potentially overwintering snapping turtles, if required.

vii. **Short-eared owl – measures that will be used to avoid or mitigate against nest disturbance or destruction due to mowing or other maintenance activities.**

Short-eared owl (*Asio flammeus*) nest on the ground in large open areas (COSEWIC 2021b). As described in Section 6.0 of the Wildlife Monitoring Plan, mowing of the LMOC and LSMOC rights-of-way (ROWs) will be delayed until after July 15 so that most grassland birds can complete a nesting cycle (Nature Canada 2019; Brown and Nocera 2017).

viii. **Eastern Whip-poor-will (EWPW) – mowing and clearing date restrictions during maintenance and operations as per EWPW Management Plan, including additional details and mitigations for when operations begin after the breeding bird season has begun.**

During the construction and operation periods, clearing will not occur between April 1 and August 31 (Project EIS Volume 3, Section 8.3.6.2). Vegetation maintenance will be limited to the outlet channel ROWs during operation and maintenance and will not likely interfere with eastern whip-poor-will (*Antrostomus vociferus*) nests as this species nests on the ground in areas with moderate tree cover and moderate to sparse shrub and ground cover (ECCC 2018). Maintenance of the vegetation cover in areas where erosion might be present, ongoing mowing of the outside drain to promote drainage, occasional mowing of shrubs and trees that encroach on berms, and ongoing weed control will be part of the maintenance program to promote establishment of a healthy vegetation cover for the Project and to allow for the proper function of water flow. As described in the Eastern Whip-poor-will Habitat Management Plan (EHMP) which was filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs, to reduce potential impacts of mowing of the Lake Manitoba Outlet Channel (LMOC) and Lake St. Martin Outlet Channel (LSMOC) ROWs on nesting birds, mowing will not occur before July 15 (Nature Canada 2019; Brown and Nocera 2017).

Other Species-specific Mitigations

In addition to the list of species provided above, species-specific mitigations have been identified for horned grebe (*Podiceps erodia*). The horned grebe builds floating nests on marshes, shallow bays, and small ponds; lakes and permanent or semi-permanent ponds are preferred (COSEWIC 2009c). Open classes of wetland having the greatest potential to support horned grebe include Class IV and V, as they contain open water and emergent vegetation for breeding (COSEWIC 2009c). As described in the response to IR IAAC-R2-13, the Wetland Offsetting Program will address most wetland sites that are directly affected by the Project in a way that cannot be fully mitigated (including 239 ha [590.6 ac] of Class III, IV, V wetlands and 769 ha [1,900 ac] for peatlands). Furthermore, results arising from the WetMP will evaluate functional changes to adjacent waterbodies to determine if there are appropriate mitigation options to address Project related effects such as drawdown, or whether additional offsetting may be required. Manitoba Transportation and Infrastructure's commitment to offsetting for the loss of Class III, IV, and V wetlands will provide breeding or overwinter habitat for various SAR including yellow rail, least bittern, horned grebe, and northern leopard frog.

ix. **Mowing and clearing date restrictions to the Operation and Maintenance column for additional species including but not limited to Golden-winged warbler, Bobolink and Least Bittern.**

A new version of Table IAAC-R2-20-8 is provided below (Table IAAC-R3-05-2) that shows mowing and clearing date restrictions in the Operation and Maintenance Column for Canada warbler (*Cardellina canadensis*), eastern whip-poor-will, golden-winged warbler (*Vermivora chrysoptera*), least bittern, olive-sided flycatcher (*Contopus cooperi*), rusty blackbird (*Euphagus carolinus*), short-eared owl, and yellow rail. This measure will benefit many other species of migratory bird that may nest within the channel ROWs. Tables IAAC-R2-20-8 and IAAC-R3-05-2 show mitigation for SAR, migratory birds, and species of cultural importance with the potential to

occur in the PDA in addition to species that are known to occur. Identified mowing and clearing restrictions, will also mitigate effects to other wildlife species, including migratory birds, even if these have not been explicitly listed in Table IAAC-R3-05-2.

x. **Cross reference and identification of any species listed in Schedule 1 of the Migratory Bird Regulations 2022 that have been identified as having year-round nest protection that may be impacted by the proposed Project.**

Of the 18 bird species whose nests are protected year-round under Schedule 1 of the Migratory Birds Regulations, 2022, only the ranges of great blue heron (*Ardea erodias*) and pileated woodpecker (*Dryocopus pileatus*) overlap the regional assessment area (RAA). Baseline surveys completed in 2016, 2020, and 2022 did not reveal the presence of great blue heron rookeries and/or pileated woodpecker nests in the LMOC or LSMOC PDAs. However, should nests or colonies be identified prior to construction, Manitoba Transportation and Infrastructure will adhere to protections and processes outlined in the Migratory Bird Regulations, 2022. Manitoba Transportation and Infrastructure has and will continue to engage IAAC and ECCC to regarding requirements and expectations for Project compliance with the Migratory Bird Regulations 2022.

xi. **Include wetland offsetting mitigation for wetland dependent species such as Least Bittern, Yellow Rail, Northern Leopard Frog etc.**

Table IAAC-R3-05-2 is a revised version of Table IAAC-R2-20-8 and presents the most current information on species-specific mitigation that will be used to update Environmental Management Program (EMP) plans, as appropriate.

Table IAAC-R3-05-2 includes wetland offsetting mitigation for least bittern, trumpeter swan (*Cygnus buccinator*), yellow rail, and northern leopard frog. Tables IAAC-R2-20-8 and IAAC-R3-05-2 show mitigation for SAR, migratory birds, and species of cultural importance with the potential to occur in the PDA in addition to species that are known to occur. Manitoba Transportation and Infrastructure's Wetland Offsetting Program, and consideration of wetland dependent SAR, is described in detail in the response to IAAC-R2-13.

Question IAAC-R3-05
October 27, 2023

Table IAAC-R3-05-2 Species at Risk, Migratory Birds, and Species of Cultural Importance Mitigation for the Lake Manitoba and Lake St. Martin Outlet Channels Project

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
American badger	*Taxidae taxus*	• No clearing between April 1-August 31	• Delayed channel haying/mowing until after July 15	WMP; PER 2.2
		• Revegetation of outlet channels to grassland community during construction	• Revegetation of outlet channels to grassland community	WMP; RVMP
		• Buffers/setbacks will be applied to active dens	• Buffers/setbacks will be applied to active dens	WMP; PER 2.11
Moose	*Alces alces*	• Access restrictions (gates, signage, fencing)	• Access restrictions (gates, signage, fencing)	AMP
		• Reduced speed limits	• Reduced speed limits	PER 2.11
		• Cover plantings along edges of PDAs to reduce line of sight	• Cover plantings along edges of PDAs to reduce line of sight	WMP; RVMP
		• Breaks in spoil piles to facilitate movement	• Breaks in spoil piles to facilitate movement	
		• Small-diameter rock armouring along channel slopes to facilitate movement	• Small-diameter rock armouring along channel slopes to facilitate movement	WMP
Black bear	*Ursus americanus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Buffers/setbacks will be applied to active dens	• Buffers/setbacks will be applied to active dens	WMP: PER 2.11

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Little brown myotis Northern myotis	*Myotis lucifugus* *Myotis septentrionalis*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2; PER 2.11
		• If active bat maternity roost identified adjacent to PDA a 500 m (1,640 ft) activity restriction buffer will be applied to protect from noise and activity disturbance	• If active bat maternity roost identified adjacent to PDA a 500 m (1,640 ft) activity restriction buffer will be applied to protect from noise and activity disturbance	WMP; PER 2.2; PER 2.11
		• If tree clearing is required during the maternity roosting period, a qualified biologist will review the trees to determine the likelihood of occupancy before removal	• If tree clearing is required during the maternity roosting period, a qualified biologist will review the trees to determine the likelihood of occupancy before removal	WMP; PER 2.2; PER 2.11
		• Buffers/setbacks will be applied to active maternity roosting sites	• Buffers/setbacks will be applied to active maternity roosting sites	WMP; PER 2.11
Bat cave	-	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• No quarry development near bat caves	• No quarry development near bat caves	QMP
Mineral lick	-	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Quarry site selection will consider environmentally sensitive sites	• Quarry site selection will consider environmentally sensitive sites	QMP
		• Buffers/setbacks will be applied to mineral licks	• Buffers/setbacks will be applied to mineral licks	WMP

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Great blue heron nests	*Ardea herodias*	• Monitor designated period (24 months) before confirmed inactive nests can be disturbed, damaged, removed, or destroyed; or request ECCC permit	• Monitor designated period (24 months) before confirmed inactive nests can be disturbed, damaged, removed, or destroyed; or request ECCC permit	WMP
		• Quarry site selection will consider environmentally sensitive sites	• Quarry site selection will consider environmentally sensitive sites	QMP
		• Buffers/setbacks will be applied to great blue heron rookeries	• Buffers/setbacks will be applied to great blue heron rookeries	WMP; PER 2.14
Pileated woodpecker nests	*Dryocopus pileatus*	• Monitor designated period (36 months) before confirmed inactive nests can be disturbed, damaged, removed, or destroyed; or request ECCC permit	• Monitor designated period (36 months) before confirmed inactive nests can be disturbed, damaged, removed, or destroyed; or request ECCC permit	WMP
Denning mammals (e.g., red fox, coyote, gray wolf, American marten, fisher, wolverine, least weasel)	-	• No clearing between April 1-August 31	• Delayed channel haying/mowing until after July 15 during operation and maintenance	WMP; PER 2.2
		• Buffers/setbacks will be applied to active dens	• Buffers/setbacks will be applied to active dens	WMP; PER 2.11
Terrestrial furbearers (e.g., American marten, fisher)	-	• Access restrictions (gates, signage, fencing)	• Access restrictions (gates, signage, fencing)	AMP
Semi-aquatic furbearers (e.g., beaver, muskrat)	-	• Access restrictions (gates, signage, fencing)	• Access restrictions (gates, signage, fencing)	AMP
		• Breaks in spoil piles to facilitate movement	• Breaks in spoil piles to facilitate movement	
		• Small-diameter rock armouring along channel slopes to facilitate movement	• Small-diameter rock armouring along channel slopes to facilitate movement	WMP

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Red-sided garter snake	*Thamnophis sirtalis*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Revegetation of outlet channels to grassland community during construction	• Revegetation of outlet channels to grassland community	WMP; RVMP
		• Quarry site selection will consider environmentally sensitive sites	• Quarry site selection will consider environmentally sensitive sites	QMP
Sharp-tailed grouse	*Tympanuchus phasianellus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Shrub plantings along edges of outlet channels during construction	• Delayed channel haying/mowing until after July 15 during operation and maintenance	WMP
			• Shrub plantings along edges of outlet channels	WMP; RVMP
Great gray owl	*Strix nebulosa*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Revegetation of outlet channels to grassland community during construction	• Revegetation of outlet channels to grassland community	WMP; RVMP
Northern hawk owl	*Surnia ulula*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
Boreal owl	*Aegolius funereus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
Osprey	*Pandion haliaetus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Pied-billed grebe Western grebe	*Podilymbus podiceps*, *Aechmophorus occidentalis,*	• Offsetting for loss or alteration of directly impacted Class III, IV and V wetlands	• Offsetting for loss or alteration of directly impacted Class III, IV and V wetlands	WCP
Black-crowned night-heron Gulls/terns	*Nycticorax nycticorax* -	• Hand clearing within 30 m (98 ft) of a waterbody	• Hand clearing within 30 m (98 ft) of a waterbody	PER 2.2
Double-crested cormorant	*Phalacrocorax auritus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
American white pelican	*Pelecanus erythrorhynchos*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
Bald eagle	*Haliaeetus leucocephalus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
Bank swallow	*Riparia riparia*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Existing quarries that have been inactive and become active during the migratory bird breeding season (April 1- August 31) will be investigated for the presence of migratory bird nests (e.g., swallow colonies) prior to quarry reactivation • Sand/gravel/soil/aggregate piles in active quarries will be contoured prior to and during the breeding bird season (April 1-August 31) to have a slope of less than 60 degrees	• Existing quarries that have been inactive and become active during the migratory bird breeding season (April 1- August 31) will be investigated for the presence of migratory bird nests (e.g., swallow colonies) prior to quarry reactivation • Sand/gravel/soil/aggregate piles in active quarries will be contoured prior to and during the breeding bird season (April 1-August 31) to have a slope of less than 60 degrees	QMP

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Barn swallow	*Hirundo rustica*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Revegetation of outlet channels to grassland community during construction	• Revegetation of outlet channels to grassland community	WMP; RVMP
		• Machinery will be parked in active areas and infrastructure will be monitored during the breeding bird season (April 1 – August 31); bird deterrents will be applied if necessary		QMP; WMP
			• If maintenance staff identify issue with barn swallow nesting on ancillary buildings, mitigation will be applied e.g., nest removal outside of nesting window, keep doors and windows closed and repairing cracks and holes • Exclusionary netting will be applied if necessary to keep birds from nesting in work areas	WMP
Barred owl	*Strix varia*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
Bobolink	*Dolichonyx oryzivorus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2;
		• Revegetation of outlet channels to grassland community during construction	• Delayed channel haying/mowing until after July 15	WMP; RVMP

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Canada warbler	*Cardellina canadensis*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
Common nighthawk	*Chordeiles minor*	• No clearing between April 1-August 31	• No clearing between April 1-August 31	WMP; PER 2.2
		• Existing sites that have been inactive and become active during the migratory bird breeding season (April 1- August 31) will be investigated for the presence of migratory bird nests (e.g., common nighthawk nests) prior to quarry reactivation	• Existing sites that have been inactive and become active during the migratory bird breeding season (April 1- August 31) will be investigated for the presence of migratory bird nests (e.g., common nighthawk nests) prior to quarry reactivation	QMP
		• Reduced speed limits	• Reduced speed limits	PER 2.11
Eastern whip-poor-will	*Antrostomus vociferous*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
			• Delayed channel haying/mowing until after July 15	WMP; RVMP
		• Shrub plantings along edges of LMOC; shrub and tree plantings along edges of LSMOC	• Shrub plantings along edges of LMOC; shrub and tree plantings along edges of LSMOC	EHMP; WMP; RVMP
		• Quarry site selection will consider environmentally sensitive sites	• Quarry site selection will consider environmentally sensitive sites	QMP
Eastern wood-pewee	*Contopus virens*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
Golden-winged warbler	*Vermivora chrysoptera*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Shrub plantings along edges of LMOC; shrub and tree plantings along edges of LSMOC	• Shrub plantings along edges of LMOC; shrub and tree plantings along edges of LSMOC	WMP; RVMP

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Horned grebe	*Podiceps auritus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Offsetting for loss or alteration of directly impacted Class IV and V wetlands	• Offsetting for loss or alteration of directly impacted Class IV and V wetlands	WCP
		• Hand clearing within 30 m (98 ft) of a waterbody	• Hand clearing within 30 m (98 ft) of a waterbody	PER 2.2
Least bittern	*Ixobrychus exilis*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Offsetting for loss or alteration of directly impacted Class IV and V wetlands	• Offsetting for loss or alteration of directly impacted Class IV and V wetlands	WCP
		• Hand clearing within 30 m of a waterbody	• Hand clearing within 30 m of a waterbody	PER 2.2
Olive-sided flycatcher	*Contopus cooperi*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; RVMP; PER 2.2
		• Hand clearing within 30 m (98 ft) of a waterbody	• Hand clearing within 30 m (98 ft) of a waterbody	PER 2.2
Red-headed woodpecker	*Melanerpes erythrocephalus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Obtain *Species at Risk Act* permit for removal and relocation of red-headed woodpecker nest trees (trees with nest cavity)	Obtain *Species at Risk Act* permit for removal and relocation of red-headed woodpecker nest trees (trees with nest cavity)	RHMP
		• Shrub plantings along edges of LMOC during construction	• Shrub plantings along edges of LMOC during construction	RHMP; WMP; RVMP
		• Installation of snags and/or nest boxes along edges of LMOC during construction	• Installation of snags and/or nest boxes along edges of LMOC	RHMP
		• Quarry site selection will consider environmentally sensitive sites	• Quarry site selection will consider environmentally sensitive sites	QMP

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Rusty blackbird	*Euphagus carolinus*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	PER 2.2
		• Hand clearing within 30 m (98 ft) of a waterbody	• Hand clearing within 30 m (98 ft) of a waterbody	PER 2.2
Short-eared owl	*Asio flammeus*	• No clearing between April 1-August 31	• Delayed channel haying/mowing until after July 15	WMP; PER 2.2
		• Revegetation of outlet channels to grassland community during construction	• Revegetation of outlet channels to grassland community	WMP; RVMP
Trumpeter swan	*Cygnus buccinator*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Hand clearing within 30 m (98 ft) of a waterbody	• Hand clearing within 30 m (98 ft) of a waterbody	PER 2.2
		• Offsetting for loss or alteration of directly impacted Class IV and V wetlands	• Offsetting for loss or alteration of directly impacted Class III and IV wetlands	WCP
Yellow rail	*Coturnicops noveboracensis*	• No clearing between April 1-August 31 • Hand clearing within 30 m (98 ft) of a waterbody	• Hand clearing within 30 m (98 ft) of a waterbody	WMP; PER 2.2
		• Offsetting for loss or alteration of directly impacted Class III and IV wetlands	• Offsetting for loss or alteration of directly impacted Class III and IV wetlands	WCP

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Northern leopard frog	*Lithobates pipiens*	• No clearing between April 1-August 31	• Delayed channel haying/mowing until after July 15	WMP; PER 2.2
		• Excavation within wetlands will be completed during dry or frozen conditions whenever feasible		PER 2.11
		• Exclusionary fencing will be installed around open excavations near wetlands when and where there is potential for entrapment of amphibians or other wildlife species, or as directed by the Contract Administrator		PER 2.11
		• Revegetation of outlet channels to grassland community during construction	• Revegetation of outlet channels to grassland community during construction	WMP; RVMP
		• Hand clearing within 30 m (98 ft) of a waterbody	• No woody vegetation management between April 1-August 31	PER 2.2
		• Breaks in spoil piles to facilitate movement	• Breaks in spoil piles to facilitate movement	WMP
		• Small-diameter rock armouring along channel slopes to facilitate movement	• Small-diameter rock armouring along channel slopes to facilitate movement	WMP
		• Offsetting for loss or alteration of directly impacted Class III, IV and V wetlands	• Offsetting for loss or alteration of directly impacted Class III and IV wetlands	WCP

Species or Feature		Species-Specific Mitigation		
Common Name	**Scientific Name**	**Construction**	**Operation and Maintenance**	**Mitigation Plan[1]**
Snapping turtle	*Chelydra serpentine*	• No clearing between April 1-August 31	• No woody vegetation management between April 1-August 31	WMP; PER 2.2
		• Reduced speed limits • Exclusionary fencing will be installed around open excavations near wetlands when and where there is potential for entrapment of amphibians, turtles, or other wildlife species, or as directed by the Contract Administrator	• Reduced speed limits	PER 2.11
		• Hand clearing within 30 m (98 ft) of a waterbody	• Hand clearing within 30 m (98 ft) of a waterbody	PER 2.2
		• Buffers/setbacks will be applied to nesting habitat	Buffers/setbacks will be applied to nesting habitat	WMP

Note:

[1] Mitigation Plans include: WMP (Wildlife Monitoring Plan); PER (Project Environmental Requirements); AMP (Access Management Plan); RVMP (Revegetation Management Plan); QMP (Quarry Management Plan); EHMP (Eastern Whip-poor-will Habitat Management Plan); RHMP (Red-headed Woodpecker Habitat Mitigation Plan); WCP (Wetland Compensation Plan)

xii. **In Table IAAC-R2-20-8, in the first row 'American badger' under the 'Operations and Maintenance' column, the term nests should be updated to dens. The column currently reads 'buffers/setbacks will be applied to active nests'.**

The term has been updated in Table IAAC-R3-05-2.

d. **Provide detail regarding how effects to nesting species at risk and migratory birds will be mitigated if operation of the channels is initiated after the breeding bird nesting season has started.**

As outlined in the May 2023 Project Description Update, the non-operating water levels in the LMOC and LSMOC will vary but remain within the zone of crushed rock armouring where SAR and other migratory birds are not expected to nest. During operation, water levels south of the LMOC WCS will decrease and remain within the armoured side slopes. Approximately one in every three years, water levels will increase in LSMOC, submerging armoured and grassy portions of the lower side slopes where bird nesting potential is expected to be low. Only in a one in 300-year event (i.e., repeat of 2011 flood with channels in place) would floodwaters in LSMOC rise high enough to cover the 15 m (49 ft)-wide grass-covered benches. Currently, the Project RAA is susceptible to periodic flooding, the effects of which include SAR and migratory bird nest destruction during the breeding bird season. Without the Project, SAR and migratory bird nests will continue to be flooded during high water periods. No additional effects on nesting birds are expected as a result of the Project; during operation, effects to species at risk and migratory birds nesting in the region will be reduced because floodwaters will be diverted through the outlet channels, affecting sub-optimal nesting habitat for SAR and migratory birds (i.e., side slopes).

e. **Include mitigations for effects due to mowing and clearing activities for each species affected during operation and maintenance.**

Mowing is required to maintain the grassland community within the channel ROWs. Periodic mowing will increase plant diversity benefitting wildlife that use grassland ecosystems (e.g., grouse, songbirds, hawks, mice, voles, red fox, coyote). To mitigate the effects of clearing on nesting bird mortality and other species that share similar timing for critical life cycle events, clearing will only occur between September 1 and March 31 of any given year. To mitigate mortality risk associated with mowing, mowing will be delayed until after July 15 so that most birds can complete a nesting cycle (Nature Canada 2019; Brown and Nocera 2017). Delayed mowing will also increase survival of less mobile animals that may inhabit the channel ROWs such as young rabbits and deer fawns. The July 15th mowing restriction has been added to Table IAAC-R3-05-2 for species that would benefit from this mitigation.

f. **Revise and update appropriate Environmental Management Plans with the revised mitigation table to ensure all of the necessary mitigations for migratory birds and species at risk are included.**

As identified in the disclaimer for each plan that forms part of the Project EMP, these plans were issued as draft documents and are subject to ongoing change as a result of the engagement and consultation processes, regulatory input, and Project planning. As these will be living documents, any changes to the plans that occur after Project approvals are received will be shared with regulators, Indigenous groups, and stakeholders prior to implementation of the change. Either a revision number or subsequent amendment would be added to the specific environmental management plan to communicate the revision or change.

Appropriate EMP plans will be updated with the revised mitigation table (Table IAAC-R3-05-2), and newly identified measures as required after the issuance of the provincial licence under *The Environment Act* and federal Environmental Assessment decision statement under the *Canadian Environmental Assessment Act 2012*, and prior to construction. These updates will advise Project staff and contractors of the necessary mitigations for migratory birds, SAR and other wildlife.

g. **Detail mitigation measures that will be in place to protect migratory bird nesting islands in Lake St. Martin and Lake Winnipeg from flooding during operation of the channels.**

As described in the May 2022 response to IR IAAC-R1-50, the Project will provide additional outlet capacity to LSM, resulting in lower water levels and decreased area of inundation during peak flows. These changes are expected to reduce the flooding of nesting islands, shorelines, and overwater nests that currently occurs during these conditions. As outlined in the May 2022 response to IR IAAC-R1-56, migratory bird species (gulls, terns, cormorants, and pelicans) that inhabit islands within LSM are expected to benefit from an increased availability of habitat and reduced risk of nest loss during flood events when the outlet channels are active. As such, no mitigation is required to protect migratory bird nesting islands on LSM. Once the Project is constructed and in operation, infrastructure will be operated in accordance with the Operating Guidelines, as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs), which includes considerations for flood management and responding to high water levels in Lake Manitoba and LSM. No discernable effects on water flow or water levels are expected on Lake Winnipeg (see May 2022 response to IR IAAC-R1-94, Table IAAC-94). As such, there are no anticipated adverse effects on the Lake Winnipeg islands and no mitigation is currently proposed unless monitoring demonstrates the need for adaptively mitigating and managing effects that are currently not anticipated.

h. **Revise Table IAAC-R2-20-3 so that the Wetland Cover Class column uses the same classification system (Stewart and Kantrud) as is used throughout the EIS and include Class II wetlands in the table.**

Table IAAC-R3-05-3 represents a new version of Table IAAC-R2-20-3. It has been revised so that the Wetland Cover Class column uses the same classification system (Stewart and Kantrud 1971) as is used throughout the Project EIS, including Class II wetlands, as shown below.

Table IAAC-R3-05-3 Wetland Cover Types in the Lake Manitoba and Lake St. Martin Outlet Channel Wildlife Local Assessment Area

Wetland Cover Class[1]	Area of habitat in the PDA (ha)	Area of habitat in the LAA (ha)	Direct Loss (% of habitat in PDA)	Direct Loss (% of habitat class in LAA)	Direct Loss LMOC (ha)	Direct Loss LSMOC (ha)
II	72.6	313.8	100	23.1	72.6	0
III	199.1	1,012.4	100	19.6	199.0	0.1
IV	39.1[1]	623.4	100	6.2	38.6	0
V	0.8[1]	19.7	100	0	0	0
Other Wetlands[2]	810.6	5,469.2	100	14.8	42.1	768.5
Total	1,122.2	7,438.5	100	15.1	352.3	768.6

Note:
[1] Values listed in the table are based on detailed wetland classes mapped by WSP (2020). Stantec estimated the values for Class IV to be 38.6 ha and 0 ha for Class V (for a total estimate of 237.7 ha of Class III, IV and V). This difference relates to the mapping base and the boundary selection for the LAA. This discrepancy of 1.3 ha will be reviewed and corrected through the Wetland Offsetting Program outlined in IAAC-R2-13. As a precautionary approach, the larger values are being used in the calculation for wetland offsetting. 2 In the PDA, 'other wetlands' include bogs, fens, and swamps. In the LAA, wetland areas surrounding LSM were not mapped to detail in Project EIS land cover mapping ('other wetlands' therefore also include broad wetland classes such as wetland-herb, wetland-shrub, and wetland-treed as per LCC).

i. **Confirm if additional baseline data is being collected in 2023 for the Wetland Monitoring Plan. If additional baseline is being collected, provide a plan for incorporation of this data into the Wetland Monitoring Plan and providing the updated plan to the Agency and relevant authorities.**

As part of a continuation of the 2022 wetland monitoring fieldwork carried out for the Project, 39 surface water monitoring stations and nine groundwater well sites were visited in 2023 in order to collect in-field data measurements and to remove monitoring equipment. The information collected will be used to help establish spring baseline conditions for wetland monitoring sites and for future comparison of changes, as indication of variation in relation to flooding or potential Project effects. Similarly, wildlife cameras deployed in 2022 and left deployed for winter data collection were retrieved. This information will be incorporated into the revised WetMP, which will be updated after federal and provincial environmental regulatory approvals are received, and prior to the start of Project construction.

j. **Clarify how the detection of multiple EWPW in the LSMOC and within EWPW critical habitat affects the EWPW Habitat Management Plan.**

The EHMP is a living document and will be updated to reflect the most current information including the results of the 2022 surveys. Areas in the LSMOC where eastern whip-poor-will were detected in 2022 are planned to be monitored with autonomous recording units (ARUs) as part of the WetMP. Data will be used by the EHMP to identify changes in eastern whip-poor-will distribution. The presence of eastern whip-poor-will along LSMOC and in a 10 x 10 kilometre (km (6.2 x 6.2 mile [mi]) critical habitat square does not change the conclusions of the Project EIS because critical habitat for this species is defined by the presence of forest habitat and well-drained soils and not by eastern-whip-poor-will observations.

k. **Confirm if the area of critical habitat that overlaps the PDA contains the biophysical attributes required by EWPW. If so, detail the plan to mitigate effects to EWPW critical habitat in the project area.**

As concluded in Volume 3, Section 8.3.6.2 of the Project EIS, the Project does not overlap with the biophysical attributes of eastern whip-poor-will Critical Habitat. Based on the Project EIS modeling of biophysical attributes for eastern whip-poor-will outlined in the recovery strategy (ECCC 2018), forest habitat located within the LSMOC PDA is not considered critical habitat for the species. The closest modeled eastern whip-poor-will habitat to the PDA was identified within the southeastern portion of the critical habitat grid square, over 5 km (3.1 mi) from the LSMOC PDA.

This is more fulsomely explained in the response to IR IAAC-R1-54, which states "On March 18, 2021, Manitoba Transportation and Infrastructure met again with ECCC and IAAC to present and describe steps taken in the Project EIS to assess Project overlap with eastern whip-poorwill habitat in the Critical Habitat grid square (Manitoba Infrastructure 2021). During this meeting it was agreed that Manitoba Transportation and Infrastructure would share spatial files and data queries such that ECCC (specifically Canadian Wildlife Service) could replicate the Project EIS eastern whip-poor will habitat analysis. After running their own independent habitat analysis for eastern whip-poorwill, ECCC confirmed that the PDA does not overlap with the biophysical attributes of eastern whip-poor-will critical habitat for breeding or foraging within the Critical Habitat square (ECCC 2021, pers. comm.). Accordingly, SAR offset or compensation plans will therefore not be developed for these species as part of the Project."

l. **Revise the EWPW Habitat Management Plan as needed based on the detection of EWPW in the LSMOC PDA.**

As indicated in the response to Part i above, the EHMP will be updated to reflect the results of the 2022 surveys. Areas in the LSMOC where eastern whip-poor-will were detected in 2022 will be monitored with ARUs as part of the WetMP. Data will be used by the EHMP to identify changes in eastern whip-poor-will distribution pre- and post-construction.

Question IAAC-R3-05
October 27, 2023

m. **Include a description to accompany Table IAAC-R2-20-5 that describes which habitat types are included as 'habitat' for each species listed in the table.**

In response to Round 2 IR IAAC-R2-20, Table IAAC-R2-20-5 “Migratory Bird Species at Risk Habitat in the Lake Manitoba and Lake St. Martin Outlet Channel Wildlife Assessment Areas,” has been revised in Table IAAC-R3-05-4 below to show the land cover classes queried for each species. It should be noted that there are small (0.1 ha [0.25 ac]) differences in total area due to rounding. Habitat classes for least bittern have been updated and for horned grebe have been added based on revised PDA mapping from Preconstruction Environmental Fieldwork - Wetlands (WSP 2020) to identify Class IV and V wetlands and refined Project EIS mapping (Project EIS Volume 3, Section 8.2.2.1) for the LAA to identify all other classes. Wetland mapping was revised using additional desktop review and 2020 field survey data, but only within the PDA and LAA (WSP 2020).

Question IAAC-R3-05
October 27, 2023

Table IAAC-R3-05-4 Migratory Bird Species at Risk Habitat in the Lake Manitoba and Lake St. Martin Outlet Channel Wildlife Assessment Areas

Migratory Bird Species at Risk[1]	Habitat Class	Area of Habitat[1] in the PDA (ha)	Area of Habitat in the LAA (ha)	Area of Habitat in the RAA (ha)	Direct Loss (% of habitat in PDA)	Direct Loss (% of habitat in LAA)	Direct Loss LMOC (ha)	Direct Loss LSMOC (ha)
Eastern whip-poor-will[2]	Coniferous Forest – Dense	0	5.0	876.0	0	0	0	0
	Coniferous Forest – Open	0	38.3	1,571.7	0	0	0	0
	Deciduous Forest – Dense	10.4	455.4	2,902.1	100	0.4	10.4	0
	Deciduous Forest – Open	3.5	142.5	3,226.1	100	0.1	3.5	0
	Mixedwood Forest - Dense	0.3	26.7	1,276.7	100	0.0	0.3	0
	Mixedwood Forest- Open	0.4	8.3	8.3	100	4.8	0.4	0
	Total	**14.7**	**676.1**	**9,860.9**	**100**	**2.2**	**14.7**	**0**
Red-headed woodpecker[2]	Deciduous Forest - Open	51.7	957.6	8,325.9	100	0.6	51.7	0
	Grassland	0	19.7	1,030.0	0	0	0	0
	Hayland	46.8	488.8	488.8	100	9.6	46.8	0
	Hayland and Pasture	0	0.8	15.6	0	0	0	0
	Marsh	56.4	222.3	222.3	100	25.4	56.4	0
	Mixedwood Forest - Dense	0.4	20.1	149.1	100	0.3	0.4	0
	Mixedwood Forest - Open	0.1	3.5	3.5	100	2.9	0.1	0
	River/Streams/Creeks	0.1	2.5	2.5	100	4.0	0.1	0
	Shallow Open Water	1.1	13.5	13.5	100	8.1	1.1	0
	Shrubland	0.5	15.2	15.2	100	3.3	0.5	0
	Tame Pasture	8.0	47.1	47.1	100	17.0	8.0	0
	Wetland-herb	0	41.7	779.3	0	0	0	0
	Wetland-shrub	0	302.4	5,475.6	0	0	0	0
	Total	**165.2**	**2,135.3**	**16,568.5**	**100**	**7.7**	**165.2**	**0**

Migratory Bird Species at Risk[1]	Habitat Class	Area of Habitat[1] in the PDA (ha)	Area of Habitat in the LAA (ha)	Area of Habitat in the RAA (ha)	Direct Loss (% of habitat in PDA)	Direct Loss (% of habitat in LAA)	Direct Loss LMOC (ha)	Direct Loss LSMOC (ha)
Bobolink[2]	Cultivated	121.8	746.6	3,362.4	100	3.6	121.8	0
	Grassland	7.7	2,531.1	54,303.3	100	0.0	1.1	6.7
	Hayland	370.6	2,997.6	2,997.6	100	12.4	370.6	0
	Hayland and Pasture	0	51.4	6,075.1	0	0	0	0
	Marsh	280.2	1,658.9	1,658.9	100	16.9	272.2	7.9
	Tame Pasture	33.8	234.6	234.6	100	14.4	33.8	0
	Total	**814.1**	**8,220.1**	**68,631.9**	**100**	**9.9**	**799.5**	**14.6**
Barn swallow[2]	Developed	0	74.7	2,802.3	0	0	0	0
	Grassland	1.7	1,971.2	49,660.0	100	0.0	1.1	0.6
	Hayland	370.6	2,992.7	2,992.7	100	12.4	370.6	0
	Hayland and Pasture	0	23.1	5,910.3	0	0	0	0
	Marsh	275.7	1,573.9	1,573.9	100	17.5	272.2	3.4
	Residential	5.0	79.4	79.4	100	6.3	5.0	0
	Roads	19.4	83.3	83.3	100	23.3	19.4	0
	Rock/Sand	0.4	4.2	4.2	100	9.5	0.4	0
	Tame Pasture	33.8	232.5	232.5	100	14.5	33.8	0
	Wetland-herb	<0.1	1,710.9	9,399.4	100	<0.1	0	<0.1
	Total	**706.5**	**8,745.9**	**72,738.0**	**100**	**8.1**	**702.5**	**4.0**
Horned grebe[3]	Class IV Wetland	38.6	623.4	739.8	100	6.2	38.6	0
	Class V Wetland	**0**	19.7	20.5	100	0	0	0
	Marsh	**0**	35.5	35.5	100	0	0	0
	Wetland-herb	**0**	3929.8	35596.9	100	0	0	0
	Total	**38.6**	**4,608.4**	**36,392.7**	**100**	**0.8**	**38.6**	**0**

Question IAAC-R3-05
October 27, 2023

Migratory Bird Species at Risk[1]	Habitat Class	Area of Habitat[1] in the PDA (ha)	Area of Habitat in the LAA (ha)	Area of Habitat in the RAA (ha)	Direct Loss (% of habitat in PDA)	Direct Loss (% of habitat in LAA)	Direct Loss LMOC (ha)	Direct Loss LSMOC (ha)
Least bittern[3]	Class IV Wetland	38.6	623.4	739.8	100	6.2	38.6	0
	Class V Wetland	0	19.7	20.5	100	0	0	0
	Marsh	0	35.5	35.5	100	0	0	0
	Swamp - shrub	44.9	236.8	373.4	100	18.9	31.2	13.7
	Wetland-herb	0	3929.8	35596.9	100	0	0	0
	Total	**83.4**	**4,845.2**	**36,766.1**	**100**	**1.7**	**69.8**	**13.7**
Yellow rail[3]	Class III Wetland	199.2	1069.7	1268.8	100	18.6	199.2	0.1
	Class IV Wetland	38.6	623.4	739.8	100	6.2	38.6	0
	Fen - Graminoid	264.0	1,564.9	1,956.3	100	16.9	0	264.0
	Marsh	0	35.5	35.5	100	0	0	0
	Wetland-herb	0	3,929.8	35596.9	100	0	0	0
	Total	**501.8**	**7,223.3**	**39,597.3**	**100**	**6.9**	**237.8**	**264.1**

Notes:

1 Does not include metrics for piping plover due to lack of Project interaction (Project EIS Volume 3, Section 8.3.6.2; see also IAAC-R1-46.

2 Habitat metrics developed using refined Project EIS mapping (Volume 3, Section 8.2.2.1).

3 Habitat metrics based on revised PDA mapping from Preconstruction Environmental Fieldwork - Wetlands (WSP 2020) to identify Class I-V wetlands and refined Project EIS mapping (Project EIS Volume 3, Section 8.2.2.1) for the LAA to identify all other classes. Wetland mapping was revised using additional desktop review and 2020 field survey data, but only within the PDA and LAA.

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QUESTION IAAC-R3-06

Referenced Round 2 IR(s): IAAC-R2-14, IAAC-R2-15, IAAC-R2-17, IAAC-R2-24, IAAC-R2-27, IAAC-R2-29, IAAC-R2-34

Expert Dept. or group:
Berens River First Nation
Bloodvein First Nation
Dakota Tipi First Nation
ECCC
Fisher River Cree Nation
IAAC
Interlake Reserves Tribal Council
Little Saskatchewan First Nation
Misipawistik Cree Nation
Peguis First Nation
Pinaymootang First Nation
Poplar River First Nation
RM of Grahamdale
Sagkeeng Anicinabe First Nation
Sandy Bay Ojibway First Nation

EIS Guideline Reference: 7.1.10 Indigenous Peoples

7.3.3 Indigenous Peoples

9. Monitoring and Follow up Programs

Context and Rationale

The EIS Guidelines require the Proponent to assess effects to Indigenous Peoples' current use, physical and cultural heritage, and health and socio-economic conditions. The Project overlaps with the traditional territories of many First Nations and Métis locals in the Interlakes region and surrounding waterbodies affected by the Project, and thus may modify their ability to undertake current use practices, affect resources and sites of importance, and affect their health and socio-economic conditions.

Surface Water Quality

The response to IAAC-R2-14 indicates the residual effects of Project operation on surface water quality are not anticipated to pose a threat to the long-term persistence and viability of traditionally harvested fish or wildlife species in the RAA. Fisher River Cree Nation noted that the RAA is a large area, much of which may be difficult to access or a far distance from a local traditional hunting or fishing location. Understanding specific effects to water quality in more localized areas is important to understand the overall effects to the availability and quality of resources for current use. The IRTC, Sandy Bay Ojibway

First Nation, Pinaymootang First Nation, and Sagkeeng First Nation noted the lack of consideration of how increased sediments will affect other facets of their socio-economic conditions, such as recreational enjoyment and use of lands.

Fragmentation of the Landscape

The Project has the potential to modify access to traditional resources and areas of current use through restrictions on the ability to navigate to and through areas used for traditional purposes. The response to IAAC-R2-15 asserts that patterns of access outside the PDA will not be altered, thus effects to traditional use will be minimal. The Proponent noted that Indigenous harvesters will be able to continue to travel in the area but the need to cross outlet channels at designated locations will impose some restrictions on travel. However, the Interlake Reserves Tribal Council (IRTC), Sandy Bay Ojibway First Nation, Pinaymootang First Nation, and Sagkeeng First Nation identified that the channels would create nearly impassable obstacles for their members to travel by foot or quad. The inability to access and traverse large portions of land represents a direct restriction on the ability of Indigenous groups to exercise their rights.

The IRTC, Sandy Bay Ojibway First Nation, Pinaymootang First Nation, and Sagkeeng First Nation also raised concerns about the physical components of the channel affecting wildlife movement and mortality. They noted that the assessment of effects to wildlife travel across the channel fails to take into consideration the cleared 400 metre ROW on either side of the channel, as well as water velocities within the channel during operation. In response to IAAC-R2-17, the Proponent states that spoil piles present along the length of the channel ROW will be configured to guide wildlife to locations that are safer and easier to cross (i.e., where smaller rock size will be used for armouring the channels). The Proponent does not offer additional mitigation measures to address the effects of the Project on wildlife movement. The Proponent notes that for both LSMOC and LMOC, high flows during operation are anticipated to impede wildlife movement by deterring wildlife from entering the channels. Additional information on configuration of the spoil piles which guide wildlife or any other mitigation measures is required to understand potential effects to wildlife movement.

In response to IAAC-R2-21, the Proponent commits to restricting access along the channels through signage, fencing, limiting road access, and having conservation officers patrol the channels. However, Fisher River Cree Nation noted that enforcing access restrictions along 46 km of outlet channels through the life of the Project would be difficult. The effectiveness of the enforcing access restrictions as a mitigation measure is uncertain.

Indigenous Participation

The response to IAAC-R2-30 discusses the Proponent's proposed Environmental Advisory Committee (EAC) as a means of continued engagement with Indigenous groups. Indigenous groups continue to raise concerns regarding the structure and function of the EAC, including access to information, input into decision-making, and Indigenous participation and capacity support. The Proponent indicated that the EAC is intended to support the meaningful participation of local communities in environmental monitoring for the proposed Project, promote the inclusion of local and Indigenous Knowledge in the Environmental

Monitoring Plans, and provide a direct point of contact for the Proponent to local communities. It is critical to ensure Indigenous groups have a full understanding of what this entails and the associated support (e.g. training, equipment, and capacity) that will be provided to ensure meaningful participation in these aspects and programs moving forward. Indigenous groups have noted that they must be included in the monitoring activity, reporting, and solutions or mitigation at every step and have adequate training and equipment to do so. Berens River First Nation, Peguis First Nation, and Fisher River Cree Nation indicated that local fishers have experienced sediment build-up in fishing areas and identified the need for additional information regarding how monitoring capacity and equipment required will be provided to support Indigenous participation in the Aquatic Environmental Monitoring Plan. Dakota Tipi First Nation, Sandy Bay Ojibway First Nation, Pinaymootang First Nation, and Sagkeeng First Nation identified the need for the co-development of a program to monitor increased sediment build-up in traditional fishing areas.

Heritage Resources

The response to IAAC-R2-34 presents conflicting information with regards to heritage resources, the approval of the Heritage Resource Impact Assessment (HRIA) by the Heritage Resources Board for the proposed Project (WSP [2020]), and the distance of the Fairford Trail from Lake Manitoba. The response also refers to mapbooks in the Environmental Protection Plan that contain "site-specific detailed protection measures" that are not provided.

The Interlake Reserves Tribal Council, Sandy Bay Ojibway First Nation, Pinaymootang First Nation, and Sagkeeng First Nation identified concerns with the Heritage Resource Protection Plan, including the lack of involvement of Indigenous groups in its development, need for cultural protocols on lands affected by the proposed Project, excavation of resources, and lack of Indigenous involvement in chance find procedures. Protecting a regionally significant and complex settlement site that dates back to 3000 B.P., has been identified as a top priority by Indigenous groups. Poplar River First Nation expressed concern regarding the lack of baseline data on cultural heritage as a result of the lack of funding for field work with elders and knowledge carriers regarding sites and artifacts. Dakota Tipi First Nation noted concerns about the lack of measures or actions to protect identified cultural, ceremonial, and harvesting sites.

Information Requests

a. Discuss the effects of changes to surface water quality on traditionally harvested fish and wildlife species in the LAA.
    i. Provide an overview of effects to each main waterbody/watercourse and analyze the associated effects to the resources that support current use.
    ii. Assess associated effects to Indigenous Peoples' health and socio-economic conditions, including recreational enjoyment and use of lands.

b. Reassess effects to current use arising from the fragmentation of the landscape as a result of project infrastructure.

   i. Include the consideration of barriers to wildlife access, as well as the implications arising from travel barriers to Indigenous land users. Include a discussion on effects to specifically identified sites and areas in the PDA.

   ii. Include an assessment of effects to wildlife arising from increased predation along the cleared ROW on either side of the outlet channels and from increased water velocities in the channel during operations.

   iii. Include details on the outlet channel crossings, including but not limited to:

   i. Location and distance in between crossings

   ii. What type of travel these crossings will be able to accommodate (foot, quad, etc.)

   iii. Signage for crossings

   iv. Provide clarity on the configuration of the spoil piles that will be present along the length of the channel ROWs and how they will be configured to guide wildlife to locations that are safer and easier to cross. A diagram and/or more details to better explain the concept is suggested. Details could include but are not limited to dimensions, slope, location, duration, etc. of the spoil piles and locations of the safe crossings.

   v. Consider and describe additional ways to enforce access restrictions along both channels. Discuss feasibility of hiring a dedicated security personnel to enforce access restrictions.

   vi. Discuss the option of registering the Lake St. Martin Access Road, temporary access road, and the service road along the channels as ‘Resource Roads’ on Manitoba’s Crown Lands Registry.

   vii. Include any additional mitigations for effects to access for current use purposes.

c. Discuss Indigenous groups’ involvement in the development of mitigation measures and implementation of monitoring and reporting activities.

   i. Include a table that describes the opportunities for the involvement of Indigenous groups in the development and facilitation of each type of monitoring and reporting activity, including timelines for such involvement.

   ii. Describe how specific training and any equipment will be provided to Indigenous groups to support their participation in monitoring efforts.

   iii. Describe how capacity for Indigenous groups to participate in monitoring programs and the EAC will be provided.

   iv. Describe the process that will be taken to implement recommendations put forward by the EAC and commitments to implementing these recommendations.

   v. Discuss the intersection between nation-specific consultation and the EAC. Describe how input from consultation with Indigenous groups will be taken into account within the EAC.

d. Update the Heritage Resource Protection Plan to include:

   i. Mapbooks that include site-specific mitigation measures.

   ii. A description of the protection measures provided in the HRIA for heritage resources.

   iii. A description of how the Indigenous Knowledge provided was used to determine effects to all tangible and intangible cultural heritage resources. Provide examples of specific Indigenous Knowledge regarding intangible cultural heritage resources and describe how this information was incorporated into the assessment.

   iv. Acknowledgement and discussion of the concerns raised about the loss of a regionally significant cultural settlement site (dating back to 3000 B.P.). Include this site in the assessment of potential effects to sites of importance and Indigenous peoples' physical and cultural heritage.

   v. A description of the heritage resource sites (that the Proponent is aware of) that will be lost due to excavation and the specific mitigations identified for the loss of these sites.

   vi. A summary of key mitigations for the avoidance and protection of identified cultural, ceremonial, and harvesting sites.

   vii. A description of Indigenous involvement in any archaeological work and chance find procedures.

Response IAAC-R3-06

a. **Discuss the effects of changes to surface water quality on traditionally harvested fish and wildlife species in the LAA.**

The May 2022 response to Information Request (IR) IAAC-R1-14 provides an updated assessment (from the Project Environmental Impact Statement [EIS]) of effects of the Project on surface water quality for each main waterbody/watercourse, including effects to the resources that support the current use of lands and resources for traditional purposes. The response to IR IAAC-R1-14 notes that the assessment of effects of the Project on surface water quality is provided in the Project EIS Volume 2, Section 6.4, as part of the Groundwater and Surface Water Valued Component. It adds that potential effect pathways for surface water quality are identified in the Project EIS Volume 2, Section 6.4.1.3, with existing conditions described in Project EIS Volume 2, Section 6.4.5, and residual effects characterized in Section 6.4.7.

The response to IR IAAC-R1-14 notes that the purpose of the Project is to provide flood protection to residents of the Lake Manitoba and Lake St. Martin basins, based primarily on the significant regional socioeconomic costs resulting from the 2011 flood. The reduction of lake levels in Lake Manitoba and Lake St. Martin due to the operation of the Lake Manitoba Outlet Channel (LMOC) and Lake St. Martin Outlet Channel (LSMOC) is a desired positive outcome and objective of the Project – to mitigate significant regional adverse effects. The operation of the LMOC and LSMOC will allow water to be conveyed from Lake Manitoba to Sturgeon Bay more quickly than without the outlets. The additional hydraulic conveyance provided by the LMOC and LSMOC will reduce peak flood levels on the lakes, reduce flows and velocities in the Fairford and Dauphin Rivers, decrease inundation of

areas around the lakes, and increase the amount of time that Lake Manitoba and Lake St. Martin can be maintained within the desired target range of lake levels.

As described in the July 2023 response to IR IAAC-R2-04, based on the available baseline surface water quality data from 1973 to 2021, surface water quality is generally similar in areas upstream and downstream of the Project. Therefore, increased volumes of water movement from Lake Manitoba to Lake Winnipeg is not expected to measurably alter surface water quality beyond current variability. In addition, from a regional perspective, the lessening of overland flooding is expected to improve surface water quality during these events, as less soil and associated contaminants would be flushed into surface waters. Therefore, from a regional surface water quality perspective no measurable changes to fish or wildlife populations and harvesting are anticipated. Project-related surface water quality changes are therefore based mainly on local inputs from each channel, primarily associated with sediments, with the majority generated through channel construction. Parts a-i, and a-ii below provide additional on those effects.

i. Provide an overview of effects to each main waterbody/watercourse and analyze the associated effects to the resources that support current use.

Overview

This response organizes information on changes to surface water quality associated effects to the resources that support the current use of lands and resources for traditional purposes for the following specific areas:

- Lake Manitoba
- Fairford River
- Lake St. Martin
- Dauphin River
- Sturgeon Bay in Lake Winnipeg
- North Basin in Lake Winnipeg

Details on the effects to these waterbodies is provided in the response to Part a-ii.

Lake Manitoba

Summary of Project Changes

The inlet to the LMOC is located at Watchorn Bay in Lake Manitoba. Project construction will involve excavation of the lake bottom that will transition as excavation moves towards the shoreline to match proposed channel invert elevations. As described in the May 2023 Project Description Update, the inlet will extend 132 metres (m) (433.1 feet [ft]) into the lake, along the centerline, with a flared design resulting in a width of the excavation where it daylights in Watchorn Bay of approximately 270 m (885.8 ft). Riprap will be installed on a portion of the inlet

side slopes, but not the base, extending from the channel proper to the shoreline. The portion of the excavation in Watchorn Bay beyond the shoreline will not have riprap. Silt curtains will be used to confine sediments to the work area, with monitoring to confirm effectiveness, as described in the Sediment Management Plan (SMP) which was filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs.

The reduction of lake levels in Lake Manitoba due to the operation of the LMOC and LSMOC is a desired positive outcome and objective of the Project. The operation of the LMOC and LSMOC will allow more water to be conveyed from Lake Manitoba to Lake Winnipeg more quickly than without the outlet channels, and aid in the regulation of Lake Manitoba within the desired range of 247.04 to 247.65 m (810.5 to 812.5 ft).

The May 2022 response to IR IAAC-R1-32 describes the assessment of changes to Watchorn Bay once the Project is in place. It was determined that the hydraulic conditions in Watchorn Bay are expected to remain within their natural variability during the construction and operation phases of the LMOC. The inlet excavation is not expected to interrupt existing sediment transport processes in the vicinity. Therefore, existing shoreline erosion processes are not expected to change because of the LMOC.

Effects to Resources that Support Current Use

Indigenous groups engaged on the Project have expressed concerns about potential effects of surface water quality in Lake Manitoba to resources that support current use, including ongoing flooding of lands and harvesting areas around Lake Manitoba; effects on migratory bird habitat and populations resulting from lowering flows and levels on Lake Manitoba; loss or alteration of fish habitat, fish movement and/or migration due to changes in water quality, shoreline morphology, and increased sediment and debris; effects to wildlife from pollutants in Lake Manitoba; and flood-related damages to plant life on Lake Manitoba. Key concerns raised by Indigenous groups related to potential effects of surface water on Lake Manitoba, as well as mitigation measures proposed by Manitoba Transportation and Infrastructure are summarized in Appendix IAAC-R3-06-1, Table 1. Based on the current water quality in upstream areas and the application of mitigation measures, the composition and volume of water transported from Lake Manitoba to Sturgeon Bay in Lake Winnipeg is not expected to be measurably altered by the Project. As a result of the predicted Project effects, surface water quality is not expected to measurably change traditionally harvested fish and wildlife species and associated current use of lands and resources for traditional purposes in the Lake Manitoba. Surface water quality monitoring will be carried out as part of the Aquatic Effects Monitoring Plan (AEMP), as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs. This includes two sites in Lake Manitoba in Watchorn Bay: offshore of the proposed LMOC and nearshore at the proposed LMOC. Water quality monitoring will be conducted during Project commissioning and immediately prior to, during, and following Project operation for flood mitigation. Samples will be collected during four sampling sessions in each monitoring year to capture seasonal variability (i.e., once in spring, summer, fall, and winter). The results of monitoring will be made available to

the Project Environmental Advisory Committee (EAC), which will serve as a venue to discuss any issues of concern.

Fairford River

Summary of Project Changes

Once the Project is in place and operating to manage flooding, a portion of the flow from Lake Manitoba will be diverted from the Fairford River and pass through the LMOC. When not operating to manage flooding, only minimal baseflows/riparian flows will pass through the LMOC to sustain fish, with most flow passing through the Fairford River. As described in the response to IR IAAC-R1-14, the operation of the LMOC and LSMOC will reduce peak flows in the Fairford River during periods of high flows and flood events. This reduction in flow is expected to reduce the occurrence of bed or bank erosion along the river and decrease the size and amount of sediment or other substrates transported in the river. The sediment load to the Fairford River from Lake Manitoba is also expected to decrease because a portion of the peak flows from Lake Manitoba will be diverted to the LMOC. The reduction in flows may cause some localized changes in channel aggradation and degradation processes but is not expected to create a change in the fluvial geomorphology of the Fairford River. Regular spring/summer high flows will still occur; however, they will be reduced in magnitude, which will reduce overbank flooding. The Project will still allow high flows that are required in river systems for flushing and natural fluvial geomorphologic processes to occur.

Effects to Resources that Support Current Use

Indigenous groups engaged on the Project have expressed concerns about potential effects of surface water quality in the Fairford River to resources that support current use. Much of this perspective appears to be based on past experiences during flood events. Examples include impacts to migratory birds resulting from lowering flows and levels on the Fairford River; loss of muskrat (*Ondatra zibethicus*) and marten (*Martes* spp.) habitat along the Fairford River; and past impacts to fishing due to flooding events and fluctuating water levels. Key concerns raised by Indigenous groups related to potential effects of surface water on the Fairford River, as well as mitigation measures proposed by Manitoba Transportation and Infrastructure are summarized in Appendix IAAC-R3-06-1, Table 2. Based on the current water quality in upstream areas and the application of mitigation measures, the composition and volume of water transported from Lake Manitoba to Sturgeon Bay in Lake Winnipeg is not expected to be measurably altered by the Project. As a result of the predicted Project effects, surface water quality is not expected to measurably change traditionally harvested fish and wildlife species and associated current use of lands and resources for traditional purposes in the Fairford River. Surface water quality monitoring will be carried out as part of the AEMP. This includes two sites in the Fairford River: at Highway 6 and near the outlet at Lake St. Martin. Samples will be collected during four sampling sessions in each monitoring year to capture seasonal variability (i.e., once in spring, summer, fall, and winter). Water quality monitoring will be conducted during Project commissioning and

immediately prior to, during, and following Project operation for flood mitigation. Results of monitoring will be made available to the Project EAC, which will serve as a venue to discuss any issues of concern.

Lake St. Martin

Summary of Project Changes

Lake St. Martin is the primary Project target for flood management. During flooding the lake will receive flows from the outlet of the LMOC as well as the Fairford River, and flows will pass more quickly through the south basin, through the Lake St. Martin Narrows, through the north basin and exit from both the Dauphin River and the LSMOC inlet. The operation of the LMOC and LSMOC will allow more floodwater to be conveyed from Lake Manitoba to Sturgeon Bay more quickly than without the outlet channels, and aid in the regulation of Lake St. Martin within the desired range of 242.93 to 243.84 m (797 to 800 ft). The reduction of flood lake levels in Lake St. Martin due to the operation of the LMOC and LSMOC is a desired positive outcome and objective of the Project.

LMOC Outlet

The outlet of the LMOC is located in Birch Bay at the south end of Lake St. Martin. Project construction will involve excavation of the lake bottom to match the proposed channel invert elevations. As described in the May 2023 Project Description Update, the outlet geometry provides a flared transition, with the bottom width starting at 22 m (72.2 ft) in the channel and widening to approximately 128 m (419.9 ft) at the daylight location, with 144 m (472.4 ft) extending into the lake, along the centerline. Riprap will be installed on a portion of the outlet side slopes, but not the base, extending from the channel proper to the shoreline. The portion of the excavation in Birch Bay beyond the shoreline will not have riprap.

Sediment issues in outlet areas are discussed in the May 2022 responses to IRs IAAC-R1-12, IAAC-R1-14, IAAC-R1-30, and July 2023 responses to IAAC-R2-08, IAAC-R2-09 and IAAC-R2-10. The Project Surface Water Management Plan (SWMP), as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs, describes monitoring and management (i.e., mitigation) requirements to address on-site surface water quality issues during construction to avoid issues in downstream watercourses and lakes. As discussed, the SMP describes measures that will be followed to address issues with sediment during construction. The AEMP examines potential effects from a regional perspective. At the LMOC outlet, sediment mobilized during the initial commissioning of the channel (primarily silt and sand) is expected to enter Birch Bay and deposit within a few kilometres (km) of the outlet. Finer sediments (relatively small amounts of clay sizes) would remain suspended in the water and transported further into Lake St. Martin before depositing in areas with existing clay substrates. As described in the SMP, sediment management protocols will be in place using real-time data gathering to facilitate water control structure (WCS) operation to maintain suspended sediment levels to within acceptable limits as per surface water quality guidelines.

The response to IR IAAC-R1-32 describes the assessment of changes to Birch Bay shorelines once the Project is in place. Following construction of the LMOC, modeling shows that when the WCS is closed, sediment appears to accumulate on the northern side of the outlet excavation and erode on the southern side during northerly wind events. When the WCS is open, an accumulation of sediment forms outside the outlet excavation; however, it is expected that the accumulated material will move further into the bay during operation of the channel. The response to IR IAAC-R1-32 explains that the Birch Bay shoreline in the southern portion of Lake St. Martin is low lying and frequently inundated during periods of high lake levels, yet it has been stable in the long term. With the Project in place the reduction in lake levels is expected to result in less inundation in the future and will not impact the shoreline stability, as breaking waves that have the potential to erode sediment during periods of high lake levels will occur further offshore.

The Narrows

Sediment issues relating to the Lake St. Martin Narrows are discussed in the May 2022 response to IR IAAC-R1-68, July 2023 responses to IAAC-R2-07 and IAAC-R2-10, and IAAC-R3-01. In general, when the Project is operating to manage floods, there will be some small differences in water elevation between the north and south basins of Lake St. Martin. This difference in water level elevation affects the velocity of water passing through the Narrows and thus the potential for sediment mobilization with resulting effects to substrate type; both water velocity and substrate type are important characteristics of fish habitat. Given that lake whitefish (*Coregonus clupeaformis*) spawn within and in the vicinity of the Narrows, and fish are an important resource for Indigenous groups, potential changes at the Narrows are of particular concern. However, as the shorelines in the Narrows are currently exposed to high velocities, based on available information, it is not expected that plumes of fine sediment would be generated beyond those that may currently occur that would affect fish beyond existing variability. In addition, recent modeling has identified that wind and wave action can influence velocities and associated erosion potential in this location under current conditions, which increases the existing variability (see response to IAAC-R3-01 for further discussion).

In general, Project effects to fish habitat in the north basin of Lake St. Martin are not expected as operation of the channels will reduce the magnitude and duration when the lake is at or above the flood stage of 244.14 m (801 ft) but will still generally maintain the lake within levels that correspond to the target operating range of the south basin of Lake St. Martin. It should be noted that higher flows and velocities at the LSM Narrows is more prevalent during open water periods, particularly flows and velocities when the south basin of Lake St. Martin exceeds the flood stage of 244.14 m (801 ft). Flows in the channels would be reduced during winter months, which provides more stable lake levels when they are ice-covered and less difference between the pre- and post-Project environments.

During the pre- and post-Project period, for a repeat of the 2011 flood, modeled water levels in the north basin of Lake St. Martin are provided below during the months of October and April throughout the operational period, which correspond to the fall and spring spawning periods, respectively:

- Pre-Project.
    - October 2010 and 2011 north basin levels range from 244.10 m (800.9 ft) to 245.10 m (804.1 ft). That these water levels are above the target range with extended periods of overland flooding (majority of October 2010 and 2011)
    - April 2011 and 2012 north basin levels range from 243.70 m (799.5 ft) to 244.70 m (802.8 ft). These water levels are generally at or above the target range with water levels exceeding the flood stage for a few days in April 2011 and the entirety of April 2012
- Post-Project.
    - October 2010 and 2011 north basin levels range from 243.25 m (798.1 ft) to 243.75 m (799.7 ft). That these water levels are within the target range and above the median lake level
    - April 2011 and 2012 north basin levels range from 243.30 m (798.2 ft) to 244.15 m (801.0 ft). These water levels are generally within the target range and above the median lake level. Water levels exceed the top of the target range for a period of approximately two weeks in late April 2011

The reduced flows through the LSM Narrows that occur during winter operation of the channels are not expected to mobilize and redistribute sediment under these conditions.

LSMOC Inlet

The LSMOC inlet is located along the northeast shoreline of the Lake St. Martin north basin within a small and shallow semi-sheltered embayment. The inlet works will involve excavation in Lake St. Martin to provide a smooth transition from the lake to the channel works. As described in the May 2023 Project Description Update, the current design inlet excavation extends approximately 1,100 m (3,608.9 ft) into Lake St. Martin, with the base width ranging from 110 m (360.9 ft) at the shoreline to approximately 550 m (1,804.5 ft) at the point of daylight (lakebed elevation). These modifications were made to provide the required flow conveyance accounting for the head loss through the Lake St. Martin Narrows, as described previously. As shoreline morphology assessments concluded that the inlet is in a low wave energy location and the risk of sediment transport and deposition in the excavated inlet is low, the current design does not include jetties at the inlet. Riprap will be installed on a portion of the inlet side slopes, but not the base, extending from the channel proper to the shoreline. The portion of the excavation beyond the shoreline will not have riprap. Silt curtains will be used to confine sediments to the work area, with monitoring to confirm effectiveness, as described in the SMP.

The response to IR IAAC-R1-32 describes the assessment of changes to the LSMOC inlet area with the Project in place. An analysis of results indicates that the boulder piles near the LSMOC inlet have been stable over the last 70 years, suggesting that the lake bottom has also been stable. While the shoreline position is altered by fluctuating water levels, shoreline erosion due to waves or sediment transport is not a governing physical process in the northern basin of Lake St. Martin. Therefore, the reduction in the lake levels from Project operation is expected to result in less flooding/inundation in the future and the Project is not expected to affect the current geomorphological stability of the LSMOC inlet area on Lake St. Martin.

Effects to Resources that Support Current Use

Indigenous groups engaged on the Project have expressed concerns about potential effects of surface water quality in Lake St. Martin to resources that support current use. These include terrestrial concerns, including effects to shoreline morphology, and increased sediment and debris. They include loss of habitat suitable for supporting wildlife plant foods and medicines on lands adjacent to Lake St. Martin as a result of fluctuating water levels, flooding and inundation, and water table saturation. Associated effects include concerns over impacts to hunting areas and preferred hunting species resulting from water fluctuations on Lake St. Martin, as well as effects to migratory birds and wildlife as a result of the Project's reduction of lake water levels in Lake St. Martin. The potential for changes to flow volumes and velocities through the Narrows also have associated concerns with loss or alteration of fish habitat, fish movement and/or migration due to changes in water quality.

Key concerns raised by Indigenous groups related to potential effects of surface water on the Lake St. Martin, as well as mitigation measures proposed by Manitoba Transportation and Infrastructure are summarized in Appendix IAAC-R3-06-1, Table 3. Based on the current water quality in upstream areas and the application of mitigation measures (e.g., as described in the SWMP and SMP, as discussed above), the composition and volume of water transported from Lake Manitoba to Sturgeon Bay in Lake Winnipeg is not expected to be measurably altered by the Project. As a result of the predicted Project effects, surface water quality is not expected to measurably change traditionally harvested fish and wildlife species and associated current use of lands and resources for traditional purposes in the Lake St. Martin. Surface water quality monitoring will be carried out as part of the AEMP. This includes sampling locations at five sites in Lake St. Martin: Birch Bay, middle of the south basin, at the Narrows, middle of the north basin, and the eastern bay near the proposed inlet to the LSMOC. Water quality monitoring will be conducted during Project commissioning and immediately prior to, during, and following Project operation for flood mitigation. Samples will be collected during four sampling sessions in each monitoring year to capture seasonal variability (i.e., once in spring, summer, fall, and winter). The results of monitoring will be made available to the Project EAC, which will serve as a venue to discuss any issues of concern.

Dauphin River

Summary of Project Changes

Once the Project is in place and operating to manage flooding, a portion of the flow from Lake St. Martin will be diverted from the Dauphin River and pass through the LSMOC. When not operating to manage flooding, only minimal baseflows/riparian flows will pass through the LSMOC to sustain fish, with most flow passing through the Dauphin River. As described in the response to IR IAAC-R1-14, the operation of the LMOC and LSMOC will reduce peak flows in Dauphin River during periods of high flows and flood events. This reduction in flow is expected to reduce the occurrence of bed or bank erosion along the river and decrease the size and amount of sediment or other substrates transported in the river. Based on the relationship between flow levels and velocities, it is expected that velocities may also decrease in areas where flows are reduced. The sediment load to Dauphin River is also expected to decrease because a portion of the peak flows from Lake Manitoba will be diverted to the LMOC and a portion of the Lake St. Martin flows will be diverted to the LSMOC. The reduction in flows may cause some localized changes in channel aggradation and degradation processes but is not expected to create a change in the fluvial geomorphology of Dauphin River. Regular spring/summer high flows will still occur; however, they will be reduced in magnitude, which will reduce overbank flooding. The Project will still allow high flows that are required in river systems for flushing and natural fluvial geomorphologic processes to occur.

Effects to Resources that Support Current Use

Indigenous groups engaged on the Project have expressed concerns about potential effects of surface water quality in the Dauphin River to resources that support current use, including impacts to migratory bird habitat and populations resulting from lowering flows and levels on the Dauphin River; reduced depth and flow in the Dauphin River affecting culturally important fish species; impacts to fish behavior and spawning success in the Dauphin River; and loss of plants and medicines in key harvesting areas along the Dauphin River. Key concerns raised by Indigenous groups related to potential effects of surface water on the Dauphin River, as well as mitigation measures proposed by Manitoba Transportation and Infrastructure are summarized in Appendix IAAC-R3-06-1, Table 4 Based on the current water quality in upstream areas and the application of mitigation measures, the composition and volume of water transported from Lake Manitoba to Sturgeon Bay in Lake Winnipeg is not expected to be measurably altered by the Project. As a result of the predicted Project effects, surface water quality is not expected to measurably change traditionally harvested fish and wildlife species and associated current use of lands and resources for traditional purposes in the Dauphin River. Surface water quality monitoring will be carried out as part of the AEMP. This includes three sites in the Dauphin River: at Lake St. Martin, near the provincial monitoring station at the “Big Bend”, and at Sturgeon Bay. Samples will be collected during four sampling sessions in each monitoring year to capture seasonal variability (i.e., once in spring, summer, fall, and winter). Water quality monitoring will be conducted during Project commissioning and immediately prior to, during, and following Project

operation for flood mitigation. Results of monitoring will be made available to the Project EAC, which will serve as a venue to discuss any issues of concern.

Lake Winnipeg

Summary of Project Changes

The LSMOC outlet is located just south of Willow Point in Sturgeon Bay of Lake Winnipeg. It is designed to limit or prevent erosion of the underlying glacial till while minimizing the volume of excavation, based on a review of the relationship between Lake Winnipeg levels and LSMOC discharge. The outlet works will involve excavation in Lake Winnipeg to provide a smooth transition from the channel works to the lake to mitigate potential erosion of the lakebed. As described in the May 2023 Project Description Update, the current design includes an excavation that extends approximately 200 m (656.2 ft) into Sturgeon Bay, with a base width of 174 m (570.9 ft) at the shoreline and approximately 224 m (734.9 ft) at the point of daylight. The current design includes rock jetties that extend approximately 100 m (328.1 ft) into Sturgeon Bay. These are constructed to reduce potential for sedimentation of the outlet. Riprap will be installed on a portion of the outlet side slopes, but not the base, extending from the channel proper to the shoreline. The portion of the excavation in Sturgeon Bay beyond the shoreline will not have riprap.

The operation of the LMOC and LSMOC does not alter the volume of flows that will enter Sturgeon Bay; the volume of water in the system is dependent on the amount of flow entering Lake Manitoba. The operation of the LMOC and LSMOC alters the timing and location of outflows to Sturgeon Bay but does not change the volume of water that needs to be passed through the system. Without the Project, all outflows to Sturgeon Bay are conveyed by Dauphin River through one outlet area into the bay. With the operation of the LMOC and LSMOC, outflows to Sturgeon Bay will be conveyed through the Dauphin River outlet and through the LSMOC, which creates an additional outlet area in the bay near Willow Point. The total volume of outflows from Lake Manitoba to Sturgeon Bay remains the same with or without the Project, but with the operation of the outlet channels, the timing of when peak flows reach Sturgeon Bay will be altered. As described in the Volume 2, Section 6.4.7 of the Project EIS, Manitoba Hydro completed an analysis of the differences in water levels on Lake Winnipeg and waterways downstream of Lake Winnipeg in relation to the changes in flows due to the Project and concluded that any potential changes in water levels are not expected to be discernible in the context of existing water level variations.

Sediment issues in outlet areas are discussed in responses to IRs IAAC-R1-12, IAAC-R1-14, IAAC-R1-30, IAAC-R2-08, IAAC-R2-09 and IAAC-R2-10. The Project SWMP describes monitoring and management requirements to address on-site surface water quality issues during construction to avoid issues in downstream watercourses and lakes. As discussed, the SMP describes measures that will be followed to address issues with sediment during construction. At the LSMOC outlet, sediment mobilized during the initial commissioning of the channel (primarily

silt and sand) is expected to enter Sturgeon Bay and deposit within a few kilometres (km) of the outlet. Sands and silts will deposit closer to the mouth of the outlet and finer sediments (relatively small amounts of clay sizes) would remain suspended in the water and transported further into the Lake Winnipeg before depositing in areas with existing clay substrates. Analysis of modeling results indicates that very small pockets of deposition in thicknesses greater than 2 millimetres (mm) (0.08 inches [in]) may occur near the mouth of the outlet, but in general deposition thicknesses will be less than 2 mm (0.08 in) and is not expected to affect fish or fish habitat in Sturgeon Bay. As described in the SMP, sediment management protocols will be in place using real-time data gathering to facilitate WCS operation to maintain suspended sediment levels to within acceptable limits as per surface water quality guidelines. More regional surface water quality monitoring will be carried out as part of the AEMP, including during the operational phase.

The response to IR IAAC-R1-32 describes the assessment of changes to Sturgeon Bay shorelines once the Project is in place. The outlet location in Sturgeon Bay was classified as a higher wave energy environment than the inlet location on Lake St. Martin. Exposed and eroding peat was observed on the shoreline on the southeast side of Willow Point (i.e., north of the LSMOC outlet), with minimal sand accumulation. Most of the shoreline from the Dauphin River mouth to the Sturgeon Park Bay reserve is currently eroding. The eroded material could potentially deposit within the LSMOC outlet during periods of non-operation. It is expected that fine sands, within distances of up to approximately 1.2 km (0.75 miles [mi]) along the shoreline, could be washed out into the lake when the channel is initially operated. However, any erosion of sand that occurs during operation of the LSMOC is likely to be replenished by natural shoreline sediment movement during subsequent non-operation of the channel. The rock jetties will limit the amount of sand that is deposited within the excavated outlet; however, sand is expected to deposit beyond the extent of the jetties. When the channel is operated again, the layer of deposited sand would likely be moved further into the lake. The process of sand deposition and transport is expected to repeat itself each time the LSMOC is operated. In general, substrate conditions in vicinity of the LSMOC outlet in Sturgeon Bay are governed by the dynamic wind and wave environment present in Lake Winnipeg. These processes sort sediments based on their size and transport potential. Coarse material, such as cobbles, are found along the shore and in headlands, sand is found at the waterline and in the nearshore, and soft sediment (i.e., mud) is found in deeper offshore water.

Any potential sediment input from the LSMOC is expected to contribute to the existing natural sediment budget of Lake Winnipeg and, subsequently, be subjected to the same natural shoreline processes that currently sort and distribute sediment in the different regions of the lake. Wave heights were determined to be almost identical in the pre- and post-Project scenarios; therefore, no measurable changes in the potential sediment transport/erosion rates are anticipated post-Project.

Effects to Resources that Support Current Use

Indigenous groups engaged on the Project have expressed concerns about potential effects of surface water quality in the Lake Winnipeg to resources that support current use, including impacts on wildlife from contaminated water in Lake Winnipeg; flooding of muskrat dens as a result of changes in water levels in Lake Winnipeg and connected marshes and wetlands; effects of pollutants and sewage on fish health in Lake Winnipeg; loss or alteration of fish habitat, fish movement and/or migration due to changes in water quality, shoreline morphology, and increased sediment and debris; and loss of habitat for plants and medicines on lands adjacent to Lake Winnipeg as a result of fluctuating water levels. Key concerns raised by Indigenous groups related to potential effects of surface water on the Lake Winnipeg, as well as mitigation measures proposed by Manitoba Transportation and Infrastructure are summarized in Appendix IAAC R3-06-1, Table 5. Based on the current water quality in upstream areas and the application of mitigation measures, the composition and volume of water transported from Lake Manitoba to Sturgeon Bay in Lake Winnipeg is not expected to be measurably altered by the Project. As a result of the predicted Project effects, surface water quality is not expected to measurably change traditionally harvested fish and wildlife species and associated current use of lands and resources for traditional purposes in Lake Winnipeg. Surface water quality monitoring will be carried out as part of the AEMP. This includes two sites in Lake Winnipeg in Sturgeon Bay: nearshore at the proposed outlet of the LSMOC and offshore of the proposed LSMOC. Samples will be collected during four sampling sessions in each monitoring year to capture seasonal variability (i.e., once in spring, summer, fall, and winter). Water quality monitoring will be conducted during Project commissioning and immediately prior to, during, and following Project operation for flood mitigation. Results of monitoring will be made available to the Project EAC, which will serve as a venue to discuss any issues of concern.

Summary

As described in the response to IR IAAC-R1-14, effects to current use of lands and resources for traditional purposes from changes in surface water quality as a result of the Project are not expected to affect the availability of traditional resources such as plants, animals and fish, access to areas of traditional use and traditional resources, or cultural and spiritual sites and areas. Concerns and issues raised by Indigenous groups engaged on the Project are summarized above (see Views of Indigenous Groups section). Additional information about surface water concerns as well as proposed mitigation and monitoring programs can be found in the May 2022 response to IR IAAC-R1-122, Table IAAC-122-1.

Although initial Project operation during commissioning is anticipated to result in increased sediment release, this effect will be temporary and not expected to occur following initial operation of the Project, and shoreline erosion is not expected to increase. By reducing the effects of periodic regional flooding, the Project is anticipated to decrease the uptake and transport of suspended and dissolved nutrients and the generation of methylmercury from flooded areas. As noted above, effects on surface water quality are not expected to be measurable within

fish populations within the local assessment area (LAA) and effects on vegetation are expected to be positive. Overall, with the application of mitigation measures (e.g., as described in the SWMP and SMP, as discussed above), residual effects on surface water quality are not anticipated to pose a threat to the long-term persistence and viability of traditionally harvested fish or wildlife species in the regional assessment area (RAA) and will not result in the loss of vegetation communities in the LAA. Effects on surface water quality are not predicted to have effects on access to areas of traditional use and traditional resources or result in direct or indirect effects to cultural and spiritual sites and areas.

ii. Assess associated effects to Indigenous Peoples' health and socio-economic conditions, including recreational enjoyment and use of lands.

Information regarding effects on changes to surface water quality on traditionally harvested fish and wildlife species has been obtained through the Indigenous consultation and engagement process for the Project. This information was obtained through Project-specific reports and studies (e.g., traditional land and resource use [TLRU] studies, socio-economic and wellbeing reports, rights impact assessments), technical reviews and other submissions from Indigenous groups to the Impact Assessment Agency of Canada (IAAC), as well as consultation and engagement meetings, workshops, and correspondence undertaken by Manitoba Transportation and Infrastructure.

Potential Project effects on Indigenous health and socio-economic conditions, including recreational enjoyment and use of lands, is discussed in Volume 4, Section 10.3 of the Project EIS. Additional information about Indigenous health and socio-economic conditions obtained by Manitoba Transportation and Infrastructure since the Project EIS was filed is presented in the July 2023 response to IR IAAC-R2-29. Table IAAC-R2-29-1 provides a consolidated description and analysis of how changes to the environment could affect the health and socio-economic conditions of Indigenous groups, including a consideration of effects of the Project on surface water quality on the availability of country foods.

