Project 6
All-Season Road
5m Contour

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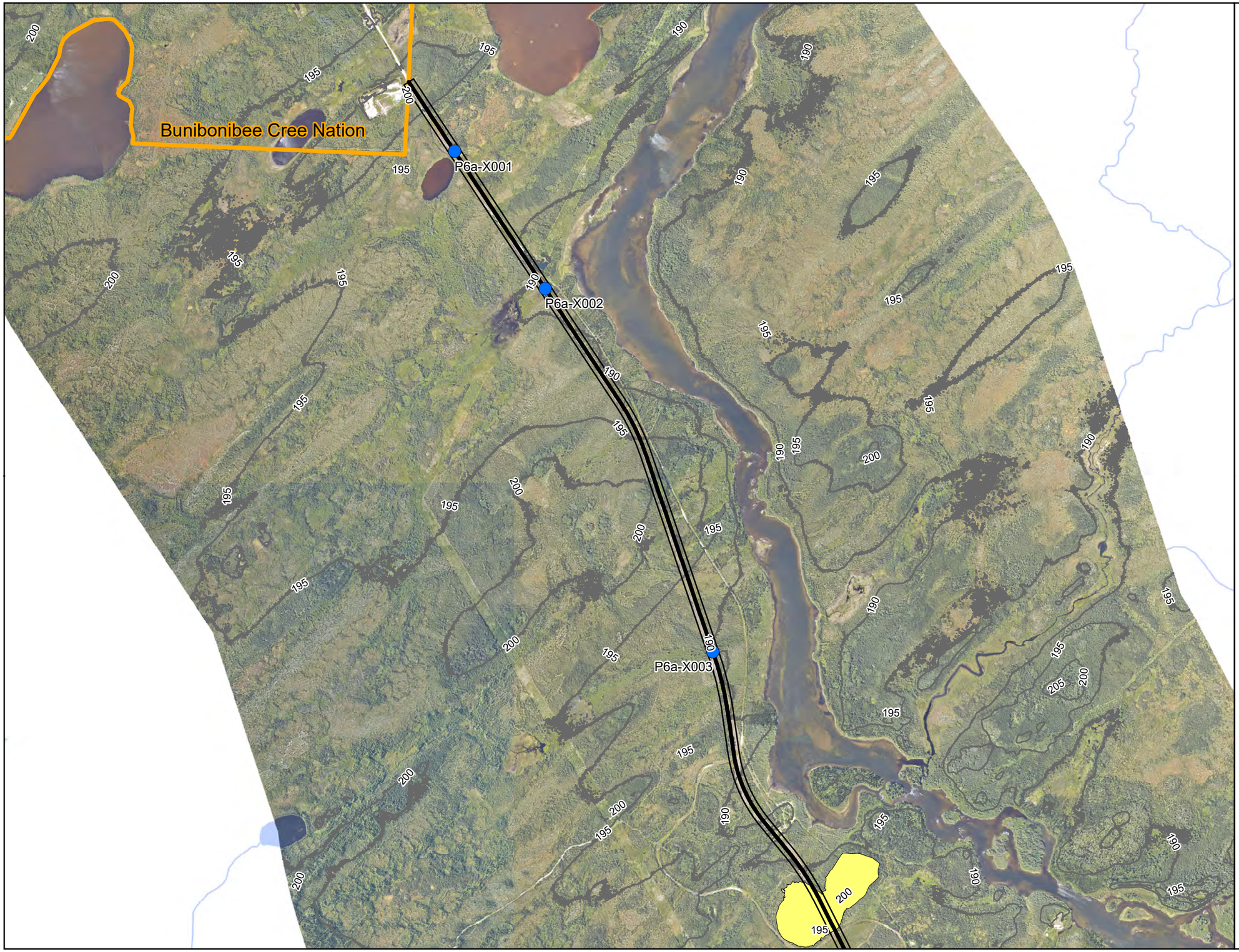

- P6 Centerline
- 60m Clearing Limit
- Potential Quarry Sites
- Water Course Crossing
- Reserve Boundary
- Elevation (m ASL)

1:20,000

0 0.2 0.4 0.8 1.2 km

N

NAD_1983_UTM_Zone_15N

Manitoba Infrastructure

Chapter 4:
Environmental Assessment Approach

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4.0 ENVIRONMENTAL ASSESSMENT APPROACH

4.1 Introduction

This chapter describes the overall approach taken by Manitoba Infrastructure (MI) for the Environmental Assessment (EA) of potential effects of the proposed Project 6 – All-Season Road linking Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation (Project). It provides an overview of the approach, the scope of the EA, sources of information used for the EA and the assessment approach followed.

The Guidelines for the Preparation of an Environmental Impact Statement (EIS) pursuant to the *Canadian Environmental Assessment Act*, 2012 (Canadian Environmental Assessment Agency [Agency] 2017a, Page 2) state that "Environmental Assessment is a process to predict environmental effects of proposed projects before they are carried out". An EA:

- identifies potential adverse effects
- proposes measures to mitigate adverse environmental effects
- predicts whether there will be significant adverse environmental effects, after mitigation measures are implemented
- includes a follow-up program to verify the accuracy of the EA and the effectiveness of the mitigation measures

In addition to the above, the EA for the proposed Project is intended to maximize beneficial effects to the extent feasible and provide early and meaningful opportunities for Indigenous and public engagement, as well as input throughout the Project planning and the EA process.

4.2 Overview of Approach

The EA for the proposed Project has been developed with regard to applicable regulatory requirements for environmental approvals as outlined in the federal *Canadian Environmental Assessment Act* (CEAA), 2012 and *The Environment Ac*t (Manitoba), as well as applicable federal and provincial legislation (**Chapter 1, Sections 1.4.1 and 1.4.2**). CEAA, 2012 requires the assessment of environmental effects of the proposed Project as outlined in section 5 of the Act. Guidance was also provided by the Agency in their 'Guidelines for the Preparation of an Environmental Impact Statement pursuant to the *Canadian Environmental Assessment Act*, 2012. Project 6 – All-Season Road Linking Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation'. The Guidelines state that "… the EIS must include a full description of changes the project will cause to the environment that may result in adverse effects on areas of federal jurisdiction (section 5 of CEAA, 2012) including changes that are directly linked or necessarily incidental to any federal decisions that would permit the project to be carried out" (Canadian Environmental Assessment Agency 2017a, Page 2). The Agency's Guidelines specify the guiding principles of the EA and the scope of the EA required for the proposed Project.

The Agency's Operational Policy Statements (OPS), technical guidance and reference documents under CEAA, 2012 also guided the EA for the proposed Project (**Table 4.1**) as did procedural guides (ex: Cumulative Effects Practitioners Guide, Determining Whether a Project is Likely to Cause Significant Adverse Effects, Addressing Cumulative Environmental Effects, Follow-up Programs under the *Canadian Environmental Assessment Act*) under the former CEAA.

The EA has also been developed respecting information requirements stipulated in Licensing Procedures Regulation 163/88 under *The Environment Act* (Manitoba) and as outlined in MI's 'Project 6 - All-Season Road Linking Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation, Environmental Assessment Scoping Document' submitted to Manitoba Sustainable Development (MSD; Manitoba Infrastructure 2017b). Responses from the Provincial Technical Advisory Committee (TAC) regarding the scoping document[1] were also considered. The EA for the proposed Project considers ecological, social and economic components of the environment consistent with legislative definitions of 'environment' and 'environmental effects' and further considers the principles and guidelines of sustainable development related to the environment as outlined in Schedules A and B of *The Sustainable Development Act* (Manitoba).

Effects on Indigenous people are assessed in relation to health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, and any structure site or thing that is of historical, archaeological, paleontological or architectural significance.

The EA considers the expected interactions between the proposed Project and the existing environmental conditions (ex: environmental setting or baseline) in the Regional Assessment Area (RAA) (**Section 4.3.3**). Potential Project-related effects considered in this EA include potential effects on the biophysical and socio-economic environments and Indigenous people as a result of biophysical changes. As outlined in section 5 of CEAA, 2012, effects on Indigenous people are assessed in relation to health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes and any structure site or thing that is of historical, archaeological, paleontological or architectural significance. Particular focus is given to health, socio-economic and cultural effects on communities directly affected by the proposed Project (ex: Manto Sipi Cree Nation, Bunibonibee Cree Nation, God's Lake First Nation and God's Lake Narrows Northern Affairs Community).

Potential effects on Indigenous and treaty rights are addressed through the assessment and mitigation of potential effects on resource use (ex: hunting, fishing, trapping) and cultural and traditional activities/sites in the RAA (**Chapter 6, Sections 6.1.11, 6.3.4 and 6.4.12**). Through the Indigenous and Public Engagement Program (IPEP) (**Chapter 5**) for the proposed Project, opportunity was provided for

[1] The Scoping Document and TAC comments regarding the scoping document are provided in the MSD Public Registry file 5897.00 accessible at: http://gov.mb.ca/sd/eal/registries/5897p6road/index.html.

Table 4.1: Canadian Environmental Assessment Agency's OPS, Technical Guidance Documents and Reference Guides under the CEAA, 2012 and Policies and Guidelines under the ***Species at Risk Act***

OPS	**Purpose**
Addressing "Purpose of" and "Alternative Means" under the *Canadian Environmental Assessment Act*, 2012	Sets out the general requirements and approach to address the purpose of a designated project and alternative means of carrying out the designated project under CEAA, 2012 when the Agency is the responsible authority.
Addressing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*, 2012	Sets out the general requirements and approach to consider cumulative environmental effects of designated projects under CEAA, 2012 when the Agency is the responsible authority. It also provides core guidance to project proponents.
Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the *Canadian Environmental Assessment Act*, 2012	Supports the implementation of CEAA, 2012 provisions related to determining whether a designated project is likely to cause significant adverse environmental effects. It is intended to support proponents of designated projects in the preparation of an EIS, in conjunction with other Agency policy and guidance instruments.
Technical Guidance Documents	**Purpose**
Guide to Preparing a Description of a Designated Project under the *Canadian Environmental Assessment Act*, 2012	Specifies the information that is required in a project description to: ▪ conform with the requirements set out in the Prescribed Information for a Description of a Designated Project Regulations ▪ inform the Agency of the possibility that the carrying out of the designated project may cause adverse environmental effects ▪ enable the Agency to determine whether an environmental assessment is required under CEAA, 2012
Technical Guidance for Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*, 2012	Provides methodological options and considerations to support the implementation of CEAA, 2012 and the approach outlined in the Cumulative Effects OPS to achieve a high quality EA. It also supports proponents in the development of an EIS.
Technical Guidance for Assessing the Current Use of Lands and Resources for Traditional Purposes under the *Canadian Environmental Assessment Act*, 2012	Supports the implementation of CEAA, 2012 provisions related to the effects of any changes to the environment on the current use of lands and resources for traditional purposes by Indigenous peoples. Provides core guidance to proponents who propose the carrying out of a designated project.
Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing that is of Historical, Archaeological, Paleontological or Architectural Significance under the *Canadian Environmental Assessment Act*, 2012	Supports the implementation of CEAA, 2012 provisions related to the effects of any changes to the environment on physical and cultural heritage or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance. Provides core guidance to project proponents.

Reference Guides	Purpose
Considering Indigenous Traditional Knowledge in Environmental Assessments conducted under the *Canadian Environmental Assessment Act*, 2012	Provides information of the importance of Traditional Knowledge (TK) in EAs, as well as general principles to be used in incorporating TK into an EA under CEAA, 2012.
Practitioners Glossary for the Environmental Assessment of Designated Projects under the *Canadian Environmental Assessment Act*, 2012	Provides a description of terms to assist in implementing CEAA, 2012.
Species at Risk Act Policies and Guidelines	**Purpose**
Support Tool for the Required Information Elements Under the *Species at Risk Act* for Environmental Assessments Conducted Under the *Canadian Environmental Assessment Act*	Provides advice on the main considerations to be incorporated when assessing effects on *Species at Risk Act* (SARA) species under the responsibility of the Minister responsible for Environment Canada and Parks Canada and the key steps needed to address the SARA in the context of federal EAs under the CEAA.
Addressing *Species at Risk Act* Considerations Under the *Canadian Environmental Assessment Act* for Species Under the Responsibility of the Minister responsible for Environment Canada and Parks Canada	Provides guidance on specific obligations under the SARA for species under the responsibility of the Minister responsible for Environment Canada and Parks Canada as they relate to federal environmental assessment. The document shows how certain SARA requirements may be addressed at each step of an EA conducted under the CEAA.

Source: Canadian Environmental Assessment Agency 2016c.

the identification and discussion of potential Project effects on Indigenous and treaty rights. Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation have indicated support for potential benefits of the proposed Project during the IPEP and also in the form of community agreements with MI (**Chapter 5**).

In accordance with Agency guidelines for the proposed Project, and consistent with provincial guidance, the assessment of potential environmental effects uses a values-based framework to promote a comprehensive and focused assessment of the potential effects of the proposed Project. This framework relies on the use of 'Valued Components' (VC) as a foundation for the EA. The selection of VCs allows the assessment to be focused on those aspects of the natural and human environment that are identified to be of importance to their role in the ecosystem and of particular importance to society. The method used to select VCs for the EA is outlined in **Section 4.5.1**.

'Valued Components' are used as a foundation for the EA to focus the assessment on those aspects of the biophysical and human environment that are identified to be of particular importance to society.

In accordance with the Agency guidelines for the proposed Project, the assessment considers the environmental effects that are likely to occur prior to, and after, the implementation of mitigation measures. Where adverse effects are identified following the implementation of appropriate mitigation (residual effects) and if those residual effects are determined to be 'significant', commentary on the likelihood of the effect occurring is provided.

Potential cumulative effects as a result of changes to the environment due to the Project combined with the existence of other past, present and reasonably foreseeable physical activities are assessed in **Chapter 6 (Section 6.6.3)**. The potential for cumulative environmental effects were considered when project environmental effects were identified and assessed. Project effects with the potential to act cumulatively with the effects of other actions in **Chapter 6, Sections 6.5** were carried forward for consideration in **Chapter 6, Section 6.6.3**. The EA for the proposed Project has used the approach described in the Agency's OPS entitled "Addressing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*, 2012 and the technical guidance document entitled "Technical Guidance for Assessing Cumulative Environmental Effects Under *the Canadian Environmental Assessment Act*, 2012". Guidance was also provided from the Agency's Cumulative Effects Practitioners Guide.

The EA for the proposed Project considers the effects of the potential accidents and malfunctions and the effects of the environment on the Project (**Chapter 6, Sections 6.6.1 and 6.6.2**). **Chapter 8** outlines MI's environmental protection program and their commitment to sustainable development. **Chapter 9** outlines a follow-up program to verify the accuracy of the effects assessment and to determine the effectiveness of mitigation and environmental design measures. The follow-up program will confirm that measures are in place throughout the development of the Project to decrease the potential for adverse

effects. The program will verify that there are action plans and emergency response procedures in place to protect human and environmental health and safety.

4.3 Scope of the Environmental Assessment

4.3.1 Project Description

The Project Description (**Chapter 3**) describes the scope of the proposed Project, Project phases, Project components and Project activities required to construct, operate and maintain the proposed Project, and to decommission components (ex: construction camps, borrow pits and quarries) not required for operation and maintenance. Project components and activities form the basis of the EA. The Agency's guidelines for the proposed Project and their "Guide to Preparing a Description of a Designated Project under the *Canadian Environmental Assessment Act, 2012*" helped guide the preparation of the Project Description chapter of this EIS. **Chapter 3** also describes the schedule and funding for the proposed Project (**Sections 3.5 and 3.6** respectively).

