



FINAL

Surface Water Study Plan

May 2021





MARTEN FALLS FIRST NATION ALL SEASON COMMUNITY ACCESS ROAD

Surface Water Study Plan

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Revision History

Rev #	Date	Revision Description
Draft	June 2020	Submitted "Study Plan – Surface Water DRAFT FOR DISCUSSION" to the Agency.
Final	May 2021	Revised to address federal and provincial agency comments.



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ALL SEASON COMMUNITY ACCESS ROAD

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Appendices

- Appendix A. Preliminary List of Data Sources
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Acronyms and Abbreviations

Agency, the ...	Impact Assessment Agency of Canada
CAR	Community Access Road
CCME	Canadian Council of Ministers of the Environment
CWQG	Canadian Water Quality Guidelines
EA	Environmental Assessment
IA	Impact Assessment
IAA	<i>Impact Assessment Act</i>
IS	Impact Statement
km	kilometre
LiDAR	Light Detection and Ranging
LSA	Local Study Area
MECP	Ontario Ministry of the Environment, Conservation and Parks
MFFN.....	Marten Falls First Nation
ODWQS	Ontario Drinking Water Quality Standards
PDA	Project Development Area
RSA	Regional Study Area
SAR	Species at Risk
TISG	Tailored Impact Statement Guidelines
ToR.....	Terms of Reference
VC.....	Valued Component





1. Introduction

The Proponent of the Community Access Road (CAR or the Project) is Marten Falls First Nation (MFFN), a remote First Nation community in northern Ontario located at the junction of the Albany and Ogoki rivers, approximately 430 kilometres (km) from Thunder Bay, Ontario. The MFFN community is proposing an all-season Community Access Road that will connect the MFFN community to Ontario's provincial highway network (Highway 643) to the south via the existing Painter Lake Road. MFFN, as the Proponent of the Project, has formed a MFFN CAR Project Team that includes MFFN CAR Community Member Advisors and MFFN CAR Project Consultants who act with input, guidance and direction from the MFFN Chief and Council.

This document outlines the Study Plan for Surface Water to support a coordinated Impact Assessment (IA) required for Project review by the Impact Assessment Agency of Canada (the Agency) under the federal *Impact Assessment Act* (IAA) and Environmental Assessment (EA) required for Project review by the Ontario Ministry of the Environment, Conservation and Parks (MECP) under the Ontario *Environmental Assessment Act*.

1.1 Federal and Provincial Terminology

The study plans have been prepared using federal terminology, however, the respective provincial terminology has been provided in **Table 1-1** for reference. The terms can be used interchangeably.

Table 1-1: Equivalent Federal and Provincial Terms

Provincial Term	Federal Term
Criteria	Valued Component
Impact Management Measure	Mitigation Measure
Net Effects	Residual Effects
Record of Consultation	Record of Engagement





1.2 Project Study Plans

This Study Plan is one of a group of study plans created for the Project. **Table 1-2** includes the study plans for each environmental¹ discipline currently planned for the Project and the valued components (VCs) covered by the study plans where applicable.

Table 1-2: Project Study Plans and Valued Components

Environmental Discipline	Study Plan Name	Valued Component(s)
Aboriginal and Treaty Rights and Interests	■ Aboriginal and Treaty Rights and Interests Study Plan	<ul style="list-style-type: none"> ■ Indigenous Current Use of Lands and Resources for Traditional Purposes ■ Cultural Continuity (ability to practice and transmit cultural traditions)
Atmospheric Environment	■ Atmospheric Environment and Greenhouse Gases Study Plan	<ul style="list-style-type: none"> ■ Air Quality ■ Greenhouse Gas Emissions
Climate Change	■ Climate Adaptation and Resiliency Study Plan	<ul style="list-style-type: none"> ■ Climate Change
Acoustic and Vibration Environment	■ Acoustic and Vibration Environment Study Plan	<ul style="list-style-type: none"> ■ Noise ■ Vibration
Physiography, Geology, Terrain and Soils	■ Physiography, Terrain and Soils Study Plan	<ul style="list-style-type: none"> ■ Physiography, Terrain and Soils
Surface Water	■ Surface Water Study Plan	<ul style="list-style-type: none"> ■ Surface Water
Groundwater and Geochemistry	■ Groundwater and Geochemistry Study Plan	<ul style="list-style-type: none"> ■ Groundwater
Vegetation	■ Vegetation Study Plan	<ul style="list-style-type: none"> ■ Wetland and Riparian Ecosystems ■ Upland Ecosystems ■ Designated Areas (Areas of Natural and Scientific Interest, Environmentally Significant Areas, Significant Woodlands, Critical Landform / Vegetation Associations) ■ Traditional Use Plants and SAR Plant Populations (including species with special conservation status or rarity in the province)
	■ Peatlands Study Plan	<ul style="list-style-type: none"> ■ Peatland Ecosystems (bogs and fens)
Wildlife	■ Wildlife Study Plan	<ul style="list-style-type: none"> ■ Bats (including SAR-bats such as: Little Brown Myotis [<i>Myotis lucifugus</i>], Northern Myotis [<i>Myotis septentrionalis</i>] and Tricolored Bat [<i>Perimyotis subflavus</i>]) ■ Fur Bearers (proxy VC² American Marten [<i>Martes americana</i>], Beaver [<i>Castor canadensis</i>] and Wolverine [<i>Gulo gulo</i>])