In addition to information on Indigenous health and socio-economic conditions, effects to the current use of lands and resources for traditional purposes are described in the response to IR IAAC-R1-122, Table IAAC-R1-122-1, organized into wildlife and hunting and trapping; aquatic environment and fishing; plants and plant harvesting; travel routes; and habitation, cultural and spiritual sites. The response notes that Volume 4, Section 10.2.2.4 of the Project EIS, contains baseline information provided by Indigenous groups engaged on the Project, with Table 10-1 summarizing issues identified through the Indigenous engagement process for the Project. In addition, Indigenous Peoples' health and socio-economic conditions are discussed in the May 2022 responses to IRs IAAC-R1-77, IAAC-R1-103, IAAC-R1-108, IAAC-R1-109, IAAC-R1-121, IAAC-R1-130, and July 2023 responses to IAAC-R2-06, IAAC-R2-07, IAAC-R2-14, IAAC-R2-28, IAAC-R2-29.

Through the Indigenous consultation and engagement process for the Project, Indigenous groups potentially affected by the Project have indicated that their land and resources have experienced effects from previous projects and activities that has potentially moved them towards thresholds of sustainability, in terms of use and enjoyment, and that many of these effects continue. Manitoba Infrastructure and Transportation is mindful of these historic and ongoing effects and this understanding has been brought into the studies of current baseline conditions. As a result, particular attention has been made to mitigate potential adverse effects, so that the Project does not cause them to exceed sustainability thresholds. While the Project is not responsible for addressing all historic and ongoing effects, efforts have been made to improve conditions over current status; the primary example is the main purpose of the Project, which is to mitigate regional adverse effects associated with flooding.

In response to Part a-ii of this request, key concerns shared by Indigenous groups regarding effects of changes to surface water quality on traditionally harvested fish and wildlife and associated effects to Indigenous Peoples' health and socio-economic conditions, including recreational enjoyment and use of land has been summarized in a series of tables that presents the information in relation to each main waterbody/watercourse as outlined above in Part a-i. and organized according to the categories presented for Indigenous socio-economic conditions presented in response to IR IAAC-R2-29, Table IAAC-R2-29-1. These tables are available in Appendix IAAC-R3-06-1. This information has been obtained through Manitoba Transportation and Infrastructure's Indigenous consultation and engagement process for the Project, including feedback provided at meetings and workshops, TLRU studies, socio-economic studies, community consultation reports, feedback on Environmental Management Program (EMP) plans, technical reviews of the Project EIS, and Indigenous feedback on draft and final responses to the first round of Technical and Public IRs. Additional information on Manitoba Transportation and Infrastructure's Indigenous consultation and engagement process can be found in the Indigenous Consultation and Stakeholder Engagement Report (ICSER), which was included as Attachment 2 of Manitoba Transportation and Infrastructure's response to the Round 2 IRs on July 24, 2023. Additional detail on changes to surface water quality on traditionally harvested fish and wildlife is available in response to IAAC-R1-122, Table IAAC-122-1. Additional detail on Indigenous Peoples' health and socio-economic conditions, including recreational enjoyment and use of land is available on response to IAAC-R2-29, Table IAAC-29-1.

b. **Reassess effects to current use arising from the fragmentation of the landscape as a result of project infrastructure.**

The purpose of the Project is to mitigate regional adverse effects from flooding, through the construction of two channels (each approximately 24 km [14.9 mi] long) that connect Lake Manitoba to Lake St. Martin and from Lake St. Martin to Lake Winnipeg. As stated in Volume 4, Section 10.2.4.5 of the Project EIS, the Project has potential to impact access to current use areas during construction and operation, which can alter or remove opportunities to access areas used for traditional purposes. Access to traditional resources or areas for current use can be affected through the direct loss or alteration of trails or travelways, restrictions on the ability to navigate to and through

current use areas, and/or limitations on the ability to undertake current use activities in proximity to the Project. Loss and alteration can result from direct physical disturbance or destruction (e.g., destruction of a traditional trail), physical deterrents or obstructions (e.g., the outlet channels themselves) that prevent access or increase effort required either spatially or temporally, changes in the landscape (e.g., vegetation clearing) that make an aspect of a trail or travelway unrecognizable either partially or completely, or changes in the conditions (e.g., construction traffic) required for current use of trails and travelways.

While the channels will only operate to convey flood waters during flood events (approximately once every three years, on average), and will have fairly gentle side slopes (5H:1V), they will contain water throughout the year, with varying depths and flows depending on the volume of water being conveyed and the channel geometry. For both the LMOC and the LSMOC, when the WCS gates are closed, there will be a minimal year-round baseflow/riparian flow, designed to limit variations in water levels and maintain suitable conditions for fish on a year-round basis. During operation, both the LMOC and LSMOC will experience higher water velocities and water depths in the channels. The response to IR IAAC-R1-38 provides technical details regarding flows, water depth, and pool width for both the LMOC and LSMOC under operating and non-operating conditions.

While the May 2022 response to IR IAAC-R1-93 explains that these conditions are similar to those in the Dauphin and Fairford rivers (e.g., the width of the Dauphin River ranges from approximately 120 m to 200 m [394 to 656 ft], with flows ranging from 0.5 to 2 metres per second [m/s] [1.6 to 6.6 feet per second]), the channels represent a new and unavoidable fragmentation of the landscape, and measures to address access for wildlife and Indigenous land users are described in Part b-i, below.

i. Include the consideration of barriers to wildlife access, as well as the implications arising from travel barriers to Indigenous land users. Include a discussion on effects to specifically identified sites and areas in the PDA.

As stated in Volume 4, Section 10.4.5 of the Project EIS, and in the May 2022 responses to IR IAAC-R1-119 and IAAC-R1-122, Project effects include permanent changes to landscape resulting from installation of the channels including changes to terrain, vegetation, and physical access. Outlet channels that intersect traditional use trails and travelways would act as barriers to accessing traditional resources, which can only be crossed at specific locations. Resource users will be able to continue to travel in the area but crossing the outlet channels will impose some restrictions on travel. Travel routes and patterns of access that are not intersected by the Project development area (PDA) will not be altered.

Through the Indigenous Consultation and Engagement process for the Project, including various Project-specific reports and studies, Indigenous groups have advised that there are trails and travel routes in the Project area that are used to access traditional resource harvesting areas. However, to-date information on the specific locations of trails or routes (i.e., mapping, records, or other documentation) have not been shared with Manitoba Transportation and Infrastructure.

More general information has been shared for the region, which has been used to develop a conservative approach to this issue. Dauphin River First Nation, Kinonjeoshtegon First Nation and Lake Manitoba First Nation reported utilizing a network of trails along the shorelines of Lake Winnipeg (Golder 2018; Olson 2020). Lake St. Martin First Nation reported travel by various modes to pursue their TLRU. They used dog teams, horses, canoes, boats, and most recently all-terrain vehicle (ATV), bombardier and skidoo (LSMFN 2021). Peguis First Nation reported that various forms of transportation are used for traditional activities, including boats, trucks, all-terrain vehicles, car, snow machines, canoes, sled, and snowshoes (Peguis First Nation 2022). Dauphin River First Nation, Peguis First Nation, Pinaymootang First Nation, and Lake St. Martin First Nation all expressed concern regarding snowmobile trails that are intersected by the Project (Golder 2018; LSMFN 2021). In their RIA studies, Dauphin River First Nation, Kinonjeoshtegon First Nation, Lake Manitoba First Nation, and Pinaymootang First Nation advised that transportation values include trails for accessing hunting, trapping and fishing sites, plant harvesting areas, habitation areas, and recreation. Kinonjeoshtegon First Nation mentioned a trail between Lynx Bay and Kinwow Bay.

The July 2023 response to IR IAAC-R2-15 provides a summary of baseline socio-economic and health conditions that Indigenous groups face regarding the harvesting of country foods. It includes a summary of harvest locations based on information received from 16 Indigenous groups. As well, specific sites and areas identified by Indigenous groups for resource harvesting within the PDA are described in response to IR IAAC-R1-122 on Table IAAC-122-1 under column 2 “Species/Locations Identified” and response to IAAC-R2-29, table IAAC-R2-29-1 under column 2 “Species/Locations Identified.”

The Context and Rationale section above states that several Indigenous groups have noted that the assessment of effects to wildlife travel across the channel fails to take into consideration the cleared 400 m (1,312 ft) right-of-way (ROW) on either side of the channel, and that no additional mitigation measures are provided to address the effects of the Project on wildlife movement. To clarify, the total width of the ROW is 400 m (1,312 ft) (not 800 m [2,625 ft], as inferred); regardless, as discussed in the May 2022 response to IR IAAC-R1-90, as well as Round 3 response to IAAC-R3-04e-i, there are a limited number of mitigation measures that can be applied to reduce Project-effects on wildlife and wildlife habitat as they relate to change in movement, particularly during operation, due to the engineering constraints of the outlet channels, as described above. However, measures that have been applied include:

- Use of small diameter armouring on the channel slopes to improve the ability for wildlife to enter and exit the wetted channel and move along shorelines.
- Gentle slopes to channels and spoil piles to make them easier to move over.
- Retaining treed habitats where safe and technically feasible to do so.
- Cover plantings (e.g., shrubs, trees) to break up sightlines in the 400 m (1,312 ft) ROW and provide escape cover along edges of the PDAs.

As an additional measure, Manitoba Transportation and Infrastructure is currently considering options to place breaks in the LMOC and LSMOC spoil piles to facilitate wildlife movement across the PDA. The responses to IAAC-R3-06b-iii, and b-v, below provide additional details on outlet channel crossings and on proposed means to enforce access restrictions.

ii. Include an assessment of effects to wildlife arising from increased predation along the cleared ROW on either side of the outlet channels and from increased water velocities in the channel during operations.

Volume 2, Section 8.3.6.3 of the Project EIS describes Project effects on wildlife mortality risk during operation. Increased access for predators and hunters or trappers, particularly along the LSMOC ROW, was identified as the primary pathway for an indirect change in mortality risk during Project operation. The Project will create continuous linear features that will increase predator efficiency and provide access to portions of the LAA that were previously more isolated. Additionally, mortality risk for furbearers and ungulates crossing the outlet channels may be elevated due to the reduced availability of escape cover. The addition of cover plantings along the edges of the LMOC and LSMOC in areas that focus on connectivity with adjacent land uses that include wildlife habitat (as described in the Revegetation Management Plan [RVMP]), will provide some security cover for furbearers, and ungulates such as moose (*Alces alces*) and white-tailed deer (*Odocoileus virginianus*). Spoil pile breaks would enhance passage of animals while providing additional wildlife cover by breaking up sightlines (wildlife moving through spoil pile breaks would be at lower elevations and therefore less visible to predators travelling along spoil piles).

The Context and Rationale section above states that several Indigenous groups noted that the assessment of effects to wildlife travel across the channel fails to take into consideration the water velocities within the channel during operation, and that additional information is required to understand potential effects to wildlife movement. As indicated in the Project EIS Volume 2, Section 8.3.6.3, and in the response to IR IAAC-R1-93, the risk of wildlife drowning could increase during periods of high flow, as the Project is operating to manage regional flooding. The potential marked flow increases will typically be limited to spring flooding events in some years; however, it is unlikely to be a regular occurrence and unlikely that water levels would rise suddenly enough to drown or fatally sweep away wildlife using the channels. Mammals that attempt to cross during periods of high flow are at greater mortality risk. Volume 2, Section 8.3.6.4 of the Project EIS indicates that most wildlife will be capable of crossing the outlet channels during periods of low flow (calculated as occurring 70 to 87% of the time).

Increased water velocities in the outlet channels are not expected to affect migratory bird migration patterns or pathways, which are influenced by factors that operate at larger scales, such as meteorological conditions and climate change, as described in the May 2022 response to IR IAAC-R1-47. This is due to the birds' ability to fly along or across the channels, as indicated in the July 2023 response to IR IAAC-R2-17, increased velocities in the channels are not expected to affect local movements. As described the response to IR IAAC-R1-93, aquatic furbearers such

as muskrat, beaver (*Castor canadensis*), and river otter (*Lontra canadensis*) are expected to be able to swim across the wetted channels under all conditions. As indicated in the response to IR IAAC-R1-93, for terrestrial mammals, it is difficult to predict how the outlet channels will affect change in movement during flooding events; monitoring carried out under the Wildlife Monitoring Plan, as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs, will assist in verifying effects and the success of mitigation measures.

As described in the Project EIS, Volume 3, Section 8.3.6.3, measures to mitigate effects from predation are as follows:

- Retaining treed habitats where safe and technically feasible to do so.
- Limiting vegetation maintenance along the outlet channel ROWs outside of spoil banks to the extent possible and allowing low-growing shrubs and trees to re-establish to a height that does not impede the safe and practical operation of the infrastructure.
- Adding cover plantings (e.g., trees and shrubs) along select upland areas of the channels to provide escape cover and break up sight lines for species crossing the outlet channel ROWs.

As described in the response to Part b-iv below, spoil piles of material excavated from the channels will be established within the PDA and parallel to each channel. Spoil piles will create elevated ridges along nearly the entire length of the PDA and these could contribute to interrupting wildlife movements. As a result, their design (slope, spacings, etc.) is being examined to minimize disruptions to wildlife movement across the PDA. In addition, as indicated in the May 2022 response to IR IAAC-R1-92, residual effects for change in wildlife mortality risk and change in wildlife movement were re-evaluated during the detailed design phase regarding the use of rock along both the LMOC and LSMOC base and side slopes. With the addition of small diameter rock (i.e., less than 100 mm [3.9 in] in diameter) the magnitude of these effects remains low, as described in Volume 3, Sections 8.3.6.3 and 8.3.6.4 of the Project EIS. Therefore, a measurable change in the abundance and distribution of wildlife in the LAA is possible, but a measurable change in the abundance of wildlife in the RAA is unlikely. The duration of the effects to wildlife remains unchanged as long-term, and the overall assessment of residual effects to wildlife are considered not significant as the Project is not expected to threaten the viability of a wildlife species, including culturally important species, in the RAA.

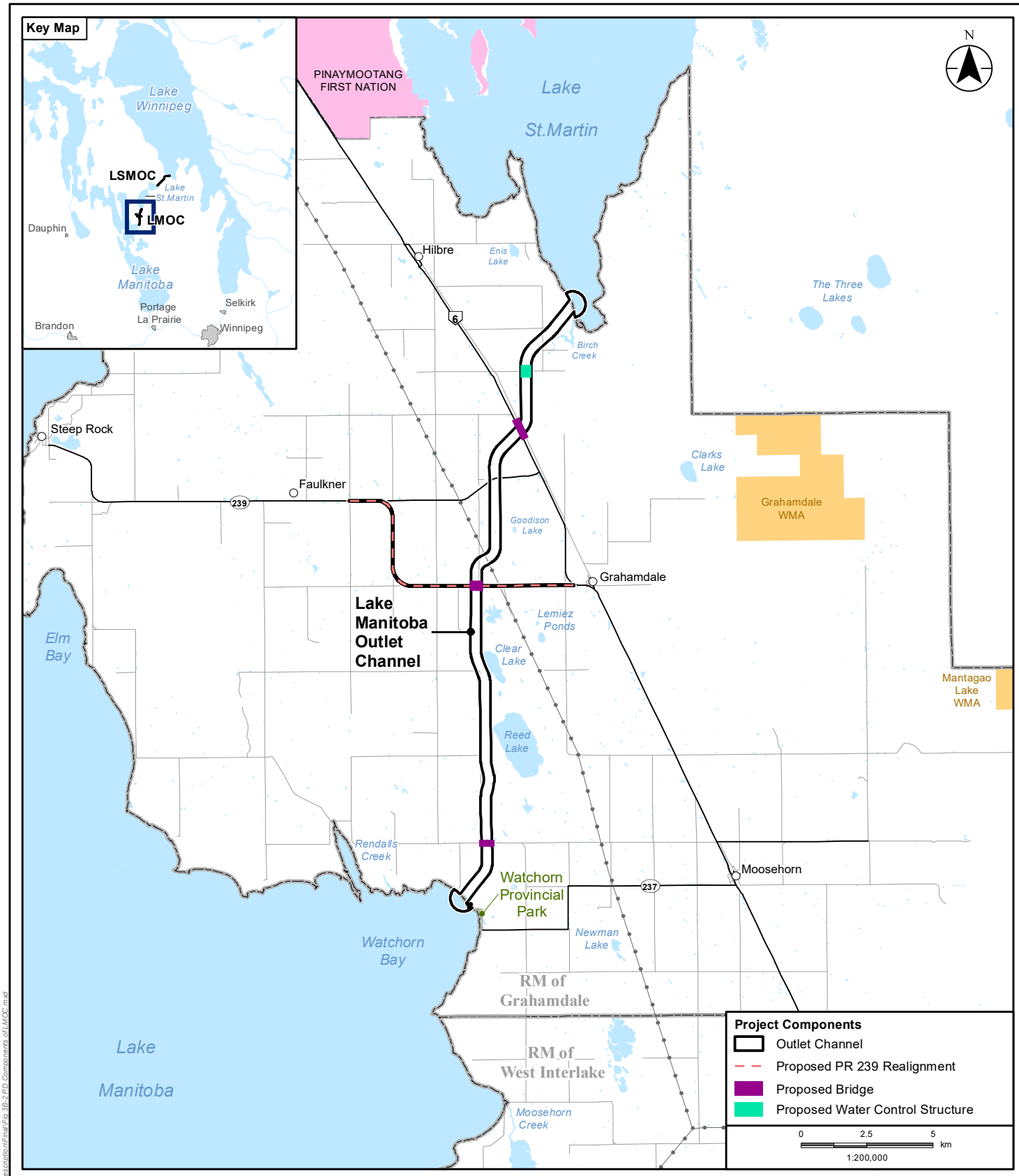
In order to evaluate the success of mitigations and examine the predictions made during the environmental assessment, wildlife movement within the channel ROWs will be monitored year-round with remote cameras and winter track surveys years 2, 4, and 6 post-construction (Section 7.3, Wildlife Monitoring Plan). The results will be shared with regulators and the Project EAC to determine if any adjustments or further mitigations are required.

iii. Include details on the outlet channel crossings, including but not limited to:

i. Location and distance in between crossings

Crossings are described in Volume 1, Section 3.4 (Project Components) of the May 2023 Project Description Update. Crossings of the channels will be provided at Township Line Road, realigned PR 239 (formerly Carne Ridge Road) and PTH 6 on the LMOC and at the WCSs on both the LMOC and LSMOC. Figures IAAC-R3-06-1 and IAAC-R3-06-2 show the location of the crossings. Currently, no other formal crossings of the LMOC and LSMOC are planned.

For the LMOC, the crossing at Township Line Road is located approximately 2.35 km (1.46 mi) north of the inlet at Watchorn Bay. The distance between crossings at Township Line Road, new PR 239, PTH 6 and the WCS are approximately 9.85 km (6.12 mi), 6.55 km (4.07 mi), and 2.30 km (1.43 mi), respectively. The WCS is located approximately 3.25 km (2.02 mi) south of the inlet at Birch Bay. For the LSMOC, the WCS is located approximately 0.6 km (0.37 mi) north of the inlet at Lake St. Martin and 21.7 km (13.5 mi) south of the outlet at Sturgeon Bay.



Legend

- Existing Transmission Line
- Provincial Highway (PTH/PR)
- Municipal Road
- First Nation
- Wildlife Management Area
- Provincial Park
- Rural Municipality

Notes

1. Coordinate System: WGS 1984 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure
3. Last Update: 8/13/2019 9:06:11 AM

Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

LMOC Crossing Locations

Figure IAAC-R3-06-1

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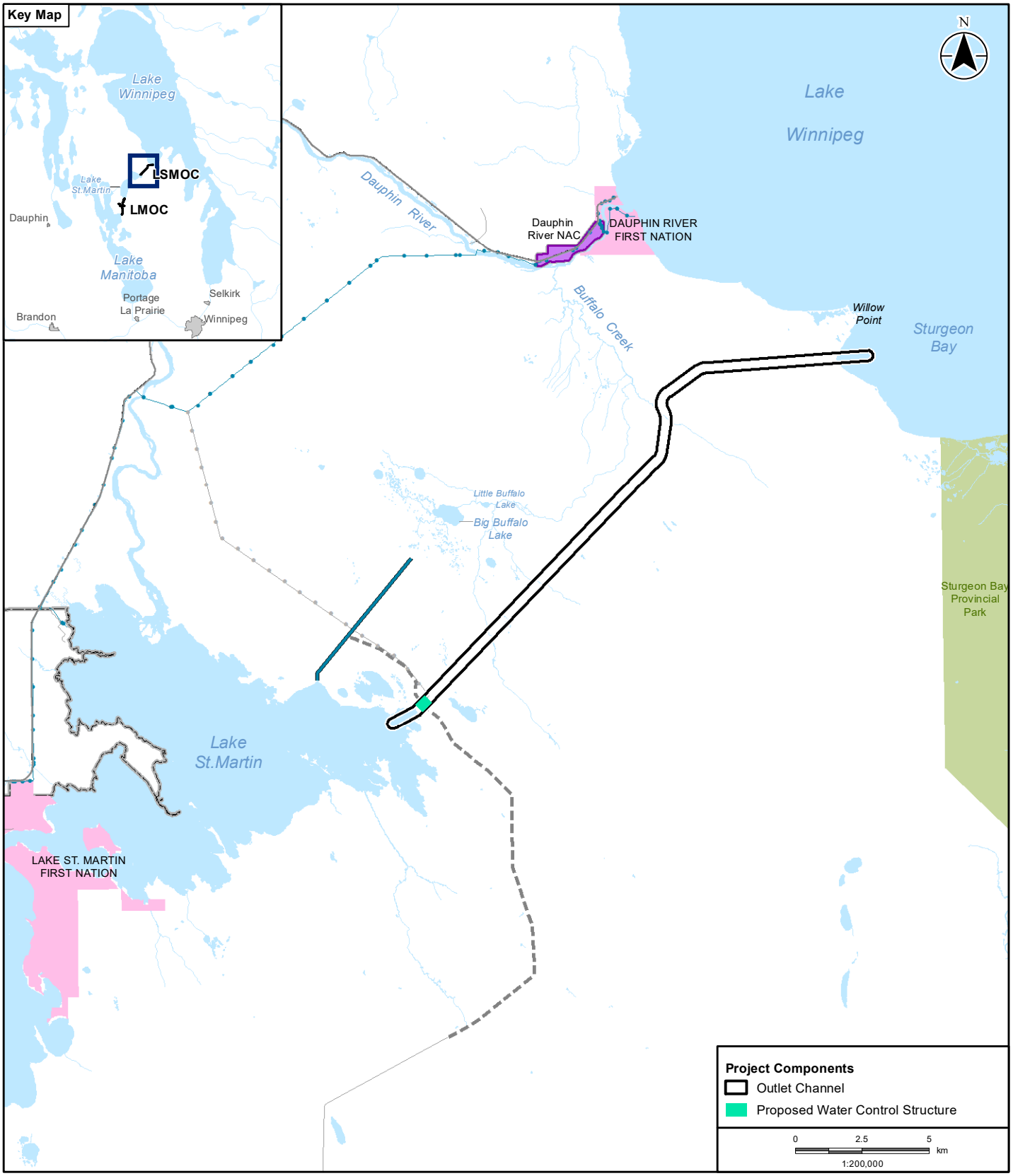

Legend

- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Access Road
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Municipal Road
- Rural Municipality
- Northern Affairs Community (NAC)
- First Nation
- Provincial Park

Notes

1. Coordinate System: WGS 1984 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure
3. Last Update: 8/13/2019 9:09:56 AM

Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

LSMOC Crossing Locations

Figure IAAC-R3-06-2

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ii. What type of travel these crossings will be able to accommodate (foot, quad, etc.)

All crossings are designed as vehicular bridges that are typical to the provincial road/highway network. Active transportation traffic (pedestrians, cyclists), off road vehicles, snowmobiles, etc. will be able to utilize the shoulders on the bridge to cross at these locations. As discussed in Volume 4, Section 9.2.4.3 of the Project EIS, bridge structures will be designed to accommodate agricultural traffic to the extent feasible. Access and the management of crossings during construction and operation is discussed in the Project Access Management Plan (AMP), as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs.

iii. Signage for crossings

Signage will be placed along both sides of the channel ROWs to inform the public of potential safety hazards and direct them to the crossing locations. Details on signage can be found in the Project AMP. Signage will be in line with relevant Canadian standards and with Manitoba Transportation and Infrastructure corporate policies. Signage will be monitored and maintained.

iv. Provide clarity on the configuration of the spoil piles that will be present along the length of the channel ROWs and how they will be configured to guide wildlife to locations that are safer and easier to cross. A diagram and/or more details to better explain the concept is suggested. Details could include but are not limited to dimensions, slope, location, duration, etc. of the spoil piles and locations of the safe crossings.

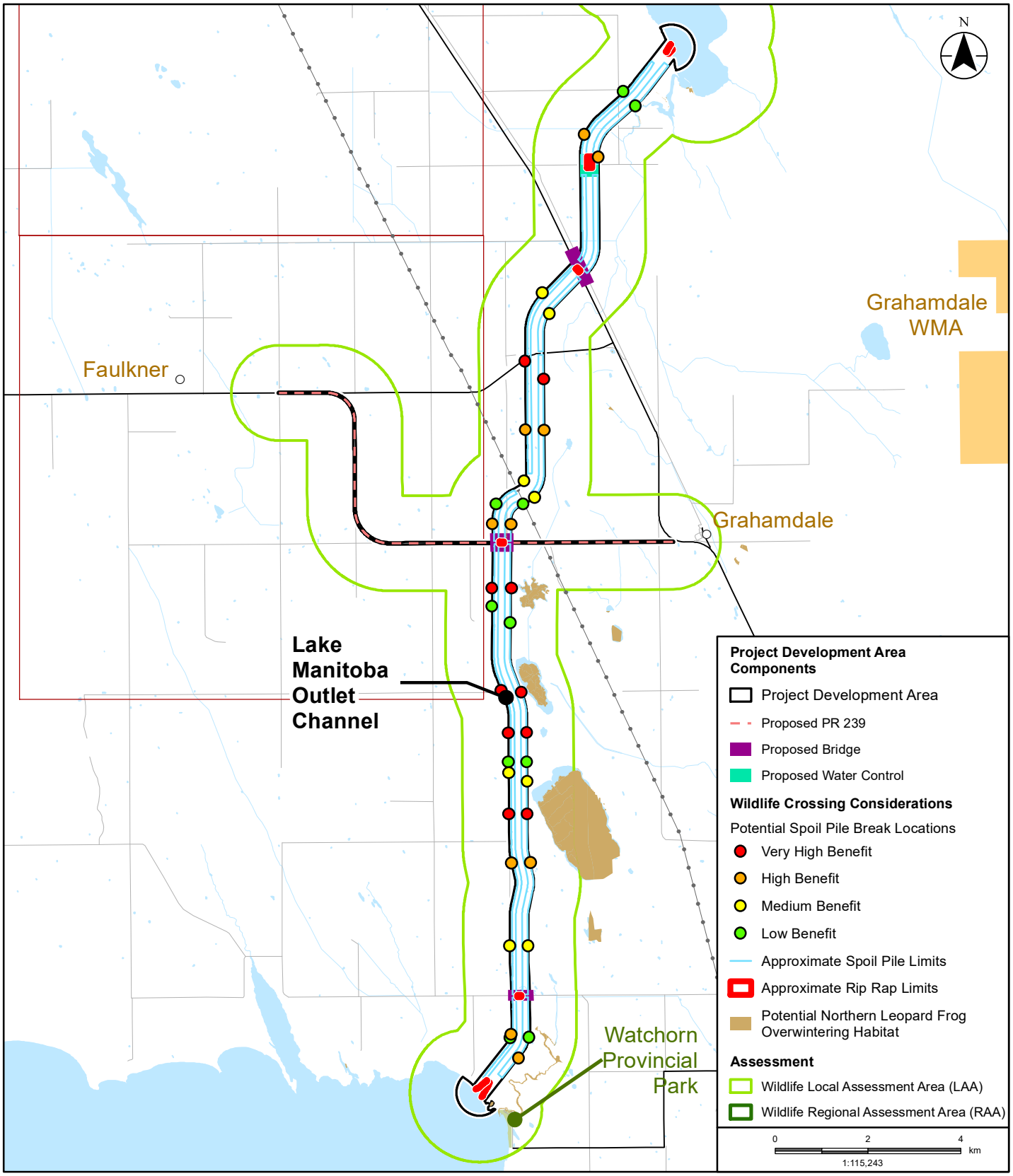
The configuration of spoil piles along the channel ROWs to guide wildlife to locations that are safer and easier to cross is currently being considered and evaluated. Possible configurations may include reductions in spoil pile height and/or breaks in the spoil piles near northern leopard frog (*Lithobates pipiens*) overwintering habitat at LMOC (Figure IAAC-R3-06-3) and in upland forested areas at LSMOC (Figure IAAC-R3-06-4). Potential wildlife crossing locations at the outlet channels were initially identified by mapping game trails identified by recent field studies and following their paths to the PDA boundary, and by identifying other potential movement corridors such as trails visible in Google Earth, cutlines and other human-made features, and forest edges that intersect the PDA. Potential northern leopard frog crossing locations were initially identified at the LMOC by mapping northern leopard frog survey sites where suitable wetland corridors were identified, and by identifying sites within 3 km of larger waterbodies (e.g., Reed Lake) that could provide potential amphibian overwintering habitat.

From a technical engineering perspective, the potential wildlife crossing locations identified along the PDAs would need to avoid areas where larger-sized rock (i.e., ‘riprap’) would be applied, as these were identified as being less permeable for wildlife movement. These locations are primarily at the inlet, outlet, bridge crossing locations, WCSs and at the LSMOC between the first drop structure and Lake Winnipeg. Potential crossing locations would be best aligned with armoured sections (i.e., approximate maximum size of 100 mm diameter rock) of the channels.

Another constraint is that a portion of the maintenance road (extending north from the inlet) will be located on the spoil piles at LSMOC (LMOC maintenance roads will be located on the top of dike so there will not be any limitations on where gaps in the spoil piles might be located from that perspective). Lastly, areas requiring more excavation, and therefore having higher volumes of spoil, would likely not accommodate reconfiguration or breaks in spoil piles as material will need to be placed nearby to minimize the need to haul it away. Areas with unforested habitat on the upgradient side of the LSMOC near the outside drain, which are expected to be relatively wet and more difficult for wildlife to traverse, were eliminated from consideration. A total of 19 potential wildlife crossing locations (nine of which are located near northern leopard frog overwintering habitat) were identified at the LMOC and five potential wildlife crossing locations were identified at the LSMOC, with varying degrees of estimated suitability for crossing.

Due to the high number (i.e., 19) of identified potential crossing locations identified on LMOC, locations were given a ranking (low benefit to very high benefit) to facilitate engineer review and assessment, with high benefit sites coinciding with northern leopard frog overwintering habitat and/or evidence of wildlife activity (e.g., game trails). Rankings were not assigned to potential LSMOC crossing locations as only five were identified and occur in similar upland habitat within a small (~6 km) stretch of the outlet channel. It is important to note that this is an ongoing process, and some locations will likely be screened out as being unfeasible from a technical perspective. A subset will be brought forward for discussions with Indigenous groups as part of a mapping exercise to further examine existing trails and priority locations that maximize benefits, as discussed below, and in the response to Part b-vii.

As indicated in the response to Part b-vii, while concerns regarding channel crossing and access across the channels has been expressed as a concern during the Indigenous Consultation and Engagement process, no information regarding specific locations have been provided. Therefore, Manitoba Transportation and Infrastructure is committed to meeting with Indigenous groups to better understand these important perspectives, including gathering input on mapping existing trails, priority locations and the process of improving access and movement. As a result, Manitoba Transportation and Infrastructure is confident that it can work through the review and selection process with Indigenous groups to optimize the design to facilitate wildlife movement.



Legend

- Fairford Water Control Structure
- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Access Road
- Existing Transmission Line
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Municipal Road
- Northern Affairs Community (NAC)
- First Nation
- Wildlife Management Area
- Provincial Park

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure, Environment and Climate Change Canada
3. Last Update: 10/12/2023 8:21:19 AM

Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

LMOC Wildlife Crossing Considerations

Figure IAAC-R3-06-3

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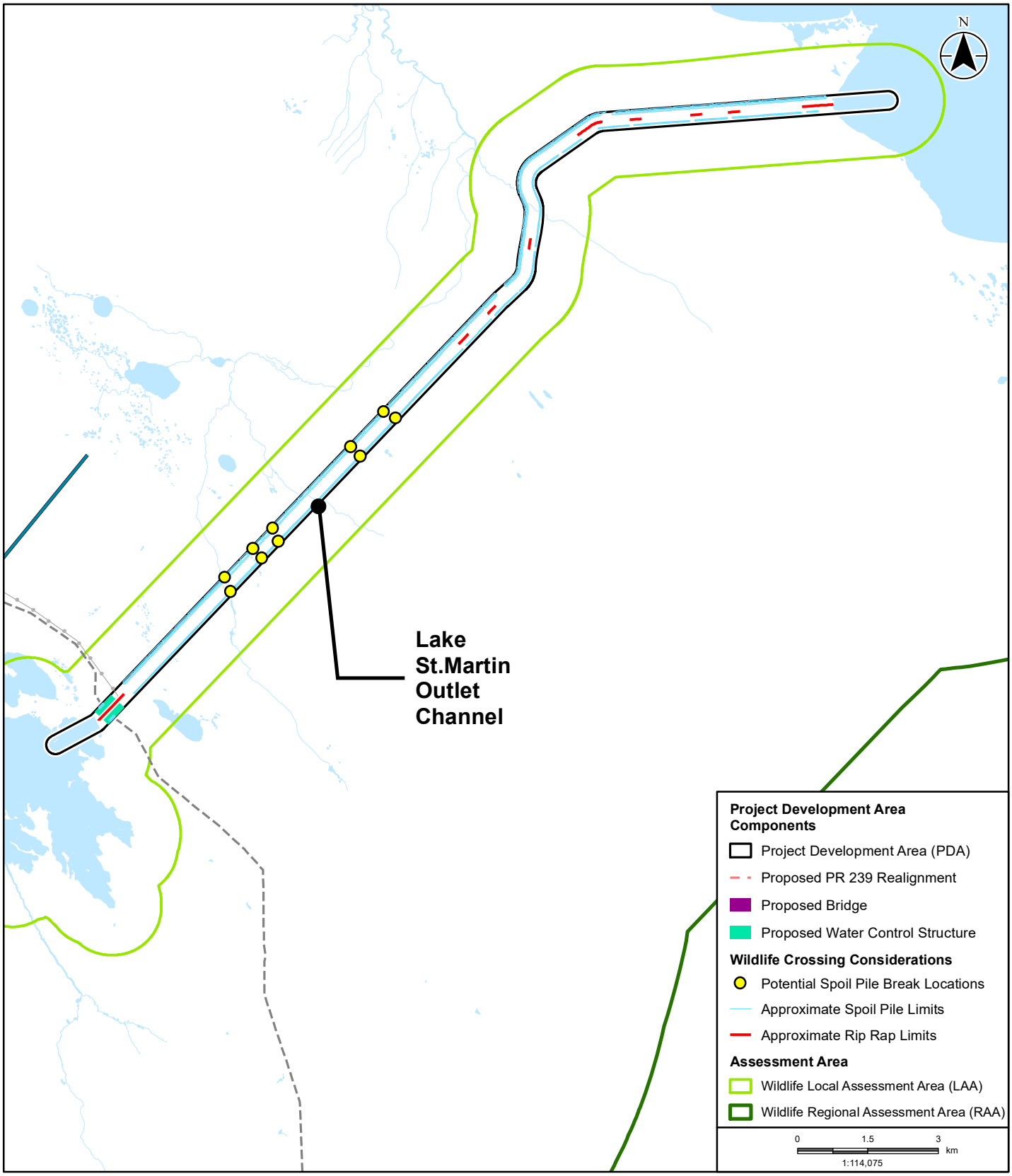


Legend

- Fairford Water Control Structure
- Lake St.Martin Emergency Outlet Channel (Reach 1)
- Lake St.Martin Access Road
- Existing Transmission Line
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Municipal Road
- Northern Affairs Community (NAC)
- First Nation
- Wildlife Management
- Provincial Park

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure, Environment and Climate Change Canada
3. Last Update: 10/2/2023 10:30:56 AM

Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

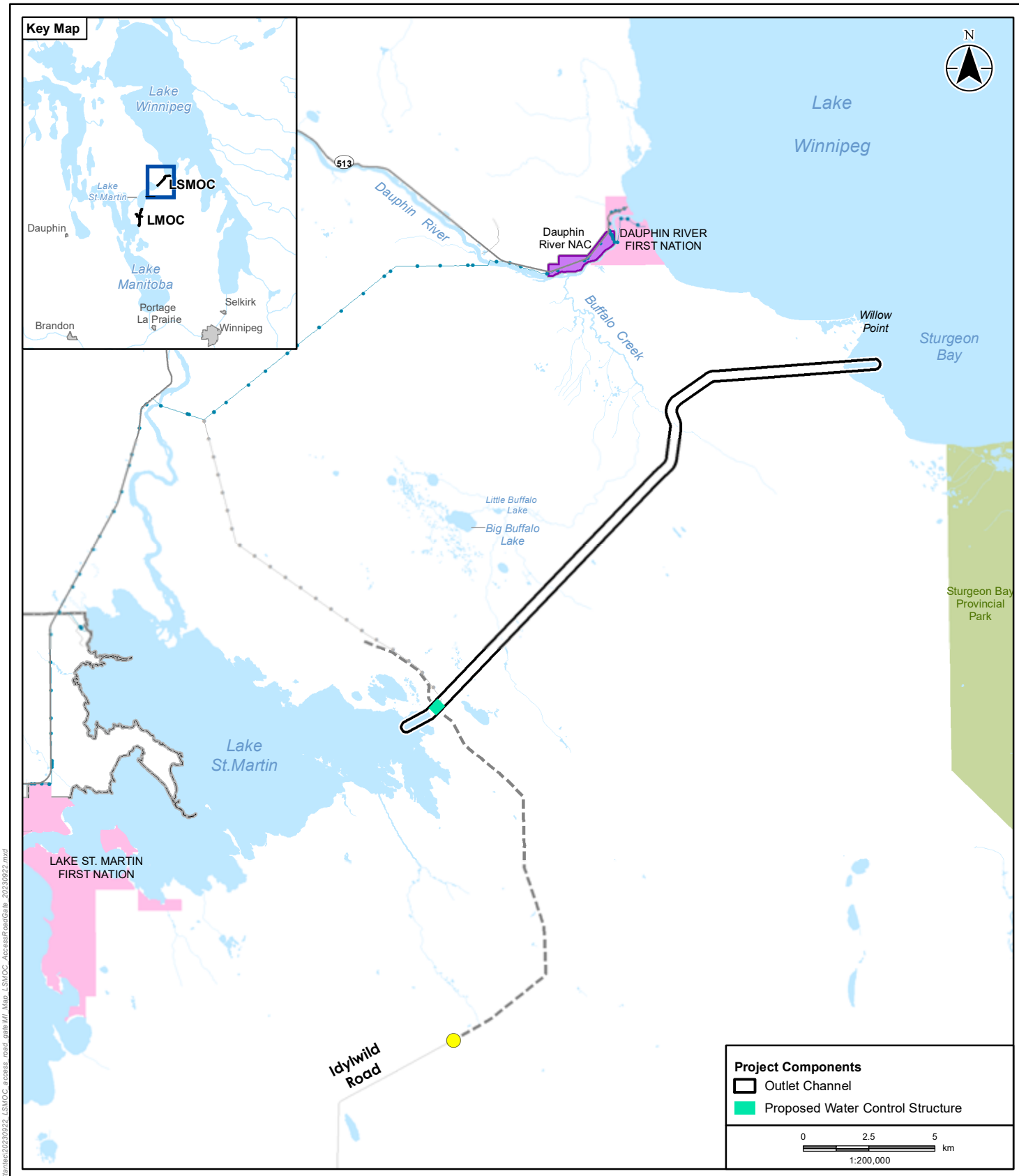
LSMOC Wildlife Crossing Considerations

Figure IAAC-R3-06-4

v. Consider and describe additional ways to enforce access restrictions along both channels. Discuss feasibility of hiring a dedicated security personnel to enforce access restrictions.

As indicated in the July 2023 response to IR IAAC-R2-21, during both construction and operation, access to LMOC and LSMOC Project infrastructure such as the outlet channels, inlets, outlets and WCS will be restricted. During construction, certain areas (e.g., the LMOC and LSMOC WCSs) will have gates and fences installed to protect the public from potential safety hazards created by the new construction. There will also be signage in the vicinity of public roads to alert the public of restricted access to the construction site in the PDA. Overall, for safety reasons, access to active construction areas will not be allowed for unauthorized users. For the operation phase, infrastructure that poses an ongoing hazard or security risk will be permanently fenced and warning signs indicating no unauthorized personnel will be installed at various locations along the LMOC and LSMOC.

As identified by the Project AMP, access to the LSMOC specifically, will be controlled by a gate. This gate will be located approximately 15 km (9.3 mi) south of the WCS along the Lake St. Martin Access Road and near the terminus of the pre-existing Idylwild road (Figure IAAC-R3-06-5). Construction of this gate is stipulated as an approval condition of Manitoba Transportation and Infrastructure 's *Environment Act* Licence #3304 for the Lake St. Martin Access Road, and not part of the Project. The purpose of this gate is to mitigate potential effects related to increased access caused by the construction of the provincially licenced Lake St. Martin Access Road; however, it will also serve to prevent public entry into potentially hazardous areas and is currently being monitored by use of motion-sensing cameras. The positioning of the gate – centered in a wetland area – was purposefully selected to prevent passage of automobiles and light-truck traffic but recognized that off-road vehicles such as snowmobiles and ATVs may succeed in circumventing the restriction. In this way, the permeability of the gate would be similar to pre-existing conditions where access beyond the gate location would have been limited to a cleared corridor through various terrain and thereby limited to travel on foot, off-road vehicle, or snowmobile. Localized restrictions around specific Project components, as identified in Table IAAC-R3-06-1, are specifically intended to minimize safety risks for individuals who may access the PDA in this manner.



Legend

- Gate Location
- Lake St.Martin Access Road
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Municipal Road
- Rural Municipality
- Northern Affairs Community (NAC)
- First Nation
- Provincial Park

Notes

1. Coordinate System: WGS 1984 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure
3. Last Update: 9/22/2023 10:04:44 AM

Manitoba

MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Lake St. Martin Access Road Gate

Figure IAAC-R3-06-5

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Question IAAC-R3-06
October 27, 2023

Table IAAC-R3-06-1 presents an outline of Manitoba Transportation and Infrastructure's currently proposed public access restriction measure(s) for key components and Project infrastructure, excluding quarries, as aggregate materials will be sourced from pre-existing sources to the greatest extent possible (see the July 2023 response to IR IAAC-R2-33) and therefore fall under the care and control of the quarry operator. Table IAAC-R3-06-1 does not include access control measures that would apply to contractors and Project employees (such as Controlled Access Points as identified in the Agricultural Biosecurity Management Plan) or other control measures that may be applied as part of Project maintenance and/or adaptive management measures. In the event that active construction or maintenance activities undergo planned (e.g., staff rotations, holidays) or unplanned shutdowns (e.g., unanticipated weather delays) restriction measures for each respective site or operation will be considered, modified, or enhanced as required with consideration of potential public safety concerns.

Table IAAC-R3-06-1 Possible Public Safety Access Restrictions for Key Project Components

Outlet Channel	Component	Project Phase	Possible Public Access Restriction(s)	Rationale
LMOC	Outlet Channel	Construction	• Signage • Localized traffic gates or barriers • Localized fencing of select areas/activities	Public safety
		Operation	• Signage • Localized traffic gates or barriers	Public safety
	Channel Inlet and Outlet	Construction	• Signage • Lighting • Other measures as stipulated by Transport Canada[2]	Public safety and navigation
		Operation	• Signage • Lighting • Floating Booms • Other measures as stipulated by Transport Canada[2]	Public safety and navigation
	Water Control Structure	Construction	• Signage • Localized traffic gates or barriers • Fencing • Temporary construction detours	Public safety
		Operation	• Signage • Fencing	Public safety
	Bridges	Construction	• Signage • Localized traffic gates or barriers • Fencing • Temporary construction detours	Public safety
		Operation	• None	

Question IAAC-R3-06
October 27, 2023

Outlet Channel	Component	Project Phase	Possible Public Access Restriction(s)	Rationale
	PR239 and Municipal Realignments	Construction	• Signage • Localized traffic gates or barriers • Fencing • Temporary construction detours	Public safety
		Operation	• None	
	Camps	Construction	• Signage • Localized fencing	Public safety
		Operation	• None	
LSMOC	Outlet Channel	Construction	• Signage • Traffic gate near terminus of pre-existing Idylwild Road	Public safety
		Operation	• Signage • Traffic gate near terminus of pre-existing Idylwild Road	Public safety
	Channel Inlet and Outlet	Construction	• Signage • Lighting • Other measures as stipulated by Transport Canada[2]	Public safety and navigation
		Operation	• Signage • Lighting • Floating Booms • Other measures as stipulated by Transport Canada[2]	Public safety and navigation
	Water Control Structure	Construction	• Signage • Fencing	Public safety
		Operation	• Signage • Fencing	Public safety
	Drop Structures	Construction	• Signage • Fencing	Public safety
		Operation	• Signage • Fencing	Public safety
	Camps	Construction	• Signage • Localized fencing	Public safety
		Operation	• None	

Notes:

1 Listed measures exclude restrictions that would apply to contractors and Project personnel as listed in various environmental management plans.

2 Outlet channel inlets and outlets will require authorization by Transport Canada under the Navigation Protection Program. This authorization is anticipated to include specific measures that must be adhered to by Manitoba Transportation and Infrastructure and its contractors.

Because the LMOC traverses a primarily agricultural area with privately held lands, it is not anticipated that the general public, including Indigenous groups, would be able to access the LMOC PDA other than at bridge crossing locations. Conversely, the LSMOC is located in a semi-remote area, and may be encountered by individuals who may be traversing the area. Should individuals access or encounter the LSMOC PDA, maintenance roads located on the spoil berms and/or dikes adjacent to the outlet channel would provide the only safe route of passage along the ROW. However, the maintenance roads are not being designed for public use or high-speed traffic. Should an individual need to cross the LSMOC, the bridge at the WCS would provide the only structure for safe passage from one side of the channel to the other. Crossing of the LSMOC at drop structures or any other uncontrolled location would not be recommended as this would present considerable safety risks and could result in serious injury or death.

As discussed in the AMP, for both the LMOC and LSMOC, Manitoba Transportation and Infrastructure has indicated that use of the PDA by individuals not directly associated with the Project may be authorized for certain user groups under certain conditions. Communication between Manitoba Transportation and Infrastructure and potential user groups or individuals is the most effective way to facilitate continued dialogue regarding public safety of individuals on the landscape. Although Manitoba Transportation and Infrastructure has yet to define when or how certain user groups might be provided access to the PDA, these will be defined prior to the start of construction. As described in the July 2023 response to IR IAAC-R2-30 and Appendix IAAC-R2-30-1, a primary output of the Project's EAC is anticipated to be written advice and/or recommendations to Manitoba Transportation and Infrastructure for ongoing refinement of environmental management plans. This may include the AMP and conditions for which greater access to the PDA may be provided.

As indicated in the response to IR IAAC-R2-21, Manitoba Transportation and Infrastructure has consulted with the Manitoba Natural Resources and Northern Development Conservation Officer Service on matters related to resource use and harvest enforcement. The Conservation Officer Service indicated that, as part of their normal duties, regular resource patrols will be conducted in the Project area. These patrols would help to prevent and enforce against unauthorized or unlawful resource use or harvest, including wildlife hunting or poaching. This measure is in addition to existing mitigation commitments and is in response to concerns raised regarding the effects of increased access on culturally important wildlife species.

Hiring of dedicated Project-specific security personnel to enforce access restrictions is not being explored at this time. As described above, Manitoba Transportation and Infrastructure has identified a number of measures which are meant to minimize safety risks associated with construction activities and Project infrastructure. For the duration of construction Manitoba Transportation and Infrastructure personnel, contractors, EAC Monitors and Contract Administrators will be present on work sites and throughout the Project area. Health and safety concerns or incidents, including public access to active construction areas, will be recorded and adaptive measures may be implemented as, or if, required. During the operation phase, Manitoba Transportation and Infrastructure will continue to conduct occasional inspections of both

channels. Should infrastructure show signs of damage from unauthorized use (e.g., soil rutting from ATVs) or signs of substantial public use, then additional measures may be implemented. The Complaint Resolution Process, as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs, would also provide an avenue for public communication with Manitoba Transportation and Infrastructure regarding access-related concerns, and would lead to further investigation and action, as required. Additionally, monitoring of the Lake St. Martin Access Road gate, will help identify if the gate is functioning as intended, or if additional measures may be required.

vi. Discuss the option of registering the Lake St. Martin Access Road, temporary access road, and the service road along the channels as 'Resource Roads' on Manitoba's Crown Lands Registry.

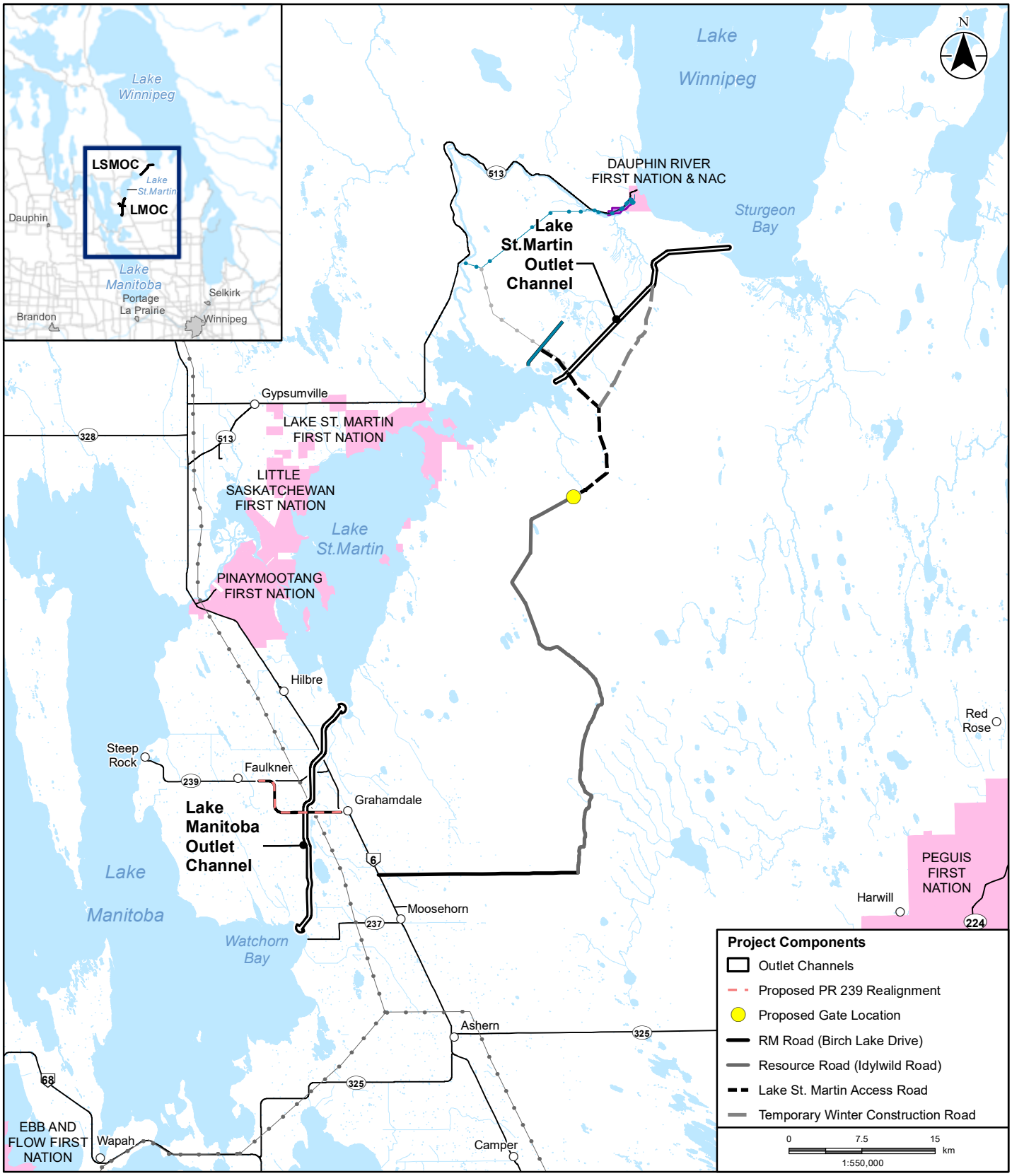
Manitoba's Crown Lands Registry System is a software database of all Crown lands in Manitoba held under authority of *The Crown Lands Act*. The registry is used to track permits, leases and other forms of tenure issued to the occupants of these Crown lands. As the Crown is indivisible, the administering department does not issue licences or permits to other government department users of Crown lands, instead, the administering department registers the use or occupation of these Crown lands by other departments into the Crown Lands Registry System as a Reservation, reserving the land for use by the respective department. The intent of this system is to track the various uses and interests and to reduce the likelihood of conflict and/or incompatible use or occupation of Crown lands.

The Lake St. Martin Access Road project consisted of upgrading 19.5 km of an existing winter road to an all-season road. The intent was to enable all-season access to the existing Emergency Outlet Channel (EOC) in case it needed to be re-opened/operated to mitigate flooding on Lake St. Martin. The availability of the EOC to manage flooding is required until the Project is commissioned and available to assume this role.

The Lake St. Martin Access Road is located on Crown land that is held under authority of The *Crown Lands Act* and is administered by Natural Resources and Northern Development (NRND). To establish the presence of this road and to reduce likelihood of conflict between users, this road has already been registered as a Reservation on Manitoba's Crown Lands Registry System. The Lake St. Martin Access Road project required a provincial license under *The Environment Act* as a Class 2 development. The licence for this project was granted in October 2019 (https://www.gov.mb.ca/sd/eal/registries/6014stmartin/index.html), and work started in 2021 and was completed in 2022. A condition of the licence requires that a gate be placed at the point where the access road meets the resource road, to restrict access to the Project site. The rationale for requiring a gate and its location is set out in Manitoba's response to IR IAAC-R3-06b-v. Another condition of the licence is that the gate must be locked at all times and only government staff (either Manitoba Transportation and Infrastructure or NRND) have access to the key.

Concurrent with construction of the Lake St. Martin Access Road, Manitoba Transportation and Infrastructure also upgraded an existing resource road (locally known as Idylwild road) as well as a portion an existing municipal road in the Rural Municipality (RM) of Grahamdale (Birch Lake Drive) to provide all-season traffic to the site of the EOC – these other road upgrades did not require any form of licensing or approval; however, information is formally recorded in the Crown Lands Registry System as a Reservation (Figure IAAC-R3-06-6).

The Temporary Winter Construction Road (TWCR) is discussed in the response to IR IAAC-R3-03d, and in the July 24, 2023, submission of Attachment 1: Supplemental Environmental Assessment of LSMOC TWCR. It is an existing 14 km (8.7 mi) winter road located several kilometers east of the LSMOC and was constructed in 2011 to facilitate construction of the downstream portion (Reach 3) of the EOC, under emergency (flood) conditions). Its original construction was authorized through work permits, issued to contractors under authority of *The Crown Lands Act*, and it was blockaded in 2012 to prevent further use. It would be re-opened for a single winter during Project construction to access the northern portion of the LSMOC for clearing and peat excavation. As this winter road would not be required for Project activities after the first winter, it is not anticipated that it would be maintained for long-term operation or maintenance uses once the roads within the Project ROW (i.e., paralleling the LSMOC channel) are established, and its long-term status would be determined as part of the EOC decommissioning process, as discussed in the response to IR IAAC-R3-03d. Since the TWCR use would be temporary, NRND has advised that it is not necessary to include it in the Crown Lands Registry System.



Legend

- Lake St. Martin Emergency Outlet Channel (Reach 1)
- Existing Transmission Line
- Existing Distribution Line
- Planned Distribution Line
- Provincial Highway (PTH/PR)
- Northern Affairs Community (NAC)
- First Nation

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MANITOBA TRANSPORTATION AND INFRASTRUCTURE
Lake Manitoba & Lake St.Martin Outlet Channels Project

Project Service and Access Roads

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Data Sources: Governments of Manitoba and Canada, Manitoba Infrastructure
3. Last Update: 9/28/2023 11:37:22 AM

Figure IAAC-R3-06-6

With respect to the other various permanent, all-season service roads that are planned to be constructed as part of the Project to allow for ongoing access to the length of the channel for inspection, operation, and maintenance purposes, Manitoba Transportation and Infrastructure does not believe that these roads need to be registered under the Crown Lands Registry System. The Crown Lands Registry System is used to establish interests and priorities on Crown lands and to reduce the likelihood of conflict between users. These service roads will be located on Crown land that is held under title of water control work (under authority of *The Water Resources Administration Act*), including the roads in the Crown Lands Registry System, will not be necessary to prevent potential land use conflicts since the land will already be titled as "water control works lands" and will be under Manitoba Transportation and Infrastructure's administration and control.

vii. Include any additional mitigations for effects to access for current use purposes.

As noted in the response to Part b-i, effects to access are discussed in Volume 4, Section 10.4.5 of the Project EIS, and in responses to IR IAAC-R1-119 and IAAC-R1-122. In general, it is recognized that effects include permanent changes to landscape resulting from installation of the channels, including barriers to area access in the form of outlet channels that can only be crossed at certain locations. It is also recognized that if the channels intersect traditional use trails and travel-ways they would act as barriers to accessing traditional resources, which can only be crossed as specific locations. The Context and Rationale section indicates that several Indigenous groups have identified that the channels would create nearly impassable obstacles for their members to travel by foot or quad, and that the inability to access and traverse large portions of land represents a direct restriction on the ability of Indigenous groups to exercise their rights. As mentioned above in Part b-i., through the Indigenous Consultation and Engagement process for the Project, Manitoba Transportation and Infrastructure understands that Indigenous groups have advised that there are trails and travel routes in the Project area that are used to access traditional resource harvesting areas (see also response to IR IAAC-R1-122, Table IAAC-122-1). However, the information on specific locations of trails or routes, or where such trails may intersect either the LMOC or LSMOC, has not been shared with Manitoba Transportation and Infrastructure, including through the Project-specific TLRU studies and Rights impact assessment reports completed by Indigenous groups.

To bridge the gap between existing information available and the most recent feedback from Indigenous groups regarding fragmentation of the landscape, Manitoba Transportation and Infrastructure is proposing to meet with Indigenous groups to conduct mapping sessions to better understand how the Project will affect access to traditional harvesting areas and identify and map where existing trails may be intersected or interrupted by the Project. Manitoba Transportation and Infrastructure is committed to working with Indigenous groups to determine how access to harvesting areas affected by the Project can be mitigated or accommodated. The proposed mapping sessions would provide an opportunity for Indigenous groups to identify their traditional trails or travelways and present an opportunity to explore additional mitigation or accommodation measures, if required. For example, this information will enable Manitoba Transportation and

Infrastructure to assess whether additional crossings should be considered, identify and implement additional mitigations to minimize impacts to Indigenous users' access to required resources, while serving as a platform for mutual collaboration and coordination.

In an effort to take a proactive approach to addressing the identified concerns, Manitoba Transportation and Infrastructure has investigated several options to mitigate and/or accommodate effects on the accessibility for current use purposes. These include installation of pedestrian/ATV bridges, and/or ford/low-level crossings, as discussed below.

Manitoba Transportation and Infrastructure has received requests to incorporate pedestrian/ATV bridges into design of channel. While these would provide safe, all-season crossing locations and would separate pedestrians and ATVs from larger motor vehicle traffic, they would have high construction and operation costs, and create operational and environmental concerns.

Manitoba Transportation and Infrastructure also reviewed options to add alternative crossings such as ford/low-level crossings. These would be a lower cost option as compared to pedestrian/ATV bridges; however, they would not be a viable option for the LMOC as the water depths are too great, particularly in the section of the LMOC between the inlet and WCS. In addition, based on channel operation predictions, this crossing type would only be accessible for approximately seven out of ten years, and could also reduce the channel conveyance capacity, depending on design. They could also be an impediment to fish movement, and erosion risks may involve high maintenance costs. Additionally, public safety is usually the primary concern associated with this option since it poses hazards to pedestrians and ATVs who attempt to cross during high flows.

While each option has its own set of potential benefits and drawbacks, based on available information and planning carried out to-date, Manitoba Transportation and Infrastructure considers that more information is required to determine the most appropriate course of action. Additional technical information and further understanding of the needs and preferences of local resources users is required before decisions can be made. Manitoba Transportation and Infrastructure remains committed to engaging in good faith negotiations and discussions to facilitate continued access to traditional resource harvesting areas identified by Indigenous groups. Options can be discussed in the proposed mapping sessions with Indigenous groups to better understand the access issue, how existing trails and travel ways may be affected by the Project and determine how access to important harvesting areas can be facilitated.

c. **Indigenous groups' involvement in the development of mitigation measures and implementation of monitoring and reporting activities.**

Manitoba Transportation and Infrastructure has undertaken a Project-specific Indigenous consultation and engagement process for the proposed Project. This process provides Indigenous groups with meaningful opportunities to express their views and concerns related to the proposed Project's potential effects. Information about socioeconomic and health conditions has been gathered through Project-specific socio-economic studies, traditional knowledge studies, community consultation reports, community meetings, socio-economic surveys, and results of the Indigenous consultation and engagement process for the proposed Project.

As indicated in Manitoba Transportation and Infrastructure's response to IR IAAC-R2-29, Table IAAC-R2-29-1 includes relevant mitigation measures that have been developed to reconcile and address concerns and issues raised by Indigenous groups related to potential Project effects on Indigenous health and socio-economic conditions. In addition, Section 3 of the ICSER discusses some key mitigation measures that were implemented as a result of Indigenous groups' feedback. As part of consultation funding agreements or mutually agreed to work plans, Manitoba Transportation and Infrastructure has offered presentations on the EMP plans to Indigenous groups to explain their purpose, function, details regarding implementation, and how the plans have been updated based on feedback received. Presentations covered the environmental management program broadly or focussed on the information provide in specific EMP plans, based on a community's preference (e.g., groundwater management, surface water management, and/or access management). The main objective of these presentations was to hear concerns and input from a variety of user groups, including Elders, fishers, trappers, and hunters. These presentations also provided the opportunity for Manitoba Transportation and Infrastructure to hear concerns that communities had regarding the proposed Project and its potential adverse effects on the exercise of their Aboriginal and treaty rights, in relation to the EMP plans. Information shared during these presentations was considered in the further refinement of mitigation strategies and environmental management and/or monitoring plans, so that any potential impacts from the proposed Project are appropriately assessed and mitigated.

Specifically, EMP review meetings were held with:

- Little Saskatchewan First Nation – October 7, 2020.
- Pinaymootang First Nation – January 26, 2021.
- Sagkeeng First Nation – March 2, 2021.
- Sandy Bay Ojibway First Nation – March 26, 2021.
- Fisher River Cree Nation – April 28, 2021; May 4, 5, 6, 2021.
- Peguis First Nation – May 12, 2021; May 21, 2021.
- Kinonjeoshtegon First Nation – September 23, 2021.

Question IAAC-R3-06
October 27, 2023

Recognizing the challenges due to the COVID-19 pandemic, Manitoba Transportation and Infrastructure adjusted the process to gather feedback on the draft EMP plans. Manitoba Transportation and Infrastructure's initial approach was to include information packages, provide presentations and discuss the draft plans. With the need to limit in-person meetings, Manitoba Transportation and Infrastructure and its consultants adapted to support Indigenous groups' review of the plans. Hard copy packages were sent to all 39 potentially affected Indigenous groups on November 16 and 30 and December 7, 2020, including printed and electronic copies of the 23 draft EMP plans. In addition, the draft EMP plans were posted online on the proposed Project's webpage. To assist with information sharing and to provide an alternative way to provide feedback, virtual open houses were developed through the proposed Project's profile on the Manitoba public engagement portal - EngageMB.

To solicit feedback and promote dialogue, individual plan-specific questionnaires were also developed and included with the EMP plans, made available online, and integrated into the virtual open house platform. Due to the COVID-19 pandemic and in response to requests from Indigenous groups, Manitoba Transportation and Infrastructure made additional funding available to communities to assist with the review of the 23 EMP plans. Manitoba Transportation and Infrastructure extended the timeframe to review the draft plans multiple times, with final feedback requested by April 17, 2021. Manitoba Transportation and Infrastructure communicated that it remained committed to reviewing and considering any information shared after this date, while the planning and regulatory processes for the proposed Project were still underway.

Fifteen (15) Indigenous groups were offered funding for their draft EMP reviews, based on their known interest and likelihood of experiencing potential impacts from the proposed Project: Dauphin River First Nation, Lake St. Martin First Nation, Little Saskatchewan First Nation, Pinaymootang First Nation, Peguis First Nation, Fisher River Cree Nation, Lake Manitoba First Nation, Kinonjeoshtegon First Nation, Hollow Water First Nation, Norway House Cree Nation, Sagkeeng First Nation, Sandy Bay Ojibway First Nation, Tataskweyak First Nation, Pimicikamak Okimawin and Manitoba Métis Federation. This feedback has and will continue to inform improvement to the measures to monitor and manage potential Project effects.

As of July 15, 2023, written responses on the EMP plans have been received from: Fisher River Cree Nation, Hollow Water First Nation, Interlake Reserves Tribal Council, Little Saskatchewan First Nation, Lake St. Martin First Nation, Manitoba Métis Federation, Loon Straights Northern Affairs Community, Norway House Cree Nation, Pimicikamak Okimawin, Pinaymootang First Nation, Pine Dock Northern Affairs Community, Sagkeeng First Nation, Sandy Bay Ojibway First Nation and Tataskweyak Cree Nation.

The following are some key mitigation measures developed based on Indigenous groups' inputs:

- **Channels Alignment:** the final route alignment for the Project considered Indigenous feedback and concerns heard regarding impacts to groundwater and drinking water, and the outlet location for the LSMOC was routed to the south of willow point as a result of input from Indigenous groups.
- **Revisions to Environmental Management Program:** in response to feedback collected during Indigenous consultation and engagement, several EMP Plans have been revised. Plans revised include the AEMP, AMP, Heritage Resources Protection Plan (HRPP), as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs, and Wetland Offsetting Program. More information can be found in Section 3.6 of the ICSER report.
- **Wetland Offsetting Program:** this Program includes offsetting for wetlands directly affected by the proposed Project as well as peatlands (see the July 2023 response to IR IAAC-R2-13 and Wetland Compensation Plan, as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs). Manitoba Transportation and Infrastructure is exempt from providing offsetting under *The Water Rights Act* (Manitoba), where wetland offsetting is a provincial requirement of some proponents developing in Class III habitats; regardless, based on concerns expressed by several Indigenous groups, Manitoba Transportation and Infrastructure is voluntarily following the intent of *The Water Rights Act* requirements by providing offsetting for the loss or alteration of 239 hectares (ha) (590.6 acres [ac]) of Class III, IV, and V wetlands that are directly affected by the proposed Project. In addition, 769 ha (1,900 ac) of other wetlands (peatlands) will be directly affected by the proposed Project. The inclusion of providing offsetting for peatlands effected by the proposed Project is a recent addition identified in 2023 (as outlined in IAAC-R2-13 submitted to IAAC on July 24, 2023). Peatland offsetting is being included as a mitigation measure to fulfill and accommodate the request of Indigenous groups. Depending on the outcome of the Wetland Monitoring Plan (WetMP), additional no-net-loss offsetting may be provided for wetlands that are demonstrated to be affected by the proposed Project (where effective mitigation cannot be applied).
- **Wetland Monitoring Program:** the Wetland Monitoring Plan, as filed as part of the June 2022 supplemental information response to IAAC Round 1 IRs, was developed in response to comments received from governmental, Indigenous and other stakeholder groups and to provide a monitoring program that assesses potential indirect effects on wetlands, including changes to class/size of wetlands, surface and groundwater quality and quantity, vegetation cover (plant species compositions/abundance) and wildlife habitat from changes to groundwater and surface water regimes for those wetlands located beyond the proposed Project footprint.
- **Channels Armouring to mitigate erosion:** in response to feedback from Indigenous groups identifying concerns about erosion, Manitoba Transportation and Infrastructure has made the commitment to mitigate potential erosion of the channels by fully armouring the LMOC and LSMOC base and side slopes.

- **Channels Operation:** in response to feedback from Indigenous groups during commissioning of each channel, Manitoba Transportation and Infrastructure intends to incrementally increase flows over multiple days to minimize sediment transport. Once operating, the channels are armoured and revegetated; therefore, sediment should not be an issue. Monitoring identified in the SMP and AEMP will be conducted to verify its assessment.
- **Wildlife Movement:** in response to Indigenous group feedback, Manitoba Transportation and Infrastructure has refined the channel design to facilitate animal movements by incorporating gentler side slopes (5:1) and using smaller diameter crushed rock (<100 mm [3.9 in] in diameter) for armouring and erosion protection, instead of riprap (larger diameter rock). This modification will reduce wildlife injury and visual obstacles to facilitate wildlife entry and exit from the channel while still providing erosion protection.
- **Fish and Fish Habitat Mitigation:** in response to concerns raised by several Indigenous groups, Manitoba Transportation and Infrastructure has added several refinements to the proposed Project's design process. These include improvements to the (baseflow/riparian flow) for the LMOC, to address potential low dissolved oxygen levels and effects to fish in the channel, and design enhancements in the LSMOC drop structures, to minimize effects from downstream fish passage.

Manitoba Transportation and Infrastructure has committed to using an adaptive management approach to improve environmental protection and minimize any unanticipated adverse environmental effects from the proposed Project. Adaptive management is a process of continual improvement founded on learning from the outcomes of existing programs and measures. Manitoba Transportation and Infrastructure will learn from both scientific monitoring of environmental variables as well as observations and concerns identified by local Indigenous groups, which may be considered to be an expression of traditional or local ecological knowledge. Indigenous groups will continue to be able to provide input and advice to Manitoba Transportation and Infrastructure on mitigation measures, either directly to Manitoba Transportation and Infrastructure or through the EAC, should any environmental impacts be documented as a result of the proposed Project.

As identified in individual EMP plans, each was developed to support the EMP as a whole for the proposed Project and has been prepared by Manitoba Transportation and Infrastructure as a way to share information and facilitate discussions with Indigenous groups, stakeholders, and the public. The EMP plans have been prepared using existing environmental and engineering information and professional expertise, as well as information from previous and ongoing public and Indigenous engagement and consultation. The contents of the EMP plans are based on conditions and information existing at the time the specific EMP plan was prepared and may be subject to change. The EMP plans should be read as a whole, in consideration of the entire EMP, and sections or parts should not be read out of context.

Question IAAC-R3-06
October 27, 2023

Manitoba Transportation and Infrastructure has sought feedback from Indigenous groups on what level of involvement and participation they would desire in the follow-up and monitoring activities outlined in the EMP plans and has proposed the development of an EAC as an ongoing information sharing forum. Manitoba Transportation and Infrastructure anticipates that the EAC will steward these activities and the response to IR IAAC-R2-30 provides more detail on the proposed structure and function of this committee.

Revisions to EMP plans have been and will continue to be informed by information received from the Indigenous engagement and consultation process, the Environmental Assessment process, Project planning activities, and on conditions of provincial and federal environmental regulatory approvals received for the proposed Project. The EMP plans will be subject to further changes after receipt of Project approvals, including those from adaptive management. Potential changes to the plans will be shared with regulators, Indigenous groups, and stakeholders prior to implementation of the change. Either a revision number or subsequent amendment would be added to the specific EMP plan to communicate the revision or change. Furthermore, opportunities are being provided for the EAC to review EMP plans and provide feedback to help finalize these documents prior to construction. In addition, if Project-related impacts are observed, the EAC will have an opportunity to provide advice to Manitoba Transportation and Infrastructure to update or add additional mitigation measures.

The EMP plans are living documents that Manitoba Transportation and Infrastructure will review and update on a regular basis, with continuous improvement being made so that the proposed Project is constructed, operated and maintained in an environmentally responsible manner. These plans are also available for review by federal and provincial governments and the general public. Continued feedback will be considered in further refinement of the EMP plans. Manitoba Transportation and Infrastructure and their technical experts will be reviewing and updating these plans to finalize the proposed Project's design and prepare for construction once necessary approvals are received. Conditions associated with provincial and federal approvals will also be factored into the relevant EMP plans.

i. **Table that describes the opportunities for the involvement of Indigenous groups in the development and facilitation of each type of monitoring and reporting activity, including timelines for such involvement.**

   Monitoring-related activities undertaken in connection with the Project are expected to involve the following three types of field activities:

   - Pre-construction fieldwork.
   - Environmental monitoring.
   - Construction compliance monitoring.

Pre-construction Fieldwork

Pre-construction fieldwork for which Indigenous groups have been involved has included activities related to aquatic habitat mapping, wetland monitoring, surface water monitoring, groundwater monitoring, heritage resources investigation, and environmental site assessment. Manitoba Transportation and Infrastructure has been providing notifications to Indigenous groups in advance performing fieldwork activities associated with the environmental assessment and/or design of the proposed Project. Notifications include information such as anticipated work date(s), as well as scope and purpose of field activities.

As summarized in Table IAAC-R3-06-2, between 2018 and 2023, consultants working for Manitoba Transportation and Infrastructure on the Project have engaged local Indigenous group members to observe/assist in these pre-construction activities. For example, North/South Consultants Inc. hired Indigenous group members from Lake St. Martin First Nation and Dauphin River First Nation as field technicians and environmental monitors in aquatic field studies. Manitoba Transportation and Infrastructure also funded Indigenous community members from Dauphin River, Kinojeoshtegon First Nation, Peguis First Nation, and Pinaymootang First Nation to participate based on their specific request to observe consultant field work. The Manitoba Métis Federation has also actively participated in pre-construction environmental fieldwork monitoring.

In addition to active involvement in pre-construction data gathering, Manitoba Transportation and Infrastructure has committed to providing opportunities to Indigenous groups who are interested to have environmental monitors in attendance to observe fieldwork activities[9]. Manitoba Transportation and Infrastructure has committed to providing funding for this participation, on an invoice-basis as per established Manitoba Transportation and Infrastructure rates. As part of this initiative, several Indigenous groups' monitors have accompanied Manitoba Transportation and Infrastructure representatives for data collection activities, monitoring purposes, and other environmental activities. The July 2023 responses to IAAC-R2-03; IAAC-R2-13; IAAC-R2-29, Table IAAC-R2-29-1; IAAC-R2-31 and IAAC-R2-34 provide additional discussion on monitoring opportunities.

[9] Indigenous monitors differ from Indigenous field assistants or field technicians. Indigenous monitors are engaged to observe Project activities to monitor compliance with mitigation measures for traditional resources, artifacts, or sites and areas of cultural importance and share relevant information about traditional and cultural use. Indigenous field assistants or field technicians meanwhile are hired to support pre-construction data gathering (e.g., surveys, studies) and do not provide information about traditional or cultural use.