4.3.2 Factors to be Considered

Section 19(1) of the CEAA, 2012 and the Agency's guidelines for the proposed Project outline factors to be considered in the EA. These include:

- the purpose of the project
- alternative means of carrying out the project that are technically and economically feasible
- comments from Indigenous and public engagement programs
- environmental effects of the project on VCs
- mitigation measures that are technically and economically feasible to minimize adverse effects
- the significance of the environmental effects
- environmental effects of potential accidents and malfunctions
- effects of the environment on the Project
- cumulative environmental effects
- follow-up program

4.3.3 Spatial and Temporal Boundaries

For the purpose of assessing the geographic extent of potential Project-related effects that are expected to occur, the following spatial boundaries have been defined.

- **Project Footprint** – The physical space or directly affected area within which Project components and activities are located and the immediately adjacent area, which is the defined limits of the all-season road 100 m right-of-way (ROW). Permanent and temporary facilities (ex: temporary access routes, as well as construction camps, borrow pits and quarries, where possible) within which effects are likely to be measurable are also included.

- **Local Assessment Area (LAA)** – Area within which Project effects are measurable and extending beyond the Project Footprint. The boundaries of the LAA vary depending on the VC (**Figure 4-1**).
  - Wildlife (ungulates) LAA
    - 2,924 km^2
    - 20 km centred on the all-season road alignment
  - Indigenous Land/Resource Use LAA, Aquatic LAA, Wildlife (other than ungulates) LAA
    - 1431 km^2
    - 10 km centred on the all-season road alignment
  - Vegetation and Heritage Resources
    - 284 km^2
    - 2 km centred on the all-season road alignment
- **RAA** – Area beyond the LAA within which most potential indirect and cumulative effects are expected to occur (**Figure 4-2**).
  - Indigenous Land/Resource Use RAA
    - 31,936 km^{2-}
    - encompasses the Traditional Territories of Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation as identified by traditional knowledge
  - Aquatic RAA
    - 20,842 km^2
    - includes areas upstream and downstream of the LAA that are connected to watercourses potentially affected by the Project Footprint, headwater areas of the affected streams and downstream receiving waterbodies such as the Hayes River and God's Lake
  - Heritage Resources RAA
    - 18,093 km^2
    - based on the NTS map sheet boundaries within which the all-season road alignment is located, or were near the alignment and contain a sample to compare newly discovered sites to the baseline data
  - Wildlife RAA
    - 8,991 km^2
    - selected to ensure home ranges of large ranging species and areas of traditional use were considered, determined using a multi-disciplinary approach incorporating both biophysical and social factors (species of special importance to local communities were determined through workshops, open houses and community discussions)
  - Vegetation RAA
    - 1,431 km^2
    - area beyond the LAA within a 10 km corridor centred on the all-season road alignment

Potential adverse effects as a result of the proposed Project may be limited to the area within which permanent Project components occur (ex: Project Footprint and immediate area) or effects may extend beyond the Project Footprint to the LAA or the larger RAA.

The LAA is the spatial area where measurable changes to most VCs are primarily expected to occur. The boundaries of the LAA will vary depending on the VC. For example, potential direct Project effects on

vegetation and heritage resources are primarily expected to be measurable within a LAA that extends one km (rather than 10 km) on either side of the centreline of the proposed ASR. Differences in the LAA boundaries, as shown in **Figure 4-1**, are discussed in **Chapter 6** where more appropriate boundaries are required to assess potential effects on specific VCs.

The RAA boundary considers the maximum anticipated regional extent of potential direct, indirect and cumulative effects that may extend beyond the LAA. The boundaries of the RAA will vary depending on the VC. In particular, the extent of the RAA boundary considers changes to the environment that may affect the traditional and resource use areas of local Indigenous communities. The Indigenous Land/Resource Use RAA is the extent of where the Indigenous communities conduct traditional and non-traditional activities. Although the Aquatics RAA is larger, it includes the extent of where potential effects may occur to fish and fish habitat and does not represent the use of the resource by the local Indigenous communities. Differences in the RAA boundaries, as shown in **Figure 4-2**, are discussed in **Chapter 6** where more appropriate boundaries are required to assess potential effects on specific VCs.

In terms of temporal boundaries, as described in the **Chapter 3** (Project Description), design of the proposed Project is anticipated to be initiated in 2020 and under current funding projections, construction is estimated to begin in 2030 with an in-service date of 2038 (an 8-year construction phase is expected). The all-season road will be divided into segments to optimize construction scheduling and resource use. There are no plans to decommission or abandon the proposed Project as it will provide all-season access among Manto Sipi Cree Nation, Bunibonibee Cree Nation and God's Lake First Nation, for the foreseeable future.

The temporal boundary of this EA spans all phases of the proposed Project and includes all Project components within the scope of the EA as outlined in **Chapter 3**. Temporal boundaries are defined as the duration of construction (anticipated to be 8 years) and for a period of 10 years post construction.

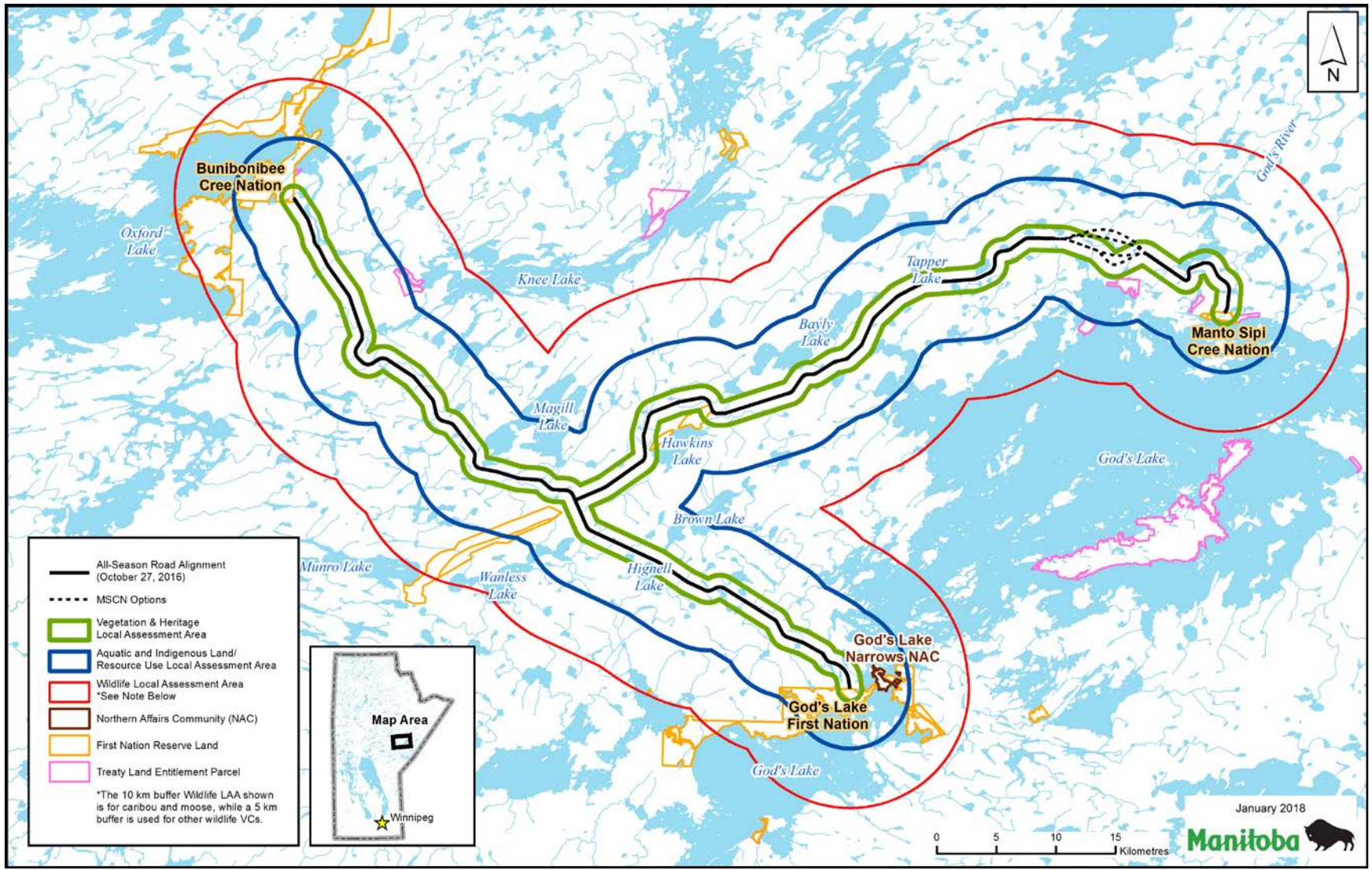

Figure 4-1: Local Assessment Areas for the proposed Project

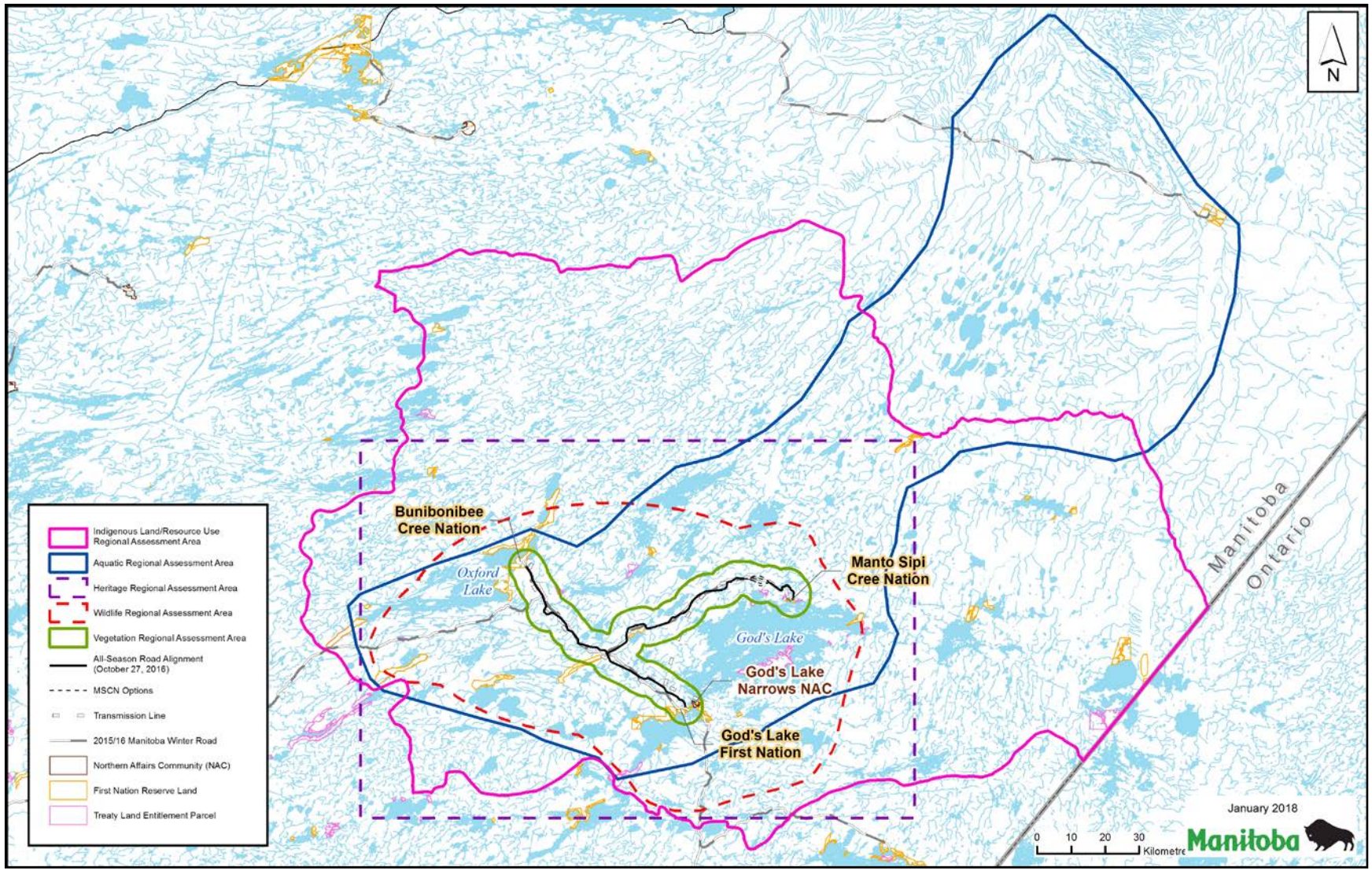

Figure 4-2: Regional Assessment Areas for the proposed Project

4.4 Sources of Information

Sources of information used to identify and assess potential environmental effects of the proposed Project included the following.

- Other EAs and reviews from regulatory authorities and others for all-season road Projects on the east side of Lake Winnipeg.
- Baseline and other studies (including field studies) conducted by discipline specialists specifically for the proposed Project. These include collecting site-specific information required for Project planning and the EA (ex: wildlife, aquatic environment, vegetation and soils, geological resources).
- Community Knowledge, TK, Land Use and Heritage Resources studies including those conducted specifically for the proposed Project.
- The IPEP for the proposed Project.
- Other information sources including regional study reports, government publications and general and scientific literature.
- Scientific advice from federal authorities provided to MI by the Agency.

A summary of these information sources is presented in **Table 4.2** and **Sections 4.4.1** to **4.4.5**. Project-specific information regarding environmental effects of the proposed Project is presented in the 'Predicted Changes to the Physical Environment' (**Chapter 6, Section 6.2**) and 'Predicted Changes on Valued Components' (**Chapter 6, Section 6.3**).

Table 4.2: Information Sources for the EA

Information Type	Source	Description
Other Environmental Assessments and Reviews	Public Works and Government Services Canada (2001)	Comprehensive Study Report of the proposed New Airport and Road between St. Theresa Point and Wasagamack, Island Lake, Manitoba.
	UMA Engineering Ltd. (2001)	Environmental Assessment Report St. Theresa Point and Wasagamack First Nations Airstrip and Connecting Road.
	Manitoba Transportation and Government Services (2006)	The Rice River Road Upgrading and Extension.
	Manitoba Floodway East Side Road Authority (MFESRA) (2009)	PR 304 to Berens River All-Season Road (Project 1) EIS.
	Canadian Environmental Assessment Agency (2011)	Comprehensive Study Report: Lake Winnipeg East Side Road. The PR 304 to Berens River All-Season Road, P1 Project.
	MFESRA (2011)	The Bloodvein Community All-Season Access Road.
	East Side Road Authority (ESRA) (2016b)	Proposed All-Season Road Linking Pauingassi First Nation and Little Grand Rapids First Nation to Little Grand Rapids Airport (Project 7A) Environmental Assessment Report.
	ESRA (2016a)	Project 4 – All-Season Road Connecting Berens River to Poplar River First Nations EIS.

