LAKE MANITOBA
LAKE ST. MARTIN

OUTLET CHANNELS PROJECT

MANITOBA INFRASTRUCTURE

Wildlife Monitoring Plan

November 16, 2020

Manitoba

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DISCLAIMER

This document was developed to support the Lake Manitoba and Lake St. Martin Outlet Channel Environmental Management and Monitoring Program. This document has been prepared by Manitoba Infrastructure as a way to share information and have discussion with Indigenous Communities and Groups and the public. This document has been prepared using existing environmental and preliminary engineering information, professional judgement as well as information from previous and ongoing public and Indigenous engagement and consultation. The contents of this document are based on conditions and information existing at the time the document was prepared and do not take into account any subsequent changes. The information, data, recommendations, and conclusions in this report are subject to change as the information has been presented as draft and will not be considered complete until further engagement and consultation is complete. The plans may be further revised based on information and direction received from provincial and federal environmental regulators. This draft report be read as a whole, and sections or parts should not be read out of context.

PREFACE

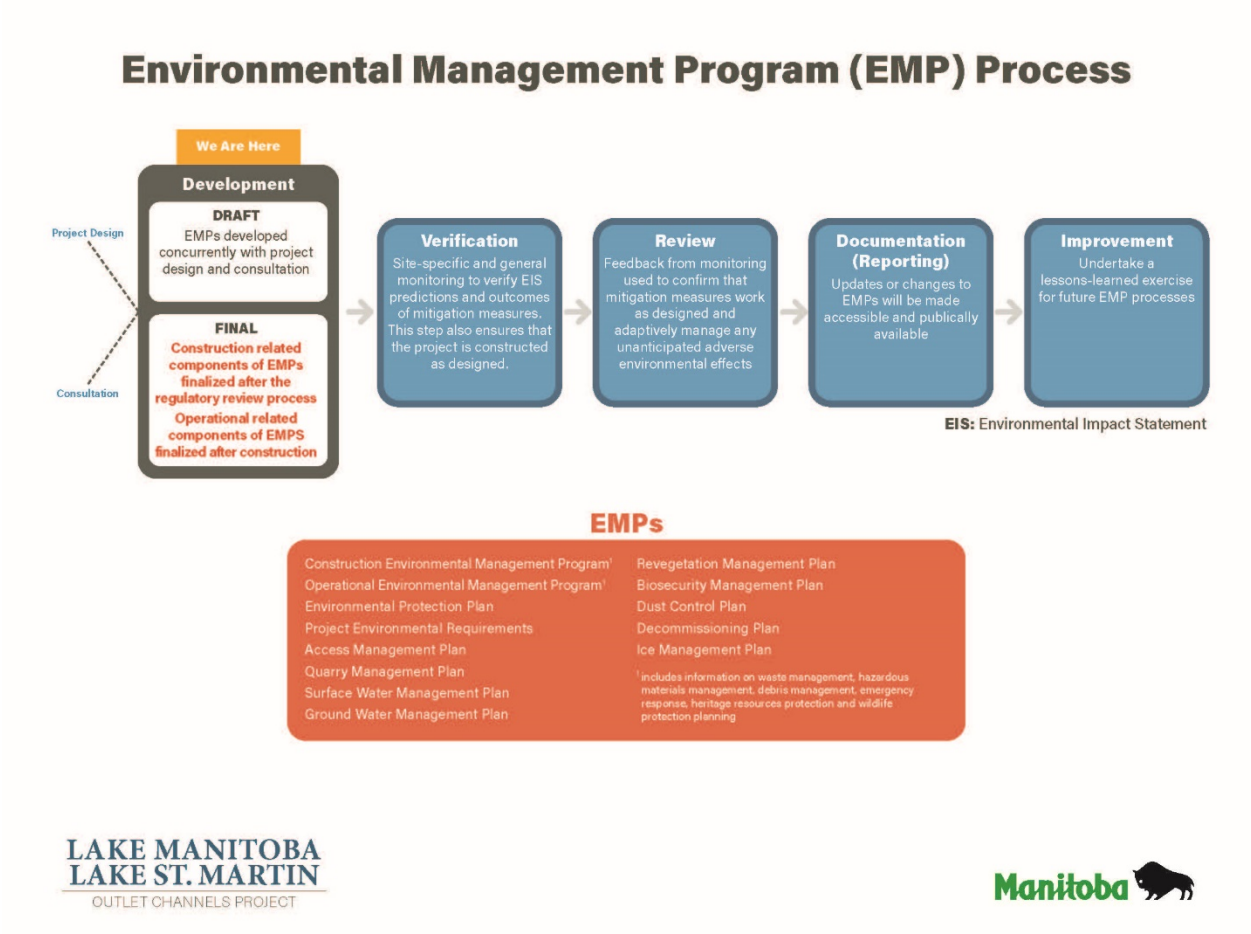
The Lake Manitoba and Lake St. Martin Permanent Outlet Channels Project (the "Project") is proposed as a permanent flood control mitigation for Lake Manitoba and Lake St. Martin to alleviate flooding in the Lake St. Martin region of Manitoba. The Project includes the construction and operation of two new diversion channels: the Lake Manitoba Outlet Channel (LMOC) will connect Lake Manitoba to Lake St. Martin and the Lake St. Martin Outlet Channel (LSMOC) will connect Lake St. Martin to Lake Winnipeg. Associated with these outlet channels is the development of bridges, control structures with power connections, a new realignment of PR 239, and other ancillary infrastructure.