Table IAAC-R3-06-2 Opportunities for the Involvement of Indigenous groups in the Development and Facilitation of Each Type of Monitoring and Reporting Activity

Indigenous Group	Indigenous Business	Consultant	Type of Work	Task	Date
Interlake Reserves Tribal Council	N/A	WSP	Heritage	Heritage Resource Impact Assessment (HRIA) - north shore of Lake St Martin. Community members helicoptered in to visit WSP archaeologists on site.	July 2020
Interlake Reserves Tribal Council	N/A	WSP	Heritage	HRIA - conducting pedestrian survey and shovel testing on the southern half of the proposed channel.	August to October 2020
Interlake Reserves Tribal Council	N/A	WSP	Heritage	Community members met with WSP heritage team a few times over this period.	August to October 2020
Interlake Reserves Tribal Council	N/A	WSP	Vegetation Surveys	Assisted with ecotype and rare plant surveys and wetland checks for the LMOC.	August 6, 2020
Interlake Reserves Tribal Council	N/A	WSP	Vegetation Surveys	Assisted with ecotype and rare plant surveys and two wetland checks for the LMOC.	August 7, 2020
Interlake Reserves Tribal Council	N/A	WSP	Vegetation Surveys	Helicopter based reconnaissance survey of the MB Hydro distribution line survey that involved confirming/refining preliminary GIS mapping.	August 8, 2020
Interlake Reserves Tribal Council	N/A	WSP	Vegetation Surveys	Assisted with ecotype and rare plant surveys and wetland checks for the LSMOC.	August 9, 2020
Interlake Reserves Tribal Council	N/A	WSP	Vegetation Surveys	Assisted with ecotype and rare plant surveys and wetland checks for the LSMOC and the MB Hydro distribution line area.	August 10, 2020

Question IAAC-R3-06
October 27, 2023

Indigenous Group	Indigenous Business	Consultant	Type of Work	Task	Date
Interlake Reserves Tribal Council	N/A	WSP	Vegetation Surveys	While the Vegetation Team completed ecosite and rare plant surveys. A helicopter flyover was conducted over areas of interest in LSMOC.	August 11, 2020
Interlake Reserves Tribal Council	N/A	WSP	WetMP & Wildlife Pre-disturbance Surveys	Late season vegetation assessment and groundwater/surface water monitoring (water sample collection, datalogger install) in LMOC.	September 2, 2022
Interlake Reserves Tribal Council	N/A	WSP	WetMP & Wildlife Pre-disturbance Surveys	Raptor Stick Nests Survey via helicopter for LSMOC.	October 3, 2022
Lake St. Martin First Nation	N/A	North/South Consultants	Aquatic Field Studies	Participation in all aquatic field studies	August 31 - November 5, 2021
Lake St. Martin First Nation	N/A	North/South Consultants	Aquatic Field Studies	Participation in all aquatic field studies	May 9 - June 12, 2022
Lake St. Martin First Nation	N/A	North/South Consultants	Aquatic Field Studies	Participation in all aquatic field studies	April 11 – 12, 2023
Dauphin River First Nation	N/A	North/South Consultants	Aquatic Field Studies	Participation in fish use studies at the LSMOC outlet	May 15 - June 8, 2018
Dauphin River First Nation	N/A	North/South Consultants	Aquatic Field Studies	Participation in fish use studies at the LSMOC outlet	October 12 – 17, 2018
Peguis First Nation	N/A	North/South Consultants	Not specified	Participation one day during fall	Fall 2020 (date not recorded)
Peguis First Nation	N/A	North/South Consultants	Aquatic Field Studies	Participation in most aquatic field studies	August 31 - November 5, 2021
Peguis First Nation	N/A	North/South Consultants	Aquatic Field Studies	Participation in most aquatic field studies	May 9 - June 12, 2022
Peguis First Nation	N/A	North/South Consultants	Aquatic Field Studies	Participation in most aquatic field studies	April 11, 2023
Pinaymootang First Nation	N/A	North/South Consultants	Not specified	One day participation	Between May 9 - June 12, 2022 (specific date not recorded)

Question IAAC-R3-06
October 27, 2023

Indigenous Group	Indigenous Business	Consultant	Type of Work	Task	Date
Not specified	Lawson Consulting & Surveying Ltd.	Hatch Ltd.	Land Surveying	Two employees performed two days of land surveying	May 2019
Not specified	Lawson Consulting & Surveying Ltd.	Hatch Ltd.	Land Surveying	Three employees performed five days of land surveying	June 2019
Not specified	Lawson Consulting & Surveying Ltd.	Hatch Ltd.	Land Surveying	Two employees performed two days of land surveying	September 2019
Not specified	Lawson Consulting & Surveying Ltd.	Hatch Ltd.	Land Surveying	Two employees performed two days of land surveying	October 2020
Not specified	Lawson Consulting & Surveying Ltd.	Hatch Ltd.	Bathymetry Surveying	Two employees performed three days of bathymetric surveying	October 2020
Not specified	Lawson Consulting & Surveying Ltd.	Hatch Ltd.	UAV Imagery	One employee performed two days of UAV imagery acquisition	October 2022
Interlake Reserves Tribal Council	N/A	Hatch Ltd.	Red Headed Woodpecker Survey	One participant attended two afternoon shifts with the field survey team for red headed woodpecker and decadent tree identification	June 2021
Peguis First Nation	N/A	Hatch Ltd.	Groundwater/Surface Water Monitoring Program	One participant provided assistance to field team during groundwater and surface water monitoring work	October 18-21, 2022
Manitoba Metis Federation	N/A	Hatch Ltd.	Groundwater/Surface Water Monitoring Program	Two participants provided assistance to field team during groundwater and surface water monitoring work.	June 19-23, 2023
Manitoba Metis Federation	N/A	Hatch Ltd.	Groundwater/Surface Water Monitoring Program	Two participants provided assistance to field team during groundwater and surface water monitoring work.	July 17-21, 2023

Indigenous Group	Indigenous Business	Consultant	Type of Work	Task	Date
Joint venture with Interlake Reserves Tribal Council	Sigfusson Northern Ltd.	KGS Group	Not specified	Supplied/ operated construction camp Excavator for rock availability program	January-April 2019
Métis Corporation	Breezy North Construction Inc.	KGS Group	Not specified	Developing/ maintaining clearing along LSMOC alignment, winter access, and forestry road	January-March 2019
Pinaymootang First Nation	N/A	KGS Group	Seismic Survey	One labourer for Seismic Survey	February 11-March 3
Métis Corporation	Not specified	KGS Group	Seismic Survey	One labourer for Seismic Survey	February 11-March 3
Skowan First Nation	N/A	KGS Group	Survey	Provided labour support, snowmobiles, and chainsaws for topographic survey of transmission line ROW	March 6 – March 11, 2019
Dauphin River First Nation	N/A	KGS Group	Snow removal	Snow clearing for drilling of sentinel groundwater well	March 8, 2019
Dauphin River Northern Affairs Community	Einarrson's Camp	KGS Group	Camp provider	Provided food and lodging during sentinel well installation	March 8, 2019
Joint venture with Interlake Reserves Tribal Council	Sigfusson Northern Ltd.	KGS Group	Not specified	Supplied/ operated excavator for rock availability program	May 22, 2019
Dauphin River Northern Affairs Community	Einarrson's Camp	KGS Group	Camp provider	Provided food and lodging during sentinel well installation	September 27, 2019
Dauphin River First Nation	N/A	KGS Group	Not specified	Boat rental and Ranger	September 29, 2019
Manitoba Metis Federation	N/A	KGS Group	Phase 1 ESA	Phase 1 ESA – Environmental monitoring	June 5, 2023
Dauphin River First Nation	N/A	KGS Group	Not specified	Boat rental and Ranger	June 8, 2023
Lake St. Martin First Nation	N/A	KGS Group	Not specified	Boat rental and operator	July 17-20, 2023

Question IAAC-R3-06
October 27, 2023

Environmental Monitoring

Manitoba Transportation and Infrastructure has committed to undertake environmental monitoring as part of the Project EMP and is anticipating that environmental monitoring will be included as a condition of federal and provincial environmental approvals. Environmental monitoring is science-based monitoring intended to verify the predictions in the Project EIS and the effectiveness of the relevant plans associated with the EMP in mitigating impacts, as well as to allow for ongoing adaptive management as, or if, required. As described in Section 7 of the EAC Terms of Reference (TOR), Manitoba Transportation and Infrastructure has committed to share the results of this monitoring work with the EAC to assist them in fulfilling their purpose and objectives.

It is expected that this type of monitoring will primarily be undertaken by Service Providers who are experts on the subject matter, and who will work on behalf of Manitoba Transportation and Infrastructure as contracted through standard tendering practices. These tendering practices will include opportunities for Indigenous group involvement in environmental monitoring.

For the upcoming environmental monitoring tender process for the Lake Manitoba and Lake St Martin Outlet Channels, the participation of Manitoba Indigenous Businesses will be mandatory. Bidders will have to include Manitoba Indigenous Business participation as the service provider or as one of the service providers by way of subcontract and a minimum Indigenous participation percentage of 10% will be required. A percentage of under 10% may result in the rejection of the proposal.

Manitoba Indigenous Business participation percentages are determined based on the value of the portion of the Services that will be delivered by a Manitoba Indigenous Business(es). Manitoba Indigenous Business participation percentages will be calculated as follows:

$$\frac{\text{\$ Value of Manitoba Indigenous Business participation}}{\text{Total \$ Value of Proposal}} = \text{Percentage of Manitoba Indigenous Business}$$

Manitoba Transportation and Infrastructure will monitor the level of Manitoba Indigenous Business[10] participation throughout the term of the Agreement to determine if the level of participation promised by a contractor is delivered and the contractor will be required to confirm the level of Manitoba Indigenous Business participation throughout the term of the Agreement.

At the end of each month, during the term of this Agreement and upon submission of its final invoice, the Service Provider shall submit completed Indigenous Business Participation Form to Manitoba certifying the actual percentage of Manitoba Indigenous Business participation in providing the Services. A failure to meet the requirement that 10% of the Services be performed by a Manitoba Indigenous Business could be considered a breach of the Service Provider Agreement and could result in the termination of the Agreement.

Construction Compliance Monitoring

Indigenous groups will be provided with opportunity and resources to participate in construction compliance monitoring through the EAC. As described in the EAC TOR (submitted as part of Round 2 IR responses in Appendix IAAC-R2-30-1) construction compliance monitoring by the EAC is expected to consist of on-site, third-party monitoring by EAC Local Community members or their selected agents so that that applicable mitigation measures are followed on the ground. The EAC will develop, on an annual basis, a work plan identifying the topics and activities it intends to undertake in that year to fulfill its purpose and to reflect priorities of EAC Local Communities. It is anticipated that the EAC will outline its proposed construction compliance monitoring activity in its annual work plan and that the work may be undertaken directly by EAC members or by Local Communities members and coordinated through the EAC.

This construction compliance monitoring would be in addition to Manitoba Transportation and Infrastructure's own compliance monitoring and would serve to augment the original monitoring program, and to help build trust between local communities and Manitoba Transportation and Infrastructure that mitigation measures are being applied as intended for applicable activities. Manitoba Transportation and Infrastructure is planning to undertake various forms of construction compliance monitoring to confirm contractor compliance with mitigation measures specified in construction contracts, EMP plans and Project approvals. This monitoring will be undertaken by Manitoba Transportation and Infrastructure using internal staff or service providers and is described in the Construction Environmental Management Program, Project Environmental Requirements as part of the EMP. As described in Section 7 of the EAC TOR, Manitoba

[10] Manitoba Indigenous Business means:
a) a business:
- That is at least 51% owned and controlled by one or more Indigenous persons of Manitoba; and
- If it has six or more full time employees, at least one thirds of whose full time employees must be Indigenous person of Manitoba where "business" includes a band, as defined by the Indian Act, a sole proprietorship, a corporation, a cooperative, or a partnership;

or
b) a not-for-profit organize whose bylaws require at least 51% of its board members be Indigenous person of Manitoba

Transportation and Infrastructure has committed to share the results of both its construction compliance and environmental monitoring work with the EAC to assist them in fulfilling their purpose and objectives.

ii. How specific training and any equipment will be provided to Indigenous groups to support their participation in monitoring efforts.

To-date, Manitoba Transportation and Infrastructure has offered and completed environmental monitoring training with Fisher River Cree Nation and the Interlake Reserves Tribal Council, who represent Dauphin River First Nation, Kinonjeoshtegon First Nation, Little Saskatchewan First Nation, Lake St. Martin First Nation, Lake Manitoba First Nation, Pinaymootang First Nation and Peguis First Nation. From August 29, 2022, to September 2, 2022, six Fisher River Cree Nation members participated in a weeklong aquatic environmental monitoring course. The workshop was facilitated by AAE Tech Services Inc., with support by Manitoba Transportation and Infrastructure and its Indigenous Consultation Branch. The course involved a four-day classroom component with a one-day fieldwork component. Manitoba Transportation and Infrastructure supported this activity by providing funding to Fisher River Cree Nation. In October 2022, 36 members from the seven representative Interlake Reserves Tribal Council First Nation communities participated in one-day training program to learn traditional and scientific environmental monitoring for the proposed Outlet Channels Project. The workshop was facilitated by Limnos Environmental and Mike Sutherland of Peguis First Nation. The training program offered opportunities to participants for studying specific environmental variables routinely monitored such as heritage resources, vegetation, waterbodies, wetlands, terrestrial species and soils, integrated with aspects of Traditional monitoring and mitigation for Traditional sites and values. Manitoba Transportation and Infrastructure supported this activity by providing funding to the Interlake Reserves Tribal Council.

Manitoba Transportation and Infrastructure is currently developing a training program to equip Indigenous group monitors to be able to identify heritage resources that may be found during construction activities (chance finds) as well as understand and apply the protocols regarding the protection of artifacts or removal of and handling of artifacts as described in the HRPP. The training is anticipated to consist of both classroom and field components that will provide tangible heritage resource field experience associated with construction (i.e., excavation). The training is intended to also introduce the Manitoba Culture, Heritage and Tourism's Historic Resources Branch (HRB) permitting and applications process, artifact identification, recovery, and analysis, site and artifact photography, and necessary reporting requirements to those who participate in the program.

In addition, Manitoba Transportation and Infrastructure is also coordinating with Manitoba Economic Development and Training, Indigenous Services Canada, and First Peoples Development Inc. (FPDI) to identify Project labour force requirements, procurement requirements and anticipated schedules, which could assist in the development of training opportunities for Indigenous groups to support potential employment as part of construction and environmental monitoring activities. Provincial and federal funding is available to support this type of training and ongoing coordination with provincial, federal, and FPDI representatives will help to identify and develop applicable training for the Project. This is all to facilitate opportunities for Indigenous groups to have a trained and ready workforce to participate in the Project. Discussions with FPDI are ongoing and anticipated to continue as a means of facilitating training opportunities for Indigenous groups and to increase opportunities for more technical and skilled positions, in addition to cleaning, cooking, or other services.

iii. How capacity for Indigenous groups to participate in monitoring programs and the EAC will be provided.

It should be noted that Parts a and c above, also include measures to support Indigenous groups with the capacity to participate in monitoring programs and the EAC, for the following three components of monitoring:

Pre-construction Fieldwork

Manitoba Transportation and Infrastructure has committed to providing funding for participation, on an invoice basis based on established Manitoba Transportation and Infrastructure rates. Manitoba Transportation and Infrastructure has also established a practice of providing communities with notice of upcoming environmental field work. Manitoba Transportation and Infrastructure strives for notification to be provided a minimum of 14 days in advance of the field work.

Environmental Monitoring

It is expected that this monitoring will be completed by Services Providers on behalf of Manitoba Transportation and Infrastructure. Bidders will be required to include Manitoba Indigenous Business participation in their proposal and at least 10% of the proposal's total value must be provided by Manitoba Indigenous Business(es). Manitoba Transportation and Infrastructure will monitor Indigenous participation throughout the term of the agreement and failure to meet this requirement could result in termination of the agreement. Manitoba Transportation and Infrastructure has committed, in Section 7 of the EAC TOR, to share the results of monitoring work with the EAC to assist the committee in fulling their purpose and objectives.

Construction Compliance Monitoring (EAC)

As noted in sections 30, 31, and 32 of the EAC TOR, construction compliance monitoring for the Project is expected to be a primary activity for the EAC. The Manitoba government is investing a total of $3.1 million (M) to establish the EAC. It is expected that the bulk of the $3.1 M budgeted for the EAC will be utilized for construction compliance monitoring by the EAC or by member communities. In terms of some of the key monitoring components, the EAC, and Local Communities through the EAC, are provided with an opportunity and resources to participate in construction compliance monitoring (i.e., observations to confirm that applicable mitigation measures are implemented, as required). It is anticipated that the EAC will outline its proposed construction compliance monitoring activity in a work plan. Construction compliance monitoring work may be undertaken directly by EAC members or by member communities and the work will be coordinated through the EAC.

iv. Process that will be taken to implement recommendations put forward by the EAC and commitments to implementing these recommendations.

The EAC's primary output is expected to be provision of written advice and/or recommendations to Manitoba Transportation and Infrastructure with respect to the EMP plans, their implementation, and environmental aspects of the Project. The EAC has a wide degree of latitude on the subject matter for which it provides advice and recommendations to Manitoba Transportation and Infrastructure. For example, the EAC could provide recommendations identifying that an issue or concern is occurring, whether it is identified in science-based environmental monitoring or through observations of Indigenous or local community members. It is also expected that should an unanticipated adverse environmental impact be identified, that the EAC may volunteer, or may be asked, for advice on how best to mitigate or offset these impacts as part of adaptive management.

Manitoba Transportation and Infrastructure is also expecting the EAC to carry out construction compliance monitoring, to confirm that contractors working on the Project are adhering to the environmental protection measures identified in the EMP. Any observations of shortcomings or violations by contractors will be actioned by Manitoba Transportation and Infrastructure and addressed with contractors through contractual measures and may also include adaptation of the EMP plans.

The EAC will also provide specific advice and recommendations on behalf of their member communities, regarding implementation of some portions of the EMP. For example, the EAC is anticipated to provide advice or recommendations with respect to wetland-related aspects of the Wetland Offsetting Program (as described in detail in the response to IR IAAC-R2-13), and will similarly be asked to recommend projects and sites for fish and fish habitat offsetting. Additional opportunities may arise for the EAC to provide substantive input into mitigation and offsetting measures in the EMP.

Question IAAC-R3-06
October 27, 2023

With respect to the process for the EAC to provide advice to Manitoba Transportation and Infrastructure and for Manitoba Transportation and Infrastructure to action and respond, the TOR for the EAC describes the following process, as described in the response to IR IAAC-R2-30, Appendix IAAC-R2-30-1:

- Advice and/or recommendations supported by a majority of the EAC members may be submitted on behalf of the EAC for consideration by Manitoba Transportation and Infrastructure. The EAC members representing local communities will use their best efforts to ensure that the EAC written advice and/or recommendations submitted to Manitoba Transportation and Infrastructure are technically and economically feasible and reflects a consensus among the Local Community EAC members.
- If consensus cannot be reached after making best efforts, the EAC will share the proposed advice and/or recommendations with all local community EAC members and EAC members will have an opportunity to explain, in writing, why they do not support the advice and/or recommendations in whole or in part, and those reasons will be conveyed to Manitoba Transportation and Infrastructure for consideration along with the advice and/or recommendations of the EAC.
- When the EAC provides written advice or recommendations to the proponent, the proponent will consider the advice and provide a written response in a timely manner.
- Should the EAC not be satisfied with the response from the proponent, the EAC will notify Manitoba Transportation and Infrastructure in writing and share its concerns with Manitoba Transportation and Infrastructure's response. Manitoba Transportation and Infrastructure will carefully consider this second response from the EAC and will provide a final written response in a timely manner.
- Should the EAC not be satisfied with the final response from Manitoba Transportation and Infrastructure, it will notify Manitoba Transportation and Infrastructure in writing. EAC may then share advice or findings with the relevant regulatory authority providing notice to Manitoba Transportation and Infrastructure of its intention to do so.

Of note, Manitoba Transportation and Infrastructure will also have two members on the EAC; however, Manitoba Transportation and Infrastructure's EAC members will refrain from participating in the EAC consensus decision-making process that will result in the EAC members providing written advice or recommendations to Manitoba Transportation and Infrastructure.

v. Intersection between nation-specific consultation and the EAC. Describe how input from consultation with Indigenous groups will be taken into account within the EAC.

Indigenous engagement and consultation is discussed in Volume 1, Section 5.3 of the Project EIS. While the specific configuration of the EAC was not formulated during the development of the Project EIS, it addresses the intent described in Volume 1, Section 5.2.5, regarding ongoing engagement and the need to continue to further develop an understanding of the interests and concerns of people and communities potentially affected by the proposed Project, and to inform ways to minimize potential adverse effects and enhance positive effects where possible.

Manitoba Transportation and Infrastructure regards engagement and consultation as two separate but interrelated processes. Engagement is the process of active communication and participation that helps build and maintain relationships and trust between the various groups. For proponents with multiple projects or activities within a region it can be a long-term process that spans the various projects and activities, but it is an important part of the planning and design of specific projects. It includes the efforts that a project proponent takes to share information about a proposed project, potential project effects, mitigations, monitoring, and follow-up being planned for the proposed project with stakeholders, Indigenous groups, and the general public. It includes the proponent's efforts to review feedback received and actions taken to address questions and concerns raised. Engagement also includes the opportunities for stakeholders, Indigenous groups, and general public to receive and review project information shared by the proponent and to provide meaningful feedback to help the project proponent plan and implement a successful project. The engagement process and records are included in proponent's EIS to support the federal and provincial environmental assessment processes. Engagement is ongoing throughout the life of a project.

Crown Indigenous Consultation is a defined process that governments must undertake to fulfil their legal obligation and duty to consult with Indigenous peoples when a government proposes any decision or action that has the potential to negatively affect the exercise of Aboriginal or treaty rights. It is typically carried out on a project-specific basis that concludes as part of the federal and/or provincial review processes. Manitoba's *Interim Provincial Policy for Crown Consultations with First Nations, Métis Communities and Other Aboriginal Communities* (2009) has four defined phases that focus on nation specific discussions between Indigenous groups and the Crown. The four phases of Manitoba's consultation process are:

- Phase 1 – Initial Assessment and Planning.
- Phase 2 – Community Consultation Process.
- Phase 3 – Analysis, Recommendation and Decision Making.
- Phase 4 – External Communications.

Descriptions of each of these steps are provided in Section 1.4 of the ICSER. Manitoba's Crown Consultation process concludes when a decision is made on whether to issue a Licence under *The Environment Act* for the Project. The federal Crown also has a duty to consult with Indigenous peoples and to that end IAAC is conducting its own separate consultation process with Indigenous groups engaged on the Project the results of which will be considered in the federal Minister's Decision Statement. In Manitoba, consultation steering committees are established for many projects to provide oversight and guidance on the consultation process. The consultation steering committee for the proposed Project consists of representatives from the provincial departments responsible for the proposed Crown decisions and those that could contribute to the overall management and implementation of the consultation and engagement process. In phase 3 of Manitoba's consultation process, the steering committee develops a consultation report that describes the consultation and engagement processes undertaken and its results, which is then submitted to the provincial Crown decision maker(s) for a decision. Information obtained through the engagement process before environmental approvals are issued can be used to inform the consultation process. Prior to making a decision on the proposed project, the Crown decision maker(s) will determine if consultation has been adequate and meaningful, the duty to consult has been reasonably met, and whether appropriate, accommodations are provided to address potential impacts to Aboriginal or treaty rights of Indigenous groups.

Feedback received from Manitoba's engagement and consultation process has led Manitoba Transportation and Infrastructure to establish the EAC for the proposed Project. While the establishment of the EAC is one of several accommodation measures that is being put forward to the Minister of Environment and Climate as a part of the Crown Consultation Process, operation, and outputs of the EAC will be the primary process Manitoba Transportation and Infrastructure uses to engage Indigenous groups and the RM of Grahamdale on the proposed Project following the issuance of provincial licencing and federal approvals. Participation in the EAC will offer Indigenous groups opportunities to provide direct input into Manitoba Transportation and Infrastructure's decision-making process regarding implementation and ongoing refinement of the environmental management program for the Project. The EAC is intended to serve as a communication and advisory forum to provide an avenue for the flow of information between and among Indigenous groups, the RM of Grahamdale and Manitoba Transportation and Infrastructure with a focus on providing opportunities for Indigenous groups and other stakeholders to have meaningful input into the EMP for the proposed Project. Information received from the EAC will be used to assist Manitoba Transportation and Infrastructure in developing and delivering a successful Project and avoiding and mitigating environmental impacts to the fullest extent possible. The next EAC meeting is tentatively scheduled for October 31, 2023, and the intent is for the EAC to discuss how members can provide input into the further development of EMP plans during the pre-construction phase of the proposed Project.

In short, Manitoba does not expect substantial direct intersection between consultation and the work of the EAC because there is a limited overlap in timelines between operation of the EAC and conduct of consultation. Manitoba's duty to consult is expected to be fulfilled, with the decisions triggering consultations expected to be made, at a time when the EAC is in the very early stages of its work (during the early pre-construction phase of the Project). The EAC will be a collaborative body to foster ongoing, engagement and two-way communication about the Project and the implementation of the environmental management program. On the other hand, as the EMP is the primary means by which potential Project impacts are to be avoided and mitigated, the EAC's work to promote the effectiveness of the EMP will play an important (albeit indirect) role in confirming that the assumptions that informed consultation hold true. In addition, while the EAC is not intended to fulfill the Crown's duty to consult, Manitoba recognizes that if any impacts or infringements to Indigenous or treaty rights are identified through the work of the EAC, Manitoba is obligated to address these issues or concerns as if they had arisen during the consultation process. Indigenous groups that Manitoba Transportation and Infrastructure identified as Potentially Most Affected through Manitoba's consultation process were invited to participate in the EAC, with a mechanism to invite upstream and downstream communities on matters of interest to those Indigenous groups**.** Several factors led to identify Indigenous groups as Potentially Most Affected, including the following:

- Potential adverse effects on Aboriginal and treaty rights.
- Potential environmental impacts and cumulative effects.
- Proximity of reserve or traditional land to proposed Project footprint.
- Communities that voiced concerns about their rights and expressed desire to be consulted.

Recommendations provided by the EAC will be reviewed and considered by Manitoba Transportation and Infrastructure. If decisions made by Manitoba Transportation and Infrastructure do not align with the EAC's recommendation, Manitoba Transportation and Infrastructure will provide the EAC an explanation or a rationale for the decision it has made. While the EAC does not have a mandate for enforcement, participation in the EAC does not prevent a participating EAC member Indigenous group from engaging with federal or provincial regulators about an impact or concern related to the proposed Project and requesting that it be investigated. It is anticipated that the work of the EAC will be carried out in three phases: pre-construction phase, construction phase, and operation phase. The TOR for the EAC are currently focused on the pre-construction and construction phase, but they do contemplate that the TOR will be reviewed and renewed at the end of the construction phase. The TOR also contemplate that the work of the EAC will be reviewed on an annual basis during the construction phase, with recommendations made on the structure of the EAC, as well as the frequency, timing, and location of future meetings during the operations phase of the proposed Project. Additional information regarding the EAC is available in response to IR IAAC-R2-30.

d. **Updates to the Heritage Resource Protection Plan**

Preamble

The Context and Rationale section states that there is a discrepancy between the response to IAAC-R2-34 and the approval of the Heritage Resource Impact Assessment (HRIA) by Manitoba Sport, Culture and Heritage's HRB, regarding the distance of the Fairford Trail from Lake Manitoba. It also notes that "site-specific detailed protection measures" are not provided in the Environmental Protection Plan (EPP) mapbooks, and that several Indigenous groups identified concerns with the Heritage Resource Protection Plan, including the lack of involvement of Indigenous groups in its development, need for cultural protocols on lands affected by the proposed Project, excavation of resources, and lack of Indigenous involvement in chance find procedures.

In response to a request from Manitoba Transportation and Infrastructure, IAAC provided additional context for the response. The following describes the context IAAC provided and Manitoba Transportation and Infrastructure's response:

- IAAC notes that the Project EIS indicates that the Fairford Trail is within 130 m (427 ft) of Lake Manitoba, whereas the response to IR IAAC-R2-34 states the "historical location of the trail within the PDA ranges from 175 m to 250 m (574 ft to 820 ft) northeast of the shore of Lake Manitoba."
    - Manitoba Transportation and Infrastructure Response: Volume 4, Section 9.6.4 of the Project EIS notes that based on the desktop (pre-HRIA) review of historic mapping, a section of the trail is within 130 m of Lake Manitoba, with more information to follow the HRIA. Historic mapping is not precise and trail distances have been described as an approximation from past reports. The intent of the field survey was to locate the original trail; however, as indicated in the response to IR IAAC-R2-34, the HRIA survey was not able to identify any evidence of the trail within the PDA. A ridge, however, was identified as a potential landform along which the trail may have traversed. A remnant of the Fairford Trail also remains in Watchorn Provincial Park and is approximately 400 m (1,312 ft) to the southeast of the outlet. The trail also passes across a portion (approximately 485 m [1,591 ft]) of the upstream end of the outside drain and the LMOC inlet area. In general, the Project EIS recognized that a trail segment (estimated as 465 m [1,526 ft] long but updated to 485 m [1,591 ft] post-HRIA) would be crossed by the PDA, which is recognized as a Project effect in the environmental assessments, in terms of the potential for heritage resources related to the use of the trail to be present.
- IAAC notes that the response to IR IAAC-R2-34 acknowledges that excavation will occur for two heritage resources in the PDA but does not contain an adequate understanding of how this relates to the conclusions drawn.
    - Manitoba Transportation and Infrastructure Response: additional information is provided in the response to Part d-ii below.

- IAAC notes that the response to IR IAAC-R2-34 states that an HRIA has been both approved and is yet to be approved by the Heritage Resources Board for the Project.
    - Manitoba Transportation and Infrastructure Response: this is an oversight as the HRIA report was reviewed and accepted by HRB prior to the development of the response to IR IAAC-R2-34. Additional mitigative heritage work is required as described in Part d-ii below.
- IAAC notes that the EPP discusses nine heritage resources, whereas the response to IR IAAC-R2-34 notes 10 heritage resources.
    - Manitoba Transportation and Infrastructure Response: Table 2 of the EPP notes that there are five Heritage Sensitive Areas and one Heritage Trail for the LMOC/PR239 PDA and Table 3 notes that there are three Heritage Sensitive Areas for the LSMOC PDA. Table 4 of the EPP describes a heritage sensitive site (Heritage Sensitive Area) as an area containing or having one or more specific heritage site(s) (i.e., specific heritage resources identified in the HRIA, and reflected in the IR responses). The 10 sites are discussed in the response to Part d-ii below.
- IAAC notes that Indigenous groups have said that the HRPP was developed without the involvement of Indigenous groups and does not respect cultural protocols on lands of the Indigenous peoples potentially affected by the Project, and that there is no mention of involving Indigenous groups in the event of chance finds, or mitigation measures beyond just excavating cultural heritage resources.
    - Manitoba Transportation and Infrastructure Response: information is provided in the response to Part d-iii below.

i. **Mapbooks with site-specific mitigation measures.**

The Project EPP identifies specific Environmentally Sensitive Sites (ESSs) for which site-specific mitigation measures are required. While defined as an ESS, detailed mapping of known heritage resources is not included as this information is confidential; it could be provided to IAAC for review upon request, if required and kept confidential. Site-specific mitigation measures for known heritage resources are described in the response to Part d-ii below. Redacted copies of the HRIA report were shared with all Indigenous groups and confidential unredacted HRIA reports were shared with Indigenous group leadership upon request; this was done to protect the locations of heritage sites from the general public as per *The Heritage Resources Act* and *Freedom of Information and Protection of Privacy Act*.

ii. **Protection measures provided in the HRIA for heritage resources.**

Results of the Project HRIA conducted in 2020 identified 10 heritage resources. These heritage resources were documented and registered as Archaeological Sites with HRB. For each heritage resource, recommendations were listed in the HRIA Report and are as follows:

1. Mitigative measures to be implemented pre-construction; and
2. Protective measures as outlined in the HRPP are to be enacted during construction and/or operation phases of the Project.

As recommended in the HRIA Report as well as in the Project HRPP, protective measures during the construction and operation phases of the Project include the Procedures for Specific Chance Find Heritage Resources (HRPP Section 5.2). Having monitors (and other construction personnel) with heritage resource identification training will provide additional vigilance if heritage resources are encountered. Knowledge of the locations and type of recorded heritage resource will assist the Project archaeologist and monitors in protecting and recovering additional artifacts should they be encountered at those sites. The HRIA Report outlines the following specific recommendations for each of the recorded heritage resource sites:

- At archaeological sites EkLm-001, EiLp-004, EiLp-005 and EhLp-003 it is recommended that archaeological monitoring is not required because the sites were tested, delineated and found to be small in size with low artifact density. If further heritage resources are identified during construction by monitors or construction personnel, the Chance Find Procedure must be enacted.
- Archaeological site EiLp-003 is to be protected and avoided during construction activities. A 30 m (98.4 ft) physical protective barrier is to be erected around the site to avoid potential impacts during construction activities. The barrier, with appropriate signage, is to be erected under the supervision and direction of a qualified archaeologist.
- At archaeological sites EkLn-001 and EiLp-002, heritage monitoring by a qualified archaeologist is recommended. The archaeologist will monitor earth-moving construction activities within 50 m (164 ft) of the sites. The earth-moving activities will include all topsoil removal and subsurface excavation. The archaeologist will be responsible for the recovery and documentation of artifacts exposed during the construction phase. Soil moving activities may be temporarily halted in the immediate area for the archaeologist to examine, photograph and record any intact features that may be exposed during the construction phase.

- Archaeological site EhLp-005 (St. Thomas Lutheran Cemetery) has been identified by HRB as requiring a qualified archaeologist to be present for heritage monitoring when construction activity is within 50 m (164 ft) of the cemetery boundary, to monitor for potential unmarked human burials. If human remains or evidence for the possibility of human remains are uncovered (i.e., soil staining suggestive of graves, wood fragments or coffin hardware), the Chance Find Procedure for Human Remains will be enacted.
- Archaeological sites EhLp-004 and EhLp-006 have been identified as requiring mitigative measures in the form of archaeological excavation. Excavations will be led by a qualified archaeological team using generally accepted methods and practices (e.g., hand troweling, shovel shaving, mechanical trenching, photographic documentation, site reporting forms, etc.) and HRB approved scientific methods (e.g., radiocarbon dating, residue analysis, etc.). The goal of the excavations is to recover archaeological material and detailed scientific information from the heritage resources prior to being destroyed during the construction phase. The excavations must explore the main activity areas of the sites and investigate for other prominent activity areas not yet identified. The excavations would encompass a sufficient portion of the site to document its overall significance to an extent that is satisfactory to HRB.
    - Site EhLp-004 excavation must include at least two activity areas: the upper bench (terrace) where the excavation unit (test hole) identified as S08EFTP02 is located and the lower bench (terrace) where excavation units identified as S8DBTP06, S8KSTP06 and S8LSTP05 were located as these test locations contained projectile points. Site EhLp-006 excavation must include at least four activity areas (Loci 1, 2, 3 and 4). Heritage monitoring during the construction phase may also be required at either or both of the sites, pending outcome of the excavations.
    - Heritage monitoring of these sites will be further required by HRB following archaeological excavations. Heritage monitoring will involve the presence of a qualified archaeologist or archaeological team to observe construction activities within 50 m (164 ft) of the site boundaries that would move, shift, or otherwise disturb intact soil layers containing heritage resources. These activities include topsoil removal, grubbing and trench excavation. The lead archaeologist will be responsible for the recovery and documentation of artifacts exposed during the construction phase. Soil moving activities may be temporarily halted in the immediate area for the archaeologist to examine, photograph and record any intact features that may be exposed during the construction phase.

iii. **How the Indigenous Knowledge provided was used to determine effects to all tangible and intangible cultural heritage resources, including examples of specific Indigenous Knowledge regarding intangible cultural heritage resources and how this information was incorporated into the assessment.**

Broadly speaking, the term "tangible" refers to things that can be physically touched, whereas the term "intangible" refers to things that cannot be touched or have a physical presence. While intangible cultural heritage has been identified by UNESCO[11] (United Nations Educational, Scientific, and Cultural Organization) as pertaining to "living heritage" (e.g., gatherings, oral traditions, songs, holidays, beliefs, etc.), in Canada intangible cultural heritage is still being discussed and explored at Federal Provincial Territorial tables.

Through the Indigenous consultation and engagement process - which included discussion tables, interviews, meetings, Traditional Knowledge studies for the Project, Manitoba Transportation and Infrastructure obtained information regarding tangible and intangible cultural heritage that contributed to the development of the HRIA. Examples include the following:

- Dauphin River First Nation and Pinaymootang First Nation noted that the Provincial Archaeological Site Inventory identified six registered archaeological sites in the Interlake Region, and several of these sites occur within or adjacent to Dauphin River First Nation and Pinaymootang First Nation traditional lands.
- Dauphin River first Nation, Lake Manitoba First Nation, Kinonjeoshtegon First Nation, and Little Saskatchewan First Nation reported unmarked graves in the area of the Project.
- Sagkeeng First Nation and Sandy Bay Ojibway First Nation reported that there are burial sites scattered throughout all of their traditional territory, possibly in the Project location. Sagkeeng First Nation also reported that there are cultural sites that may be impacted by the Project; however, they prefer to keep the locations confidential.
- Lake St. Martin reported that there is a mass burial site on the shore of Lake St. Martin from the Spanish flu in the 1900s.
- Peguis First Nation and Pinaymootang First Nation expressed concern over potential for the Project to disturb unknown burial sites.
- Fisher River Cree Nation reported that a ridge that runs beside the Project area was a historically a travel corridor.
- Peguis First Nation reported that they visit the following cultural sites around Lake Winnipeg: ceremonial sites, gathering places, sweat lodges, meeting places, burial sites, birth places, death places, rock paintings, important sites, traditional burial sites, petroforms, battlegrounds and Sundance sites.

[11] Article authored by the UNESCO Canadian Commission at https://en.ccunesco.ca/blog/2019/10/understanding-intangible-cultural-heritage

- Fisher River Cree Nation is concerned with reduced or altered ability to transmit knowledge or cultural practices due to changes in landscape and traditional resources.
- Manitoba Metis Federation reported that remaining cultural sites and connections are very important because so much of the Manitoba Metis Homeland and cultural sites have already been taken up by development and urbanization.
- Dauphin River First Nation, Kinonjeoshtegon First Nation and Lake Manitoba First Nation reported that Cultural Continuity values include gathering sites for community events and camping sites.
- Lake St. Martin First Nation stated that the land is important for well-being (mino pimatisiwiin). A central tenet for mino pimitisiwiin is the connection to land, and how the people lived a life that was based on hard work and living off the land. Lake St. Martin has a deep spiritual significance to Lake St. Martin First Nation. Lake St, Martin First Nation shared that Big Rock has an important cultural and spiritual significance where traditional, cultural and spiritual events took place.
- Little Saskatchewan First Nation reported that they have deep ancestral connections to the land, which has led to a strong sense of identity and attachment linked to the territory among Little Saskatchewan First Nation members.
- Pinaymootang First Nation reported that the area of the proposed Project is important for food, water, and medicine and is a place of healing and passing on Pinaymootang language, spirituality, and culture.
- Sagkeeng First Nation continue to have a deep connection to the Project area through family relationships, historical use, and other relational connections that have the potential to be adversely affected by the Project.
- Sandy Bay Ojibway First Nation reported that due to their mobile nature, important cultural sites are found throughout the territory, including sites where ceremonies were practiced.

Additional detail regarding tangible and intangible cultural heritage resources, including habitation, cultural and spiritual sites is available in response to IR IAAC-R1-122. Table IAAC-122-1.

As demonstrated through the TLRU information collected and provided by Indigenous groups, local communities have an intimate knowledge of the land around Lake St Martin; a long-standing history of their relationship with the land; and traditional use and dependence on what the land provides. The knowledge shared during the interviews revealed specific locations or areas within close proximity to the PDA as well as outside the PDA that experienced heavier traffic (land use) for resource gathering (hunting/trapping, plant harvesting) and Cultural Continuity than other areas. Although all areas within the PDA and in proximity to the PDA are known to be important, the ability to define higher use areas allowed the HRIA to focus additional attention to those locations, yet not ignore the lower traffic areas.

The TLRU information provided insights into the historical, cultural, and social significance of the investigated sites. In addition, it was complementary to the desktop research and mapping of the PDA by the archaeologists to determine locations that had a higher potential to contain heritage resources (a method commonly used by archaeologists to establish a fieldwork survey plan prior to entering the field for the HRIA). Many of the locations identified for testing for the HRIA were also labelled as areas of traditional use (for subsistence as well as culturally important) demonstrating a successful merger of both research tools to determine high potential areas that may contain heritage resources. Examples of such locations include the heritage sites that are recorded. The locations of these heritage resources were identified in the TLRU research as areas important for subsistence gathering (fishing, hunting/ trapping and gathering of plants/ medicines) as well as holding Cultural Significance. Physical evidence in the form of artifacts (lithic tools and flakes, pottery, animal, bird and fish bones) demonstrate that these sites were also considered as important for subsistence gathering and Cultural Continuity for many thousands of years in the past.

Locations identified as culturally important by the heritage consultant and/or Indigenous groups yet not containing the traditional tangible heritage resources are determined as intangible areas. These locations are to be identified as areas of concern with mitigation measures to be determined in continued talks with Indigenous groups, Manitoba Transportation and Infrastructure and HRB.

Furthermore, the TLRU information provided in conjunction with in-person conversations with Indigenous group members, as well as during the ongoing Project heritage meetings (see response to Part d-vii for details) with Indigenous groups, contributed a greater understanding of additional areas considered outside of the PDA, but are of heritage concern to the Indigenous groups and to the Project. Based on the recent knowledge provided through these sources of information, Manitoba Transportation and Infrastructure has identified additional locations that require archaeological investigations. Locations such as the Lake St Martin Narrows and Snake Island will undergo heritage surveys to identify potential heritage resources, but to also record and preserve heritage objects found.

iv. **Concerns raised about the loss of a regionally significant cultural settlement site (dating back to 3000 B.P.) and inclusion of this site in the assessment of potential effects to sites of importance and Indigenous peoples' physical and cultural heritage.**

As described in Volume 1, Section 2.4.2 of the Project EIS, the location of the channels was selected based on a balance of technical effectiveness, cost, and minimizing effects to environmental issues such as surface water quality, groundwater, terrestrial environment, fish habitat, fish resources, and social environment. A key environmental consideration was minimizing effects to groundwater, and routing was changed based on input received from Indigenous groups and key stakeholders. Once the design had advanced, the specific alignments had been selected, and the Project began the more formal regulatory review process, a HRIA was carried out in the PDA to identify and address any heritage resources concerns.

Archaeological sites EhLp-004 and EhLp-006 identified during the HRIA contained undisturbed levels of cultural layers from thousands of years in the past. Based on the work of the HRIA, the sites provided tangible evidence corroborating oral histories and what people have known: that Indigenous People have been living in that area for at least 5,000 years. Further research through excavation may provide more answers and evidence of earlier dates of occupation at those locations as well as how Indigenous peoples lived during those times. It is acknowledged there is great interest from Indigenous groups as to when the construction phase of the Project impacts the locations of the two sites, as a portion or all of these sites will be lost due to removal for the development of the channel.

Mitigation methods and construction monitoring will allow for research, recovery and analysis of the heritage resources that may assist in telling everyone the story of how the Indigenous peoples lived at those sites. The archaeological work would be conducted with great respect and provide a learning opportunity for all of those involved. Manitoba Transportation and Infrastructure is working with Indigenous groups to address concerns raised.

From what is currently understood, past Indigenous peoples thrived by means of seasonal rounds. There were traditional hunting and gathering locations for the season or even spring / summer and fall / winter where the food sources were more abundant and accessible at those locations at specific times of the year, providing an optimal opportunity to survive and even thrive. Therefore, calling the site(s) a permanent settlement is not accurate; however, it appears that the site was revisited often (likely not yearly) over 5,000+ years. Based on the soil stratigraphy identified at the site, there appear to have been long periods of non-use where those populations may have lived at a similar site in the area. Layers of soil were sterile of artifacts between paleolsols (cultural layers).

Knowledge of the heritage site is preserved through the archaeological excavation. This work is considered mitigation and includes heritage object (artifact) removal, to protect artifacts from being lost to construction activities and detailed recording to document the process and outcomes of mitigation work.

v. Heritage resource sites (that the Proponent is aware of) that will be lost due to excavation and the specific mitigations identified for the loss of these sites

In discussing ESSs, Section 3.0 of the EPP (Mitigation) references the relevant HRPP and Project Environmental Requirements (PERs) sections and says: “For an ESS in which a Project Archaeologist is required to be present for heritage monitoring as directed by HRB, the Project Archaeologist will take the extra measures to inspect and provide direction for the excavation by mechanical means. For the remaining known archaeological sites, the Monitor will take extra measures to inspect soil layers within the ESS and enact the Chance Find procedure if heritage resources are encountered. If this occurs, work at the location shall be suspended until the Project archaeologist can assess the archaeological or historic artifacts encountered, and mitigation measures are confirmed with the Manitoba HRB.”

Question IAAC-R3-06
October 27, 2023

Section 2.13.1 of the PERs (Heritage Mitigation) provides the following general mitigation measures:

- The contractor will report encountered heritage resource materials immediately to the Contract Administrator.
- As per the HRPP, work at the location shall be suspended until a Project archaeologist can assess the archaeological or historic artifacts encountered, and mitigation measures are confirmed with the Manitoba HRB.
- Heritage resources discovered during site preparation and construction will be left in their original position until the Project archaeologist is contacted and provides instruction.
- If deemed necessary by the Project archaeologist or required by legislation, the HRB will be informed of heritage resources, or objects thought to be heritage resources, are discovered during site preparation and construction who will determine whether additional measures are required.
- If deemed necessary by the Project archaeologist or required by the HRB, protective barriers will be placed around heritage resource sites that are inadvertently found during construction so that the area can be protected while work proceeds. These barriers may be stakes or fences and will remain in place until any additional measures required by HRB are completed to the satisfaction of HRB. At that time, the barriers will be removed, and construction will proceed.
- The Project archaeologist will carry out additional measures as required by the HRB.
- If human remains are encountered, the measures described above will be enacted plus informing the Royal Canadian Mounted Police for determination of jurisdiction (forensic or archaeological). If forensic, Royal Canadian Mounted Police has custody of and is responsible for recovery of remains. If archaeological, HRB has custody of and is responsible for removal of remains.
- The HRPP will be adhered to during construction and operation phases of the Project."

A total of 10 Heritage resource sites (archaeological sites) were identified and documented during the HRIA. The following six sites were identified as Pre-European Contact Period:

- EkLm-001 is a lithic scatter of undetermined age, found on a small, elevated area within a forested zone in proximity to large boulders. Mitigation measures would be required if further heritage resources were identified by a monitor or construction personnel, then the Chance Finds Procedure would be enacted.

- EkLn-001 is a campsite. Based on the chronology of identified lithic tools, the site was dated to the Late or Woodland Period (2,2000 years B.P. to European contact) with specific Besant (1,900 to 1,100 years B.P.) and Eastern Triangle (1,000 to 400 B.P) components. No identifiable intact subsurface cultural layers were found at the site, but more cultural material could be present on the surface. Mitigation measures would entail heritage monitoring by a qualified archaeologist. The archaeologist would monitor all earth moving construction activities within 50 m (164 ft) of the sites. The earth moving activities would include all topsoil removal and subsurface excavation.
- EiLp-002 is a lithic scatter of undetermined age.
- EiLp-004 is a lithic scatter of undetermined age. Mitigation measures would entail heritage monitoring by a qualified archaeologist. The archaeologist would monitor all earth moving construction activities within 50m (164 ft) of the sites. The earth moving activities would include all topsoil removal and subsurface excavation.
- EhLp-004 is a campsite. Based on the chronology of identified lithic tools and pottery, the site was dated to the McKean Complex of the Middle Period (with specific Duncan [3,700 to 2,500 years B.P.] and Hanna [4,500 to 3,500 years B.P.] components) and to the Late Period (the presence of unidentified pottery placed the site as early as 2,000 years B.P.). This site has been identified as requiring mitigative measures in the form of excavation. The excavation will be led by a qualified archaeological team conducting the work by standard and HRB-approved scientific methods. The goal of the excavations is to recover archaeological material and detailed scientific information from the heritage resources prior it being destroyed during the construction phase. The excavations must explore the main activity areas of the sites and investigate other prominent activity areas not yet identified. The excavations would encompass a sufficient portion of the site to document its overall significance to an extent that is satisfactory to HRB. Heritage monitoring during the construction phase will also be required at the site, pending outcome of the excavations.
- EhLp-006 is a campsite. Based on the chronology of identified lithics and pottery, the site dated to the Late or Woodland Period (2,2000 years B.P. to European contact) with a specific Laurel component (2,000 to 1,100 years B.P.) This site has been identified as requiring mitigative measures in the form of excavation. The excavation will be led by a qualified archaeological team conducting the work by standard and HRB-approved scientific methods. The goal of the excavations is to recover archaeological material and detailed scientific information from the heritage resources prior it being destroyed during the construction phase. The excavations must explore the main activity areas of the sites and investigate other prominent activity areas not yet identified. The excavations would encompass a sufficient portion of the site to document its overall significance to an extent that is satisfactory to HRB. Heritage monitoring during the construction phase will also be required at the site, pending outcome of the excavations.

The following four sites were identified as the Later Historic Period:

- EiLp-005 is a historic farmyard. None of the site's components predated the 1940s. Mitigation measures would entail if further heritage resources were identified by monitor or construction personnel, then the Chance Finds Procedure would be enacted.
- EhLp-003 is a midden related to a historic farmyard. None of the site's components predated the 1940s. Mitigation measures would entail if further heritage resources were identified by monitor or construction personnel, then the Chance Finds Procedure would be enacted.
- EhLp-005 is the St. Thomas Lutheran Cemetery. The component of the site within the PDA may date to the early 1900s. Mitigation measures have been identified by HRB as requiring a qualified archaeologist to be present for heritage monitoring during construction activity within 50 m (164 ft) of the cemetery boundary, to monitor for potential unmarked human burials. If human remains or evidence for the possibility of human remains are uncovered (i.e., soil staining suggestive of graves, wood fragments or hardware from coffins), the Chance Find Procedure for Human Remains will be enacted. The following site was identified as likely Historic but may predate the Historic Period.
- EiLp-003 is a stone feature of undetermined age and function. The feature may be the remnants of a dock or the scattered remains of a cairn. No artifacts were recovered within or around the feature, nor clues gleaned from its composition which could aid in determining an age or function. Mitigative measures for this site is for it to be protected and avoided during construction activities as a precautionary measure. A 30m physical protective barrier is to be erected around the site to minimize potential impacts during construction activities. The barrier with appropriate signage is to be erected under the supervision and direction of a qualified archaeologist. The barrier and signage are to remain over the construction and operation phases of the Project. If there is evidence that the site is in danger of impact from the construction or operations phases of the Project, then a permanent barrier may be required.

vi. **Summary of key mitigations for the avoidance and protection of identified cultural, ceremonial, and harvesting sites**

Cultural and Ceremonial Sites

Section 5.1.3 of the HRPP (Culturally Important Areas) states: "CIAs are locations within the PDA that hold historic, social, economic, and/or spiritual value to the inhabitants of the Project LAA and RAA. Examples of CIAs may include burial sites, sacred sites, ceremonial sites, specific berry or plant foraging areas, or specific hunting locations. The CIAs were identified during the pre-construction HRIA and is ongoing through Indigenous group and other stakeholder engagement. The location of a CIA will be classified in the EPP as an ESS without detailing sensitive information to maintain confidentiality. In the case of a CIA, the sensitivity is towards cultural resources."

As described further in Part d-iii above, in order to identify potential CIAs within the PDA, Indigenous groups conducted TLRUs, and the resulting assessment of potential effects on land and resource use (including CIAs) is provided in Volume 4, Section 10.2 of the Project EIS, and further detailed in response to IR IAAC-R1-122. The TLRU information received provided insights into the historical, cultural, and social significance of the area. In addition, it was complementary to the desktop research and mapping of the PDA undertaken by the archaeologists as part of the HRIA to determine locations that had a higher potential to contain heritage resources (a method commonly used by archaeologists to establish a fieldwork survey plan prior to entering the field for the HRIA). Many of the locations identified for testing for the HRIA were also labelled as areas of Traditional Land Use (for subsistence as well as culturally Important) demonstrating a successful merger of both research tools to determine potential areas of CIAs.

To supplement the TLRU information received from Indigenous groups, and provide additional site specific details, Manitoba Transportation and Infrastructure is committed to meeting with Indigenous groups to conduct mapping sessions to better understand the how the Project may affect access to culturally important sites or harvesting areas, and to identify and map where areas or sites may be located and potentially be affected by the Project. The proposed mapping sessions would provide an additional opportunity for Indigenous groups to identify their traditional trails, sites, or travel ways and present an opportunity to explore additional mitigation or accommodation measures, if required. Manitoba Transportation and Infrastructure is committed to working with Indigenous groups to determine how access to CIAs and harvesting areas can be improved, and in discussing possible mitigations or accommodation(s) that may be considered to address potential adverse Project effects.

Information and concerns about culturally sensitive areas could also be brought forward by Indigenous groups through the EAC (potentially through a Heritage Resource Board or sub-committee as discussed in Part v-ii. below), to provide these recommendations to Manitoba Transportation and Infrastructure. Additionally, regular, and ongoing communication about construction schedules, locations of upcoming excavation, and heritage updates would also provide opportunities for Indigenous groups to share any concerns about potential CIAs as they arise.

In conjunction with the 10 recorded heritage sites identified during the HRIA, other additionally identified cultural, ceremonial and harvesting sites, whether archaeologically or culturally affiliated, will be addressed by Manitoba Transportation and Infrastructure (potentially in conjunction with the EAC, if desired by Indigenous groups) on a site-by-site basis for mitigation strategies. Mitigation methods and construction monitoring will allow for research, recovery and analysis of the heritage resources that may assist in telling the story of how the Indigenous peoples lived at those sites. The work would be conducted respectfully, following the legislative requirements of the *Historical Resources Ac*t, and may provide a meaningful learning opportunity. Manitoba Transportation and Infrastructure will continue working with Indigenous groups to address any additional concerns as they arise.

In general, the primary form of mitigation whenever possible is avoidance. If the site in question is located in an area that is outside of the construction zone, the option would be for avoidance and protection in the form of barriers and signage. Mitigation methods for important sites within the PDA and construction zones depending on the type of site can include (1) respectful intact removal (if physical evidence is found and whenever physically possible) and placed in an agreed upon new and safe location, or (2) excavation of the site to carefully document and remove sections of the site for preservation and study prior to construction activities at those locations. These methods may include ceremonies prior to the work and after the work is complete. Periodic visits by monitors at those locations would be expected to confirm that the barriers and signage are intact, and the avoidance rules are being respected.

Harvesting Sites

An assessment of effects on medicinal plants and other plant species of cultural importance is provided in Volume 3, Section 8.2.4.4 of the Project EIS and an assessment of potential effects on TLRU is provided in Volume 4, Section 10.2 of the Project EIS. An assessment of the effects of the Project on medicinal plants and other plant species of cultural importance is provided in the May 2022 response to IR IAAC-R1-99, and July 2023 response to IAAC-R2-15.

Loss of harvesting sites within the PDA is an unavoidable consequence of channel construction, but the environmental assessment has concluded that the losses of plants and wildlife would not have significant effects to regional populations of these resources. In terms of local effects, Indigenous groups will be provided with opportunities to harvest resources in the PDA prior to construction start. During construction, efforts will be made to retain treed areas where feasible and the RVMP uses native species and weed control. While access within the PDA will be carefully managed during construction from a safety perspective, for adjacent areas a schedule of construction and Project activities will be available for Indigenous groups engaged on the Project so important areas and time periods of activity can be avoided. In terms of post-construction, the Wetland Offsetting Program has been developed to address losses caused by the Project, with a process described in the response to IR IAAC-R2-13 for participation of Indigenous groups. The responses to Part d-iv and d-vii describe the measures developed to address access issues. Accommodations to address potential effects to harvesting sites will be considered as part of the Section 35 Consultation process.

vii. **Indigenous involvement in any archaeological work and chance find procedures**

In the Fall of 2022, Manitoba initiated quarterly meetings with the Indigenous groups potentially most affected by the proposed Project, and will continue to meet on a quarterly basis, to discuss community concerns related to heritage resources. Manitoba's intent for initiating these meeting was to develop a Project Heritage Resource Planning Group to begin project planning related to heritage in advance of forming the EAC.

Several heritage resource planning meetings with the Heritage Resource Planning Group have taken place after its completion and have included participation and attendance of Indigenous group members and/or their representatives. Meetings to provide heritage resource updates to communities were held on September 29, 2022, January 24, 2023, April 27, 2023, and July 25, 2023. These meetings also provided opportunities to discuss other heritage resource concerns, and the need for their consideration and/or protection as part of Project activities. Meetings on January 24, 2023, April 27, 2023, and July 25, 2023, were also aimed to gather input to assist in defining procedures and process for communicating with communities should a find occur. These meetings were meant to provide opportunity for the potentially most affected communities to work with Manitoba Transportation and Infrastructure on developing these processes and expressing their viewpoints or concerns.

There may be an opportunity for the Heritage Resource Planning Group to become a sub-committee of the EAC, if the EAC chooses. Manitoba and the Heritage Resource Planning Group are working together to establish an agreed upon Heritage Resource protocol or process prior to construction, should the proposed Project proceed. In addition to the specific heritage training for Indigenous environmental monitors discussed above in IAAC-R3-06c-ii), Manitoba will also be developing a heritage training program for construction workers in regard to recognizing heritage resources and following protocols, with input from Indigenous groups, Manitoba Transportation and Infrastructure's heritage resource consultant, and Manitoba’s HRB.

Past Activities

In terms of past Indigenous involvement in any archaeological work, Indigenous group members participated in the 2020 HRIA investigations, and the 2020 Pre-Construction Surveys. During the HRIA along the north shore of Lake St. Martin, Indigenous group members were brought to the site via helicopter to observe archaeologists on site. During the HRIA pedestrian survey and shovel testing on the southern half of the proposed channel, a member of Dauphin River First Nation worked with Project archaeologists from August to October 2020. During this period, Manitoba Transportation and Infrastructure and Indigenous group members who are a part of the IRTC met with Project archaeologists to discuss progress.

Upcoming Opportunities

Upcoming opportunities exist for Indigenous participation in heritage resources activities. A key component will be continued participation on the Project Heritage Resource Planning Group and/or EAC, as results of ongoing activities will be presented, and any issues of concern will be discussed. Other opportunities include heritage resources training, the pre-construction heritage investigations Manitoba Transportation and Infrastructure is doing to accommodate requests by Indigenous groups, construction compliance monitoring, and the development of an additional procedure for human remains with the Project Heritage Resource Planning Group.

Training Program

Through heritage resource planning meetings, Manitoba Transportation and Infrastructure heard requests for Indigenous groups to participate in heritage monitoring and to receive associated training for these activities. In response, Manitoba Transportation and Infrastructure Manitoba Transportation and Infrastructure will provide heritage training to equip Indigenous group monitors to be able to identify heritage resources that may be found during construction activities (chance finds) as well as understand and apply the protocols regarding the protection of artifacts or removal of and handling of artifacts as described in the HRPP.

The training will consist of both classroom and field components to provide tangible heritage resource field experience associated with construction (i.e., excavation). The training is intended to also introduce the HRB permitting and applications process, artifact identification, recovery, and analysis, site and artifact photography, and necessary reporting requirements to those who participate in the programs.

Volume 4, Section 9.6.4 of the Project EIS states “Orientation for Project staff working in construction areas will include heritage resource awareness and training including the nature of heritage resources and the management of any resources encountered.” Table R2-29-1 states “Manitoba will be developing a heritage training program for construction workers in regard to recognizing heritage resources and following protocols, with input from Indigenous groups, Manitoba's heritage resource consultant, and Manitoba’s HRB.”

Pre-construction Heritage Investigations

In response to feedback received from Indigenous groups in recent heritage-related discussions, Manitoba Transportation and Infrastructure has developed three programs that will allow further investigation of heritage sites and participation of Indigenous groups:

1. HRIA of LSMOC Distribution Line.

   The proposed Manitoba Hydro distribution line to provide power to the LSMOC was largely not accessible for a pedestrian survey in 2020 due to heavily saturated soils and standing water preventing accurate shovel testing. Manitoba Infrastructure and Transportation is planning to revisit the area to further investigate the site to determine whether heritage resources are present. The HRIA will be conducted using archaeological field techniques of pedestrian survey and shovel testing. Indigenous monitors will be invited to participate in this program and their honoraria and general expenses will be covered by Manitoba Transportation and Infrastructure as per established Manitoba Transportation and Infrastructure rates.

2. Heritage Survey of Snake Island and Lake St Martin Narrows.

   Indigenous groups have voiced concerns that the Lake St Martin “Narrows” and Snake Island contain heritage resources. These locations are said to have been a part of oral histories of the area. Manitoba Infrastructure and Transportation has proposed conducting a heritage survey to identify and record any heritage resources at those locations. Indigenous monitors will be invited to participate in this program and their honoraria and general expenses will be covered by Manitoba Infrastructure and Transportation as per established Manitoba Infrastructure and Transportation rates.

3. Site Inventory of Burials Located on Indigenous Community Lands at Lake St Martin.

   Indigenous groups have expressed concerns about burial sites located at their community lands and requested they be added to HRB’s archaeological site registry. Manitoba Infrastructure and Transportation has proposed further investigation of this area and to guide archaeologists to the known burial sites, Lake St. Martin Knowledge Keepers will be invited to participate. The Knowledge Keepers will be instrumental in providing guidance and direction to the archaeologists preserved.

Construction Compliance Monitors

Indigenous monitors trained through Manitoba Infrastructure and Transportation’s heritage training program will be provided with opportunities and resources to participate in construction compliance monitoring through the EAC (if desired by Indigenous groups). Construction compliance monitoring by the EAC is expected to consist of on-site, third-party monitoring by local community members. Manitoba Infrastructure and Transportation expects trained heritage monitors will be selected to be on-site to identify and protect heritage resources. Monitors will take extra measures to inspect soil layers within the construction area and enact the Chance Find procedure if heritage resources are encountered (as per subsections 5.2 and 5.3 of the HRPP).

Chance Find Protocols

Should previously unrecorded cultural or heritage resources be encountered during site preparation and construction, Manitoba Transportation and Infrastructure will follow applicable provincial legislation and protocols established by the HRB. The HRB will be informed immediately. Protective barriers will be placed around the site and construction will cease in the immediate vicinity until the HRB provides instruction. Manitoba Transportation and Infrastructure will take direction from the HRB regarding informing Indigenous groups about a chance find and involving Indigenous groups in mitigation of cultural or heritage resources, as described in the HRPP.

Additional Procedure for Human Remains

In addition to subsection 5.3.1 of the HRPP that outlines the procedure in the event that human remains are found during construction, Manitoba Infrastructure and Transportation has been discussing with Indigenous groups at the heritage resource planning meetings the additional steps that will be developed to notify communities and facilitate Indigenous ceremonies. The following process describes how Indigenous groups will be involved if case human remains are found:

- Once the remains are deemed non-forensic by the Royal Canadian Mounted Police, community appointed heritage resource representatives will first be notified by phone of the find and ceremony arrangements will be coordinated as required.
- Following the initial phone call, Manitoba Infrastructure and Transportation will send out Letters of Notification immediately to community leaders with exact locations and any further details provided by the Project archaeologist and/or HRB.
- Once arrangements for ceremony have been finalized, the appropriate interested parties will be given an opportunity to conduct a ceremony according to their tradition.
- After archaeological work has commenced, the affected communities will have the opportunity to make recommendations with regard to further analysis, repatriation site, potential memorial structures, and matter of this kind.

References

Golder Associates Ltd. 2018. "Interlake Reserves Tribal Council October Phase 1 Traditional Land Use and Traditional Knowledge Report." Unpublished Manuscript.

LSMFN (Lake St. Martin First Nation). 2021. Lake St. Matin Traditional Knowledge and Resource Use Study.

Olson and Firelight Research Inc., R. 2020. Interlake Reserves Tribal Council Traditional Knowledge and Use Study Specific to MTI’s Proposed Lake Manitoba and Lake St. Martin Outlet Channels Project.

Peguis First Nation. 2022. Lake Manitoba and Lake St. Martin Channel Project. Final Traditional Land and Resource Use Study: Land and Occupancy Report. April 2022.

QUESTION IAAC-R3-07

Referenced Round 2 IR(s): IAAC-R2-29

Expert Dept. or group: Dauphin River First Nation
Fisher River Cree Nation
IAAC
Interlake Reserves Tribal Council
Kinonjeoshtegon First Nation
Lake Manitoba First Nation
Lake St. Martin First Nation
Little Saskatchewan First Nation
Peguis First Nation
Pinaymootang First Nation
Poplar River First Nation
Sagkeeng Anicinabe First Nation
Sandy Bay Ojibway First Nation

EIS Guideline Reference: 7.1.10 Indigenous Peoples

7.3.3 Indigenous Peoples

Context and Rationale

Multiple Indigenous groups conducted Rights Impact Assessments and Socio-Economic Wellbeing Studies to document potential project impacts on their Indigenous rights, wellbeing, and way of life.

In response to IAAC-R2-29, the Proponent provided Table IAAC-R2-29-1 that summarizes available information for each Indigenous group regarding current and future availability of country foods; water quality (drinking, recreational and cultural uses); mental and social well- being; economic conditions; use of navigable waters; food security; and other topics such as health care systems, cultural continuity, employment, increased population, cost of living, transportation delays, or other factors where they were brought forward by Indigenous groups. This table presents new information that supports the understanding of how the Project impacts Indigenous rights including through an understanding of the effects to the biological and physical conditions that support the exercise of rights. Fisher River Cree Nation (FRCN) indicated that Table IAAC-R2-29-1 is of unreasonable size for review, and requested a summary analysis with examples of key issues and unique issues raised by Indigenous groups. A summary would also support IAAC and federal authorities' analysis of the information provided.

Question IAAC-R3-07
October 27, 2023

FRCN noted that their specific Aboriginal and treaty rights have not been identified or discussed by the Proponent. As a result, the potential impacts of the Project on FRCN's specific uses and occupations of lands and resources have not been adequately assessed. FRCN noted that they are a treaty five First Nation with roots in Norway House and York Factory, and therefore may have different Aboriginal and treaty rights than the treaty 2 First Nations located within the Project's Regional Assessment Area (RAA). For example, Game Hunting Areas 21 and 21A which surround FRCN are closed to all moose hunting. For FRCN members who have relied on moose for meat and cultural uses, the loss of habitat which may further delay the recovery of the moose population is an important potential cumulative impact. This potential impact may be different for other Indigenous groups if they have the opportunity to hunt moose in other areas. This is one example of how priorities and potential impacts on Indigenous rights may differ between communities.

Little Saskatchewan First Nation (LSFN) indicated that the Rights Impact Assessments and Socio-Economic Wellbeing Studies serve as a concrete articulation of their Indigenous Knowledge which must be meaningfully included in the assessments of the potential effects of the Project. LSFN noted that the Proponent referenced these studies in their Round 2 IR responses; however, these references do not indicate meaningful consideration of concerns or integration of the referenced information into the planning and design of the Project.

The Interlake Reserves Tribal Council, Sandy Bay Ojibway First Nation, Pinaymootang First Nation, and Sagkeeng Anicinabe First Nation further noted that the Proponent has not indicated how engagement data has informed changes or revisions to the information provided, or how the Proponent has ensured meaningful integration of Indigenous perspectives into project processes and documentation.

The Interlake Reserves Tribal Council (IRTC) raised concerns about the lack of mitigations for effects to cultural continuity. They noted that the overarching socio-economic status and wellbeing of the IRTC member Nations will be affected by the reductions in the availability of culturally important foods and medicines, fish, and wildlife species, loss of access to preferred harvesting areas, and the resulting impacts to knowledge transmission, sense of place, and cultural identity. The Rights Impact Assessments echo this concern and note that the connection to the land and cultural continuity is an integral element of Indigenous groups' way of life.

Rights Impact Assessments provided by Indigenous groups discuss changes to the ability to safely access preferred fishing areas and efficacy of fishing due to project-related changes in water flow currents that affect ice-depth patterns. Lake St. Martin First Nation identified priority ice fishing times to be during first and last ice in the fall and spring, respectively. The IRTC, Peguis First Nation, Pinaymootang First Nation, and Poplar River First Nation raised concerns about the ability to ice fish due to alterations to water levels resulting in shallow waters during the winter, changes to water freeze levels/ice formation, effects to gill fish nets, and increased danger of ice fishing. Discussions related to ice management are currently focused on ice conditions and jamming within the channels and do not provide discussion of changes to ice conditions related to ice fishing. The Agency understands that the Proponent has provided an ice Management plan (IMP); it is important to understand the intersection of the IMP with winter operation of the outlet channels and impacts to Indigenous groups' fishing rights.

Question IAAC-R3-07
October 27, 2023

Information Requests

a. Discuss any distinctions between the Aboriginal and treaty rights of all Indigenous groups engaged on the Project.

b. Update the assessment of impacts on the rights of each Indigenous group engaged on the Project, using the information in the Rights Impact Assessments, Socio-Economic Wellbeing Studies, and comments provided in response to Round 2 Information Requests.

c. Indicate how all Indigenous input and knowledge collected during engagement processes has informed or influenced changes and revisions to project documentation such as Environmental Management Plans and information request responses.

d. Describe how Indigenous input and knowledge has been incorporated into mitigation and adaptive management measures, providing specific examples for each Indigenous group.

e. Provide a summary analysis of Table R2-29-1, including specific examples of key issues for each Indigenous group, and an assessment of common and unique issues raised by Indigenous groups.

f. Discuss Project potential effects to cultural continuity, including knowledge transmission, sense of place, and cultural identity, and provide mitigation, monitoring, and follow-up measures related to these effects.

g. Discuss Project potential effects to ice fishing and provide mitigation, monitoring, and follow-up measures related to these effects.

Response IAAC-R3-07

Preamble

Manitoba Transportation and Infrastructure has, through its ongoing engagement and consultation with Indigenous groups and material prepared in support of the environmental assessment (EA) of the Project, acknowledged and assessed potential effects on Indigenous rights. The first such assessment was provided in the Project Environmental Impact Statement (EIS) Volume 4 Section 10.4 (Aboriginal and Treaty Rights), which was supplemented by later information such as the May 2022 response to Information Request (IR) IAAC-R1-122 and the July 2023 response to IAAC-R2-29, as identified in this IR. As well, Manitoba Transportation and Infrastructure's understanding of the scope of consultation and engagement arising out of potential impacts of the Project on Aboriginal and Treaty rights is outlined in the Indigenous Consultation and Stakeholder Engagement Report (ICSER), provided in Attachment 2 of the June 2022 supplemental information response to IAAC IRs.

Question IAAC-R3-07
October 27, 2023

Manitoba Transportation and Infrastructure welcomes the recent provision of Rights Impact Assessments (RIAs) from Interlake Reserves Tribal Council (IRTC) Nations with information representative of their understanding, views and conclusions regarding effects on their rights. The responses below address the information in the RIAs in the context of the EA work that has already been done for the Project. As previously stated, Manitoba Transportation and Infrastructure will continue to engage with Indigenous groups to reflect on and respond to concerns, issues and insights of consequence to the Project and Indigenous groups' interests throughout the life of the Project.

Before proceeding below with a response to each of the specific questions, following review of the RIAs, Manitoba Transportation and Infrastructure wishes to clarify some details that arise in those reports regarding Project operation and mitigation.

Regarding Project operation, as mentioned in previous filings, the Project's purpose is to assist the management of floods; specifically, to reduce lake levels, reduce area flooded and reduce the duration of time in which areas are flooded. The RIAs make repeated mention of occasional if not continued exceedance of the flood management target for Lake St. Martin of 801 feet (244.15 metres) above sea level during Project flood operation, which implies that the Project will cause flooding or worsen flooding. Such an interpretation is incorrect. The Project will, in its operations, seek to maintain the target lake elevation (EL) to the extent possible; however, depending on the severity of the flood, that may not always be possible. In such instances, the Project still offers a flood management benefit by both reducing lake level compared to what the level would have been without the Project, and reducing the period of time that flood levels would occur. Manitoba Transportation and Infrastructure notes various occasions in the RIAs where effects on rights are specifically identified as arising due to flooding, effects that would be ameliorated by the Project.

Manitoba Transportation and Infrastructure also wishes to reiterate that the Project does not exacerbate the episodic nature of lake level fluctuations, and that conduits of flood waters downstream already exist in the form of the two interconnecting rivers (Fairford and Dauphin), which already transport floodwaters and their constituents, including "contaminants."

Regarding Project mitigation in the quantification of "Estimated efficacy of proposed mitigation" that appears in each RIA in Section 4, Table 10 (Evaluation of Potential Effectiveness of Proposed Mitigation, Follow-up and Offsetting Measures for Addressing Project Impacts on Rights), Manitoba Transportation and Infrastructure is unaware of the basis of these values (an explanation is not provided), is unaware of such an approach for other Project applications and in any event, disagrees with conclusions indicative of no or low efficacy (e.g. 0 percent (%), 20%) of proposed mitigations. In its Project engineering design and assessment, Manitoba Transportation and Infrastructure has committed to mitigation and management plans that it views as appropriate, attainable, and reflective of measures that offer reasonable and effective means to manage Project effects.

Question IAAC-R3-07
October 27, 2023

a. **Discuss any distinctions between the Aboriginal and treaty rights of all Indigenous groups engaged on the Project.**

In attempting to determine how potential or established Aboriginal and treaty rights may interact with the Project, Manitoba Transportation and Infrastructure has relied on the EIS Guidelines for the Project (CEA Agency 2018), which cite the *Updated Guidelines for Federal Officials to Fulfill the Duty to Consult* (AANDC 2011), for definitions of Aboriginal rights and treaty rights. In these documents, Aboriginal rights are defined as follows:

> *Practices, traditions and customs integral to the distinctive culture of the Aboriginal group claiming the right that exist[ed] prior to contact with the Europeans (Van de Peet). In the context of Métis groups, Aboriginal rights means practices, traditions, and customs integral to the distinctive culture of the Métis group that existed prior to effective European control, that is, prior to the time when Europeans effectively established political and legal control in the claimed area (Powley). Generally, these rights are fact and site specific. For greater certainty, the Guidelines also define Aboriginal title as an Aboriginal right (AANDC 2011:61).*

Treaty rights are defined as follows:

> *Rights that are defined by the terms of a historic treaty, rights set out in a modern land claims agreement or certain aspects of some self-government agreements. In general, Treaties (historic and modern) are characterized by the intention to create obligations, the presence of mutually binding obligations and a measure of solemnity (Simon, Sioui). A treaty right may be an expressed term in a treaty, an implied term or reasonably incidental to the expressed treaty right. The scope of treaty rights will be determined by their wording, which must be interpreted in accordance with the principles enunciated by the Supreme Court of Canada (Badger 1996, Sundown 1999, Marshall 1999 (AANDC 2011:62).*

Manitoba Transportation and Infrastructure recognizes that Indigenous groups may exercise Aboriginal and treaty rights on unoccupied Crown land or other lands to which there is a right of access to exercise these rights. All the First Nations engaged for the Project are signatories to Treaties 1, 2 or 5, which provide historically defined treaty rights. Indigenous groups that are not signatories to a Treaty consist of the Manitoba Métis Federation and the residents of the identified Northern Affairs Communities (NACs). As stated in Volume 4, Section 10.4 of the Project EIS, Manitoba Transportation and Infrastructure understands that treaty rights have been codified under *The Manitoba Natural Resources Transfer Act (1930)* (MNRTA), and these rights have been recognized and affirmed by Section 35 of *The Constitution Act*, 1982. The Indigenous rights of Métis people have been recognized by the Supreme Court of Canada (SCC) in the *Goodon* and *Powley* decisions and formalized in the *Agreement on Métis Natural Resource Harvesting* with Manitoba (Government of Manitoba 2012) and the *Framework Agreement on Advancing Reconciliation* with Canada (CIRNAC 2016). *The Northern Affairs Act* provides the framework through which designated northern communities located within an unorganized territory of Manitoba receive municipal services and coordinates interprovincial and interjurisdictional initiatives, policies and strategies affecting

northern Manitoba. Eleven of the Indigenous groups engaged on the Project are designated Northern Affairs Communities under this Act.

Following Impact Assessment Agency of Canada, IAAC Guidance[12], Manitoba Transportation and Infrastructure acknowledges that the environmental impact assessment process is not a rights determination process, and the assessment of potential Project effects on Aboriginal and treaty rights is not intended to define or delimit existing or asserted rights of Indigenous groups engaged on the Project. The consideration of Aboriginal and treaty rights in Volume 4, Section 10.4 of the Project EIS relied on information obtained through the Project's Indigenous consultation and engagement process and publicly available sources to document the assertion of potential or established Aboriginal and treaty rights and the perspectives of Indigenous groups on potential Project interactions with the ability to exercise Aboriginal or treaty rights. The Crown has the ultimate responsibility to fulfill the duty to consult and, if warranted, provide accommodations.