1. The use of the term environment in this document is inclusive of the components of the environment that are included in the Ontario Environmental Assessment Act definition, which includes a general description of the social, cultural, built and natural environments.
2. A proxy VC is used when looking at the effects of one species that represents many others.





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Environmental Discipline	Study Plan Name	Valued Component(s)
		<ul style="list-style-type: none"> ■ Amphibians and Reptiles ■ Pollinating Insects
	<ul style="list-style-type: none"> ■ Ungulates (Moose and Caribou) Study Plan 	<ul style="list-style-type: none"> ■ Moose (<i>Alces alces</i>) ■ Caribou, boreal population (<i>Rangifer tarandus</i>)
	<ul style="list-style-type: none"> ■ Bird Study Plan 	<ul style="list-style-type: none"> ■ Forest Birds (proxy VC of Red-eyed Vireo [<i>Vireo olivaceus</i>] for deciduous forest, Ovenbird [<i>Seiurus aurocapilla</i>] for mixedwood forest, Dark-eyed Junco [<i>Junco hyemalis</i>] for coniferous forest and disturbed forest ■ Raptors (proxy VC of Osprey [<i>Pandion haliaetus</i>] for diurnal raptors and Boreal Owl [<i>Aegolius funereus</i>] for nocturnal raptors ■ Shorebirds (proxy VC of Wilson's Snipe [<i>Gallinago delicata</i>]) ■ Waterfowl (proxy VC of Mallard [<i>Anas platyrhynchos</i>]) ■ Bog / Fen Birds and Other Wetland Birds (proxy VC of Palm Warbler [<i>Setophaga palmarum</i>] for bogs, Common Yellowthroat [<i>Geothlypis trichas</i>] for fens; and Northern Waterthrush [<i>Parkesia noveboracensis</i>] for swamps. ■ SAR birds: Canada Warbler (<i>Cardellina canadensis</i>), Chimney Swift (<i>Chaetura pelagica</i>), Common Nighthawk (<i>Chordeiles minor</i>), Eastern Whip-poor-will (<i>Anrostomus vociferous</i>), Eastern Wood-Pewee (<i>Contopus virens</i>), Evening Grosbeak (<i>Coccothraustes vespertinus</i>), Olive-sided Flycatcher (<i>Contopus cooperi</i>), Bald Eagle (<i>Haliaeetus leucocephalus</i>), Peregrine Falcon (<i>Falco peregrinus</i>), Short-eared Owl (<i>Asio flammeus</i>), Bank Swallow (<i>Riparia riparia</i>), Barn Swallow (<i>Hirundo rustica</i>), Black Tern (<i>Chlidonias niger</i>), Rusty Blackbird (<i>Euphagus carolinus</i>), Yellow Rail (<i>Coturnicops noveboracensis</i>)
Fish and Fish Habitat	<ul style="list-style-type: none"> ■ Fish and Fish Habitat Study Plan 	<ul style="list-style-type: none"> ■ Lake Sturgeon (<i>Acipenser fulvescens</i>) ■ Walleye (<i>Sander vitreus</i>) ■ Brook Trout (<i>Salvelinus fontinalis</i>) ■ Northern Pike (<i>Esox lucius</i>) ■ Lake Whitefish (<i>Coregonus clupeaformis</i>) ■ Chain Pickerel (<i>Esox niger</i>) ■ Yellow Perch (<i>Perca flavescens</i>) ■ Cisco (<i>Coregonus artedii</i>) ■ Burbot (<i>Lota lota</i>) ■ Longnose Sucker (<i>Catostomus catostomus</i>) ■ White Sucker (<i>Catostomus commersonii</i>) ■ Forage / Prey Species (including species such as Lake Chub [<i>Couesius plumbeus</i>]) ■ Lower Trophic Organisms (e.g., benthic invertebrates)
Social	<ul style="list-style-type: none"> ■ Social Study Plan 	<ul style="list-style-type: none"> ■ Housing and Accommodation ■ Community Service and Infrastructure ■ Transportation ■ Community Well-being ■ Populations and Demographics