Manitoba Infrastructure (MI) is the proponent for the Project. After receipt of the required regulatory approvals, MI will develop, manage, and operate the Project. This Wildlife Monitoring Plan is one component of the overall Environmental Management Program (EMP) framework which describes the environmental management processes that will be implemented during the construction and operation phases of the Project. The goal of the EMP is to ensure that the environmental protection measures committed to in the Environmental Impact Statement (EIS) and the requirements of the Environment Act Licence and Federal Decision Statement Conditions are undertaken in a timely and effective manner. This includes the verification that environmental commitments are executed, monitored, and evaluated for effectiveness, and that information is reported back in a timely manner to the Project management team for adjustment if required.

Manitoba Infrastructure remains committed to ongoing engagement and consultation with Indigenous groups and other stakeholders that are potentially affected by the Project. Detailed EMP review discussions have been incorporated into community-specific consultation work plans and additional engagement opportunities will be provided prior to EMP finalization. Engagement opportunities include virtual open house events and EMP-specific questionnaires. EMP-specific questionnaires will be provided to Indigenous groups and stakeholders to obtain feedback and views on the draft plans, in addition to exploring opportunities for Indigenous participation in follow-up monitoring. Feedback and recommendations will be used to inform the completion of the plans.

The EMP provides the overarching framework for the Construction Environmental Management Program (CEMP) and the Operation Environmental Management Program (OEMP), which will be finalized as separate documents prior to Project construction and ideally operation, respectively. Their finalization will consider applicable conditions of the Environment Act Licence and associated approvals, any other pertinent findings through the design and regulatory review processes and key relevant outcomes of the ongoing Indigenous and public engagement and Consultation processes.

The purpose of the CEMP and OEMP is to guide how environmental issues will be addressed during construction and operation, respectively, and how adverse effects of activities will be mitigated. The CEMP is supported by several specific or targeted management plans (e.g., surface water, groundwater, sediment, etc.), as shown in the Figure below, that will guide MI's development of the Project's contract documents and subsequently, the Contractor(s) activities, in constructing the Project in an environmentally responsible manner. The OEMP will likely include the same targeted plans developed to manage issues during construction, but prior to construction completion they would be revised and adapted to suit the specific needs during the operation phase.



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OUTLET CHANNELS PROJECT

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ACRONYMS

Acronyms

ARU	autonomous recording unit
CEA Agency	Canadian Environmental Assessment Agency
EIS	environmental impact statement
EMP	Environmental Management Program
EPP	Environmental Protection Plan
IBA	Important Bird Area
LAA	Local Assessment Area
LMOC	Lake Manitoba Outlet Channel
LSMOC	Lake St. Martin Outlet Channel
MCC	Manitoba Conservation and Climate
MI	Manitoba Infrastructure
PDA	Project Development Area
PR	Provincial Road
RVMP	Revegetation Management Plan
ROW	right-of-way
SAR	species at risk
SARA	*Species at Risk Act*
SOCC	Species of Conservation Concern
WMP	Wildlife Monitoring Plan

1.0 INTRODUCTION

1.1 Purpose

The purpose of the Wildlife Monitoring Plan (WMP) is to describe the monitoring activities that will be undertaken to address follow-up requirements identified in Chapter 12 of the environmental impact statement (EIS). Follow-up requirements are actions implemented to verify key environmental assessment predictions, to reduce potential adverse effects on wildlife and their habitat(s), and to confirm compliance with regulatory requirements (compliance monitoring contained in the Environmental Protection Plan [EPP]; CEAA 2012). For the wildlife and wildlife habitat valued component, monitoring will be carried out during the construction and operation phases of the Lake Manitoba and Lake St. Martin Outlet Channels Project (the "Project").

The wildlife assessment identified potential changes to wildlife habitat, mortality risk, and movement during construction and operation of the Project. This WMP will be implemented as part of the Environmental Management Program (EMP) described in Chapter 3.7 of the EIS. The EMP prescribes measures and practices to avoid or reduce adverse environmental effects on wildlife (e.g., clearing outside of the primary nesting period for migratory birds, use of buffers for wildlife and sensitive wildlife habitat). This WMP provides details on how predicted changes to habitat, mortality risk, and movement will be verified and how the effectiveness of mitigation strategies will be evaluated.

In summary, this document describes:

- regulatory requirements
- potential Project effects on wildlife
- Project-specific wildlife mitigation
- monitoring and adaptive management
- schedule and reporting protocols

1.2 Objectives

The monitoring criteria established for the WMP were informed by concerns raised through the EIS review and subsequent information requests received from federal and provincial regulators, Indigenous groups, and stakeholders. Thus, the monitoring criteria reflect measurable and meaningful parameters to verify key EIS predictions and to evaluate the effectiveness of mitigation measures. The objectives of the WMP are to:

- verify EIS predictions and evaluate the effectiveness of mitigation strategies for the environmental effects on wildlife and wildlife habitat (i.e., change in habitat, mortality risk, and movement), particularly as it relates to uncertainty in the assessment; and
- establish a framework for adaptive management that can be used to modify or enhance mitigation strategies for wildlife and wildlife habitat.

2.0 REGULATORY REQUIREMENTS

The Project EIS has been submitted to the Canadian Environmental Assessment Agency (CEA Agency; now Impact Assessment Agency of Canada), pursuant to the *Canadian Environmental Assessment Act, 2012*, and to Manitoba Conservation and Climate (MCC) as an Environment Act Proposal, pursuant to requirements of *The Environment Act* (Manitoba). The relevant federal and provincial regulatory requirements are described below.

2.1 Federal Requirements

As defined under the *Canadian Environmental Assessment Act* (CEAA) 2012, monitoring and follow-up is required to verify the accuracy of the environmental assessment of a project and determine the effectiveness of measures taken to mitigate potential adverse environmental effects (CEAA 2012).