Potential or established Aboriginal and treaty rights identified by Indigenous groups through the consultation and engagement process for the Project have been incorporated into the responses to IR IAAC-R1-122, Table IAAC-122-1 and IR IAAC-R2-29, Table IAAC-R2-29-1 as appropriate. These are summarized in Table IAAC-R3-07-1, below:

Table IAAC-R3-07-1 Aboriginal and Treaty Rights Identified by Indigenous Groups

Aboriginal and Rights	Indigenous groups
Impacts on hunting and trapping due to Project impacts on wildlife, including SAR species, (migration, habitat population).	• Berens River First Nation • Dauphin River First Nation • Fisher River Cree Nation • Hollow Water First Nation • Lake St. Martin First Nation • The Manitoba Métis Federation • Misipawistik Cree Nation • Norway House Cree Nation • Pimicikamak Okimawin • Pinaymootang First Nation • Sagkeeng First Nation • Sandy Bay Ojibway First Nation
Impacts on hunting and harvesting rights, including access and navigation routes and conservation closures.	• Berens River First Nation • Dauphin River First Nation • Fisher River Cree Nation • Hollow Water First Nation • Lake St. Martin First Nation • The Manitoba Métis Federation

[12] *The Practitioner's Guide to the Impact Assessment Act.* Guidance: Assessment of Potential Impacts on the Rights of Indigenous Peoples. Available at: Guidance: Assessment of Potential Impacts on the Rights of Indigenous Peoples - Canada.ca

Aboriginal and Rights	Indigenous groups
	• Misipawistik Cree Nation • Norway House Cree Nation • Pimicikamak Okimawin • Pinaymootang First Nation • Sagkeeng First Nation • Sandy Bay Ojibway First Nation
Impacts to treaty and Indigenous traditional, cultural and treaty rights due to loss of wetlands.	• Fisher River Cree Nation • Lake St. Martin First Nation
Impacts on Indigenous and treaty rights to subsistence and commercial fishing due to effects on fish and fish habitat and changes to water flow and water quality, introduction of invasive species, nutrient loading and sedimentation.	• Dauphin River First Nation • Fisher River Cree Nation • Hollow Water First Nation • Kinonjeoshtegon First Nation • Lake Manitoba First Nation • Lake St. Martin First Nation • The Manitoba Métis Federation • Misipawistik Cree Nation • Norway House Cree Nation • Pimicikamak Okimawin • Peguis First Nation • Pinaymootang First Nation • Sagkeeng First Nation • Sandy Bay Ojibway First Nation • Tataskweyak Cree Nation
Impacts on Indigenous and treaty rights to harvest traditional plant foods and medicines.	• Dauphin River First Nation • Hollow Water First Nation • Kinonjeoshtegon First Nation • Lake Manitoba First Nation • Lake St. Martin First Nation • Little Saskatchewan First Nation • The Manitoba Métis Federation • Norway House Cree Nation • Pimicikamak Okimawin • Peguis First Nation • Pinaymootang First Nation • Sagkeeng First Nation • Sandy Bay Ojibway First Nation
Impacts to rights for trapping and gathering from the prohibition of trapping and harvesting at any time within the LAA that lies beyond the immediate Project construction area.	• Fisher River Cree Nation

Aboriginal and Rights	Indigenous groups
Impacts to treaty and Indigenous rights from instituting and enforcing a “no fishing” policy in the LAA for construction workers.	• Fisher River Cree Nation
Impacts to cultural continuity rights caused by the loss of ability to hunt moose and elk, due to the fact that meat cannot be shared among family and Elders and there is limited opportunity to teach children how to hunt moose.	• Dauphin River First Nation • Kinonjeoshtegon First Nation • Lake Manitoba First Nation • Lake St. Martin First Nation • Little Saskatchewan First Nation • Peguis First Nation • Pinaymootang First Nation
Impacts ontreaty and traditional use rights caused by water quality/water level impacts.	• Dauphin River First Nation • Kinonjeoshtegon First Nation • Fisher River Cree Nation • Hollow Water First Nation • Lake St. Martin First Nation • Lake Manitoba First Nation • Norway House Cree Nation • Peguis First Nation • Pimicikamak Okimawin • Pinaymootang First Nation • Sagkeeng First Nation • Sandy Bay Ojibway First Nation • Tataskweyak Cree Nation
Impacts to treaty and traditional use rights due to sediment levels and sediment quality in the Project area during construction, operation and maintenance activities causing effects to fish harvesting, drinking water quality, and impacts on reserve shoreline habitat and cultural and recreational use.	• Hollow Water First Nation • Kinonjeoshtegon First Nation • Lake Manitoba First Nation • Lake St. Martin First Nation • Peguis First Nation • Pinaymootang First Nation • Sagkeeng First Nation • Sandy Bay Ojibway First Nation • Tataskweyak Cree Nation
Impacts on traditional and treaty rights in terms of opening traditional and reserve lands for public access resulting in an impact to cultural and Aboriginal harvesting of herbs, medicines and culturally significant wildlife species for sustenance and aesthetic value due to construction of the access road and transmission line.	• Hollow Water First Nation • Lake St. Martin First Nation
Impacts to the right to fish, navigate, travel, and conduct recreation on ice.	• Poplar River First Nation

Aboriginal and Rights	Indigenous groups
Project's continuation of rights curtailment and a contribution to existing cumulative effects.	• Kinonjeoshtegon First Nation • Lake Manitoba First Nation • Pinaymootang First Nation • Sagkeeng First Nation • Sandy Bay Ojibway First Nation
Impacts to Indigenous harvesting rights caused by past water management operations, including the Fairford Control Structure past operations.	• Hollow Water First Nation • Lake St. Martin First Nation • Pinaymootang First nation • Sagkeeng First Nation
Impacts to the right to practice farming on treaty settlement lands.	• Dauphin River First Nation • Kinonjeoshtegon First Nation • Lake Manitoba First Nation • Lake St. Martin First Nation • Little Saskatchewan First Nation • Peguis First Nation • Pinaymootang First Nation
Impacts to traditional use and treaty rights caused by the alteration of the carbonate aquifer in the vicinity of LMOC and LSMOC.	• Fisher River Cree Nation • Hollow water Fist Nation • Lake St. Martin First Nation

b. **Update the assessment of impacts on the rights of each Indigenous group engaged on the Project, using the information in the Rights Impact Assessments, Socio-Economic Wellbeing Studies, and comments provided in response to Round 2 Information Requests.**

The assessment of potential effects of the Project on Indigenous peoples, including impacts to potential or established Aboriginal and treaty rights, was conducted in accordance with applicable federal legislation and guidelines in place at the commencement of the EIS for the Project, including *The Canadian Environmental Assessment Act, 2012* (CEAA) (CEA Agency 2015) and *The Project-specific Guidelines for the Preparation of an Environmental Impact Statement Pursuant to the Canadian Environmental Assessment Act, 2012* (EIS Guidelines) issued by the former Canadian Environmental Assessment Agency (CEA Agency) (CEA Agency 2018). This assessment was also informed by IAAC guidance, including *Technical Guidelines for assessing the Current Use of Lands and Resources for Traditional Purposes under CEAA 2012* (CEA Agency 2015) and *Considering Aboriginal Traditional Knowledge in Environmental Assessments Conducted Under CEAA – Interim Principles* (CEA Agency 2014).

Manitoba Transportation and Infrastructure recognizes that Indigenous groups may exercise Aboriginal and treaty rights on unoccupied Crown land or other lands to which there is a right of access to exercise these rights. As stated in Volume 4, Section 10.4 of the Project EIS, Manitoba Transportation and Infrastructure understands that treaty rights have been codified under the MNRTA, and these rights have been recognized and affirmed by Section 35 of the *Constitution Act*, 1982. The Indigenous rights of Métis people have been recognized by the SCC in the *Goodon* and *Powley* decisions and formalized in the *Agreement on Métis Natural Resource Harvesting* with Manitoba (Government of Manitoba 2012) and the *Framework Agreement on Advancing Reconciliation* with Canada (CIRNAC 2016). *The Northern Affairs Act* provides the framework through which designated northern communities located within an unorganized territory of Manitoba receive municipal services and coordinates interprovincial and interjurisdictional initiatives, policies and strategies affecting northern Manitoba. Eleven of the Indigenous groups engaged on the Project are designated Northern Affairs Communities under this Act.

Available Indigenous Knowledge (IK) shared by Indigenous groups engaged on the Project was considered in Volume 4, Section 10.4 of the EIS for the Project and contributed to the assessment of potential effects of the Project on potential or established Aboriginal and treaty rights. Information shared regarding the nature and extent of Aboriginal and treaty rights was reviewed with respect to loss or alteration of resources relied on to exercise a right; restricted or altered ability to access sites and areas associated with the exercise of a right; alteration of specific areas of cultural importance where rights are exercised; sensory disturbances or other changes which detract from use of the area or lead to avoidance of the area associated with the exercise of rights; indirect effects on cultural traditions, laws and governance systems that inform the way rights are exercised; and change in disposition of Crown land which may affect the ability to exercise rights.

Following the submission of the final version of EIS for the Project in March 2020, Manitoba Transportation and Infrastructure continued to review additional information regarding effects to potential or established Aboriginal and treaty rights provided by Indigenous groups. This information was considered against the results of the EIS for the Project and incorporated into the responses to IR IAAC-R1-122, Table IAAC-R1-122-1 and IR IAAC-R2-29, Table IAAC-R2-29-1, as appropriate.

In September 2023, Manitoba Transportation and Infrastructure received final drafts of RIA and Socio-economic and Wellbeing (SEWB) studies from Dauphin River First Nation, Kinonjeoshtegon First Nation, Lake Manitoba First Nation, Lake St. Martin First Nation, Little Saskatchewan First Nation, Peguis First Nation, and Pinaymootang First Nation. These have been reviewed and the main conclusions from each study are summarized below.

Dauphin River First Nation

Dauphin River First Nation provided its draft SEWB study and RIA to Manitoba Transportation and Infrastructure in June 2023 and final versions of the SEWB and RIA in September 2023. The draft SEWB study was substantially complete and was reviewed and information incorporated into Manitoba Transportation and Infrastructure's responses to Round 2 IRs, notably response to

IR IAAC-R2-29. Meanwhile, the final version of the RIA represented a considerable progression of the draft RIA. Relevant information from the draft RIA was incorporated where appropriate into the Round 2 IR responses. The main conclusions of the final version of both the SEWB study and RIA are summarized below. How this information has been considered in the assessment of effects on Aboriginal and treaty rights is presented below under the heading “Potential Effects on Aboriginal and Treaty Rights”.

Dauphin River First Nation Socio-economic and Well-being Study

The SEWB study submitted by Dauphin River First Nation states that the SEWB study should be reviewed and understood in consideration of the parallel RIA. The SEWB study explains that Dauphin River First Nation social, economic, cultural, and community health and wellness baseline conditions are below standard condition. The SEWB study identifies six valued components (VCs) that were selected as representative of the critical conditions or elements necessary for the continued social, cultural and economic well-being of Dauphin River First Nation. The SEWB study outlines the extent to which each of these VCs were impacted by the 2011 and 2014 floods and identifies Project-specific interactions. The SEWB study concludes that Project-specific interactions include:

- **Housing and Infrastructure:** Access to Dauphin River First Nation may be affected by submersion of key roads and other flooding related effects. Existing community infrastructure, buildings, and housing have been highly impacted by past flooding events – the Project could improve these conditions through facilitating construction of housing and infrastructure and the provision of land.
- **Economy and Employment:** The Project has the potential to address issues of unemployment, underemployment, and low income by providing contracts, training, and employment tailored to Dauphin River First Nation capacity. The Project may negatively impact traditional resources, further reducing the viability of traditional economies.
- **Education and Training:** The Project could interrupt schooling if residents are required to relocate due to further damage to existing housing and building stocks.
- **Culture:** Potential Project impacts to traditional activities, such as harvesting, could further reduce community engagement, disrupt knowledge transmission, and alienate the community from their culture, land, and one another.
- **Food Security:** The Project could further reduce the availability and access to traditionally harvested foods and make access to store-bought foods more difficult.
- **Community Health and Mental Wellness:** The Project has the potential to increase the presence of drugs and alcohol in the community and may also indirectly increase substance dependence by exacerbating existing vulnerabilities and eroding community strengths. Project-related increases in addictions and crime, reduced access to traditional and healthy foods, and increased stress on community housing and infrastructure could all decrease community wellness.

Question IAAC-R3-07
October 27, 2023

Dauphin River First Nation Rights Impact Assessment

The RIA submitted by Dauphin River First Nation identifies potential Project effects to two types of Aboriginal and treaty rights: harvesting and farming rights and way of life rights. Harvesting and farming rights as defined by Dauphin River First Nation consist of rights in respect of water, fishing, hunting, trapping, gathering of plant foods and medicines, and farming. Way of life rights as defined by Dauphin River First Nation consist of rights in respect of cultural continuity, the opportunity to derive a reasonable livelihood from rights-based activities and practices, and stewardship of lands, waters, and resources within Dauphin River First Nation's core territory. With respect to each of these rights, the RIA by Dauphin River First Nation has reached the following conclusions:

- **Water:** Dauphin River First Nation has determined that the Project will result in a moderate impact on rights related to water due to increased sediment and chemical nutrients exacerbating poor water quality, and changes to groundwater resulting from inundation and saturation of land.
- **Fishing:** Dauphin River First Nation has determined that the Project will have a high impact on rights related to fishing due to the effects of increased sediment on fish habitat and fish spawning; changes to fish habitat from reduced water depth and flow; diversion of migrating fish away from the Dauphin River; increased incidence algal blooms and eutrophication; impaired access and navigation at the Narrows; reduced shoreline access for fishing from Dauphin River First Nation reserve lands; decreased access to preferred fishing areas; reduced effectiveness of gillnet ice fishing for walleye (*Sander vitreus)*; and unpredictable water levels and current patterns that diminish the relevance of Indigenous knowledge relative for exercise of fishing rights.
- **Hunting:** Dauphin River First Nation has determined that the Project will have a moderate high impact on rights related to hunting due to the outlet channels bisecting Dauphin River First Nation territory and restricting access to preferred hunting areas previously accessible by foot and quad; habitat fragmentation in the vicinity of Big Buffalo Lake; effects on ungulate distribution and migration patterns from habitat loss and fragmentation; the outlet channels creating a barrier to ungulate crossing; and increased predation as a result of right-of-way clearing.
- **Trapping:** Dauphin River First Nation has determined that the Project will have a moderate impact on rights related to trapping due to reduction in muskrat (*Ondatra zibethicus)* as a result of flooding of muskrat dens; and elevated water levels and shoreline inundation causing loss of access to preferred trapping areas on Pineimuta Lake and south basin of Lake St. Martin.
- **Gathering Plant Foods and Medicines:** Dauphin River First Nation has determined that the Project will have a high impact on rights related to gathering plant foods and medicines due to loss of habitat resulting from water table saturation along the south basin of Lake St. Martin, north basin of Lake St. Martin, Dauphin River, and Lake Winnipeg; and loss of access to preferred plant harvesting areas along the south basin of Lake St. Martin due to elevated water levels and shoreline inundation.

- **Cultural Continuity:** Dauphin River First Nation has determined that the Project will have a high impact on rights related to cultural continuity due to decreased availability of culturally important plant medicines and foods, and fish and wildlife species necessary for cultural transmission; decrease in productive potential of preferred harvesting areas such as reduced success of moose (*Alces alces*) hunt; disruption of patterns of use of preferred harvesting areas linked to sense of place and cultural identity; avoidance of key cultural areas (notably water bodies) due to perceived risks from water quality; and loss of meaningful harvesting opportunities resulting in lost future opportunities to teach and transmit cultural knowledge and "way of life".
- **Reasonable Livelihood:** Dauphin River First Nation has determined that the Project will have a high impact on rights related to reasonable livelihood due to ecological effects that reduce the abundance of wildlife, plant medicine and foods, fish and farmlands; and impacts on lands for farming, gardening, fresh water, and other elements essential for a reasonable livelihood.
- **Stewardship:** Dauphin River First Nation has determined that the Project will have a high impact on rights related to stewardship due to federal and provincial exclusion of Dauphin River First Nation from decision-making role in respect of project approval, terms of project operation and project operational management.

Kinonjeoshtegon First Nation

Kinonjeoshtegon First Nation submitted its draft SEWB study and RIA to Manitoba Transportation and Infrastructure in June 2023 and final versions of the SEWB study and RIA in September 2023. The draft SEWB study was substantially complete and was reviewed and information incorporated into Manitoba Transportation and Infrastructure's responses to Round 2 IRs, notably the response to IAAC-R2-29. The final version of the RIA represented a considerable progression of the draft RIA. Relevant information from the draft RIA was incorporated where appropriate into the Round 2 IRs. The main conclusions of the final version of both the SEWB study and RIA are summarized below. How this information has been considered in the assessment of effects on Aboriginal and treaty rights is presented below under the heading "Potential Effects on Aboriginal and Treaty Rights."

Question IAAC-R3-07
October 27, 2023

Kinonjeoshtegon First Nation Socio-economic and Well-being Study

The SEWB study submitted by Kinonjeoshtegon First Nation states that the SEWB study should be reviewed and understood in consideration of the parallel RIA. The SEWB study explains that Kinonjeoshtegon First Nation social, economic, cultural, and community health and wellness baseline conditions are below standard condition. The SEWB study identifies six VCs that were selected as representative of the critical conditions or elements necessary for the continued social, cultural and economic well-being of Kinonjeoshtegon First Nation. The SEWB study outlines the extent to which each of these VCs were impacted by the 2011 and 2014 floods and identifies Project-specific interactions. The SEWB study concludes that Project-specific interactions include:

- **Housing and Infrastructure:** Access to Kinonjeoshtegon First Nation may be affected by submersion of key roads and other flooding related effects. Existing community infrastructure, buildings, and housing have been highly impacted by past flooding events – the Project could improve these conditions through facilitating construction of housing and infrastructure and the provision of land.
- **Economy and Employment:** The Project has the potential to address issues of unemployment, underemployment, and low income by providing contracts, training, and employment tailored to Kinonjeoshtegon First Nation capacity. The Project may negatively impact traditional resources, further reducing the viability of traditional economies.
- **Education and Training:** The Project could interrupt schooling if residents are required to relocate due to further damage to existing housing and building stocks.
- **Culture:** Potential Project impacts to traditional activities, such as harvesting, could further reduce community engagement, disrupt knowledge transmission, and alienate the community from their culture, land, and one another.
- **Food Security:** The Project could further reduce the availability and access to traditionally harvested foods and make access to store-bought foods more difficult.
- **Community Health and Mental Wellness:** The Project has the potential to increase the presence of drugs and alcohol in the community and may also indirectly increase substance dependence by exacerbating existing vulnerabilities and eroding community strengths. Project-related increases in addictions and crime, reduced access to traditional and healthy foods, and increased stress on community housing and infrastructure could all decrease community wellness.

Question IAAC-R3-07
October 27, 2023

Kinonjeoshtegon First Nation Rights Impact Assessment

The RIA submitted by Kinonjeoshtegon First Nation identifies potential Project effects to two types of Aboriginal and treaty rights: harvesting and farming rights and way of life rights. Harvesting and farming rights as defined by Kinonjeoshtegon First Nation consist of rights in respect of water, fishing, hunting, trapping, gathering of plant foods and medicines, and farming. Way of life rights as defined by Kinonjeoshtegon First Nation consist of rights in respect of cultural continuity, the opportunity to derive a reasonable livelihood from rights-based activities and practices, and stewardship of lands, waters, and resources within Kinonjeoshtegon First Nation's core territory. With respect to each of these rights, the RIA by Kinonjeoshtegon First Nation has reached the following conclusions:

- **Water:** Kinonjeoshtegon First Nation has determined that the Project will result in as moderate impact on rights related to water due to increased sediment and chemical nutrients exacerbating poor water quality, and changes to groundwater resulting from inundation and saturation of land.
- **Fishing:** Kinonjeoshtegon First Nation has determined that the Project will have a high impact on rights related to fishing due to the effects of increased sediment on fish habitat and fish spawning; changes to fish habitat from reduced water depth and flow; diversion of migrating fish away from the Dauphin River; increased incidence algal blooms and eutrophication; impaired access and navigation at the Narrows; decreased access to preferred fishing areas; reduced effectiveness of gillnet ice fishing for walleye; and unpredictable water levels and current patterns that diminish the relevance of Indigenous knowledge relative for exercise of fishing rights.
- **Hunting:** Kinonjeoshtegon First Nation has determined that the Project will have a moderate high impact on rights related to hunting due to the outlet channels bisecting Kinonjeoshtegon First Nation territory and restricting access to preferred hunting areas previously accessible by foot and quad; habitat fragmentation in the vicinity of Big Buffalo Lake; effects on ungulate distribution and migration patterns from habitat loss and fragmentation; the outlet channels creating a barrier to ungulate crossing; and increased predation as a result of right-of-way clearing.
- **Trapping:** Kinonjeoshtegon First Nation has determined that the Project will have a moderate impact on rights related to trapping due to reduction in muskrat as a result of flooding of muskrat dens; and elevated water levels and shoreline inundation causing loss of access to preferred trapping areas on Pineimuta Lake and south basin of Lake St. Martin.
- **Gathering Plant Foods and Medicines:** Kinonjeoshtegon First Nation has determined that the Project will have a high impact on rights related to gathering plant foods and medicines due to loss of habitat resulting from water table saturation along the south basin of Lake St. Martin, north basin of Lake St. Martin, Dauphin River, and Lake Winnipeg; and loss of access to preferred plant harvesting areas along the south basin of Lake St. Martin due to elevated water levels and shoreline inundation.
- **Farming and Gardening:** Kinonjeoshtegon First Nation has determined that the Project will have a high impact on rights related to farming and gardening due to reoccurring saturation of hay fields on Kinonjeoshtegon First Nation reserve lands as a result of Project-related flood events.

- **Cultural Continuity:** Kinonjeoshtegon First Nation has determined that the Project will have a high impact on rights related to cultural continuity due to decreased availability of culturally important plant medicines and foods, and fish and wildlife species necessary for cultural transmission; decrease in productive potential of preferred harvesting areas such as reduced success of moose hunt; disruption of patterns of use of preferred harvesting areas linked to sense of place and cultural identity; avoidance of key cultural areas (notably water bodies) due to perceived risks from water quality; and loss of meaningful harvesting opportunities resulting in lost future opportunities to teach and transmit cultural knowledge and "way of life".
- **Reasonable Livelihood:** Kinonjeoshtegon First Nation has determined that the Project will have a high impact on rights related to reasonable livelihood due to ecological effects that reduce the abundance of wildlife, plant medicine and foods, fish and farmlands; and impacts on lands for farming, gardening, fresh water, and other elements essential for a reasonable livelihood.
- **Stewardship:** Kinonjeoshtegon First Nation has determined that the Project will have a high impact on rights related to stewardship due to federal and provincial exclusion of Kinonjeoshtegon First Nation from decision-making role in respect of Project approval, terms of project operation and project operational management.

Lake Manitoba First Nation

Lake Manitoba First Nation provided its draft SEWB study and RIA to Manitoba Transportation and Infrastructure in June 2023 and final versions of the SEWB and RIA in September 2023. The draft SEWB study was substantially complete and was reviewed and information incorporated into Manitoba Transportation and Infrastructure's responses to Round 2 IRs, notably response to IAAC-R2-29. Meanwhile, the final version of the RIA represented a considerable progression of the draft RIA. Relevant information from the draft RIA was incorporated where appropriate into the Round 2 IR responses. The main conclusions of the final version of both the SEWB study and RIA are summarized below. How this information has been considered in the assessment of effects on Aboriginal and treaty rights is presented below under the heading "Potential Effects on Aboriginal and Treaty Rights."

Question IAAC-R3-07
October 27, 2023

Lake Manitoba First Nation Socio-economic and Well-being Study

The SEWB study submitted by Lake Manitoba First Nation states that the SEWB study should be reviewed and understood in consideration of the parallel RIA. The SEWB study explains that Lake Manitoba First Nation social, economic, cultural, and community health and wellness baseline conditions are below standard condition. The SEWB study identifies six VCs that were selected as representative of the critical conditions or elements necessary for the continued social, cultural and economic well-being of Lake Manitoba First Nation. The SEWB study outlines the extent to which each of these VCs were impacted by the 2011 and 2014 floods and identifies Project-specific interactions. The SEWB concludes that Project-specific interactions include:

- **Housing and Infrastructure:** Access to Lake Manitoba First Nation may be affected by submersion of key roads and other flooding related effects. Existing community infrastructure, buildings, and housing have been highly impacted by past flooding events – the Project could improve these conditions through facilitating construction of housing and infrastructure and the provision of land.
- **Economy and Employment:** The Project has the potential to address issues of unemployment, underemployment, and low income by providing contracts, training, and employment tailored to Lake Manitoba First Nation capacity. The Project may negatively impact traditional resources, further reducing the viability of traditional economies.
- **Education and Training:** The Project could interrupt schooling if residents are required to relocate due to further damage to existing housing and building stocks.
- **Culture:** Potential Project impacts to traditional activities, such as harvesting, could further reduce community engagement, disrupt knowledge transmission, and alienate the community from their culture, land, and one another.
- **Food Security:** The Project could further reduce the availability and access to traditionally harvested foods and make access to store-bought foods more difficult.
- **Community Health and Mental Wellness:** The Project has the potential to increase the presence of drugs and alcohol in the community and may also indirectly increase substance dependence by exacerbating existing vulnerabilities and eroding community strengths. Project-related increases in addictions and crime, reduced access to traditional and healthy foods, and increased stress on community housing and infrastructure could all decrease community wellness.

Lake Manitoba First Nation Rights Impact Assessment

The RIA submitted by Lake Manitoba First Nation identifies potential Project effects to two types of Aboriginal and treaty rights: harvesting and farming rights and way of life rights. Harvesting and farming rights as defined by Lake Manitoba First Nation consist of rights in respect of water, fishing, hunting, trapping, gathering of plant foods and medicines, and farming. Way of life rights as defined by Lake Manitoba First Nation consist of rights in respect of cultural continuity, the opportunity to derive a reasonable livelihood from rights-based activities and practices, and stewardship of lands, waters, and resources within Lake Manitoba First Nation's core territory. With respect to each of these rights, the RIA by Lake Manitoba First Nation has reached the following conclusions:

- **Water:** Lake Manitoba First Nation has determined that the Project will result in as moderate impact on rights related to water due to increased sediment and chemical nutrients exacerbating poor water quality, and changes to groundwater resulting from inundation and saturation of land.
- **Fishing:** Lake Manitoba First Nation has determined that the Project will have a high impact on rights related to fishing due to the effects of increased sediment on fish habitat and fish spawning; changes to fish habitat from reduced water depth and flow; diversion of migrating fish away from the Dauphin River; increased incidence algal blooms and eutrophication; impaired access and navigation at the Narrows; reduced shoreline access for fishing from Lake Manitoba First Nation reserve lands; decreased access to preferred fishing areas; reduced effectiveness of gillnet ice fishing for walleye; and unpredictable water levels and current patterns that diminish the relevance of Indigenous knowledge relative for exercise of fishing rights.
- **Hunting:** Lake Manitoba First Nation has determined that the Project will have a moderate high impact on rights related to hunting due to the outlet channels bisecting Lake Manitoba First Nation territory and restricting access to preferred hunting areas previously accessible by foot and quad; habitat fragmentation in the vicinity of Big Buffalo Lake; effects on ungulate distribution and migration patterns from habitat loss and fragmentation; the outlet channels creating a barrier to ungulate crossing; and increased predation as a result of right-of-way clearing.
- **Trapping:** Lake Manitoba First Nation has determined that the Project will have a moderate impact on rights related to trapping due to reduction in muskrat as a result of flooding of muskrat dens; and elevated water levels and shoreline inundation causing loss of access to preferred trapping areas on Pineimuta Lake and south basin of Lake St. Martin.
- **Gathering Plant Foods and Medicines:** Lake Manitoba First Nation has determined that the Project will have a high impact on rights related to gathering plant foods and medicines due to loss of habitat resulting from water table saturation along the south basin of Lake St. Martin, north basin of Lake St. Martin, Dauphin River, and Lake Winnipeg; and loss of access to preferred plant harvesting areas along the south basin of Lake St. Martin due to elevated water levels and shoreline inundation.
- **Farming and Gardening:** Lake Manitoba First Nation has determined that the Project will have a high impact on rights related to farming and gardening due to reoccurring saturation of hay fields on Lake Manitoba First Nation reserve lands as a result of Project-related flood events.

- **Cultural Continuity:** Lake Manitoba First Nation has determined that the Project will have a high impact on rights related to cultural continuity due to decreased availability of culturally important plant medicines and foods, and fish and wildlife species necessary for cultural transmission; decrease in productive potential of preferred harvesting areas such as reduced success of moose hunt; disruption of patterns of use of preferred harvesting areas linked to sense of place and cultural identity; avoidance of key cultural areas (notably water bodies) due to perceived risks from water quality; and loss of meaningful harvesting opportunities resulting in lost future opportunities to teach and transmit cultural knowledge and "way of life".
- **Reasonable Livelihood:** Lake Manitoba First Nation has determined that the Project will have a high impact on rights related to reasonable livelihood due to ecological effects that reduce the abundance of wildlife, plant medicine and foods, fish and farmlands; and impacts on lands for farming, gardening, fresh water, and other elements essential for a reasonable livelihood.
- **Stewardship:** Lake Manitoba First Nation has determined that the Project will have a high impact on rights related to stewardship due to federal and provincial exclusion of Lake Manitoba First Nation from decision-making role in respect of Project approval, terms of project operation and project operational management.

Lake St. Martin First Nation

Lake St. Martin First Nation provided its draft SEWB study and RIA to Manitoba Transportation and Infrastructure in June 2023 and final versions of the SEWB study and RIA in September 2023. The draft SEWB study was substantially complete and was reviewed and information incorporated into Manitoba Transportation and Infrastructure's responses to Round 2 IRs, notably response to IR IAAC-R2-29. Meanwhile, the final version of the RIA represented a considerable progression of the draft RIA. Relevant information from the draft RIA was incorporated where appropriate into the Round 2 IR responses. The main conclusions of the final version of both the SEWB study and RIA are summarized below. How this information has been considered in the assessment of effects on Aboriginal and treaty rights is presented below under the heading "Potential Effects on Aboriginal and Treaty Rights."

Question IAAC-R3-07
October 27, 2023

Lake St. Martin First Nation Socio-economic and Well-being Study

The SEWB study submitted by Lake St. Martin First Nation states that the SEWB study should be reviewed and understood in consideration of the parallel RIA. The SEWB study explains that Lake St. Martin First Nation social, economic, cultural, and community health and wellness baseline conditions are below standard condition. The SEWB study identifies six VCs that were selected as representative of the critical conditions or elements necessary for the continued social, cultural and economic well-being of Lake St. Martin First Nation. The SEWB study outlines the extent to which each of these VCs were impacted by the 2011 and 2014 floods and identifies Project-specific interactions. The SEWB study concludes that Project-specific interactions include:

- **Housing and Infrastructure:** access to Lake St. Martin First Nation may be affected by submersion of key roads and other flooding related effects. Existing community infrastructure, buildings, and housing have been highly impacted by past flooding events – the Project could improve these conditions through facilitating construction of housing and infrastructure and the provision of land.
- **Economy and Employment:** The Project has the potential to address issues of unemployment, underemployment, and low income by providing contracts, training, and employment tailored to Lake St. Martin First Nation capacity. The Project may negatively impact traditional resources, further reducing the viability of traditional economies.
- **Education and Training:** The Project could interrupt schooling if residents are required to relocate due to further damage to existing housing and building stocks.
- **Culture:** Potential Project impacts to traditional activities, such as harvesting, could further reduce community engagement, disrupt knowledge transmission, and alienate the community from their culture, land, and one another.
- **Food Security:** The Project could further reduce the availability and access to traditionally harvested foods and make access to store-bought foods more difficult.
- **Community Health and Mental Wellness:** The Project has the potential to increase the presence of drugs and alcohol in the community and may also indirectly increase substance dependence by exacerbating existing vulnerabilities and eroding community strengths. Project-related increases in addictions and crime, reduced access to traditional and healthy foods, and increased stress on community housing and infrastructure could all decrease community wellness.

Question IAAC-R3-07
October 27, 2023

Lake St. Martin First Nation Rights Impact Assessment

The RIA submitted by Lake St. Martin First Nation identifies potential Project effects to two types of Aboriginal and treaty rights: harvesting and farming rights and way of life rights. Harvesting and farming rights as defined by Lake St. Martin First Nation consist of rights in respect of water, fishing, hunting, trapping, gathering of plant foods and medicines, and farming. Way of life rights as defined by Lake St. Martin First Nation consist of rights in respect of cultural continuity, the opportunity to derive a reasonable livelihood from rights-based activities and practices, and stewardship of lands, waters, and resources within Lake St. Martin First Nation's core territory. With respect to each of these rights, the RIA by Lake St. Martin First Nation has reached the following conclusions:

- **Water:** Lake St. Martin First Nation has determined that the Project will result in as moderate impact on rights related to water due to increased sediment and chemical nutrients exacerbating poor water quality, and changes to groundwater resulting from inundation and saturation of land.
- **Fishing:** Lake St. Martin First Nation has determined that the Project will have a high impact on rights related to fishing due to the effects of increased sediment on fish habitat and fish spawning; changes to fish habitat from reduced water depth and flow; diversion of migrating fish away from the Dauphin River; increased incidence algal blooms and eutrophication; impaired access and navigation at the Narrows; reduced shoreline access for fishing from Lake St. Martin First Nation reserve lands; decreased access to preferred fishing areas; reduced effectiveness of gillnet ice fishing for walleye; water levels and flow affecting ice formation impacting winter fishing; and unpredictable water levels and current patterns that diminish the relevance of Indigenous knowledge relative for exercise of fishing rights.
- **Hunting:** Lake St. Martin First Nation has determined that the Project will have a moderate high impact on rights related to hunting due to the outlet channels bisecting Lake St. Martin First Nation territory and restricting access to preferred hunting areas previously accessible by foot and quad; habitat fragmentation in the vicinity of Big Buffalo Lake; effects on ungulate distribution and migration patterns from habitat loss and fragmentation; potential effect on ungulate reproduction patterns as a result of reduction of habitat, with further effect on population size and health; the outlet channels creating a barrier to ungulate crossing; and increased predation as a result of right-of-way clearing.
- **Trapping:** Lake St. Martin First Nation has determined that the Project will have a moderate impact on rights related to trapping due to reduction in muskrat as a result of flooding of muskrat dens; and elevated water levels and shoreline inundation causing loss of access to preferred trapping areas on Pineimuta Lake and south basin of Lake St. Martin.
- **Gathering Plant Foods and Medicines:** Lake St. Martin First Nation has determined that the Project will have a high impact on rights related to gathering plant foods and medicines due to loss of habitat resulting from water table saturation along the south basin of Lake St. Martin, north basin of Lake St. Martin, Dauphin River, and Lake Winnipeg; and loss of access to preferred plant harvesting areas along the south basin of Lake St. Martin due to elevated water levels and shoreline inundation.

- **Farming and Gardening:** Lake St. Martin First Nation has determined that the Project will have a high impact on rights related to farming and gardening due to reoccurring saturation of hay fields on Lake St. Martin First Nation reserve lands as a result of Project-related flood events.
- **Cultural Continuity:** Lake St. Martin First Nation has determined that the Project will have a high impact on rights related to cultural continuity due to decreased availability of culturally important plant medicines and foods, and fish and wildlife species necessary for cultural transmission; decrease in productive potential of preferred harvesting areas such as reduced success of moose hunt; disruption of patterns of use of preferred harvesting areas linked to sense of place and cultural identity; avoidance of key cultural areas (notably water bodies) due to perceived risks from water quality; loss of meaningful harvesting opportunities resulting in lost future opportunities to teach and transmit cultural knowledge and "way of life."
- **Reasonable Livelihood:** Lake St. Martin First Nation has determined that the Project will have a high impact on rights related to reasonable livelihood due to ecological effects that reduce the abundance of wildlife, plant medicine and foods, fish and farmlands; and impacts on lands for farming, gardening, fresh water, and other elements essential for a reasonable livelihood; impact on the possibility of profit-generating activities that create employment for community members and prevent youth migration out of the reserve; heavy impact on freedom of mobility on the land; impact on the safety of community members, especially women and feminized people, children and youth, Elders and people with disabilities.
- **Stewardship:** Lake St. Martin First Nation has determined that the Project will have a high impact on rights related to stewardship due to federal and provincial exclusion of Lake St. Martin First Nation from decision-making role in respect of Project approval, terms of project operation and project operational management; loss of governance rights due the presence of Project security; and criminalization of hunters and further denial of harvesting rights.

Little Saskatchewan First Nation

Little Saskatchewan First Nation provided it's draft SEWB study and RIA to Manitoba Transportation and Infrastructure in June 2023 and final versions of the SEWB and RIA in September 2023. The draft SEWB study was substantially complete and was reviewed and information incorporated into Manitoba Transportation and Infrastructure's responses to Round 2 IRs, notably response to IAAC-R2-29. Meanwhile, the final version of the RIA represents a considerable progression of the draft RIA. Relevant information from the draft RIA was incorporated where appropriate into the Round 2 IR responses. The main conclusions of the final version of both the SEWB study and RIA are summarized below. How this information has been considered in the assessment of effects on Aboriginal and treaty rights is presented below under the heading "Potential Effects on Aboriginal and Treaty Rights."

Question IAAC-R3-07
October 27, 2023

Little Saskatchewan First Nation Socio-economic and Well-being Study

The SEWB study submitted by Little Saskatchewan First Nation states that the SEWB study should be reviewed and understood in consideration of the parallel RIA. The SEWB study explains that Little Saskatchewan First Nation social, economic, cultural, and community health and wellness baseline conditions are below standard condition. The SEWB study identifies six VCs that were selected as representative of the critical conditions or elements necessary for the continued social, cultural and economic well-being of Little Saskatchewan First Nation. The SEWB study outlines the extent to which each of these VCs were impacted by the 2011 and 2014 floods and identifies Project-specific interactions. The SEWB study concludes that Project-specific interactions include:

- **Housing and Infrastructure:** Access to Little Saskatchewan First Nation may be affected by submersion of key roads and other flooding related effects. Existing community infrastructure, buildings, and housing have been highly impacted by past flooding events – the Project could improve these conditions through facilitating construction of housing and infrastructure and the provision of land.
- **Economy and Employment:** The Project has the potential to address issues of unemployment, underemployment, and low income by providing contracts, training, and employment tailored to Little Saskatchewan First Nation capacity. The Project may negatively impact traditional resources, further reducing the viability of traditional economies.
- **Education and Training:** The Project could interrupt schooling if residents are required to relocate due to further damage to existing housing and building stocks.
- **Culture:** Potential Project impacts to traditional activities, such as harvesting, could further reduce community engagement, disrupt knowledge transmission, and alienate the community from their culture, land, and one another.
- **Food Security:** The Project could further reduce the availability and access to traditionally harvested foods and make access to store-bought foods more difficult.
- **Community Health and Mental Wellness:** The Project has the potential to increase the presence of drugs and alcohol in the community and may also indirectly increase substance dependence by exacerbating existing vulnerabilities and eroding community strengths. Project-related increases in addictions and crime, reduced access to traditional and healthy foods, and increased stress on community housing and infrastructure could all decrease community wellness.

Little Saskatchewan First Nation Rights Impact Assessment

The RIA submitted by Little Saskatchewan First Nation identifies potential Project effects to two types of Aboriginal and treaty rights: harvesting and farming rights and way of life rights. Harvesting and farming rights as defined by Little Saskatchewan First Nation consist of rights in respect of water, fishing, hunting, trapping, gathering of plant foods and medicines, and farming. Way of life rights as defined by Little Saskatchewan First Nation consist of rights in respect of cultural continuity, the opportunity to derive a reasonable livelihood from rights-based activities and practices, and stewardship of lands, waters, and resources within Little Saskatchewan First Nation's core territory. With respect to each of these rights, the RIA by Little Saskatchewan First Nation has reached the following conclusions:

- **Water:** Little Saskatchewan First Nation has determined that the Project will result in as moderate impact on rights related to water due to increased sediment and chemical nutrients exacerbating poor water quality, and changes to groundwater resulting from inundation and saturation of land.
- **Fishing:** Little Saskatchewan First Nation has determined that the Project will have a high impact on rights related to fishing due to the effects of increased sediment on fish habitat and fish spawning; changes to fish habitat from reduced water depth and flow; diversion of migrating fish away from the Dauphin River; increased incidence algal blooms and eutrophication; impaired access and navigation at the Narrows; reduced shoreline access for fishing from Little Saskatchewan First Nation reserve lands; decreased access to preferred fishing areas; reduced effectiveness of gillnet ice fishing for walleye; and unpredictable water levels and current patterns that diminish the relevance of Indigenous knowledge relative for exercise of fishing rights.
- **Hunting:** Little Saskatchewan First Nation has determined that the Project will have a moderate high impact on rights related to hunting due to the outlet channels bisecting Little Saskatchewan First Nation territory and restricting access to preferred hunting areas previously accessible by foot and quad; habitat fragmentation in the vicinity of Big Buffalo Lake; effects on ungulate distribution and migration patterns from habitat loss and fragmentation; the outlet channels creating a barrier to ungulate crossing; and increased predation as a result of right-of-way clearing.
- **Trapping:** Little Saskatchewan First Nation has determined that the Project will have a moderate impact on rights related to trapping due to reduction in muskrat as a result of flooding of muskrat dens; and elevated water levels and shoreline inundation causing loss of access to preferred trapping areas on Pineimuta Lake and south basin of Lake St. Martin.
- **Gathering Plant Foods and Medicines:** Little Saskatchewan First Nation has determined that the Project will have a high impact on rights related to gathering plant foods and medicines due to loss of habitat resulting from water table saturation along the south basin of Lake St. Martin, north basin of Lake St. Martin, Dauphin River, and Lake Winnipeg; and loss of access to preferred plant harvesting areas along the south basin of Lake St. Martin due to elevated water levels and shoreline inundation.

- **Farming and Gardening:** Little Saskatchewan First Nation has determined that the Project will have a high impact on rights related to farming and gardening due to reoccurring saturation of hay fields and lands used for gardens on Little Saskatchewan First Nation reserve lands as a result of Project-related flood events.
- **Cultural Continuity:** Little Saskatchewan First Nation has determined that the Project will have a high impact on rights related to cultural continuity due to decreased availability of culturally important plant medicines and foods, and fish and wildlife species necessary for cultural transmission; decrease in productive potential of preferred harvesting areas such as reduced success of moose hunt; disruption of patterns of use of preferred harvesting areas linked to sense of place and cultural identity; avoidance of key cultural areas (notably water bodies) due to perceived risks from water quality; and loss of meaningful harvesting opportunities resulting in lost future opportunities to teach and transmit cultural knowledge and "way of life."
- **Reasonable Livelihood:** Little Saskatchewan First Nation has determined that the Project will have a high impact on rights related to reasonable livelihood due to ecological effects that reduce the abundance of wildlife, plant medicine and foods, fish and farmlands; and impacts on lands for farming, gardening, fresh water, and other elements essential for a reasonable livelihood.
- **Stewardship:** Little Saskatchewan First Nation has determined that the Project will have a high impact on rights related to stewardship due to federal and provincial exclusion of Little Saskatchewan First Nation from decision-making role in respect of Project approval, terms of project operation and project operational management.

Peguis First Nation

Peguis First Nation submitted its draft SEWB study and RIA to Manitoba Transportation and Infrastructure in June 2023 and final versions of the SEWB and RIA in September 2023. The draft SEWB study was substantially complete and was reviewed and information incorporated into Manitoba Transportation and Infrastructure's responses to Round 2 IRs, notably response to IAAC-R2-29. Meanwhile, the final version of the RIA represented a considerable progression of the draft RIA. Relevant information from the draft RIA was incorporated where appropriate into the Round 2 IR responses. The main conclusions of the final version of both the SEWB study and RIA are summarized below. How this information has been considered in the assessment of effects on Aboriginal and treaty rights is presented below under the heading "Potential Effects on Aboriginal and Treaty Rights."

Question IAAC-R3-07
October 27, 2023

Peguis First Nation Socio-economic and Well-being Study

The SEWB study submitted by Peguis First Nation states that the SEWB study should be reviewed and understood in consideration of the parallel RIA. The SEWB study explains that Peguis First Nation social, economic, cultural, and community health and wellness baseline conditions are below standard condition. The SEWB study identifies six VCs that were selected as representative of the critical conditions or elements necessary for the continued social, cultural and economic well-being of Peguis First Nation. The SEWB study outlines the extent to which each of these VCs were impacted by the 2011 and 2014 floods and identifies Project-specific interactions. The SEWB study concludes that Project-specific interactions include:

- **Housing and Infrastructure:** Access to Peguis First Nation may be affected by submersion of key roads and other flooding related effects. Existing community infrastructure, buildings, and housing have been highly impacted by past flooding events – the Project could improve these conditions through facilitating construction of housing and infrastructure and the provision of land.
- **Economy and Employment:** The Project has the potential to address issues of unemployment, underemployment, and low income by providing contracts, training, and employment tailored to Peguis First Nation capacity. The Project may negatively impact traditional resources, further reducing the viability of traditional economies.
- **Education and Training:** The Project could interrupt schooling if residents are required to relocate due to further damage to existing housing and building stocks.
- **Culture:** Potential Project impacts to traditional activities, such as harvesting, could further reduce community engagement, disrupt knowledge transmission, and alienate the community from their culture, land, and one another.
- **Food Security:** The Project could further reduce the availability and access to traditionally harvested foods and make access to store-bought foods more difficult.
- **Community Health and Mental Wellness:** The Project has the potential to increase the presence of drugs and alcohol in the community and may also indirectly increase substance dependence by exacerbating existing vulnerabilities and eroding community strengths. Project-related increases in addictions and crime, reduced access to traditional and healthy foods, and increased stress on community housing and infrastructure could all decrease community wellness.

Peguis First Nation Rights Impact Assessment

The RIA submitted by Peguis First Nation identifies potential Project effects to two types of Aboriginal and treaty rights: harvesting and farming rights and way of life rights. Harvesting and farming rights as defined by Peguis First Nation consist of rights in respect of water, fishing, hunting, trapping, gathering of plant foods and medicines, and farming. Way of life rights as defined by Peguis First Nation consist of rights in respect of cultural continuity, the opportunity to derive a reasonable livelihood from rights-based activities and practices, and stewardship of lands, waters, and resources within Peguis First Nation's core territory. With respect to each of these rights, the RIA by Peguis First Nation has reached the following conclusions:

- **Water:** Peguis First Nation has determined that the Project will result in as moderate impact on rights related to water due to increased sediment and chemical nutrients exacerbating poor water quality, and changes to groundwater resulting from inundation and saturation of land.
- **Fishing:** Peguis First Nation has determined that the Project will have a high impact on rights related to fishing due to the effects of increased sediment on fish habitat and fish spawning; changes to fish habitat from reduced water depth and flow; diversion of migrating fish away from the Dauphin River; increased incidence algal blooms and eutrophication; impaired access and navigation at the Narrows; reduced shoreline access for fishing from Peguis First Nation reserve lands; decreased access to preferred fishing areas; reduced effectiveness of gillnet ice fishing for walleye; and unpredictable water levels and current patterns that diminish the relevance of Indigenous knowledge relative for exercise of fishing rights.
- **Hunting:** Peguis First Nation has determined that the Project will have a moderate high impact on rights related to hunting due to the outlet channels bisecting Peguis First Nation territory and restricting access to preferred hunting areas previously accessible by foot and quad; habitat fragmentation in the vicinity of Big Buffalo Lake; effects on ungulate distribution and migration patterns from habitat loss and fragmentation; the outlet channels creating a barrier to ungulate crossing; and increased predation as a result of right-of-way clearing.
- **Trapping:** Peguis First Nation has determined that the Project will have a moderate impact on rights related to trapping due to reduction in muskrat as a result of flooding of muskrat dens; and elevated water levels and shoreline inundation causing loss of access to preferred trapping areas on Pineimuta Lake and south basin of Lake St. Martin.
- **Gathering Plant Foods and Medicines:** Peguis First Nation has determined that the Project will have a high impact on rights related to gathering plant foods and medicines due to loss of habitat resulting from water table saturation along the south basin of Lake St. Martin, north basin of Lake St. Martin, Dauphin River, and Lake Winnipeg; and loss of access to preferred plant harvesting areas along the south basin of Lake St. Martin due to elevated water levels and shoreline inundation.
- **Gardening:** Peguis First Nation has determined that the Project will have a high impact on rights related to farming and gardening due to reoccurring saturation of hay fields and lands used for gardens on Peguis First Nation reserve lands as a result of Project-related flood events.

- **Cultural Continuity:** Peguis First Nation has determined that the Project will have a high impact on rights related to cultural continuity due to decreased availability of culturally important plant medicines and foods, and fish and wildlife species necessary for cultural transmission; decrease in productive potential of preferred harvesting areas such as reduced success of moose hunt; disruption of patterns of use of preferred harvesting areas linked to sense of place and cultural identity; avoidance of key cultural areas (notably water bodies) due to perceived risks from water quality; and loss of meaningful harvesting opportunities resulting in lost future opportunities to teach and transmit cultural knowledge and "way of life."
- **Reasonable Livelihood:** Peguis First Nation has determined that the Project will have a high impact on rights related to reasonable livelihood due to ecological effects that reduce the abundance of wildlife, plant medicine and foods, fish and farmlands; and impacts on lands for farming, gardening, fresh water, and other elements essential for a reasonable livelihood.
- **Stewardship:** Peguis First Nation has determined that the Project will have a high impact on rights related to stewardship due to federal and provincial exclusion of Peguis First Nation from decision-making role in respect of Project approval, terms of project operation and project operational management.

Pinaymootang First Nation

Pinaymootang First Nation submitted its draft SEWB study and RIA to Manitoba Transportation and Infrastructure in June 2023 and final versions of the SEWB and RIA in September 2023. The draft SEWB study was substantially complete and was reviewed and information incorporated into Manitoba Transportation and Infrastructure's responses to Round 2 IRs, notably response to IR IAAC-R2-29. Meanwhile, the final version of the RIA represented a considerable progression of the draft RIA. Relevant information from the draft RIA was incorporated where appropriate into the Round 2 IR responses. The main conclusions of the final version of both the SEWB study and RIA are summarized below. How this information has been considered in the assessment of effects on Aboriginal and treaty rights is presented below under the heading "Potential Effects on Aboriginal and Treaty Rights."

Question IAAC-R3-07
October 27, 2023

Pinaymootang First Nation Socio-economic and Well-being Study

The SEWB study submitted by Pinaymootang First Nation states that the SEWB study should be reviewed and understood in consideration of the parallel RIA. The SEWB study explains that Pinaymootang First Nation social, economic, cultural, and community health and wellness baseline conditions are below standard condition. The SEWB study identifies six VCs that were selected as representative of the critical conditions or elements necessary for the continued social, cultural and economic well-being of Pinaymootang First Nation. The SEWB study outlines the extent to which each of these VCs were impacted by the 2011 and 2014 floods and identifies Project-specific interactions. The SEWB study concludes that Project-specific interactions include:

- **Housing and Infrastructure:** access to Pinaymootang First Nation may be affected by submersion of key roads and other flooding related effects. Existing community infrastructure, buildings, and housing have been highly impacted by past flooding events – the Project could improve these conditions through facilitating construction of housing and infrastructure and the provision of land.
- **Economy and Employment:** The Project has the potential to address issues of unemployment, underemployment, and low income by providing contracts, training, and employment tailored to Pinaymootang First Nation capacity. The Project may negatively impact traditional resources, further reducing the viability of traditional economies.
- **Education and Training:** The Project could interrupt schooling if residents are required to relocate due to further damage to existing housing and building stocks.
- **Culture:** Potential Project impacts to traditional activities, such as harvesting, could further reduce community engagement, disrupt knowledge transmission, and alienate the community from their culture, land, and one another.
- **Food Security:** The Project could further reduce the availability and access to traditionally harvested foods and make access to store-bought foods more difficult.
- **Community Health and Mental Wellness:** The Project has the potential to increase the presence of drugs and alcohol in the community and may also indirectly increase substance dependence by exacerbating existing vulnerabilities and eroding community strengths. Project-related increases in addictions and crime, reduced access to traditional and healthy foods, and increased stress on community housing and infrastructure could all decrease community wellness.

Pinaymootang First Nation Rights Impact Assessment

The RIA submitted by Pinaymootang First Nation identifies potential Project effects to two types of Aboriginal and treaty rights: harvesting and farming rights and way of life rights. Harvesting and farming rights as defined by Pinaymootang First Nation consist of rights in respect of water, fishing, hunting, trapping, gathering of plant foods and medicines, and farming. Way of life rights as defined by Pinaymootang First Nation consist of rights in respect of cultural continuity, the opportunity to derive a reasonable livelihood from rights-based activities and practices, and stewardship of lands, waters, and resources within Pinaymootang First Nation's core territory. With respect to each of these rights, the RIA by Pinaymootang First Nation has reached the following conclusions:

- **Water:** Pinaymootang First Nation has determined that the Project will result in as moderate impact on rights related to water due to increased sediment and chemical nutrients exacerbating poor water quality, and changes to groundwater resulting from inundation and saturation of land.
- **Fishing:** Pinaymootang First Nation has determined that the Project will have a high impact on rights related to fishing due to the effects of increased sediment on fish habitat and fish spawning; changes to fish habitat from reduced water depth and flow; diversion of migrating fish away from the Dauphin River; increased incidence algal blooms and eutrophication; impaired access and navigation at the Narrows; reduced shoreline access for fishing from Pinaymootang First Nation reserve lands; decreased access to preferred fishing areas; reduced effectiveness of gillnet ice fishing for walleye; and unpredictable water levels and current patterns that diminish the relevance of Indigenous knowledge relative for exercise of fishing rights.
- **Hunting:** Pinaymootang First Nation has determined that the Project will have a moderate to high impact on rights related to hunting due to the outlet channels bisecting Pinaymootang First Nation territory and restricting access to preferred hunting areas previously accessible by foot and quad; habitat fragmentation in the vicinity of Big Buffalo Lake; effects on ungulate distribution and migration patterns from habitat loss and fragmentation; the outlet channels creating a barrier to ungulate crossing; and increased predation as a result of right-of-way clearing.
- **Trapping:** Pinaymootang First Nation has determined that the Project will have a moderate impact on rights related to trapping due to reduction in muskrat as a result of flooding of muskrat dens; and elevated water levels and shoreline inundation causing loss of access to preferred trapping areas on Pineimuta Lake and south basin of Lake St. Martin.
- **Gathering Plant Foods and Medicines:** Pinaymootang First Nation has determined that the Project will have a high impact on rights related to gathering plant foods and medicines due to loss of habitat resulting from water table saturation along the south basin of Lake St. Martin, north basin of Lake St. Martin, Dauphin River, and Lake Winnipeg; and loss of access to preferred plant harvesting areas along the south basin of Lake St. Martin due to elevated water levels and shoreline inundation.
- **Farming and Gardening:** Pinaymootang First Nation has determined that the Project will have a high impact on rights related to farming and gardening due to reoccurring saturation of hay fields on Pinaymootang First Nation reserve lands as a result of Project-related flood events.

- **Cultural Continuity:** Pinaymootang First Nation has determined that the Project will have a high impact on rights related to cultural continuity due to decreased availability of culturally important plant medicines and foods, and fish and wildlife species necessary for cultural transmission; decrease in productive potential of preferred harvesting areas such as reduced success of moose hunt; disruption of patterns of use of preferred harvesting areas linked to sense of place and cultural identity; avoidance of key cultural areas (notably water bodies) due to perceived risks from water quality; and loss of meaningful harvesting opportunities resulting in lost future opportunities to teach and transmit cultural knowledge and "way of life."
- **Reasonable Livelihood:** Pinaymootang First Nation has determined that the Project will have a high impact on rights related to reasonable livelihood due to ecological effects that reduce the abundance of wildlife, plant medicine and foods, fish and farmlands; and impacts on lands for farming, gardening, fresh water, and other elements essential for a reasonable livelihood.
- **Stewardship:** Pinaymootang First Nation has determined that the Project will have a high impact on rights related to stewardship due to federal and provincial exclusion of Pinaymootang First Nation from decision-making role in respect of Project approval, terms of Project operation and Project operational management.

Project Effects on Aboriginal and Treaty Rights

There is considerable consistency in both the Aboriginal and treaty rights and the potential Project effects to rights identified in the separate SEWB studies and RIAs submitted by the seven IRTC Nations. Therefore, Manitoba Transportation and Infrastructure will herein consider the concerns and issues raised in the SEWB studies and RIAs collectively. However, Manitoba Transportation and Infrastructure stresses that the conclusions in this section apply equally to the information shared by Dauphin River First Nation, Kinonjeoshtegon First Nation, Lake Manitoba First Nation, Lake St. Martin First Nation, Little Saskatchewan First Nation, Peguis First Nation, and Pinaymootang First Nation in each of their SEWB studies and RIAs.

The final versions of the RIAs and SEWB studies have been reviewed against the conclusions of the EIS for the Project and the responses to relevant IRs, in particular the responses to IR IAAC-R1-122, Table -122-1 and IR IAAC-R2-29, Table IAAC-R2-29-1. It is the position of Manitoba Transportation and Infrastructure that the concerns and issues raised in these reports have been substantively responded to in the EIS for the Project and previous IR responses. The concerns and issues raised in the SEWB studies have largely been incorporated into the response IR IAAC-R2-29, Table IAAC-R2-29-1 where Manitoba Transportation and Infrastructure provided a detailed response to each issue and concern, including proposed mitigation, monitoring and follow-up programs and a description of predicted residual effects after mitigation.

With respect to the specific Aboriginal and Treaty rights identified in each of the RIAs, as summarized above, Manitoba Transportation and Infrastructure is of the view that there is a large volume of evidence already on the record providing a thorough response to each of the potential Project effects described in the RIAs. Table IAAC-R3-07-2, below, provides direction to where this information may be found.

Table IAAC-R3-07-2 Sections of the Project EIS or IRs where Potential Effects Identified in the RIAs have been Discussed

Effect on Right Identified in the RIAs	Reference to Relevant Section of the Project EIS or IR
Effects on water rights, including potential Project effects from increased sedimentation, chemical nutrients, poor water quality, and changes to groundwater.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Sediment effects/management – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-30, IAAC-R1-32, IAAC-R1-44, IAAC-R1-76, IAAC-R1-81, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-31 – IAAC-R3-01 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Cattle operations – EIS Volume 4, Section 9.2.2.2 – IAAC-R1-14 – IAAC-R2-01 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Groundwater – EIS Volume 2, Section 6.4.8 – IAAC-R1-18, IAAC-R1-21, IAAC-R1-22, IAAC-R1-23, IAAC-R1-24, IAAC-R1-72 and IAAC-R1-73 – IAAC-R2-02, IAAC-R2-03, and IAAC-R2-05 – IAAC-R3-01

Effect on Right Identified in the RIAs	Reference to Relevant Section of the Project EIS or IR
Effects on fishing rights, including from increased sediment, reduced water depth and flow, changes to fish habitat and fish spawning, algal blooms and eutrophication, impaired access and navigation at the Narrows, reduced shoreline access for fishing	• Availability of and access to traditional resources for current use – Volume 4, Section 10.2.4 – IAAC-R1-122 – IAAC-R2-29 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Fish habitat offsetting – EIS Volume 3, Section 7.2.4 – IAAC-R1-36, IAAC-R1-37, IAAC-R1-46, IAAC-R1-53 – IAAC-R2-10 – IAAC-R3-02 • Sediment effects/management – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-30, IAAC-R1-32, IAAC-R1-44, IAAC-R1-76, IAAC-R1-81, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-31 – IAAC-R3-01 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Navigation – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-119, IAAC-R1-111, IAAC-R1-122 – IAAC-R2-29 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04 • Access – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-93, IAAC-R1-101, IAAC-R1-119, IAAC-R1-122 – IAAC-R2-12, IAAC-R2-15, IAAC-R2-21 – IAAC-R3-06

Effect on Right Identified in the RIAs	Reference to Relevant Section of the Project EIS or IR
Effects on hunting rights, including from habitat loss and fragmentation, effects ungulate movement and migration, increased predation, and changes in access to preferred hunting areas	• Availability of and access to traditional resources for current use – Volume 4, Section 10.2.4 – IAAC-R1-122 – IAAC-R2-29 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Wildlife movement – EIS Volume 3, Section 8.3.6 – IAAC-R1-47, IAAC-R1-93 – IAAC-R2-17, IAAC-R2-21 – IAAC-R3-06 • Access – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-93, IAAC-R1-101, IAAC-R1-119, IAAC-R1-122 – IAAC-R2-12, IAAC-R2-15, IAAC-R2-21 – IAAC-R3-06 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4
Effects on trapping rights, including from flooding of muskrat dens, and loss of access to preferred trapping areas	• Availability of and access to traditional resources for current use – Volume 4, Section 10.2.4 – IAAC-R1-122 – IAAC-R2-29 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Wildlife movement – EIS Volume 3, Section 8.3.6 – IAAC-R1-47, IAAC-R1-93 – IAAC-R2-17, IAAC-R2-21 – IAAC-R3-06 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Access – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-93, IAAC-R1-101, IAAC-R1-119, IAAC-R1-122 – IAAC-R2-12, IAAC-R2-15, IAAC-R2-21 – IAAC-R3-06

Effect on Right Identified in the RIAs	Reference to Relevant Section of the Project EIS or IR
Effects on rights to gather plant foods and medicines, including from loss of habitat, inundation and saturation of the shoreline, and loss of access to preferred plant harvesting areas	• Availability of and access to traditional resources for current use – Volume 4, Section 10.2.4 – IAAC-R1-122 – IAAC-R2-29 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Wetlands/WCP – EIS Volume 3, Section 8.2.4 – IAAC-R1-23, IAAC-R1-24, IAAC-R1-53, IAAC-R1-73, IAAC-R1-95, IAAC-R1-97, IAAC-R1-98, IAAC-R1-99, IAAC-R1-133 – IAAC-R2-07, IAAC-R2-13 – IAAC-R3-02, IAAC-R3-04, IAAC-R3-05 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04 • Access – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-93, IAAC-R1-101, IAAC-R1-119, IAAC-R1-122 – IAAC-R2-12, IAAC-R2-15, IAAC-R2-21 – IAAC-R3-06
Effects on rights related to farming and gardening due to recurring saturation of hay fields on First Nation reserve lands as a result of Project-related flood events	• Land and resource use – Volume 4, Section 9.4 • Indigenous socio-economic conditions – Volume 4, Section 10.3.3.2 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4

Question IAAC-R3-07
October 27, 2023

Effect on Right Identified in the RIAs	Reference to Relevant Section of the Project EIS or IR
Effects on cultural continuity rights, including from decreased availability of culturally important plant medicines and foods, fish and wildlife species, decrease in productive potential of preferred harvesting areas (reduced success of moose hunt), disruption of areas linked to sense of place and cultural identity, Avoidance of key cultural areas due to perceived risks from water quality, loss of future opportunities to teach and transmit cultural knowledge and "way of life"	• Availability of and access to traditional resources for current use – Volume 4, Section 10.2.4 – IAAC-R1-122 – IAAC-R2-29 • Cultural and spiritual sites and areas – Volume 4, Section 10.2.4 – IAAC-R1-122 • Cultural value or importance associated with current use – Volume 4, Section 10.2.4 – IAAC-R1-122 • Indigenous socioeconomics – EIS Volume 4, Section 10.3.3.1 • Mental Health – EIS Volume 4, Section 10.3.3.2 – IAAC-R1-103 – IAAC-R2-29 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04
Effects on rights to reasonable livelihood, including from reduced abundance of wildlife, plant medicine and foods, fish and farmlands, and impacts on lands for farming, gardening, fresh water, and other elements.	• Availability of and access to traditional resources for current use – Volume 4, Section 10.2.4 – IAAC-R1-122 – IAAC-R2-29 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04

Effect on Right Identified in the RIAs	Reference to Relevant Section of the Project EIS or IR
	– IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04
Effects on stewardship rights, including from federal and provincial exclusion of First Nations from decision-making on project approvals, terms of project operation and project operational management	Manitoba Transportation and Infrastructure regards the issue of stewardship to be beyond the scope of the environmental review of the Project. As Project proponent, matters of provincial water management regimes or provincial and federal licencing and approval processes are not within the care and control of Manitoba Transportation and Infrastructure. The right to steward lands and resources within their traditional territories are matters First Nations should more properly seek to resolve with the Government of Manitoba and the Government of Canada.

The identification of Project interactions and the assessment of potential effects on Aboriginal and treaty rights in Volume 4, Chapter 10.4 of the Project EIS considers both the exercise and practice of Aboriginal and Treaty rights and the conditions that support the exercise of those rights. Manitoba Transportation and Infrastructure recognizes that the ability to exercise or practice Aboriginal and treaty rights, including harvesting rights and integral practices, traditions, and customs, depends upon the health of the land to support those practices. The potential effects of the Project on asserted or established Aboriginal and treaty rights are derived directly or indirectly from the physical effects of the Project on the environment. Consequently, effects on the ability to exercise Aboriginal and treaty rights may be considered to occur to the extent that the Project has residual effects on traditional harvesting (hunting, trapping, fishing, plant, or material gathering) or on physical activities associated with traditional use (travel and navigation, use of habitation, cultural and spiritual areas). Therefore, circumstances in which traditional resources necessary for the exercise of rights are diminished or in which lands accessed for traditional activities are disturbed may reasonably be understood to represent adverse effects on Aboriginal and treaty rights.

The pathways for potential effects for the exercise and practice of Aboriginal and treaty rights are similar to those for the availability of and access to traditionally harvested resources and traditional sites and areas (Project EIS Volume 4, Section 10.2.1.3), as well as for the conditions that support the exercise of rights (including Indigenous health, Indigenous socio-economic conditions, and Indigenous physical and cultural heritage – see Project EIS Volume 4, Section 10.3.1.3). For example, a change in availability of traditional resources for current use (e.g., wildlife species of importance) that results in a residual environmental effect on the diversity, distribution, or abundance of a species relied upon for traditional hunting may also be considered an effect on hunting rights. Similarly, a loss or alteration, or restriction of access to a traditionally used trail or travelway may be considered an effect on the ability to exercise Aboriginal and Treaty rights on unoccupied Crown land or other lands to which there is a right of access, including the ability to access important sites for teaching or cultural transmission. As stated in Volume 4, Chapter 10.2.4.5 of the Project EIS, Manitoba Transportation and Infrastructure understands that Indigenous groups may choose not to practice traditional activities or use traditional sites and areas near the Project for a variety of cultural, spiritual, aesthetic, or personal reasons, and that there may be Project effects on the ability to

exercise Aboriginal and treaty rights even where it has been determined there are minimal effects to biological resources or physical sites within the RAA.

The purpose of the Project is to reduce existing adverse effects created by periodic regional flooding. Flooding can impact the ability to exercise Aboriginal and treaty rights through damage or removal of habitat, reducing access to areas for traditional use, inundation of culturally important sites, reduced surface water quality, or impacts on the cultural, economic, and mental well-being of local communities. By reducing the effects of periodic regional flooding, the Project is anticipated to reduce effects to the resources, sites and conditions that support the exercise of Aboriginal and treaty rights.

While the RIA reports from the IRTC Nations provided additional detail on the nature and extent of Aboriginal and treaty rights in relation to the Project, they did not identify new pathways for effects or new Project effects. That is, the effects on rights described in the RIAs in each instance are derived from physical effects of the Project on the environment. For example, the RIAs described effects on water rights occurring as a result of potential Project effects that could increase sedimentation, disseminate chemical nutrients, or affect groundwater. Similarly, the RIAs described effects on fishing rights occurring as a result of potential Project effects such as increased sediment, reduced water depth and flow, algal blooms, and changes to fish habitat. As outlined in Table IAAC-R3-07-2 above, the potential effects of the Project on the environment that may impact the Aboriginal and treaty rights identified in the RIAs have been previously assessed. Overall, with the implementation of mitigation measures, residual Project effects on the ability to exercise Aboriginal or treaty rights are expected to reflect the residual effects predicted for traditional land and resource use (TLRU) in Volume 4, Section 10.2.4 of the Project EIS, including the availability of and access to traditionally harvested resources and traditional sites and areas, as well as for the conditions that support the exercise of rights (including Indigenous health, Indigenous socio-economic conditions, and Indigenous physical and cultural heritage). Therefore, the conclusions regarding Project effects on Aboriginal and treaty rights in Volume 4, Section 10.4 of the EIS, the response to IR IAAC-R1-122, Table IAAC -122-1, and the response to IR IAAC-R2-29, Table IAAC-R2-29-1 remain unchanged.

c. **Indicate how all Indigenous input and knowledge collected during engagement processes has informed or influenced changes and revisions to Project documentation such as Environmental Management Plans and information request responses.**

Preamble

Information received from Indigenous groups has informed and influenced the Project design, Project planning, and mitigation planning process. As described in Volume 1, Section 2 of the Project EIS, Indigenous engagement has been an important input to various documents describing the process to select the Project among various alternatives and to shape its scope. The key Project documentation is the EIS, and Volume 4, Section 5 summarizes the Indigenous engagement process, with subsections in each VC-based section (i.e., 6.2.1.2 on physical environment, 7.2.1.2/7.2.1.3 on aquatic environment, 8.2.1.2 on terrestrial environment and 9.2.1.1 on human environment) summarizing key concerns and how/where they were addressed in the document.

Question IAAC-R3-07
October 27, 2023

The response to IR IAAC-R3-06c describes the current status of Indigenous groups' involvement in the development of Project documentation such as Environmental Management Program (EMP) plans and IR responses, which is summarized below.

EMP Plans

Manitoba Transportation and Infrastructure began sharing the draft EMP plans with Indigenous groups in November and December 2020. Funding was offered to 15 Indigenous groups to support this review. As the EMP plans are considered "living documents," they have been adapted to include input from potentially affected Indigenous groups and stakeholders. Updated EMP plans were filed as part of the June 2022 supplemental response to the IAAC's Round 1 IRs, and updated EMP plans were shared again with Indigenous groups for comment in fall 2022. Additional funding was offered to Indigenous groups to support this secondary review of updated EMP plans (and final Round 1 IAAC Information Request responses). Feedback received has been included in the subsequent refinement of mitigation strategies and the EMP, as appropriate.

The response to IR IAAC-R2-29, Table IAAC-R2-29-1 includes relevant mitigation measures that have been developed to reconcile and address concerns and issues raised by Indigenous groups related to potential Project effects on Indigenous health and socio-economic conditions. Much of this input has become part of the EMP plans, as described in the response to IR IAAC-R2-29, Table IAAC-R2-29-1.

Manitoba Transportation and Infrastructure staff and consultants have offered presentations on the proposed EMP plans to Indigenous groups to explain their purpose, function, details regarding implementation, and how the plans have been updated based on feedback received. Presentations were designed to be flexible and cover the environmental management framework broadly or focus on the information provided in specific plans, based on a community's preference (e.g., groundwater management, surface water management, and/or access management). The main objective of these presentations was to hear concerns and input from a variety of user groups, including Elders, fishers, trappers, and hunters. These presentations also provided the opportunity for Manitoba Transportation and Infrastructure to hear concerns that communities had regarding the proposed Project and its potential adverse effects on the exercise of their Aboriginal and treaty rights, in relation to the proposed EMP plans. Information shared during these presentations was considered in the further refinement of mitigation strategies and environmental management and/or monitoring plans, so that any potential impacts from the proposed Project are appropriately assessed and mitigated.

Specifically, EMP review meetings were held as follows:

- Little Saskatchewan First Nation – October 7, 2020.
- Pinaymootang First Nation – January 26, 2021.
- Sagkeeng First Nation – March 2, 2021.
- Sandy Bay Ojibway First Nation – March 26, 2021.

- Fisher River Cree Nation – April 28, 2021; May 4, 5, 6, 2021.
- Peguis First Nation – May 12, 2021; May 21, 2021.
- Kinonjeoshtegon First Nation – September 23, 2021.

Recognizing the challenges due to the COVID-19 pandemic, Manitoba Transportation and Infrastructure adjusted the process to gather feedback on the draft EMP plans. Manitoba Transportation and Infrastructure's initial approach was to distribute information packages, provide presentations and discuss the draft plans. With the need to limit in-person meetings, Manitoba Transportation and Infrastructure and its consultants adapted to support Indigenous groups' review of the plans. Hard copy packages were sent to all 39 potentially affected Indigenous groups on November 16 and 30 and December 7, 2020, including printed and electronic copies of the 23 draft EMP plans. In addition, the draft EMP plans were posted online on the proposed Project's webpage. To assist with information sharing and to provide an alternative way to provide feedback, virtual open houses were developed through the proposed Project's profile on the Manitoba public engagement portal - EngageMB.

To accept feedback and promote dialogue, individual questionnaires were also developed and included with the EMP plans, made available online, and integrated into the virtual open house platform. Due to the COVID-19 pandemic and in response to requests from Indigenous groups, Manitoba Transportation and Infrastructure made additional funding available to communities to assist with the review of the 23 draft EMP plans. Manitoba Transportation and Infrastructure extended the timeframe to review the draft plans multiple times, with final feedback requested by April 17, 2021. Manitoba Transportation and Infrastructure communicated that it remained committed to reviewing and considering any information shared after that date, while the planning and regulatory processes for the proposed Project were still underway.

Fifteen (15) Indigenous groups were offered funding for their draft EMP reviews, based on their known interest and likelihood of experiencing potential impacts from the proposed Project. These Indigenous groups are: Dauphin River First Nation, Lake St. Martin First Nation, Little Saskatchewan First Nation, Pinaymootang First Nation, Peguis First Nation, Fisher River Cree Nation, , Manitoba Métis Federation, Hollow Water First Nation, Norway House Cree Nation, Sagkeeng First Nation, Sandy Bay Ojibway First Nation, Tataskweyak First Nation, Lake Manitoba First Nation, Kinonjeoshtegon First Nation, and Pimicikamak Okimawin. Feedback regarding the draft EMP plans received to date, and input received during the continued EA process, has and will continue to inform improvement to the measures to monitor and manage potential Project effects.

As of July 15, 2023, written responses on the draft EMP plans have been received from: Fisher River Cree Nation, Hollow Water First Nation, Interlake Reserves Tribal Council, Little Saskatchewan First Nation, Lake St. Martin First Nation, Manitoba Métis Federation, Loon Straights Northern Affairs Community, Norway House Cree Nation, Pimicikamak Okimawin, Pinaymootang First Nation, Pine Dock Northern Affairs Community, Sagkeeng First Nation, Sandy Bay Ojibway First Nation and Tataskweyak Cree Nation.

As identified in individual EMP plans, each plan was developed to support the EMP as a whole for the proposed Project and has been prepared by Manitoba Transportation and Infrastructure as a way to share information and facilitate discussions with Indigenous groups, stakeholders, and the public. The EMP plans have been prepared using existing environmental and engineering information and professional expertise, as well as information from previous and ongoing public and Indigenous engagement and consultation. The contents of the EMP plans are based on conditions and information existing at the time the specific EMP plan was prepared and may be subject to change. The EMP plans should be read as a whole, in consideration of the entire EMP, and sections or parts should not be read out of context.

Revisions to EMP plans have been informed by and will be based on information received from the engagement and consultation process, the EA process, Project planning activities, and on conditions of provincial and federal environmental regulatory approvals received for the proposed Project. The EMP plans will be subject to further changes after receipt of Project approvals, including those identified through adaptive management. Potential changes to the plans will be shared with regulators, Indigenous groups, and other stakeholders prior to implementation of the changes. A revision number or subsequent amendment would be added to the specific EMP plan to communicate the revision or change. Furthermore, opportunities are being provided for the Environmental Advisory Committee (EAC) to review EMP plans and provide feedback to help finalize these documents prior to Project construction. In addition, if Project related impacts are observed, the EAC will have an opportunity to provide advice to Manitoba Transportation and Infrastructure to update or add additional mitigation measures to the EMP plans.

The EMP plans are living documents that Manitoba Transportation and Infrastructure will review and update on a regular basis, with continuous improvement being made so that the proposed Project is constructed, operated, and maintained in an environmentally responsible manner. These plans are also available for review by federal and provincial governments and the general public. Continued feedback will be considered in further refinement of the EMP plans in the future. Manitoba Transportation and Infrastructure and their technical experts will be reviewing and updating these plans to finalize the proposed Project's design and prepare for construction once necessary approvals are received.

IR Responses

In advance of a formal submission of Round 1 of Technical and Public Information Requests, Manitoba Transportation and Infrastructure provided the Technical and Public Information Request draft responses to Indigenous groups. The intention was to provide an opportunity for early issue identification, facilitate discussion on substantive issues, and identify matters requiring continued dialogue and resolution. As of April 2022, written comments were received from the following Indigenous groups:

- Fisher River Cree Nation (FRCN 2022a, 2022b, 2022c, 2022d, 2022e, 2022f).
- Hollow Water First Nation (HWFN 2021a, 2021b).

- IRTC (IRTC, SAFN, & SBOFN 2022; IRTC 2022a, 2022b, 2022c, 2022d).
- Lake St. Martin First Nation (LSMFN 2020a, 2020b, 2022).
- Little Saskatchewan First Nation (LSFN 2022).
- Manitoba Métis Federation (MMF 2021a).
- Misipawistik Cree Nation (MCN 2021).
- Norway House Cree Nation (NHCN 2022; A.L. Ecologic 2021, 2022).
- Peguis First Nation (Peguis First Nation 2020, 2022a).
- Pimicikamak Okimawin (A.L. Ecologic 2021, 2022).
- Pinaymootang First Nation (PFN n.d., 2022a, 2022b, 2022c, 2022d, 2022e)).
- Sagkeeng First Nation (IRTC, SAFN, & SBOFN 2022; SAFN 2022a; SAFN & SBOFN 2022a, 2022b, 2022c).
- Sandy Bay Ojibway First Nation (IRTC, SAFN, & SBOFN 2022; PFN, SAFN & SBOFN 2022a, 2022b, 2022c; SBOFN 2022a).
- Tataskweyak Cree Nation (TCN 2022).

Project-specific reports have been received from the IRTC (Olson et al. 2020a), Little Saskatchewan First Nation (Olson et al. 2020b), The Manitoba Métis federation (MMF 2021b), Lake St, Martin Fist Nation (LSMFN 2021), Fisher River Cree Nation (FRCN 2021), Peguis First Nation (Peguis First Nation 2022b), Pinaymootang First Nation (PFN 2021; Tam et al. 2022), Sandy Bay Ojibway First Nation (SBOFN 2021) and Sagkeeng First Nation (SAFN 2021). In addition to opportunities to provide input to EMP plans, Manitoba Transportation and Infrastructure integrated input received from ongoing engagement, or through written input, to the various IR responses. The Round 1 responses to Public IRs include a section typically called Views of Indigenous Groups, which summarizes input relevant to the response and how it has been addressed.