Information Type	Source	Description
	Canadian Environmental Assessment Agency (2016a, b)	Comments and technical review information requests on the EIS for the Proposed Project 4 – All-Season Road Connecting Berens River to Poplar River First Nations.
	Canadian Environmental Assessment Agency (2017b)	Project 4 - All-season Road Connecting Berens River and Poplar River First Nation: Environmental Assessment Report.
Baseline Studies: ▪ Aquatics	North/South Consultants Inc. (2017a, b)	Field and desktop studies, risk and effects assessments conducted to assess potential effects of watercourse crossing construction on aquatic habitats and fish, including Species at Risk. See **Chapter 6** for details.
▪ Wildlife	Joro Consultants (2017a, b)	Field and desktop studies and analysis conducted to assess potential effects of the proposed Project on wildlife, including moose, caribou, furbearers, birds, reptiles and amphibians. See **Chapter 6** for details.
▪ Vegetation and Soils	Szwaluk Environmental Consulting Ltd. *et al.* (2017a, b)	Field and desktop studies and analysis conducted to characterize and assess effects of the proposed Project on vegetation. Mitigation measures are identified. See **Chapter 6** for details.
Community Knowledge, Traditional Knowledge, Land Use and Heritage Resource Studies	AMEC Foster Wheeler (2016a)	A Heritage Resource Impact Assessment was conducted within the right-of-way (ROW) and LAA for the proposed all-season road. See **Chapter 6** for details.
	AMEC Foster Wheeler (2016b)	A baseline desktop study was conduced in RAA in support of the Heritage Resource Impact Assessment for the proposed all-season road. See **Chapter 6** for details.
	AMEC Foster Wheeler (2016c)	A flyover was designed assess previously identified heritage potential of lands in the assessment areas. The flyover resulted in the identification of 90 high potential areas and 116 moderate potential areas that will be further assessed during ground reconnaissance. The flyover also resulted in modification of the proposed road alignments. See **Chapter 6** for details.
	HTFC Planning & Design (2017a)	Bunibonibee Cree Nation Traditional Knowledge Study providing Project-specific information used to characterize baseline conditions and to assess potential Project effects on the community and the environment.
	HTFC Planning & Design (2017b)	God's Lake First Nation Traditional Knowledge Study providing Project-specific information used to characterize baseline conditions and to assess potential Project effects on the community and the environment.
	HTFC Planning & Design (2017c)	God's Lake Narrows Northern Affairs Community Traditional Knowledge Study providing Project-specific information used to characterize baseline conditions and to assess potential Project effects on the community and the environment.
	HTFC Planning & Design (2017d)	Manto Sipi Cree Nation Traditional Knowledge Study providing Project-specific information used to characterize baseline conditions and to assess potential Project effects on the community and the environment.
	SNC Lavalin *et al.* (2011b)	Broad-based Traditional Knowledge studies completed with communities on the east side of Lake Winnipeg as a part of the Large Area Transportation Network Study.

Information Type	Source	Description
Other Information Sources	Dillon Consulting Limited and H.N. Westdal & Associates (2000)	Report on All-Weather Road – East Side of Lake Winnipeg Justification and Scoping.
	East Side Planning Initiative (2004)	Promises to Keep… Towards a Broad Area Plan for the East Side of Lake Winnipeg.

4.4.1 Other Environmental Assessments and Reviews

Other EAs and reviews by regulatory authorities and others have been conducted for all-season road projects on the east side of Lake Winnipeg including:

- Comprehensive Study Report of the proposed New Airport and Road between St. Theresa Point and Wasagamack, Island Lake, Manitoba (Public Works and Government Services Canada 2001).
- Environmental Assessment Report St. Theresa Point and Wasagamack First Nations Airstrip and Connecting Road (UMA Engineering Ltd. 2001).
- The Rice River Road Upgrading and Extension (Manitoba Transportation and Government Services 2006).
- PR 304 to Berens River All-Season Road (Project 1) – EIS (MFESRA 2009).
- Comprehensive Study Report: Lake Winnipeg East Side Road. The PR 304 to Berens River All-Season Road, P1 Project (Canadian Environmental Assessment Agency 2011).
- The Bloodvein Community All-Season Access Road (MFESRA 2011).
- Proposed All-Season Road Linking Pauingassi First Nation and Little Grand Rapids First Nation to Little Grand Rapids Airport (Project 7A) Environmental Assessment Report (ESRA 2016b).
- Project 4 – All-Season Road Connecting Berens River to Poplar River First Nation EIS (ESRA 2016a).
- Comments and technical review information requests on the EIS for the Proposed Project 4 – All-Season Road Connecting Berens River to Poplar River First Nations (Canadian Environmental Assessment Agency 2016a, b).
- Project 4 – All-season Road Connecting Berens River and Poplar River First Nation: Environmental Assessment Report (Canadian Environmental Assessment Agency 2017b).

The environmental effects, mitigation measures and follow-up identified in the EA reports were considered in the identification, assessment and mitigation of environmental effects for the proposed Project, as were comments from regulatory authorities and others.

4.4.2 Project 6 Baseline Studies

Baseline studies including site visits, reconnaissance surveys and field work were conducted within the Project Footprint, LAA and RAA to provide information on the existing environment for the EA of the proposed Project. These studies are listed in **Table 4.2** and include studies on fish and aquatic resources, wildlife, vegetation and soils. Aquatic field study methods included sampling for fish and mollusc, riparian and instream habitat assessments and the measurement of water quality parameters. Wildlife study field methods included aerial surveys, collaring, aerial telemetry, the use of trail cameras and Automatic Recording Units and ground-based pedestrian surveys. Baseline information on furbearers was also obtained from MI's Trapper Participation Program (**Section 4.4.3**). Vegetation field study methods

included field observations and sample plot analysis. **Chapter 6** summarizes the aquatic, wildlife and vegetation studies.

4.4.3 Community Knowledge, Traditional Knowledge, Land Use and Heritage Resource Studies

Table 4.2 lists the Community Knowledge, TK, Land Use and Heritage Resource studies commissioned by MI for the Project RAA. The Agency's technical guidance documents under CEAA, 2012 for assessing the current use of lands and resources for traditional purposes, and assessing physical and cultural heritage were used to guide the studies. TK used in the EA for the proposed Project was collected through interviews at community meetings, workshops and interviews with knowledgeable members of Manto Sipi Cree Nation, Bunibonibee Cree Nation, God's Lake First Nation and God's Lake Narrows Northern Affairs Community. The heritage resources studies involved archaeological field surveys along the proposed all-season road alignment.

Information from MI's Trapper Participation Program, which includes trapper involvement in research and monitoring activities on furbearers on the east side of Lake Winnipeg, also provided information for the EA for the proposed Project. The Program contributed to the acquisition of baseline data and helped to assess the potential effects of the proposed Project on furbearer distribution and trapline harvest. Program initiatives were developed with the specific intent of incorporating local knowledge from trappers in baseline studies and to promote collaboration with the trapping community including wildlife stakeholders such as the Manitoba Trappers Association.

In addition to studies conducted with Indigenous and local community participants in the RAA, relevant information was obtained from the broader area TK studies that overlap, in part, with the RAA. This included broad-based TK studies completed with communities on the east side of Lake Winnipeg as a part of the Large Area Transportation Network Study (SNC-Lavalin *et al.* 2011b).[2]

An overview of information from the Community Knowledge, TK, Land Use and Heritage Resources studies is discussed in **Chapter 6 (Section 6.1.9 and 6.1.11)**. This information has been used in the EA to assist in the characterization of the existing environment and to assess potential Project effects on Indigenous groups, local communities and the environment.

4.4.4 Indigenous and Public Engagement Program

An extensive multi-round IPEP was developed by MI to provide meaningful opportunities to engage in dialogue and exchange information about the proposed Project with directly affected communities and interested parties. Through MI's IPEP, which is detailed in **Chapter 5**, local communities provided substantial input to the Project development process by providing feedback on proposed locations of Project components, proposed mitigation measures to avoid or reduce potential adverse effects and

[2] Communities included in the Large Area Network Study were Hollow Water First Nation, Bloodvein First Nation, Berens River First Nation, Berens River Northern Affairs Community, Poplar River First Nation, Little Grand Rapids First Nation, Little Grand Rapids Northern Affairs Community, Pauingassi First Nation, Norway House Cree Nation, Norway House Northern Affairs Community, Garden Hill First Nation, Island Lake Northern Affairs Community, St. Theresa Point First Nation, Red Sucker Lake First Nation, Bunibonibee Cree Nation, Manto Sipi Cree Nation, God's Lake First Nation, God's Lake Narrows Northern Affairs Community and Cross Lake Band of Indians/Pimickamak Okimawin. Norway House Cree Nation, Cross Lake Band of Indians/Pimickamak Okimawin, Garden Hill First Nation, Red Sucker Lake First Nation, St. Theresa Point First Nation and Wasagamack First Nation were identified in the Agency Guidelines for the proposed Project. Further information is in Chapter 6, Section 6.1.9.2 and Chapter 5, Section 5.2.3.

providing local and TK of resource use and culturally important sites/areas. The IPEP is continuing the dialogue that began in 2000 between the Manitoba Government and east side of Lake Winnipeg communities and other stakeholders (Rounds 1 to 3) (SNC-Lavalin *et al*. 2010b, d, 2011b). Three rounds of the IPEP were conducted specifically for the EA. The initial round for the EA (Round 4) provided information on the EA and obtained input from communities regarding the identification and verification of VCs, while the second round (Round 5) presented and obtained feedback on preliminary EA findings including potential environmental effects and recommended mitigation and follow-up concepts to community members. The final round (Round 6) presented the EA results and a description of the EA process moving forward to community members. Public Open Houses were held in the City of Winnipeg in Rounds 5 and 6, which invited the Manitoba Metis Federation to participate. **Chapter 5** provides additional information about the IPEP, questions and comments identified during the IPEP and how MI responded in terms of the alignment for the all-season road.

4.4.5 Other Information Sources

Information from studies listed above has been supplemented with additional information contained in other studies conducted on lands east of Lake Winnipeg to the Ontario border that overlap with the RAA. Other information sources undertaken in the area are summarized in **Table 4.2.**

4.5 Assessment Approach

Once the scope of the EA is determined, as outlined in **Section 4.3**, the assessment involves a series of steps to identify potential effects of the proposed Project. Key steps in the process are outlined below.

4.5.1 Selection of Valued Components

VCs[3] are the foundation for the assessment of Project effects and refer to environmental biophysical or human features[4] that may be affected by the Project as related to the role of the VC in the ecosystem and the value people place on it.

The assessment evaluated potential Project effects on identified VCs as presented in the Agency Guidelines for the Project (Canadian Environmental Assessment Agency 2017a) and the Environmental Assessment Scoping Document (Manitoba Infrastructure 2017b) provided to MSD. Section 5 of the CEAA, 2012 and the Agency Guidelines for the proposed Project indicate that the VCs to be considered by this EA must include, but not necessarily be limited to the following.

- Fish and fish habitat as defined in the *Fisheries Act*.
- Aquatic species as defined in the SARA.
- Migratory birds as defined in the *Migratory Birds Convention Act*.

[3] VC is defined by the Canadian Environmental Assessment Agency as "*the environmental element of an ecosystem that is identified as having scientific, social, cultural, economic, historical, archaeological, or aesthetic importance*" (Canadian Environmental Assessment Agency 2016a).
[4] For the purpose of this EA, 'human features' include archaeological and cultural sites and travel routes.

- Effects on Indigenous peoples that may result in effects to health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Additional VCs are also considered in accordance with the Scoping Document for this Project submitted to MSD (Manitoba Infrastructure 2017b).

Potential effects on the Transboundary Environment (ex: federal lands or lands in a province outside of Manitoba) have been considered within the assessment of Project effects on VCs and within the assessment of cumulative effects (**Chapter 6**). Other VCs which have not already been assessed that may be affected as a result of a federal decision (ex: an authorization under section 35 of the *Fisheries Act*) have also been described and assessed.

Species at Risk potentially occurring in the RAA are considered as VCs within the EA.

The environmental (ex: biophysical and human) components of the RAA were subject to an initial screening process using the following criteria to identify a preliminary list of VCs.

- **Potential for the environmental component to occur within the LAA and RAA**.
  Based on the baselines studies completed for the proposed Project and existing information available for the region, a determination was made regarding the potential for a specific environmental component to occur within the LAA and RAA.
- **Potential for the environmental component to interact with the proposed Project**.
  If the environmental component occurs within the LAA and RAA, a determination was made as to whether or not the proposed Project has the potential to interact, directly or indirectly, or adversely affect the environmental component.
- **Identification of the environmental component by First Nations or other Indigenous communities**.
  Information regarding environmental components having specific economic, societal, cultural, historical, archaeological or aesthetic significance was primarily obtained through the IPEP (**Chapter 5**) and TK studies (**Section 4.4.3**) specifically for communities potentially affected by the proposed Project.
- **Identification of the environmental component by regulatory authorities**.
  Federal and provincial regulatory authorities were consulted during the planning and EA stages of the proposed Project. Regulatory authorities focused on environmental components with perceived ecological importance and those covered under federal and/or provincial legislation (ex: the federal *Fisheries Act*, the SARA, *The Endangered Species and Ecosystems Act* (ESEA) of Manitoba, and the Canadian Environmental Protection Act, 1999). Section 5 of the CEAA, 2012 lists environmental components that must be assessed as do the Agency Guidelines issued for the preparation of the Project EIS (Canadian Environmental Assessment Agency 2017a).
- **Identification of the environmental component by other stakeholders**.
  The input of other stakeholders was obtained through the IPEP which included community meetings

with First Nations and others potentially affected by the proposed Project and Public Open Houses in Winnipeg (**Chapter 5**).

Species at Risk have special protection status by virtue of the federal SARA and Manitoba's ESEA. Therefore, Species at Risk occurring in the RAA are considered as potential VCs for assessment within the EA. For the purpose of this EA, Species at Risk [5]are defined as federal species listed under the federal SARA or designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) for listing on Schedule 1 of the federal SARA, including species in the risk categories of extirpated, endangered, threatened and special concern (Canadian Environmental Assessment Agency 2017a); provincial species listed as Endangered or Threatened under the Manitoba ESEA; and species listed as very rare (provincial status of S1) or rare (provincial status of S2) throughout their range as listed by the MCDC (Manitoba Conservation Data Centre 2016).

Following the initial screening process of environmental components, a list of preliminary VCs was identified and presented at community meetings in Round 4 (**Chapter 5**) to verify the appropriateness of the proposed VCs and to revise the VC list to be assessed, as needed, based on input from community members. Based on the above screening criteria, final VCs for a focused EA were selected and the predicted effects on these VCs are discussed in **Chapter 6**, **Section 6.3.** The final list of VCs selected reflects feedback from regulatory authorities, First Nations, other Indigenous peoples and the public through the IPEP, professional judgement and EA practice and guidance documents. The final list of VCs for the focused EA, the rationale for their selection and which LAA and RAA are being used for each VC, is provided in **Appendix 4-1**. **Appendix 4-1** also provides the rationale for the exclusion of any VCs identified during the IPEP and, in particular, from local communities. Additional details on the VC selection and rationale prepared by the baseline consultants for the specific aquatic, vegetation, wildlife and heritage topics are provided in **Appendix 4-2**.

Appendix 7-1 in **Chapter 7** (Summary of Environmental Effects Assessment) also provides a check-list of which VCs can be considered 'environmental effects' as defined in section 5 of the CEAA, 2012 and specifies which sub-section of this Act is relevant to the selected VCs.

4.5.2 Project Setting and Baseline Conditions

The existing environment in the RAA is described including the past and present environment without the proposed Project. It provides a description of the existing environment in the RAA and includes trends and conditions which has affected the current and future baseline. The Project Setting includes a description of the physical, terrestrial and aquatic biological, socio-economic, resource use and heritage environments.