The *Species at Risk Act* (SARA) provides protection for species at risk (SAR) in Canada that are listed on Schedule 1. The legislation provides a framework to facilitate recovery of species listed as threatened, endangered, or extirpated and to prevent species listed as special concern from becoming threatened or endangered. SARA provides protection for both SAR and their critical habitat by prohibiting: 1) the killing, harming, or harassing of endangered or threatened SAR (sections 32 and 36 of SARA); and 2) the destruction of critical habitat of an endangered or threatened SAR (sections 58, 60, and 61 of SARA; Government of Canada 2002).

2.2 Provincial Requirements

Manitoba's *Endangered Species and Ecosystems Act* (MESEA) provides protection to threatened and endangered ecosystems and plant and animal SAR in Manitoba. The Act facilitates the management and development of recovery strategies for threatened, endangered, and extirpated or extinct species to prevent further declines and promote recovery. MESEA-listed species are those that, "are of ecological, educational, aesthetic, historical, medical, recreational and scientific value to Manitoba and the residents of Manitoba" (Government of Manitoba 2015, 2019).

The Wildlife Act provides general provisions for regulating the activities relating to the take and trade of wild animals in Manitoba. A "wild animal" is defined as "an animal or bird of a species or type listed in Schedule A or declared by the regulations to be a wild animal", and includes select amphibian, reptile and mammal species and most bird species (including those not protected under the *Migratory Bird Convention Act*) known to exist in Manitoba (Government of Manitoba 2000). *The Wildlife Act* includes protection for bird species not already afforded protection under the MBCA (Schedule A, Division 6), and as such, all bird species in Manitoba are considered protected by law.

3.0 PUBLIC COMMUNICATIONS AND ENGAGEMENT

Manitoba Infrastructure (MI) has undertaken and maintained engagement efforts with regulatory agencies, Indigenous groups, and the public throughout the development of the Project and welcomes members of the public to submit questions or comments throughout the process. Feedback on the wildlife mitigations and monitoring programs presented in this WMP are also welcome and can be sent to MI through the Project website: www.gov.mb.ca/mit/wms/lmblsmoutlets. As stated on the Project website, additional information is available to the public upon request via the dedicated Project e-mail address: outletchannels@gov.mb.ca.

4.0 PROJECT OVERVIEW

The Project will provide a permanent flood control mitigation system for Lake Manitoba and Lake St. Martin for alleviating flooding in the Lake St. Martin region. This will be accomplished through construction of a new outlet channel from Lake Manitoba to Lake St. Martin (Lake Manitoba Outlet Channel [LMOC]) and a new outlet channel from Lake St. Martin to Lake Winnipeg (LSMOC). These new channels will allow for floodwaters to be moved more quickly through Lake Manitoba and Lake St. Martin into Lake Winnipeg. The Project will result in less flooding and reduced lake levels on Lake St. Martin. Other works include re-alignment of Provincial Road (PR) 239 and a hydroelectric distribution line for operation of the Lake St. Martin Outlet Channel outlet structure (Appendix 1, Figure 1).

The WMP falls within the verification step of the EMP process described in the preface. The Project EMP contains several plans that prescribe measures and practices to avoid and reduce Project-related adverse environmental effects. For wildlife, other notable plans include the Environmental Protection Plan (EPP), Revegetation Management Plan (RVMP), and Red-headed Woodpecker and Eastern Whip-poor-will offset plans. The offset plans include species-specific monitoring commitments and monitoring for those species and therefore are not discussed further in this WMP. The EPP contains monitoring commitments associated with regulatory compliance (e.g., avoiding harm to migratory bird nests) while mitigation measures related to the wildlife monitoring activities are outlined within this WMP.

5.0 POTENTIAL PROJECT EFFECTS ON WILDLIFE

The following describes the predicted effects on wildlife and wildlife habitat, as described in the Project EIS. The EIS includes baseline data gathered in 2016 (EEI 2017a and b) and MI supplemented those data by completing additional pre-construction wildlife field investigations in 2020 (WSP 2020). This WMP incorporates information from both the EIS (including baseline data) and the pre-construction field investigations.

5.1 Change in Habitat

Project construction will remove terrestrial and aquatic habitat used by migratory birds, SAR, and other wildlife. However, with mitigation and reclamation/channel revegetation, estimates of habitat loss will be reduced. Construction noise and activity may deter wildlife, including SAR and migratory birds, from using areas within and adjacent to the active construction areas for the short-term, with animals returning to the area when disturbance ceases. Positive effects are predicted during operation and are expected to mainly benefit the Lake St. Martin Important Bird Area (IBA) and its waterbird colonies through reduced flooding and erosion of habitat and nests. Other wildlife such as muskrats, ducks, grebes, loons, and geese that occupy or nest amongst marshy lake shores are also expected to benefit from reduced flooding on Lake St. Martin.

The Project may have indirect effects on wetlands located adjacent to the LMOC and LSMOC. The channels may alter surface water drainage flows, causing changes to soil moisture regimes and hydrologic function upgradient and downgradient of the channels. As a result, wetlands may become wetter or dryer depending on their location relative to the channels. Changes to wetlands will be monitored as part of the Surface Water Management Plan.

5.2 Change in Mortality Risk

During construction, there is potential for increased wildlife mortality risk due to vehicular collision and encounters with construction equipment. Clearing outside of the sensitive breeding period for migratory birds and adherence to mitigation measures outlined in the EPP are expected to reduce mortality risk for wildlife.

During operation and maintenance, the outlet channel rights-of-way (ROWs) have the potential to increase predator and hunter/trapper efficiency by providing access along a continuous, linear corridor. Prey species encountering the outlet channels may be at a greater risk to predation until cover plantings (i.e., escape or concealment cover) are well established.