Similar early opportunities for input were provided in the Round 2 process. Manitoba Transportation and Infrastructure provided IAAC with a preliminary Round 2 IR response package to share with Indigenous groups for their review and input in advance of the formal review process, in order to give communities and regulators more time outside the legislated timelines to review and provide comment. Written comments were received from the following Indigenous groups:

- Lake St. Martin First Nation (LSMFN 2022).
- Fisher River Cree Nation (FRCN 2022f).
- Little Saskatchewan First Nation (LSFN 2022).
- Pinaymootang First Nation (PFN 2022f).
- Poplar River First Nation (PRFN 2022).
- Sagkeeng First Nation (SAFN 2022).
- Sandy Bay Ojibway First Nation (SBOFN 2022a; 2022b).

Round 2 IR responses include a Preamble section which references the specific input received and typically how/where in the response it is addressed. Furthermore, written comments from Indigenous groups on Round 2 Information Requests were reviewed and integrated into Round three responses, where possible.

As Project TLRU reports have been received from Indigenous groups, the information has been reviewed and integrated into IR responses as appropriate. Manitoba Transportation and Infrastructure has received TLRU reports from the IRTC (Olson et al. 2020a), Little Saskatchewan First Nation (Olson et al. 2020b), The Manitoba Métis federation (MMF 2021b), Lake St, Martin Fist Nation (LSMFN 2021), Fisher River Cree Nation (FRCN 2021), Peguis First Nation (Peguis First Nation 2022b), Pinaymootang First Nation (PFN 2021; Tam et al. 2022), Sandy Bay Ojibway First Nation (SBOFN 2021) and Sagkeeng First Nation (SAFN 2021).

d. **Describe how Indigenous input and knowledge has been incorporated into mitigation and adaptive management measures, providing specific examples for each Indigenous group.**

As noted in the Preamble to Part c above, information received from Indigenous groups has informed and influenced the Project design, Project planning, and mitigation planning processes. This includes input into the process to select the Project among various alternatives and to shape its scope to avoid adverse effects. It includes input into the various VC-based sections of the EIS. Input often did not explicitly include mitigation measures, but provided important perspectives on effects, which influenced the mitigation being developed.

Manitoba Transportation and Infrastructure has undertaken a Project-specific Indigenous consultation and engagement process for the proposed Project. This process has provided Indigenous groups with meaningful opportunities to express their views and concerns related to the proposed Project's potential effects. Information about socioeconomic and health conditions has been gathered through Project-specific socio-economic studies, traditional knowledge studies, community consultation reports, community meetings, socio-economic surveys, and results of the Indigenous consultation and engagement process for the proposed Project. The response to IR IAAC-R3-06c describes the current status of Indigenous groups' involvement in the development of mitigation and adaptive management measures.

As described in the response to Part c above, the process of offering Indigenous groups an opportunity to review EMP plans provided a tangible venue to gather input on mitigation measures. Information provided in draft plans or through discussions with communities included information about the plans and associated proposed mitigation adaptive management measures. This input was considered in the further refinement of mitigation strategies and environmental management and/or monitoring plans, so that any potential impacts from the proposed Project are appropriately assessed and mitigated.

Question IAAC-R3-07
October 27, 2023

Manitoba Transportation and Infrastructure's response to IR IAAC-R2-29, Table IAAC-R2-29-1 includes relevant mitigation measures that have been developed to reconcile and address concerns and issues raised by Indigenous groups related to potential Project effects on Indigenous health and socio-economic conditions. In addition, Section 3 of the ICSER which was included as Attachment 2 of Manitoba Transportation and Infrastructure's response to the Round 2 IRs on July 24, 2023, discusses some key mitigation measures that were implemented as a result of Indigenous groups' feedback.

As noted in the response to IR IAAC-R3-06c, the following are some key mitigation measures developed based on feedback from Indigenous groups:

- **Channels alignment:** The final route alignment for the Project was chosen to focus on addressing key concerns heard regarding impacts to groundwater and drinking water. The outlet location for the LSMOC was routed to the south of willow point as a result of input from Indigenous groups.
- **Revisions to EMP:** In response to feedback collected during Indigenous consultation and engagement, several EMP Plans have been revised. Plans revised include the Aquatic Effects Monitoring Plan (AEMP), Access Management Plan (AMP), Heritage Resources Protection Plan and Wetland Offsetting Program. More information can be found in Section 3.6 of the ICSER, which was included as Attachment 2 of Manitoba Transportation and Infrastructure's response to the Round 2 IRs on July 24, 2023.
- **Wetland Offsetting Program:** This program includes offsetting for wetlands directly affected by the proposed Project as well as peatlands (see the July 2023 response to IR IAAC-R2-13 and Wetland Offsetting Program). Manitoba Transportation and Infrastructure is exempt from providing offsetting under *The Water Rights Act* (Manitoba), where wetland offsetting is a provincial requirement of some proponents developing in Class III habitats; regardless, based on concerns expressed by several Indigenous groups, Manitoba Transportation and Infrastructure is voluntarily following the intent of *The Water Rights Act* requirements by providing offsetting for the loss or alteration of 239 ha (0.923 square miles) of Class III, IV, and V wetlands that are directly affected by the proposed Project. In addition, 769 ha (2.97 square miles) of other wetlands (peatlands) will be directly affected by the proposed Project. The inclusion of providing offsetting for peatlands affected by the proposed Project is a recent addition identified in 2023 (as outlined in the response to IR IAAC-R2-13 submitted to IAAC on July 24, 2023). Peatland offsetting is being included as a mitigation measure to fulfill and accommodate the request of Indigenous groups. Depending on the outcome of the Wetland Monitoring Plan, additional no-net-loss offsetting may be provided for wetlands that are demonstrated to be affected by the proposed Project (where effective mitigation cannot be applied).

- **Wetland Monitoring Program:** The Wetland Monitoring Plan (WetMP) was developed in response to comments received from governmental, Indigenous and other stakeholder groups and to provide a monitoring program that assesses potential indirect effects on wetlands, including changes to class/size of wetlands, surface and groundwater quality and quantity, vegetation cover (plant species compositions/abundance) and wildlife habitat from changes to groundwater and surface water regimes for those wetlands located beyond the proposed Project footprint.
- **Channels armouring to mitigate erosion:** In response to feedback from Indigenous groups identifying concerns about erosion, Manitoba Transportation and Infrastructure has made the commitment to mitigate potential erosion of the channels by fully armouring the Lake Manitoba Outlet Channel (LMOC) and Lake St. Martin Outlet Channel (LSMOC) base and side slopes.
- **Channels operation:** In response to feedback from Indigenous groups during commissioning of each channel, Manitoba Transportation and Infrastructure intends to incrementally increase flows over multiple days to minimize sediment transport. Once operating, the channels will be armoured and revegetated, and therefore, sediment should not be an issue. Monitoring identified in the Sediment Management Plan and Aquatic Effects Monitoring Plan will be conducted to verify its assessment.
- **Wildlife movement:** In response to Indigenous group feedback, Manitoba Transportation and Infrastructure has refined the channel design to facilitate animal movements by incorporating gentler side slopes (5:1) and using smaller diameter crushed rock (<100 mm [<3.94 inches] in diameter) for armouring and erosion protection, instead of riprap (larger diameter rock). This modification will reduce wildlife injury and visual obstacles to facilitate wildlife entry and exit from the channel while still providing erosion protection.
- **Fish and fish habitat mitigation:** In response to concerns raised by several Indigenous groups, Manitoba Transportation and Infrastructure has added several refinements to the proposed Project's design process. These include improvements to the riparian flow (base flow) for the LMOC, to address potential low dissolved oxygen levels and effects to fish in the channel, and design enhancements in the LSMOC drop structures, to minimize effects from downstream fish passage.

Manitoba Transportation and Infrastructure has committed to using an adaptive management approach to improve environmental protection and minimize any unanticipated adverse environmental effects from the proposed Project. Adaptive management is a process of continual improvement founded on learning from the outcomes of existing programs and measures. Manitoba Transportation and Infrastructure will learn from both scientific monitoring of environmental variables as well as observations and concerns identified by local Indigenous groups, which may reflect traditional or local ecological knowledge. Indigenous groups will continue to be able to provide input and advice to Manitoba Transportation and Infrastructure on mitigation measures, either directly to Manitoba Transportation and Infrastructure or through the EAC, should any environmental impacts be documented as a result of the proposed Project.

Manitoba Transportation and Infrastructure has sought feedback from Indigenous groups on what level of involvement and participation they would desire in the follow-up and monitoring activities outlined in the EMP plans and has proposed the development of an EAC as an ongoing information sharing forum. Manitoba Transportation and Infrastructure anticipates that the EAC will steward these activities and the July 2023 response to IR IAAC-R2-30 provides more detail on the proposed structure and function of this committee.

As outlined in the ICSER, which was included as Attachment 2 of Manitoba Transportation and Infrastructure's response to the Round 2 IRs on July 24, 2023, Manitoba Transportation and Infrastructure is committed to ongoing consultation and engagement with Indigenous groups and will continue to engage with Indigenous groups on mitigation and adaptive management measures. The EAC has been formed for the Project to facilitate information sharing and for communities to provide advice or recommendations to Manitoba Transportation and Infrastructure on the ongoing refinement and implementation of the EMP. Manitoba Transportation and Infrastructure anticipates that the EAC will provide opportunities for Indigenous groups to provide input on mitigation and adaptive management measures. In both the EAC and ongoing community meetings, Manitoba Transportation and Infrastructure will be prepared to present and discuss the results on monitoring and any necessary adjustments to mitigation and adaptive management measures.

e. **Provide a summary analysis of Table IAAC-R2-29-1, including specific examples of key issues for each Indigenous group, and an assessment of common and unique issues raised by Indigenous groups.**

In IR IAAC-R2-29, IAAC requested a comprehensive description and analysis of how changes to the environment could affect the health and socio-economic conditions of Indigenous peoples, including descriptions of proposed mitigation and follow-up measures. Responding to this IR required Manitoba Transportation and Infrastructure to integrate a large volume of material touching on several different sections of the EIS for the Project, numerous IR responses, and the entire record of Indigenous consultation and engagement for the Project. The response to IR IAAC-R2-29, Table IAAC-R2-29-1 was intended to provide a consolidated description of potential effects on Indigenous health and socio-economic conditions that takes into account the interactions among effects to related biophysical and socio-economic VCs and change in conditions, attributes, sites, lands, resources, or structures of relevance for Indigenous groups. Manitoba Transportation and Infrastructure understands that the response to IR IAAC-R2-29, Table IAAC-R2-29-1 is large and complex. However, the nature of the request, the volume of filed material on the record, and the number of Indigenous groups engaged on the Project precludes any succinct or simple response.

A summary analysis of the response to IR IAAC-R2-29, Table IAAC-R2-29-1 will of necessity be high level and unavoidably lose important detail and precision. Manitoba Transportation and Infrastructure therefore recommends relying on the response to IR IAAC-R2-29, Table IAAC-R2-29-1 for a fulsome description of potential Project effects to Indigenous health and socio-economic conditions. However, to assist in the understanding of the material provided, a summary analysis of the response to IR IAAC-R2-29, Table IAAC-R2-29-1 is provided below.

Question IAAC-R3-07
October 27, 2023

1. **Key Issues**:
   - Current and Future Availability of Country Foods.
   - Water Quality (drinking, recreational, and cultural uses).
   - Mental and Social Well-being.
   - Economic Conditions.
   - Use of Navigable Waters.
   - Food Security.
2. **An assessment of common and unique issues**:
   - Reduced or loss of access to traditionally harvested country foods will be mitigated to the extent possible by engineering design opportunities to reduce directly affected land and operational restrictions described in management plans, resulting in some localized effects but retention of availability and access regionally.
   - Changes to groundwater adjacent to the Project and sediment discharge into lakes by Project will be mitigated to the extent possible through engineering design and channel operational controls, resulting in localized ground and surface water effects and reduced effects to fish and aquatic habitat in downstream lakes.
   - Effects on Indigenous health from Project construction and operation will be mitigated to the extent possible by implementation of multiple management plans and adaptive response to outcomes of continuing community engagement, including EAC.
   - Effects on Indigenous employment and economy will be both adverse from influx of Project workforce, effects on commercial activities, including trapping and forestry, and recreation and tourism, positive from Project related employment and training opportunities and benefits for Indigenous owned businesses. Adverse effects will be mitigated to the extent possible through use of temporary work camps and development of training opportunities for Indigenous peoples, and adaptive response to outcomes of continuing community engagement, including EAC.
   - Loss or alteration of water-based travel routes and navigational hazards presenting impediments to water travel will be mitigated to the extent possible through enacting measures in the Project Environmental Requirement to minimize debris issues and implementation of the AMP to address issues that relate to navigation.
   - Changes to quality and distribution of species harvested for country foods, increased reliance on more expensive store-bought foods, and adverse effects to agricultural lands on reserves will be mitigated to the extent possible by engineering design opportunities to reduce directly affected land and operational restrictions described in management plans, resulting in some localized effects but retention of availability and access regionally.

f. **Discuss Project potential effects to cultural continuity, including knowledge transmission, sense of place, and cultural identity, and provide mitigation, monitoring, and follow-up measures related to these effects.**

The CEAA EIS Guidelines for the Project directed Manitoba Transportation and Infrastructure to consider "the cultural value or importance associated with traditional uses or areas affected by the Project (e.g., values or attributes of the area that make it important as a place for inter-generational teaching of language or traditional practices, communal gatherings, integrity of preferred traditional practice areas)" (CEA Agency 2018, p. 34).

Volume 4, Section 10.2.4.7 of the EIS for the Project considers potential effects to changes to cultural value or importance associated with current use, based on effects pathways identified through the Indigenous consultation and engagement process for the Project. Cultural values are generally intangible and unquantifiable, and potential effects on cultural values can include changes to cultural transmission, language retention, sense of place, patterns of cultural behaviour, and the sensorial experience of traditional land users. Potential effects to the cultural value or importance associated with current use identified by Indigenous groups include spiritual and cultural experiences of activities or practices, sense of place and well-being, and transmission of Indigenous knowledge, laws, customs, and traditions. Changes to the environment resulting from the Project that have the potential to affect cultural values include values or attributes of the area that make it important as a place for intergenerational teaching of language or traditional practices, communal gatherings, or integrity of preferred traditional practice areas.

The purpose of the Project is to reduce existing adverse effects created by periodic regional flooding. Flooding can impact cultural value and importance through damage or destruction of important cultural and spiritual sites and areas, disruption of cultural experiences, activities, or practices, unsettling a sense of place and well-being, and dislocation of community members. By alleviating the effects of regional flooding, the Project is expected to reduce property damage and episodes of dislocation for Indigenous groups, result in positive effects on Indigenous mental health and social wellbeing and reduce effects cultural value or importance associated with current use.

Proposed mitigation measures that may serve to reduce or avoid Project effects to the cultural value or importance associated with current use are discussed in Volume 4, Section 10.3.3.2 of the Project EIS and response to IR IAAC-R2-29, Table IAAC-R2-29-1. These include ongoing engagement by Manitoba Transportation and Infrastructure with potentially affected Indigenous groups and implementation of measures to continue to provide access and minimize disturbances to traditional practices, opportunities to harvest traditional plants and medicines in advance of Project construction, firearms restrictions for Project workers, public access restrictions to protect the public from potential hazards created by the new construction, signage to inform the public about potential safety issues, such as at the inlet, outlet and water control structure areas. Use of areas close to the Lake St. Martin Outlet Channel (LSMOC) by individuals not directly associated with the Project may be authorized for certain user groups (e.g., Indigenous peoples who intend to carry out traditional practices) to the extent that such access is safe. Manitoba Transportation and Infrastructure also anticipates that

potential effects of the Project on cultural values may be addressed through ongoing engagement, including through participation of local Indigenous groups in the EAC.

g. **Discuss Project potential effects to ice fishing and provide mitigation, monitoring, and follow-up measures related to these effects.**

As noted in the Context and Rationale section above, Rights Impact Assessments provided by Indigenous groups include documentation of concerns about changes to shoreline access for ice fishing purposes due to changes in water levels, and changes in the ability to safely access preferred fishing areas due to Project-related changes in water flow currents that affect ice depth patterns, especially during priority fishing times (i.e., during first and last ice in the fall and spring, respectively). This response explains the potential effects to ice fishing and how this will be managed.

As noted in the Volume 4, Section 9.2.2, and 9.2.4.5 of the Project EIS, commercial, subsistence and recreational fishing take place in Lake Manitoba, Lake St. Martin, Lake Winnipeg, Dauphin River, and Mantagao River, as well as some tributary watercourses. Lake Manitoba, Lake St. Martin and Lake Winnipeg provide fisheries resources and/or income to Indigenous groups, permanent and seasonal residents, tourists, farmers, and recreational and commercial fishers within the region. Commercial, subsistence and recreational fishing takes place in the open water and winter seasons. Commercial fish species harvested in Lake St. Martin are harvested during a winter fishery and spring fishery. Commercial fish species harvested in Lake Winnipeg are harvested as part of a summer/fall fishery and a winter fishery. Commercial bait fishing is also practiced in Birch Creek, Mercer Creek and Watchorn Creek, but only during the open water season.

Ice effects are discussed in Volume 2, Section 6.4.7.6 and Volume 5, Section 14 of the Project EIS. Ice conditions can create access and safety issues under current conditions. Warmer winters can influence the thickness of ice, making travel unsafe. Of particular concern is the generation of frazil ice (small disc-shaped crystals), which occurs when flowing water becomes supercooled by below freezing air temperatures and is a common occurrence in rivers in Northern Manitoba. The generated frazil ice will flocculate and grow into ice pans as it progresses downstream. This has the potential to create large ice dams that could cause substantial water level staging in watercourses or outlet areas to lakes and can create issues during the spring, as the thicker ice cover caused by the ice dams will be slower to melt and may result in reduced channel conveyance at a time when maximum channel capacity may be required. As noted in the July 2023 response to IR IAAC-R2-23, ice jams are an existing issue on rivers that flow into Lake Winnipeg such as the Dauphin, Red, and Icelandic rivers and can cause flooding in spring, as the river does not have sufficient velocity to push or move the ice jam.

The Project EA examined issues associated with ice, and whether the Project might change ice formation processes. It was determined that the changes to regional flows and lake levels due to operation of the Project, and the changes in local drainage areas and local drainage patterns due to construction and operation of the Project, may affect ice processes in these waterways because freeze and thaw cycles in lakes and rivers are related to flow and lake levels.

Based on the observations and results of previous studies in the Project area (such as those for the Emergency Outlet Channel), it is expected that the reduced flows and lake levels will reduce the risk of ice jamming and flooding in the Fairford and Dauphin rivers. In addition, Lake Winnipeg water levels are managed under the Lake Winnipeg Regulation, and changes in lake levels will be within past water level extents and virtually imperceptible among wind and wave action. Therefore, discussion is focused on potential changes to Lake St. Martin.

When the channels are operated during the winter months, it will be at reduced flow rates and there will be less change in water levels on Lake St. Martin during those periods. Therefore, water levels on Lake St. Martin will be more stable and at lower elevations during post-Project operation. During operation of the Project for flood mitigation, water levels on Lake St. Martin will be lower than pre-Project levels, but still greater than normal lake levels and water depths. As indicated above, water levels will be more stable in the post-Project environment (i.e., less variability in water levels during the winter months from December through March). More stable and lower water levels during operation in the post-Project environment should improve shoreline access for fishing purposes over current conditions. In addition, recent MIKE-21 hydraulic modeling completed in Lake St. Martin, including wind/wave effects, shows minimal to no changes in water velocities in Lake St. Martin during the open water season (spring, summer, fall) with the exception of the channel inlets/outlets, Fairford River outlet, and the Lake St. Martin Narrows. These changes will be even less in the ice-covered winter environment. Therefore, ice thickness in the lake should not change, even if there is a repeat of the 2011 flood event. Operation of the Project during the winter will not be required for minor flood events. In addition, the Lake St. Martin Narrows typically does not freeze over completely in the winter in the existing environment; open water leads remain in the constriction where water velocities are highest. Winter operation of the outlet channels will increase flow through the system and could cause some increase in the size of the open water leads that remain through the Lake St. Martin Narrows over the winter.

As a result of the analysis of potential ice effects, no specific ice management practices are anticipated to be required outside of the LMOC and LSMOC, and there should be no changes in access to winter fishing areas, other than the Project inlet and outlet areas. The addition of the Project inlet and outlet areas in Watchorn Bay, Birch Bay, Lake St. Martin and Sturgeon Bay will likely alter ice forming processes in these areas because there will be changes in flows and, in some areas, changes in local shoreline geomorphology. If the water control structure (WCS) gates are opened during early winter periods, the changes in flows could slow the formation of ice at the inlet and outlet areas, and it would require longer periods of time to achieve a solid ice cover in these areas. Volume 2, Section 6.4.7.6 of the Project EIS noted that this localized effect on ice formation could affect transportation across these areas in winter periods.

The Project Ice Management Plan (IMP) was developed to address the operational and safety-related issues associated with ice, and the issue is discussed in response to several IRs, including the May 2022 responses to IAAC-R1-71 and IAAC-R1 68, and the July 2023 responses to IAAC-R2-11 and IAAC-R2-23. Due to the risks and consequences described above, winter operations will require careful adjustments of the WCS gates and continuous monitoring to manage ice conditions in the

channels, including the potential for ice jams and hanging ice dams. The Lake Manitoba and Lake St. Martin Water Control Structures Operating Guidelines include clauses for each channel (Clause 6 for LMOC and Clause 7 for LSMOC) that minimizes flow changes to maintain stable ice conditions. Winter flow limits will be in place to mitigate ice accumulation and the potential rise in water levels.

Regular reconnaissance surveys will be carried out by Manitoba Transportation and Infrastructure Regional Operations staff during freeze up, and monitoring may include the use of a drone to provide visual coverage of inaccessible areas, and/or the use of RADARSAT satellite imagery to provide images of ice conditions. Monitoring will include water levels, ice processes, ice thicknesses and ice front locations.

At the onset of freeze-up, in years when winter operations are required, the WCSs will be operated to reduce or stop flows in the channels, while maintaining baseflow/riparian flow for dissolved oxygen and fish. The short-term loss of discharge capacity during the ice formation period is not anticipated to be overly detrimental to the resulting upstream lake water levels, given the substantial storage capacity available and the lower inflows during this time period. The reduction in water velocity afforded by this action will promote the rapid formation of a stable ice cover. Once formed, this ice cover will insulate the water surface, and curtail the volume of frazil ice that would otherwise be produced. Once a stable ice cover has formed, the WCS gates would be fully opened to allow the channel to operate at the highest winter flow capacity possible. The flow will be increased gradually, and in steps to limit the risk of mechanical breakup of the ice cover. This will limit the severity of ice accumulation in the channel and avoid the formation of a hanging ice dam near the outlet areas. For the LSMOC, this will also limit the severity of ice accumulations on the drop structures.

As indicated, observational monitoring of ice conditions and dike freeboard will be conducted regularly during winter operation so that corrective action can be taken to reduce the chances of ice cover instabilities occurring. It is anticipated that monitoring of ice conditions will occur more frequently during the first few winter operations (i.e., daily to weekly) to document and understand the ice conditions. Monitoring frequency may be adjusted in subsequent years to be commensurate with patterns in the observed ice conditions. If unforeseen ice conditions develop in the outlet channel (i.e., ice jams or excessive accumulation of ice on the drop structure crests), causing reduced freeboard on channel dikes, the WCS gates will be lowered to reduce flow and maintain safe freeboard. Manitoba Transportation and Infrastructure staff will investigate the cause and respond as required. This would include confirming that flow reduction was successful or moving to a secondary response. Secondary responses could involve the use of equipment such as long-reach excavators, if necessary, to assist in clearing ice jams if forecasted flood conditions necessitate the continued operation at higher flows. It could also involve the use of stop-logs to close the WCS, or emergency diking at channel low points.

As noted in the IMP, operation of the outlet channels would be communicated to nearby communities via press releases, forecasts, and reports by the Hydrologic Forecasting Center, and/or real time operation/monitoring data on Manitoba Transportation and Infrastructure's website. Manitoba Transportation and Infrastructure has developed a draft Complaint Resolution Process intended to

collect, respond to, and resolve any Project-related complaints. Complaints regarding ice will be addressed through this process and may include specific monitoring activities such as visual observations, drone flights, surveys, etc., as required on a case-by-case basis.

As discussed in the May 2022 response to IR IAAC-R1-120 and the response to IAAC-R3-01, for reasons of public safety, it is anticipated that the immediate inlet and outlet areas on Lake Manitoba, Lake St. Martin and Lake Winnipeg will be unavailable for use throughout the life of the Project, and that measures such as signage, buoys and safety booms will be implemented to inform and protect boaters from potential hazards and prevent access to these areas. Manitoba Transportation and Infrastructure will monitor these controls after commissioning of the channels and adjust or augment as required to maintain public safety. During channel operation when the Project is conveying floodwater, it is expected that fishers would avoid the immediate areas of the inlets and outlets where water velocities will increase, as this would disrupt gill nets. In addition, as indicated, ice conditions would be unsafe where water velocities are increased at the inlets and outlets, which would affect winter fisheries (e.g., Lake St. Martin). Manitoba Natural Resources and Northern Development Fisheries Branch has indicated that commercial fishing is not currently feasible at the proposed LMOC inlet or outlet locations due to shallow water depth in those areas; in terms of the LSMOC, Sturgeon Bay has both open water and winter commercial fishing but there is no currently known use of the area immediately downstream of the proposed LSMOC outlet location by commercial fishers.

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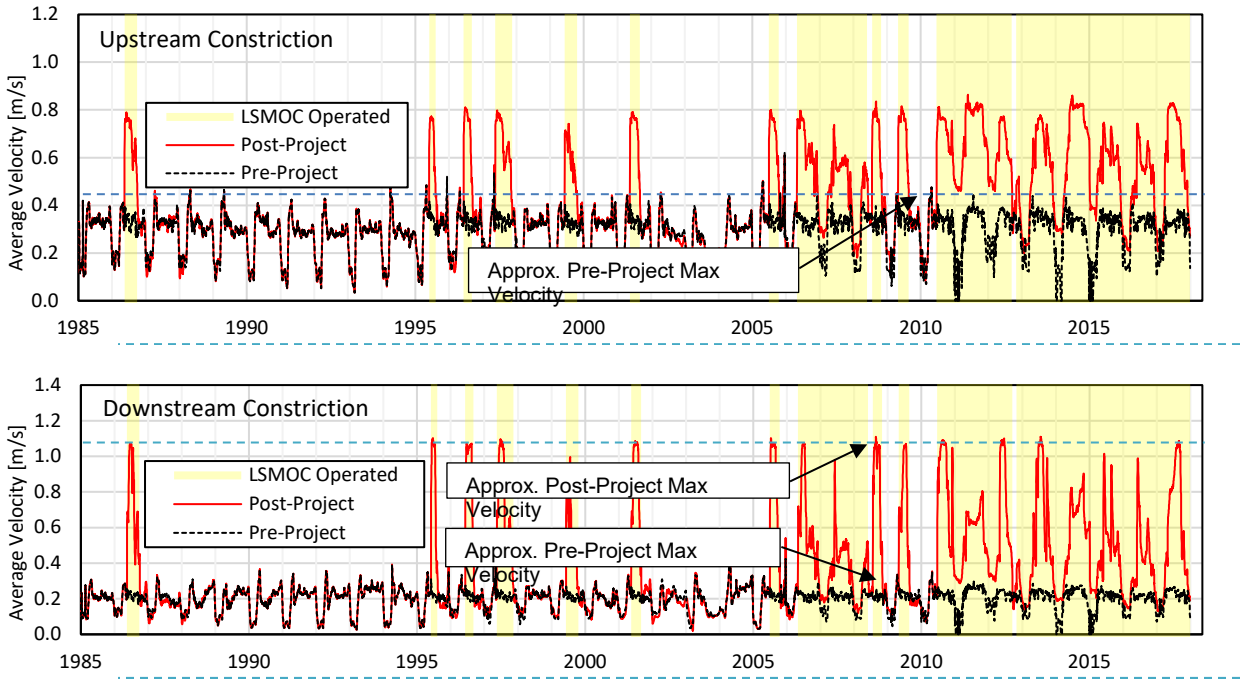
APPENDIX IAAC-R3-01-1: ADDITIONAL HYDRAULIC MODELLING TECHNICAL DATA SUMMARY

Hydraulic Modeling Results

Additional two-dimensional hydraulic modeling of Lake St. Martin (LSM) was completed to simulate the 2011 flood event under pre- and post-Project conditions. While the additional modeling was only completed for the 2011 flood event, previous analysis (KGS Group 2021) has shown that without operation of the channels, the upper bound of velocities experienced at the upstream and downstream constrictions (areas with the highest velocities) are relatively consistent year-to-year, with peak values occurring during the 2011 flood, as shown in Appendix IAAC-R3-01, Figure 1. Similarly, the upper bounds of velocities at these locations are also consistent for each operation of the channels, albeit higher than without operation. Comparing the pre- and post-Project conditions for the 2011 event provides a conservative representation of the relative conditions during operation of the outlet channels.

Appendix IAAC-R3-01-1, Figure 1 Average Cross-Sectional Velocity at Upstream and Downstream Constrictions at Lake St. Martin Narrows, without Effects of Wind

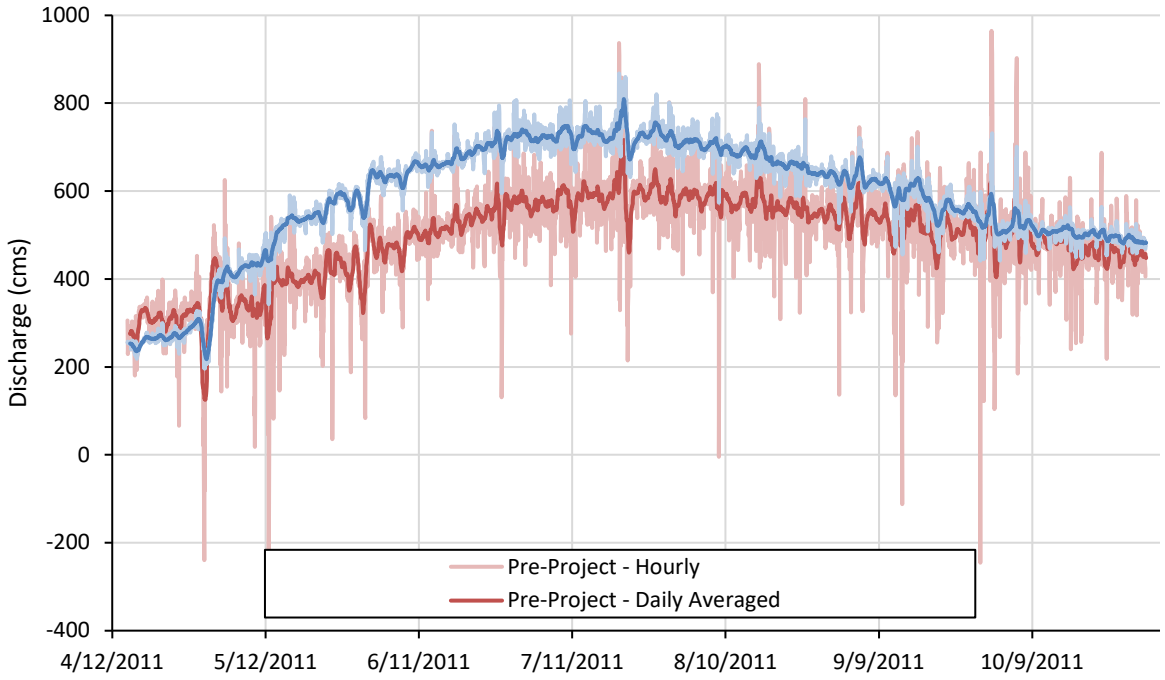


Appendix IAAC-R3-01-1: Additional Hydraulic Modelling Technical Data Summary
October 27, 2023

Recent additional hydraulic modeling incorporated the effects of wind and wave action in LSM, to provide a more comprehensive representation of lake hydraulics. These effects were included by applying wind friction and wave radiation stresses determined from spectral wave modeling. The analysis utilized recorded wind data from the George Island (Climate ID: 5030984) weather station, with missing data infilled with over-water corrected data from Dauphin Airport (Climate ID: 5040689). Including these effects improved the match between simulated and observed water levels in both the north and south basins of LSM, which increases confidence in the overall model results.

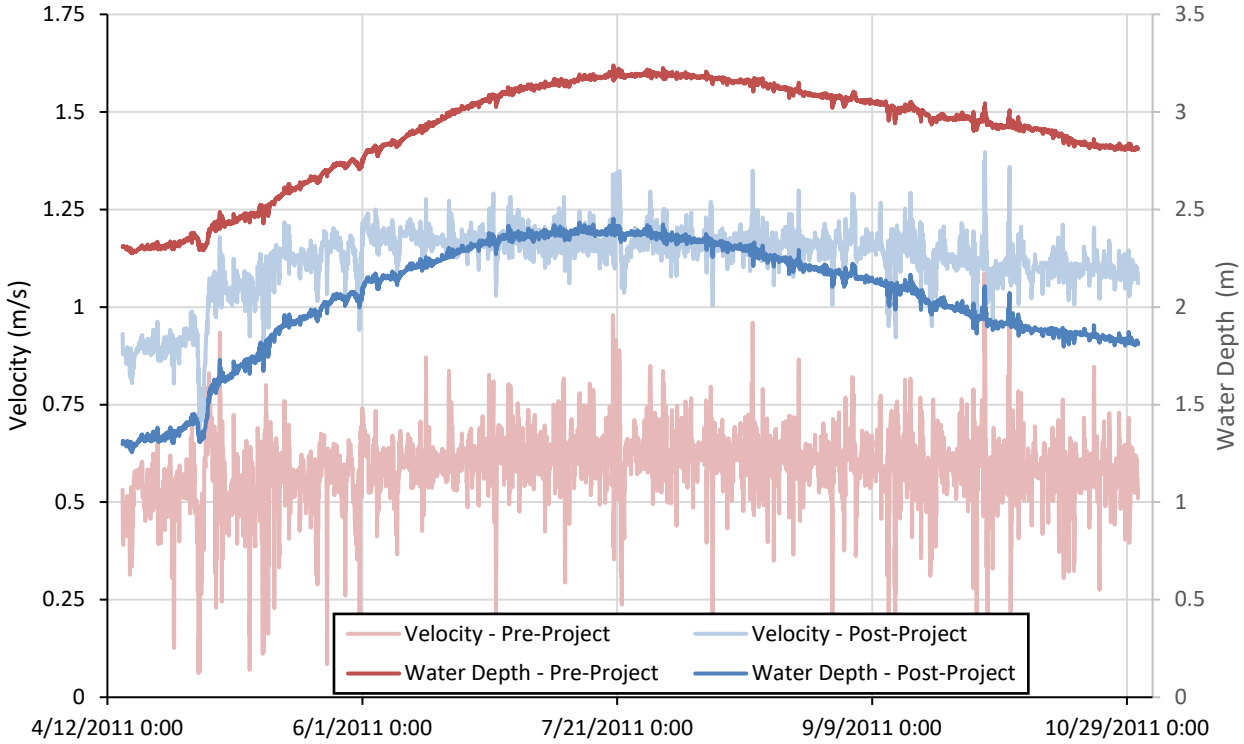
Appendix IAAC-R3-01, Figure 2 shows the hourly and daily averaged discharge (flow) through the LSM Narrows during the 2011 flood event under pre-Project and post-Project conditions. As shown, the daily averaged discharge through the LSM Narrows is approximately 13% greater under post-Project conditions; however, the peak hourly discharge is 10% greater under the pre-Project conditions (shown as light-orange colored spikes in late September / early October, which exceed the light-purple spikes), since higher water levels facilitate greater wind setup induced flow through the LSM Narrows. The fluctuating discharge due to wind effects demonstrates the variability of the hydraulic system under existing conditions.

Appendix IAAC-R3-01-1, Figure 2 Flow through Lake St. Martin Narrows During 2011 Flood Event



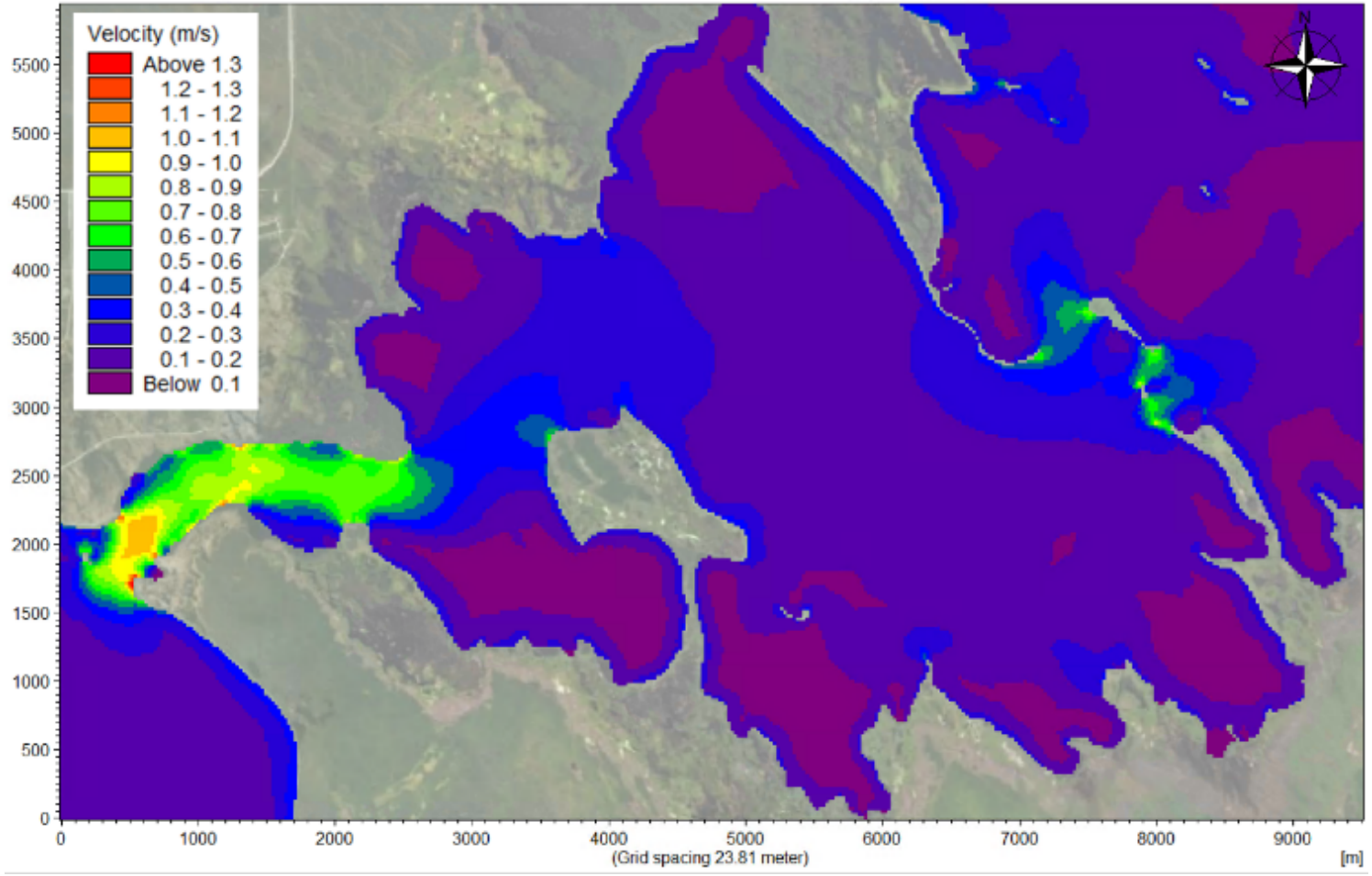
Despite a higher peak hourly LSM Narrows flow under the pre-Project conditions, the peak hourly velocity is greater under post-Project conditions during a repeat of the 2011 flood event. This is evident on Appendix IAAC-R3-01, Figure 3, which shows the simulated depth-averaged water velocity during the 2011 flood event under pre-Project and post-Project conditions at a high velocity location at the center of the upstream constriction. It should be noted that the depth-averaged velocities presented are larger than the cross-sectional averaged velocities since they are taken at a high velocity point within the section, instead of being averaged across the entire cross-section. The higher peak velocity under post-Project conditions suggest that the predicted increase in velocity through the LSM Narrows is mostly due to the lower water levels in LSM (i.e., less flow area to convey similar peak flows), which provides a flood mitigation benefit of reduced overland flooding adjacent to LSM. Improved flood protection and reduced overland flooding of lands surrounding LSM is a key objective of the Project.

Appendix IAAC-R3-01-1, Figure 3 Depth-Averaged Velocity and Water Depth at High Velocity Point Through Upstream Constriction at Lake St. Martin Narrows During 2011 Flood Event

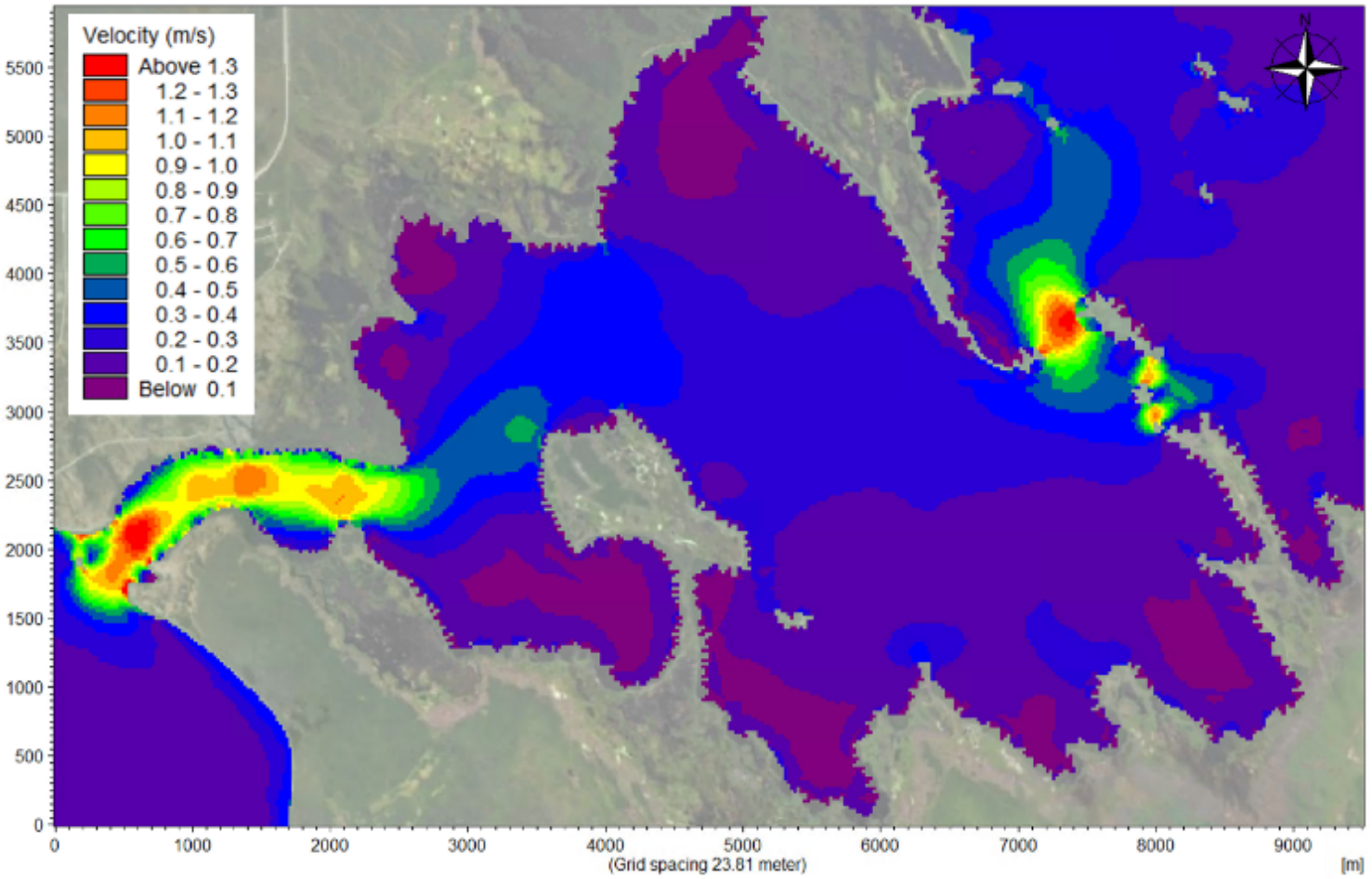


Appendix IAAC-R3-01, Figure 4 and 5 illustrate the maximum depth-averaged velocities simulated for the 2011 open water season under the pre and post-Project conditions, respectively, while Appendix IAAC-R3-01, Figure 6 shows the difference between maximum pre- and post-Project velocities (i.e., the post-Project velocities minus the pre-Project velocities). As shown, the magnitude of both pre- and post-Project velocities, as well as the differences between them, are greatest through the upstream and downstream LSM Narrows constrictions, with increases less than 0.1 metres per second (feet per second) observed throughout most of the LSM Narrows.

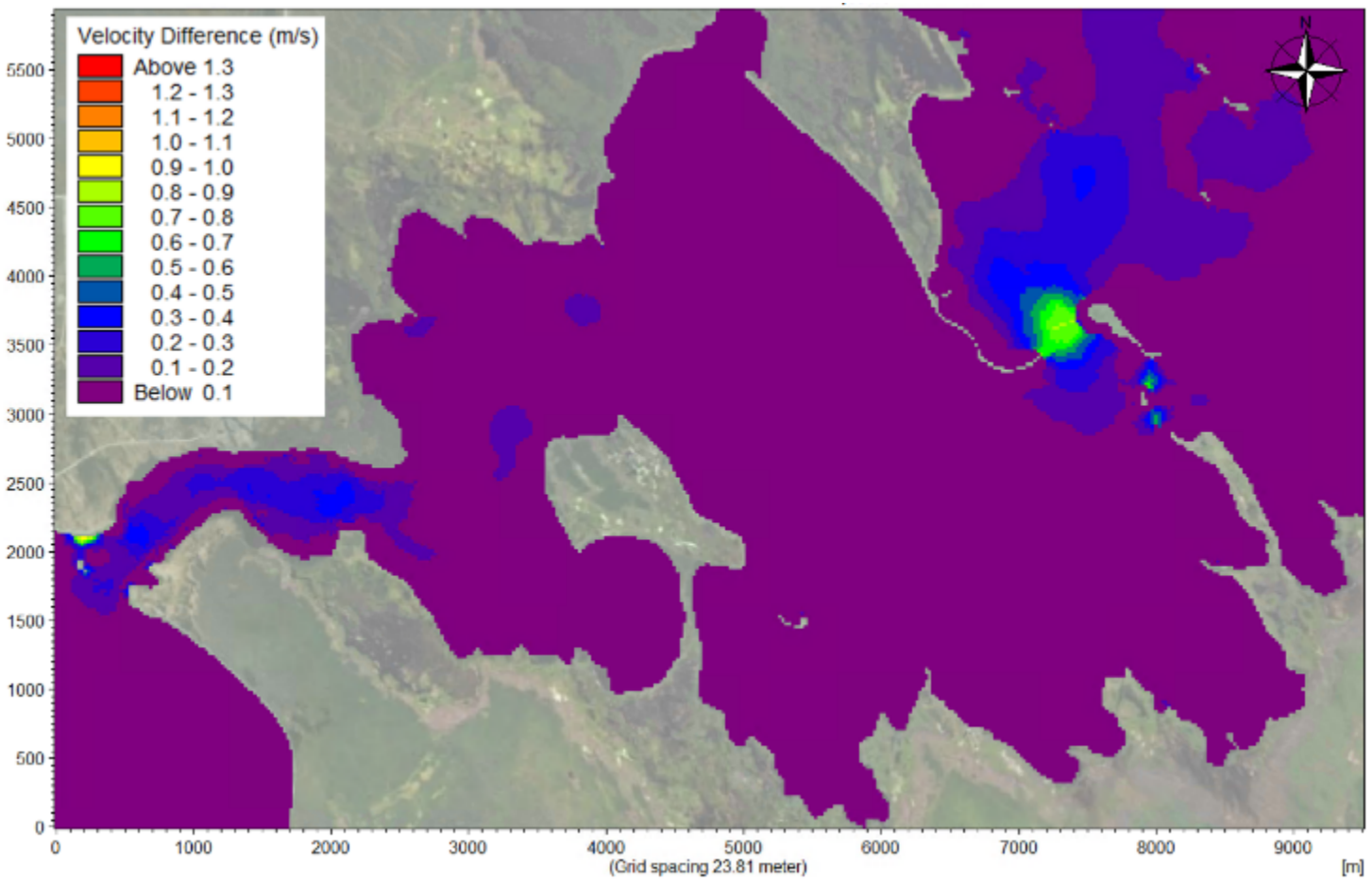
Appendix IAAC-R3-01-1, Figure 4 Pre-Project Maximum Depth-Averaged Velocity During 2011 Open Water Season at Lake St. Martin Narrows



Appendix IAAC-R3-01-1, Figure 5 Post-Project Maximum Depth-Averaged Velocity During 2011 Open Water Season at Lake St. Martin Narrows



Appendix IAAC-R3-01-1, Figure 6 **Post-Project Minus Pre-Project Maximum Depth Average Velocity During 2011 Open Water Season at Lake St. Martin Narrows**



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APPENDIX IAAC-R3-02-1: MIXING CALCULATIONS FOR GROUNDWATER AND SURFACE WATER TO BUFFALO CREEK AND EXISTING REACH 3

Memorandum

To:	James Betke, P.Eng.	**Date:**	October 24, 2023
		Project No.:	18-0300-005
From:	Jason Mann, M.Sc., P.Geo, FGC		
Re:	**Lake St. Martin Outlet Channel Round 3 Information Request – IAAC – R3-02 Mixing Calculations for Groundwater and Surface Water to Buffalo Creek and Existing Reach 3 Channel**		

Background

As part of IAAC R3, the Agency has requested follow up information subsequent to groundwater flow and geochemical characterization previously completed for the response to information Request IAAC -R2-02. Specifically, KGS Group was to characterize groundwater quality and geochemical behavior in the existing Reach 3 channel of the LSMOC, under conditions of high aquifer piezometric pressure conditions, and with relatively low to normal aquifer piezometric pressure conditions. Secondly, analyze groundwater and surface water mixing along Buffalo Creek, in the same manner that was done in the response to IR IAAC-R2-02 for Big Buffalo Lake and the wetlands located upgradient of Buffalo Creek.

The following narrative documents the work completed by KGS Group requested to support the response to this Information Request (IR). Please refer to the site Figure included in Appendix A that includes all locations identified within his memo, in order to reference and refer to locations that will be discussed as part of this IR response.

Hydrologic Channel Conditions – Wet Versus Dry Periods

There is a very important distinction regarding flow through events in Reach 3 of the Emergency Outlet Channel (EOC), when comparing and contrasting the “wet year” conditions of June 2022, the very “dry year” conditions of 2021, and the “normal” summer conditions of 2019. Importantly, there is a channel “plug” which contains, and diverts surface water flows of “Creek 3” across the existing emergency LSMOC channel. Like other upwelling and channelized surface water flows or “creeks” in the vicinity of the LSMOC, its water quality is often a blend of surface water and groundwater. However, depending on the year, the Creek 3 plug may be overtopped, leading to contributions of Creek 3 surface water into the lower reaches and bedrock exposed areas of Reach 3 of the EOC. During “drier” years, the plug is also somewhat leaky. Figures 1 through 4 show photographs of these varying representative conditions.

Figure 1 – June 2022 view of the Creek 3 plug, looking up channel. The flow over this plug proceeds down channel into the bedrock exposed area of Reach 3 of the EOC. The metered flow contribution calculated at the down channel bedrock exposed area of Reach 3 was 0.18 M^3/s at this time.

Figure 2 – June 2022 view of Reach 3 of the EOC, bedrock area, looking down channel. The temporary quarry site is in the upper left of the photo. A significant volume of water is stored in the channel at this time, draining from this reach of the channel over time. Note the high surface water levels adjacent to the channel. The metered flow contribution calculated at the down channel bedrock exposed area of Reach 3 was 0.18 M^3/s at this time.

Figure 3 – June 2019 aerial view of the Creek 3 plug, looking west. The leaky flow through this plug (to the right or dry side of the plug), proceeds down channel into the bedrock exposed area of Reach 3 of the EOC. The metered flow contribution calculated at the down channel bedrock exposed area of Reach 3 was 0.004 M^3/s at this time.

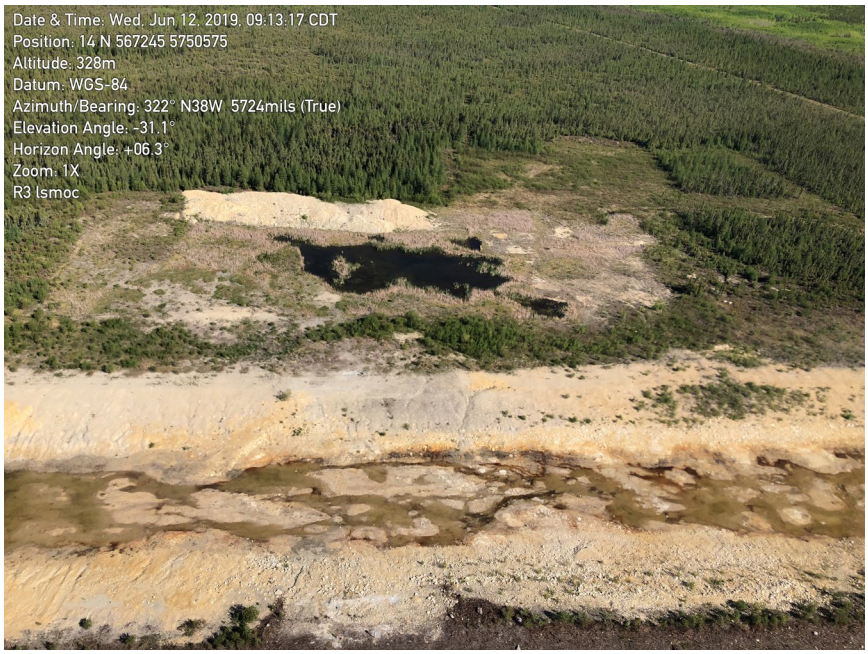


Figure 4 – June 2019 view of the Reach 3 channel, bedrock area, looking west. The temporary quarry site is in the upper part of the photo. Note the low quantity of water, and partially dry channel base, in the channel at this time. The metered flow contribution calculated at the down channel bedrock exposed area of Reach 3 of the EOC was 0.004 M3/s at this time.

While flow metering is completed at the upstream side and downstream side of the bedrock area exposed in the emergency Reach 3 channel, with the delta (difference) calculated between the measurements providing the inferred increase in channel flow related to the exposed bedrock section of the channel and presumed aquifer exfiltration groundwater contribution, the characteristics of the channel and timing of measurements are important to note. As reported in IAAC-R2-02, regional precipitation events leading up to and ending on June 2 were a contributing factor to the channel flow conditions observed and measured on June 7, 2022, including having taken place in an overall wet year.

In particular, there are times where there are associated upstream contributions, such as shown in the photos above, relative to the upstream Creek 3 plug, where significant channel flows originate in upstream areas (i.e. June 2022), and which have an impact on the down channel measurements. This is important to consider in particular when understanding the hydraulic channel conditions downstream of the bedrock exposed area of Reach 3 of the EOC. There are important considerations regarding the June 2022 channel flow measurements from the hydraulic perspective, as follows:

- The spring of 2022 was very wet overall with above average precipitation throughout.
- Peak runoff in the region of the LSMOC occurred in early May, with flows gradually receding after.
- The above average runoff conditions resulted in larger flow volumes conveyed down Reach 3 of the EOC, particularly during early May.
- The uneven ground surface in the existing Reach 3 channel, within the bedrock exposed areas and due to uneven bedrock excavation, results in ponding of water in the channel in that area under higher flow conditions.
- Considering the very wide channel size relative to the precipitation runoff volumes, (the Reach 3 channel was designed for LSM floods which are orders of magnitude larger than the local runoff in this area, even during a wet year such as 2022), the ponded water in this area of the channel can store water over longer periods as outflows from the channel occur more gradually.
- Channel flow metering during June 2022 occurred during the recession of the runoff hydrograph, and following additional regional precipitation that ended on June 2. It is therefore interpreted that a portion of the larger outflows from the bedrock exposed areas of the emergency Reach 3 channel measured and calculated in June of 2022 (0.18 M3/s) are attributed to this local storage effect due to the configuration of the channel, and the observed inputs of surface flows from up-channel areas (e.g. the overflows at the Creek 3 plug) which contribute to the overall water load in the channel and associated storage/drainage effect.

Other notes regarding channel baseflow measurements are that the measurement accuracy of the velocity data can be assumed to be <0.01 m/s, and that the main component of the overall discharge uncertainty can be attributed to the shallow depth and presence of rock/stones in this area of the channel which, considering the relatively small depth of the channel, have an impact on the magnitude of velocity vectors in the water column.

Groundwater and Surface Water Mixing Analyses

PHREEQC (v.3) is a computer program written in the C and C++ programming languages that is designed to perform a wide variety of aqueous geochemical calculations such as mixing of surface water and groundwater to understand surface-subsurface interactions. PHREEQC offers the ability to calculate the ionic distribution of dissolved species in a solution of given chemical composition (Parkhurst and Appelo, 2013). Given defined water qualities and prescribed geochemical reactions, PHREEQC calculates the results using mass-action formulas based on equilibrium-thermodynamic chemistry.

A batch equilibrium-geochemical modeling was performed to complete the mixing calculations of variable proportions of Lake St. Martin surface water, and the bedrock aquifer groundwater. This was to understand the sources and potential proportions of surface versus groundwater source waters in Buffalo Creek, and at Reach 3 of the EOC. Reactive transport modeling was not performed due to some unknown geochemical and hydraulic parameters, including mineral surface area, kinetic rate constants, and solute and groundwater residence times, that are required for more elaborate simulations. Hence, the batch equilibrium modeling becomes an appropriate initial approach to evaluate the mineral equilibrium occurring within the bedrock aquifer. The thermodynamic database that was used for mixing calculations was the standard PHREEQC.dat, that accounts for a range of temperature- and pressure-dependent equilibrium constants, as well as the thermodynamic data on elements and equilibrium reactions involved in the simulations.

During mixing, each input water quality defined in PHREEQC is multiplied by its mixing fraction and the chemical composition of the resulting solution is calculated by summing all of the fractional solutions. As an example, the temperature of the resulting mixture is approximated by multiplying each solution temperature by its mixing fraction, summing these numbers, and divided by the sum of the mixing fractions. In the similar manner, other intensive properties of the mixture are calculated within PHREEQC.

Two parent solutions: Solution 1, representing the Lake St. Martin surface water conditions (hereafter referred to as surface water); and the Solution 2, representing the bedrock aquifer groundwater (hereafter referred to as groundwater), were considered for different mixing proportions, based on outcomes of the IAAC-R2-02 work, reported separately. Separately, more specific scenarios were modelled for Reach 3 of the EOC and Buffalo Creek, for high groundwater flow events measured during June of 2022, where specific surface water sources were used in the calculations relative to specific field observations of June 2022 (see Scenario 8 details, below). The results obtained by the mixing proportion in the software were expressed in molar concentration and further converted to “mg/L” using the molar mass of each element.

It is important to note several key interpretations required for completing this work:

- There is not a simple location within the region of the LSMOC to sample a simple surface water condition, as most of the region of the project has significant groundwater discharge to surface, thus many surface water sites are typically representative of groundwater geochemical compositions (i.e. artesian spring sites) or a variable blend of groundwater and surface water.
- Lake St. Martin being chosen as a surface water “end member” for mixing is a complex (but necessary – it is the only end member reasonably available for surface water in the region of the LSMOC) choice, because the composition of water within the lake varies during times of variable hydrologic flow through events, and is overprinted by unique groundwater geochemistry originating from the adjacent

Lake St. Martin Impact Structure. As described within the KGS Group Water Quality Assessment memo (KGS Group, 2021) "groundwater quality and geochemistry in the Lake St. Martin impact zone near Gypsumville has been documented by researchers (Simpson and Desbarats, 2003) and has a characteristically higher concentration of total dissolved solids including sulphate and sodium as well as boron, fluoride, and strontium. This type of water was not found either in the artesian spring studies (by others) or the current studies of groundwater quality in the LSMOC project area. The LSMOC project area does not appear to be part of the groundwater flow system originating from the Lake St. Martin impact crater zone. There was no evidence found in the current groundwater data in the vicinity of the LSMOC, of any long-distance groundwater flow paths from the impact crater region, surfacing in the groundwater flow system within the LSMOC project area." Importantly, the water quality profile of surface water within Lake St. Martin does vary due to the influence of the adjacent impact crater hydrogeology and geochemistry and varies depending on the magnitude of hydrologic flow through the basin.

- It is recognized that, even during high flow through hydrologic events (e.g. during natural flooding), there is not a direct connection of Lake St. Martin to Big Buffalo Lake or Buffalo Creek, however it is inferred that Lake St. Martin would still represent a surface water quality in the region of the LSMOC that would be most relevant.
- With the complexities observed in Lake St. Martin surface water qualities and hydrologic flow through event differences highlighted above, and because it was used as a key parameter for determining surface water and groundwater interactions on the Lake Manitoba Outlet Channel project, the mixing analyses presented herein were "benchmarked' using Fluorine (F) as a key and unique indicator parameter.

Flow metering by KGS Group in the region of the LSMOC started in the spring of 2021. In terms of hydrologic conditions during the times when surface water data and groundwater data were collected on the LSMOC project, the following general conditions apply:

- 2019 – wet spring, normal summer, wet fall;
- 2020 – wet spring, dry summer and fall;
- 2021 – very dry all year;
- 2022 – very wet spring, normal rest of year.

In terms of groundwater conditions and hydrologic flow through the region of the LSMOC and Big Buffalo Lake:

- During 2021, bedrock aquifer piezometric pressures were relatively low, and flow metering at Reach 3 of the EOC, where bedrock is exposed, and where the bedrock aquifer exfiltrates to surface, indicated flows of <0.01 m^3/s in 2021. At the outlet of Buffalo Creek at the Dauphin River (Buffalo Creek receives groundwater from spring sites and from diffuse groundwater upwelling in the region of LSMOC), measured flows were 0.10 m^3/s.
- During 2022, bedrock aquifer piezometric pressures were relatively elevated, and flow metering at Reach 3 of the EOC, where bedrock is exposed, and the bedrock aquifer exfiltrates to surface, indicated flows of 0.18 m^3/s in June of 2022, and down to 0.06 m^3/s in late September. At the outlet of Buffalo Creek at the Dauphin River (Buffalo Creek receives groundwater from spring sites and from diffuse

groundwater upwelling in the region of LSMOC), measured flows were approximately 10 m^3/s in June of 2022, and down to 0.13 m^3/s in the fall of 2022.

Seven different scenarios based on selection of parent samples and their mixing proportions were considered to understand the source of water accumulated in Buffalo Creek, and eight scenarios were run to understand the surface water mixing conditions at the bedrock exposed area within Reach 3 of the EOC. Those scenarios are as follows (see results and graphics within Appendix B):

1. Mixing the average chemical composition of Lake St. Martin surface water collected between 2021 and 2022, with the average composition of bedrock groundwater samples collected between 2019 and 2022. An optimized proportion of these end members was determined benchmarked on the average fluoride concentration of Buffalo Creek or Reach 3 samples collected between 2021 and 2022.
2. Mixing the minimum chemical concentrations of Lake St. Martin surface water collected between 2021 and 2022, with the average composition of bedrock groundwater samples collected between 2019 and 2022. An optimized proportion of these end members was determined benchmarked on the average fluoride concentration of Buffalo Creek or Reach 3 samples collected between 2021 and 2022.
3. Mixing the maximum chemical concentrations of Lake St. Martin water collected between 2021 and 2022 with the average composition of bedrock groundwater samples collected between 2019 and 2022. An optimized proportion of these end members was determined benchmarked on the average fluoride concentration of Buffalo Creek or Reach 3 samples collected between 2021 and 2022.
4. Mixing the Lake St. Martin surface water collected on the June 2022 event that represents the “wet period”, with the average composition of bedrock groundwater samples collected between 2019 and 2022. An optimized proportion of these end members was determined benchmarked on the average fluoride concentration of Buffalo Creek or Reach 3 samples collected between 2021 and 2022.
5. Mixing the Lake St. Martin surface water collected on the June 2021 event that represents the “dry period” with the average composition of bedrock groundwater samples collected between 2019 and 2022. An optimized proportion of these end members was determined benchmarked on the average fluoride concentration of Buffalo Creek or Reach 3 samples collected between 2021 and 2022.
6. Mixing the average chemical composition of Lake St. Martin surface water collected between 2021 and 2022, with the minimum concentrations of bedrock groundwater samples collected between 2019 and 2022. An optimized proportion of these end members was determined benchmarked on the average fluoride concentration of Buffalo Creek or Reach 3 samples collected between 2021 and 2022.
7. Mixing the average chemical composition of Lake St. Martin surface water collected between 2021 and 2022, with the maximum concentrations of bedrock groundwater samples collected between 2019 and 2022. An optimized proportion of these end members was determined benchmarked on the average fluoride concentration of Buffalo Creek or Reach 3 samples collected between 2021 and 2022.
8. These Scenarios were specific to the Reach 3 channel and Buffalo Creek, to determine the proportions of surface and groundwater flows that occur through these areas, during a very wet period when groundwater aquifer piezometric pressures are high, and it is known that many surface water sources are at least partially composed of upwellings of bedrock aquifer groundwater, and isotopically tend to show a string groundwater signature. Source waters were chosen specific to these site-specific conditions, as follows: Observed Reach 3 surface water quality of June 2022 was assessed against source groundwater at PW19-KGS03 of June 2022, and the mean source surface water quality at Creek 3 (sites

CR-1 and CR-2), as sampled on June, 2022; and observed Buffalo Creek mean surface water quality sampled June 2022 at sites BC-01 through BC-05 was assessed against source mean groundwater concentrations on June 2022, and the mean surface water conditions measured on June 2022 at sites UC-1, UC-2, Big Buffalo Lake, and at Creek 3 (CR3-1, and CR3-2). An optimized proportion of these end members was determined benchmarked on the average fluoride concentration of Buffalo Creek or Reach 3 samples collected June, 2022.

Scenario 1 is based entirely on mean groundwater parameters for each end member mixing solution and looking to match mean groundwater parameters measured at Buffalo Creek or Reach 3. Scenarios 2 through 7 were designed to carry out a sensitivity analysis of the mixing calculations. To best proportionate the composition of parent or end member samples, a range of maximum and minimum Lake St. Martin water, as well as a maximum-minimum range of bedrock groundwater were determined through the sensitivity analysis. The same approach was taken in the response to IAAC-R2-02, where mixing calculations were performed for the Big Buffalo Lake and wetland complex upgradient of Buffalo Creek. In all results, as with the prior Big Buffalo Lake analyses, likely due to the complexity of the geochemistry of the adjacent impact structure, and because practically Lake St. Martin does not directly connect to Big Buffalo Lake, matching of parameters including sodium (Na) and chloride (Cl), were challenging. With prior analyses completed during IAAC-R2-02 on Big Buffalo Lake complex, a 75% surface water and 25% groundwater mixing ratio appeared to match best with overall results, when using mean water quality data. The same approaches were applied here, with conceptual end member ranges of approximately 40% groundwater (when using minimum groundwater mixing concentrations), and 5% groundwater (when using maximum groundwater mixing concentrations) considered, as determined during groundwater and surface water mixing analyses completed during IAAC-R2-02.

However, some results are important to note (see results shown in Appendix B):

- Using averaged conditions of each end member input water quality, and the resulting Buffalo Creek or Reach 3 water quality, and compared to average Buffalo Creek or Reach 3 water quality (Scenario 1), and a mixing proportion of approximately 75% surface water, and 25% groundwater, the results were not particularly good for Reach 3, with the benchmark of F overpredicted by 100%. This is due to the concentrations of F in the source mixing waters both being at a higher source concentration than mean F observed within Reach 3 surface water. For Buffalo Creek, the error on benchmarked F was less (65% overprediction in the results), again because the mean source water concentrations of F are greater than the observed mean Buffalo Creek surface water concentration of F.
- The results of Scenario 1 improve when applying minimum Lake St. Martin parameter concentrations as the surface water end member (e.g. Scenario 2), and becomes a much worse comparative fit when using maximum concentrations of Lake St. Martin surface waters (Scenario 3), in particular when benchmarking on F concentrations.
- Scenario 4, the June 2022 “wet period” could be envisioned, by all accounts, to be a large hydrologic flow through event (i.e. flood year) where Lake St. Martin surface water would reasonably represent the surface water condition in the region of the LSMOC. In this scenario, proportions of mixing indicate a composition of approximately 75% surface water and 25% groundwater, to match Buffalo Creek surface water quality, with a reasonable match (approximately 30% overprediction) to the benchmark parameter of F. In this case the fit could improve by increasing the proportion of Lake St. Martin surface

water in this mixing scenario, because the concentration of F within Lake St. Martin at this time is less than that observed within the mean Buffalo Creek water quality, and much less than the mean concentration of F within the groundwater.

- Scenario 4, the June 2022 "wet" period at the bedrock exposed section of the existing Reach 3 channel is not a good fit, with the benchmark parameter of F well over predicted (by approximately 60%), likely because the observed concentrations of F in Reach 3 during this wet period are much less than that observed within Lake St. Martin during the wet period, and even further from the mean bedrock concentrations of F observed in the region of the LSMOC.
- Scenario 5, the June 2021 "dry period" (i.e. drought like) is not a particularly good match for either Buffalo Creek or surface water within Reach 3 of the EOC, likely due to the geochemical influence of the impact structure hydrogeology on Lake St. Martin surface water end-member water quality, during this extensive dry period.
- Scenarios 6 and 7 apply minimum bedrock groundwater parameter concentrations, and maximums, respectively, to mean Lake St. Martin surface water conditions, and compare to mean Buffalo Creek and Reach 3 of the EOC mean surface water parameter concentrations. Neither of these fits are particularly good, presumably because the concentrations of F within the input source surface and ground waters even at (minimum concentration), are at (e.g. Buffalo Creek), or above (e.g. Reach 3) the observed F concentrations in surface waters at those sites. As with the prior analyses in IAAC-R2-02, these results would indicate that the widest range of groundwater contribution these surface water sites would conceptually be between approximately 5% (or possibly less) groundwater (under maximum groundwater source parameter concentrations), and approximately 40% groundwater (under minimum groundwater source parameter concentrations).
- Scenario 8 results are important, because they are specific to the "wet" period and high bedrock aquifer piezometric pressure conditions of June, 2022. Based on isotopic data (details below), this event represents the maximum period of groundwater discharge to surface water, based on the available LSMOC data to date. The resultant water quality at Buffalo Creek and at Reach 3 of the EOC, of June 2022, are based on specific groundwater conditions local to these sites and as measured on June, 2022, along with surface water inflows that are known specific to these two surface water sampling locations, namely UC-1, UC-2, Big Buffalo Lake, and Creek 3 for Buffalo Creek; and Creek 3 for Reach 3 of the EOC.
- Results of the Scenario 8 analysis indicate that for Reach 3 of the EOC in June 2022, a mix proportion of 95% Creek 3 groundwater and surface water, overflowing the Creek 3 plug flowing down channel to the bedrock exposed area of the Reach 3 channel, and 5% of groundwater, based on groundwater at PW19-KGS03, creates a very good modelled match for overall water chemistry sampled at Reach 3, with the benchmark F concentrations varying only by approximately 8 percent. Indicator parameters Cl, F, and TDS are distinct at this time when looking at groundwater concentrations and surface water concentrations at Reach 3 (see detailed information in memo sections below), supporting the model that the largest proportion of water within this portion of Reach 3 during June 2022 was groundwater/surfacewater mix typical of upwelling discharges originating at Creek 3. With a Reach 3 total flow measurement of 0.18 M^3/s at this time (approximately 2,850 USgpm), the inference would be that 95% (0.17 m^3/S, or 2,695 USgpm) of this surface water flow in the channel was sourced from the Creek 3 discharge overflowing the Creek 3 plug into the channel, with the remaining 5% (0.009 M3/s; or

approximately 155 USgpm) originating from the bedrock aquifer direct to the Reach 3 channel, where the bedrock is exposed.

- Results of the Scenario 8 analysis indicate that for Buffalo Creek in June 2022, a mix proportion of approximately 80% mean June 2022 water quality from surface water/groundwater source sites UC-1, UC-2, Big Buffalo Lake, and Creek 3 (all of which flow into Buffalo Creek), 20% of groundwater, based on mean groundwater quality conditions during June, 2022, creates a very good modelled match for overall water chemistry sampled at Reach 3, with the benchmark F concentrations nearly matching exactly. Indicator parameters Cl, F, and TDS are distinct at this time when looking at groundwater concentrations and surface water concentrations at Buffalo Creek (see detailed information in memo sections below), supporting the model that the largest proportion of water within this portion of Buffalo Creek during June 2022 was groundwater/surface water mix typical of upwelling discharges originating at all the sites which ultimately feed into Buffalo Creek.

Isotope Analyses – Surface Water and Groundwater in the Region of the LSMOC

All isotope data collected in surface water and groundwater were compiled and plotted for this portion of the analysis. Isotope parameters Oxygen-18 ($\delta^{18}O$) and Deuterium (δD), were analyzed and plotted against historical groundwater and surface water isotope results, defined and discussed in detail by others (Simpson and Desbarats, 2003). Figures 5 through 8 display the results of this analysis. In each of the plots, the isotopic results from all surface water and groundwater samples taken in the region of the LSMOC are plotted with the groundwater and surface water isotopic results in the region, from the 2003 study (Simpson and Desbarats, 2003). For reference, see also the figure within Appendix A that shows the sample sites, and the legend in Appendix C which indicates all samples plotted in these figures. The groundwater and surface water data have been reported in other bulk data publications completed by KGS Group for the LSMOC project (see references).

FIGURE 5: DEUTERIUM (ΔD) VERSUS OXYGEN-18 ($\Delta^{18}O$) PLOT (AFTER SIMPSON AND DESBARATS, 2003). GROUNDWATER SAMPLES IN BLUE; SURFACE WATER SAMPLES IN GREEN.

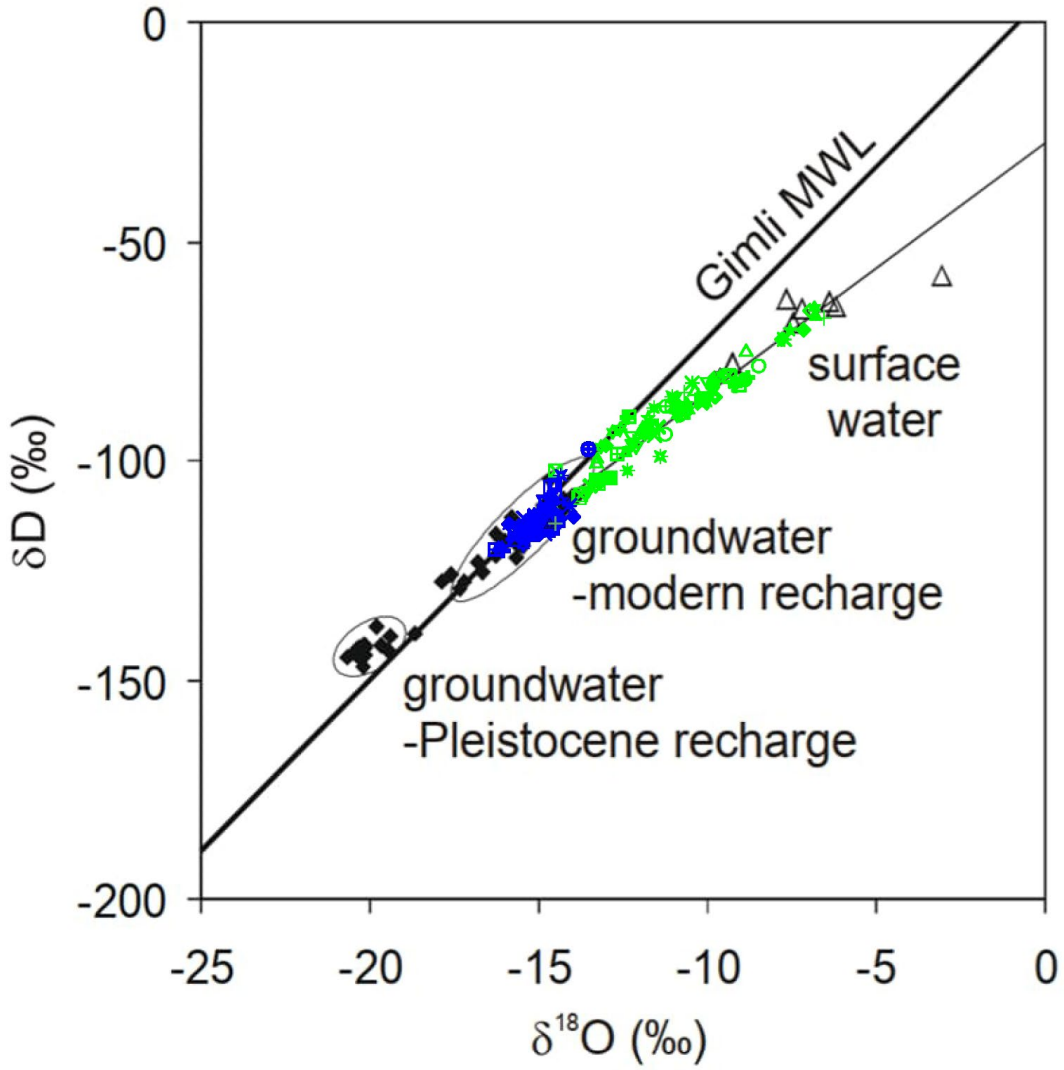


FIGURE 6: OXYGEN-18 ($\Delta^{18}O$) VERSUS TOTAL DISSOLVED SOLIDS (TDS) PLOT (AFTER SIMPSON AND DESBARATS, 2003). GROUNDWATER SAMPLES IN BLUE; SURFACE WATER SAMPLES IN GREEN.