[5] In the Project Description for the proposed Project, MI referred to "Species at Risk" as "Species of Conservation Concern". The term "Species at Risk" is used in the EIS as it is consistent with the "Guidelines for the Preparation of an Environmental Impact Statement pursuant to the *Canadian Environmental Assessment Act, 2012*" (Canadian Environmental Assessment Agency, September 2017).

4.5.3 Identification of Potential Effects

Assessment of effects on a VC include effects from Project components and activities (direct effects) and secondary environmental effects (indirect effects) that occur as a result of changes that a project may cause in the environment. Potential effects of the proposed Project on the environment prior to the implementation of mitigation measures were identified using the current environmental conditions as the baseline from which to assess the potential effects of the proposed Project. As described in **Section 4.4**, a variety of information sources were used to describe the baseline, pre-Project, existing environmental condition of the RAA so that changes to the environment due to the phases of the Project can be assessed. This included other EAs, baseline studies for the proposed Project, community knowledge, TK, land use and heritage studies, the IPEP for the proposed Project and other information sources.

In addition to these, potential direct and indirect effects of the proposed Project were identified using checklists, interaction matrices, linkage diagrams and professional judgement. Potential effects are identified separately during the Project's construction and operation phases. Factors considered in determining potential environmental effects include, but are not necessarily limited to, those key factors summarized in **Table 4.3**.

Table 4.3: Factors Considered in Identifying Potential Environmental Effects

Potential Changes to the Environment	Potential Effects on Indigenous Peoples Resulting from Changes to the Environment
▪ changes to the atmospheric environment (ex: air quality, ambient noise levels, night-time light levels) ▪ changes to geology and geochemistry ▪ changes to topography and soil ▪ changes to groundwater and surface water ▪ changes to vegetation ▪ changes to mammals ▪ changes to amphibians and reptiles ▪ predicted changes to VCs including: o fish and fish habitat o migratory birds and their habitat o species at Risk o indigenous Peoples ▪ transboundary environments (ex: federal lands or lands outside of Manitoba) ▪ other VCs affected by a federal decision	▪ effects on resources (fish, wildlife, birds, plants or other natural resources) used for traditional uses (ex: hunting, fishing, trapping, collection of medicinal plants, use of sacred sites) ▪ effects of alterations to access to areas used for traditional uses including navigation ▪ effects on cultural value or importance associated with traditional uses or areas affected by the Project ▪ effects to human health related to changes in the environment such as changes to air quality, drinking water quality, noise exposure and quality and availability of country foods ▪ changes to physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or archaeological significance to Indigenous groups

Source: Summarized from Canadian Environmental Assessment Agency 2017a

After identifying potential direct and indirect effects on a particular VC, effects that were considered to be negligible or positive, and hence do not require mitigation measures, were not considered further in the assessment. Once the potential adverse environmental effects of the proposed Project were

identified, the effects on the VCs were assessed using the criteria outlined in **Section 4.5.5** to understand potential effects prior to mitigation.

4.5.4 Mitigation of Adverse Effects

Mitigation measures that are technically and economically feasible were then identified to avoid or minimize potential adverse effects. MI's general environmental protection policies, procedures and plans are described in **Chapter 8**. Specific measures that will be applied to mitigate potential Project-specific adverse effects on VCs relating to the physical, terrestrial and aquatic biological, socio-economic and cultural environments are outlined in **Chapter 6 (Section 6.4)**.

4.5.5 Assessment of Residual Effects

Residual effects are the environmental effects remaining following the implementation of technically and economically feasible mitigation measures. Determining the significance of residual environmental effects of the Project on VCs involved the consideration and evaluation of specific assessment criteria based on the degree ('level') of potential Project effects. The evaluation considers the social and ecological context of potential Project effects in terms of the influence of the affected VC on the ecosystem and in turn, how the potentially affected ecosystem directly affects socio-economic interests (including Indigenous peoples and treaty rights). Residual environmental effects of the Project on VCs were assessed against a series of criteria to assist in determining their significance. As per the Agency guidelines for the proposed Project (Canadian Environmental Assessment Agency 2017a), criteria used to determine the significance of residual effects were:

- direction or nature of effect (type of effect)
- duration of time that the effect occurs
- magnitude (severity) of the effect
- timing
- geographic extent of the effect
- frequency of the effect (how often the effect occurs)
- reversibility of the effect (if the effect can be reversed)
- ecological and social context (resilience of a VC to adapt to changes as a result of the project)
- existence of environmental standards, guidelines or objectives for assessing the effect

To apply these criteria, a three-level ranking system was identified for each with the exception of the direction or nature of effect (positive, negative or negligible/neutral) as this establishes whether the VC needs to be assessed further. Definitions for the three-level ranking of the assessment criteria are provided in **Table 4.4**. These definitions were developed based on the Canadian Environmental Assessment Agency Comprehensive Study Report for ESRA's all-season road Project 1 and other recent EAs.

Table 4.4: Description of Assessment Criteria and Levels of Potential Environmental Effects

Assessment Criteria	Range of Criteria	Level of Effect and Definition[6]
Direction of Change (type of effect)	Neutral or Negligible	No measurable change on the VC.
	Negative	Net loss (adverse or undesirable change) on the VC.
	Positive	Net benefit (or desirable change) on the VC.
Duration (period of time the effect occurs)	Short-Term	**Level I** - The potential effect results from short-term events or activities such as the time required to complete a discrete component during construction, maintenance, or rehabilitation activities (a timeframe of several months up to one year).
	Medium-Term	**Level II** - The potential effect is likely to persist until the completion of construction and rehabilitation activities (> 1 year to 10 years).
	Long-Term	**Level III** -The potential effect is likely to persist beyond the completion of construction and rehabilitation activities into the operations and maintenance phase of the Project (a timeframe of > than 10 years).
Magnitude (degree or intensity of the change)	Negligible or Low	**Level I** - A change that is not likely to have a definable, detectable or measurable potential effect above baseline (potential effect is within a normal range of variation) or is below established thresholds of acceptable change (ex: water quality guideline). See **Table 4.5** for VC specific criteria.
	Moderate	**Level II** – A change that will have a potential measurable effect that can be detected with a well-designed monitoring program; but is only marginally beyond standards/guidelines or established thresholds of acceptable change. See **Table 4.5** for VC specific criteria.
	High	**Level III** – A change that will have potential effects that are easily observed, measured and described (readily detectable without a monitoring program) and are well beyond guidelines or established thresholds of acceptable change. See **Table 4.5** for VC specific criteria.
Timing[7]	No Sensitivity	**Level I** – Effect does not occur during critical life stage / effect does not occur during harvesting times as identified in Harvest Calendars created during Traditional Knowledge Studies.
	Moderate Sensitivity	**Level II** – Effect occurs at the start or end of a critical life stage/ effect occurs during opportunistic harvesting times as identified in Harvest Calendars created during Traditional Knowledge Studies.
	High Sensitivity	**Level III** – Effect occurs during a critical life stage/ effect does occurs during focused harvesting times as identified in Harvest Calendars created during Traditional Knowledge Studies.

[6] **Chapter 6** outlines VC specific definitions for the three level ranking system.

[7] In terms of **Timing**, the critical life stages include things such as nesting, breeding, spawning and calving which will vary by VC and will vary annually depending on seasonal conditions. For example, it is clear that winter is outside of bird nesting and breeding period and that spring is fully within this critical time period, whereas early spring and late fall is a transitional period that depending on the seasonal conditions may or may not affect the life stage.

Assessment Criteria	Range of Criteria	Level of Effect and Definition[6]
Extent (Spatial Boundary)[8]	Project Footprint	**Level I** - The physical space or directly affected area on which Project components or activities are located and/or immediately adjacent area which is within the defined limits of the 100-m all-season road ROW and permanent and temporary facilities (ex: temporary access routes and quarries) within which potential effects are likely to be measurable.
	LAA	**Level II** - Area within which potential Project effects are measurable and extending beyond the Project Footprint to, but not beyond, the LAA (either a 2 km or 20 km corridor centred on the all-season road alignment depending on the VC) (**Figure 4-1**).
	RAA	**Level III** - The maximum anticipated regional extent of potential direct, indirect and cumulative effects that may extend beyond the LAA. The boundaries of the RAA will vary depending on the VC.
Frequency (how often the effect occurs)	Infrequent	**Level I** - The potential effect occurs once or seldom during the life of the Project (ex: initial clearing of the ROW).
	Sporadic/Intermittent	**Level II** - The potential effect occurs only occasionally and without any predictable pattern during the life of the Project (ex: blasting at quarries; site-specific construction equipment noise; potential wildlife-vehicle collisions).
	Regular/Continuous	**Level III** – The potential effect occurs at regular and frequent intervals during the Project phase in which they occur or over the life of the Project (ex: operations traffic).
Reversibility (the degree of permanence)	Reversible (short-term)	**Level I** – Potential effect is readily reversible over a relatively short period (< than eight years).
	Reversible (long-term)	**Level II** - Potential effect is potentially reversible but over a long period (> than eight years).
	Irreversible	**Level III** - Project-specific potential effects are permanent and irreversible.
Ecological and Social Context (resilience of a VC to adapt to changes as a result of the project)	Low	**Level I** – Ecological - the VC is not rare or unique and is resilient to imposed change. Social - Indigenous people/communities in the RAA are able to adapt with relative ease and maintain pre-project development activities.
	Moderate	**Level II** – Ecological - The VC is moderately/seasonally fragile and has some capacity to adapt to imposed change. Social - Indigenous people/communities in the RAA are able to adapt with some adjustments and maintain pre-project development activities but only with a degree of support.
	High	**Level III** – Ecological - The VC is a protected/designated species under ESEA, SARA and species listed by COSEWIC and by the MBCDC as very rare (S1) to rare (S2) or fragile with low resistance to imposed change or part of a very fragile ecosystem. Social - affected Indigenous people/communities in the RAA will not be able to adapt to changes or maintain-pre-project development activities.

[8] **Figures 4-1** and **4-2** illustrate the VC specific spatial boundaries of the LAA and RAA, which are discussed in greater detail in **Chapter 6**.

Table 4.5: Description of Magnitude Criteria and VC Specific Levels of Potential Environmental Effects

Component	Factor	Level I	Level II	Level III
Physical Environment	Air Quality	Emissions are above the baseline but are within CCME Canadian Ambient Air Quality Standards and Manitoba Ambient Air Quality Objectives and Guidelines criteria	Emissions have the potential to exceed Canadian Ambient Air Quality Standards or Manitoba Ambient Air Quality Objectives and Guidelines criteria resulting in the potential for adverse environmental effects to resources (land, water, biota) or residents.	Emissions are likely to exceed Canadian Ambient Air Quality Standards or Manitoba Ambient Air Quality Objectives and Guidelines criteria resulting in unacceptable adverse environmental effects to resources (land, water, biota) or residents.
	Climate	Greenhouse gas emissions of <0.1% of Canada's 2030 target CO2 emission rate of 523 Mt/a.	Greenhouse gas emissions of 0.1 to 1.0% of Canada's 2030 target CO2 emission rate of 523 Mt/a.	Greenhouse gas emissions of >1.0% of Canada's 2030 target CO2 emission rate of 523 Mt/a.
	Terrain, Soils and Geology	Effects considered minor and any soil alteration, loss or contamination is within CCME Soil Quality Guidelines for the Protection of Environmental and Human Health	Any soil alteration, loss or contamination has the potential to exceed a CCME Soil Quality Guidelines for the Protection of Environmental and Human Health resulting in the potential for adverse environmental effects.	Any soil alteration, loss or contamination exceeds CCME Soil Quality Guidelines for the Protection of Environmental and Human Health resulting in unacceptable adverse environmental effects.
	Water Quality - Surface	Water quality effects in receiving waters are within CCME Water Quality Guidelines for Protection of Aquatic Life and Manitoba Water Quality Standards, Objective and Guidelines; or if guidelines exceeded, no anticipated adverse environment effects beyond any defined mixing zones.	Water quality effects in receiving waters exceed CCME Water Quality Guidelines for Protection of Aquatic Life, Manitoba Water Quality Standards, Objective and Guidelines and have the potential to adversely affect drinking water uses, aquatic life and/or wildlife, beyond any defined mixing zones.	Water quality effects in receiving waters exceed CCME Water Quality Guidelines for Protection of Aquatic Life, Manitoba Water Quality Standards, Objective and Guidelines and guidelines and are likely to adversely affect drinking water uses, aquatic life and/or wildlife, beyond any defined mixing zones, likely resulting in unacceptable adverse environmental effects.

Component	Factor	Level I	Level II	Level III
	Water Quantity - Surface	Change to creek and river flows is within the range of natural variation or <15% of the seasonal average.	Change to creek and river flows is outside the range of natural variation and 15 to 25% of seasonal average.	Change to creek and river flows is outside the range of natural variation and >25% of seasonal average.
Physical Environment	Water Quality - Ground	Water quality effects in receiving waters are within applicable federal and provincial regulations and guidelines; or if guidelines exceeded, no anticipated adverse environment effects.	Water quality effects in receiving waters exceed applicable federal and provincial regulations and guidelines and have the potential to adversely affect drinking water uses.	Water quality effects in receiving waters exceed applicable federal and provincial regulations and guidelines and are likely to adversely affect drinking water uses, likely resulting in an unacceptable adverse effect.
	Water Quantity - Ground	Change to groundwater fed creek or river flows or well production is <15% of seasonal average.	Change to groundwater fed creek or river flows or well production is 15 to 25% of seasonal average.	Change to groundwater fed creek or river flows or well production is >25% of seasonal average.
Biological Environment	Aquatic Environment (aquatic life, fish and fish habitat)	In water work or structures necessary but no net loss of the productive capacity of fish habitat and no measurable reduction to fish communities or populations.	In water work or structures necessary resulting in a net loss of the productive capacity of fish habitat affecting local fish communities and populations.	In water work or structures necessary resulting in a net loss of the productive capacity of fish habitat affecting fish communities and populations.
	Aquatic Species at Risk – Lake Sturgeon	In water work or structures necessary but the effect is considered minor, habitat alteration/loss is restricted to non-limiting habitat and considered to be minor relative to availability.	In water work or structures necessary and will have a potential measurable effect on individuals, such as displacement of critical life stages (can be detected with a well-designed monitoring program). The potential effect is considered to be minor relative to population size or habitat availability and does not affect limiting habitat.	In water work or structures necessary and will have potential effects on individuals such as mortality, that are easily observed, measured and described (readily detectable without a monitoring program) and affects limiting habitat.
	Vegetation and Wetlands	Effect considered minor (only affecting common species or communities).	Activity has the potential to measurably affect vegetation communities or species but the	Activity is likely to measurably affect vegetation communities or

Component	Factor	Level I	Level II	Level III
			effect is limited to common species or communities.	species and may affect rare or protected species.
Biological Environment	Wildlife and Wildlife Habitat, including: • Amphibians and Reptiles • Migratory birds • Furbearers • Large game	A change that is not likely to have a definable, detectable or measurable potential effect and considered to occur at the individual level, not affecting population or habitat availability.	A change that will have a potential measurable effect on populations (readily detected with a well-designed monitoring program) and considered to be moderate relative to habitat availability.	A change that will have potential population effects that are easily observed, measured and described (readily detectable without a monitoring program) and considered to have a major effect on habitat availability.
	Wildlife Species at Risk	Effect is considered minor, habitat alteration/loss is limited to non-critical habitat and considered to be minor relative to availability.	A change that will have a potential measurable effect on individuals, such as displacement critical life stages (can be detected with a well-designed monitoring program). The potential effect is considered to be minor relative to habitat availability and does not affect critical habitat.	A change that will have potential effects on individuals such as mortality or destruction of nests, that are easily observed, measured and described (readily detectable without a monitoring program) and affects critical habitat.
Indigenous People (how changes to the environment as a result of the Project will affect activities exercised)	Socio-economic conditions including the use of navigable waters, recreational use and commercial fishing, hunting, trapping and gathering activities.	Indigenous people/communities in the RAA are able to adapt with relative ease and maintain pre-project development activities.	Indigenous people/communities in the RAA are able to adapt with some adjustments and maintain pre-project development activities but only with a degree of support.	Affected Indigenous people/communities in the RAA will not be able to adapt to changes or maintain pre-development activities.
Human Environment (how changes to the environment as a result of the	Current land use in the area including commercial activities, use of waterways and outdoor recreation.	Current land uses in the RAA are able to continue with relative ease and maintain pre-project development levels.	Current land uses in the RAA are able to continue with some adaptation and maintain pre-project development levels but only with a degree of support.	Current land uses in the in the RAA will not be able to continue and maintain pre-project development levels.