Although most wildlife species will be able to cross the channels during operation, wildlife mortality risk will be higher for species attempting to cross the channels during high flow periods. The outlet channel ROWs, and to a lesser extent the electrical distribution line, have the potential to increase mortality risk by providing a travel corridor that increases hunting/trapping and predator efficiency. Limiting public access to the ROWs and adding cover plantings to reduce sight lines and provide escape cover is predicted to reduce mortality

risk to wildlife. The PR 239 realignment may also increase mortality risk for wildlife; however, it is not expected to exceed existing risk associated with the current PR 239 alignment.

5.3 Change in Movement

The outlet channel ROWs have the potential to alter wildlife movement, particularly during construction and during flood events when the channels are conveying floodwater. Terrestrial wildlife movements may be affected during flood events, which could limit dispersion of wildlife across the channel(s) for the short-term. The ROWs will be revegetated and include additional cover plantings in strategic locations to facilitate wildlife movement across the outlet channels. Movement of most wildlife, including elk (*Cervus canadensis*), moose (*Alces alces*), furbearers, migratory birds, and SAR and SOCC are not expected to change during gates closed (i.e., non-operational period). The PR 239 realignment may affect wildlife movement; however, it is not expected to differ substantially from effects currently associated with the existing PR 239 alignment.

6.0 MITIGATION

The EIS lists multiple mitigation measures to reduce potential Project effects on wildlife (Sections 8.3.6.2 to 8.3.6.4). Some of these measures will be implemented and monitored during construction and/or operation as part of compliance monitoring while others will be the focus of environmental effects and mitigation monitoring. Table 1 summarizes the wildlife mitigation measures that will be monitored as part of the environmental management plans.

Table 1: Management Plans Addressing Wildlife Mitigation Measures Committed to in the EIS

Potential Effect	Mitigation Objective	Mitigation Measure (s)	Management Plan
Change in Habitat	Reduce loss of red-headed woodpecker nesting habitat	Add nesting structures on edge of LMOC ROW	Revegetation Management Plan; Red-headed Woodpecker Habitat Mitigation Plan
	Maintain native vegetation (e.g., grassland and areas of shrubland) along outlet channels	Revegetate with a native and agronomic seed mix; weed control	Revegetation Management Plan
Change in Mortality Risk	Reduce wildlife collision risk with Project vehicles	Reduced travel speeds; use multi-passenger vehicles; signs to increase awareness	Environmental Protection Plan; Project Environmental Requirements
	Provide escape cover for wildlife; reduce sight lines	Cover plantings (i.e., shrubs) along edges of LMOC and LSMOC ROWs	Revegetation Management Plan
	Reduce access to LSMOC	Gated access road	Access Management Plan
	Reduce potential to affect migratory bird nests and bat roosts	Clearing outside of the breeding and roosting period (April 1-August 31); setbacks/terrestrial buffers for sensitive wildlife features (e.g., nests, dens)	Environmental Protection Plan; Project Environmental Requirements
Change in Movement	Facilitate movement of wildlife across channels	Channel design will have 4:1 slopes; low use of rip-rap; cover plantings along edges of LMOC and LSMOC ROW	Construction Environmental Management Plan; Revegetation Management Plan

7.0 MONITORING

As described in Section 1.2, the WMP will be used to verify EIS predictions and evaluate the effectiveness of mitigation strategies for the key environmental effects. A detailed description for each of the monitoring criteria, as they relate to change in habitat, mortality risk, and movement, is provided in the subsequent sub-sections.

7.1 Change in Habitat

The Project will disturb lands and remove vegetation through clearing and grubbing, excavation of the LMOC and LSMOC, local drainage construction, and road construction/realignment. Revegetation will be completed in some of these areas to provide erosion and sediment control and to mitigate effects on wildlife and vegetation. Predictions in the EIS state that revegetation measures outlined in the RVMP will, over time, provide habitat for some wildlife along the outlet channels.

The Project has the potential to indirectly affect wetlands adjacent to the outlet channels due to altered drainage flows (e.g., wetlands to the east of the LMOC). Altered drainage patterns along the east side of the LMOC, for example, could reduce habitat for migratory birds and SAR dependent on open water habitats and increase it for others that prefer shallower habitats or habitats less frequently flooded. Residual effects to wetland functions could alter the habitat effectiveness for wetland-dependent wildlife species, including migratory birds and SAR; however, the extent of the potential effects was noted as uncertain in the EIS. Indirect change in wetland habitats will be assessed by the Surface Water Management Plan with support from wetland-based SAR surveys. The rationale, objective(s), and general methods for each survey are described below.

7.1.1 Wetland Species at Risk Survey

Rationale

Based on the species and wetland types present within the LAA, the species most likely to be affected by altered wetland function include yellow rail (*Coturnicops noveboracensis*), least bittern (*Ixobrychus exilis*), and northern leopard frog (*Lithobates pipiens*). The occupancy and distribution of these wetland-dependent SAR will be used to supplement wetland hydrology monitoring described in the SWWP and GWWP.

Objective

The objective of the SAR survey is to establish an understanding of SAR presence/absence in wetland habitats located adjacent to the PDA.

The data may also provide incidental detections of other wildlife species (e.g., other amphibian and/or migratory bird species) that may use wetlands.

Measurable Parameter

The measurable parameter for this survey program is SAR occurrence (presence/absence) and/or number of detections/ARU.