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Environmental Discipline	Study Plan Name	Valued Component(s)
Economy	■ Economic Study Plan	<ul style="list-style-type: none"> ■ Regional Economy ■ Labour Force and Employment ■ Government Finances
Land and Resource Use	■ Land and Resource Use Study Plan	<ul style="list-style-type: none"> ■ Land Use Compatibility ■ Parks and Protected Areas ■ Extractive Industry ■ Forestry Industry ■ Energy and Linear Infrastructure ■ Recreation and Tourism
Human Health and Community Safety	■ Human Health and Community Safety Study Plan	<ul style="list-style-type: none"> ■ Public Safety ■ Public Health ■ Diet ■ Environmental Factors Influencing Health
Visual Aesthetics	■ Visual Aesthetics Study Plan	<ul style="list-style-type: none"> ■ Visual Contrast / Character ■ Visibility ■ Visual Sensitivity
Archaeological and Cultural Heritage	■ Cultural Heritage Study Plan	<ul style="list-style-type: none"> ■ Archaeological Sites and Resources ■ Built Heritage Resources and Cultural Heritage Landscapes

It should be noted that while there is not a consultation study plan, the Project has developed the *Consultation and Engagement Plan to Support the Environmental Assessment / Impact Statement* (AECOM 2020) (referred to as the Impact Statement [IS] / EA Consultation Plan).





2. Purpose and Objectives

The key objectives of conducting an IA / EA are to describe the existing environment, gather sufficient information to predict Project-related effects (positive and negative, direct and indirect) of the Project and alternatives on the environment, determine measures needed to avoid or minimize adverse Project effects, and enhance beneficial Project effects where feasible, and to undertake consultation and engagement throughout. The purpose of this Study Plan is to explain:

- A baseline³ study methodology that will result in a comprehensive description of the existing environment potentially impacted by the Project;
- How efficient and transparent data management and analysis will be undertaken;
- Effects assessment scoping inputs specific to Surface Water that will allow for potential effects of the Project on the existing environment to be appropriately assessed in the IS / EA Report; and
- How the Study Plan aligns with federal and provincial requirements and guidance, including the Agency's Tailored Impact Statement Guidelines (TISG), dated February 24, 2020 (the Agency 2020c), for this Project and applicable provincial agency comments on the Draft Terms of Reference (ToR)⁴.

As required by the IAA and referenced in TISG Section 7.3 (the Agency 2020c), work plans will also be developed for disciplines as required. It is anticipated the work plans will include further details on how to action the study plans; for example, they would contain such information as location of sampling sites, scheduling, and sequencing.

For the purposes of establishing appropriate context, the Study Plan begins with background and relevant information on:

- Study Plan related discussions with the Agency, the MECP and applicable agencies to date (**Section 3**);
- The approach to Project consultation and engagement (**Section 4**);
- How Indigenous Knowledge will be collected and used in the IA / EA (**Section 5**); and
- The spatial and temporal boundaries that will be used for the IA / EA (**Section 6**).