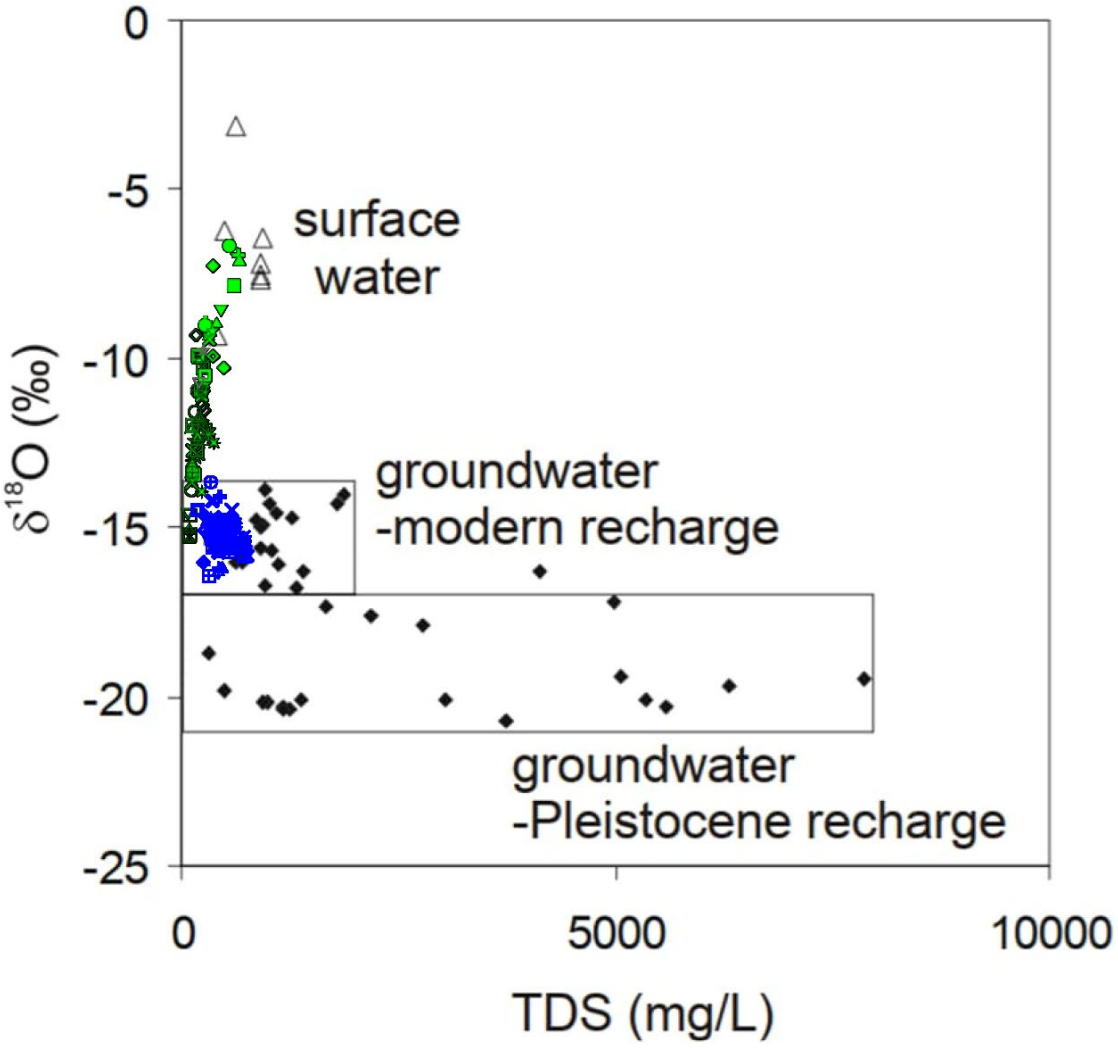


FIGURE 7: OXYGEN-18 ($\Delta^{18}O$) VERSUS FLUORIDE PLOT (AFTER SIMPSON AND DESBARATS, 2003). GROUNDWATER SAMPLES IN BLUE; SURFACE WATER SAMPLES IN GREEN.

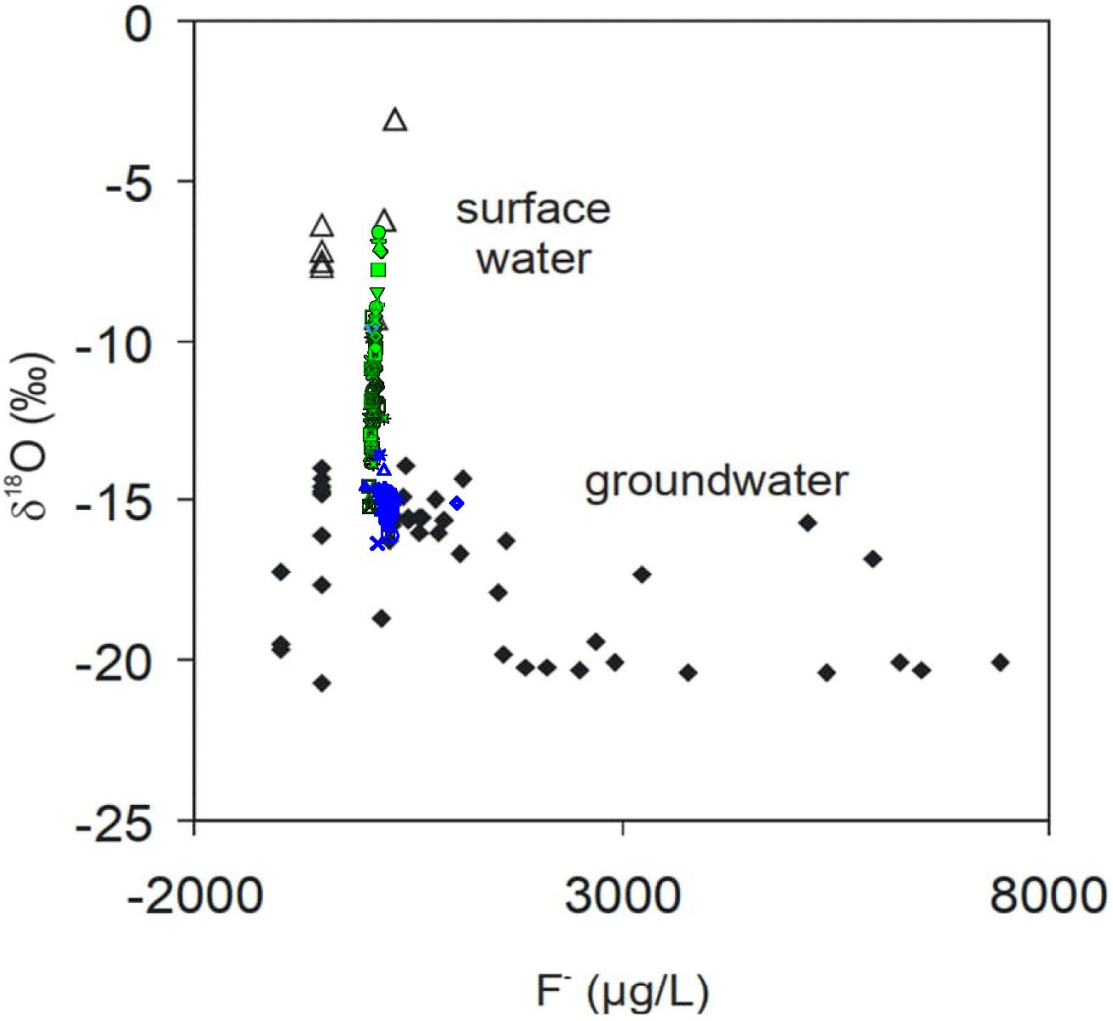
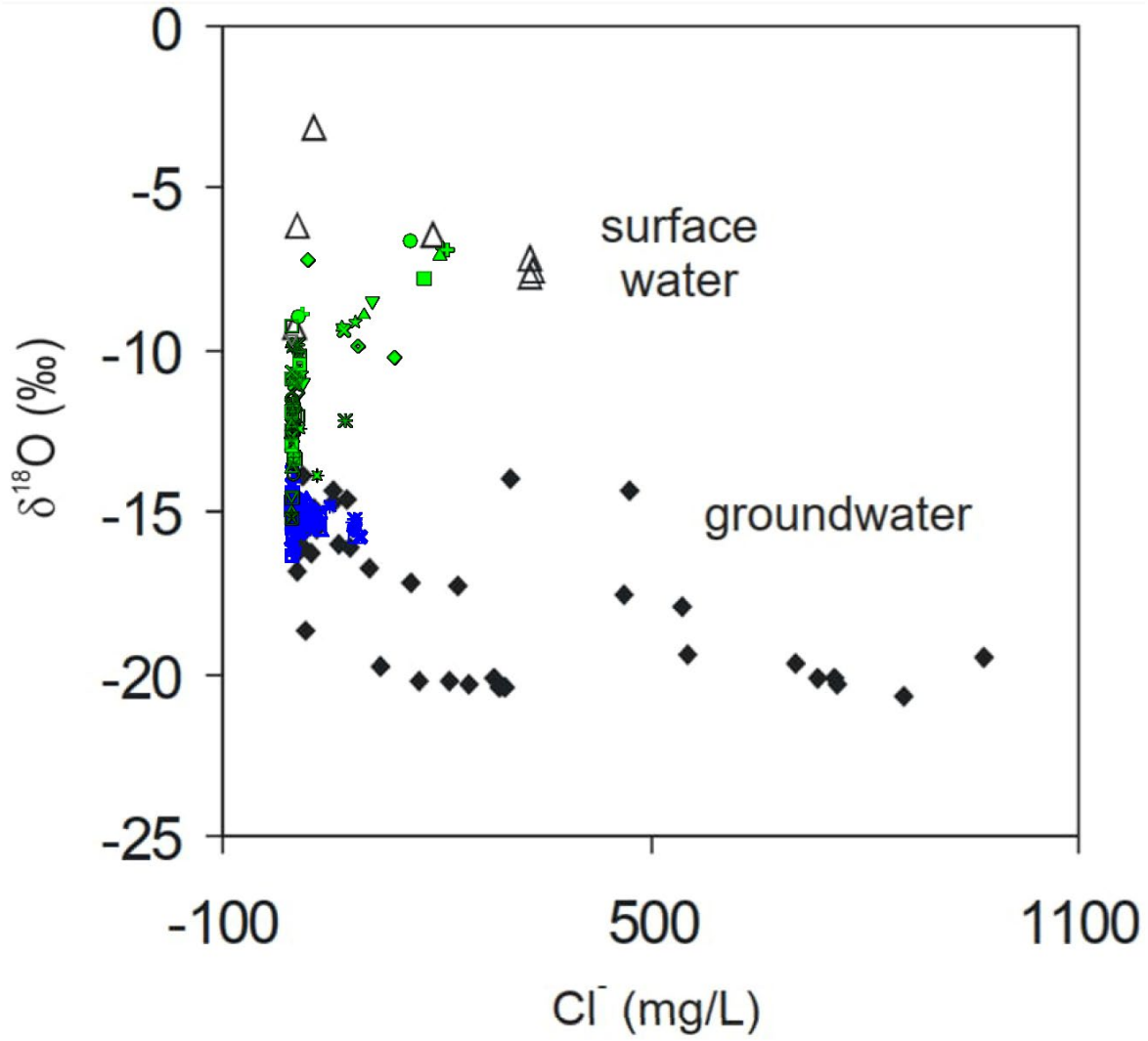


FIGURE 8: OXYGEN-18 ($\Delta^{18}O$) VERSUS CHLORIDE PLOT (AFTER SIMPSON AND DESBARATS, 2003). GROUNDWATER SAMPLES IN BLUE; SURFACE WATER SAMPLES IN GREEN.



Based on the review of all available isotopic data for groundwater, and surface water sites (including Buffalo Creek, and Reach 3, specifically asked for within this response to IAAC -R3-02):

- All groundwater samples cluster within the known fields for groundwater in the region of the LSMOC, and are characterized as groundwaters of “modern recharge”. These sample compositions do not vary significantly based on year, or season of sampling. The Sentinel Wells located near Dauphin River (see Figure in Appendix A) tend to have a higher chloride concentration than other groundwater samples in the region of the LSMOC. All of these groundwater samples have a $\delta^{18}O$ of approximately -14.5 $^{o}/_{oo}$, or less (i.e. more negative).

- Surface water signatures within the region of the LSMOC show a calculated $\delta^{18}O$ of approximately -10 $^{o}/_{oo}$, or greater, up to a δ18O of approximately -5 $^{o}/_{oo}$.
- Relatively strong groundwater signatures within a blended groundwater and surface water sample show a calculated $\delta^{18}O$ of approximately -13.5 $^{o}/_{oo}$, to -15 $^{o}/_{oo}$
- Other blended groundwater and surface water signatures within the region of the LSMOC show a calculated $\delta^{18}O$ of less than approximately -10 $^{o}/_{oo}$, and greater than approximately -13.5 $^{o}/_{oo}$. These are typical of a blended groundwater and surface water sample, at various times of the year, with a weaker groundwater signature.
- At the bedrock exposed portion of Reach 3of the EOC (sample site SW-R3, see Figure in Appendix A), June 2022 shows a strong groundwater signature, with $\delta^{18}O$ of approximately -15 $^{o}/_{oo}$. During all other sample periods, the samples taken here are a mix of groundwater and surface water (with δ18O measured between approximately -12 and -13 $^{o}/_{oo}$), with results relatively more similar to "groundwater" during October of 2020 (a "dry" fall), and more similar to "surface water" during June of 2019 (a "normal" summer).
- At sample sites CR3-1 and CR3-2 at Creek 3 (see Figure in Appendix A), a strong groundwater signal is noted during June 2022, with δ18O of approximately -15 $^{o}/_{oo}$. At all other times, the results indicate a blend of surface water and groundwater (with δ18O measured between approximately -12 and -13 $^{o}/_{oo}$), with conditions relatively more similar to "groundwater" during October of 2020 (a "dry" fall). Note that Creek 3 was overtopping the channel plug during June 2022, thus contributing surface water with a strong groundwater signature, into the lower Reach 3 channel reaches, and specifically into storage areas on Reach 3 where bedrock is exposed in the base of the channel, and where channel baseflows were calculated at approximately 0.18 M^3/s at that time.
- As reported in IAAC-R2-02, During the June 2022 "wet period" the isotopic signature of Big Buffalo Lake surface water, and creek source waters sampled at UC-1 and UC-2 (see Figure in Appendix A), all carried isotopic and geochemical signatures representative of groundwater for the region. During all other sampling periods other than June of 2022, Big Buffalo Lake surface water is isotopically and geochemically similar to surface water in the region. During all other sampling periods other than June 2022, surface water at UC-1 and UC-2 isotopically and geochemically plot between the groundwater end members and surface water end members (including Big Buffalo Lake), indicating that water quality at these sites during those sampling events is comprised of a blend of groundwater and surface water. Sites UC-1 and UC-2 are most like groundwater in June of 2022 (a very "wet" period) with δ18O measured between approximately -13 and -14 $^{o}/_{oo}$, and during June of 2021 (a very dry period), UC-1 and UC-2 show results most like surface water with δ18O measured approaching -10 $^{o}/_{oo}$
- There are 5 locations where surface water samples are taken along Buffalo Creek (BC-01 through BC-05, see Figure in Appendix A). All sites BC-01 through BC-05 cluster tightly during June 2022, with a strong groundwater signal, with reported δ18O of approximately -15 $^{o}/_{oo}$. BC-01 receives flows from the Big Buffalo Lake complex, which is in turn fed by upstream groundwater upwelling creek sites UC-1 and UC-2, located in the wetland complex to the east of the planned LSMOC channel; BC-05 also intercepts flows that originate at groundwater upwellings that form Creek 3, and site BC-03 is located just prior to discharge at the Dauphin River, but below artesian groundwater spring sites that drain to Buffalo Creek, and are located just northeast of the Big Buffalo Lake Complex. Because the Buffalo Creek drainage receives known groundwater discharges from sites including UC-1, UC-2, CR3-1, CR3-2, and artesian

groundwater spring sites located northeast of the Big Buffalo Lake Complex, it stands to reason that in June 2022 the Buffalo Creek sample sites all carry a strong groundwater signature. At all other times the Buffalo Creek sites are a blend of surface water and groundwater with δ18O measured between approximately -12 and -13 $^{o}/_{oo}$. During 2021 (a very dry year overall), Buffalo Creek sites are closest to surface water with δ18O measured at approximately -10 $^{o}/_{oo}$, though BC-03 and BC-05 show a slight bias toward groundwater, likely due to the groundwater/surface water contribution this BC-05 receives from Creek 3, and BC-03 receives from the upstream groundwater artesian spring sites, which is blended into the overall Buffalo Creek flows along the reach of the creek.

- The Dauphin River (DR-01, see Figure in Appendix A), sampled upstream of the confluence of Buffalo Creek, always carries a surface water signature, though in June of 2022 a slightly more negative δ18O signal of approximately -10 $^{o}/_{oo}$ was measured.
- The LSMOC inlet (i.e. Lake St. Martin, see Figure in Appendix A) while having notably higher Cl concentrations, shows a surface water signature at all times, with δ18O measured between approximately -5 and -10 $^{o}/_{oo}$. However, in June 2022, a greater proportion of groundwater signal was noted, with a δ18O measured at approximately -14 $^{o}/_{oo}$. This is not unexpected as Lake St. Martin receives direct groundwater discharge from artesian spring sites located on the eastern side of the lake near the Lake St. Martin Narrows, and from the adjacent impact structure hydrogeological system to the northwest of the lake.
- The LSMOC outlet (i.e. Lake Winnipeg, see Figure in Appendix A) shows a surface water signature at all times, with δ18O measured of approximately -10 $^{o}/_{oo}$. However, in June 2022, a greater proportion of groundwater signal was noted, with a δ18O measured at approximately -13 $^{o}/_{oo}$. This is not unexpected as Lake Winnipeg receives discharges of groundwater from artesian spring sites located on the shoreline of the lake along the lower reaches of the LSMOC, and from all the upstream sources as described above.

Importantly, based on compiling all the analyses herein for the June, 2022 sampling event, and as originally described in IAAC R2-02:

- When flow through hydrologic events in the region for surface water through Lake St. Martin was ongoing in 2022, and relatively significant as a “wet” year; bedrock aquifer piezometric pressures were also relatively high, with an observed significant response of measurable groundwater discharge baseflows stored and measured at the bedrock section of the Emergency Reach 3 channel, along with many sample sites in the region of the LSMOC that also show strong isotopic groundwater signatures at that time, and as detailed above.
- When flow through the Big Buffalo Lake and the upgradient wetland complex system, as measured hydrologically on Buffalo Creek was high (i.e. 2022 “wet” year), a significant groundwater isotopic and geochemical signature was measured in surface water from Buffalo Lake, originating from groundwater fed creeks that flow into the Buffalo Lake basin, and throughout the 5 sample sites of Buffalo Creek system, which receives flows from Bug Buffalo Lake, the wetlands upgradient of Buffalo Creek, Creek 3, and artesian groundwater sites located to the northeast of the Big Bufalo Lake Complex.

During all other periods, the surface water measurement sites either demonstrate isotopic signatures most like surface water, or a blend of surface water and groundwater, with a muted groundwater signature in comparison to the June 2022 event.

Tables 1 and 2, below, summarize the key routine water quality indicators taken along with the isotope samples, and as plotted on Figures 5 through 8 (see also sample site locations on the Figure in Appendix A).

TABLE 1 – KEY ROUTINE WATER QUALITY PARAMETER RANGES (ALL AVAILABLE DATA)

Site	Cl (mg/l)	F (mg/l)	TDS (mg/l)
Big Buffalo Lake (BBL)	4.5 – 22.9	0.084 – 0.199	153 - 366
Buffalo Creek (BC-01 through BC-05)	2.66 – 14.4	0.068 – 0.160	122 – 277
Upstream Creeks UC-1 and UC-2	0.15 – 2.33	0.066 – 0.102	125 – 210
Creek 3 (CR3-1 and CR3-2)	0.13 – 1.72	0.046 – 0.158	78 – 256
Reach 3 of the EOC (SW-R3)	<0.10 – 1.08	<0.020 – 0.165	98 – 272
Groundwater	0.38 – 97.2	0.123 – 1.15	190 - 759
Dauphin River (DR-01)	145 - 219	0.127 – 0.175	492 – 662
LSMOC Inlet (Lake St. Martin)	36 - 209	0.104 – 0.178	240 – 671
LSMOC Outlet (Lake Winnipeg)	71.1 – 93.6	0.114 – 0.136	315 – 365

TABLE 2 – KEY ROUTINE WATER QUALITY PARAMETERS DURING ISOTOPE SAMPLING ("WET" AND "DRY" REGIONAL CONDITIONS)

Site	Cl (mg/l) June 2022 (wet)	Cl (mg/l) June 2021 (dry)	F (mg/l) June 2022 (wet)	F (mg/l) June 2021 (dry)	TDS (mg/l) June 2022 (wet)	TDS (mg/l) June 2021 (dry)
Big Buffalo Lake (BBL)	4.5	15.3	0.084	0.158	153	280
Buffalo Creek (BC-01 through BC-05)	2.91 – 5.78	8.96 – 11.9	0.068 – 0.073	0.120 – 0.236	122 – 132	240 – 378
Upstream Creeks UC-1 and UC-2	0.15 – 0.16	0.40 – 0.58	0.060 – 0.066	0.069 – 0.080	125 – 127	172 – 187
Creek 3 (CR3-1 and CR3-2)	0.13	0.13 – 0.28	0.047 – 0.048	0.064 – 0.073	78 – 94	121 – 132
Reach 3 of the EOC (SW-R3)	0.13	0.25	0.049	0.097	99	164
Groundwater at Reach 3 Bedrock Zone (PW19-KGS03, "wet"; TH19-KGS17, "dry")	0.67	0.87	0.156	0.252	321	360
Dauphin River (DR-01)	145	213	0.127	0.152	492	647
LSMOC Inlet (Lake St. Martin)	36	167	0.104	0.167	240	554
LSMOC Outlet (Lake Winnipeg)	75.6	71.1	0.114	0.115	315	315

The following summary points are noted within this indicator parameter data:

- In general, parameter concentrations are increased during the “dry” 2021 period, versus the “wet” 2022 period, with the exception of the LSMOC outlet (Lake Winnipeg), which is generally stable. Isotopically the wet periods show the strongest groundwater signals, including δ18O values as low as approximately -15 $^{o}/_{oo}$, indicating that the typical surface water parameter concentrations are “diluted” by the increased proportions of groundwater and regional surface water contributions to the flow system in the region of the LSMOC during these wet periods when upwellings of groundwater flows to the surface water system are strongest.
- The LSMOC inlet (Lake St. Martin) clearly shows large increases in chloride, TDS, and somewhat in fluoride, during dry periods, indicating the influence on the regional hydrogeology of the nearby impact crater on the surface water quality of the lake when it is a dry period, and overall flows through the region, including groundwater discharges to surface water (as demonstrated by the isotopic data), are less. Increases in groundwater discharges to Lake St. Martin are observable in the isotopic data during the wet periods, which tend to dilute the surface water parameter conditions in the lake.
- Big Buffalo Lake has much higher chloride, fluoride, and TDS concentrations during dry periods, when its surface water conditions are not being diluted by flow throughs of groundwater originating at UC-1 and UC-2. Isotopic data detailed in IAAC-R2-02 demonstrated that groundwater flow throughs occur at Big Buffalo Lake during wet periods, which dilutes the typical surface water conditions at the Big Buffalo Lake Complex.
- Similarly, Buffalo Creek during wet periods is isotopically characterized by a higher proportion of groundwater contributions originating at UC-1 and UC-2, Creek 3, and the artesian groundwater spring sites located northeast of the Big Buffalo Lake Complex, which dilute the concentrations of surface water parameters that are overall measured to be higher during comparatively dry periods. As mentioned prior, the isotopic signal within Buffalo Creek at all five sample sites is characterized as a mix of groundwater and surface waters during the observed wet period of June, 2022.
- Surface water parameters at the bedrock exposed section of Reach 3 of the EOC, and at Creek 3 are very similar, in particular during the wet period of June 2022 when Creek 3 waters were overflowing the channel plug and flowing down-channel to temporarily pond and drain from the bedrock exposed area of the existing Reach 3 channel. All of these indicator parameters, however, are less than the concentrations recorded within the groundwater, indicating some form of a blend of surface and groundwaters. Isotopically, these waters both at Creek 3 and at Reach 3 of the EOC indicated a strong groundwater signal at that time, blended with surface water flows within the region of the LSMOC.
- During dry periods, surface water sources such as UC-1, UC-2, Buffalo Creek, Creek 3, and the bedrock exposed section of Reach 3 of the EOC are distinct in terms of surface water indicator parameters, compared to local groundwater (in particular with respect to TDS, which is at much higher concentration overall within the bedrock). Note that isotopically these waters during these dry periods remain a distinct blend between surface and groundwater however, with an increase in δ18O values to become less negative, supporting the interpretation that during dry periods, there is a reduction in the contribution of groundwater to the surface water system, though the groundwater contribution is always present, including during these overall “dry” periods.

Summary

The following summarizes the key findings of the analyses completed to support a response to IAAC R3 regarding groundwater discharge to Buffalo Creek and the existing Emergency Reach 3 channel:

Hydrologic Channel Conditions

- In June 2022, it was clear that overtopping of the Creek 3 plug at Creek 3, was contributing surface waters to the lower reaches of Reach 3 of the EOC, with downstream pooling of water and drainage from the bedrock exposed area of the channel. During dry periods, such as shown for June 2019, the Creek 3 plug is somewhat "leaky", with some contribution of Creek 3 surface waters to down channel areas as well. In June of 2022, channel baseflows in the bedrock section of the Reach 3 channel were measured at 0.18 M^3/s, and in June 2019, at 0.004 M^3/s.
- Channel flow metering during June 2022 occurred during the recession of the runoff hydrograph, and following additional regional precipitation that ended on June 2. It is therefore interpreted that a portion of the larger outflows from the bedrock exposed areas of Reach 3 of the EOC measured and calculated in June of 2022 (0.18 M^3/s) are attributed to this local storage effect due to the configuration of the channel, and the observed inputs of surface flows from up-channel areas (e.g. the overflows at the Creek 3 plug) which contribute to the overall water load in the channel and associated storage/drainage effect.

Geochemical Mixing Models

- Geochemical mixing analyses completed as part of this IR request indicate that, based on prior models run for IAAC-R2-02 (focused on Big Buffalo Lake Complex), matches are not particularly good for the Reach 3 channel and Buffalo Creek, when using end member surface waters of Lake St. Martin, and typical groundwater in the region of the LSMOC. In IAAC-R2-02, this method worked reasonably well with a 75% surface water and 25% groundwater mixing ratio, likely because (like Lake St. Martin) the routine water quality (e.g. Cl) at Big Buffalo Lake Complex is typically of higher parameter concentrations than at the other sites in the region of the LSMOC. In that work, the conceptual mixing proportions vary between approximately 5% groundwater contribution (under maximum groundwater source parameter concentrations), and approximately 40% groundwater contribution (under minimum groundwater source parameter concentrations). Neither of these mixing scenarios yielded a particularly good fit, but these would be considered the conceptual upper and lower limits of groundwater contribution to Big Buffalo Lake, based on data available to date.
- In this mixing modeling study, focused on Buffalo Creek and Reach 3 of the EOC during the June 2022 "wet" period of maximum groundwater flows and upwellings through the region, the mixed surface water and groundwater upwelling inputs originating at UC-1, UC-2, Big Buffalo Lake (flow through), and Creek 3 (CR3-1 and CR3-2) were applied to determine the mixing proportions of these water sources and groundwater during June 2022 for Buffalo Creek. For the Reach 3 channel, the same approach was taken, with Creek 3 surface water/groundwater inputs to the channel overtopping the Creek 3 plug, and flowing into down channel areas, and proportioned to typical groundwater inputs, to match observed channel surface water conditions. Both of these examples are referred to as "Scenario 8" in the mixing models.

- Results for Buffalo Creek indicate that approximately 80% of the surface water/groundwater upwelling sources, mixed with approximately 20% of typical groundwater in the region of the LSMOC provided a very strong mixing match to observed Buffalo Creek water quality, during June, 2022. Note that the 80% portion of the input water source is clearly a blend of upwellings of groundwater and mixed surface water because isotopically it (and the samples taken in Buffalo Creek) has a strong groundwater signal, even though typical indicator parameters such as Cl, F, and TDS are distinct in the surface water compared to the typical groundwater, at that time.
- Results for Reach 3 of the EOC indicate that approximately 95% of the surface water/groundwater upwelling source (specifically Creek 3), mixed with approximately 5% of typical groundwater in this particular area of the LSMOC provided a very strong mixing match to observed Reach 3 water quality, during June, 2022. Note that the 95% portion of the input water source is clearly a blend of upwelling of groundwater and mixed surface water from Creek 3, because isotopically it (and the Reach 3 channel surface water) has a strong groundwater signal, even though typical indicator parameters such as Cl, F, and TDS are distinct (i.e. lesser concentration) in the surface water, compared to the typical groundwater, at that time.
- Applying the mixing proportions at Reach 3 of the EOC calculated from the above mixing scenario results, conceptually, the 0.18 M^3/s channel flow at the downstream end of Reach 3 of the EOC of June 2022 could be comprised of approximately 95% (0.17 m^3/S, or 2,695 USgpm) of this blended surface water/groundwater flow in the channel sourced from the Creek 3 discharge overflowing the Creek 3 plug into the channel, with the remaining 5% (0.009 M^3/s; or approximately 155 USgpm) originating from the bedrock aquifer direct to the Reach 3 channel, where the bedrock is exposed.

Groundwater and Surface Water Isotopic Analyses

- Isotopically, all groundwater samples cluster within the known fields for groundwater in the region of the LSMOC, and are characterized as groundwaters of “modern recharge”. These sample compositions do not vary significantly based on year, or season of sampling. All of these groundwater samples have a δ18O of approximately -14.5 $^o/_{oo}$, or less (i.e. more negative).
- Surface water signatures within the region of the LSMOC show a calculated δ18O of approximately -10 $^o/_{oo}$, or greater, up to a δ18O of approximately -5 $^o/_{oo}$.
- Relatively strong groundwater signatures within a blended groundwater and surface water sample show a calculated δ18O of approximately -13.5 $^o/_{oo}$, to -15 $^o/_{oo}$
- Other blended groundwater and surface water signatures within the region of the LSMOC show a calculated δ18O of less than approximately -10 $^o/_{oo}$, and greater than approximately -13.5 $^o/_{oo}$. These are typical of a blended groundwater and surface water sample, at various times of the year, with a weaker groundwater signature.
- During “wet” periods such as during June 2022 when the surface water flows through the region are relatively high, and when the piezometric pressure of the bedrock aquifer is relatively high, surface water/groundwater upwelling sites including UC-1, UC-2, Creek 3, the bedrock exposed area in the Reach 3 of the EOC (SW-R3), Big Buffalo Lake Complex Surface water, and Buffalo Creek Surface water are all isotopically representative of regional groundwater conditions or a mix of groundwater and regional surface waters, with observed baseflow discharge of groundwater at Reach 3 of the EOC measured at 0.18 M^3/s, and elevated surface water flows out of the Big Buffalo lake Basin via Buffalo

Creek measured at approximately 10 M^3/s at that time. The groundwater sources to Big Buffalo Lake are the groundwater fed surface water creeks that drain into the Big Buffalo Lake basin originating at groundwater/surface water sites UC-1 and UC-2, east of the LSMOC. Buffalo Creek receives upwelling sources of groundwater and surface water from UC-1 and UC-2 (as flow through the Big Buffalo Lake Complex), Creek 3, and groundwater from the artesian spring sites located northeast of Big Buffalo Lake. Reach 3 receives groundwater baseflow where bedrock is exposed within the channel, but also contributions of groundwater/surface waters that overflow or leak through the Creek 3 plug and make their way down channel to pool and drain below the bedrock exposed area of Reach 3.

- During all other sample periods other than June 2022, the samples taken from groundwater/surface water upwelling sites (including UC-1, UC-2, Reach 3 channel, Creek 3, and Buffalo Creek) are a mix of groundwater and surface water with a weaker groundwater signature (with δ18O measured between approximately -12 and -13 $^o/_{oo}$). Results relatively more similar to "groundwater" (i.e. more negative δ18O) were noted during October of 2020 (a "dry" fall), and more similar to "surface water" (i.e. less negative δ18O) during June of 2019 (a "normal" summer), with some locations approaching surface water conditions only with δ18O measured approaching -10 $^o/_{oo}$, including sites along Buffalo Creek, and at upwelling sites UC-1 and UC-2.
- During "dry year' conditions, the Big Buffalo Lake complex surface water quality is distinctly isotopically and geochemically representative of surface water in the region of the LSMOC with δ18O measured approaching -10 $^o/_{oo}$.
- The Dauphin River, sampled upstream of the confluence of Buffalo Creek, always carries a surface water signature, though in June of 2022 a slightly more negative δ18O signal of approximately -10 $^o/_{oo}$ was measured.
- The LSMOC inlet (i.e. Lake St. Martin) while having notably higher Cl concentrations, shows a surface water signature at all times, with δ18O measured between approximately -5 and -10 $^o/_{oo}$. However, in June 2022, a greater proportion of groundwater signal was noted, with a δ18O measured at approximately -14 $^o/_{oo}$. This is not unexpected as Lake St. Martin receives direct groundwater discharge from artesian spring sites located on the eastern side of the lake near the Lake St. Martin Narrows, and from the adjacent impact structure hydrogeological system to the northwest of the lake.
- The LSMOC outlet (i.e. Lake Winnipeg) shows a surface water signature at all times, with δ18O measured of approximately -10 $^o/_{oo}$. However, in June 2022, a greater proportion of groundwater signal was noted, with a δ18O measured at approximately -13 $^o/_{oo}$. This is not unexpected as Lake Winnipeg receives discharges of groundwater from artesian spring sites located on the shoreline of the lake along the lower reaches of the LSMOC, and from all the upstream sources (via the Dauphin River and other surface drainages) as described above.

Water Quality Indicator Parameters (Cl, F, and TDS)

- In general, parameter concentrations are comparatively increased during the "dry" 2021 period, versus the "wet" 2022 period, with the exception of the LSMOC outlet (Lake Winnipeg), which is generally stable. Isotopically the wet periods also show the strongest groundwater signals, including δ18O values as low as approximately -15 $^o/_{oo}$ within groundwater upwelling/surface water sources, indicating that the typical surface water parameter concentrations are "diluted" by the increased proportions of groundwater contributions to the flow system in the region of the LSMOC during these wet periods

when upwellings of groundwater flows to the surface water system are strongest. This "dilution" of indicator parameters in typical surface water, by mixed groundwater upwellings/surface water contributions from various source sites (like UC-1, UC-2, and Creek 3) is an important component of the resultant water qualities at sites like the Big Buffalo Lake Complex, Buffalo Creek, and at the existing Reach 3 channel.

- Big Buffalo Lake has much higher chloride, fluoride, and TDS concentrations during dry periods, when its surface water conditions are not being diluted by flow throughs of groundwater originating at UC-1 and UC-2. Isotopic data detailed in IAAC-R2-02 demonstrated that groundwater flow throughs occur at Big Buffalo Lake during wet periods, which dilutes the typical surface water conditions at the Big Buffalo Lake Complex.
- Similarly, Buffalo Creek during wet periods versus dry periods is isotopically characterized by a higher proportion of groundwater contributions which dilute the concentrations of surface water parameters that are overall measured to be higher during comparatively dry periods.
- Surface water parameters at the bedrock exposed section of Reach 3 of the EOC, and at Creek 3 are very similar, in particular during the wet period of June 2022 when Creek 3 waters were overflowing the channel plug and flowing down-channel. All of the indicator parameters, however, are less than the concentrations recorded within the groundwater.
- During dry periods, isotopically these upwelling groundwater/ surface waters remain a distinct blend between surface water and groundwater, with an increase in δ18O values to become less negative, supporting the interpretation that during dry periods, there is a reduction in the contribution of groundwater to the surface water system, though the groundwater contribution is always present, including during these overall "dry" periods. Based on the data available to date, only some sites such as along Buffalo Creek, and at upwelling sites UC-1 and UC-2, approach "true" surface water isotopic signatures of approximately -10 $^{o}/_{oo}$, during extended dry periods.

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STATEMENT OF LIMITATIONS AND CONDITIONS

Limitations

This memorandum has been prepared for Manitoba Transportation and Infrastructure in accordance with the agreement between KGS Group and Manitoba Transportation and Infrastructure (the "Agreement"). This memorandum represents KGS Group's professional judgment and exercising due care consistent with the preparation of similar documents. The information, data, recommendations and conclusions in this memorandum are subject to the constraints and limitations in the Agreement and the qualifications in this memorandum. This memorandum must be read as a whole, and sections or parts should not be read out of context.

This memorandum is based on information made available to KGS Group by (Manitoba Transportation and Infrastructure. Unless stated otherwise, KGS Group has not verified the accuracy, completeness or validity of such information, makes no representation regarding its accuracy and hereby disclaims any liability in connection therewith. KGS Group shall not be responsible for conditions/issues it was not authorized or able to investigate or which were beyond the scope of its work. The information and conclusions provided in this memorandum apply only as they existed at the time of KGS Group's work.

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KGS Group prepared the geo-environmental conclusions and recommendations for this memorandum in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. The information contained in this memorandum is based on the information that was made available to KGS Group during the investigation and upon the services described, which were performed within the time and budgetary requirements of Manitoba Transportation and Infrastructure. As this memorandum is based on the available information, some of its conclusions could be different if the information upon which it is based is determined to be false, inaccurate or contradicted by additional information. KGS Group makes no representation concerning the legal significance of its findings or the value of the property investigated.

APPENDIX A

Groundwater and Surface Water Sampling Site Location Plan

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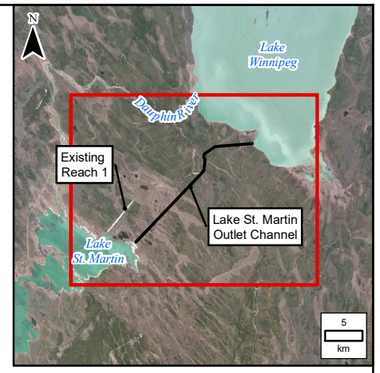
550000 560000 570000 580000

5750000

5740000

N W E S

Sentinel Well SW19-KGS-01
Sentinel Well SW19-KGS-03
Sentinel Well SW19-KGS-02
Dauphin River First Nation and Community
Dauphin River
DR-01
BC-03
Johnson Beach
Willow Point
Lake Winnipeg
TH19-KGS-10
TH15-06
TH15-06A
TH15-07
TH15-07A
TH15-08
TH15-08A
TH15-09
TH19-KGS-17/17A/17B
TH15-10
TH15-11
TH19-KGS-19
TH19-KGS-19A
LSMOC-OUTLET-1A
TH15-12
TH19-KGS-18/18A
BC-05
SW-R3
TH19-KGS-16/16B
PW19-KGS-03
TH19-KGS-15
TH19-KGS-14/14A
20 + 000
TH19-KGS-08
Buffalo Creek
CR3-2
BC-04
CR3-1
TH15-03
TH15-03A
TH15-05
TH15-05A
EXISTING REACH 3 CHANNEL (STA. 13+800 TO 18+300)
15 + 000
TH15-02
TH15-02A
TH15-04
TH15-04A
BC-02
TH19-KGS-11/11A
TH19-KGS-13/13A
Big Buffalo Lake
Little Buffalo Lake
BBL
TH19-KGS-12/12B
BC-01
10 + 000
TH19-KGS-100
TH19-KGS-09
UC-2
EXISTING REACH 1
TH19-KGS-20
PW19-KGS-02
TH19-KGS-07/07A
5 + 000
TH20-KGS-01
TH19-KGS-04
UC-1
TH20-KGS-03
TH20-KGS-02
TH19-KGS-03A
TH20-KGS-04
TH20-KGS-05
TH20-KGS-06b
TH19-KGS-02B
TH20-KGS-07
TH20-KGS-08
WATER CONTROL STRUCTURE LOCATION (APPROX.)
PW19-KGS-01
TH19-KGS-01B
TH15-01
LSMOC-INLET-1A
0 + 000
Lake St. Martin



LEGEND:

- Surface Water Sampling Location
- Groundwater Sampling Location
- Standpipe with Vibrating Wire
- Standpipe
- LSMOC C/L Alignment
- 5 + 000 LSMOC C/L Stationing
- 400m Right Of Way

NOTES:
1. Locations with water quality samples have been labelled. For all other locations see Figure 02.
2. Wetland, watercourse, and waterbody layers shown were obtained from NRCAN 1:50,000 data.
3. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 14. Elevations are in metres above sea level (MSL).

1 0 1 2 3 4
Kilometres

SCALE: 1:100,000 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
0	22/07/22	ISSUED WITH FINAL REPORT	PJL	JDM

REVISIONS / ISSUE

KGS GROUP

Manitoba Transportation and Infrastructure

LAKE ST. MARTIN OUTLET CHANNEL
GEOTECHNICAL DATA REPORT

GROUNDWATER AND SURFACE WATER SAMPLING SITE LOCATION PLAN

JULY 2022 | FIGURE 03 | REV: 0

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11"x17" PLOT SCALE 1:1

APPENDIX B

Mixing Calculations for Lake St. Martin and Bedrock Groundwater

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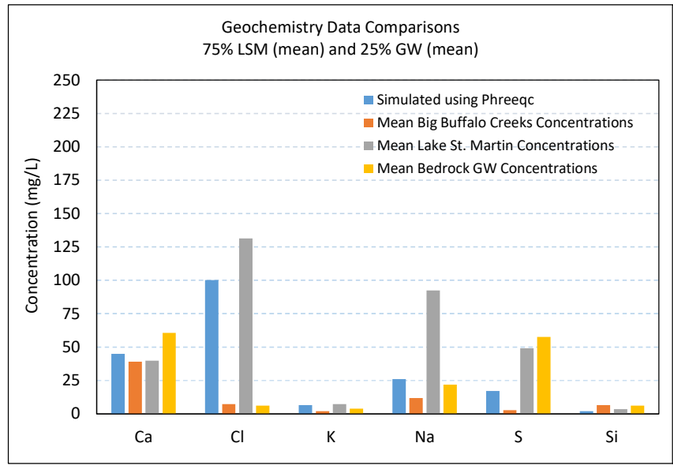
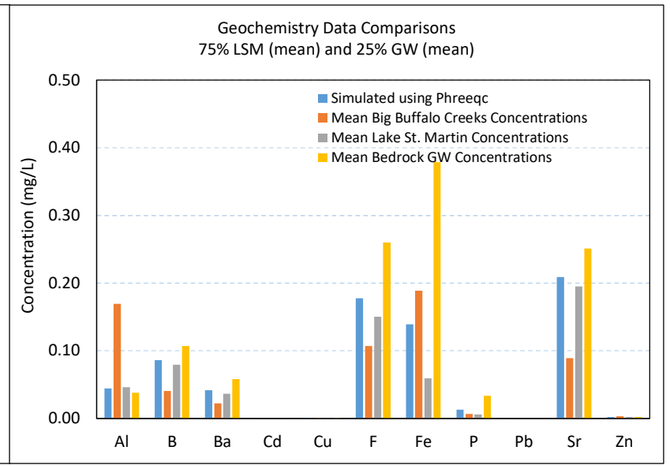
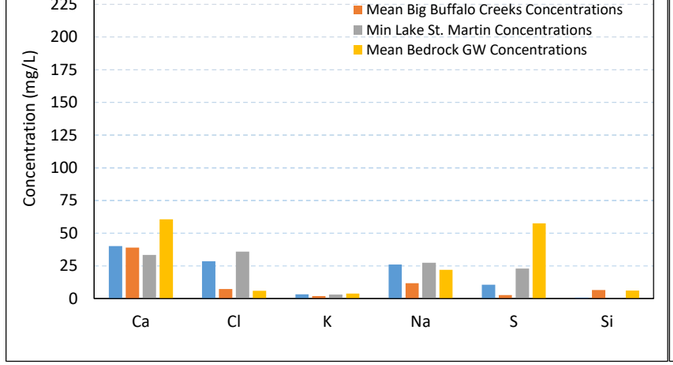
LSMOC - Mixing Calculations for Lake St. Martin and Bedrock Groundwater, and comparison with Big Buffalo Creeks (BC-01 to BC-05) Water Quality
Bedrock GW Data: 2019-2022, Lake St. Martin Data: 2021-2022, Big Buffalo Creeks Data: 2021-2023

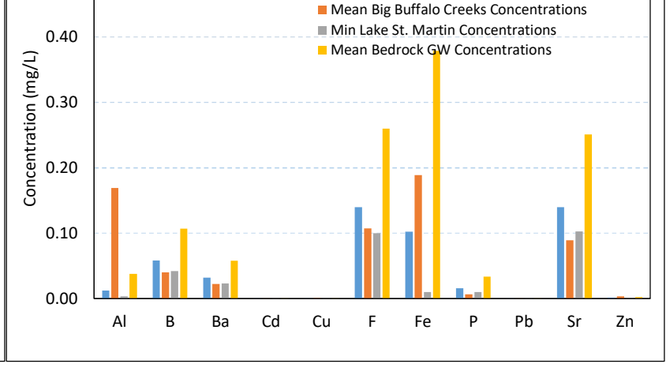
1. Mean LSM, Mean Bedrock GW. Output compared with mean Big Buffalo Creeks' data					
Mixing Proportions: 75% LSM and 25% GW					
Element	Simulated by Phreeqc (mg/L)	Observed Mean Buffalo Creek (mg/L)	Comparison (%) [1]	Mean LSM (mg/L)	Mean Bedrock GW (mg/L)
Al	0.044	0.169	-73.849	0.046	0.038
B	0.086	0.040	114.208	0.079	0.107
Ba	0.042	0.022	88.612	0.036	0.058
Cd	0.000016	0.000015	12.962	0.000020	0.000006
Cu	0.001	0.001	-38.517	0.001	0.001
F	**0.178**	**0.107**	65.723	0.150	0.260
Fe	0.139	0.189	-26.250	0.059	0.379
P	0.013	0.007	92.746	0.006	0.034
Pb	0.0001	0.0001	14.083	0.000	0.000
Sr	0.209	0.089	134.589	0.195	0.251
Zn	0.002	0.003	-32.550	0.002	0.002
Ca	44.970	39.139	14.897	39.725	60.600
Cl	100.190	7.230	1285.756	131.500	6.120
K	6.510	1.987	227.589	7.380	3.898
Na	26.024	11.746	121.567	92.325	21.909
S	17.074	2.660	541.883	49.000	57.570
Si	1.958	6.540	-70.067	3.540	6.129





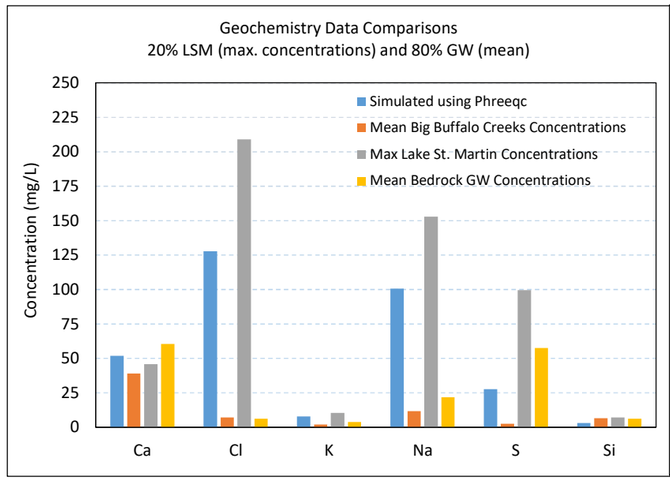
2. Minimum LSM, Mean Bedrock GW. Output compared with mean Big Buffalo Creeks' data					
Mixing Proportions: 75% LSM (min. concentrations) and 25% bedrock GW (mean concentrations)					
Element	Simulated by Phreeqc (mg/L)	Observed Mean Buffalo Creek (mg/L)	Comparison (%) [1]	Minimum LSM concentrations (mg/L)	Mean Bedrock GW (mg/L)
Al	0.012	0.169	-92.740	0.004	0.038
B	0.058	0.040	44.694	0.042	0.107
Ba	0.032	0.022	44.619	0.023	0.058
Cd	0.000009	0.000015	-38.688	0.000010	0.000006
Cu	0.001	0.001	-46.206	0.001	0.001
F	**0.140**	**0.107**	30.699	0.100	0.260
Fe	0.102	0.189	-45.834	0.010	0.379
P	0.016	0.007	137.618	0.010	0.034
Pb	0.000	0.0001	14.083	0.000	0.000
Sr	0.140	0.089	57.245	0.103	0.251
Zn	0.001	0.003	-59.847	0.001	0.002
Ca	40.200	39.139	2.711	33.400	60.600
Cl	28.533	7.230	294.641	36.000	6.120
K	3.337	1.987	67.926	3.150	3.898
Na	26.024	11.746	121.567	27.400	21.909
S	10.562	2.660	297.063	23.000	57.570
Si	0.864	6.540	-86.796	0.420	6.129

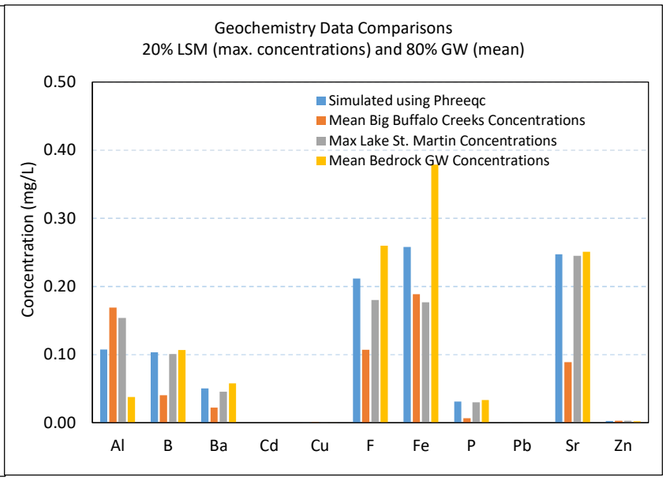




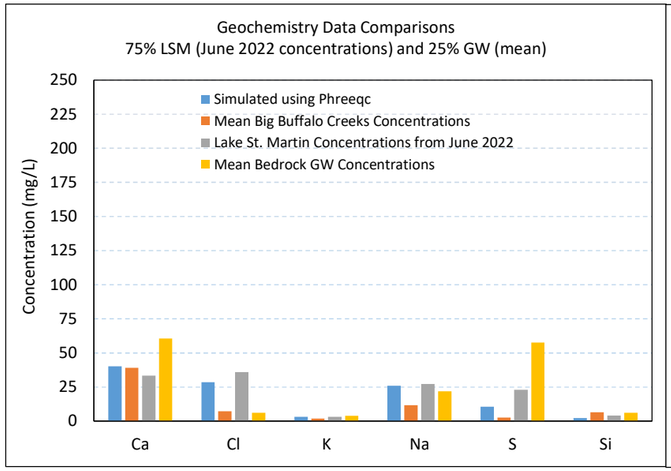
LSMOC - Mixing Calculations for Lake St. Martin and Bedrock Groundwater, and comparison with Big Buffalo Creeks (BC-01 to BC-05) Water Quality
Bedrock GW Data: 2019-2022, Lake St. Martin Data: 2021-2022, Big Buffalo Creeks Data: 2021-2023

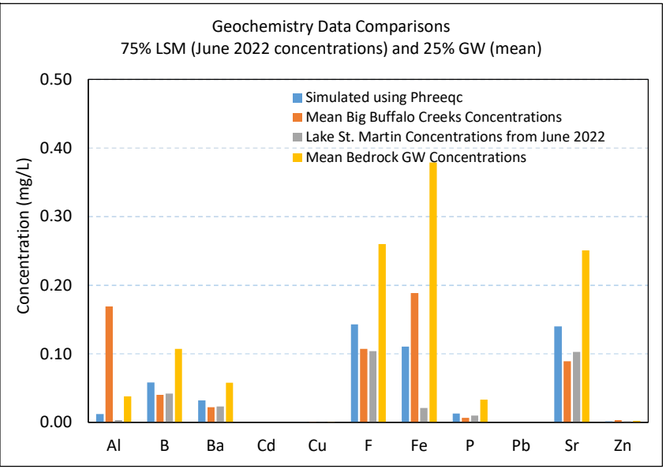
3. Maximum LSM, Mean Bedrock GW. Output compared with mean Big Buffalo Creeks' data 20% LSM with max concentrations and 80% bedrock GW mean concentrations					
Element	Simulated by Phreeqc (mg/L)	Observed Mean Buffalo Creek (mg/L)	Comparison (%) [1]	Maximum LSM concentrations (mg/L)	Mean Bedrock GW (mg/L)
Al	0.108	0.169	-36.337	0.154	0.038
B	0.103	0.040	156.927	0.101	0.107
Ba	0.051	0.022	128.702	0.046	0.058
Cd	0.000062	0.000015	328.931	0.000100	0.000006
Cu	0.001	0.001	-26.239	0.001	0.001
F	**0.212**	**0.107**	97.910	0.180	0.260
Fe	0.258	0.189	36.583	0.177	0.379
P	0.031	0.007	370.043	0.030	0.034
Pb	0.000	0.0001	136.411	0.000	0.000
Sr	0.248	0.089	177.984	0.245	0.251
Zn	0.003	0.003	-17.535	0.003	0.002
Ca	51.783	39.139	32.306	45.900	60.600
Cl	127.914	7.230	1669.217	209.000	6.120
K	7.863	1.987	295.665	10.500	3.898
Na	100.603	11.746	756.516	153.000	21.909
S	27.646	2.660	939.308	99.600	57.570
Si	3.157	6.540	-51.736	7.170	6.129





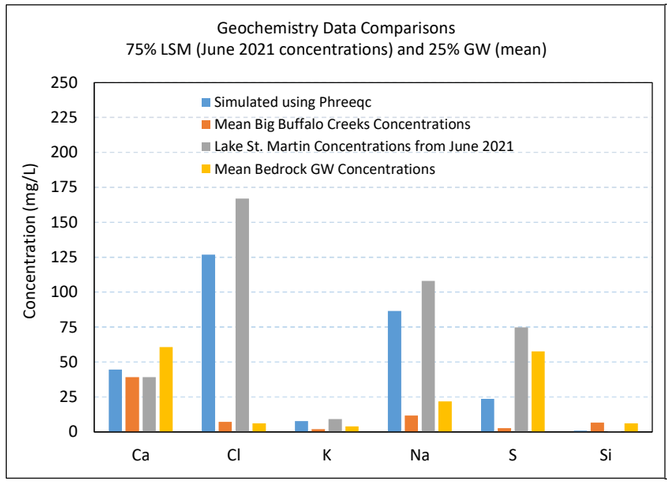
4. June 2022 LSM, Mean Bedrock GW. Output compared with mean Big Buffalo Creeks' data 75% LSM (June 2022 concentrations) and 25% bedrock GW mean concentrations					
Element	Simulated by Phreeqc (mg/L)	Observed Mean Buffalo Creek (mg/L)	Comparison (%) [1]	June 2022 LSM concentrations (mg/L)	Mean Bedrock GW (mg/L)
Al	0.012	0.169	-92.740	0.004	0.038
B	0.058	0.040	44.694	0.042	0.107
Ba	0.032	0.022	44.619	0.023	0.058
Cd	0.000013	0.000015	-8.717	0.000016	0.000006
Cu	0.001	0.001	-43.901	0.001	0.001
F	**0.143**	**0.107**	33.501	0.104	0.260
Fe	0.110	0.189	-41.485	0.021	0.379
P	0.013	0.007	92.699	0.010	0.034
Pb	0.000	0.0001	-19.550	0.000	0.000
Sr	0.140	0.089	57.245	0.103	0.251
Zn	0.002	0.003	-43.940	0.002	0.002
Ca	40.200	39.139	2.711	33.400	60.600
Cl	28.533	7.230	294.641	36.000	6.120
K	3.337	1.987	67.926	3.150	3.898
Na	26.024	11.746	121.567	27.400	21.909
S	10.562	2.660	297.063	23.000	57.570
Si	2.213	6.540	-66.159	4.270	6.129

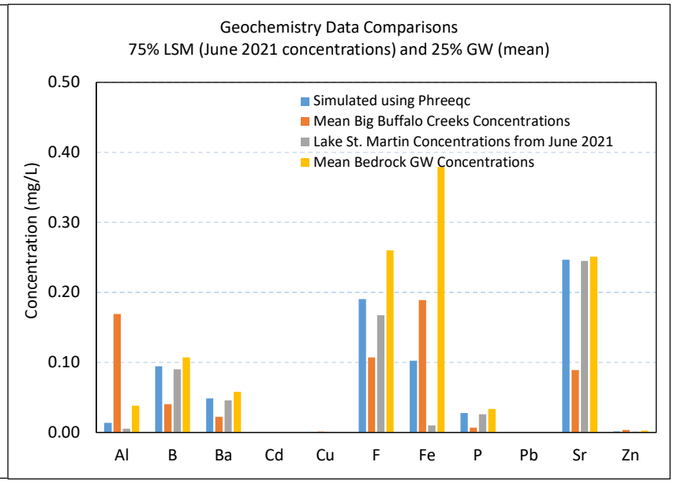




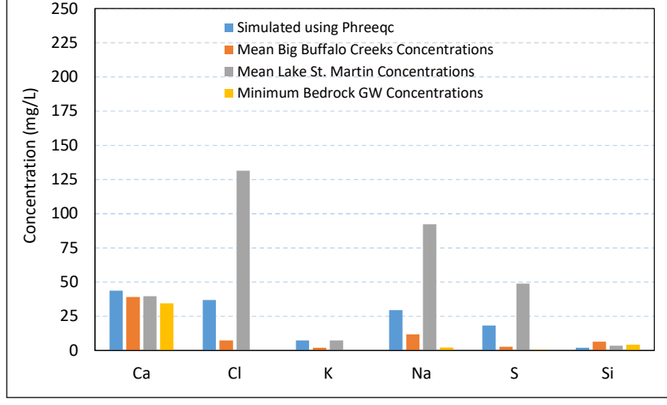
LSMOC - Mixing Calculations for Lake St. Martin and Bedrock Groundwater, and comparison with Big Buffalo Creeks (BC-01 to BC-05) Water Quality
Bedrock GW Data: 2019-2022, Lake St. Martin Data: 2021-2022, Big Buffalo Creeks Data: 2021-2023

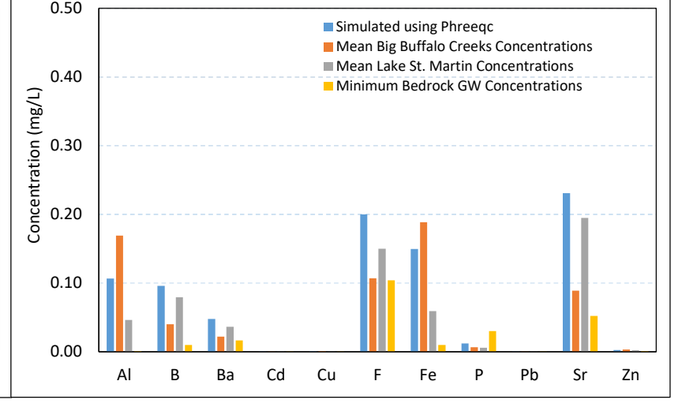
5. June 2021 LSM, Mean Bedrock GW. Output compared with the mean Big Buffalo Creeks' data 75% LSM (June 2021 concentrations) and 25% bedrock GW mean concentrations					
Element	Simulated by Phreeqc (mg/L)	Observed Mean Buffalo Creek (mg/L)	Comparison (%) [1]	June 2021 LSM concentrations (mg/L)	Mean Bedrock GW (mg/L)
Al	0.013	0.169	-92.073	0.005	0.038
B	0.094	0.040	134.185	0.090	0.107
Ba	0.049	0.022	120.461	0.046	0.058
Cd	0.000005	0.000015	-64.516	0.000005	0.000006
Cu	0.001	0.001	-47.735	0.0005	0.001
F	**0.190**	**0.107**	77.694	0.167	0.260
Fe	0.102	0.189	-45.834	0.010	0.379
P	0.028	0.007	315.066	0.026	0.034
Pb	0.000	0.0001	-19.531	0.000	0.000
Sr	0.247	0.089	176.901	0.245	0.251
Zn	0.001	0.003	-59.827	0.001	0.002
Ca	44.569	39.139	13.873	39.200	60.600
Cl	126.815	7.230	1654.016	167.000	6.120
K	7.809	1.987	292.911	9.110	3.898
Na	86.511	11.746	636.533	108.000	21.909
S	23.513	2.660	783.930	74.700	57.570
Si	0.864	6.540	-86.796	0.420	6.129





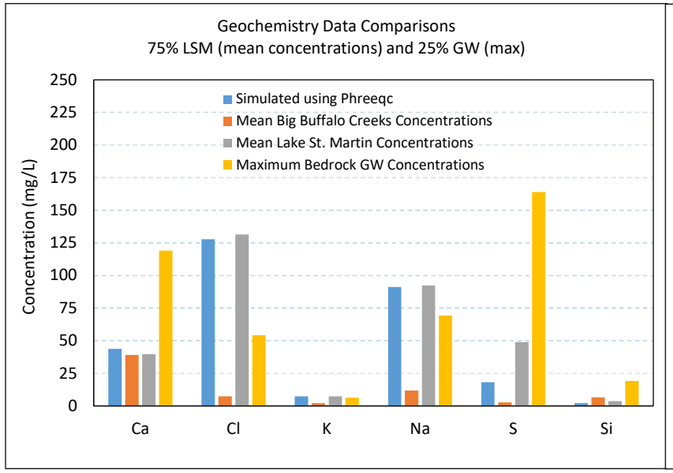
6. Mean LSM, Minimum Bedrock GW. Output compared with mean Big Buffalo Creeks' data 60% LSM and 40% GW (min. concentrations)					
Element	Simulated by Phreeqc (mg/L)	Observed Mean Buffalo Creek (mg/L)	Comparison (%) [1]	Mean LSM (mg/L)	Min conc. Bedrock GW (mg/L)
Al	0.107	0.169	-37.008	0.046	0.001
B	0.096	0.040	138.346	0.079	0.010
Ba	0.048	0.022	115.813	0.036	0.016
Cd	0.000020	0.000015	39.596	0.000020	0.000005
Cu	0.001	0.001	-18.426	0.001	0.000
F	**0.200**	**0.107**	86.738	0.150	0.104
Fe	0.150	0.189	-20.600	0.059	0.010
P	0.012	0.007	81.898	0.006	0.030
Pb	0.000	0.0001	230.010	0.000	0.000
Sr	0.231	0.089	159.583	0.195	0.052
Zn	0.003	0.003	-21.655	0.002	0.001
Ca	43.687	39.139	11.620	39.725	34.400
Cl	36.907	7.230	410.464	131.500	0.170
K	7.336	1.987	269.104	7.380	0.194
Na	29.496	11.746	151.122	92.325	2.100
S	18.280	2.660	587.206	49.000	0.600
Si	2.021	6.540	-69.096	3.540	4.290

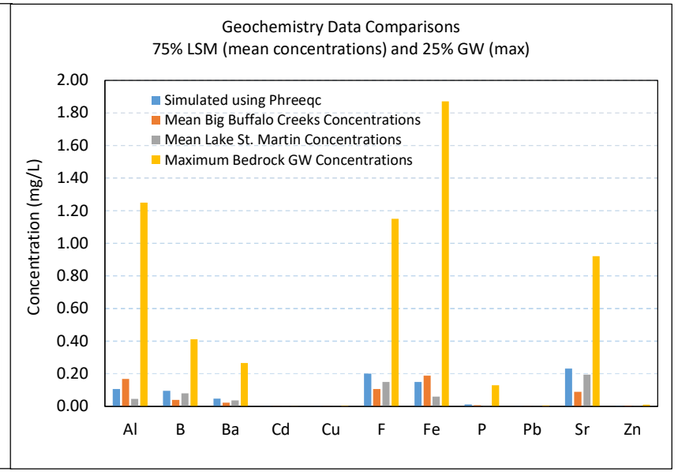




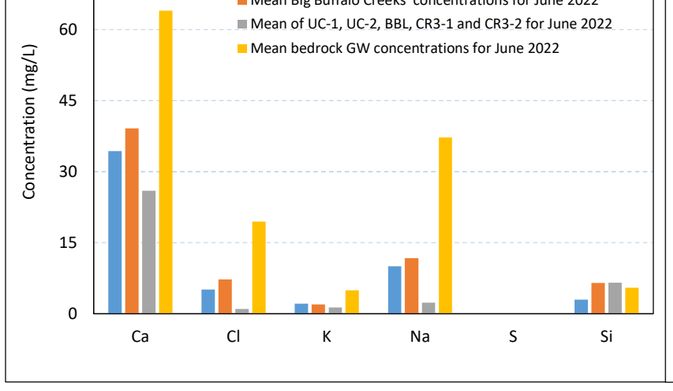
LSMOC - Mixing Calculations for Lake St. Martin and Bedrock Groundwater, and comparison with Big Buffalo Creeks (BC-01 to BC-05) Water Quality
Bedrock GW Data: 2019-2022, Lake St. Martin Data: 2021-2022, Big Buffalo Creeks Data: 2021-2023

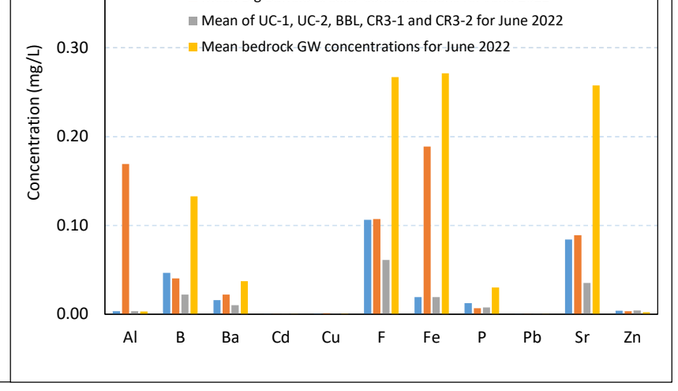
7. Mean LSM, Max Bedrock GW. Output compared with mean Big Buffalo Creeks' data 95% LSM and 5% GW (max. concentrations)					
Element	Simulated by Phreeqc (mg/L)	Observed Mean Buffalo Creek (mg/L)	Comparison (%) [1]	Mean LSM (mg/L)	Max conc. Bedrock GW (mg/L)
Al	0.106	0.169	-37.167	0.046	1.250
B	0.096	0.040	138.373	0.079	0.412
Ba	0.048	0.022	115.875	0.036	0.265
Cd	0.000020	0.000015	39.674	0.000020	0.000025
Cu	0.001	0.001	-18.426	0.0006	0.005
F	**0.200**	**0.107**	86.738	0.150	1.150
Fe	0.150	0.189	-20.600	0.059	1.870
P	0.012	0.007	81.898	0.006	0.129
Pb	0.00037	0.0001	230.010	0.000	0.005
Sr	0.231	0.089	159.681	0.195	0.921
Zn	0.003	0.003	-21.635	0.002	0.010
Ca	43.687	39.139	11.620	39.725	119.000
Cl	127.666	7.230	1665.785	131.500	54.200
K	7.336	1.987	269.104	7.380	6.440
Na	91.201	11.746	676.462	92.325	69.300
S	18.280	2.660	587.206	49.000	164.000
Si	2.021	6.540	-69.096	3.540	19.200





8. Mean of UC-1, UC-2, BBL, CR3-1 and CR3-2 for June 2022, and Mean bedrock GW (June 2022). Output compared with mean of BC-01 to BC-05 for June 2022 Data 78% Surface Water and 22% GW					
Element	Simulated by Phreeqc (mg/L)	Observed Mean of BC-01 to BC-05 for June 2022 Data (mg/L)	Comparison (%) [1]	Mean of UC-1, UC-2, BBL, CR3-1 and CR3-2 for June 2022 (mg/L)	Mean bedrock GW (June 2022) (mg/L)
Al	0.003	0.169	-98.186	0.003	0.003
B	0.047	0.040	15.589	0.022	0.133
Ba	0.016	0.022	-27.876	0.010	0.037
Cd	0.000010	0.000015	-32.889	0.000011	0.000005
Cu	0.000	0.001	-73.041	0.0002	0.000
F	**0.106**	**0.107**	-0.761	0.061	0.267
Fe	0.019	0.189	-89.723	0.019	0.271
P	0.012	0.007	84.587	0.007	0.030
Pb	0.00006	0.0001	-49.338	0.000	0.000
Sr	0.084	0.089	-5.545	0.035	0.258
Zn	0.004	0.003	12.813	0.004	0.002
Ca	34.341	39.139	-12.260	25.960	64.030
Cl	5.080	7.230	-29.731	1.014	19.488
K	2.119	1.987	6.599	1.313	4.971
Na	9.996	11.746	-14.896	2.314	37.224
S	-	-	-	-	-
Si	2.952	6.540	-54.871	6.548	5.480





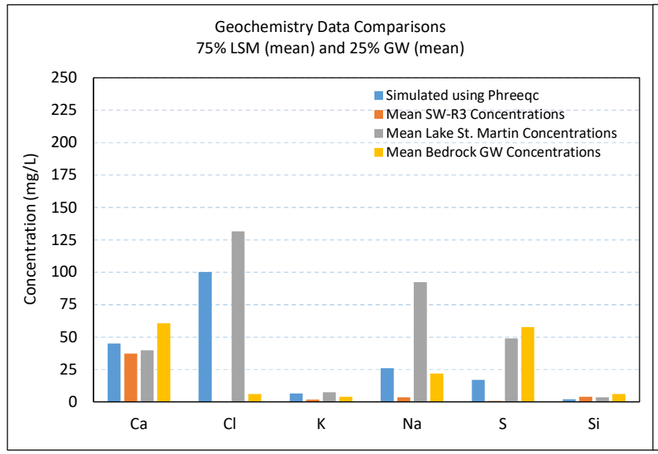
Notes

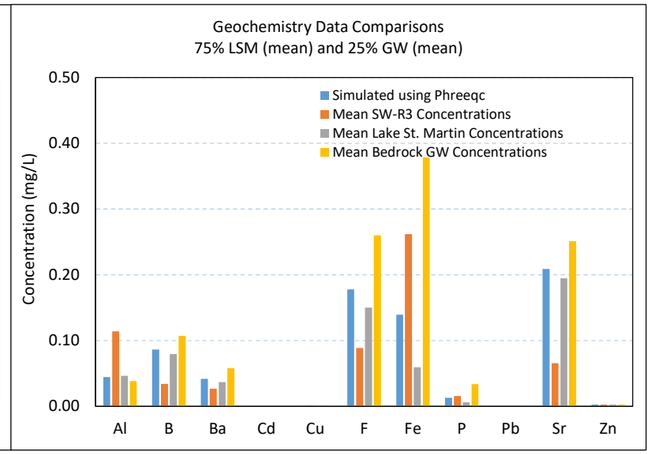
1 Simulated versus Observed data is compared by calculating the relative percentage difference using the expression: (Simulated - Observed)*100/Observed

Relative Percent Difference between simulated and observed concentrations is greater than 100%

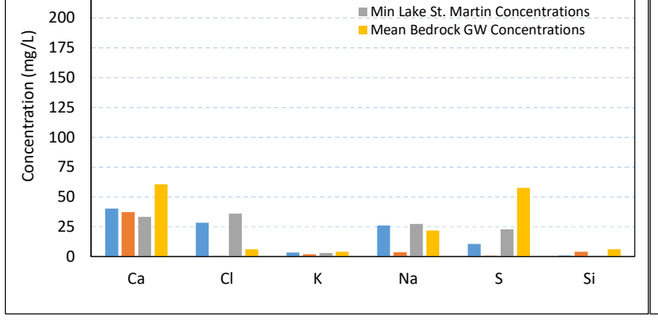
LSMOC - Mixing Calculations for Lake St. Martin and Bedrock Groundwater, and comparison with SW-R3 Water Quality
Bedrock GW Data: 2019-2022, Lake St. Martin Data: 2021-2022, , CR3-1 and CR3-2 Data: 2020-2022, SW-R3 Data: 2021-2023

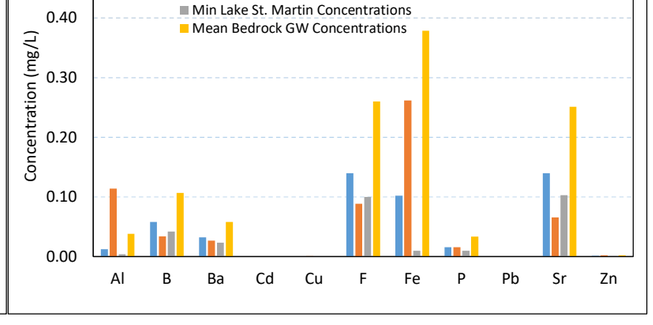
1. Mean LSM, Mean Bedrock GW. Output compared with mean SW-R3					
Mixing Proportions: 75% LSM and 25% GW					
Element	Simulated by Phreeqc (mg/L)	Observed Mean SW-R3 (mg/L)	Comparison (%) [1]	Mean LSM (mg/L)	Mean Bedrock GW (mg/L)
Al	0.044	0.114	-61.169	0.046	0.038
B	0.086	0.034	153.653	0.079	0.107
Ba	0.042	0.027	57.091	0.036	0.058
Cd	0.000016	0.000006	168.211	0.000020	0.000006
Cu	0.001	0.001	-41.081	0.001	0.001
F	**0.178**	**0.089**	100.126	0.150	0.260
Fe	0.139	0.262	-46.831	0.059	0.379
P	0.013	0.016	-17.736	0.006	0.034
Pb	0.0001	0.0001	47.262	0.000	0.000
Sr	0.209	0.065	219.398	0.195	0.251
Zn	0.002	0.002	-8.347	0.002	0.002
Ca	44.970	37.243	20.747	39.725	60.600
Cl	100.190	0.471	21152.462	131.500	6.120
K	6.510	1.860	249.972	7.380	3.898
Na	26.024	3.460	652.059	92.325	21.909
S	17.074	0.630	2610.171	49.000	57.570
Si	1.958	3.933	-50.221	3.540	6.129



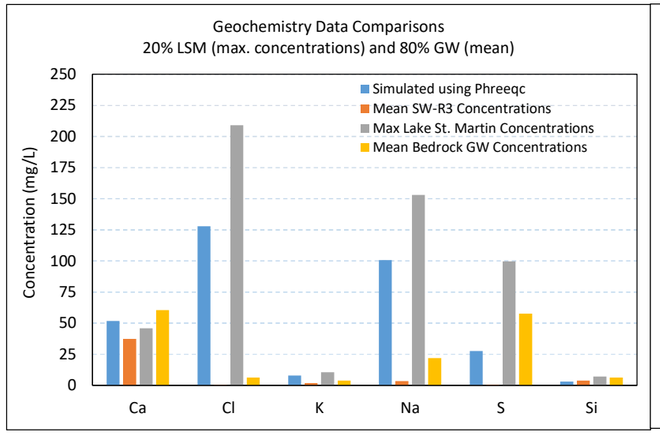


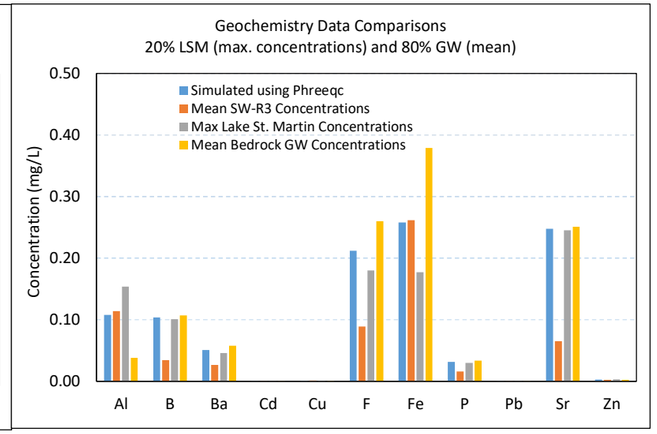
2. Minimum LSM, Mean Bedrock GW. Output compared with mean SW-R3					
Mixing Proportions: 75% LSM (min. concentrations) and 25% bedrock GW (mean concentrations)					
Element	Simulated by Phreeqc (mg/L)	Observed Mean SW-R3 (mg/L)	Comparison (%) [1]	Minimum LSM concentrations (mg/L)	Mean Bedrock GW (mg/L)
Al	0.012	0.114	-89.220	0.004	0.038
B	0.058	0.034	71.339	0.042	0.107
Ba	0.032	0.027	20.450	0.023	0.058
Cd	0.000009	0.000006	45.576	0.000010	0.000006
Cu	0.001	0.001	-48.449	0.001	0.001
F	**0.140**	**0.089**	57.831	0.100	0.260
Fe	0.102	0.262	-60.950	0.010	0.379
P	0.016	0.016	1.416	0.010	0.034
Pb	0.000	0.0001	47.262	0.000	0.000
Sr	0.140	0.065	114.093	0.103	0.251
Zn	0.001	0.002	-45.439	0.001	0.002
Ca	40.200	37.243	7.941	33.400	60.600
Cl	28.533	0.471	5952.364	36.000	6.120
K	3.337	1.860	79.400	3.150	3.898
Na	26.024	3.460	652.059	27.400	21.909
S	10.562	0.630	1576.489	23.000	57.570
Si	0.864	3.933	-78.042	0.420	6.129