Design

Surveys will occur in the LAA in wetlands adjacent to the outlet channel ROWs where potential effects are most likely to occur (i.e., within 500m of ROW), and outside of the LAA where Project effects are not expected. Areas outside of the LAA will function as reference sites. Surveys will be stratified by wetland type for target SAR species. For example, surveys are likely to occur along the LMOC near the lakes and wetlands east of the ROW and along the LSMOC where the ROW is adjacent to wetlands or intersects large fen habitats.

Methods

Surveys will be completed following standardized survey protocols (Table 2) modified for the use of autonomous recording units (ARUs; e.g., Wildlife Acoustics Song Meter SM4 [Wildlife Acoustics 2020]) which can be effective in detecting secretive waterbird species, particularly when attempting to optimize spatial and temporal coverage (Sidie-Slettedahl et al. 2015). ARUs will be deployed in target wetlands, spaced ≥ 250 m apart (Jobin at al. 2011), and pre-programmed to collect daily recordings during peak calling periods for the respective SAR (Table 2). Upon retrieval of the ARUs, the data files will be processed using commercial software (e.g., Kaleidoscope Pro [Wildlife Acoustics 2019]) that automatically scans data files for the species of interest using a reference library; a qualified biologist will review and validate a sample of the results for false-negative and false-positive results.

Frequency

The SAR survey will be completed daily during the peak breeding period for each respective species (Table 2). Surveys will be undertaken during the first year of construction and will be repeated in years 2, 4, and 6 post-construction (Section 7.1.4).

Decision Trigger / Threshold for Action

Post-construction SAR occurrences are below construction phase estimates (i.e., prior to PDA development).

- Action: Consider altering surface water management efforts and report survey results to MCC regional wildlife biologist/manager through annual data reports.

Table 2: Wetland Species at Risk Survey Criteria

Target Species	Survey Period	Survey Timing	Frequency	Protocol Reference
Yellow rail	Late-May to early July[1]	2300 – 0300 h	Daily	Bazin and Baldwin 2007
Least bittern	Mid- to late-May until mid-July[2]	Sunrise to 4.5 h after sunrise	Daily	Conway 2011
Northern leopard frog	Late-April until late-May[3]	30 min after sunset to 0100 h	Daily	SKMOE 2014

1 – dates represent values for the Interlake region of Manitoba (Bazin and Baldwin 2007, Martin 2012)
2 – dates represent values for the northern Interlake region of Manitoba (Jobin et al. 2011)
3 – dates represent values for Delta Marsh, Manitoba (Eddy 1976) but vary annually depending on wetland ice conditions

7.1.2 Summary

A summary of the monitoring criteria for change in habitat is provided in Table 3. A summary of scheduled monitoring commitments is provided in Section 9.

Table 3: Monitoring Criteria for Change in Habitat

Monitoring Objective	Method	Monitoring Metric	Project Phase	Duration	Frequency
Evaluate Project effects on wetland habitats for SAR	Wetland species at risk survey	Species occurrence	Construction and Operation	First year Construction; Post-construction Years 2, 4, 6	Continuous during breeding period (June)

7.2 Change in Mortality Risk

The Project has potential to increase vehicle- and equipment-related wildlife mortality risk during the construction phase and increase human/predator wildlife mortality risk due to increased access. The increase in vehicle- and equipment-related mortality risk is expected to be low, whereas an increase in mortality risk resulting from increased access is uncertain. Monitoring will allow for the evaluation of the effectiveness of mitigation measures identified in the EIS and EPP and implementation of additional measures if an increase in mortality rates or elevated access rates are observed in certain locations.

7.2.1 Mortality Reporting

Rationale

Mortality reporting will be used to evaluate the effectiveness of mitigation measures designed to reduce traffic- and equipment- -related mortality risk resulting from during the construction of the Project. Monitoring criteria for a change in mortality risk is summarized in Section 7.2.3.

Objective

The objective of mortality reporting is to gather data on Project-related wildlife mortality.

Measurable Parameter

The measurable parameter for mortality monitoring is the number of Project-related wildlife mortality events (Section 7.2.3).

Design

Mortality reporting will be completed continuously during the construction phase of the Project for all MI and contractor personnel working within the PDA and LAA where measurable direct effects are most likely to occur.

Methods

All Project Environmental Assessment Officers and contractor personnel will be informed during initial Project orientation of the expectation to report all mortality events to MI. A form will be developed by MI to collect relevant information about the mortality event (e.g., location, time of day, species) and annual summaries will be developed.

Frequency

Mortality reporting will occur continuously during the construction phase of the Project.

Decision Triggers / Thresholds for Action

More than five large (e.g., ungulates, predators) or ten small wildlife species mortality events per year.

- Action: Provide MCC Conservation Officer with GPS location and circumstances as incidents are detected and report survey results to MCC regional wildlife biologist/manager through annual data reports.
- Action: take measures to identify high risk zones with signage and implement speed restrictions.

7.2.2 Access Monitoring

Rationale

Access monitoring will be used to evaluate the effectiveness of mitigation measures designed to reduce wildlife mortality risk that may result from increased access by humans and predators (i.e., coyote [*Canis latrans*] and gray wolf [*Canis lupus*]). Monitoring criteria for a change in mortality risk is summarized in Section 7.2.3.

Objective

The objective of access monitoring is to gather data on human and predator activity at access points along the outlet channel ROWs.

Measurable Parameters

The measurable parameter for access monitoring will be the number of human and predator access events/month at monitoring site (Section 7.2.3).

Design

Remote cameras (e.g., Reconyx™ Hyperfire™ PC900 [Reconyx 1997]) will be deployed year-round along strategic access points along the LMOC and LSMOC PDAs where humans and predators are most likely to access and/or travel along the ROWs.