3. *Baseline refers to the current conditions of the environment potentially impacted by the Project. Baseline conditions serve as a reference against which changes due the Project are measured.*

4. *If necessary, the Study Plan will be updated to reflect the approved ToR if approval is obtained.*





2.1 Approach to Handling Confidential Information

2.1.1 Indigenous Knowledge

Permission from the Indigenous community will be sought before including Indigenous Knowledge in the IS / EA Report, regardless of the source of the Indigenous Knowledge. Sensitive and / or confidential information will be specifically collected through the Indigenous Knowledge Program to inform the IS / EA Report, and its use and publication will be governed by Indigenous community-specific Indigenous Knowledge Sharing Agreements. Sensitive and / or confidential information collected through Indigenous Knowledge Sharing Agreements will be protected from public or third-party disclosure and will be established between the Proponent and Indigenous communities participating in the Indigenous Knowledge Program prior to the sharing and use of any sensitive information. Instances where Indigenous Knowledge sharing has taken place during consultation activities (e.g., meetings) will be recorded in the Record of Consultation and Engagement, including where Indigenous Knowledge was incorporated into Project decisions and into the IS / EA Report (i.e., specifics will not be included in the Record of Consultation and Engagement given the potential sensitivity and / or confidentiality of the information shared).





3. Study Plan Technical Discussions

To facilitate the development of satisfactory study plans and eventually a satisfactory IS / EA Report, MFFN previously submitted draft study plans in an effort to hold technical discussions with the Agency, the MECP and applicable agencies. A summary of technical discussions and correspondence held to date on this Study Plan has been provided in **Table 3-1**.

Table 3-1: Study Plan Technical Review

Attendees / Responsible Party	Correspondence	Discussion Point	Solution
<ul style="list-style-type: none"> ■ The Agency 	<ul style="list-style-type: none"> ■ Comments received following submission and review of draft Study Plan. 	<ul style="list-style-type: none"> ■ 23-July-2020: Comments and clarification questions received, including editorial comments, additional information requirements regarding the Study Plan, assessment and desktop analysis. 	<ul style="list-style-type: none"> ■ Additional details and clarification are provided within this Study Plan and responses to these comments can be found in Appendix B.
<ul style="list-style-type: none"> ■ MECP 	<ul style="list-style-type: none"> ■ Comments received following submission and review of draft Study Plan. 	<ul style="list-style-type: none"> ■ 23-July-2020: Comments and clarification questions received, including editorial comments, additional information requirements regarding the Study Plan, assessment and desktop analysis. 	<ul style="list-style-type: none"> ■ Additional details and clarification are provided within this Study Plan and responses to these comments can be found in Appendix B.
<ul style="list-style-type: none"> ■ The Agency ■ MECP ■ Ministry of Energy, Northern Development and Mines ■ Environment and Climate Change Canada ■ Health Canada ■ Natural Resources Canada ■ Transport Canada ■ MFFN CAR Project Team 	<ul style="list-style-type: none"> ■ Technical discussion of comments received following agency review of draft Study Plan. 	<ul style="list-style-type: none"> ■ 1-November-2020: Comment and technical discussion pertaining to proposed deviations from the TISG, i.e., requesting that baseline water quality conditions be established using two years of monitoring data vs. the draft Study Plan proposing a single year of monitoring water quality over multiple seasons (fall of 2020 and the spring and summer of 2021) to be evaluated along with existing baseline water quality results from the Noront Cliffs project (obtained in 2011-2012), to define the characteristic range of natural variability in water quality conditions on an intra- and inter-annual basis. 	<ul style="list-style-type: none"> ■ The MFFN CAR Project Team will follow-up with Environment and Climate Change Canada following the future summer sampling round to share the complete raw dataset and determine if an additional year of sampling is required by Environment and Climate Change Canada to further define the range of natural variability in water quality conditions.





4. IS / EA Report Consultation and Engagement Process

4.1 Interested Persons and Government Agencies

The Proponent will provide Project notices and advise of opportunities for consultation and engagement with interested persons⁵ which includes, at a minimum, members of the public outlined in the *Public Participation Plan for the Marten Falls Community Access Road Project Impact Assessment* (the Agency 2020) (referred to as the Public Participation Plan). This will include the opportunity to provide input on the existing environment, VCs, effects assessment methods, effects assessment results, and mitigation and follow-up program measures as applicable. A variety of activities will be offered so that members of the public are informed of the IS / EA Report as it progresses and are aware of the opportunities and means to provide their input. The study plans have recognized public and agency input received on the Project to date. Government agencies and interested persons will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process. The Project's approach to handling confidential and sensitive information is outlined in **Section 2.1**.