Component	Factor	Level I	Level II	Level III
Project will affect land use)	Human Health (noise, air quality, drinking and recreational water quality and country foods).	Selected parameter changes by <10% from baseline conditions within the RAA.	Selected parameter changes by 10 to 20% from baseline conditions within the RAA.	Selected parameter changes by >20% from baseline conditions within the RAA.
Human Environment (how changes to the environment as a result of the Project will affect land use)	Physical and cultural heritage and structures, sites or things of historical, archaeological, paleontological or architectural significance	Resources are disturbed by the proposed Project and are recoverable.	Resources of local importance are disturbed by the proposed Project and are not recoverable.	Resources of regional/national importance are disturbed by the proposed Project and are not recoverable.

For the EA, MI defines an adverse residual effect associated with a selected VC as significant if it meets both of the following criteria:

1) *A Level III rating result for ecological and social context; and*
2) *A Level II or III rating result for each of the effect attributes of duration, magnitude, extent, timing, frequency and reversibility.*

In cases where a significant adverse residual effect occurred, the following descriptors of the effect are provided.

- Level of confidence in the data and methods used in the framework of the environmental analysis of the significance determination.
- The likelihood of the significant effect occurring, which refers to the probability of occurrence (the risk of an event occurring) and is described as very unlikely, unlikely, likely, or very likely.

Potential residual effects of the proposed Project on VCs identified in **Section 4.5.1** are assessed in **Chapter 6, Section 6.5**. Assumptions and limits to the assessment criteria above are explained in context with the residual assessment determinations for each VC as required in **Chapter 6**.

4.5.6 Other Effects to Consider

4.5.6.1 Effects of Potential Accidents or Malfunctions

The potential effect on the environment from accidents and malfunctions during construction and operation and maintenance was assessed with contingency and emergency measures identified to respond to these in the event that they occur. This assessment included an identification of the magnitude of an accident and/or malfunction, including the quantity, mechanism, rate, form and characteristics of the contaminants and other materials likely to be released into the environment during the accident and malfunction events and would potentially result in an adverse environmental effect as defined in section 5 of CEAA, 2012. Potential accidents and malfunctions are identified based on the Project components, activities, equipment and materials (type and quantity) associated with each Project phase. The effects of potential accidents or malfunctions are found in **Chapter 6, Section 6.6.1**.

4.5.6.2 Effects of the Environment on the Project

The potential for local conditions and natural hazards, such as severe and/or extreme weather conditions and zones of permafrost, as well as external events to adversely affect the proposed Project were assessed considering how this in turn could result in effects to the environment. This included weather conditions, flooding, forest fires, permafrost, subsidence risk, climate change and seismic events. The effects of the environment on the Project are found in **Chapter 6, Section 6.6.2.**

4.5.6.3 Cumulative Effects Assessment

Cumulative environmental effects are assessed that are likely to result from the Project in combination with the effects of other projects or human activities that have been or will be carried out. The cumulative effects assessment focuses on VCs that may be adversely affected by the proposed Project after mitigation is applied. It considers likely adverse effects caused by the other projects or human activities that overlap in space and time with those of the proposed Project. The Project's cumulative effects were identified and assessed following the Agency's OPS – Addressing Cumulative Environmental Effects under the CEAA, 2012 and the guide Technical Guidance for Assessing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act*, 2012. The Cumulative Effects Assessment for the proposed Project is in **Chapter 6, Section 6.6.3**.

4.5.7 Follow-up Program

The final step in the EA for the proposed Project is the development of a follow-up program for managing the effects of the Project during construction and operation and maintenance. The follow-up program includes a monitoring component to verify the accuracy of the effects assessment and determine the effectiveness of mitigation measures. Guidance for the follow-up program was provided from the Agency's OPS – Addressing Cumulative Environmental Effects under the *Canadian Environmental Assessment Act, 2012* and the Agency's OPS – Follow-up Programs under the *Canadian Environmental Assessment Act* (December 2011), applicable Environment Act Licence conditions received for Project 1, PR304 to Berens River, Project 4 All Season Road connecting Berens River and Poplar River First Nation and Project 7a All Season Road Linking Pauingassi First Nation and Little Grand Rapids First Nation to Little Grand Rapids Airport, as well as applicable conditions received from Minister of Environment and Climate Change for Project 4 All Season Road connecting Berens River and Poplar River First Nation. The follow-up program for the proposed Project is outlined in **Chapter 9**.

CHAPTER 4 APPENDICES

Appendix 4-1: Valued Components and Rationale for Their Selection

Appendix 4-1: Valued Components (VCs) and Rationale for Their Selection

Valued Component (VC)	Importance				Selection Rationale	Assessment Areas
	FN[i]	Gov't	Public [ii]	Other [iii]		
Physical Environment						
Atmospheric Environment		√		√	▪ there is a strong link between air quality, noise levels and vibration, and other VCs ▪ changes in air quality, noise levels or vibration can affect the quality of life of people in the vicinity of the proposed Project ▪ changes in noise levels and vibration can affect fish and wildlife, and disturb local residents or resource users ▪ changes to the atmospheric environment can have potential effects on climate and microclimate ▪ Agency Guidelines identify atmospheric environment as a VC to be considered for the EA (Canadian Environmental Assessment Agency 2017)	▪ Indigenous Land/Resource Use LAA and RAA
Groundwater and Surface Water Quality		√		√	▪ changes to groundwater can affect the quantity and quality of surface water, which can affect the aquatic and terrestrial environments, as well as people that use these resources ▪ changes to the surface water quality can affect the aquatic and terrestrial environments and, as a result, the use of these resources for Indigenous people ▪ Agency Guidelines identify groundwater and surface water as a VC to be considered for the EA (Canadian Environmental Assessment Agency 2017) ▪ water quality is regulated under The Water Protection Act (Manitoba)	▪ Indigenous Land/Resource Use LAA and RAA
Fish and Fish Habitat						
Fish Habitat	√	√		√	▪ supports fish species that are of importance for Indigenous and local community culture, traditional, and economic activities and values ▪ protected under the federal Fisheries Act which prohibits the permanent alteration or destruction of fish habitat that are part of or support a Commercial, Recreational, or Indigenous Fishery as defined by the Act ▪ 'effects on fish habitat' is an area of federal jurisdiction and therefore is pursuant to section 5 of CEAA, 2012 ▪ Agency Guidelines identify fish habitat as a VC to be considered in the EA (Canadian Environmental Assessment Agency 2017) ▪ encompasses biophysical features of the aquatic environment and lower tropic levels (ex: aquatic plants and benthic invertebrate communities) ▪ fish habitat is often used as a surrogate for the productive capacity of aquatic habitats	▪ Aquatic LAA and RAA

Valued Component (VC)	Importance				Selection Rationale	Assessment Areas
	FN[i]	Gov't	Public [ii]	Other [iii]		
Fish	√	√		√	▪ fish that are part of or support the Commercial, Recreational, or Aboriginal Fishery as defined by the federal Fisheries Act are protected under the Act ▪ 'effects on fish' is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ Agency Guidelines identify fish as a VC to be considered in the EA (Canadian Environmental Assessment Agency 2017) ▪ important as a food source to people, local communities, and the ecosystem that inhabit the area	▪ Aquatic LAA and RAA
Lake Sturgeon	√	√		√	▪ assessed under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) ▪ 'effects on aquatic species as defined in SARA' is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ Agency Guidelines indicate that 'Species at Risk' are to be considered in the EA (Canadian Environmental Assessment Agency 2017) ▪ subsistence harvest by First Nations in the Regional Assessment Area and of cultural, social, and economic importance	▪ Aquatic LAA and RAA
Terrestrial Environment						
Species at Risk (Vegetation)		√		√	▪ protected under the federal SARA ▪ assessed under the COSEWIC ▪ protected under The Endangered Species and Ecosystem Act (ESEA) (Manitoba), and those listed as very rare to rare by the Manitoba Conservation Data Centre (MBCDC) ▪ Agency Guidelines indicate that 'Species at Risk' are to be considered in the EA (Canadian Environmental Assessment Agency 2017)	▪ Vegetation LAA and RAA
Key Community Harvest Areas (Vegetation)	√	√		√	▪ are of importance for Indigenous and local community culture, traditional, and economic activities and values ▪ vegetation communities are an integral part of the ecosystem, and provide food and habitat for wildlife	▪ Vegetation LAA and RAA
Moose (Mammals; Ungulates)	√		√	√	▪ important for Indigenous cultural and traditional activities ▪ first Nations and others hunt moose in the region as a food source ▪ ecological importance/function as prey to wolves ▪ habitat indicator – generalist and represents habitat requirements for large species group	▪ Wildlife LAA and RAA

Valued Component (VC)	Importance				Selection Rationale	Assessment Areas
	FN[i]	Gov't	Public [ii]	Other [iii]		
Caribou (Mammals; Ungulates)	√	√	√	√	▪ boreal woodland caribou are ranked "Threatened" under COSEWIC, Schedule 1 of SARA, and the ESEA (Manitoba), Pen Islands caribou are assessed as "Endangered" under COSEWIC, regulatory need to assess critical habitat for woodland caribou ▪ Agency Guidelines indicate that 'Species at Risk' are to be considered in the EA (Canadian Environmental Assessment Agency 2017) ▪ ecological importance/function as prey to wolves ▪ highly sensitive to construction noise and human presence ▪ First Nations hunt caribou as a food source and they are of social and cultural importance	▪ Wildlife LAA and RAA
Beaver (Mammals; Aquatic Furbearers)[1]	√		√	√	▪ commercial harvest for First Nations and others ▪ keystone and representative aquatic furbearer ▪ tolerant of human activities but, may be affected by habitat loss	▪ Wildlife LAA and RAA
Marten (Mammals; Terrestrial Furbearers)[2]	√		√	√	▪ commercial harvest for First Nations and others ▪ top level predator characteristic of upland terrestrial environments ▪ important predator/prey species	▪ Wildlife LAA and RAA
Canada Geese (Birds; Waterfowl)	√	√		√	▪ protected under the Migratory Bird Convention Act ▪ effects on migratory birds under the Migratory Bird Convention Act is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ First Nations identified Canada Geese as an important species that is hunted in the spring and fall ▪ hunting and license under The Wildlife Act (Manitoba) ▪ food web function	▪ Wildlife LAA and RAA

[1] First Nation communities identified mink, muskrat and otter as potential VCs, but they were not included for the following reasons. Beaver was selected as a VC representing aquatic furbearers, which includes habitat suitable for mink, muskrat and otter. Beaver habitat can also be modelled with existing information, and their distribution and abundance can be measured through lodge and pond surveys.

[2] First Nation communities identified fisher, which is a terrestrial furbearer, as a potential VC, but it was not included for the following reasons. Marten represents habitat suitable for fisher. Marten are the main species trapped in the Regional Assessment Area, and baseline data from track surveys and trappers in the region exists. Data on fisher is limited and their numbers are thought to be much lower than marten in this region. Likewise, wolverine did not qualify as a VC due to their very low numbers, extremely large home ranges, and dependence on carrion, making modelling and monitoring extremely difficult.

Valued Component (VC)	Importance				Selection Rationale	Assessment Areas
	FN[i]	Gov't	Public [ii]	Other [iii]		
Mallard (Birds; Waterfowl; Dabbling Duck)	√	√		√	▪ protected under the Migratory Bird Convention Act ▪ effects on migratory birds under the Migratory Bird Convention Act is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ Boreal Conservation Region (BCR) 8 and North American Wildlife Management Plan (NAWMP, Ducks Unlimited 2012) identify mallards as a priority species ▪ First Nations in the region hunt mallards ▪ mallards are a migratory bird species that use shallow marshes and wetlands with emergent vegetation	▪ Wildlife LAA and RAA
Ring-necked Duck (Birds Waterfowl; Diving Duck)	√	√		√	▪ protected under the Migratory Bird Convention Act ▪ effects on migratory birds under the Migratory Bird Convention Act is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ BCR 8 and NAWMP (DU 2012) identify Ring-necked ducks as a priority species ▪ First Nations in the region hunt Ring-necked ducks ▪ ring-necked ducks are a migratory bird species that use meadows adjacent to water or emergent vegetation	▪ Wildlife LAA and RAA
Bald Eagle (Birds; Raptor)	√	√		√	▪ important to First Nations culture ▪ top predator ▪ The Wildlife Act (Manitoba) protects nests and nesting trees	▪ Wildlife LAA and RAA
Ruffed Grouse (Birds; Upland Game Bird)	√	√		√	▪ First Nations hunt Ruffed Grouse ▪ prey species which represent deciduous forest ▪ hunting and license under The Wildlife Act (Manitoba)	▪ Wildlife LAA and RAA
Magnolia Warbler (Birds; Migratory Songbird)		√		√	▪ protected under the Migratory Bird Convention Act ▪ 'effects on migratory birds under the Migratory Bird Convention Act' is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ found in sufficient numbers during Breeding Bird Assessment to monitor ▪ other studies to compare – increases during spruce budworm outbreaks	▪ Wildlife LAA and RAA
Ovenbird (Birds; Migratory Songbird)		√		√	▪ protected under the Migratory Bird Convention Act ▪ 'effects on migratory birds under the Migratory Bird Convention Act' is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ well-studied (Ex:, fragmentation) ▪ Boreal Avian Monitoring (BAM) (www.borealbirds.ca) Project test case and area-sensitive species ▪ BCR 8 strategy Priority species list for stewardship	▪ Wildlife LAA and RAA