Methods

Surveys will use a standardized operating procedure for both deployment and data analysis and will be completed in concert with the remote camera survey (Section 7.3.1.3) when possible. Camera locations will be at least 1 km apart (unless on opposite sides of the LMOC and LSMOC) to maintain independent sampling. Cameras will be installed at approximately 1.2 m above ground to optimize capture rates for the range mammal species that can trigger the sensors. Vegetation that might interfere with the field of view will be removed during installation and maintained during the subsequent maintenance (e.g., battery change, height adjustment to account for snow accumulation) and data download visits (i.e., every four months).

All photographs will be transferred to a central database and analyzed using photo analysis software (e.g., Reconyx MapView Professional™ [Reconyx 2010]). Each photograph is analyzed individually, and if a human or predator is identified as the cause of the trigger, a unique event is created. Each event will be classified by human/species, vehicle type, number, age, and gender, as applicable. The start of a new camera event occurs when there is a change in human or wildlife species or a gap of 2 minutes between events when no photos are captured. Three photos are classified per event. The length of each event is determined by calculating the time between the first and last observation of an animal passing a camera. For each event, a single photo will be 'tagged' as the best representation of the event attributes (i.e., species, abundance, age, and gender). Photos that are triggered by environmental conditions (e.g., wind, vegetation, shadows) are analyzed but not classified as an event unless a human or predator was present. The number of events will be summarized by event type (human or predator) for each camera location and treatment.

Frequency

Access monitoring will be completed continuously during the operation phase of the Project for six years post-construction.

Decision Trigger / Thresholds for Action

Significant increase in human or predator access.

- Action: Consider adding or altering mitigation at outlet channel access points and report survey results to MCC regional wildlife biologist/manager through annual data reports.

7.2.3 Summary

A summary of the monitoring criteria for change in mortality risk is provided in Table 4. A summary of scheduled monitoring commitments is provided in Section 9.

Table 4: Monitoring Criteria for Change in Mortality Risk

Monitoring Objective	Method	Monitoring Metrics	Project Phase	Duration	Frequency
Evaluate the effectiveness of mitigation strategies implemented to reduce mortality risk	Mortality reporting	Mortality events per year	Construction	Years 1-3	Continuous
	Access monitoring	Events per week	Operation	Years 1-6	Continuous

7.3 Change in Movement

Operation of the outlet channels will, at times, present a semi-permeable barrier for some wildlife species (e.g., ungulates, furbearers) that limits their ability to move across the outlet channels. The EIS states that while wildlife may avoid crossing the outlet channels during flood events, most species will be able to cross when channels are not conveying floodwater. The prediction that wildlife movement will not be impeded outside of flood events is based on channel design, such as use of 4:1 side slopes, and low flows. In addition, mitigation measures, such as the addition of cover plantings, have been developed to facilitate wildlife movement along and across the outlet channels.

To address public concern and uncertainty regarding wildlife movement along and across the outlet channels, movement monitoring will be undertaken using three survey programs: marten movement survey, winter track survey, and remote camera survey to determine if mitigation measures (i.e., cover plantings, absence of riprap) facilitate (i.e., do not hinder) wildlife movement. Monitoring criteria for a change in movement is summarized in Section 7.3.4.

7.3.1 Winter Track Survey

Rationale

Mitigation measures have been incorporated into the design of the outlet channels to reduce the potential for adverse effects on wildlife movement (i.e., cover plantings and absence of riprap to facilitate movement). The winter track survey will be used to assess the effectiveness of these mitigation measures on facilitating wildlife crossing the outlet channels in winter. The survey will include examining the number of tracks that cross the ROW relative to the areas of the ROW where mitigation has and has not been applied. It is expected, for example, that more tracks will be observed in areas with the mitigation measures than without.

This survey will provide information on a wide range of wildlife species (e.g., upland game birds, furbearers, ungulates, wolves) interacting with the LMOC and LSMOC during the winter months. The survey will include investigating mammal use of Dauphin and Fairford rivers located west of LSMOC and LMOC, respectively. Lastly, surveys will also provide incidental information into how humans and predators (e.g., gray wolf) access and interact with the outlet channel ROWs.

Objectives

The objectives of the winter track survey are to assess the effectiveness of channel mitigation measures in facilitating wildlife movement and compare crossing rates to the Dauphin and Fairford rivers during the winter.

Measurable Parameter

The measurable parameter for the aerial winter track survey is the number of wildlife track crossings/km/wildlife species (Section 7.3.4).

Design

Surveys will be undertaken along the LMOC and LSMOC ROWs to confirm crossing events relative to mitigation treatments and adjacent habitat types. Surveys will also be completed in areas adjacent to the outlet channels (for regional context), including along the centerline of the Dauphin and Fairford Rivers as comparisons and/or reference areas.

Methods

Surveys will follow standardized aerial survey protocols (ASRD 2015) and will be completed twice per winter to account for seasonal variation in wildlife movements. Surveys will be completed using a helicopter and a two-person team with the primary observer in the front left seat, and the secondary observer/data recorder in the rear right. Surveyors will focus on an area within 100 m of the helicopter in which all wildlife and tracks will be recorded. Surveys will be flown < 100 m above ground level at approximately 50 km/hr (altitude and speed will vary depending on conditions) during periods of good environmental conditions:

- wind <30 km/h;
- cloud ceiling >150 m;
- precipitation not exceeding a light, intermittent snowfall;
- absence of fog;
- during periods of adequate daylight (from one half hour after sunrise to one half hour before sunset); and
- with a snow base of ≥25 cm (MCWS 2015, unpublished).

To identify mammal tracks in the snow during aerial surveys, surveys are typically undertaken within two to three days after a snowfall event (5-10 cm; BC MOELP 1998).