3. Maximum LSM, Mean Bedrock GW. Output compared with mean SW-R3					
20% LSM with max concentrations and 80% bedrock GW mean concentrations					
Element	Simulated by Phreeqc (mg/L)	Observed Mean SW-R3 (mg/L)	Comparison (%) [1]	Maximum LSM concentrations (mg/L)	Mean Bedrock GW (mg/L)
Al	0.108	0.114	-5.470	0.154	0.038
B	0.103	0.034	204.238	0.101	0.107
Ba	0.051	0.027	90.480	0.046	0.058
Cd	0.000062	0.000006	918.428	0.000100	0.000006
Cu	0.001	0.001	-29.315	0.001	0.001
F	**0.212**	**0.089**	138.994	0.180	0.260
Fe	0.258	0.262	-1.532	0.177	0.379
P	0.031	0.016	100.615	0.030	0.034
Pb	0.000	0.0001	205.169	0.000	0.000
Sr	0.248	0.065	278.481	0.245	0.251
Zn	0.003	0.002	12.056	0.003	0.002
Ca	51.783	37.243	39.042	45.900	60.600
Cl	127.914	0.471	27033.363	209.000	6.120
K	7.863	1.860	322.699	10.500	3.898
Na	100.603	3.460	2807.252	153.000	21.909
S	27.646	0.630	4288.187	99.600	57.570
Si	3.157	3.933	-19.736	7.170	6.129

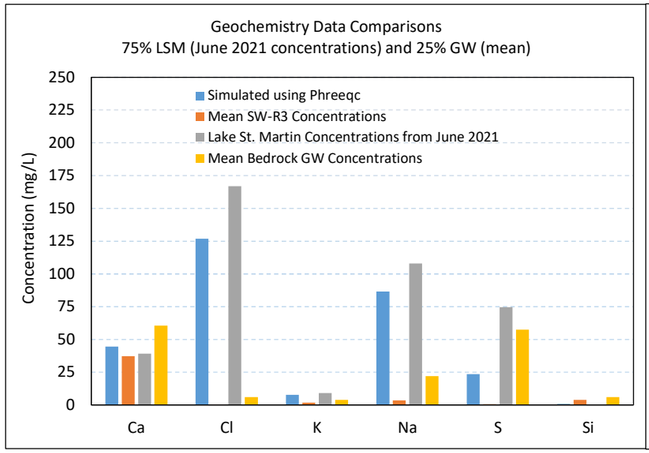


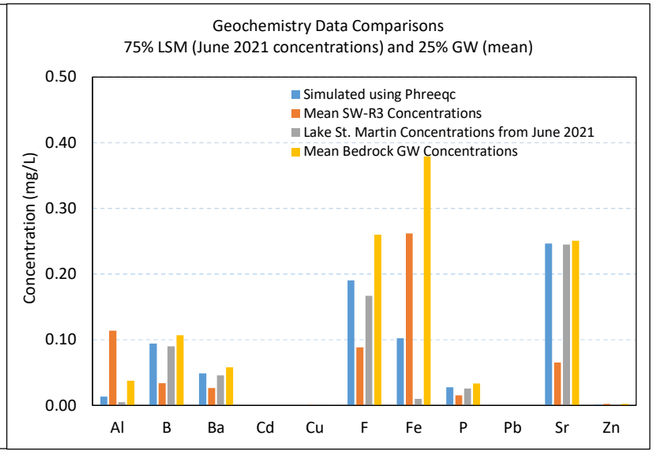


4. June 2022 LSM, Mean Bedrock GW. Output compared with mean SW-R3					
75% LSM (June 2022 concentrations) and 25% bedrock GW mean concentrations					
Element	Simulated by Phreeqc (mg/L)	Observed Mean SW-R3 (mg/L)	Comparison (%) [1]	June 2022 LSM concentrations (mg/L)	Mean Bedrock GW (mg/L)
Al	0.012	0.114	-89.220	0.004	0.038
B	0.058	0.034	71.339	0.042	0.107
Ba	0.032	0.027	20.450	0.023	0.058
Cd	0.000013	0.000006	116.738	0.000016	0.000006
Cu	0.001	0.001	-46.241	0.001	0.001
F	**0.143**	**0.089**	61.214	0.104	0.260
Fe	0.110	0.262	-57.815	0.021	0.379
P	0.013	0.016	-17.756	0.010	0.034
Pb	0.000	0.0001	3.848	0.000	0.000
Sr	0.140	0.065	114.093	0.103	0.251
Zn	0.002	0.002	-23.825	0.002	0.002
Ca	40.200	37.243	7.941	33.400	60.600
Cl	28.533	0.471	5952.364	36.000	6.120
K	3.337	1.860	79.400	3.150	3.898
Na	26.024	3.460	652.059	27.400	21.909
S	10.562	0.630	1576.489	23.000	57.570
Si	2.213	3.933	-43.722	4.270	6.129

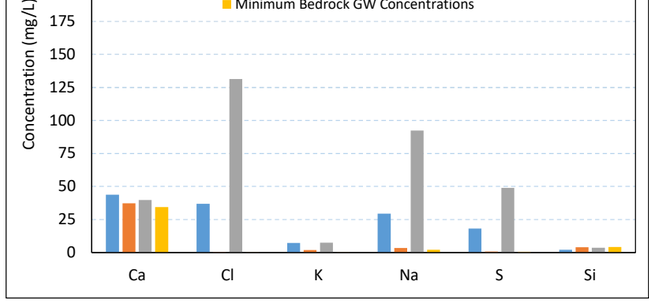
LSMOC - Mixing Calculations for Lake St. Martin and Bedrock Groundwater, and comparison with SW-R3 Water Quality
Bedrock GW Data: 2019-2022, Lake St. Martin Data: 2021-2022, , CR3-1 and CR3-2 Data: 2020-2022, SW-R3 Data: 2021-2023

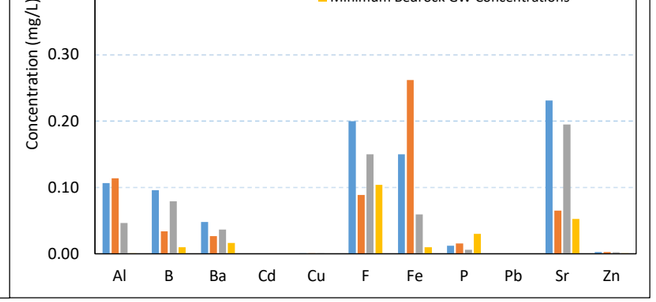
5. June 2021 LSM, Mean Bedrock GW. Output compared with the mean SW-R3					
75% LSM (June 2021 concentrations) and 25% bedrock GW mean concentrations					
Element	Simulated by Phreeqc (mg/L)	Observed Mean SW-R3 (mg/L)	Comparison (%) [1]	June 2021 LSM concentrations (mg/L)	Mean Bedrock GW (mg/L)
Al	0.013	0.114	-88.230	0.005	0.038
B	0.094	0.034	177.308	0.090	0.107
Ba	0.049	0.027	83.616	0.046	0.058
Cd	0.000005	0.000006	-15.750	0.000005	0.000006
Cu	0.001	0.001	-49.915	0.0005	0.001
F	**0.190**	**0.089**	114.581	0.167	0.260
Fe	0.102	0.262	-60.950	0.010	0.379
P	0.028	0.016	77.151	0.026	0.034
Pb	0.000	0.0001	3.872	0.000	0.000
Sr	0.247	0.065	277.007	0.245	0.251
Zn	0.001	0.002	-45.412	0.001	0.002
Ca	44.569	37.243	19.671	39.200	60.600
Cl	126.815	0.471	26800.232	167.000	6.120
K	7.809	1.860	319.756	9.110	3.898
Na	86.511	3.460	2399.997	108.000	21.909
S	23.513	0.630	3632.148	74.700	57.570
Si	0.864	3.933	-78.042	0.420	6.129





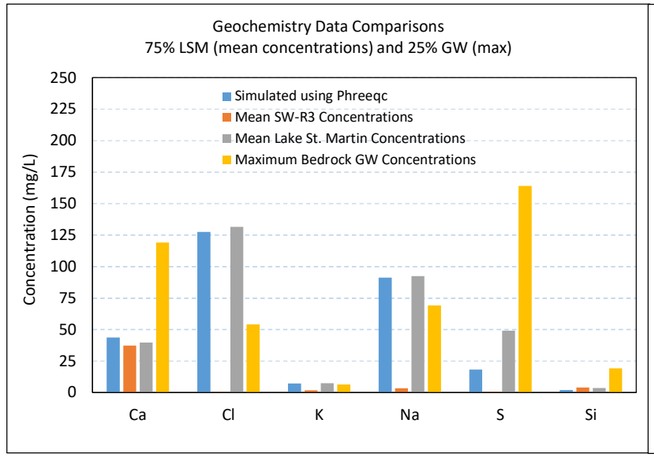
6. Mean LSM, Minimum Bedrock GW. Output compared with mean SW-R3					
60% LSM and 40% GW (min. concentrations)					
Element	Simulated by Phreeqc (mg/L)	Observed Mean SW-R3 (mg/L)	Comparison (%) [1]	Mean LSM (mg/L)	Min conc. Bedrock GW (mg/L)
Al	0.107	0.114	-6.465	0.046	0.001
B	0.096	0.034	182.236	0.079	0.010
Ba	0.048	0.027	79.746	0.036	0.016
Cd	0.000020	0.000006	231.449	0.000020	0.000005
Cu	0.001	0.001	-21.829	0.001	0.000
F	**0.200**	**0.089**	125.503	0.150	0.104
Fe	0.150	0.262	-42.758	0.059	0.010
P	0.012	0.016	-22.365	0.006	0.030
Pb	0.000	0.0001	325.989	0.000	0.000
Sr	0.231	0.065	253.427	0.195	0.052
Zn	0.003	0.002	6.457	0.002	0.001
Ca	43.687	37.243	17.304	39.725	34.400
Cl	36.907	0.471	7728.667	131.500	0.170
K	7.336	1.860	294.323	7.380	0.194
Na	29.496	3.460	752.377	92.325	2.100
S	18.280	0.630	2801.538	49.000	0.600
Si	2.021	3.933	-48.607	3.540	4.290

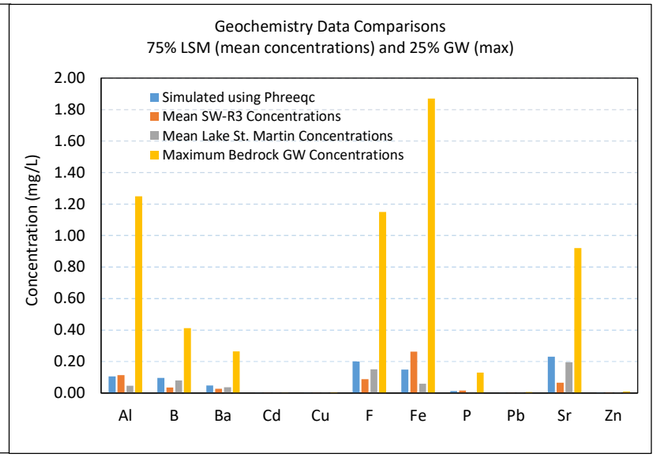




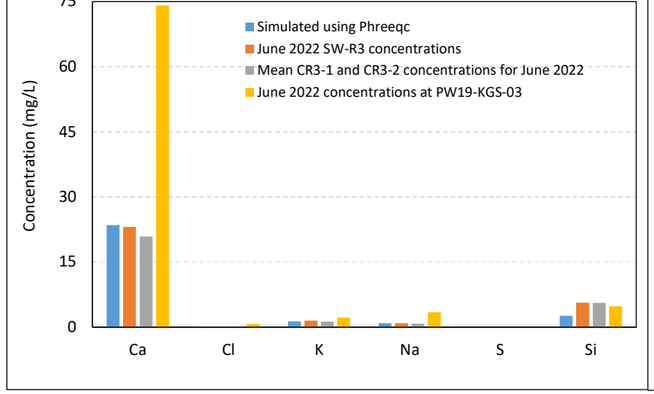
LSMOC - Mixing Calculations for Lake St. Martin and Bedrock Groundwater, and comparison with SW-R3 Water Quality
Bedrock GW Data: 2019-2022, Lake St. Martin Data: 2021-2022, , CR3-1 and CR3-2 Data: 2020-2022, SW-R3 Data: 2021-2023

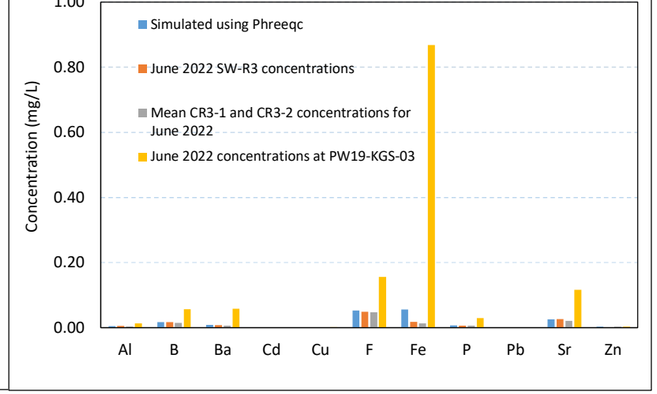
7. Mean LSM, Max Bedrock GW. Output compared with mean SW-R3					
95% LSM and 5% GW (max. concentrations)					
Element	Simulated by Phreeqc (mg/L)	Observed Mean SW-R3 (mg/L)	Comparison (%) [1]	Mean LSM (mg/L)	Max conc. Bedrock GW (mg/L)
Al	0.106	0.114	-6.702	0.046	1.250
B	0.096	0.034	182.268	0.079	0.412
Ba	0.048	0.027	79.798	0.036	0.265
Cd	0.000020	0.000006	231.633	0.000020	0.000025
Cu	0.001	0.001	-21.829	0.0006	0.005
F	**0.200**	**0.089**	125.503	0.150	1.150
Fe	0.150	0.262	-42.758	0.059	1.870
P	0.012	0.016	-22.365	0.006	0.129
Pb	0.00037	0.0001	325.989	0.000	0.005
Sr	0.231	0.065	253.561	0.195	0.921
Zn	0.003	0.002	6.484	0.002	0.010
Ca	43.687	37.243	17.304	39.725	119.000
Cl	127.666	0.471	26980.720	131.500	54.200
K	7.336	1.860	294.323	7.380	6.440
Na	91.201	3.460	2535.527	92.325	69.300
S	18.280	0.630	2801.538	49.000	164.000
Si	2.021	3.933	-48.607	3.540	19.200





8. Mean of CR3-1 and CR3-2 for June 2022, June 2022 GW for PW19-KGS-03. Output compared with June 2022 SW-R3 Data					
95% of Mean CR3-1 and CR3-2 (June 2022) and 5% GW at PW19-KGS-03 (June 2022)					
Element	Simulated by Phreeqc (mg/L)	Observed June 2022 SW-R3 (mg/L)	Comparison (%) [1]	Mean of CR3-1 and CR3-2 for June 2022 (mg/L)	Bedrock GW at PW19-KGS-03 for June 2022 (mg/L)
Al	0.005	0.006	-20.930	0.0042	0.014
B	0.017	0.017	0.597	0.015	0.057
Ba	0.009	0.008	12.022	0.006275	0.058
Cd	0.000005	0.000005	0.014	0.000005	0.000005
Cu	0.00027	0.000	36.020	0.0002	0.002
F	**0.053**	**0.049**	8.019	0.0475	0.156
Fe	0.056	0.018	212.433	0.0135	0.868
P	0.008	0.006	18.426	0.0064	0.030
Pb	0.000	0.0001	29.618	0.00005	0.000
Sr	0.026	0.026	-2.619	0.0208	0.117
Zn	0.003	0.001	206.258	0.00305	0.003
Ca	23.515	23.100	1.796	20.85	74.100
Cl	0.157	0.130	20.786	0.13	0.670
K	1.311	1.520	-13.770	1.265	2.180
Na	0.960	0.947	1.378	0.832	3.390
S	-	-	-	-	-
Si	2.588	5.650	-54.195	5.575	4.810





Notes

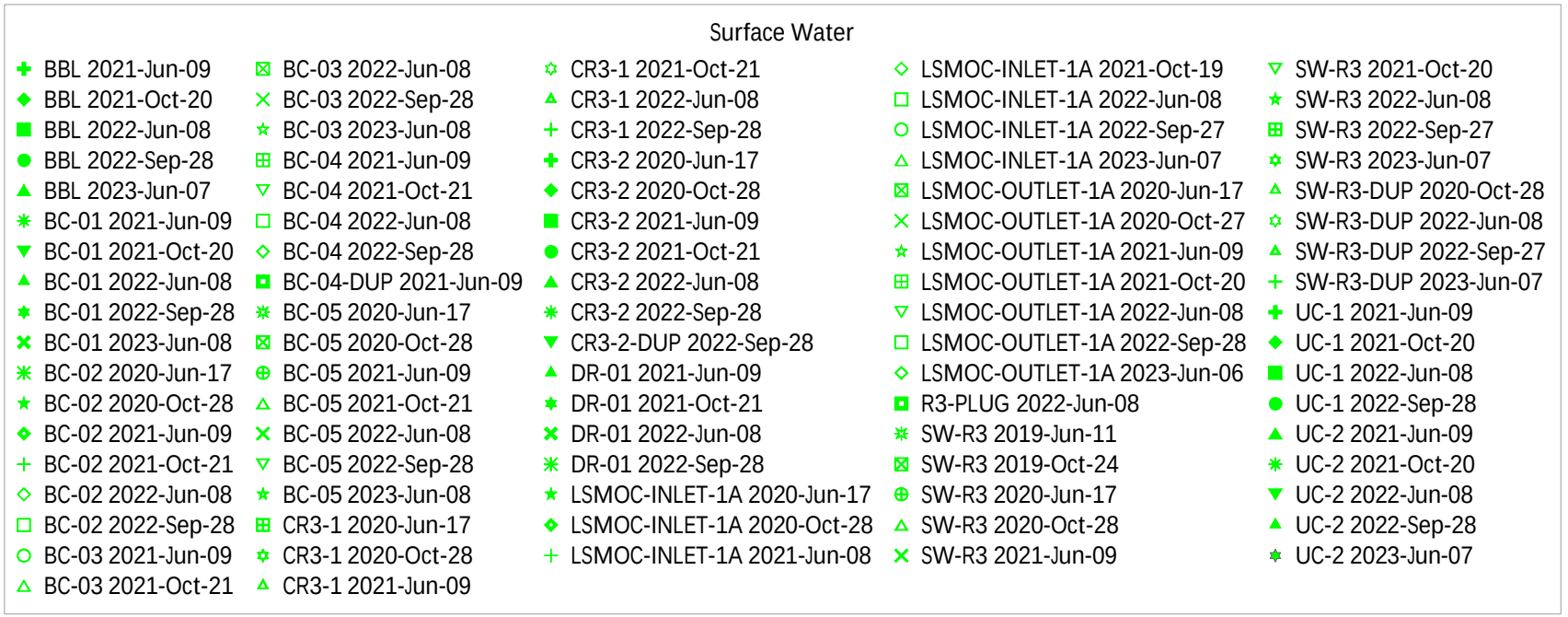
1 Simulated versus Observed data is compared by calculating the relative percentage difference using the expression: (Simulated - Observed)*100/Observed

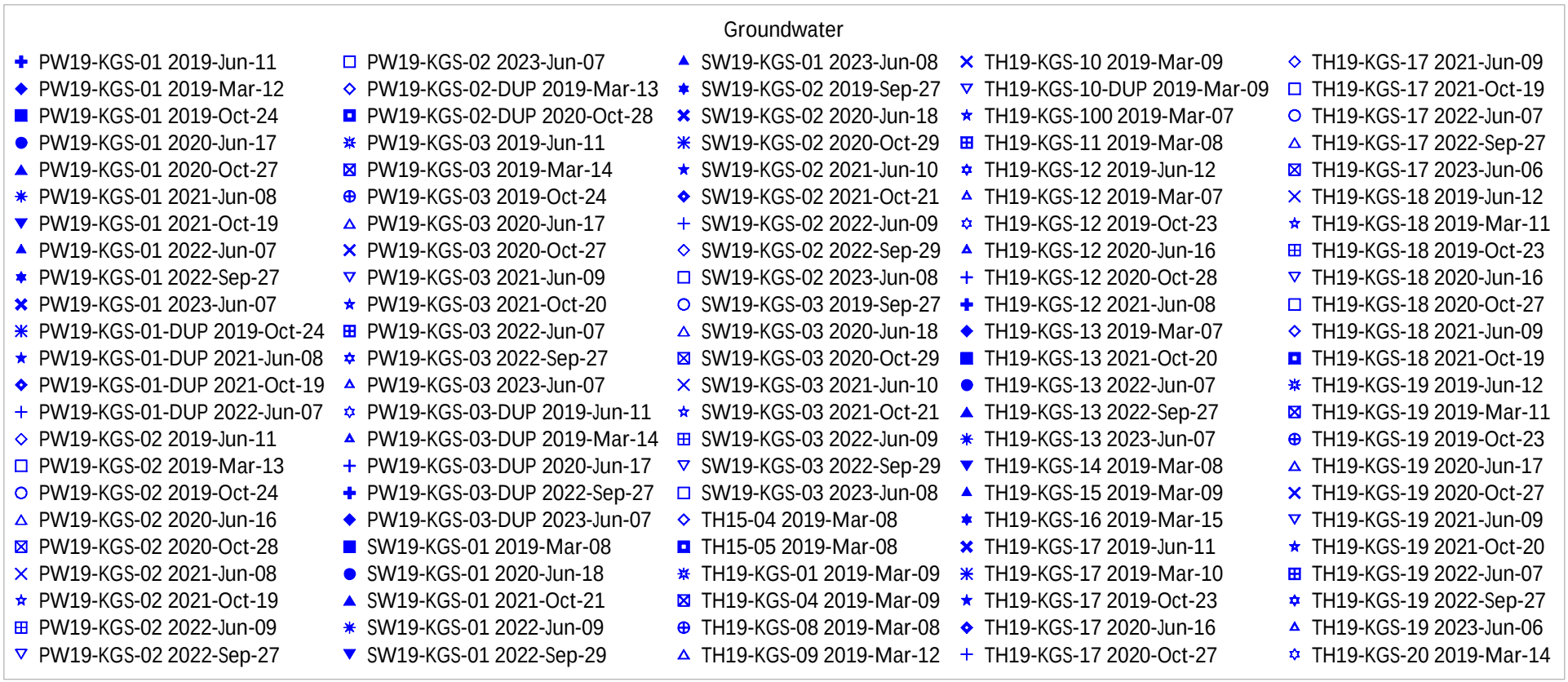
Relative Percent Difference between simulated and observed concentrations is greater than 100%

APPENDIX C

Isotope Plot Legends

KGS GROUP


Surface Water
BBL 2021-Jun-09
BBL 2021-Oct-20
BBL 2022-Jun-08
BBL 2022-Sep-28
BBL 2023-Jun-07
BC-01 2021-Jun-09
BC-01 2021-Oct-20
BC-01 2022-Jun-08
BC-01 2022-Sep-28
BC-01 2023-Jun-08
BC-02 2020-Jun-17
BC-02 2020-Oct-28
BC-02 2021-Jun-09
BC-02 2021-Oct-21
BC-02 2022-Jun-08
BC-02 2022-Sep-28
BC-03 2021-Jun-09
BC-03 2021-Oct-21
BC-03 2022-Jun-08
BC-03 2022-Sep-28
BC-03 2023-Jun-08
BC-04 2021-Jun-09
BC-04 2021-Oct-21
BC-04 2022-Jun-08
BC-04 2022-Sep-28
BC-04-DUP 2021-Jun-09
BC-05 2020-Jun-17
BC-05 2020-Oct-28
BC-05 2021-Jun-09
BC-05 2021-Oct-21
BC-05 2022-Jun-08
BC-05 2022-Sep-28
BC-05 2023-Jun-08
CR3-1 2020-Jun-17
CR3-1 2020-Oct-28
CR3-1 2021-Jun-09
CR3-1 2021-Oct-21
CR3-1 2022-Jun-08
CR3-1 2022-Sep-28
CR3-2 2020-Jun-17
CR3-2 2020-Oct-28
CR3-2 2021-Jun-09
CR3-2 2021-Oct-21
CR3-2 2022-Jun-08
CR3-2 2022-Sep-28
CR3-2-DUP 2022-Sep-28
DR-01 2021-Jun-09
DR-01 2021-Oct-21
DR-01 2022-Jun-08
DR-01 2022-Sep-28
LSMOC-INLET-1A 2020-Jun-17
LSMOC-INLET-1A 2020-Oct-28
LSMOC-INLET-1A 2021-Jun-08
LSMOC-INLET-1A 2021-Oct-19
LSMOC-INLET-1A 2022-Jun-08
LSMOC-INLET-1A 2022-Sep-27
LSMOC-INLET-1A 2023-Jun-07
LSMOC-OUTLET-1A 2020-Jun-17
LSMOC-OUTLET-1A 2020-Oct-27
LSMOC-OUTLET-1A 2021-Jun-09
LSMOC-OUTLET-1A 2021-Oct-20
LSMOC-OUTLET-1A 2022-Jun-08
LSMOC-OUTLET-1A 2022-Sep-28
LSMOC-OUTLET-1A 2023-Jun-06
R3-PLUG 2022-Jun-08
SW-R3 2019-Jun-11
SW-R3 2019-Oct-24
SW-R3 2020-Jun-17
SW-R3 2020-Oct-28
SW-R3 2021-Jun-09
SW-R3 2021-Oct-20
SW-R3 2022-Jun-08
SW-R3 2022-Sep-27
SW-R3 2023-Jun-07
SW-R3-DUP 2020-Oct-28
SW-R3-DUP 2022-Jun-08
SW-R3-DUP 2022-Sep-27
SW-R3-DUP 2023-Jun-07
UC-1 2021-Jun-09
UC-1 2021-Oct-20
UC-1 2022-Jun-08
UC-1 2022-Sep-28
UC-2 2021-Jun-09
UC-2 2021-Oct-20
UC-2 2022-Jun-08
UC-2 2022-Sep-28
UC-2 2023-Jun-07


Groundwater
PW19-KGS-01 2019-Jun-11
PW19-KGS-01 2019-Mar-12
PW19-KGS-01 2019-Oct-24
PW19-KGS-01 2020-Jun-17
PW19-KGS-01 2020-Oct-27
PW19-KGS-01 2021-Jun-08
PW19-KGS-01 2021-Oct-19
PW19-KGS-01 2022-Jun-07
PW19-KGS-01 2022-Sep-27
PW19-KGS-01 2023-Jun-07
PW19-KGS-01-DUP 2019-Oct-24
PW19-KGS-01-DUP 2021-Jun-08
PW19-KGS-01-DUP 2021-Oct-19
PW19-KGS-01-DUP 2022-Jun-07
PW19-KGS-02 2019-Jun-11
PW19-KGS-02 2019-Mar-13
PW19-KGS-02 2019-Oct-24
PW19-KGS-02 2020-Jun-16
PW19-KGS-02 2020-Oct-28
PW19-KGS-02 2021-Jun-08
PW19-KGS-02 2021-Oct-19
PW19-KGS-02 2022-Jun-09
PW19-KGS-02 2022-Sep-27
PW19-KGS-02 2023-Jun-07
PW19-KGS-02-DUP 2019-Mar-13
PW19-KGS-02-DUP 2020-Oct-28
PW19-KGS-03 2019-Jun-11
PW19-KGS-03 2019-Mar-14
PW19-KGS-03 2019-Oct-24
PW19-KGS-03 2020-Jun-17
PW19-KGS-03 2020-Oct-27
PW19-KGS-03 2021-Jun-09
PW19-KGS-03 2021-Oct-20
PW19-KGS-03 2022-Jun-07
PW19-KGS-03 2022-Sep-27
PW19-KGS-03 2023-Jun-07
PW19-KGS-03-DUP 2019-Jun-11
PW19-KGS-03-DUP 2019-Mar-14
PW19-KGS-03-DUP 2020-Jun-17
PW19-KGS-03-DUP 2022-Sep-27
PW19-KGS-03-DUP 2023-Jun-07
SW19-KGS-01 2019-Mar-08
SW19-KGS-01 2020-Jun-18
SW19-KGS-01 2021-Oct-21
SW19-KGS-01 2022-Jun-09
SW19-KGS-01 2022-Sep-29
SW19-KGS-01 2023-Jun-08
SW19-KGS-02 2019-Sep-27
SW19-KGS-02 2020-Jun-18
SW19-KGS-02 2020-Oct-29
SW19-KGS-02 2021-Jun-10
SW19-KGS-02 2021-Oct-21
SW19-KGS-02 2022-Jun-09
SW19-KGS-02 2022-Sep-29
SW19-KGS-02 2023-Jun-08
SW19-KGS-03 2019-Sep-27
SW19-KGS-03 2020-Jun-18
SW19-KGS-03 2020-Oct-29
SW19-KGS-03 2021-Jun-10
SW19-KGS-03 2021-Oct-21
SW19-KGS-03 2022-Jun-09
SW19-KGS-03 2022-Sep-29
SW19-KGS-03 2023-Jun-08
TH15-04 2019-Mar-08
TH15-05 2019-Mar-08
TH19-KGS-01 2019-Mar-09
TH19-KGS-04 2019-Mar-09
TH19-KGS-08 2019-Mar-08
TH19-KGS-09 2019-Mar-12
TH19-KGS-10 2019-Mar-09
TH19-KGS-10-DUP 2019-Mar-09
TH19-KGS-100 2019-Mar-07
TH19-KGS-11 2019-Mar-08
TH19-KGS-12 2019-Jun-12
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TH19-KGS-13 2022-Jun-07
TH19-KGS-13 2022-Sep-27
TH19-KGS-13 2023-Jun-07
TH19-KGS-14 2019-Mar-08
TH19-KGS-15 2019-Mar-09
TH19-KGS-16 2019-Mar-15
TH19-KGS-17 2019-Jun-11
TH19-KGS-17 2019-Mar-10
TH19-KGS-17 2019-Oct-23
TH19-KGS-17 2020-Jun-16
TH19-KGS-17 2020-Oct-27
TH19-KGS-17 2021-Jun-09
TH19-KGS-17 2021-Oct-19
TH19-KGS-17 2022-Jun-07
TH19-KGS-17 2022-Sep-27
TH19-KGS-17 2023-Jun-06
TH19-KGS-18 2019-Jun-12
TH19-KGS-18 2019-Mar-11
TH19-KGS-18 2019-Oct-23
TH19-KGS-18 2020-Jun-16
TH19-KGS-18 2020-Oct-27
TH19-KGS-18 2021-Jun-09
TH19-KGS-18 2021-Oct-19
TH19-KGS-19 2019-Jun-12
TH19-KGS-19 2019-Mar-11
TH19-KGS-19 2019-Oct-23
TH19-KGS-19 2020-Jun-17
TH19-KGS-19 2020-Oct-27
TH19-KGS-19 2021-Jun-09
TH19-KGS-19 2021-Oct-20
TH19-KGS-19 2022-Jun-07
TH19-KGS-19 2022-Sep-27
TH19-KGS-19 2023-Jun-06
TH19-KGS-20 2019-Mar-14

APPENDIX IAAC-R2-06-1: SUMMARY OF KEY CONCERNS TABLES

Appendix IAAC-R3-06-1, Table 1 Lake Manitoba

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Current and Future Availability of Country Foods	Wildlife Hunting and Trapping	• Ongoing flooding of lands and harvesting areas around Lake Manitoba. • Concerns regarding the barrier that the Project will create, from Lake Manitoba to Lake Winnipeg, which will impede the free flow of terrestrial wildlife. • Concerns that the position of the channels will further reduce the natural variability of Lake Manitoba and Lake St Martin marshes resulting in degradation of the marsh and migratory bird habitat. • Concerns that with the reduction of the operating range and reduced natural water level variability of Lake Manitoba and Lake St Martin, riparian zones and lake marshes will be degraded reducing their ecological integrity and important role as wildlife habitat and natural biological filter. • Effects on migratory bird habitat and populations resulting from lowering flows and levels on Lake Manitoba, Lake St. Martin, the Fairford River and the Dauphin River. • Concerns regarding pollutants in Lake Manitoba and resulting effects to wildlife.	• The main purpose of the Project is to alleviate flooding, including on Lake Manitoba. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 metres (m) (812.5 feet [ft]); outside of this, conditions will remain as currently experienced. • The channels may affect the movement of terrestrial wildlife and are anticipated to act as a semi-permeable barrier. Effects to wildlife movement are anticipated to be most prominent when the channels are operating in times of flood. • Measures to reduce effects to wildlife movements include the use of small-sized rock armouring material, which provides a smoother surface for wildlife to cross while also addressing erosion, shallow slopes for channel and spoil piles, retaining trees where possible, planting cover vegetation to reduce sight lines. Consideration is also being given to adding breaks in spoil piles to enhance wildlife movement, where possible. • As the channels are cutting off some of the flow from upgradient areas, an outside drain beside the channels will alleviate pooling of water in upgradient areas, and wetland offsetting is being designed to replace any losses to downgradient wetlands. • The Wetland Compensation Program (WCP) comprises most wetland sites that are directly affected by the Project in a way that cannot be fully mitigated (i.e., 1,008 hectares (ha) (2,491 acres [ac]) (239 ha [590.6 ac] for Class III, IV, V plus 769 ha [1,900 ac] for peatlands). Results arising from the Wetland Monitoring Plan (WetMP) will be evaluating functional changes to adjacent wetlands and to determine if there are appropriate mitigation options to address Project related effects such as drawdown and whether additional offsetting may be required. • As indicated, the Project is designed to address flooding, but the fluctuations in lake levels are still expected to occur, and so the effects to lake shorelines and associated wetlands and other habitat (during non-flood events) are expected to remain relatively unchanged. • As the Project will reduce overland flooding, this would be expected to reduce inputs from nutrients and contaminants in soils, which could otherwise affect wildlife. • From a local perspective, the Lake Manitoba Outlet Channel (LMOC) will be intersecting cattle operations and wetland areas are being developed to passively treat this runoff and outflows to the lake are expected to not measurably change and may result in slight improvements to water quality. Relocation of some operations is being considered, pending negotiations with landowners.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Wildlife movement – EIS Volume 3, Section 8.3.6 – IAAC-R1-47, IAAC-R1-93 – IAAC-R2-17, IAAC-R2-21 – IAAC-R3-06 • Access – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-93, IAAC-R1-101, IAAC-R1-119, IAAC-R1-122 – IAAC-R2-12, IAAC-R2-15, IAAC-R2-21 – IAAC-R3-06 • Local drainage – EIS Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-75 – IAAC-R2-13 • Wetlands/WCP – EIS Volume 3, Section 8.2.4 – IAAC-R1-23, IAAC-R1-24, IAAC-R1-53, IAAC-R1-73, IAAC-R1-95, IAAC-R1-97, IAAC-R1-98, IAAC-R1-99, IAAC-R1-133 – IAAC-R2-07, IAAC-R2-13 – IAAC-R3-02, IAAC-R3-04, IAAC-R3-05 • Cattle operations – EIS Volume 4, Section 9.2.2.2 – IAAC-R1-14 – IAAC-R2-01 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
	Aquatic Environment and Fishing	• Concerns regarding the spread of zebra mussels into Lake Manitoba. • Project effects on the spawning cycle and increased sedimentation on spawning windows and key fish spawning habitat in Watchorn Bay. • Loss or alteration of fish habitat and fish movement and/or migration due to Project construction and operation, presence of permanent infrastructure, changes in water quality and shoreline morphology, and alteration of water, sediment and debris transfer between Lake Manitoba, Lake St. Martin, and Lake Winnipeg. • Cumulative impacts to harvesting rights, specifically including, water and fishing. • Impacts to aquatic species, shoreline erosion, and fish habitat on Lake Manitoba. • Concerns regarding loss or alteration of fish habitat, fish movement and/or migration due to the Project. • Effects on fish spawning areas, including Johnson Beach.	• Cumulative effects of past activities have been incorporated into the baseline conditions in carrying out the Project environmental assessment and the responsibility for the Project is to maintain current conditions and look for opportunities to improve conditions where feasible, from a Project perspective. • Zebra mussels were found in Lake Manitoba in 2021. They will almost certainly spread downstream into Lake St. Martin before construction would start if approvals for the Project are granted. The Project will adhere to provincial regulations regarding measures to limit the spread. • During construction, a portion of Watchorn Bay will be isolated to install the inlet structure, extending approximately 132 m (433.1 ft) into the bay. Silt curtains will be used to confine sediments to the work area, with monitoring to confirm effectiveness, as described in the Sediment Management Plan (SMP). The hydraulic conditions in Watchorn Bay are expected to remain within their natural variability during the construction and operation phases of the LMOC. The inlet excavation is not expected to interrupt existing sediment transport processes in the vicinity. • Losses of fish habitat in Watchorn Bay are being offset as required by the *Fisheries Act*. The area that will be excavated for the channel inlet is not suitable for spawning. • Some fish will likely move into the channels. Baseflows are being provided to maintain dissolved oxygen levels, and while they cannot move back upstream from downstream lakes they can via the existing Dauphin and Fairford rivers. • Based on analysis of regional water quality, areas upstream are similar to those downstream, and so no measurable changes are expected.	• Zebra mussels/ AIS – EIS Volume 3, Section 7.2.4.2 – IAAC-R1-39, IAAC-R1-77 – IAAC-R2-14, IAAC-R2-27 – IAAC-R3-01 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Fish habitat offsetting – EIS Volume 3, Section 7.2.4 – IAAC-R1-36, IAAC-R1-37, IAAC-R1-46, IAAC-R1-53 – IAAC-R2-10 – IAAC-R3-02 • Baseflows – EIS Volume 1, Section 3.3.2, Section 3.4.3, Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-31, IAAC-R1-38, IAAC-R1-78 – IAAC-R2-11 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04
	Plant and Plant Harvesting	• Impacts to plant harvesting due to water level fluctuations on Lake Manitoba. • Flood-related damages to plant life on Lake Manitoba. • Concerns regarding harvesting areas used for berry picking and Seneca root.	• The main purpose of the Project is to alleviate flooding, including on Lake Manitoba. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 m (812.5 ft); outside of this, conditions will remain as currently experienced. • The reduction in flooding should improve access to plants around the lake, but the channels will impact movement and access to local resources.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Water Quality (drinking, recreational and cultural uses)		• Potential impacts on drinking water quality, especially near the LMOC where soils have been impacted by agriculture, including the addition of manures and fertilizers to the soils. • Concerns regarding water quality and impacts from pollutants and agricultural runoff entering Lake Manitoba. • Concerns regarding water increased sediment loads into Lake Manitoba. • Decline of surface water quality due to the impacts from agricultural run-off and inadequately managed sewage. • Increases of nitrogen and phosphorous resulting in increases of blue-green algae in Lake Manitoba. • Concerned about agricultural runoff causing a decline in water quality in Lake Manitoba. • Effects of increased sediment in Watchorn Bay. • Effects to drinking water and increased pollution in Lake Manitoba. • Concerns that sediment transport into the south basin will increase due to LMOC being a vector for Lake Manitoba sediment. • Effects related to agricultural runoff, which is a contributing factor to the decline in water quality (drinking, recreational and cultural uses) in Lake Manitoba. • Concerns that Lake Manitoba will be polluted and jeopardized with both Lake Winnipeg spillways open at the same time and unfiltered water entering the lakes. • Further deterioration of water quality in Lake Manitoba from the proposed project. • Concerns with the quality of water that will be flowing into Lake Manitoba and the potential increase of algae blooms. • Concerns that the natural water level variability of Lake Manitoba and Lake St. Martin has been significantly impacted since the increase in capacity of the Fairford River and the advent of the Portage Diversion. • Changes in water quality and shoreline morphology, and alteration of water, sediment and debris transfer between Lake Manitoba, Lake St. Martin and Lake Winnipeg as a result of construction and operation, and the presence of permanent infrastructure.	• The main purpose of the Project is to mitigate the effects of flooding, and from a regional perspective this should reduce the overall amount of soil entering the lake that has been impacted by agriculture. • From a local perspective, the LMOC will be intersecting cattle operations and wetland areas are being developed to passively treat this runoff and outflows to the lake are expected to not measurably change and may result in slight improvements to water quality. Relocation of some operations is being considered, pending negotiations with landowners. • During construction, silt curtains will be used to confine sediments to the work area in Watchorn Bay, with monitoring to confirm effectiveness, as described in the SMP. The hydraulic conditions in Watchorn Bay are expected to remain within their natural variability during the construction and operation phases of the LMOC. The inlet excavation is not expected to interrupt existing sediment transport processes in the vicinity. • Based on analysis of regional water quality, areas upstream are similar to those downstream, and so no measurable changes are expected. • Surface water quality monitoring will be carried out during construction (Surface Water Management Plan) and for several operation periods (Aquatic Effects Monitoring Plan [AEMP]) to confirm that the Project is not measurably changing water quality over current conditions. • The Project environmental assessment focusses on maintaining current conditions and improving conditions where feasible. Lake levels will be managed through hydrometric monitoring and adherence to Operating Guidelines.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Cattle operations – EIS Volume 4, Section 9.2.2.2 – IAAC-R1-14 – IAAC-R2-01 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Economic Conditions		• Impacts to commercial fishing on Lake Manitoba due to changing water levels. • Impacts to commercial trapping on Lake Manitoba. • Erosion of fishing stations at Goodman's Landing and McBeth Point. • Effects to fishing and fishing camps from erosion, invasive species, water quality changes, and changes to water levels, fish spawning, migration and consequently affecting livelihoods. • Loss of viable farmland located on the shores of Lake Manitoba from flood damage. • Cumulative impacts to harvesting rights, specifically including, water and fishing.	• The main purpose of the Project is to alleviate flooding, including on Lake Manitoba. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 m (812.5 ft); outside of this, conditions will remain as currently experienced. • Flood protection provided by the Project will have positive effects to farmland and trapping areas around the lake. • The reduction in peak flood flows will reduce the potential for shoreline erosion. Velocities will be higher at specific locations in the lakes (inlets/outlets, Lake St. Martin Narrows) during Project operation, but generally not in shoreline areas, including islands in Lake St. Martin. • Surface water quality effects should be localized to a portion of Watchorn Bay during construction and managed with monitoring and silt curtains. • Losses to fish habitat in Watchorn Bay will be offset as a requirement under the *Fisheries Act*. • Some fish may leave the lake via the LMOC but are able to return up the Fairford and Dauphin rivers. • Changes to regional fish populations are not expected but will be monitored under the AEMP, with results being made available to regulators and local communities.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Fish habitat offsetting – EIS Volume 3, Section 7.2.4 – IAAC-R1-36, IAAC-R1-37, IAAC-R1-46, IAAC-R1-53 – IAAC-R2-10 – IAAC-R3-02 – Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Mental and Social Well-being		• Project environmental effects within the Lake Manitoba Basin and their impacts on the Lake Winnipeg natural resources, aquatic habitat and fishery, traditional and treaty rights, and health. • Diminished recreational value of the Watchorn Provincial Park (WPP). • Concerns regarding ancestral settlement site located near Watchorn Bay on the route of the Lake Manitoba Outlet Channel. • Impacts to rights to access safe drinking water in Lake Manitoba. • Concerns regarding fishing rights being impacted in certain locations at the LMOC inlet and outlet. • Concerns that adverse effects to fish and fish habitat in Lake Manitoba have the potential to impact the fishing rights.	• The environmental assessment examined potential effects from the Project and developed mitigation to address adverse effects. This included addressing effects and concerns expressed by participating Indigenous groups. Information was documented in the Environmental Impact Statement and shared during the engagement process. • The Project will need to receive formal provincial and federal regulatory approval before it can be constructed. It is expected that decisions will incorporate concerns expressed by Indigenous communities and how they are being addressed. • Construction of the LMOC will result in shoreline modification in the immediate vicinity of the inlet to the channel; however, waterborne effects are not predicted to extend to WPP. • Suspended sediment from the Project is not expected to affect the WPP shoreline. During construction of the inlet, site activities will be done in a manner to prevent the release and deposition of suspended sediments into Lake Manitoba. • Changes to existing shoreline erosion processes are not predicted to occur and the Project is not expected to affect the sands on the beach. Lake levels and water flow in the lake will occur within the range that have previously occurred in the Project area. • The inlet and associated works have been designed such that change to the morphology of the natural and modified shorelines is minimized and/or prevented. The shoreline area will be monitored during and after construction to confirm no changes beyond current variability and trends. • Surface water and fish and fish habitat will be monitored during construction and for several operating periods under the AEMP to verify predictions made in the environmental assessment and address any unpredicted adverse effects. • The results of monitoring will be shared with regulators and communities, and ongoing engagement will provide opportunities for discussion. • The Project Environmental Advisory Committee (EAC) has been established as a venue to share results and discuss issues of concern. • While it is difficult to address aspects of mental and social wellbeing, Manitoba Transportation and Infrastructure is committed to the sharing of results and ongoing engagement to help to address the uncertainties, concerns and issues currently being expressed.	• Indigenous socioeconomics – EIS Volume 4, Section 10.3.3.1 • Mental Health – EIS Volume 4, Section 10.3.3.2 – IAAC-R1-103 – IAAC-R2-28 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04 • Sediment effects/management – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-30, IAAC-R1-32, IAAC-R1-44, IAAC-R1-76, IAAC-R1-81, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-31 – IAAC-R3-01 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • EAC – IAAC-R1-65 – IAAC-R2-30 – IAAC-R3-06
Use of Navigable Waters		• Access to Lake Manitoba due to changing water levels. • Concerns regarding the use of boats on Lake Manitoba during certain periods with the operations of the Project and the Fairford River Water Control Structure. • Concern that the reduction of the water level of Lake Manitoba will have potential effects on the ability for boats to navigate fishing areas.	• The main purpose of the Project is to alleviate flooding, including on Lake Manitoba. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 m (812.5 ft); outside of this, conditions will remain as currently experienced. • During construction, a portion of Watchorn Bay will be isolated to install the inlet structure, extending approximately 132 m (433.1 ft) into the bay. After construction, safety booms will be used to protect boaters and prevent access to the inlet areas from a safety perspective. This area would be unavailable for fishing but represents a relatively small portion of available areas in Watchorn Bay.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Navigation – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-119, IAAC-R1-111, IAAC-R1-122 – IAAC-R2-29

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Food Security		• Ongoing flooding of lands and harvesting areas around Lake Manitoba. • Concerns regarding the barrier that the Project will create, from Lake Manitoba to Lake Winnipeg, which will impede the free flow of terrestrial wildlife. • Concerns regarding pollutants in Lake Manitoba and resulting effects to wildlife. • Cumulative impacts to harvesting rights, specifically including, water and fishing. • Loss of viable farmland located on the shores of Lake Manitoba from flood damage.	• The main purpose of the Project is to alleviate flooding, including on Lake Manitoba. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 m (812.5 ft); outside of this, conditions will remain as currently experienced. • The reduction in flooding should reduce the overall amount of soil entering the lake that has been impacted by agriculture. • The reduction in flooding should improve availability of farmland and access to plants around the lake during these times. • The channels may affect the movement of terrestrial wildlife and are anticipated to act as a semi-permeable barrier. Effects to wildlife movement are anticipated to be most prominent when the channels are operating in times of flood. • Measures to reduce effects to wildlife movements include the use of small-sized rock armouring material which provides a smoother surface for wildlife to cross while also addressing erosion, shallow slopes for channel and spoil piles, retaining trees where possible, planting cover vegetation to reduce sight lines, and consideration being given to adding breaks in spoil piles to enhance wildlife movement where possible. • As the channels are cutting off some of the flow from upgradient areas, an outside drain beside the channels will alleviate pooling of water in upgradient areas, and wetland offsetting is being designed to replace any losses to downgradient wetlands. The Wetland Offsetting Program comprises most wetland sites that are directly affected by the Project in a way that cannot be fully mitigated (i.e., 1,008 ha [2,491 ac] 239 ha [590.6 ac]) for Class III, IV, V plus 769 ha [1,900 ac] for peatlands). Results arising from the WetMP will be evaluating functional changes to adjacent wetlands and to determine if there are appropriate mitigation options to address Project related effects such as drawdown and whether additional offsetting may be required.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Wildlife movement – EIS Volume 3, Section 8.3.6 – IAAC-R1-47, IAAC-R1-93 – IAAC-R2-17, IAAC-R2-21 – IAAC-R3-06 • Local drainage – EIS Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-75 – IAAC-R2-13 • Wetlands/WCP – EIS Volume 3, Section 8.2.4 – IAAC-R1-23, IAAC-R1-24, IAAC-R1-53, IAAC-R1-73, IAAC-R1-95, IAAC-R1-97, IAAC-R1-98, IAAC-R1-99, IAAC-R1-133 – IAAC-R2-07, IAAC-R2-13 – IAAC-R3-02, IAAC-R3-04, IAAC-R3-05

Appendix IAAC-R3-06-1, Table 2 Fairford River

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Current and Future Availability of Country Foods	Wildlife Hunting and Trapping	• Concerns that the Project will impact migratory bird habitat and populations resulting from lowering flows and levels on the Fairford River. • Concerns related to flood-impacted (2011) important nesting areas for geese and habitat for muskrat along the Fairford River and along Highway 513 adjacent to the Dauphin River. • Loss of muskrat and marten habitat along the Fairford River. • Loss of trapping areas along the Fairford River as a result of major flooding events. • Concerns that fluctuations in lake levels on Lake St. Martin, which is highly influenced by the Fairford water control structure (WCS), may create conditions that are not ideal for muskrat and beaver. • Concerns that (Provincial Road) PR 239 realignment and widening may have a minor impact on migratory bird habitat. • As a result of lowering flows and levels on the Fairford River, migratory fowl habitat will shrink and be degraded resulting in declines in migratory birds in the region.	• Changes to the Fairford River would only occur if the Project was operating to manage a flood and will have the positive benefit of reducing overbank flooding and reducing velocities in spring/summer. • Project-related changes are expected to be positive, in terms of birds and wildlife habitat, as well as access to these resources. • PR 239 realignment occurs along an existing right-of-way that will require minimal clearing of migratory bird habitat. Implementation of Environmental Management Program plans will reduce the likelihood of harmful substances entering wetlands and affecting migratory birds in areas adjacent to PR 239. Implementation of habitat mitigation plans for the red-headed woodpecker and eastern whip-poor-will assist in addressing potential effects.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Migratory bird habitat – EIS Volume 3, Section 8.3.6 – IAAC-R1-47, IAAC-R1-49, IAAC-R1-50, IAAC-R1-53, IAAC-R1-132 – IAAC-R2-04, IAAC-R2-13, IAAC-R2-17, IAAC-R2-18, IAAC-R2-20 – IAAC-R3-02, IAAC-R3-03, IAAC-R3-04, IAAC-R3-05
	Aquatic Environment and Fishing	• Impacts to fishing values due to flooding events and fluctuating water levels on Lake St. Martin caused by the operation of existing flood management infrastructure situated on the Fairford River. • Impacts to fish and their ability to move between bodies of water due to the WCS on the Fairford River. • Effects on fishing grounds and fishers who operate out of Fairford River. • Recurring effects from unexpected fluctuations in water levels on Lake St. Martin (i.e., from low to high), caused by the operation of existing flood management infrastructure situated on the Fairford River that includes: – Changes to fish habitat and migration corridors due to flooding and fluctuating water levels on Lake St. Martin associated with the operation of the Fairford River Water Control Structure (FRWCS). – Adverse effects on fish habitat in Lake St. Martin and Dauphin River, e.g., changes to water flows and water quality on the fall spawning run of whitefish up the Dauphin River from Lake Winnipeg to spawning beds along the river and in Lake St. Martin. – Increased fish mortality during low water due to inadequate oxygen in the stagnant water, or when the river freezes to the bottom.	• Cumulative effects of past activities have been incorporated into the baseline conditions in carrying out the Project environmental assessment and the responsibility for the Project is to maintain current conditions and look for opportunities to improve conditions where feasible, from a Project perspective. • Measurable changes to Fairford River would only occur if the Project was operating to manage a flood and will reduce peak flows in the Fairford River during periods of high flows and flood events. • Regular spring/summer high flows will still occur; the Project's management of floods will not affect flows under low flow conditions when movements of fish could be impeded and there will still be sufficient flow for spring flushing and natural fluvial geomorphologic processes to occur. • The channels may attract fish to pass downstream through them and while they cannot move back upstream through the channels, they can still migrate up the Fairford and Dauphin rivers. • Lake Manitoba will supply baseflow in the LMOC which will in turn supply baseflow in the Lake St. Martin Outlet Channel (LSMOC); therefore, no impact would be expected on the Dauphin River, even during drought conditions. Water levels on Lake Manitoba would need to be very low (significantly below the bottom of the target range, which is extremely rare) for a decision to turn off the base flow in the LMOC. Therefore, it is anticipated that baseflow would be provided at all times in both channels when not in use for flood operation. • Effects of operation related to the Lake St. Martin Emergency Outlet Channel (EOC) are being offset as a requirement of the *Fisheries Act* Authorization for the EOC.	• Cumulative effects – EIS Volume 5, Section 11 – IAAC-R1-130 – IAAC-R2-22, IAAC-R2-25, IAAC-R2-34 – IAAC-R3-01, IAAC-R3-03 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Baseflows – EIS Volume 1, Section 3.3.2, Section 3.4.3, Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-31, IAAC-R1-38, IAAC-R1-78 – IAAC-R2-11 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Current and Future Availability of Country Foods (cont'd)	Plant and Plant Harvesting	• Project effects on wetlands by changing wetland composition and hydrology in the Fairford River. Wetland degradation may result in loss of ecological function and impact harvesters' ability to use the wetlands as a source of sustenance and medicinal plants.	• Changes to the Fairford River would only occur if the Project was operating to manage a flood and will reduce overbank flooding and reduce velocities in spring/summer. This would reduce potential effects to plants and medicines adjacent to the Fairford River and improve access to harvest sites during these periods. • A Wetland Offsetting Program is being developed with input from Indigenous groups to address most wetland sites that are directly affected by the Project in a way that cannot be fully mitigated (i.e., 1,008 hectares (ha) (2,491 acres [ac]) (239 ha [590.6 ac] for Class III, IV, V plus 769 ha [1,900 ac] for peatlands). Results arising from the Wetland Monitoring Plan will be evaluating functional changes to adjacent wetlands and to determine if there are appropriate mitigation options to address Project related effects such as drawdown and whether additional offsetting may be required.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Wetlands/WCP – EIS Volume 3, Section 8.2.4 – IAAC-R1-23, IAAC-R1-24, IAAC-R1-53, IAAC-R1-73, IAAC-R1-95, IAAC-R1-97, IAAC-R1-98, IAAC-R1-99, IAAC-R1-133 – IAAC-R2-07, IAAC-R2-13 – IAAC-R3-02, IAAC-R3-04, IAAC-R3-05

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Water Quality (drinking, recreational and cultural uses)		• Concerns that the the natural water level variability of Lake Manitoba and Lake St. Martin has been significantly impacted since the increase in capacity of the Fairford River and the advent of the Portage Diversion. • Cumulative effects to water quality since the construction of the FRWCS, Portage Diversion, and subsequent flood events. • Concerns regarding the effects on the Fairford River due to ensuring adequate base flows in the channels during low flow periods. • Effects related to the nutrients, wastewater effluents, fertilizers, pesticides, animal waste and other contaminants that are entering the Fairford River. • Concerns that any disruption of the balance of inflow and outflow due to LMOC and LSMOC channel adjustments or Fairford flow adjustments to deal with ice impacts may cause shifting ice on Lake St. Martin or ice jamming on the Fairford River. • Fluctuating water levels and flows due to flooding and water management via control structures such as the FRWCS. • Recurring effects from unexpected fluctuations in water levels on Lake St. Martin, i.e., from low to high), caused by the operation of existing flood management infrastructure situated on the Fairford River that includes a decrease in water clarity and quality as a result of construction and operation of the Portage Diversion [and FRWCS]. • Concerns that low water levels on Lake St. Martin create problems with the whitefish and walleye fishery, including the loss of fish in the winter due to low oxygen levels, and fish becoming trapped in pools in the Fairford and Dauphin Rivers and being lost when the pools freeze to the bottom. • The change of water levels during the winter, either by increasing or decreasing water flows through the Fairford River while the lake is frozen, also has negative effects on winter fishing activities (e.g., nets freezing in the lake). • Concerns that the proposed reduction of lake levels to 797.5 ft asl in the north basin during typical operations has analogous effects as water level reductions on Lake St. Martin in past years caused by water being held back at the FRWCS during drought periods. • Impacts from the FRWCS, which creates high flows in the Fairford River resulting in extremely high levels on Lake Manitoba but abnormally low and/or unpredictable levels on Lake St. Martin and Lake Pineimuta. • Impacts from the recent and severe recent flood events (notably the floods in 2011 and 2014) and poorly managed WCSs (particularly the FRWCS) have resulted in changes to the level, flow and velocity of waterbodies including Lake Manitoba, Lake St. Martin and Lake Pineimuta.	• The Project environmental assessment approach is designed to consider current conditions, in terms of adverse effects, and incorporates changes due to previous projects and activities into the baseline. The operation of the FRWCS follows the “minimal log change model” developed by the 2003 Lake Manitoba Regulation Review Advisory Committee. The objective of this operating regime is to reduce the unnatural fluctuations in water levels experienced on Lake St. Martin and Lake Pinemuta due the regulation of Lake Manitoba. The principles of this operating regime have also been applied to the operating guidelines developed for the Lake Manitoba and Lake St. Martin. • The main purpose of the Project is to alleviate flooding. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 m (812.5 ft); outside of this, conditions will remain as currently experienced. Seasonal fluctuations in lake levels are still expected to occur, and so the effects to lake shorelines and associated wetlands and other habitat are expected to remain relatively unchanged. • Measurable changes to the Fairford River would only occur if the Project was operating to manage a flood and will reduce peak flows in the Fairford River during periods of high flows and flood events. • A reduction in overland flooding should reduce inputs into the Fairford River from nutrients and contaminants in soils. • Lake Manitoba will supply baseflow/riparian flow in the LMOC which will in turn supply baseflow in the Lake St. Martin Outlet Channel and therefore no impact would be expected on the Dauphin River even during drought conditions. • Water levels on Lake Manitoba would need to be very low (significantly below the bottom of the target range, which is extremely rare) for a decision to turn off the baseflow/riparian flow in the LMOC. Therefore, it is anticipated that baseflow would be provided at all times in both channels when not in use for flood operation. The amount of erosion and sediment load to Fairford River is also expected to decrease because a portion of the peak flows from Lake Manitoba will be diverted to the LMOC. • From a regional perspective, water quality in upstream areas is comparable to downstream areas and is not expected to measurably change. • Methods of operating the LMOC and LSMOC to reduce the risk of ice jams is described in the Ice Management Plan. Due to the risks of ice dams, winter operations will require careful adjustments of the WCS gates and continuous monitoring to manage ice conditions in the channels, including the potential for ice jams and hanging ice dams. • The proposed operating guidelines have been drafted with consideration for maintaining stable ice cover. If the outlet channels must be operated continuously from the open water season into winter freeze-up, the control structures will be operated in a manner to minimize water level fluctuations over the winter and to maintain stable ice conditions. In general, operation of the outlet control structures will not be initiated (going from fully closed to open) during the period in which there is solid ice cover in the channel unless there is a high degree of certainty for major flooding in the coming spring. • Operation of the FRWCS is also avoided in the winter unless there is a high degree of certainty for major flooding in the coming spring.	• Cumulative effects – EIS Volume 5, Section 11 – IAAC-R1-130 – IAAC-R2-22, IAAC-R2-25, IAAC-R2-34 – IAAC-R3-01, IAAC-R3-03 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Baseflows – EIS Volume 1, Section 3.3.2, Section 3.4.3, Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-31, IAAC-R1-38, IAAC-R1-78 – IAAC-R2-11 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Ice effects/management – IAAC-R1-71 – IAAC-R2-10, IAAC-R2-11, IAAC-R2-23

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Economic Conditions		• Recurring effects from unexpected fluctuations in water levels on Lake St. Martin, i.e., from low to high), caused by the operation of existing flood management infrastructure situated on the Fairford River that includes, loss of equipment due to water-level fluctuations on Lake St. Martin associated with the operation of the FRWCS, and associated loss of income. • Effects from widely fluctuating flows through the FRWCS and associated changes in water levels on Lake St. Martin and Pineimuta Lake have resulted in impacts to economic and traditional activities including ranching, fishing and trapping.	• The Project environmental assessment is responsible for considering current conditions but incorporates changes due to previous projects and activities into the baseline. • The main purpose of the Project is to alleviate flooding. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 m (812.5 ft); outside of this, conditions will remain as currently experienced.	• Cumulative effects – EIS Volume 5, Section 11 – IAAC-R1-130 – IAAC-R2-22, IAAC-R2-25, IAAC-R2-34 – IAAC-R3-01, IAAC-R3-03 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05
Mental and Social Well-being		• Impacts to Treaty rights resulting from construction and continued operation of existing WCS (i.e., the Portage Diversion, FRWCS, and the EOC).	• Manitoba Transportation and Infrastructure's response to IAAC-R1-127 describes how the integrated water management system in Manitoba was considered as part of the cumulative effects assessment for the proposed Outlet Channels Project. Water mitigation infrastructure, flood mitigation and water management projects in the Regional Assessment Area have played a part in defining the existing environment of the area. Other than the Lake St. Martin EOC, the structures discussed in the response to IAAC-R1-127, including the Portage Diversion and FRWCS, were built in the 1960s and 1970s. The operational effects of these structures are incorporated into the hydrologic record, and therefore are considered as part of the description of existing conditions for each Valued Component in the Project Environmental Impact Statement (EIS). • Manitoba Transportation and Infrastructure's response to IAAC-R1-128 also explains that management of the regional watershed to address flooding is accomplished by the Province of Manitoba through the planned coordination of operational parameters of multiple existing flood physical works infrastructures. The outcome of such coordination is to reduce peak water elevations and hence to reduce adverse effects of flooding in the regional watershed. Thus, the existing flood physical works infrastructures are part of the existing baseline conditions against which the effects of the Project are assessed. The cumulative effects contributions of these other physical works is implicit in the cumulative effects assessment. • A Regional Historical Overview was submitted as an appendix (Appendix IAAC-124A) to Manitoba Transportation and Infrastructure's IAAC-R1-124 information request responses and supplements the cumulative effects assessment in Volume 5, Section 11 of the Project EIS by providing additional detail on the natural and human history of southern Manitoba, and therefore, context for regional change leading up to the proposed Project. • In order to provide a consolidated description and analysis of how changes to the environment could affect the health and socio-economic conditions of Indigenous peoples, Manitoba Transportation and Infrastructure has summarized available information regarding health and socioeconomic conditions for each Indigenous group engaged on the Project, including, as requested by the Agency, current and future availability of country foods, use of drinking water or recreational and cultural uses of water, mental and social well-being, economic conditions, use of navigable waters, and food security. This provides additional information on the assessment of effects to Indigenous health and socio-economic conditions.	• Cumulative effects – EIS Volume 5, Section 11 – IAAC-R1-124 (Appendix IAAC-R1-124A), IAAC-R1-127, IAAC-R1-128, IAAC-R1-130 – IAAC-R2-22, IAAC-R2-25, IAAC-R2-34 – IAAC-R3-01, IAAC-R3-03 • Health and socioeconomics – IAAC-R2-29 • EAC – IAAC-R2-30

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
			• While there are no specific Environmental Management Program (EMP) plans to monitor and mitigate Project effects on the health and socio-economic conditions, this is achieved through two mechanisms. The first is through monitoring and managing the various pathways of effect that contribute to health and socioeconomic conditions. These pathways include water quality, vegetation, wildlife and fishing. EMP plans such as the Surface Water Management Plan, SMP, AEMP, Revegetation Management Plan, Wetland Monitoring Plan, and Wildlife Monitoring Plan are examples of the various formal commitments Manitoba Infrastructure and Transportation has made to manage the various pathways of effects to health and socio-economic conditions. The second mechanism to monitor these effects is through engagement. Manitoba Transportation and Infrastructure is committed to ongoing engagement to share results on Project monitoring and discuss any issues of concern. A formal Complaint Resolution Process has been established as a venue outside of engagement to gather input. Another is the establishment of the EAC. • Manitoba Transportation and Infrastructure will continue to involve Indigenous groups in additional monitoring within the Project area. This will be achieved by the implementation activities of the EAC, on a consensus-based approach with participating communities. Manitoba Transportation and Infrastructure is currently working with communities to establish terms of reference for the EAC and anticipates this committee would have a role in finalizing the EMP plans prior to construction, as well as act as an avenue to share information and discuss Project-related concerns, and to recommend plan modifications if required. As stated in the Terms of Reference for the EAC distributed to local communities on April 24, 2023, participation in the EAC is at the discretion of the Indigenous group. Participation in the EAC does not signify acceptance or approval of the Project by an Indigenous group and an Indigenous group may withdraw from the EAC at any time by advising the Secretariat in writing.	
Use of Navigable Waters		• Reduction of the ability to use boats on Lake Manitoba during certain periods with the operations of the Project and the FRWCS. • Impeded boat access and use of Fairford River due to low water levels.	• The effects of the existing FRWCS on the Fairford River are not related to the Project, and measurable changes to Fairford River from the Project would only occur if the Project was operating to manage a flood and will reduce peak flows in the Fairford River during periods of high flows and flood events.	• Cumulative effects – EIS Volume 5, Section 11 – IAAC-R1-130 – IAAC-R2-22, IAAC-R2-25, IAAC-R2-34 – IAAC-R3-01, IAAC-R3-03

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement (EIS)/ Information Request (IR) Reference
Food Security		• Impacts to fishing values due to flooding events and fluctuating water levels on Lake St. Martin caused by the operation of existing flood management infrastructure situated on the Fairford River. • Impacts to fish and their ability to move between bodies of water due to the WCS on the Fairford River. • Effects on fishing grounds and fishers who operate out of Fairford River. • Project effects on wetlands by changing wetland composition and hydrology in the Fairford River. Wetland degradation may result in loss of ecological function and impact harvesters' ability to use the wetlands as a source of sustenance and medicinal plants.	• Manitoba Transportation and Infrastructure is working to address other existing issues and concerns with flood control infrastructure and management, but not as part of the Project. This includes the intent to construct a new fish ladder at the FRWCS that provides enhanced opportunities for fish to move upstream through the WCS. A separate engagement and consultation process with Indigenous groups is on-going for that project. • The main purpose of the Project is to alleviate flooding. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 m (812.5 ft); outside of this, conditions will remain as currently experienced and the effects to lake shorelines and associated wetlands and other habitat are expected to remain relatively unchanged. • Changes to the Fairford River would only occur if the Project was operating to manage a flood and reduce overbank flooding and velocities in spring/summer.	• Cumulative effects – EIS Volume 5, Section 11 – IAAC-R1-130 – IAAC-R2-22, IAAC-R2-25, IAAC-R2-34 – IAAC-R3-01, IAAC-R3-03 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10

Appendix IAAC-R3-06-1, Table 3 Lake St. Martin

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
Current and Future Availability of Country Foods	Wildlife Hunting and Trapping	• Impacts to hunting areas and preferred hunting species resulting from water fluctuations on Lake St. Martin. • Impacts to vegetation and habitat vital to supporting ungulate populations resulting from flooding and inundation of lands adjacent to Lake St. Martin during Project operations. • Loss of moose and moose habitat in preferred hunting areas located on the east and north ends of Lake St. Martin as a result of the floods of 2011. • Concerns that with the reduction of the operating range and reduced natural water level variability of Lake St Martin, riparian zones and lake marshes will be degraded reducing their ecological integrity and important role as wildlife habitat and natural biological filter. • Concerns that the position of the channels and realignment of PR 239 will further reduce the natural variability of Lake St Martin marshes resulting in degradation of the marsh and migratory bird habitat. • Effects to migratory birds and wildlife as a result of the Project's reduction of lake water levels in Lake St. Martin, changes to flow volumes and velocities through the Narrows. • Effects to furbearers, including beaver, marten, fox, fisher and muskrat, due to fluctuating water levels on Lake St. Martin. • Impacts to the sufficiency and availability of furbearers (specifically muskrats) arising from the flooding out of muskrat dens during critical periods of the reproductive cycle as a result of changes in water levels in Lake St. Martin and connected marshes and wetlands. • Impacts to the ability of harvesters to access preferred trapping around the south basin of Lake St. Martin due to elevated water levels and shoreline inundation from the operation of the LMOC in tandem with the FRWCS during flood events. • Concerns regarding moose habitat and population on Dunsekikan Island. • Concerns that no additional mitigation measures have been proposed to regulate lake levels on the south basin of Lake St. Martin to a maximum of 801 ft. asl to avoid impacts to wildlife habitat adjoining the south basin of Lake St. Martin and Pineimuta Lake.	• The main purpose of the Project is to alleviate flooding, including on Lake St. Martin. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 m (812.5') and water levels on Lake St. Martin south basin exceed the top of the target range of 243.84 m (800'); outside of this, conditions will remain as currently experienced. • The seasonal fluctuations in lake levels are still expected to occur, and so the effects to lake shorelines, riparian zones and associated wetlands and other habitat are expected to remain relatively unchanged. • The reduction in flooding should improve access to hunting areas around the lake during these times. • As the channels are cutting off some of the flow from upgradient areas, an outside drain beside the channels will alleviate pooling of water in upgradient areas, and wetland offsetting is being designed to replace any losses to downgradient wetlands. The Wetland Offsetting Program comprises most wetland sites that are directly affected by the Project in a way that cannot be fully mitigated (i.e., 1,008 ha (239 ha for Class III, IV, V plus 769 ha for peatlands). Results arising from the Wetland Monitoring Plan will be evaluating functional changes to adjacent wetlands and to determine if there are appropriate mitigation options to address Project related effects such as drawdown and whether additional offsetting may be required. • There will be unavoidable effects to access across the channels, which will become like another river in the area. Measures to reduce effects to wildlife movements include the use of small-sized rock material to avoid harm to animals, while addressing erosion, shallow slopes for channel and spoil piles, retaining trees where possible, configuring spoil piles to include breaks, where possibles, and planting cover vegetation to reduce sight lines. • The Project will reduce the frequency of high-water levels in the south basin of Lake St. Martin. This will have a positive effect on Dunsekikan island by reducing the amount of shoreline habitat that would otherwise be temporarily flooded and unavailable to wildlife such as moose and furbearers. Dunsekikan island is not expected to experience Project-related effects during periods of non-operation as water levels in the south basin of Lake St. Martin will remain within the range of existing variability.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Local drainage – EIS Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-75 – IAAC-R2-13 • Wetlands/WCP – EIS Volume 3, Section 8.2.4 – IAAC-R1-23, IAAC-R1-24, IAAC-R1-53, IAAC-R1-73, IAAC-R1-95, IAAC-R1-97, IAAC-R1-98, IAAC-R1-99, IAAC-R1-133 – IAAC-R2-07, IAAC-R2-13 – IAAC-R3-02, IAAC-R3-04, IAAC-R3-05 • Access – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-93, IAAC-R1-101, IAAC-R1-119, IAAC-R1-122 – IAAC-R2-12, IAAC-R2-15, IAAC-R2-21 – IAAC-R3-06
	Aquatic Environment and Fishing	• Impacts to fishing rights including impacts to water such as declines in water quality and fluctuating water levels, as well as direct impacts to fish habitat, declines in fish quantities, and barriers to access. • Loss or alteration of fish habitat, fish movement and/or migration due to Project construction and operation, presence of permanent infrastructure, changes in water quality and shoreline morphology, and alteration of water, sediment and debris transfer between Lake Manitoba, Lake St. Martin and Lake Winnipeg. • Concerns related to Project effects on traditional fishing grounds at Lake St. Martin, which are relied upon by fishers.	• The main purpose of the Project is to alleviate flooding, including on Lake St. Martin. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of the target range of 247.65 m (812.5') and water levels on Lake St. Martin south basin exceed the top of the target range of 243.84 m (800'); outside of this, conditions will remain as currently experienced. In addition, the diversion of water from the Fairford River to the LMOC is not expected to measurably alter oxygen levels in the north basin.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Regional water quality – EIS Volume 2, Section 6.4.8

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
		• Concerns regarding changes to shoreline access for fishing purposes caused by project-related changes to water levels on Lake St. Martin. • Concerns regarding the ability to safely access preferred fishing areas, with preferred means, on Lake St. Martin and Sturgeon Bay during period of ice coverage (Late Fall/Winter). • Effects to whitefish and pickerel spawning grounds in Lake St. Martin. • Concerns regarding the potential destruction of the fish spawning sites at the Narrows. • Adverse changes to fish habitat at the Narrows (increased flow velocity and turbulence, at lower depth during operations) resulting in reduced whitefish spawning success. • Concerns that whitefish emerging from the spawning grounds in Lake St. Martin will be carried into the LSMOC and directly into Lake Winnipeg rather than being able to use their traditional migratory route through Dauphin River to the lake because of the change in flow path. • Concerns regarding pesticides entering Lake St. Martin, affecting water quality and fish populations. • Concerns regarding Project effects on fish related to changes to lake levels on Lake St. Martin, changes to flow rates and volumes at the Narrows. • Concerns regarding Project effects on the spawning cycle and increased sedimentation on spawning windows in Lake St. Martin. • Concerns that cumulative effects on the fishery in Lake St. Martin caused by major man-made flooding events in 2011 and 2014 are being overlooked. • Concerns regarding Project effects on migratory patterns of fish species that inhabit and spawn in Lake St. Martin. Particular locations of concern include the mouth of the Dauphin River as it enters Lake St. Martin, as well as Birch Bay. • Impacts to juvenile fish rearing habitat arising from the reduction of lake levels in the north basin of Lake St. Martin during typical operations. • Concerns regarding the potential loss of the existing pickerel and whitefish fishery in the north basin of Lake St. Martin due to the proposed lowering of the north basin by 1 metre. • Loss of access to winter fishing areas, due to inconsistent or delayed ice formation on Lake St. Martin. • Reduced ability to utilize gillnets for fishing on Lake St. Martin due to lowered lake levels and subsequent freezing of nets (lake depth at these locations is 4 feet, and ice depth can reach 3 feet). • Impacts to shoreline access for fishing purposes caused by Project-related water level changes on Lake St. Martin. • Impacts to the ability to safely access preferred ice fishing areas due to Project-related changes in water flow currents that affect ice depth patterns. • Concerns regarding water levels in Lake St. Martin (below 796 to 797 feet) over the winter months result in low oxygen levels. This results in high mortality of whitefish eggs. • Concerns related to increased transport of nutrient-laden waters from Lake Manitoba into Lake St. Martin via the channels, resulting over time in increased incidence and scope of algal blooms resulting in eutrophication and toxic environment for fish.	• Based on regional data, surface water quality in upstream lakes is similar to downstream lakes and so no measurable effects are anticipated with increased water velocities. From a regional perspective this should reduce the overall amount of soil entering the lake that has been impacted by agriculture, in terms of nutrients and pesticides. • Cumulative effects of past activities have been incorporated into the baseline conditions in carrying out the Project environmental assessment and the responsibility for the Project is to maintain current conditions and look for opportunities to improve conditions where feasible, from a Project perspective. • Algae blooms are an ongoing issue, but the Project is not expected to measurably contribute to this issue. • The use of pesticides and fertilizers on this Project will be carefully regulated and monitored. • Construction of channel outlet and inlet areas will be carried out inside silt curtains with monitoring to manage sediments entering the lake environment. • Areas at the inlet and outlet that will be excavated for the channels are not unique fish habitat (i.e., same habitat is available elsewhere around the lake). Changes to fish habitat in inlet and outlet areas will be offset as required under the *Fisheries Act*. • During channel commissioning, sediment concentrations in the water will be monitored using real-time loggers and gate opening will be operated to maintain sediment concentrations to within acceptable limits agreed to with regulators as per water quality guidelines. • Lake St. Martin is a shallow, turbulent lake influenced by wind and wave action and based on modelling results sediment deposition is expected to affect a relatively small amount of fish habitat in comparison to the total amount of habitat available in the lake. • Sediment will be monitored and managed during construction via the Surface Water Management Plan and SMP, with the AEMP addressing sediment monitoring during operation. • Some fish may leave the lake via the LMOC and LSMOC but are able to return up the Fairford and Dauphin rivers. • During Project operation, velocities at the Narrows will increase, but are not expected to impede lake whitefish movements, and based on field studies and mapping, sufficient spawning habitat is expected to be available. • When the channels are operated during the winter months it is at reduced flow rates and there is less change in water levels on Lake St. Martin during these periods, particularly for a repeat of the 2011 flood event. Simply put, water levels on Lake St. Martin are more stable and at lower elevations during post-Project operation. There should be no loss of access to winter fishing areas, with the possible exception of the LMOC outlet in Birch Bay and the LSMOC inlet in LSM north basin. • During operation of the Project for flood mitigation, water levels on Lake St. Martin are lower than pre-Project but still greater than normal lake levels and water depths. As indicated above, water levels are more stable in the post-Project environment (i.e., less variability in water levels during the winter months - December through March).	– IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Sediment effects/management – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-30, IAAC-R1-32, IAAC-R1-44, IAAC-R1-76, IAAC-R1-81, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-31 – IAAC-R3-01 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • LSM Narrows – EIS Volume 2, Section 6.4.1 – IAAC-R1-68 – IAAC-R2-10, IAAC-R2-22 – IAAC-R3-01 • EAC – IAAC-R1-65 – IAAC-R2-30 – IAAC-R3-06

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
			• More stable and lower water levels during operation in the post-Project environment should improve shoreline access for fishing purposes. Shoreline access should be better in the post-Project environment. In addition, recent (MIKE-21) hydraulic modeling completed in Lake St. Martin including wind/wave effects shows minimal to no changes in water velocities in Lake St. Martin during the open water season (spring, summer, fall) with the exception of the channel inlets/outlets, Fairford River outlet, and the LSM Narrows. These changes are even less in the ice-covered winter environment. Therefore, ice thicknesses in the lake should not change, even during operation for a repeat of a 2011 flood event. Operation during the winter will not be required for minor flood events. Note that there is typically open water at the LSM Narrows in the pre-Project environment so this will not change. • No specific ice management practices are anticipated to be required outside of the LMOC and LSMOC, and the Ice Management Plan has been developed to address these issues. In general, the magnitude of the potential changes to ice processes in the Dauphin River and Fairford River is predicted to be low to negligible. In addition, the Lake St. Martin Narrows typically does not freeze over completely in the winter in the existing environment; open water leads remain in the constriction where water velocities are highest. Winter operation of the outlet channels would increase flow through the system and could cause some increase in the size of the open water leads that remain through the Lake St. Martin Narrows over the winter. • The AEMP includes fish community and fish habitat monitoring. • Monitoring results will be reported to regulators and Indigenous communities via the EAC and if effects are beyond those predicted, additional mitigation and/or offsetting will be required.	