Valued Component (VC)	Importance				Selection Rationale	Assessment Areas
	FN[i]	Gov't	Public [ii]	Other [iii]		
Yellow-Bellied Flycatcher (Birds; Migratory Songbird)		√		√	▪ protected under the Migratory Bird Convention Act ▪ 'effects on migratory birds under the Migratory Bird Convention Act' is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ ground nesting ▪ BCR 8 strategy Priority species list for stewardship	▪ Wildlife LAA and RAA
Palm Warbler (Birds; Migratory Songbird)		√		√	▪ protected under the Migratory Bird Convention Act ▪ 'effects on migratory birds under the Migratory Bird Convention Act' is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ neotropical migrant songbird occupying bogs and open coniferous forests	▪ Wildlife LAA and RAA
Spring Peeper (Amphibian)		√		√	▪ numerous in the Regional Assessment Area ▪ characteristic of woodland ponds, near their northern range which generally extends east of Lake Winnipeg ▪ food web function	▪ Wildlife LAA and RAA
Indigenous and Human Environment						
Land and Resource Use	√	√	√	√	▪ 'effects on the current use of lands and resources for traditional purposes' is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ Agency Guidelines indicate that Indigenous peoples be considered for the EA (Canadian Environmental Assessment Agency 2017) ▪ several fish, plant and wildlife species are important to Indigenous and local community cultural, traditional and/or economic activities and values	▪ Indigenous Land/Resource Use LAA and RAA
Travel Routes	√			√	▪ may interact with, and potentially be affected by, the proposed Project, types of travel routes that may be affected include access to waterways, portages and other trails ▪ Agency Guidelines indicate that Indigenous peoples be considered for the EA (Canadian Environmental Assessment Agency 2017) ▪ importance for Indigenous and local community culture, as well as traditional activities and values ▪ First Nations rights to navigation of waterways are protected under Treaty (Government of Canada, 2013)	▪ Indigenous Land/Resource Use LAA and RAA

Valued Component (VC)	Importance				Selection Rationale	Assessment Areas
	FN[i]	Gov't	Public [ii]	Other [iii]		
Economy	√	√		√	▪ changes to the economy, and potential effects of these changes on Indigenous people must be evaluated pursuant to section 5 of CEAA, 2012 ▪ Agency Guidelines indicate that Indigenous peoples be considered for the EA (Canadian Environmental Assessment Agency 2017) ▪ concern was raised during Round 4 of the IPEP about the price of goods and cost of living given that winter roads are not open as much as in the past given the effects of global warming	▪ Indigenous Land/Resource Use LAA and RAA
Heritage and Archaeological Resources	√	√		√	▪ effects on physical and cultural heritage, and any structure, site or thing that is of historical, archaeological, paleontological or architectural significance is an area of federal jurisdiction, and therefore is pursuant to section 5 of CEAA, 2012 ▪ Agency Guidelines indicate that Indigenous peoples be considered for the EA (Canadian Environmental Assessment Agency 2017) ▪ important for Indigenous and local community cultural and traditional activities and values ▪ protected under The Heritage Resources Act (Manitoba)	▪ Heritage Resources LAA and RAA
Human Health and Safety		√		√	▪ linked to section 5 of CEAA, 2012 ▪ Agency Guidelines indicate that the EA should describe how changes to the environment potentially caused by the proposed Project will affect human health (Canadian Environmental Assessment Agency 2017) ▪ changes to the atmospheric environment can affect human health	▪ Indigenous Land/Resource Use LAA and RAA

[i] Bunibonibee Cree Nation, Manto Sipi Cree Nation, God's Lake First Nation and God's Lake Narrows Northern Affairs Community.
[ii] Public and stakeholder input.
[iii] Primary data collection, literature references, expert input and professional judgement.

Appendix 4-2: Baseline Consultants Memorandum - Valued Components and Rationale for Their Selection

Subject: **Project 6 Aquatic Environment Valued Component Selection**

To: Shaun Moffatt

KGS Group

From: Kurt Mazur

North/South Consultants Inc.

Date: January 5, 2017

The environmental effects assessment for Project 6 will use a Valued Component (VC) approach. The potential effects, mitigation measures and residual effects will be assessed relative to the selected aquatic VCs. The selection of aquatic VC's was made with guidance from the KGS document "P6 and P3b: Selection Criteria for Valued Components (VCs)", CEAA (2012) and specific direction provided by CEAA on the Project 4 EIA.

The primary consideration in selecting the aquatic environment VCs was the extensive protection afforded to fish and fish habitat by the federal *Fisheries Act.* The *Fisheries Act* prohibits causing serious harm to fish or fish habitat that are part of or support a commercial, recreational or Aboriginal (CRA) fishery. In most situations, fish and fish habitat in the Project 6 study area will be afforded protection under the *Fisheries Act* and therefore fish and fish habitat were both selected as VCs. This includes all fish species and their habitat. The ability to monitor changes over time and value to public or First Nations were not required as selection criteria because these criteria are inherently incorporated into the *Fisheries Act* and the fish and fish habitat VCs.

Valued Component selection also considered species that have been identified as rare and are designated or listed by federal or provincial legislation or agencies. Although these species are also protected by provisions of the *Fisheries Act,* they were separated out based on comments from CEAA on Project 4. For Project 6, only one rare species, Lake Sturgeon was identified in the Project Area and included as a VC.

A summary of selected VCs is provided below (Table 1) and includes rationale, VC parameters and indicators. Table 2 summarizes habitat preferences by fish VC that occur in streams on the Project alignment including Lake Sturgeon. Species assemblages by habitat types were not included in Table 2, as per the example provided, because the fish VC includes all species with no one species serving as an umbrella species. The fish habitat VC is considered to serve as an umbrella for the aquatic environment including fish as this is the interpretation of habitat provisions of the *Fisheries Act.*

Table 1. Aquatic Environment Valued Components (VC).

VC	Group	Importance IDd by:[1]				Indicator	Parameter	Rationale
		FN	Gv	PS	Ot			
Fish	Fish		√			Species distribution and abundance; productivity of CRA[2] fisheries.	Species occurrence and abundance; factors related to Project effects (e.g., fish mortality).	• Important to people, communities and the ecosystem they inhabit in the area. • They may be potentially affected by the Project. • Fish that are part of or support a CRA[2] Fishery are protected under the federal *Fisheries Act*. Therefore this includes all fish species.

VC	Group	Importance IDd by:[1]				Indicator	Parameter	Rationale
		FN	Gv	PS	Ot			
Fish Habitat	Fish		√			Distribution and abundance of habitat (including important habitat); productivity of CRA[2] fisheries.	Amount and locations of physical habitat (including important habitats); water quality; riparian vegetation type and abundance.	• The federal *Fisheries Act* prohibits the permanent alteration or destruction of fish habitat that supports fish and habitat that are part of or support a CRA[2] fishery; • Encompasses biophysical features of the aquatic environment and lower trophic levels (i.e., aquatic plants and benthic invertebrate communities). • It is often used as a surrogate for the productive capacity of aquatic habitats.
Lake Sturgeon	Fish	√	√			Distribution and abundance of Lake Sturgeon and habitat (including important habitat)	Species occurrence and abundance; amount and locations of physical habitat (including important habitats); water quality.	• COSEWIC[3] • Subsistence harvest by FN.

[1] FN=First Nations (Gods Lake, Bunibonibee and Manto Sipi); Gv=Government; PS =Public/Stakeholder; Ot=Other (e.g., science)

[2] Commercial, Recreational or Aboriginal Fishery as defined by the *Fisheries Act.*

[3] Committee on the Status of Endangered Wildlife in Canada.

Table 2. Habitat Preferences for Valued Component (VC) Fish Species found within waterbodies on the Project alignment.

Species	Spawning	Rearing (fry/juvenile)	Adult	Overwintering
SALMONIDAE (trout family)				
Brook Trout (*Salvelinus fontinalis)*	September to November; sub-medium large gravels with low amounts of fine sediment; shallow streams or lakeshores; water depth >9 cm; velocities between 0.08 - 0.1 m/s; associated with ground-water percolation.	Areas of low velocity; upon emergence fry disperse to shallow along stream edges, backwater eddies or slow current areas midstream; juveniles like areas of low velocity, gravel/cobble substrate and available cover (instream debris, cobbles, undercut banks).	Cool, well-oxygenated streams with gravel/cobble streambeds; beaver ponds and pool habitat with low water velocities; water velocities 0.08 – 0.26 m/s; undercut banks, overhanging and instream vegetation and rocks used for cover.	Lakes; large water courses; deep pools.
Lake Trout *(Salvelinus namaycush)*	September to November, almost exclusively in lakes over a clean substrate consisting of coarse angular cobble or gravel with no fine substrate	Hatching occurs in April; young remain in rock crevices near spawning site inshore waters.	Found at the surface in spring usually in deep waters in the summer. Almost exclusively found in deep lakes, rarely found in rivers or streams	Dispersed throughout lakes in the winter.
Lake Whitefish (*Coregonus clupeaformis*)	Occurs September to January; firm substrate (i.e., rocks or compact sand); at depths of 2 - 4 m in lakes.	Rear in large groups; along steep shorelines; migrate to deeper water by early summer.	Restricted to cool well-oxygenated regions of lakes; occasionally occur in rivers.	Deep pools and lakes; minimum DO levels of >3 mg/L.
Cisco (*Coregonus artedi)*	Lake shoals and river shallows over gravel or rocky substrates, but can spawn over others.	Shallow inshore areas and offshore spawning shoals	Shallow in spring, below thermocline in summer, shallow again as water cools in fall. Generally in deep water areas of lakes	Deep water areas of lakes.
ACIPENSERDAE (sturgeon family)				
Lake Sturgeon (*Acipenser fulvescens*)	Occurs in late spring, May to June; in swift flowing water or rapids, base of falls; water depth 0.6 – 4.9 m; rocky substrate.	Bottom areas of lakes and rivers with preference for deeper water as juveniles; feed on bottom for clams, snails, insect larvae, some fish and plant material; mud and mud/gravel substrate.	Shallow bottom areas of lakes and rivers; typically mud or gravel/mud substrate; deep back eddies >2.5 m depth; outside river bend 0.5 m depth; feed on bottom for clams, snails, insect larvae, some fish and plant material.	Deep wintering areas of large rivers and lakes.
ESOCIDAE (pike family)				
Northern Pike (*Esox lucius*)	Occurs in early spring, during or shortly after the ice clears; shallow marshes connected to rivers and lakes or flooded vegetation in shallow bays and rivers; water velocity <0.1 m/s; water depth 0.2-0.4 m.	Prefer dense submergent and emergent vegetation (>30% cover) in the calm bays of sloughs, marshes and lakes and in the back eddies or mouths of (low gradient) tributary streams; water depth <4 m.	Prefer shallow, weedy, clear waters primarily in lakes and marshes; common in streams with slow to moderate current with ample aquatic vegetation and fine substrate; diet consists of fish, crustacean, minnows, insects and young muskrats and ducks.	Typically deep water; dissolved oxygen >3-4 mg/L.
PERCOPSIDAE (trout-perch family)				
Trout-perch (*Percopsis omiscomaycus*)	Early spring; shallow streams and lake shores; substrate rocky or gravel and sand.	Presumably similar to adult stage.	Deep lakes, rivers and shallow streams; typically in turbid water; diet consists of insect larvae, amphipods and minnows.	Early spring; shallow streams and lake shores; substrate rocky or gravel and sand.

Species	Spawning	Rearing (fry/juvenile)	Adult	Overwintering
PERCIDAE (perch family)				
Walleye (*Sander vitreus*)	Inlet streams or tributaries; rocky shoals in lakes; boulder to coarse gravel substrate; water velocities 0.73-1.5 m/s; mid-April to late May.	Turbid or dark water; slow velocity for juveniles using banks and logs for cover; gravel-cobble substrate; avoiding submerged vegetation.	Tolerant of a great range of environmental conditions; most abundant in large, shallow, and turbid lakes; frequent large streams, provided they are deep and turbid enough with ample hiding cover; diet consists of fish and aquatic invertebrates.	Deep pools; minimum DO levels of >6 mg/L
Sauger *(Sander canadensis)*	Occurs in the spring, May to June; may use shoals of gravel to rubble; turbid rivers; 0.6 – 3.9 m depth.	Presumably similar to adult stage.	Found in slow flowing rivers; tolerant of turbid waters; backwater areas and mouths of tributary streams; feed on bottom dwelling fishes and insects.	
Yellow perch (*Perca flavescens)*	Typically occurs near rooted vegetation, submerged brush, fallen trees and rocks, but at times occurs over sand and gravel substrates.	Shallow water, near shores; at the end of the first year, diet shifts from plankton and chironomid larvae to larger benthic invertebrates.	Very adaptable and able to utilize a wide variety of warm to cooler habitats; large lakes to ponds, or quiet rivers; abundant in shallow open water of lakes with moderate levels of vegetation growth; clear water; substrates of fines and gravel.	Fish concentrate offshore during the winter; acute lethal DO Limit <1 mg/L
Johnny Darter (*Etheostoma nigrum*)	Undersides of rocks	Presumably similar to adult stage.	Most commonly found in waters with moderate or no current with a sand, sand and gravel or sand and silt substrate. Do not inhabit weedy areas or gravel riffles of streams	
GADIDAE (cod family)				
Burbot (*Lota lota*)	Boulders, cobble, or gravel with small amount of silt, sand and detritus; shallow bays or on shoals of lakes and rivers; no current; clear water; <2m deep; mid-winter under ice.	Juveniles occur along rocky shores and weedy areas of tributary streams; cover is important.	Cold parts of lakes and in large and small streams; in cold rivers prefer moderate-high turbidity, velocities <0.46 m/s, water depths <0.76 m, and rubble/cobble substrates; diet consists of fish and aquatic insect larvae as well as whitefish eggs; adults are night feeders and voracious predators.	Deep water of lakes and large rivers; sensitive to DO levels with acute lethal DO limit <2 mg/L.
CATOSTOMIDAE (sucker family)				
Longnose Sucker (*Catostomus catostomus*)	Shallows of streams or areas of lakes; gravel substrate; water depth 0.15-0.28 m; water velocity 0.3-0.45 m/s; mid-April to mid-May.	Fry remain within gravel for 1-2 weeks then disperse to bottoms of deeper, cooler lakes and clear rivers; often in association with vegetation and sandy substrates.	Slow water areas of rivers such as back eddies and river mouths; adult fish feed primarily on bottom invertebrates.	Slow water areas of river such as back eddies and river mouths that contain adequate oxygen.
Shorthead Redhorse *(Moxostoma macrolepidotum)*	Smaller rivers and streams in riffles over gravel substrate		Shallow, clear waters of lakes or clear rivers over sand or gravel bottoms without heavy silt	

Species	Spawning	Rearing (fry/juvenile)	Adult	Overwintering
White Sucker (*Catostomus commersoni*)	Streams, lake margins and mouths of blocked streams; gravel substrate; shallow water; occasionally in rapids; May to early June.	Fry feed on surface plankton and other invertebrates.	Adults are bottom feeders; prefer warm, shallow lakes and tributary rivers of large lakes.	Overwinter in streams and lakes and move upstream after ice breakup
GASTEROSTEIDAE (stickleback family)				
Brook Stickleback (*Culea indonstans*)	Builds nests in shallow water, on the stems of grass, reeds, or on substrate bottom; spring-early summer.	Presumably similar to adult stage.	Streams, shallow lakes, and bays; associated with vegetation; slow-moderate current.	High tolerance to low oxygen concentration.
Ninespine Stickleback *(Pungitius pungitius)*	Shallow weedy areas, fresh water.		Lakes, creeks and streams, also in brackish water in coastal areas.	
COTTIDAE (sculpin family)				
Slimy Sculpin (*Cottus bairdii*)	Shallow waters with a rock or gravel substrate, under stones, also under submerged tree roots		Deeper waters of lakes and cooler streams with a rock or gravel substrate, bottom dwelling	
CYPRINIDAE (minnow family)				
Blacknose Shiner (*Notropis heterolepis)*	Shallow riffles over a gravel bottom.		Clean, swift flowing streams with a gravel substrate. Also in inshore waters of lakes over gravel or boulder substrate.	
Emerald Shiner (*Notropis atherinoides)*	Thought to be midwater spawners.		Open waters in lakes and large rivers, usually offshore and near the surface in summer, inshore areas in the fall.	Move back into deeper waters of lakes and large rivers.
Fathead Minnow (*Pimephales promelas*)	Occurs from June through to August; water depth < 1 m; underside of log, branch or rock.	Presumably similar to adult stage.	Found in turbid streams, ponds and lakes; quiet, shallow waters; tolerant of extreme pH and salinity levels, as well as low DO levels; feeds on algae, zooplankton, and insect larvae.	High tolerance to low oxygen concentration.
Lake Chub (*Couesius plumbeus*)	Migrate from lakes to tributary streams; June to mid-August.	Fry typically found in submerged vegetation; slow flowing water; food preference variable but typically insects, zooplankton and algae	Lakes, rivers, and small streams; food preference variable but typically insects, zooplankton, and algae.	Intermediate sensitivity to DO levels with acute lethal DO limit 1-2 mg/L.
Longnose Dace (*Rhinichthys cataractae)*	Riffle areas containing gravel substrate.	Shallow water near shore; velocity low to none.	Swift flowing streams; inshore waters of lakes; gravel to boulder substrate.	
Pearl Dace (*Margariscus margarita*)	Gravel to silt; quiet or flowing water; 45-60 cm deep; April-May.		Cool, clear, slow-flowing water; bog habitat.	