A handheld GPS will be used to collect a track log that recorded coordinates at one-second intervals. Upon observation of a mammal track or individual, the data recorder will record the species, number of tracks, and number of individuals, along with the associated time (hh:mm:ss) which will be used to extract a matching coordinate from the GPS track log. The helicopter may slow down or circle back to obtain a more accurate

location for the observation. The georeferenced data will be summarized and mapped using ArcGIS® (ESRI 2012).

Frequency

Surveys will be undertaken during the first year of construction and in years 2, 4, and 6 during operation, twice per year (early winter and late winter).

Decision Triggers / Thresholds for Action

Ungulate and/or predator crossings are observed but furbearers are not despite mitigation.

- Action: Review results from remote camera survey and marten movement survey and consider if additional mitigation measures are required to enhance wildlife movement. Report survey results to MCC regional wildlife biologist/manager through annual data reports.

Wildlife crossings are not observed along the outlet channel ROWs despite mitigation.

- Action: Review results from remote camera survey and marten movement survey and consider if additional mitigation measures are required to enhance wildlife movement. Report survey results to MCC regional wildlife biologist/manager through annual data reports.

7.3.2 Remote Camera Survey

Rationale

Mitigation measures have been incorporated into the design of the outlet channels to reduce the potential for adverse effects on wildlife movement (i.e., cover plantings and absence of riprap to facilitate movement). The remote camera survey will be used to assess the effectiveness of these mitigation measures by examining the number of wildlife photo events along the ROW relative to the areas of the ROW where mitigation has been applied. It is expected, for example, that a greater number of photo events will be observed in closer proximity to the mitigation measures. This survey will build upon baseline surveys and will provide information on a wide range of wildlife species interacting with the LMOC and LSMOC year-round. The survey will also provide incidental information on how predators (e.g., wolves, coyotes) interact with the outlet channel ROWs.

Objective

Assess the effectiveness of mitigation measures in facilitating wildlife movement across channels.

Measurable Parameter

The measurable parameter for the remote camera survey is the number of photo events/species and number of mammal crossings (Section 7.3.3).

Design

Remote cameras (e.g., Reconyx™ Hyperfire™ PC900 [Reconyx 1997]) will be deployed along the LMOC and LSMOC PDA using a randomly stratified design that incorporates the mitigation treatment (active mitigation vs control sites) and side of the outlet channel (east or west). Cameras will be placed near the water line and

along the edges of the ROWs. Cameras may also be placed on Project infrastructure (e.g., inlet structures, bridge) to obtain time-lapse photos of the wetted channel and local mammal movements.

Methods

Surveys will be undertaken using a standardized operating procedure for both deployment and data analysis. Camera locations will be at least 500 m apart (unless on opposite sides of the outlet channels) to maintain independent sampling and installed at roughly breast height (1.2 m) to optimize the range of mammals that can trigger the sensors and to allow for snow depth during the winter months. Vegetation, if present will be cleared/trimmed from the line-of-sight for each camera during installation and maintained during subsequent maintenance and data download visits (i.e., every four months).

All photographs will be transferred to a central database and analyzed using photo analysis software (e.g., Reconyx MapView Professional™ [Reconyx 2010]). Each photograph is analyzed individually, and if wildlife is identified as the cause of the trigger a unique event is created. Wildlife captured in each event are classified by species, number, age, and sex, if possible. The start of a new camera event occurs when there is a change in wildlife species or a gap of one hour between events when no photos are captured. Three photos are classified per wildlife event. The length of each event is determined by calculating the time between the first and last observation of an animal passing a camera. For each event, a single photo is classified as the best representation of the event attributes (i.e., species, abundance, age, sex). Photos that are triggered by environmental conditions (e.g., wind, vegetation, shadows) are analyzed but not classified as an event unless an animal was present. The species and number of events will be summarized for each camera location and treatment.

Frequency

Cameras will be deployed following the completion of channel ROW revegetation. The cameras will monitor wildlife use in years 2, 4, and 6 post-construction.

Decision Triggers / Thresholds for Action

Ungulate and/or predator crossings are observed but furbearers are not despite mitigation.

- Action: Review results from remote camera survey and marten movement survey and consider if additional mitigation measures are required to enhance wildlife movement. Report survey results to MCC regional wildlife biologist/manager through annual data reports.

Wildlife crossings are not observed along the outlet channel ROWs despite mitigation.

- Action: Review results from winter track survey and marten survey and consider additional mitigation measures to enhance wildlife movement. Report survey results to MCC regional wildlife biologist/manager through annual data reports.

7.3.3 Summary

A summary of the monitoring criteria for change in movement is provided in Table 5. A summary of scheduled monitoring commitments is provided in Section 9.

Table 5: Monitoring Criteria for Change in Movement

Monitoring Objective	Method	Monitoring Metrics	Project Phase	Duration	Frequency
Assess mammal movement across the outlet channels and evaluate the effectiveness of mitigation strategies used to facilitate movement	Winter track survey	Number and location of wildlife crossing events	Construction and Operation	First year of construction and years 2, 4, and 6 post-construction	Twice each winter
	Remote camera survey	Number of photo events	Operation	3 years (years 2, 4, and 6 post-construction)	Continuous

8.0 ADAPTIVE MANAGEMENT

Adaptive management is a structured and systematic process focused on improving environmental management by using lessons learned to reduce uncertainty while updating policies and practices (British Columbia Ministry for Forests and Range 2015). Adaptive management allows for the flexibility to identify and implement new mitigation measures or to modify existing ones (CEAA 2015).