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
	Plant and Plant Harvesting	• Impacts to plant harvesting rights. • Impacts to the sufficiency and availability of plant foods and medicine resources arising from the degradation and loss of habitat suitable for supporting plant foods and medicines on lands adjacent to Lake St. Martin as a result of fluctuating water levels, flooding and inundation, and water table saturation. • Concerns regarding the substantial decline in plant food and medicine resources and adverse effects to natural vegetation habitat on preferred harvesting areas adjoining Lake St. Martin resulting from the legacy effects of flood management operation of the FRWCS, including the “mega-floods” of 2011 and 2014. • Loss of medicinal plants on the Islands in Lake St. Martin. • Concerns related to flood-damaged sugar trees on the southeast side of Lake St. Martin. • Concerns regarding degradation and loss of habitat suitable for supporting plant foods and medicines on lands adjoining the south basin of Lake St. Martin resulting from water table saturation. • Loss of access to preferred plant harvesting areas in vicinity of south basin of Lake St. Martin due to elevated water levels and shoreline inundation during operation of LMOC in tandem with FRWCS. • Concerns that the hydraulic constraint of the Narrows, combined with the Project’s operating guidelines, will result in flooding effects on the south basin when the channel is used for flood management operations. This will result in adverse effects on habitat suitable for supporting plant foods and medicines on lands adjoining the south basin of Lake St. Martin.	• The main purpose of the Project is to alleviate flooding, including on Lake St. Martin. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of its target range of 247.65 m (812.5’) and water levels on Lake St. Martin south basin exceed the top of its target range of 243.84 m (800’); outside of this, conditions will remain as currently experienced. • The reduction in flooding should improve growth conditions and access to plants around the lake during these times, but the channels will impact movement and access to local resources. • The Project will reduce the magnitude and duration of overland flooding during future flood events, which will alleviate most of the identified concerns, particularly with respect to plants and medicines.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4
Water Quality (drinking, recreational and cultural uses)		• Effects from historic and ongoing flooding and fluctuating water levels in Lake St. Martin. • Concern regarding the further deterioration of water quality (drinking, recreational and cultural uses) in Lake St. Martin, from the proposed project. • Concerns that construction and operation of the channel will have a serious impact on the flows, water quantity and aquatic health in the northern basin of Lake St. Martin. • Concerns regarding flow volumes, flow velocity and turbidity changes at the Narrows. • Increases of nitrogen and phosphorous resulting in increases of blue-green algae in Lake St. Martin. • Concerns regarding increases in debris moving through the Lake St. Martin system. • Effects related to the nutrients, wastewater effluents, fertilizers, pesticides, animal waste and other contaminants that are entering Lake St. Martin. • Concerns regarding changes to the dynamics of currents, erosion, bed sediments, and turbidity in Lake St. Martin. • Concerns regarding the spread of invasive species, including zebra mussels and Prussian carp into Lake St. Martin. • Concerns that diminishing groundwater pressure and volume will impact the Birch Creek and Lake St. Martin ecosystem.	• The main purpose of the Project is to alleviate flooding, including on Lake St. Martin. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of its target range of 247.65 m (812.5’) and water levels on Lake St. Martin south basin exceed the top if its target range of 243.84 m (800’); outside of this, conditions will remain as currently experienced. • Fluctuations in lake levels are still expected to occur, but not to levels experienced during 2011, and so the effects to lake shorelines, riparian zones and associated wetlands and other habitat are expected to remain relatively unchanged. • From a regional perspective the reduction in overland flooding should reduce the overall amount of soil entering the lake that has been impacted by agriculture. • There will be increased velocities during Project operation to manage flooding, but the lake is shallow and already turbulent from wind and wave action and there is considerable mixing currently occurring. • From a local perspective, the LMOC will be intersecting cattle operations and wetland areas are being developed to passively treat this runoff and outflows to the lake are expected to not measurably change and may result in slight improvements to water quality. Relocation of some operations is being considered, pending negotiations with landowners.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
		• Concerns regarding changes in quality of groundwater on reserve due to land inundation and ground saturation resulting from elevation of water levels in Lake St. Martin above 801 ft asl during operations. • Concern that a silt deposition delta will establish over time, filling the southernmost portion of the Lake St Martin basin and that less fish habitat will be available. • Concerns that the wetlands will shrink and degrade overtime as a result of regulating Lake St. Martin, and Lake Piniemuta to narrower operating regimes. • Concerns that any disruption of the balance of inflow and outflow due to LMOC and LSMOC channel adjustments or Fairford flow adjustments to deal with ice impacts may cause shifting ice on Lake St. Martin or ice jamming on the Fairford River. • Concerns regarding transport of sediments and chemical nutrients from Lake Manitoba into Lake St. Martin, via the channels, resulting in increased contribution to poor water quality that renders lake waters unsafe for swimming and bathing. • Impacts of sediment outflows from channels during construction, i.e., sediment transport and accumulation on spawning areas in Lake St. Martin and Birch Bay. • Concerns regarding shoreline erosion on Lake St. Martin and the Narrows. Concern regarding lake depth in north basin of Lake St. Martin, as well as increased flow velocity, turbulence, and a lower depth at the Narrows during operations.	• During inlet and outlet construction, silt curtains will be used to confine sediments to the work areas, with monitoring to confirm effectiveness, as described in the SMP. As described in the SMP, sediment management protocols will be in place using real-time data gathering to facilitate gate operation to maintain suspended sediment levels to within acceptable limits as per surface water quality guidelines. • Based on modelling, sediment deposition is not expected to be sufficient to establish a delta during channel operations. A small amount of fish habitat will be affected at the outlet of the LMOC in Birch Bay, but the total area is negligible compared to the spawning habitat available in Lake St. Martin. • Based on analysis of regional water quality, areas upstream are similar to those downstream, and so no measurable changes are expected. • Unlike the Emergency Outlet Channel, the Project is designed to minimize additional inputs of debris. • Prussian carp have been found in upstream watersheds and it is likely that they will eventually move into the area with or without the Project. • Zebra mussels have been found in Lake Manitoba and they will almost certainly spread downstream into Lake St. Martin before construction would start if approvals for the project are granted. The Project will adhere to provincial regulations regarding measures to limit the spread. • Surface water quality monitoring will be carried out during construction (Surface Water Management Plan) and for several operation periods (AEMP) to confirm that the Project is not measurably changing over current conditions. • The Project environmental assessment focusses on maintaining current conditions and improving conditions where feasible. The Project will be operated in accordance with the Operating Guidelines. • Groundwater contribution to Birch Creek and Lake St. Martin is very small (i.e., less than 1%) when compared to the surface water flows in those systems. • The Project will reduce the flooding around Lake St. Martin, thus reducing the risk of surface water contaminating wells. Wells that remain in the flood zone will be capped or decommissioned to limit the risk of surface water contaminating the aquifer. • During Project operation, changes in lake water levels and regulation of water levels have the potential to alter wetland conditions around Lake Manitoba and Lake St. Martin. However, Project operations will continue to permit the lakes to fluctuate in a manner more closely related to the natural conditions that occurred prior to the 2011 flood. The Project will act to reduce the peak lake levels and duration of flooding that occurred in 2011, with minimal changes at the low water levels. It is expected that these changes would be beneficial for wetland development from a regional perspective. • The Project includes a Wetland Compensation Plan, with target sites to be selected in a collaborative process with Indigenous groups and the Project Environmental Advisory Committee.	– IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Sediment effects/management – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-30, IAAC-R1-32, IAAC-R1-44, IAAC-R1-76, IAAC-R1-81, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-31 – IAAC-R3-01 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Debris – EIS Volume 2, Section 6.4.1.2 – IAAC-R1-120 – IAAC-R2-23, IAAC-R2-26 • Zebra mussels/ AIS – EIS Volume 3, Section 7.2.4.2 – IAAC-R1-39, IAAC-R1-77 – IAAC-R2-14, IAAC-R2-27 – IAAC-R3-01 • Groundwater – EIS Volume 2, Section 6.4.8 – IAAC-R1-18, IAAC-R1-21, IAAC-R1-22, IAAC-R1-23, IAAC-R1-24, IAAC-R1-72 and IAAC-R1-73 – IAAC-R2-02, IAAC-R2-03, and IAAC-R2-05 – IAAC-R3-01 • Wetlands/WCP – EIS Volume 3, Section 8.2.4 – IAAC-R1-23, IAAC-R1-24, IAAC-R1-53, IAAC-R1-73, IAAC-R1-95, IAAC-R1-97, IAAC-R1-98, IAAC-R1-99, IAAC-R1-133 – IAAC-R2-07, IAAC-R2-13 – IAAC-R3-02, IAAC-R3-04, IAAC-R3-05 • Sediment effects/management – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-30, IAAC-R1-32, IAAC-R1-44, IAAC-R1-76, IAAC-R1-81, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-31

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
			• During channel commissioning, sediments will be monitored using real-time loggers and gate operation to maintain sediments to within acceptable limits agreed to with regulators as per water quality guidelines. • Lake St. Martin is a shallow, turbulent lake influenced by wind and wave action and based on modelling results sediments are not expected to measurably affect fish habitat in downstream areas with the exception of Birch Bay at the outlet of LMOC. • Sediment will be monitored and managed during construction via the Surface Water Management Plan and SMP, with the AEMP addressing sediment monitoring during operation. • Methods of operating the LMOC and LSMOC to reduce the risk of ice jams is described in the Ice Management Plan (IMP). Due to the risks and of ice dams, winter operations will require careful adjustments of the WCS gates and continuous monitoring to manage ice conditions in the channels, including the potential for ice jams and hanging ice dams. • During Project operation, velocities at the Narrows will increase, but are not expected to impede lake whitefish movements, and based on field studies and mapping, sufficient spawning habitat is expected to be available.	– IAAC-R3-01 • Ice effects/management – IAAC-R1-71 – IAAC-R2-10, IAAC-R2-11, IAAC-R2-23 • LSM Narrows – EIS Volume 2, Section 6.4.1 – IAAC-R1-68 – IAAC-R2-10, IAAC-R2-22 – IAAC-R3-01
Economic Conditions		• Adverse effects to fishing (water quality, spawning, migration) in Lake St. Martin and Lake Winnipeg, affecting livelihoods. • Concerns how changes to local drainage and water flow will affect water quality for supporting a viable rights-based and commercial fishery of Lake St. Martin. • Widely fluctuating flows through the FRWCS and associated changes in water levels on Lake St. Martin and Pineimuta Lake have resulted in impacts to economic and traditional activities including ranching, fishing and trapping. • Concerns that the Project, during flood events, will result in saturation of hay and grain fields. • Concerns regarding the flow of algae from Lake Manitoba into Lake St. Martin, which will devastate the fishing industry. • Loss of fishing equipment due to unexpected fluctuation in water levels in Lake St. Martin and associated loss of income. • Legacy and cumulative effects of flood management infrastructure on Lake St. Martin have resulted in the disruption of activities vital to supporting cultural transmission and the erosion of the resources necessary to derive a reasonable livelihood.	• The purpose of the Project is to manage flooding so that a repeat of conditions from 2011 and 2014 does not reoccur, with associated economic impacts to communities. • Water levels and flows will only change over current conditions when the Project is operating to manage large flood events, such as those that occurred in 2011. • From a regional perspective the reduction in overland flooding should reduce the overall amount of soil entering the lake that has been impacted by agriculture. • Based on regional data, surface water quality in upstream lakes is similar to downstream lakes and so no measurable effects are anticipated with increased water flows to manage flooding, including algae. • From a local perspective, the LMOC will be intersecting cattle operations and wetland areas are being developed to passively treat this runoff and outflows to the lake are expected to not measurably change and may result in slight improvements to water quality. Relocation of some operations is being considered, pending negotiations with landowners. • As the channels are cutting off some of the flow from upgradient areas, an outside drain beside the channels will alleviate pooling of water in upgradient areas, and wetland offsetting is being designed to replace any losses to downgradient wetlands. The Wetland Offsetting Program comprises most wetland sites that are directly affected by the Project in a way that cannot be fully mitigated (i.e., 1,008 ha (239 ha for Class III, IV, V plus 769 ha for peatlands). Results arising from the Wetland Monitoring Plan will be evaluating functional changes to adjacent wetlands and to determine if there are appropriate mitigation options to	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Cattle operations

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
			address Project related effects such as drawdown and whether additional offsetting may be required. • The flood management should have positive effects to farmland and trapping areas around the lake. • The reduction in peak flood flows will reduce the potential for shoreline erosion. Velocities will be higher at key locations, such as the constrictions at the LSM Narrows, during Project operation, but not in shoreline areas. • Lake levels during operation of the Project will be within historical levels in will be lower in magnitude and duration for more severe flood events. • Surface water quality effects should be localized to a portion of Watchorn Bay during construction and managed with monitoring and silt curtains. • Losses to fish habitat in outlet and inlet areas will be offset as a requirement under the *Fisheries Act*. • Some fish may leave the lake via the LSMOC but are able to return up the Dauphin River. • Changes to regional fish populations are not expected but will be monitored under the AEMP, with results being made available to regulators and local communities. • To address the specific concerns expressed by Indigenous groups about effects to nets, a comparative program to monitor levels of debris in commercial fishing nets between periods of channel operation and non-operation is being developed by Manitoba Transportation and Infrastructure and will be discussed with commercial fishers based out of Dauphin River and McBeth Point prior to its implementation as discussed in the response to IR IAAC-R2-26. Manitoba Transportation and Infrastructure is developing a debris monitoring program to provide information about the potential effects of the Project on debris levels in nets once the Project is operating, and to document any unanticipated effects. The debris monitoring results will be shared with Indigenous groups and will likely be an agenda topic for the proposed EAC. • Manitoba Transportation and Infrastructure recognizes the cumulative effects of past activities and Projects. They are incorporated into the baseline conditions in carrying out the Project environmental assessment and the responsibility for the Project is to maintain current conditions and look for opportunities to improve conditions where feasible, from a Project perspective.	– EIS Volume 4, Section 9.2.2.2 – IAAC-R1-14 – IAAC-R2-01 • Local drainage – EIS Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-75 – IAAC-R2-13 • Wetlands/WCP – EIS Volume 3, Section 8.2.4 – IAAC-R1-23, IAAC-R1-24, IAAC-R1-53, IAAC-R1-73, IAAC-R1-95, IAAC-R1-97, IAAC-R1-98, IAAC-R1-99, IAAC-R1-133 – IAAC-R2-07, IAAC-R2-13 – IAAC-R3-02, IAAC-R3-04, IAAC-R3-05 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Fish habitat offsetting – EIS Volume 3, Section 7.2.4 – IAAC-R1-36, IAAC-R1-37, IAAC-R1-46, IAAC-R1-53 – IAAC-R2-10 – IAAC-R3-02 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Debris – EIS Volume 2, Section 6.4.1.2 – IAAC-R1-120 – IAAC-R2-23, IAAC-R2-26 • Fishing – EIS Volume 4, Section 9.2.4.5, Section 10.3.3 – IAAC-R1-76, IAAC-R1-81, IAAC-R1-105, IAAC-R1-122

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
				– IAAC-R2-26 – IAAC-R3-06 • Cumulative effects – EIS Volume 5, Section 11 – IAAC-R1-130 – IAAC-R2-22, IAAC-R2-25, IAAC-R2-34 – IAAC-R3-01, IAAC-R3-03
Mental and Social Well-being		• Project-related effects on Lake St. Martin, which is of spiritual significance. • Concerns regarding the infringement of the Project on traditional and treaty rights, as well as negative effects to future generations due to the impacts of the Project on Lake St. Martin aquatic and terrestrial ecosystem. • Effects on cultural heritage and current use related to changes of levels on Lake St. Martin, changes to flow rates and volumes at the Narrows and through the Dauphin River. • Concerns regarding the presence of burials along the north shores of Lake St. Martin. • Concerns that regulating Lake St. Martin will cause erosion and potentially expose burial sites with high and low water levels. • Concerns regarding islands on the north side of the south basin of Lake St. Martin, which are locations for cultural practices. • Concerns how changes to local drainage and water flow will affect water quality for supporting social and cultural uses of Lake St. Martin. • Project-related effects on cultural heritage and current use resulting from changes to lake levels on Lake St. Martin, changes to flow rates and volumes at the Narrows and through the Dauphin River. • Impaired sense of place and identity due to landscape and ecological changes in the post-flood environment around Lake St. Martin. • Impacts to patterns of use of key cultural areas (notably Lake St. Martin, Dauphin River, Lake Winnipeg, and areas nearby) due to real and perceived risks from water quality. • Concerns that past flooding on Lake St. Martin has contributed to a loss of valued habitat relied on for resource harvesting activities such as hunting and gathering plants, as access to viable land is required to support the transmission of cultural knowledge. • Legacy and cumulative effects of flood management infrastructure on Lake St. Martin have resulted in the disruption of activities vital to supporting cultural transmission and the erosion of the resources necessary to derive a reasonable livelihood.	• The purpose of the Project is to manage flooding so that a repeat of conditions from 2011 and 2014 does not reoccur, with associated effects to mental and social well-being. • The management of flooding is expected to alleviate risks of shoreline erosion at high water marks. When operating, the Project will result in higher velocities, but based on modelling outputs, for most lake areas and islands these are not expected to increase velocities close to shorelines. One exception is the Narrows, but shorelines in this area already experience higher velocities and have eroded back to large rock or bedrock, which can resist erosion. As a result, other than losses addressed in the Project Development Area as part of the Heritage Resources Impact Assessment, sites used for social and cultural practices are not expected to be measurably affected by the Project. • Issues associated with local drainage and water flow will be managed through several plans that form part of the Project Environmental Management Program, such as the Surface Water Management Plan, SMP, Revegetation Management Plan, and AEMP. • The environmental assessment examined potential effects from the Project and developed mitigation to address adverse effects. This included effects and concerns expressed by participating Indigenous groups. Information was documented in the Environmental Impact Statement and shared during the engagement process. • The Project will need to receive formal provincial and federal regulatory approval before it can be constructed. The decisions will incorporate concerns expressed by Indigenous communities and how they are being addressed. • Surface water and fisheries will be monitored during construction and for several operating periods as described in the AEMP to address uncertainties in predictions and address any unpredicted adverse effects. • The results of monitoring will be shared with regulators and communities, and ongoing engagement will provide opportunities for discussion. • The Project Environmental Advisory Committee has been established as a venue to share results and discuss issues of concern. • While it is difficult to address aspects of mental and social wellbeing, Manitoba Transportation and Infrastructure is hopeful that the sharing of results and ongoing engagement will help to address the uncertainties, concerns and issues currently being expressed.	• Mental Health – EIS Volume 4, Section 10.3.3.2 – IAAC-R1-103 – IAAC-R2-28 • Indigenous socioeconomics – EIS Volume 4, Section 10.3.3.1 • Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04 • LSM Narrows – EIS Volume 2, Section 6.4.1 – IAAC-R1-68 – IAAC-R2-10, IAAC-R2-22 – IAAC-R3-01 • Cultural resources – EIS Volume 4, Section 10.2.4.6 – IAAC-R1-68, IAAC-R1-114, IAAC-R1-115, IAAC-R1-116, IAAC-R1-117, IAAC-R1-118, IAAC-R1-119, IAAC-R1-130, IAAC-122 – IAAC-R2-29, IAAC-R2-30, IAAC-R2-34 – IAAC-R3-06 • EAC – IAAC-R1-65 – IAAC-R2-30 – IAAC-R3-06

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
Use of Navigable Waters		• Loss of access to Lake St. Martin because of fluctuating water levels. • Impacts to navigation and safety of fishers arising from changes in water currents and the location of sandbars, such as at the Narrows in Lake St. Martin, and at the head and throughout the Dauphin River. • Concerns that low water levels will result in unsafe or inaccessible boating conditions on Lake St. Martin. • Potential of the Project to impair access and navigation at the Narrows and at the head and main course of the Dauphin River.	• The main purpose of the Project is to alleviate flooding, including on Lake St. Martin. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of its target range of 247.65 m (812.5') and water levels on Lake St. Martin south basin exceed the top of its target range of 243.84 m (800'); outside of this, conditions will remain as currently experienced. • During construction, a portion of Birch Bay will be isolated to install the LMOC structure, extending 144 m (472.4 ft.) into the bay. Similarly, a portion of the northeast shoreline of the lake will be isolated to install the LSMOC inlet structure, extending 550 m (1,804.5 ft.) into the lake. After construction, safety buoys will be used to prevent access to the inlet areas from a safety perspective. This area would be unavailable for fishing but represents a relatively small portion of available areas in the lake. • During operation of the Project for flood mitigation, water levels on Lake St. Martin are lower than pre-Project but still greater than normal lake levels and water depths. As indicated above, water levels are more stable in the post-Project environment (i.e., less variability in water levels during the winter months - December through March). More stable and lower water levels during operation in the post-Project environment should improve shoreline access for fishing purposes. • Recent (MIKE-21) hydraulic modeling completed in Lake St. Martin including wind/wave effects shows minimal to no changes in water velocities in Lake St. Martin during the open water season (spring, summer, fall) with the exception of the channel inlets/outlets, Fairford River outlet, and the LSM Narrows. These changes are even less in the ice-covered winter environment. Therefore, ice thicknesses in the lake should not change, even during operation for a repeat of a 2011 flood event. Operation during the winter will not be required for minor flood events. Note that there is typically open water at the LSM Narrows in the pre-Project environment so this will not change. • No specific ice management practices are anticipated to be required outside of the LMOC and LSMOC, and the Ice Management Plan has been developed to address these issues. In general, the magnitude of the potential changes to ice processes in the Dauphin River and Fairford River is predicted to be low to negligible. • The Lake St. Martin Narrows typically does not freeze over completely in the winter in the existing environment; open water leads remain in the constriction where water velocities are highest. Winter operation of the outlet channels would increase flow through the system and could cause some increase in the size of the open water leads that remain through the Lake St. Martin Narrows over the winter. • During high flow periods at the Narrows (90th percentile), the maximum depth-average velocity would increase from 0.5 to 0.96 m/s and the minimum water depth would decrease from 1.78m to 1.22m. During a 2011 type flood, the water depths would be higher than at the 90th percentile, improving navigation, but velocities would increase at the constrictions to approximately 1.3 m/s.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Navigation – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-119, IAAC-R1-111, IAAC-R1-122 – IAAC-R2-29

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
			• In terms of navigation, under current normal water level conditions, navigation through the downstream portion of the Narrows is difficult due to shallow water, even with a shallow draft boat (e.g., jetboat or small fishing boat), and boat travel is typically restricted to the south basin. The changes in hydrology at the Narrows at the 90th percentile condition would likely have little effect on the ability to boat through the Narrows.	
Food Security		• Concerns regarding changes in the taste of harvested animals such as deer, moose, rabbit, and grouse. • Concerns regarding the effects to the quality and taste of harvested game and fish due to increased pollution, contamination in Lake St. Martin • Impacts to hunting areas and preferred hunting species resulting from water fluctuations on Lake St. Martin. • Loss of moose and moose habitat in preferred hunting areas located on the east and north ends of Lake St. Martin as a result of the floods of 2011. • Effects to migratory birds and wildlife as a result of the Project's reduction of lake water levels in Lake St. Martin, changes to flow volumes and velocities through the Narrows. • Concerns regarding moose habitat and population on Dunsekikan Island. • Impacts to fishing rights including impacts to water such as declines in water quality and fluctuating water levels, as well as direct impacts to fish habitat, declines in fish quantities, and barriers to access. • Loss or alteration of fish habitat, fish movement and/or migration due to Project construction and operation, presence of permanent infrastructure, changes in water quality and shoreline morphology, and alteration of water, sediment and debris transfer between Lake Manitoba, Lake St. Martin and Lake Winnipeg. • Concerns related to Project effects on traditional fishing grounds at Lake St. Martin, which are relied upon by fishers. • Concerns regarding changes to shoreline access for fishing purposes caused by project-related changes to water levels on Lake St. Martin. • Concerns regarding the ability to safely access preferred fishing areas, with preferred means, on Lake St. and Sturgeon Bay during period of ice coverage (Late Fall/Winter). • Loss of access to winter fishing areas, due to inconsistent or delayed ice formation on Lake St. Martin. • Effects to whitefish and pickerel spawning grounds in Lake St. Martin. • Concerns regarding the potential destruction of the fish spawning sites at the Narrows. • Adverse changes to fish habitat at the Narrows (increased flow velocity and turbulence, at lower depth during operations) resulting in reduced whitefish spawning success. • Concerns that whitefish emerging from the spawning grounds in Lake St. Martin will be carried into the LSMOC and directly into Lake Winnipeg rather than being able to use their traditional migratory route through Dauphin River to the lake because of the change in flow path. • Concerns regarding pesticides entering Lake St. Martin, affecting water quality and fish populations.	• The main purpose of the Project is to alleviate flooding, including Lake St. Martin. It will only operate to manage flooding conditions when water levels on Lake Manitoba exceed the top of its target range of 247.65 m (812.5') and water levels on Lake St. Martin south basin exceed the top of its target range of 243.84 m (800'); outside of this, conditions will remain as currently experienced. The reduction in flooding would result in less overland flooding and associated water quality issues from fertilizers and pesticides. • As indicated, the Project is designed to address more extreme flooding, but the fluctuations in lake levels are still expected to occur, and so the effects to lake shorelines, riparian zones and associated wetlands and other habitat are expected to remain relatively unchanged. • The reduction in flooding should improve access to hunting areas around the lake during these times. • The management of flooding is expected to alleviate risks of shoreline erosion at high water marks. When operating, the Project will result in higher velocities, but based on modelling outputs, in most lake areas and islands these are not expected to increase velocities close to shorelines. One exception is the Narrows, but shorelines in this area already experience higher velocities and have eroded back to large rock or bedrock, which can resist erosion. As a result, changes to shoreline bird and wildlife habitat are not anticipated. • During Project operation, velocities at the Narrows will increase, but are not expected to impede lake whitefish movements, and based on field studies and mapping, sufficient spawning habitat is expected to be available. • The Project will reduce the magnitude and duration of high-water levels in the south basin of Lake St. Martin. This will have a positive effect on Dunsekikan island by reducing the amount of shoreline habitat that would otherwise be temporarily flooded and unavailable to wildlife such as moose and furbearers. Dunsekikan island is not expected to experience Project-related effects during periods of non-operation as water levels in the south basin of Lake St. Martin will remain within the range of existing variability. • Losses to fish habitat in outlet and inlet areas will be offset as a requirement under the *Fisheries Act*. • Some fish may leave the lake via the LSMOC but are able to return up the Fairford and Dauphin rivers. • Based on analysis of regional water quality, areas upstream are similar to those downstream, and so no measurable changes are expected, including for nutrients.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04 • LSM Narrows – EIS Volume 2, Section 6.4.1 – IAAC-R1-68 – IAAC-R2-10, IAAC-R2-22 – IAAC-R3-01 • Fish habitat offsetting – EIS Volume 3, Section 7.2.4 – IAAC-R1-36, IAAC-R1-37, IAAC-R1-46, IAAC-R1-53 – IAAC-R2-10 – IAAC-R3-02 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Regional water quality – EIS Volume 2, Section 6.4.8

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
		• Concerns regarding Project effects on fish related to changes to lake levels on Lake St. Martin, changes to flow rates and volumes at the Narrows and through the Dauphin River. • Concerns regarding the potential loss of the existing pickerel and whitefish fishery in the north basin of Lake St. Martin due to the proposed lowering of the north basin by 1 metre. • Reduced ability to utilize gillnets for fishing on Lake St. Martin due to lowered lake levels and subsequent freezing of nets. (Lake depth at these locations is 4 feet, and ice depth can reach 3 feet). • Impacts to shoreline access for fishing purposes caused by Project-related water level changes on Lake St. Martin. • Impacts to the ability to safely access preferred ice fishing areas due to Project-related changes in water flow currents that affect ice depth patterns. • Concerns regarding water levels in Lake St. Martin (below 796 - 797 feet) over the winter months result in low oxygen levels. This results in high mortality of whitefish eggs. • Concerns related to increased transport of nutrient-laden waters from Manitoba into Lake St. Martin via the channels, resulting over time in increased incidence and scope of algal blooms resulting in eutrophication and toxic environmental for fish. • Impacts to plant harvesting rights. • Impacts to the sufficiency and availability of plant foods and medicine resources arising from the degradation and loss of habitat suitable for supporting plant foods and medicines on lands adjacent to Lake St. Martin as a result of fluctuating water levels, flooding and inundation, and water table saturation. • Concerns regarding the substantial decline in plant food and medicine resources and adverse effects to natural vegetation habitat on preferred harvesting areas adjoining Lake St. Martin resulting from the legacy effects of flood management operation of the FRWCS, including the “mega-floods” of 2011 and 2014. • Loss of medicinal plants on the Islands in Lake St. Martin. • Concerns related to flood-damaged sugar trees on the southeast side of Lake St. Martin. • Concerns regarding degradation and loss of habitat suitable for supporting plant foods and medicines on lands adjoining the south basin of Lake St. Martin resulting from water table saturation. • Loss of access to preferred plant harvesting areas in vicinity of south basin of Lake St. Martin due to elevated water levels and shoreline inundation during operation of LMOC in tandem with FRWCS.	• Unlike the Emergency Outlet Channel, the Project is designed to minimize additional inputs of debris. • The reduction in flooding should improve growth conditions and access to plants around the lake during these times, but the channels will impact movement and access to local resources. • When the channels are operated during the winter months it is at reduced flow rates and there is less change in water levels on Lake St. Martin during these periods, particularly for a repeat of the 2011 flood event. Simply put, water levels on Lake St. Martin are more stable and at lower elevations during post-Project operation. There should be no loss of access to winter fishing areas, with the possible exception of the LMOC outlet in Birch Bay and the LSMOC inlet in LSM north basin. • During operation of the Project for flood mitigation, water levels on Lake St. Martin are lower than pre-Project but still greater than normal lake levels and water depths. As indicated above, water levels are more stable in the post-Project environment (i.e., less variability in water levels during the winter months - December through March). • More stable and lower water levels during operation in the post-Project environment should improve shoreline access for fishing purposes. Shoreline access should be better in the post-Project environment. In addition, recent (MIKE-21) hydraulic modeling completed in Lake St. Martin including wind/wave effects shows minimal to no changes in water velocities in Lake St. Martin during the open water season (spring, summer, fall) with the exception of the channel inlets/outlets, Fairford River outlet, and the LSM Narrows. These changes are even less in the ice-covered winter environment. Therefore, ice thicknesses in the lake should not change, even during operation for a repeat of a 2011 flood event. Operation during the winter will not be required for minor flood events. Note that there is typically open water at the LSM Narrows in the pre-Project environment so this will not change. • No specific ice management practices are anticipated to be required outside of the LMOC and LSMOC, and the Ice Management Plan has been developed to address these issues. In general, the magnitude of the potential changes to ice processes in the Dauphin River and Fairford River is predicted to be low to negligible. • The Lake St. Martin Narrows typically does not freeze over completely in the winter in the existing environment; open water leads remain in the constriction where water velocities are highest. Winter operation of the outlet channels would increase flow through the system and could cause some increase in the size of the open water leads that remain through the Lake St. Martin Narrows over the winter.	– IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Debris – EIS Volume 2, Section 6.4.1.2 – IAAC-R1-120 – IAAC-R2-23, IAAC-R2-26

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
			• During high flow periods at the Narrows (90th percentile), the maximum depth-average velocity would increase from 0.5 to 0.96 m/s and the minimum water depth would decrease from 1.78m to 1.22m. During a 2011 type flood, the water depths would be higher than at the 90th percentile, improving navigation, but velocities would increase at the constrictions to approximately 1.3 m/s. In terms of fish movements, it is expected that fish would still be able to move though faster-flowing areas using velocity breaks. In terms of navigation, under current normal water level conditions, navigation through the downstream portion of the Narrows is difficult due to shallow water, even with a shallow draft boat (e.g., jetboat or small fishing boat), and boat travel is typically restricted to the south basin. The changes in hydrology at the Narrows at the 90th percentile condition would likely have little effect on the ability to boat through the Narrows.	

Appendix IAAC-R3-06-1, Table 4 Dauphin River

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
Current and Future Availability of Country Foods	Wildlife Hunting and Trapping	• Impacts on traditional hunting and gathering activities along Dauphin River. • Concerns about the Permanent Outlet Channel effects on traditional and gathering activities along Dauphin River. • Effects to migratory birds and wildlife as a result of changes to flow volumes and velocities through the Dauphin River. • Concerns that the Project will impact migratory bird habitat and populations resulting from lowering flows and levels on the Dauphin River. • Concerns about changes to flow volumes and flow velocities in the Dauphin River that support local movement and the seasonal habitat of migratory birds. • Concerns related to flood- impacted (2011) important nesting areas for geese and habitat for muskrat along Highway 513 adjacent to the Dauphin River. • As a result of lowering flows and levels on Dauphin River, migratory fowl habitat will shrink and be degraded resulting in declines in migratory birds in the region.	• Changes to Dauphin River would only occur if the Project was operating to manage a flood and will reduce overbank flooding and reduce velocities in spring/summer. This would reduce potential effects to plants and medicines adjacent to the Dauphin River and improve access to harvest sites during these periods. • Project-related changes to Dauphin River during a flood event are expected to be positive, in terms of birds and wildlife habitat/ movement and access to these resources. • Lake Manitoba will supply baseflow in the LMOC which will in turn supply baseflow in the LSMOC; therefore, no impact would be expected on the Dauphin River, even during drought conditions. Water levels on Lake Manitoba would need to be very low (significantly below the bottom of the target range, which is extremely rare) for a decision to turn off the base flow in the LMOC. Therefore, it is anticipated that baseflow would be provided at all times in both channels when not in use for flood operation.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Baseflows – EIS Volume 1, Section 3.3.2, Section 3.4.3, Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-31, IAAC-R1-38, IAAC-R1-78 – IAAC-R2-11
	Aquatic Environment and Fishing	• Effects to fish spawning areas in the Dauphin River. • Reduction in the availability of fish in the Dauphin River. • Concerns that whitefish emerging from the spawning grounds in Lake St. Martin will be carried into the LSMOC and directly into Lake Winnipeg rather than being able to use their traditional migratory route through Dauphin River to the lake because of the change in flow path. • Potential effects of the Project on fishers who operate out of Dauphin River, which is relied upon by Indigenous fishers. • Concerns that lake whitefish may become attracted to flowing water they will not be able to ascend, which could delay or prevent the movement from the outflow into the Dauphin River. • Low water levels on Lake St. Martin create problems with the whitefish and walleye fishery, including the loss of fish in the winter due to low oxygen levels, and fish becoming trapped in pools in the Fairford and Dauphin rivers and being lost when the pools freeze to the bottom. • Adverse changes to fish behavior and spawning success resulting from the potential for new flows at the mouth of the LSMOC during operations to divert fish away from the Dauphin River during spawning migration periods. • Adverse changes to fish habitat on the Dauphin River resulting from reduced depth and flow affecting culturally important fish species. • Impacts to fish behavior and spawning success in the Dauphin River affecting the ability for fish to access spawning beds and impacting fish migratory routes. • Project effects on fish related to changes to lake levels on Lake St. Martin, changes to flow rates and volumes at the Narrows and through the Dauphin River.	• Measurable changes to Dauphin River would only occur if the Project was operating to manage a flood and will reduce peak flows in Dauphin River during periods of high flows and flood events. There would be small changes in flow during low conditions (1oth percentile) but these would result in a negligible change to the hydraulic conditions in the Dauphin River, which is not expected to change the potential for sediment erosion or deposition. • Lake Manitoba will supply baseflow in the LMOC which will in turn supply baseflow in the LSMOC; therefore, no impact would be expected on the Dauphin River, even during drought conditions. Water levels on Lake Manitoba would need to be very low (significantly below the bottom of the target range, which is extremely rare) for a decision to turn off the base flow in the LMOC. Therefore, it is anticipated that baseflow would be provided at all times in both channels when not in use for flood operation. • Regular spring/summer high flows will still occur; the Project's management of floods will not affect flows under low flow conditions when movements of fish could be impeded; spring flushing and natural fluvial geomorphologic processes will still occur. • Larval fish may drift via the Dauphin River or the LMOC but would still reach Sturgeon Bay; no adverse effect is expected.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Baseflows – EIS Volume 1, Section 3.3.2, Section 3.4.3, Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-31, IAAC-R1-38, IAAC-R1-78 – IAAC-R2-11 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Regional water quality – EIS Volume 2, Section 6.4.8

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
		• Concerns that sediment production causing negative impacts on fish use of the area and a decrease in secondary productivity and diversity and would likely have some effects on migratory movement of fish into the Dauphin River. • Project impacts on migratory patterns of fish species that inhabit and spawn in Lake St. Martin. Locations of concern include the mouth of the Dauphin River as it enters Lake St. Martin, as well as Birch Bay. If the channel is constructed and results in lower water flows in the Dauphin River, fish may not be able to follow the natural path of the river, which is anticipated to affect whitefish spawning in Lake St. Martin. • Adverse effects on fish habitat in Lake St. Martin and Dauphin River, e.g., changes to water flows and water quality on the fall spawning run of whitefish up the Dauphin River from Lake Winnipeg to spawning beds along the river and in Lake St. Martin.	• Effects to water quality in Lake St. Martin that extend beyond the immediate outlet area in Birch Bay are not expected; therefore, effects to fish as a result of changes in water quality in Lake St. Martin and the Dauphin River are not expected. The Aquatic Effects Monitoring describes to commitment to monitor effects and address any issues that are applicable. • Fish may be attracted to the outlet of the LSMOC at Sturgeon Bay. Substrate in areas of higher velocity is expected to be suitable for spawning and would provide alternate spawning habitat. Fish spawn in many areas of Sturgeon Bay, including at Willow Point to the north of the outlet of the LSMOC and at the mouth of the Dauphin River.	– IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04
	Plant and Plant Harvesting	• Loss of plants and medicines, disappearance of traditional medicines and degradation of key harvesting areas along the Dauphin River.	• During current conditions, flooding likely damages plants and medicines and reduces access to harvest sites adjacent to the Dauphin River. Changes to Dauphin River would only occur if the Project was operating to manage a flood and will reduce overbank flooding and reduce velocities in spring/summer. • Project-related changes are expected to be positive, in terms of plants/medicines and access to these resources.	• Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10
Water Quality (drinking, recreational and cultural uses)		• Fluctuating water levels in the Dauphin River. • Effects to the Dauphin River due to ensuring adequate base flows in the channels during low flow periods. • Changes to flow volumes and flow velocities through the Narrows and in the Dauphin River. • Effects related to the nutrients, wastewater effluents, fertilizers, pesticides, animal waste and other contaminants that are entering the Dauphin River. • Concerns regarding sediment and debris in the Dauphin River. • Concerns regarding water quality, increased erosion, and increased flood risk on the Dauphin River. • Further deterioration of water in the Dauphin River from the proposed Project. • Concerns regarding sediment and debris in the Dauphin River. • Concerns regarding the erosion caused by the permanent operational channel operations from the increase of water flow on the Dauphin River and into Lake Winnipeg • Concerns about sediment transport and erosion, the reduction of lake levels in the north basin of Lake St. Martin and potential whitefish migratory disruption through the Dauphin River, and heightened differential of lake levels between the south and north Lake St. Martin during channel operations because of the Narrows serving as a hydraulic control. • Increases in silt load into Sturgeon Bay as a result of the operation of the EOC covered the coarse substrates at the mouth of the Dauphin River with silt and clay. • Reduced depth and flow in the Dauphin River during the Project's operations. • Shoreline erosion of the Dauphin River	• Measurable changes to Dauphin River would only occur if the Project was operating to manage a flood and will reduce peak flows in Dauphin River during periods of high flows and flood events. • Lake Manitoba will supply baseflow in the LMOC which will in turn supply baseflow in the LSMOC; therefore, no impact would be expected on the Dauphin River, even during drought conditions. Water levels on Lake Manitoba would need to be very low (significantly below the bottom of the target range, which is extremely rare) for a decision to turn off the base flow in the LMOC. Therefore, it is anticipated that baseflow would be provided at all times in both channels when not in use for flood operation. • A reduction in overland flooding should reduce inputs from nutrients and contaminants in soils. • The amount of erosion and sediment load to Dauphin River is also expected to decrease because a portion of the peak flows from Lake Manitoba will be diverted to the LMOC and a portion of the Lake St. Martin flows will be diverted to the LSMOC. • Water quality in upstream areas is comparable to downstream areas and is not expected to measurably change.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Baseflows – EIS Volume 1, Section 3.3.2, Section 3.4.3, Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-31, IAAC-R1-38, IAAC-R1-78 – IAAC-R2-11 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
Economic Conditions		• Concerns that the local fisheries will be affected because the economic base and spawning grounds for their fisheries are impacted.	• Changes to fish habitat and fish movements are not expected to affect regional fisheries populations. • Some fish may pass down the channels but are still able to move up the Dauphin River.	• Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10
Mental and Social Well-being		• Effects on cultural heritage and current use related to changes to lake levels on Lake St. Martin, changes to flow rates and volumes through the Dauphin River. • Concerns that adverse effects to fish and fish habitat in the Dauphin River have the potential to impact the fishing rights. • Impaired sense of place due to landscape and ecological changes in the post-flood environment around Dauphin River. • Impacts to patterns of use of key cultural areas (notably Lake St. Martin, Dauphin River, Lake Winnipeg, and areas nearby) due to real and perceived risks from water quality.	• The Project is designed to address flooding such as occurred in 2011, and associated effects to mental and social well-being. • Lake Manitoba will supply baseflow in the LMOC which will in turn supply baseflow in the LSMOC; therefore, no impact would be expected on the Dauphin River, even during drought conditions. Water levels on Lake Manitoba would need to be very low (significantly below the bottom of the target range, which is extremely rare) for a decision to turn off the base flow in the LMOC. Therefore, it is anticipated that baseflow would be provided at all times in both channels when not in use for flood operation. • During current conditions, flooding likely reduces access to sites adjacent to the Dauphin River. • During current conditions, flooding could result in shoreline erosion and exposure/ loss of cultural heritage. • Changes to Dauphin River would only occur if the Project was operating to manage a flood and will reduce velocities and associated erosion.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Indigenous socioeconomics – EIS Volume 4, Section 10.3.3.1 • Mental Health – EIS Volume 4, Section 10.3.3.2 – IAAC-R1-103 – IAAC-R2-28 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Baseflows – EIS Volume 1, Section 3.3.2, Section 3.4.3, Volume 2, Section 6.4.7.4 – IAAC-R1-14, IAAC-R1-31, IAAC-R1-38, IAAC-R1-78 – IAAC-R2-11 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
Use of Navigable Waters		• Concerns regarding potential hazardous debris flow into the Dauphin River caused by the channel operations. • Reduction of north basin water levels to 797 ft asl during typical operations, resulting in reduced water depths at the Narrows and on the Dauphin River, changes in water currents and location of sand bars, with potential to impair access and navigation at the head and main course of the Dauphin River. • Potential of the Project to impair access and navigation at the Narrows and at the head and main course of the Dauphin River. • Reduced water depths on the Dauphin River. • Impacts to navigation and safety of fishers arising from changes in water currents and the location of sandbars, such as at the Narrows in Lake St. Martin, and at the head and throughout the Dauphin River.	• The operation of the Project will reduce peak flows in Dauphin River during periods of high flows and flood events and should not increase the amount of potential hazardous debris flow into the Dauphin River. • The reduction in flows may cause some localized changes in areas where bed materials accumulate and disappear but is not expected to change the overall shape of the river. • Based on the outputs of modelling, the small change in flow during lower flow (e.g., 10th and 50th percentiles) conditions is expected to result in only a negligible change to water depths and velocities in the Dauphin River and at the Narrows. • During higher flows (e.g. 90th percentile) on the Dauphin River, the range in cross-sectional average velocity will decrease from approximately 0.3-2.8 m/s to 0.2-2.2 m/s and the range in water depths will decrease from approximately 0.9-4.9 m to 0.6-4.6 m. The reduction in velocities should improve boat navigation – although some areas would still be difficult to navigate under the high velocity conditions. The reduction in water depths may impact navigation in some locations that are typically shallow; however, water levels at those locations during floods conditions (e.g. at the 90th percentile event) would still be higher than during none-flood conditions. Therefore, although the water levels are lower because of the Project, they would still be higher as compared to a non-flood scenario (i.e., shallow areas may already be difficult to navigate during non-flood conditions) – and velocities may still impede navigation in other areas. • During higher flows at the Narrows (90th percentile), the maximum depth-averaged velocity would increase from 0.5 to 0.96 m/s and the minimum water depth would decrease from 1.78m to 1.22m (from 5’10” to about 4’), which is not expected to affect navigation.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Navigation – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-119, IAAC-R1-111, IAAC-R1-122 – IAAC-R2-29
Food Security		• Impacts on traditional hunting and gathering activities along Dauphin River. • Concerns about the Permanent Outlet Channel effects on traditional and gathering activities along Dauphin River. • Loss of plants and medicines, disappearance of traditional medicines and degradation of key harvesting areas along the Dauphin River. • Reduction in the availability of fish in the Dauphin River. • Potential effects of the Project on fishers who operate out of Dauphin River, which is relied upon by fishermen.	• No adverse changes to plants, birds or other wildlife, or access to these resources are expected, and reduced frequency of flooding may reduce existing effects. • No measurable changes to regional fish populations are anticipated, but monitoring for this resource will be carried out at several sites near the Dauphin River as part of the AEMP.	• Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Fishing – EIS Volume 4, Section 9.2.4.5, Section 10.3.3 – IAAC-R1-76, IAAC-R1-81, IAAC-R1-105, IAAC-R1-122 – IAAC-R2-26 – IAAC-R3-06

Appendix IAAC-R3-06-1, Table 5 Lake Winnipeg

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
Current and Future Availability of Country Foods	Wildlife Hunting and Trapping	• Effects to hunting and trapping rights. • Effects to hunting areas along the shores of Lake Winnipeg. • Loss of trapping areas on the shoreline of Lake Winnipeg due to higher water levels. • Impacts to the sufficiency and availability of furbearers (specifically muskrats) arising from the flooding of muskrat dens during critical periods of the reproductive cycle as a result of changes in water levels in Lake Winnipeg and connected marshes and wetlands. • Decreases of animal populations in the area around Kinwow Bay. • Impacts on wildlife from contaminated water in Lake Winnipeg. • Concerns that the barrier the Project will create, from Lake Manitoba to Lake Winnipeg, will impede the free flow of terrestrial wildlife. • Concerns the Project will change the water levels in the area, thereby impacting access harvesting sites on Lake Winnipeg. • Effects to ungulate habitat, including moose, on lands adjacent to Lake Winnipeg during Project operations. • Effects on traditional activities such as trapping, and hunting at Black Island and Deer Island.	• Changes to Lake Winnipeg will be limited mainly to areas close to the LSMOC Outlet. Lake Winnipeg water levels are managed under the Lake Winnipeg Regulation. During Project operation to manage flooding there will be more flow entering the lake earlier, but changes in lake levels will be within past water level extents and virtually imperceptible among wind and wave action. • The main purpose of the Project is to mitigate the effects of flooding, and from a regional perspective this should reduce the overall amount of soil entering the lake that has been impacted by agriculture, in terms of nutrients and pesticides. • Algae blooms are an ongoing issue, but the Project is not expected to measurably contribute to this issue. The use of pesticides and fertilizers will be carefully regulated and monitored. • Based on regional data, surface water quality in upstream lakes is similar to downstream lakes and so no measurable effects are anticipated with increased water velocities. • Construction of LSMOC channel outlet will be carried out inside silt curtains with monitoring to manage sediments entering the lake environment as described in the SMP. As described in the SMP, sediment management protocols will be in place using real-time data gathering to facilitate gate operation to maintain suspended sediment levels to within acceptable limits as per surface water quality guidelines. • Measures to reduce effects to wildlife movements include the use of small-sized rock material to avoid harm to animals, while addressing erosion, shallow slopes for channel and spoil piles, retaining trees where possible, configuring spoil piles to include breaks that enhance wildlife movement, where possible, and planting cover vegetation to reduce sight lines. • Based on the assessment of the proposed effects of the Project on wildlife and the proposed mitigation measures, the residual effects are not expected to threaten the viability of a wildlife species.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Wildlife movement – EIS Volume 3, Section 8.3.6 – IAAC-R1-47, IAAC-R1-93 – IAAC-R2-17, IAAC-R2-21 – IAAC-R3-06
	Aquatic Environment and Fishing	• Effects to fishing rights. • Loss of fishing areas on the shoreline of Lake Winnipeg due to higher water levels. • Loss or alteration of fish habitat, fish quantity, fish movement and/or migration due to Project construction and operation, presence of permanent infrastructure, changes in water quality and shoreline morphology, and alteration of water, sediment and debris transfer between Lake Manitoba, Lake St. Martin and Lake Winnipeg. • Effects to the fishing grounds on Lake Winnipeg, Sturgeon Bay and Kinwow Bay. • Concerns regarding occurrences of fish with deformities. • Effects of pollutants and sewage on fish health in Lake Winnipeg. • Concerns related to fish die offs and poor water quality throughout the southern basin of Lake Winnipeg.	• Changes to Lake Winnipeg will be limited mainly to areas close to the LSMOC Outlet. Lake Winnipeg water levels are managed under the Lake Winnipeg Regulation. During Project operation to manage flooding there will be more flow entering the lake earlier, but changes in lake levels will be within past water level extents and virtually imperceptible among wind and wave action. • The main purpose of the Project is to alleviate flooding, including on Lake Manitoba. It will only operate (in accordance with the Operating Guidelines) to manage flooding conditions when water levels on Lake Manitoba exceed the top of its target range of 247.65 m (812.5') and water levels on Lake St. Martin south basin exceed the top of its target range of 243.84 m (800'); outside of this, conditions will remain as currently experienced. • Based on regional data, surface water quality in upstream lakes is similar to downstream lakes and so no measurable effects are anticipated with increased water velocities. • Cumulative effects of past activities have been incorporated into the baseline conditions in carrying out the Project environmental assessment and the responsibility for the Project is to maintain current conditions and look for opportunities to improve conditions where feasible, from a Project perspective.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
		• Concerns that whitefish emerging from the spawning grounds in Lake St. Martin will be carried into the LSMOC and directly into Lake Winnipeg rather than being able to use their traditional migratory route through Dauphin River to the lake because of the change in flow path. • Concerns regarding algal blooms in Lake Winnipeg that have significantly impacted harvesting activities, particularly when nets are filled with algae. • Concern that the regional assessment area does not include the full Lake Winnipeg North Basin, which has fish stocks supported by significant spawning grounds for whitefish and pickerel in Lake St. Martin and will be impacted by the Project. • Concerns regarding potential for further flooding events and associated impacts on fishing safety, equipment, and practices, particularly in Lake Winnipeg. • Increased debris, fouling or damaged nets, and high turbidity in Sturgeon Bay. • Ability to safely access preferred fishing areas on Lake Winnipeg during periods of ice coverage (fall/winter). • Project effects on the spawning cycle and increased sedimentation on spawning windows and key fish spawning habitat in the Black Island, Wanipigow Bay area, and Sturgeon Bay. • Effects to traditional fishing grounds not included in the scope of the local assessment area (LAA), including Saskatchewan Point, McBeth Point, Fisher Bay, Fisher River, and the northern half of the Sturgeon Bay. • Increased dangers of ice fishing caused by elevated water level in Lake Winnipeg • Concern regarding Project effects on Lake Winnipeg fishing grounds at Sturgeon Bay, Kinwow Bay, McBeth Point and Sturgeon Bay which are relied upon by fishermen. • Effects on traditional activities such as angling at Black Island and Deer Island.	• The main purpose of the Project is to mitigate the effects of flooding, and from a regional perspective this should reduce the overall amount of soil entering the lake that has been impacted by agriculture, in terms of nutrients and pesticides. • Algae blooms are an ongoing issue, but the Project is not expected to measurably contribute to this issue. The use of pesticides and fertilizers during construction and for channel maintenance will be carefully regulated and monitored. • Construction of LSMOC outlet area will be carried out inside a cofferdam with monitoring to manage sediments entering the lake environment. • Changes to Lake Winnipeg will be limited mainly to areas close to the LSMOC outlet. Lake Winnipeg water levels are managed under the Lake Winnipeg Regulation. During Project operation to manage flooding there will be more flow entering the lake earlier, but changes in lake levels will be virtually imperceptible among wind and wave action. • There may be existing issues with access due to ice, but the Project is not anticipated to worsen conditions. Modeling outputs indicate that water levels in Lake Winnipeg are within the regulation range during winter months, even for a repeat of the 2011 flood event which is the most severe flood event on record for the Lake Manitoba / Lake St. Martin system. The only Project-related effects on Lake Winnipeg from an ice perspective are that there will be some area of open water and thin ice at the outlet. Ice conditions on the Dauphin River and its outlet to Lake Winnipeg will be more stable with the lower flows and velocities in the Dauphin River. • No unique fish habitat is present at the LSMOC outlet. Losses of fish habitat in the LSMOC outlet will be offset as required under the *Fisheries Act.* • Modeling of sediment deposition at the LSMOC outlet indicates that sediment will be widely dispersed in Sturgeon Bay and not form a thick enough layer to affect fish use of coarse substrates for spawning. No effects to sediments at Black Island or Wanipigow Bay will occur as a result of the Project as these are far removed from the Project. • No effects to fish habitat beyond the LSMOC are predicted. However, targeted monitoring of the lake bottom at McBeth Point and selected locations closer to Sturgeon Bay are planned to verify if unanticipated effects occur. • The Project is not expected to have any effects to the south basin of Lake Winnipeg, which is heavily influenced by inputs from the Red River. • The Project is not expected to increase the occurrence of fish deformities, but these will be documented during monitoring as part of the AEMP. • During channel commissioning, sediments will be monitored using real-time loggers and gate operation to maintain sediments to within acceptable limits agreed to with regulators as per water quality guidelines. • Sturgeon Bay is a shallow, turbulent area influenced by wind and wave action and based on modelling results sediments are not expected to measurably affect fish habitat in downstream areas. • Sediment will be monitored and managed during construction via the Surface Water Management Plan and SMP, with the AEMP addressing sediment monitoring during operation. • Some fish may leave the lake via the LSMOC but are able to return up the Dauphin River. • The AEMP includes fish community and fish habitat monitoring. • The Project was designed to avoid adverse effects associated with Emergency Outlet Channel, which included mobilization of mineral sediment and organic materials including plant debris. The channels are being cleared of vegetation and other organic material and constructed to be non-erodible, including armoring.	– IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Ice effects/management – IAAC-R1-71 – IAAC-R2-10, IAAC-R2-11, IAAC-R2-23 • Fish habitat offsetting – EIS Volume 3, Section 7.2.4 – IAAC-R1-36, IAAC-R1-37, IAAC-R1-46, IAAC-R1-53 – IAAC-R2-10 – IAAC-R3-02 • Sediment effects/management – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-30, IAAC-R1-32, IAAC-R1-44, IAAC-R1-76, IAAC-R1-81, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-31 – IAAC-R3-01 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10 • Debris – EIS Volume 2, Section 6.4.1.2 – IAAC-R1-120 – IAAC-R2-23, IAAC-R2-26 • Fishing – EIS Volume 4, Section 9.2.4.5, Section 10.3.3 – IAAC-R1-76, IAAC-R1-81, IAAC-R1-105, IAAC-R1-122 – IAAC-R2-26 – IAAC-R3-06

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
			• Modeling of sediment deposition shows that there will be negligible deposition in Sturgeon Bay with no effects to fish populations and sediment increases outside of Sturgeon Bay are not expected to be detectable; therefore, effects are not predicted to extend beyond Sturgeon Bay. • Substrate monitoring that will be conducted within Sturgeon Bay at McBeth Point and potentially other locations such as near Reindeer Island was added to the AEMP will indicate whether unanticipated movement of organic materials and sediments along the lake bottom is occurring out of Sturgeon Bay into other areas of Lake Winnipeg. • Manitoba Transportation and Infrastructure is developing a debris monitoring program to provide information about the potential effects of the Project on debris levels in nets once the Project is operating, and to document any unanticipated effects. The debris monitoring results will be shared with Indigenous groups and will likely be an agenda topic for the proposed EAC. • Monitoring results will be reported to regulators and Indigenous communities and if effects are beyond those predicted, additional mitigation and/or offsetting will be required.	
	Plant and Plant Harvesting	• Impacts to plant harvesting due to water level fluctuations on Lake Winnipeg. • Concern about the cumulative effects of upstream flow controls on Limestone Bay in the northwest basin of Lake Winnipeg and shoreline plant communities. • Effects on traditional activities such as picking medicines along the shoreline at Black Island and Deer Island. • Impacts to the sufficiency and availability of plant foods and medicine resources arising from the degradation and loss of habitat suitable for supporting plant foods and medicines on lands adjacent to Lake Winnipeg as a result of fluctuating water levels, flooding and inundation, and water table saturation. • Impacts to the ability to access areas of preferred plant harvesting in the vicinity of Lake Winnipeg due to elevated water levels and shoreline inundation during the operation of the LSMOC in tandem with the FRCWS.	• Changes to Lake Winnipeg will be limited mainly to areas close to the LSMOC outlet. Lake levels are managed under the Lake Winnipeg Regulation. During Project operation to manage flooding there will be more flow entering the lake earlier, but changes in lake levels will be within past water level extents and virtually imperceptible among wind and wave action. • Cumulative effects of past activities have been incorporated into the baseline conditions in carrying out the Project environmental assessment and the responsibility for the Project is to maintain current conditions and look for opportunities to improve conditions where feasible, from a Project perspective.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
Water Quality (drinking, recreational and cultural uses)		• Effects from historic and ongoing flooding and fluctuating water levels in Lake Winnipeg. • Adverse effects to drinking water. • Concerns regarding access to clean drinking water in Lake Winnipeg. • Concerns about Lake Winnipeg water quality and the introduction of agricultural runoff, fertilizers, pesticides, debris and microorganisms. • Concerns regarding the introduction of invasive species, such as carp and zebra mussels, to Lake Winnipeg. • Concern regarding transport of sediments and chemical nutrients from Lake Manitoba into Lake St. Martin and Lake Winnipeg via the channels, resulting in increased contribution to poor water quality that renders it unsafe for swimming and bathing. • Ability to safely swim and bathe in water from Sturgeon Bay. • Concerns regarding the impact of sedimentation and erosion on aquatic habitat long term and the downstream end of the channel (Lake Winnipeg and Sturgeon Bay). • Concerns regarding the potential for erosion in the channels to add substantial and harmful levels of sediment to Sturgeon Bay in Lake Winnipeg. • Concerns that construction and operation of the Project will have a serious impact on the flows, water quantity and aquatic health in the northern basin of Lake Winnipeg and Sturgeon Bay. • Increased in sedimentation due to construction activities and increased flow between water bodies causing eutrophication and spikes in deposited sediments, particularly in Lake Winnipeg. • Concerns regarding increased nitrogen and phosphorous resulting in increases of blue-green algae in Lake Manitoba, Lake St. Martin, Lake Winnipeg, Nelson River and Split Lake. • Concern that the Cumulative Effects Analysis ignores long term effects of multiple floods on water quality in Lake Winnipeg and Split Lake. • Concerns that the incremental impact of the increased flow through the LSMOC into Sturgeon Bay and Lake Winnipeg during high wind events has not been assessed. • Potential effects of methylmercury in Lake Winnipeg or other water bodies connected to the Project. • Increased erosion affecting islands (Little Tamarack Island, Big Tamarack Island, Reindeer Island and Big and Little Sturgeon Islands).	• Changes to Lake Winnipeg will be limited mainly to areas close to the LSMOC Outlet. Lake Winnipeg water levels are managed under the Lake Winnipeg Regulation. During Project operation to manage flooding there will be more flow entering the lake earlier, but changes in lake levels will be within past water level extents and virtually imperceptible among wind and wave action. • The Project is not anticipated to worsen historic and ongoing flooding and fluctuating water levels. • Based on regional data, surface water quality in upstream lakes is similar to downstream lakes and so no measurable effects are anticipated with increased water velocities. • Invasive species such as carp and zebra mussels are currently in Lake Winnipeg, and so the Project is not expected to contribute to introductions in the lake. • The main purpose of the Project is to mitigate the effects of flooding, and from a regional perspective this should reduce the overall amount of soil entering the lake that has been impacted by agriculture, in terms of nutrients and pesticides. • Algal blooms are an ongoing issue, but the Project is not expected to measurably contribute to this issue. The use of pesticides and fertilizers will be carefully regulated and monitored. • The Project is not expected to affect the ability to safely swim and bathe in water from Sturgeon Bay, other than in the immediate vicinity of the LSMOC outlet, which will have safety booms and signage installed, from a safety perspective. • Sturgeon Bay is a shallow, turbulent area influenced by wind and wave action and based on modelling results sediments are not expected to measurably affect water quality or fish habitat in downstream areas. • Sediment will be monitored and managed during construction via the Surface Water Management Plan and SMP, with the AEMP addressing sediment monitoring during operation. • Project flows and lake levels will be managed through hydrometric monitoring and operating guidelines. The AEMP has established surface water quality sites in areas downstream of potential effects to provide the ability to mage effects, so they do not move further downstream. • The Project environmental assessment approach is designed to maintain current conditions, in terms of adverse effects, but incorporates changes due to previous projects and activities into the baseline. • From a regional perspective, the Project has the potential to reduce, not increase, the amount of flooded organic carbon and decomposing vegetation, therefore reducing mercury methylation, and eventually the bioaccumulation of methylmercury in fish - baseline mercury concentrations in locally harvested fish, human health risks of methyl mercury and monitoring and adaptive management for mercury is discussed in IAAC-R2-32.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Zebra mussels/ AIS – EIS Volume 3, Section 7.2.4.2 – IAAC-R1-39, IAAC-R1-77 – IAAC-R2-14, IAAC-R2-27 – IAAC-R3-01 • Decreased flooding – agriculture/country foods – EIS Volume 4, Section 9.2.4.3, Section 10.2.4 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Shoreline erosion – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-32, IAAC-R1-44, IAAC-R1-56, IAAC-R1-111 – IAAC-R2-34 – IAAC-R3-04 • Sediment effects/management – EIS Volume 2, Section 6.4.7.5 – IAAC-R1-30, IAAC-R1-32, IAAC-R1-44, IAAC-R1-76, IAAC-R1-81, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-31 – IAAC-R3-01 • Cumulative effects – EIS Volume 5, Section 11 – IAAC-R1-130 – IAAC-R2-22, IAAC-R2-25, IAAC-R2-34 – IAAC-R3-01, IAAC-R3-03 • Mercury – EIS Volume 3, Section 7.2.4.4 – IAAC-R1-39, IAAC-R1-106 – IAAC-R2-32

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
Economic Conditions		• Effects to commercial fishing on Lake Winnipeg. • Adverse effects to fishing (water quality, spawning, migration) in Lake Winnipeg, affecting First Nations livelihoods. • Erosion of fishing stations at Goodman's Landing and McBeth Point.	• Changes to Lake Winnipeg will be limited mainly to areas close to the LSMOC Outlet. Lake Winnipeg water levels are managed under the Lake Winnipeg Regulation. During Project operation to manage flooding there will be more flow entering the lake earlier, but changes in lake levels will be within past water level extents and virtually imperceptible among wind and wave action. • Some Lake Whitefish from the north basin of Lake Winnipeg migrate up the Dauphin River to spawn in Lake St. Martin. Many of the larval whitefish that hatch in Lake St. Martin drift back downstream into Lake Winnipeg. This whitefish migration and subsequent hatch and drift of larval fish has been a key focus of the assessment. Based on available information, the project is not expected to adversely affect Lake Whitefish spawning success in Lake St. Martin and so no effects to whitefish populations in the north basin of Lake Winnipeg are predicted.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 • Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10
Mental and Social Well-being		• Effects to harvesting rights along the shores of Lake Winnipeg, which are important to cultural survival. • Concern that Project effects to Lake Winnipeg will negatively impact treaty rights and people's health. • Effects to cultural sites around Lake Winnipeg, including, ceremonial sites, archaeological sites, gathering places, sweat lodges, meeting places, birth places, death places, rock paintings, important sites, traditional burial sites, petroforms, battlegrounds and Sundance sites. • Effects to culturally important sites around Lake Winnipeg and its river system including wetlands and marshes, freshwater springs, boat launches, animal observations, nesting areas, water crossings, fish spawning areas, animal wintering sites, portages and calving. • Diminished value of camping along Lake Winnipeg caused by on-going flooding and erosion of shoreline. • Impaired sense of place due to landscape and ecological changes in the post-flood environment around Lake Winnipeg. • Impacts to patterns of use of key cultural areas due to real and perceived risks from water quality. • Concerns regarding burial sites on the shores of Lake Winnipeg, which are being eroded due to fluctuations in water levels. • Effects on traditional activities such as ceremony at Black Island and Deer Island. • Concerns how changes to local drainage and water flow will affect water quality for supporting social and cultural uses of Sturgeon Bay in Lake Winnipeg.	• The purpose of the Project is to reduce the duration and severity of flooding on Lake Manitoba and Lake St. Martin and therefore the mental and social-well being effects associated with flood events as well. • Changes to Lake Winnipeg will be limited mainly to areas close to the LSMOC Outlet. Lake Winnipeg water levels are managed under the Lake Winnipeg Regulation. During Project operation to manage flooding there will be more flow entering the lake earlier, but changes in lake levels will be virtually imperceptible among wind and wave action. • The environmental assessment examined potential effects from the Project and developed mitigation to address adverse effects. This included effects and concerns expressed by participating Indigenous groups. Information was documented in the Environmental Impact Statement and shared during the engagement process. • The Project will need to receive formal provincial and federal regulatory approval before it can be constructed. The decisions will incorporate concerns expressed by Indigenous communities and how they are being addressed. • Surface water and fisheries will be monitored during construction and for several operating periods under the AEMP to address uncertainties in predictions and address any unpredicted adverse effects. • The results of monitoring will be shared with regulators and communities, and ongoing engagement will provide opportunities for discussion. • The Project Environmental Advisory Committee has been established as a venue to share results and discuss issues of concern. • While it is difficult to address aspects of mental and social wellbeing, Manitoba Transportation and Infrastructure is committed to sharing the results and ongoing engagement to help to address the uncertainties, concerns and issues currently being expressed.	• Indigenous socioeconomics – EIS Volume 4, Section 10.3.3.1 • Mental Health – EIS Volume 4, Section 10.3.3.2 – IAAC-R1-103 – IAAC-R2-28 • EAC – IAAC-R1-65 – IAAC-R2-30 – IAAC-R3-06

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
Use of Navigable Waters		• Access to Kinwow Bay due to low water levels. • Changes to shoreline access for fishing on Lake Winnipeg caused by project-related changes to water levels.	• Changes to Lake Winnipeg will be limited mainly to areas close to the LSMOC outlet. Lake levels are managed under the Lake Winnipeg Regulation. During Project operation to manage flooding there will be more flow entering the lake earlier, but changes in lake levels will be within past water level extents and virtually imperceptible among wind and wave action.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Navigation – EIS Volume 4, Section 10.2.4.5 – IAAC-R1-119, IAAC-R1-111, IAAC-R1-122 – IAAC-R2-29
Food Security		• Effects to hunting and trapping rights. • Effects to hunting areas along the shores of Lake Winnipeg. • Decreases of animal populations in the area around Kinwow Bay. • Impacts on wildlife from contaminated water in Lake Winnipeg. • Effects to ungulate habitat, including moose, on lands adjacent to Lake Winnipeg during Project operations. • Effects on traditional activities such as trapping, hunting at Black Island and Deer Island. • Effects to fishing rights. • Loss of fishing areas on the shoreline of Lake Winnipeg due to higher water levels. • Loss or alteration of fish habitat, fish quantity, fish movement and/or migration due to Project construction and operation, presence of permanent infrastructure, changes in water quality and shoreline morphology, and alteration of water, sediment and debris transfer between Lake Manitoba, Lake St. Martin and Lake Winnipeg. • Effects to the fishing grounds on Lake Winnipeg, Sturgeon Bay and Kinwow Bay. • Concerns regarding occurrences of fish with deformities. • Effects of pollutants and sewage on fish health in Lake Winnipeg. • Ability to safely access preferred fishing areas on Lake Winnipeg during periods of ice coverage (fall/winter). • Effects to traditional fishing grounds not included in the scope of the local assessment area, including Saskatchewan Point, McBeth Point, Fisher Bay, Fisher River, and the northern half of the Sturgeon Bay. • Concerns regarding algal blooms in Lake Winnipeg that have significantly impacted harvesting activities, particularly when nets are filled with algae. • Increased debris, fouling or damaged nets, and high turbidity in Sturgeon Bay.	• The purpose of the Project is to reduce the magnitude and duration of flooding on Lake Manitoba and Lake St. Martin for future flood events when the target ranges on the lakes are exceeded. The Project will be operated in accordance with the Operating Guidelines. • Changes to Lake Winnipeg will be limited mainly to areas close to the LSMOC outlet. Lake levels are managed under the Lake Winnipeg Regulation. During Project operation to manage flooding there will be more flow entering the lake earlier, but changes in lake levels will be within past water level extents and virtually imperceptible among wind and wave action. • The Project would only operate to manage larger flooding such as occurred during 2011. The reduction in flooding would result in less overland flooding and associated water quality issues from fertilizers and pesticides. • The Project will only operate to manage a repeat of flooding conditions similar to those experienced during 2011 and 2014; outside of this, conditions will remain as currently experienced. Lake levels will be managed by Operating Guidelines. • Based on regional data, surface water quality in upstream lakes is similar to downstream lakes and so no measurable effects are anticipated with increased water velocities. • The main purpose of the Project is to mitigate the effects of flooding, and from a regional perspective. This should reduce the overall amount of soil entering the lake that has been impacted by agriculture, in terms of nutrients and pesticides. • Algae blooms are an ongoing issue, but the Project is not expected to measurably contribute to this issue. The use of pesticides and fertilizers will be carefully regulated and monitored. • Unlike the Emergency Outlet Channel, the Project is designed to minimize additional inputs of debris. Substrate monitoring that will be conducted within Sturgeon Bay at McBeth Point and potentially other locations such as near Reindeer Island was added to the AEMP will indicate whether unanticipated movement of organic materials and sediments along the lake bottom is occurring out of Sturgeon Bay into other areas of Lake Winnipeg. • Manitoba Transportation and Infrastructure is developing a debris monitoring program to provide information about the potential effects of the Project on debris levels in nets once the Project is operating, and to document any unanticipated effects. The debris monitoring results will be shared with Indigenous groups and will likely be an agenda topic for the proposed EAC. • Construction of LSMOC outlet area will be carried out inside silt curtains with monitoring to manage sediments entering the lake environment. • Losses of fish habitat in inlet and outlet areas will be offset as required under the *Fisheries Act*.	• Flooding operation – EIS Volume 1, Section 1.1 – IAAC-R1-38, IAAC-R1-103, IAAC-R1-14, IAAC-R1-122 – IAAC-R2-06, IAAC-R2-22 – IAAC-R3-05 • Regional water quality – EIS Volume 2, Section 6.4.8 – IAAC-R1-14, IAAC-R1-15, IAAC-R1-88 – IAAC-R2-04 • Algae and nutrients/pesticides – EIS Volume 2, Section 6.4.5.2, EIS Volume 3, Section 7.2.2.2 – IAAC-R1-14, IAAC-R1-107 – IAAC-R2-04 • Debris – EIS Volume 2, Section 6.4.1.2 – IAAC-R1-120 – IAAC-R2-23, IAAC-R2-26 • Fishing – EIS Volume 4, Section 9.2.4.5, Section 10.3.3 – IAAC-R1-76, IAAC-R1-81, IAAC-R1-105, IAAC-R1-122 – IAAC-R2-26 – IAAC-R3-06 • Inlet/outlet construction – EIS Volume 1, Section 3.5.2.2 – IAAC-R1-76, IAAC-R1-84 – IAAC-R2-08, IAAC-R2-09, IAAC-R2-10 – IAAC-R3-01 • Fish habitat offsetting – EIS Volume 3, Section 7.2.4

Health and Socioeconomic Component	Subsection	Key Concerns	Effects/Mitigations	Environmental Impact Statement/ Information Request Reference
		• Increased dangers of ice fishing caused by elevated water level in Lake Winnipeg • Concern regarding Project effects on Lake Winnipeg fishing grounds at Sturgeon Bay, Kinwow Bay, McBeth Point and Sturgeon Bay which are relied upon by fishermen. • Concerns regarding potential for further flooding events and associated impacts on fishing safety, equipment, and practices, particularly in Lake Winnipeg. • Effects on traditional activities such as angling at Black Island and Deer Island. • Concern that the regional assessment area does not include the full Lake Winnipeg North Basin, which has fish stocks supported by significant spawning grounds for whitefish and pickerel in Lake St. Martin and will be impacted by the Project. • Impacts to plant harvesting due to water level fluctuations on Lake Winnipeg. • Impacts to the sufficiency and availability of plant foods and medicine resources arising from the degradation and loss of habitat suitable for supporting plant foods and medicines on lands adjacent to Lake Winnipeg as a result of fluctuating water levels, flooding and inundation, and water table saturation. • Impacts to the ability to access areas of preferred plant harvesting in the vicinity of Lake Winnipeg due to elevated water levels and shoreline inundation during the operation of the LSMOC in tandem with the FRCWS.	• Some fish may leave the lake via the LSMOC but are able to return up the Fairford and Dauphin rivers. • The AEMP has established surface water quality, fish and fish habitat sampling sites in areas downstream of potential effects to provide the ability to manage effects, so they do not move further downstream.	– IAAC-R1-36, IAAC-R1-37, IAAC-R1-46, IAAC-R1-53 – IAAC-R2-10 – IAAC-R3-02 • Fish movements – EIS Volume 3, Section 7.2.4 – IAAC-R1-33, IAAC-R1-41, IAAC-R1-43, IAAC-R1-74, IAAC-R1-128 – IAAC-R2-10 – Fairford/Dauphin flows – IAAC-R1-41, IAAC-R1-43 – IAAC-R2-10