4.2 Indigenous Communities

The Proponent will provide Project notices and opportunities for consultation and engagement with Indigenous communities identified in **Table 4-1**, which is inclusive of all Indigenous communities identified in the *Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment* (the Agency 2020a) (referred to as the Indigenous Engagement and Partnership Plan).

Indigenous communities will be provided the opportunity to be involved at critical decision-making points throughout the IS / EA Report so that the Proponent can consider and incorporate, where appropriate Indigenous Knowledge and Indigenous land and resource use information into the Project as it pertains to the existing environment, VCs, effects assessment methods, effects assessment results, and mitigation and follow-up program measures. A variety of activities will be offered so that Indigenous communities are

5. *Interested persons, as defined in the IS / EA Consultation Plan, are individuals and groups (e.g., associations, non-governmental organizations, industry and academia) who could have an interest in the Project, including but not limited to communities in the region, those with commercial interests (e.g., forestry, trappers, outfitters, other mineral tenure holders in the area) and recreational users or those with recreational interest (e.g., campers, hunters and environmental groups).*





informed of the IS / EA Report as it progresses and are aware of the opportunities, means and timelines to provide their input. The study plans have recognized Indigenous community input received on the Project to date. Indigenous communities will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process.

Table 4-1: Identified Neighbouring Indigenous Communities, including their Provincial Territorial Organizations and / or Tribal Council Affiliations

Tribal Council Affiliation	Indigenous Community or Organization
Matawa First Nations Management <i>(Nishnawbe Aski Nation)</i>	<ul style="list-style-type: none"> ■ Marten Falls First Nation (Proponent and potentially affected Indigenous community) ■ Aroland First Nation ■ Constance Lake First Nation ■ Eabametoong First Nation ■ Ginoogaming First Nation ■ Neskantaga First Nation ■ Nibinamik First Nation ■ Webequie First Nation
Matawa First Nations Management and the Union of Ontario Indians / Nishnawbe Aski Nation	<ul style="list-style-type: none"> ■ Long Lake #58 First Nation**
Mushkegowuk Council <i>(Nishnawbe Aski Nation)</i>	<ul style="list-style-type: none"> ■ Attawapiskat First Nation ■ Fort Albany First Nation ■ Kashechewan First Nation
Shibogama First Nations Council <i>(Nishnawbe Aski Nation)</i>	<ul style="list-style-type: none"> ■ Kasabonika Lake First Nation ■ Kingfisher Lake First Nation ■ Wapekeka First Nation ■ Wawakapewin First Nation ■ Wunnumin Lake First Nation
Independent First Nations Alliance <i>(Nishnawbe Aski Nation)</i>	<ul style="list-style-type: none"> ■ Kitchenuhmaykoosib Inninuwug First Nation
Independent First Nations <i>(Nishnawbe Aski Nation)</i>	<ul style="list-style-type: none"> ■ Mishkeegogamang First Nation ■ Weenusk First Nation
Nokiiwin Tribal Council	<ul style="list-style-type: none"> ■ Animiigoo Zaagi'igan Anishinaabek First Nation*
Métis Nation of Ontario	<ul style="list-style-type: none"> ■ Métis Nation of Ontario; Region 2*
Independent Métis Nation	<ul style="list-style-type: none"> ■ Red Sky Independent Métis Nation*

Notes: * Indigenous communities or organizations identified by the MECP who should be consulted on the basis that they may be interested in the Community Access Road.

** The MECP indicated in a letter to MFFN that Long Lake #58 First Nation was moved from interest-based to rights-based.





4.3 Consideration of Identity and Gender-Based Analysis Plus in Engagement

To fulfill requirements of the IAA, the Consultation and Engagement Program will consider a diverse range of perspectives from interested persons and interested Indigenous communities and their members identified in the Agency's Indigenous Engagement and Partnership Plan and the Public Participation Plan. This will include at a minimum providing ongoing opportunities for engagement to:

- **Neighbouring Indigenous communities, including relevant subpopulations:**
 - Women;
 - Youth; and
 - Elders.
- **Non-Indigenous communities including:**
 - Women;
 - Youth; and
 - Activity-based subgroups (e.g., recreationalists, snowmobilers, tourism establishment operators).