The initial steps in this adaptive management framework involve developing and implementing wildlife mitigation measures as committed to in the EIS. Wildlife mitigation measures will be monitored as described in Section 7, and their effectiveness evaluated and documented as part of the reporting requirement (Section 10). During this process, if mitigation measures are deemed deficient, a root cause analysis would be undertaken to understand how they failed to meet objectives. Regulators, Indigenous groups, and other stakeholders may be engaged during this evaluation and review period to identify next steps and/or adaptive measures. Should adaptive measures be implemented, monitoring and reporting would continue as described.

[

9.0 SCHEDULE

The proposed schedule for all Project-related wildlife monitoring described in Section 8 is summarized in Table 6. Although these activities are planned to commence in 2021, this schedule is subject to change and contingent upon federal and provincial (i.e., Manitoba Environment Act licence) approvals.

Table 6: Proposed Schedule for Wildlife Monitoring Activities[1,2]

Residual Effect	Key Monitoring Activity	Project Phase								
		Construction			Post-construction					
		2021	2022	2023	2024	2025	2026	2027	2028	2029
Change in Habitat	Wetland species at risk survey	■				■		■		■
Change in Mortality Risk	Mortality reporting	■	■	■						
	Access monitoring				■	■	■	■	■	■
Change in Movement	Marten movement survey					■		■		■
	Aerial track survey	■				■		■		■
	Remote camera survey					■		■		■

[1] Gray cells indicate when monitoring activities are planned
[2] The proposed schedule is pending regulatory approvals

10.0 REPORTING PROTOCOLS

Annual monitoring reports summarizing activities results will be developed and provided to MCC, [insert relevant regulator(s)]. At the completion of the monitoring program, annual reports will be summarized into one final Wildlife Monitoring Report.

11.0 REFERENCES

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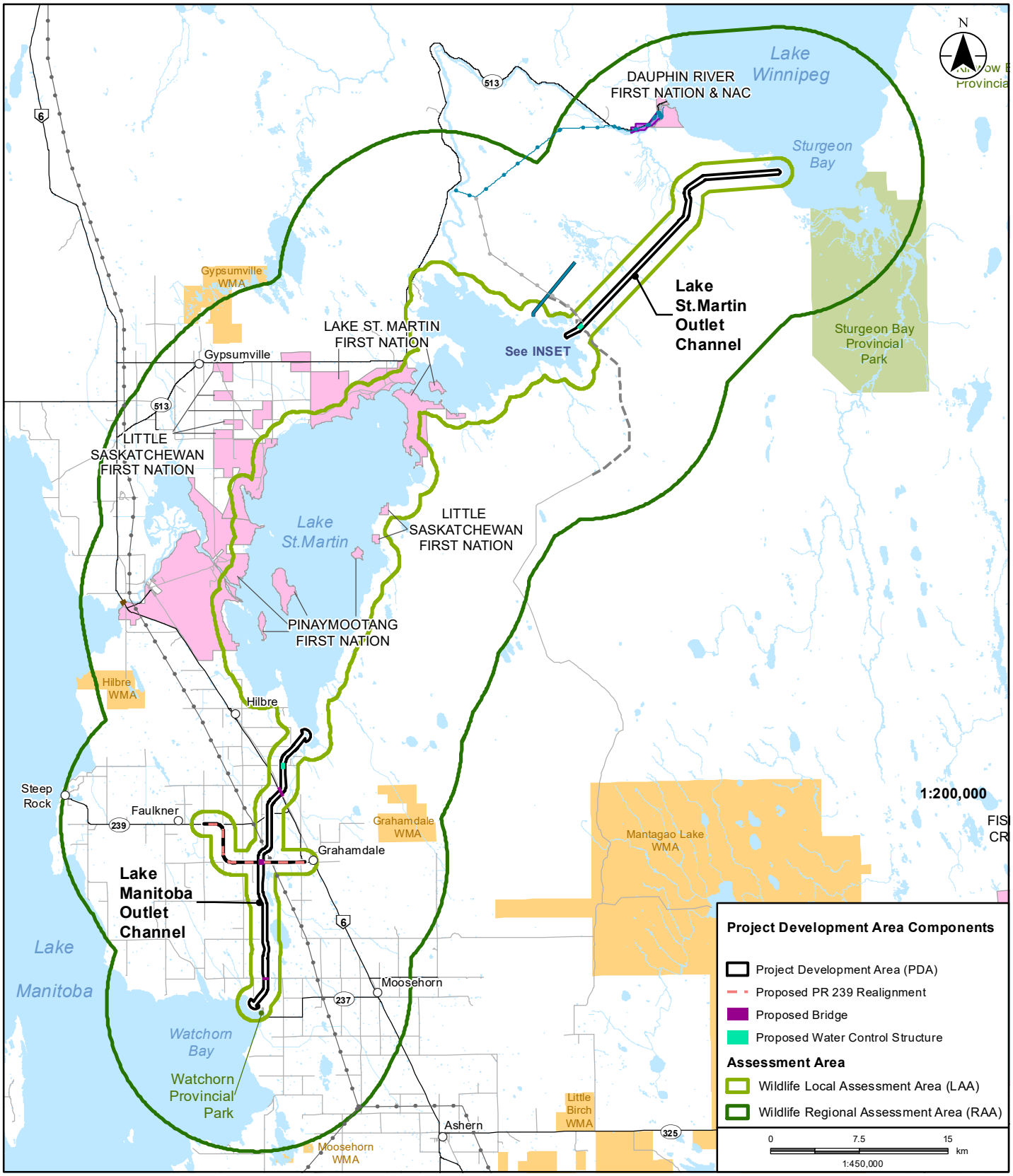
APPENDIX 1

Maps



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, Stantec Consulting
3. Last Update: 11/16/2020 3:09:55 PM

Manitoba Stantec

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

Project Overview Map

Figure 1

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