Species	Spawning	Rearing (fry/juvenile)	Adult	Overwintering
Spottail Shiner (*Notropis hudsonius*)	Late spring to early summer; over sandy shoals; gravel; occurs in large schools.	Presumably similar to adult stage.	Common in lakes, rivers and streams; schools found in open water of lakes; feed on plankton, aquatic insects, and bottom fauna.	

Source: McPhail and Lindsey (1970), Scott and Crossman (1973), Stewart and Watkinson (2004).

Memorandum

To: Shaun Moffatt
KGS Group

Date: January 4, 2017

cc: Jamie Clarke
Manitoba Infrastructure

From: Kevin Szwaluk
Szwaluk Environmental Consulting Ltd.

Re: Rationale for VC selection

Background

The following memo provides the vegetation VC selection for Project P6, requested on December 22, 2016. Included are Table 1 and 2 which outline the vegetation VC rationale and habitat preferences.

Table 1. Vegetation Valued Components Rationale.

VCs	Group	Importance IDd by:[1]				Indicator	Parameter	Rationale
		FN	Gv	PS	Ot			
Vegetation								
Species of Conservation Concern	Various Plants		√		√	Species occurrence	Presence/ absence	• Regulatory importance (SARA under Schedule 1; COSEWIC; ESEA; MBCDC species listed very rare to rare) • Ecological and environmental importance
Key Community Harvest Areas (Plant Species of Interest)	Various Plants	√	√		√	Species occurrence; Area of resource use	Presence/ absence; Hectares	• Cultural importance • Regulatory importance • Ecological and environmental importance

[1]FN=First Nations (Gods Lake, Bunibonibee and Manto Sipi); Gv=Government; PS =Public/Stakeholder; Ot=Other (e.g., science)

Table 2. Habitat Preference for Vegetation Valued Components.

VCs	Group	Habitat Preference	Broad Habitat	Species-Habitat Associations
Vegetation				
Species of Conservation Concern	Various Plants	Habitat preference ranges from wet forests and lowlands; fens; conifer and deciduous forests; conifer swamps; shallow to deep water of ponds and lakes; slow flowing streams; outcrops; crevices and ledges on cliffs; rocky slopes (Flora of North America 1993+).	Wetland Mixedwood Coniferous	Example species associations may include: black spruce, tamarack, jack pine, trembling aspen, Saskatoon, bunchberry, velvet-leaved blueberry, twinflower, smooth wild strawberry, Labrador tea, bog cranberry, prickly rose, trailing dewberry, leatherleaf, cloud berry, Schreber's moss, splendid feathermoss, peat moss.
Key Community Harvest Areas (Plant Species of Interest)	Various Plants	Habitat preference ranges from wet open areas; marshes; stream banks and shores; moist to dry sites; open forests; bogs, muskeg and peatlands; mossy woods; roadsides; jack pine stands; lichen woodlands; wooded swamps; rocky soils and outcrops; slopes; spruce forests (Flora of North America 1993+).	Wetland Mixedwood Coniferous Broadleaf	Example species associations may include: black spruce, jack pine, trembling aspen, Saskatoon, bunchberry, velvet-leaved blueberry, twinflower, smooth wild strawberry, Labrador tea, bog cranberry, prickly rose, trailing dewberry, white grained mountain rice grass, Schreber's moss, splendid feathermoss.

Joro Consultants

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Memo

To: Shaun Moffatt and Elisabeth Hicks

From: Doug Schindler, Blair McMahon and Kerrith McKay

Date: March 22, 2017

Re: Wildlife VC Selection: Project 6

This memo outlines the process used by Joro in selecting potential wildlife valued component (VC) species for Project 6 (P6). The scoping process and wildlife species proposed to be suitable VCs are known to occur within the Regional Assessment Area (RAA) illustrated in Map 1.

1.0 Wildlife Valued Component Species

1.1 Data Sources

Prior to conducting a VC screening process, Joro biologists evaluated all existing information sources to determine which wildlife species occur in the P6 Regional Assessment Area. These sources include, but are not limited to: existing maps, provincial databases (MBCDC), field-based data (e.g., trail camera, caribou and wolf collaring, and aerial surveys), expert input, habitat modeling, and traditional knowledge (TK) provided by local First Nation resource users, e.g., at wildlife workshops and open houses conducted in the P6 Communities (Gods Lake, Bunibonibee and Manto Sipi). Among the information provided by First Nation communities in the region that was carefully considered in the process of selecting wildlife VC species are:

- Community members, including resource users (trappers and hunters), indicated that suitable VC's include: beaver, wolves, lynx, marten, otter, fox, mink, wolverine, and fisher
- Species that are hunted and trapped are important:
  - Species important for community hunting include caribou, moose, beaver, rabbit, bear, goose (in the spring), duck, and muskrat
  - Moose hunting is an important activity for community members
  - Caribou were mentioned frequently – some people hunt them
  - Goose hunting commonly occurs and is typically a fall activity for the community

- Duck hunting is common but number of ducks appear to be declining – mallard, bluebills (i.e., diving ducks such as scaup), and other ducks (including wood duck)
- Furbearers trapped include beaver, muskrat, otter, mink, and fisher

- Other notable observations influencing VC selection as they represent unique species assemblages or features of importance include:
  - Gull and tern colonies are not typically found on small waterbodies along the roads
  - Bald eagle population is at a high level and there are many active nests in the GLFN area
  - Bat sightings and hibernacula observed near the community, e.g., bat observations at McIvor Creek, Minaposkitay Lake, Kawapasik Narrows, and Wapanakow Point
  - Frogs are typically observed in large numbers
  - Garter snakes are also found on Oxford Lake on a small island south of McIvor Peninsula and the small southeastern peninsula of Kisetpiskanak Island
  - Magill Lake was highlighted as an area of importance and concern for participants

1.2 Wildlife VC Selection Process

The selection of VCs considers technical guidance from CEAA (2014), builds on methodology/criteria suggested by KGS and examples from other environmental assessments for which CEAA has been involved. The proposed wildlife VCs complies with federal guidance, as described by the Canadian Environmental Assessment Agency (CEAA 2012, 2014 and 2015), e.g., "*VCs refer to environmental features that may be affected by a project and that have been identified to be of concern by the proponent, government agencies, Aboriginal people, or the public. The value of a component not only relates to its role in the ecosystem, but also to the value of people place on it*". "*The VCs will be described in sufficient detail to allow the reviewer to understand their importance and to assess for environmental effects arising from the project activities. The EIS will provide a rationale for selecting specific VCs and for excluding any VCs or information specific in these guidelines." (CEAA 2015)*

A list of all wildlife species known or likely to occur in the RAA and their conservation status is provided in the Wildlife Technical Report. Terrestrial wildlife species likely to occur in the RAA first underwent a screening process. To be put forward as a candidate wildlife VC, the species or wildlife component first needs to be measurable for project effects over the long term (pre-construction, construction, and operation) and be identified as important in at least one category (Figure 1).

Species not considered for inclusion as a VC were those that are difficult to detect or not measurable using standard scientific methods (Figure 1). Species at Risk (SAR) were considered for inclusion as a VC only if they meet the selection criteria, i.e., having potential for project-related effects and being measurable over the long-term. Rare or listed species are typically not recommended as VCs as these species usually occur at very low densities, have low populations, have potentially limited distribution and are difficult to observe during surveys. In the comments on the P4 ASR Project, CEAA (2016) advises that Species at Risk be evaluated although they are typically not suitable as VCs because "…species that are rare, uncommon or associated with habitat types not prevalent in the Project Footprint do not adequately represent that Migratory Bird species which may be found within the Project Footprint during construction and operation activities" (Pg 35). It is hard to collect sufficient

data required for long-term monitoring for most SAR and thus are generally not used for monitoring trends; however, wildlife SAR not selected as VCs still undergo a comprehensive assessment.

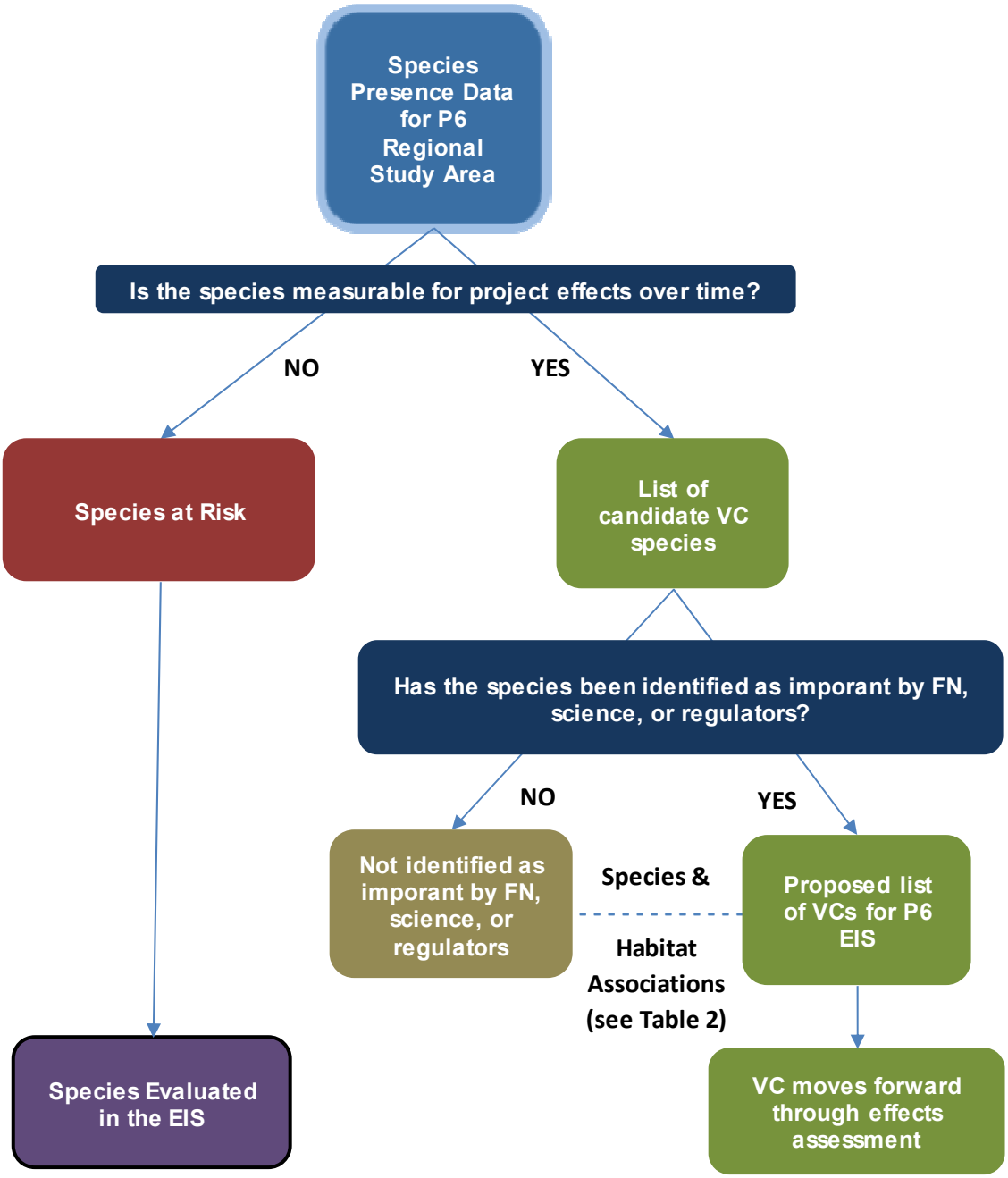

Figure 1 Process Followed by Joro in Selecting Wildlife VCs

All species that are measurable for project effects pass the first step in the screening process (shown as "yes" in Figure 1) and become a potential wildlife VC species. While the exact nature of the project effect on the VC species may not be fully known at the time of VC selection, there needs to be a linkage (potential for effect) between the Project 6 development and the species.

The next selection criteria consider whether the wildlife component or species fulfills one or more of the following:

- Environmental component identified by local First Nations or other Aboriginal communities as having cultural, social, or economic importance.
- Environmental component identified by government regulators.
- Environmental component identified by public and stakeholders as being important.
- Environmental component identified by science – typically due to their ecosystem function and/or being representative of a broad range of species/habitat types in the RAA. Existing data, professional judgment, and habitat models commonly assist in this process.

The species that meet the abovementioned criteria remain as wildlife VCs unless there is a clear rationale for excluding them from the list, e.g., a migratory songbird with similar life history and habitat use has already been selected as a better VC candidate that represents a particular habitat and/or guild. Those species that are excluded as VCs will be evaluated as part of the ecosystem evaluation, e.g., a species that is either prey or predator to a wildlife VC.

The list of candidate VC species presented in Table 1 represent those terrestrial wildlife species that were screened in as candidate species following the process outlined in Figure 1. One of the final steps in the determination of the suitability of those proposed wildlife VCs involved an assessment of habitat preferences illustrated in Table 2; species identified in this table are those whose primary habitat preferences are most similar to VCs. These habitat preferences were then associated with the main habitat types in the RAA as identified through LCC (Land Cover Classification) Cover Types and the ALCES model (A Landscape Cumulative Effects Simulator; Map 2, Table 3). The evaluation revealed that all major wildlife habitat types in the RAA are represented by one or more of the proposed wildlife VC species. Consideration was also given to the landscape features associated with those habitat types in the RAA; most of the RAA is comprised of lowlands containing wetlands, bogs, and muskeg with some limited upland habitat.

The final step in confirming the validity of the VC species selected involved determining which other wildlife species occupy the same habitat type as each VCs listed in Table 1. This process assisted in determining the suite of wildlife species that are correlated with and represented by each wildlife VC; as such, the VC species selected are representative proxies for other commonly occurring species in the RAA.

The environmental assessment evaluates other wildlife non-VC species (Figure 1). For example, species that are transient or occur in very low numbers and/or have restricted distribution in the RAA are considered in relation to their function within the ecosystem, particularly with respect to VC species. If the non-VC species shares a similar habitat preference and/or life history as a wildlife VC, potential project-related effects on a VC are likely to similarly influence other non-VC species.

The screening process confirmed that the wildlife VCs outlined in Table 1 are good choices.

Table 1 Candidate Wildlife Valued Component (VC) Species

VCs	Group	Importance IDd by:[1]				Indicator	Parameter	Rationale
		FN	Gv	PS	Ot			
Mammals								
Moose	Ungulate	√			√	Distribution and abundance of moose and habitat (including important habitat)	Amount and locations of habitat (including important habitat); presence/absence and relative density; factors contributing to Project effects (e.g., predation); trends (e.g., habitat changes, use and mortality)	• FNs and others hunt/ harvest • Ecological importance/function as prey to wolf • Habitat indicator - generalist, represents habitat requirements for large species group
Caribou	Ungulate	√	√		√	Distribution and abundance of caribou and habitat (including critical habitat)	Amount and locations of habitat (including critical habitat); presence/absence and density; factors contributing to Project effects (e.g., predation); trends	• Some FNs harvest • Regulatory need to assess critical habitat for woodland caribou. • Ecological importance/function as prey to wolf
Beaver	Aquatic Furbearer	√			√	Distribution and abundance of habitat (including important habitat)	Amount and locations of habitat and key habitat parameters; presence /absence and lodge number/location; trends, e.g., changes in habitat, trapping and mortality	• Commercial harvest by FN and others • Keystone and representative aquatic furbearer
Marten	Furbearer	√			√	Distribution and abundance of marten and habitat (including important habitat)	Amount and locations of habitat and key habitat parameters; presence/absence and/or density of marten relating to habitat types and Project effects; changes in habitat or trapping during Project; mortality levels	• Commercial harvest for FN and others • Top-level predator characteristic of upland terrestrial environments • Important predator/prey species
Birds								
Canada geese	Waterfowl[2]	√	√		√	Distribution and abundance of geese and habitat; access	Amount and locations of habitat (including important habitat); presence/absence and relative density; factors contributing to Project effects (e.g., predation); trends (e.g., habitat use and mortality and wetland productivity)	• *Migratory Birds Convention Act* • FN identified as important hunted species spring/fall • Hunting and license (*Wildlife Act*) and *Migratory Birds Convention Act* (MBCA) • Food web function

VCs	Group	Importance IDd by:[1]				Indicator	Parameter	Rationale
		FN	Gv	PS	Ot			
Mallard	Waterfowl: Dablling Duck	√	√		√	Distribution and abundance of ducks and habitat; access	Number of ducks, breeding locations, trends (e.g., habitat use and mortality, and wetland productivity)	• *Migratory Birds Convention Act* • BCR 8 and North American Wildlife Management Plan (NAWMP; DU 2012) priority species • FN hunt • Migratory bird that use shallow marshes and wetlands with emergent vegetation
Ring-necked Duck	Waterfowl: Diving Duck	√	√		√	Distribution and abundance of ducks and habitat; access	Number of ducks, breeding locations, trends (e.g., habitat use and mortality, and wetland productivity)	• *Migratory Birds Convention Act* • BCR 8 and NAWMP priority species (DU 2012) • FN hunt • Migratory bird that use meadows adjacent to water or emergent vegetation
Bald eagle	Raptor	√	√		√	Distribution and abundance of bald eagles and habitat, e.g., nest trees	Number of eagles, location of active nesting trees, trends	• Culturally important species to FNs • Top predator • *Wildlife Act* for nests and nesting trees
Ruffed grouse	Upland game bird	√	√		√	Distribution and abundance of grouse and habitat	Number of grouse, breeding locations, trends	• FN hunt • Hunting and license (*Wildlife Act*) • Prey species represent deciduous forest
Magnolia Warbler	Migratory songbird		√		√	Distribution and abundance of MAWA and habitat	Number of MAWA, breeding locations, trends	• *Migratory Birds Convention Act* • Found in sufficient numbers during BBA to monitor • Other studies to compare – Increases during spruce budworm outbreaks

VCs	Group	Importance IDd by:[1]				Indicator	Parameter	Rationale
		FN	Gv	PS	Ot			
Ovenbird	Migratory Songbird		√		√	Distribution and abundance of OVEN and habitat	Number of ovenbird, breeding locations, trends	• MBCA • Well studied (e.g., fragmentation) • Boreal Avian Monitoring[3] (BAM) Project test case + area-sensitive species • Boreal Conservation Region (BCR)8 strategy Priority species list for stewardship
Yellow-Bellied flycatcher	Migratory Songbird		√		√	Distribution and abundance of YBFL and habitat	Number of YBFL, breeding locations, trends	• MBCA • Ground nesting • BCR8 strategy Priority species list for stewardship
Palm warbler	Migratory Songbird		√		√	Distribution and abundance of warbler habitat	Amount and locations of habitat; presence/absence	• *Migratory Birds Convention Act* • Neotropical migrant songbird occupying bogs & open coniferous forests
Amphibians								
Spring peeper	Amphibian		√		√	Distribution and abundance of spring peeper and habitat	Amount and locations of habitat and important habitat parameters; presence/absence and/or density of marten relating to habitat types and Project effects	• Numerous in the RAA, characteristic of woodland ponds, near northern range, which generally extends east of Lake Winnipeg • Food web function

[1]FN=First Nations (Gods Lake, Bunibonibee and Manto Sipi); Gv=Government; PS =Public/Stakeholder; Ot=Other (e.g., science)

[2]Waterfowl (geese and ducks) suggested will cover off wetland, open water and near shore environments during the effects assessment.

[3] The Boreal Avian Modelling (BAM) Project is an international research collaboration for the ecology, management and conservation of boreal birds (www.borealbirds.ca) with multiple federal, provincial and private funding partners.

Table 2 Habitat Preference for Candidate Valued Component (VC) Species and Other Wildlife

VCs	Group	Habitat Preference*	Wildlife Habitat	Species-Habitat Associations
Mammals				
Moose	Ungulate	Typically found in forested areas and edges, with tall shrubs and re-generating vegetation for browse (Manitoba Hydro, 2011a; 2011b). Moose often occur near streams and rivers and edges of shallow lake. In the summer they prefer cool, moist lowland habitat providing suitable forage and escape cover. They often travel further inland to rut and feed on shrubs in the fall. In late winter, they typically use dense coniferous forest (Austman, 2015).	Wetland Shrubland Coniferous (Dense)	Black bear, lynx, porcupine, racoon, wolf, wolverine, alder flycatcher, American kestrel, American redstart, black-and-white warbler, black-capped chickadee, blue jay, chipping sparrow, common raven, downy woodpecker, gray tree frog, wood frog
Caribou	Ungulate	Boreal woodland caribou are typically found in large, un-fragmented tracts of mature coniferous-dominated boreal forest with inherently low ecological diversity and low predator densities (Manitoba Hydro, 2011b). Forests containing a mixture of jackpine and treed muskeg provide good overall caribou habitat and are often associated with spruce stands (Schindler, 2006).	Mixedwood Coniferous	Black bear, northern flying squirrel, silver haired bat, American tree sparrow, Lincoln's sparrow, mourning warbler, rusty blackbird, swamp sparrow, black backed woodpecker, boreal owl, Cooper's hawk, great grey owl, northern saw-whet owl, sharp-shinned hawk and spruce grouse
Beaver	Aquatic Furbearer	Prefer riparian areas including lakes, creeks, rivers, and other water bodies with nearby forests used to build dams and lodges (Manitoba Hydro 2011a). Prefer habitat containing willows, aspen, and other deciduous trees along with mixedwood forests with trees large enough for browse and building material (Kunke and Watkins, 1999).	Wetland Deciduous Mixedwood	Masked shrew, meadow vole, mink, pygmy shrew, otter, water shrew, yellow warbler, great blue heron, lesser yellowlegs, northern water thrush, sora rail, Virginia rail yellow rail, boreal chorus frog, wood frog, green frog, and northern leopard frog
Marten	Furbearer	Prefer old growth forests for denning (Manitoba Hydro, 2011a). Mature coniferous forests (especially undisturbed) featuring structural complexity - high canopy closure and vertical and horizontal woody structure, (Kunke and Watkins, 1999).	Coniferous	Ermine, fisher, black bear, porcupine, silver-haired bat, red squirrel, wolverine, wolf, three-toed woodpecker, spruce grouse, ruby crowned kinglet, northern hawk owl, gray jay, boreal owl, and common redpoll

VCs	Group	Habitat Preference*	Wildlife Habitat	Species-Habitat Associations
Birds				
Canada geese	Waterfowl	Often near lakes, rivers, ponds, or other small or large bodies of water (Kunke and Watkins, 1999; Manitoba Naturalist Society, 2003; Cornell, 2016).	Wetland	Wood frog, boreal chorus frog, spring peeper, northern leopard frog, bufflehead, common goldeneye, lesser yellowlegs, sandhill crane, short-billed dowitcher, short-eared owl, white-winged scoter, yellow rail, northern bog lemming, southern bog lemming
Ring-necked Duck	Waterfowl	Like wet meadow, swamp, shallow water/ pond & marsh. Common on smaller bodies of water than other diving ducks, e.g., beaver ponds and small lakes. Breed in freshwater marshes, bogs, and other shallow, often acidic wetlands (Kunke and Watkins, 1999; Manitoba Naturalist Society, 2003; Cornell, 2016).	Wetland	Green frog, American wigeon, blue- and green-winged teal, gadwall, horned grebe, lesser scaup, northern harrier, pied-billed grebe, red-necked grebe, ruddy duck, sedge wren, surf scoter, western grebe, Wilson's phalarope,
Bald eagle	Raptor	Nests are commonly found in mature forests, usually within 200 m of a water body (Manitoba Hydro 2011c). Common near lakes, reservoirs, rivers, marshes, and coasts. Nest in trees near water (Kunke and Watkins, 1999; Manitoba Naturalist Society, 2003; Cornell, 2016).	Wetland Coniferous	Common snapping turtle, Brewer's blackbird, double-crested cormorant, great crested flycatcher, hooded merganser, killdeer, northern pintail, osprey, ovenbird, red-breasted merganser, yellow-throated vireo, hoary bat, little brown bat, racoon
Ruffed grouse	Upland game bird	Occupy mixed deciduous and coniferous forest interiors with scattered clearings. They also live along forested streams and in areas growing back from burning or logging (Kunke and Watkins, 1999; Manitoba Naturalist Society, 2003; Cornell, 2016). Ruffed grouse inhabit deciduous and mixedwoods forests and coniferous forests (Manitoba Hydro, 2011c).	Mixedwood Decidouous Wetland Coniferous	American goldfinch, American tree sparrow, black-capped chickadee, blue jay, Canada warbler, chipping sparrow, clay-coloured sparrow, Connecticut warbler, eastern kingbird, eastern wood pewee, golden-winged warbler, gray catbird, great crested flycatcher, great horned owl, Licoln's sparrow, long-eared owl, mourning warbler, northern saw-whet owl, northern waterthrush, red-eyed vireo, song sparrow, veery, warbling vireo, western wood pewee, whip-poor-will, white-breasted nuthatch, yellow-bellied flycatcher, yellow warbler, beaver, ermine, fisher, masked shrew, meadow vole, mink, otter, pygmy shrew, silver-haired bat, star-nosed mole, water shrew

VCs	Group	Habitat Preference*	Wildlife Habitat	Species-Habitat Associations
Magnolia Warbler	Migratory songbird	Breed in small conifers, especially young spruces, in purely coniferous stands or mixed forest (Kunke and Watkins, 1999; Manitoba Naturalist Society, 2003; Cornell, 2016).	Coniferous	Common snapping turtle, Brewer's blackbird, double-crested cormorant, great crested flycatcher, hooded merganser, killdeer, northern pintail, osprey, ovenbird, red-breasted merganser, yellow-throated vireo, hoary bat, little brown bat, racoon
Ovenbird	Migratory Songbird	Breed in closed-canopy forests, particularly deciduous and mixed deciduous-coniferous woods. They avoid wet or swampy areas (Kunke and Watkins, 1999; Manitoba Naturalist Society, 2003; Cornell, 2016).	Deciduous Mixedwood	Common snapping turtle, American kestrel, bald eagle, Brewer's blackbird, killdeer, magnolia warbler, northern pintail, osprey, orange-crowned warbler, solitary vireo, yellow-throated vireo, hoary bat, little brown bat, racoon
Yellow-Bellied flycatcher	Migratory Songbird	Breed in boreal coniferous forests and peatlands. Nests in cool, moist forests, bogs, swamps, and muskegs (Kunke and Watkins, 1999; Manitoba Naturalist Society, 2003; Cornell, 2016).	Wetland Coniferous	American goldfinch, American tree sparrow, black-capped chickadee, blue jay, Canada warbler, chipping sparrow, clay-coloured sparrow, Connecticut warbler, eastern kingbird, eastern wood pewee, golden-winged warbler, gray catbird, great crested flycatcher, great horned owl, Licoln's sparrow, long-eared owl, mourning warbler, northern saw-whet owl, northern waterthrush, red-eyed vireo, ruffed grouse, song sparrow, veery, warbling vireo, western wood pewee, whip-poor-will, white-breasted nuthatch, yellow warbler, beaver, ermine, fisher, masked shrew, meadow vole, mink, otter, pygmy shrew, silver-haired bat, star-nosed mole, water shrew
Palm warbler	Migratory Songbird	Breed in bogs, open boreal coniferous forest, and partly open situations with scattered trees and heavy undergrowth, usually near water (Kunke and Watkins, 1999; Manitoba Naturalist Society, 2003; Cornell, 2016).	Wetland Coniferous	Boreal chorus frog, spring peeper, northern waterthrush, sharp tailed grouse, spruce grouse, veery, yellow-rumped warler, ermine, fisher

VCs	Group	Habitat Preference*	Wildlife Habitat	Species-Habitat Associations
Amphibians				
Spring peeper	Amphibian	Associated with a wide range of wet habitats: characteristic of temporary woodland ponds. Peepers reach their highest density in brushy secondary growth or cutover woodlands. They apparently cannot withstand extensive urbanization (NatureNorth, 2016; The Manitoba Herps Atlas, 2016).	Wetland Mixedwood Shrubland	Wood frog, boreal chorus frog, Cope's gray treefrog, northern leopard frog, Canadian toad, sandhill crane, alder flycatcher, ducks American tree sparrow, Canada goose, Wilson's snipe, Conneticut warbler, great horned owl, horned grebe, Licoln's sparrow, mallard, marsh wren, northern saw-whet owl, northern shoveler, northern waterthrush, olive-sided flycatcher, grebes, red-winged blackbird, ring-necked duck, rusty blackbird, sedge wren, short-eared owl, sora rail, swamp sparrow, yellow rail, yellow-headed blackbird, beaver, masked shrew, mink, muskrat, southern bog lemming, star nosed mole, water shrew

Table 3 Habitat Types within the RAA as Identified Through the LCC and ALCES

Wildlife Habitat Type	LCC Cover Type
Deciduous	Broadleaf Dense
	Broadleaf Open
Mixedwood	Mixedwood Dense
Coniferous	Coniferous Open
	Coniferous Sparse
Shrubland	Shrub Tall
Wetland	Wetland Herb
	Wetland Shrub
	Wetland Treed

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