The Proponent will also consult and engage with other subpopulations identified by communities during consultation and engagement. The information from these activities and any additional identity groups identified by communities through consultation and engagement will be considered by applicable environmental disciplines for the purposes of data collection and considering disproportionate effects.

During consultation and engagement, these aforementioned groups will be consulted and engaged with on targeted input. Specialized knowledge will be gathered through other disciplines such as Social, Economic, Land and Resource Use and Aboriginal and Treaty Rights and Interests. The socio-economic Data Collection Program is expected to include targeted interviews, focus groups, questionnaires and other niche tools to gather information from diverse populations to resolve gaps in socio-economic secondary data. These diverse populations include the aforementioned identity groups, which are also referenced in the IS / EA Consultation Plan, and those identified by communities during consultation and engagement. The importance of soliciting inputs and perspectives from diverse subgroups has also been factored into the Indigenous Knowledge Program and associated materials (see **Section 5**).

When feedback is received from interested persons and Indigenous communities, issues, comments and questions will be tracked, which is consistent with the process described in the IS / EA Consultation Plan.





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Specific to Gender-Based Analysis Plus objectives, this will include efforts to engage with diverse populations. It is expected this will include activities specific to subgroups and tabulation of consultation and engagement participation with respect to identity factors. This will provide summary statistics to demonstrate the diversity achieved in consultation and engagement.





5. Consideration of Indigenous Knowledge in the IS / EA Report

The following provides a general description of how Indigenous Knowledge will be considered in the IA / EA process. The extent to which Indigenous Knowledge is considered by each specific VC will vary depending on the nature of the VC, the potential for Project effects on the VC and whether Indigenous knowledge that relates to a VC is provided / obtained. As such, not all aspects of the general approach described below may apply to all VCs / study plans.

There are two concurrent and complementary avenues for Indigenous communities and groups to be engaged with and provide input on the Project: the Indigenous Knowledge Program and the Consultation and Engagement Program. Both programs serve to support the collection of Indigenous perspectives, values, and input on the Project, including Aboriginal and Treaty Rights and how they may be impacted by the Project, to be integrated throughout the IA / EA process. However, the Indigenous Knowledge Program specifically aims to solicit and incorporate information that is considered sensitive and may have confidentiality requirements, including Indigenous Knowledge and information on Indigenous land and resource use. Indigenous Knowledge Sharing Agreements will be established between the Proponent and Indigenous communities participating in the Indigenous Knowledge Program prior to the sharing and use of any sensitive information.

All Indigenous communities and groups identified by the MECP and the Agency through the Indigenous Engagement and Partnership Plan have the opportunity to participate in the Indigenous Knowledge Program. The Indigenous Knowledge Program provides interested Indigenous communities an opportunity to: share existing Indigenous Knowledge and information on Indigenous land and resource use and cultural values that may be relevant to the Project, and / or complete Project-specific studies to collect and share Indigenous Knowledge and information on Indigenous land and resource use and cultural values. The Indigenous Knowledge Program includes opportunities for Indigenous communities and groups to meet with the Proponent to discuss the program, ask questions, and share concerns and interests. In support of this, the Proponent has created an Indigenous Knowledge Program Guidance Document (the Guidance Document) that provides:

- An overview of the Indigenous Knowledge Program and information on how Indigenous Knowledge, Indigenous land and resource use, and cultural values and practices can be collected and / or shared;





- Information on how Indigenous Knowledge and information on Indigenous land and resource use and cultural values and practices may be used in the planning and design processes; and
- A suite of guidance materials that were developed based on the information requirements of both the federal and provincial assessment processes, including: question guides to support the collection of information on historical and current community context; Indigenous Knowledge that may be relevant to the various technical disciplines; information on Indigenous land and resource use, cultural values and practices and associated spatial data, and perspective on potential Project-related effects and associated mitigation and / or enhancement measures.

The Guidance Document will also support participating Indigenous communities in providing Project-specific information in a manner that facilitates meaningful incorporation into the IS / EA Report.

The IS / EA Consultation Plan outlines the process for obtaining information and feedback about the Project from Indigenous communities (i.e., the Consultation and Engagement Program). All Indigenous communities identified by the MECP and the Agency have the opportunity to participate in the Consultation and Engagement Program through community-specific meetings, Public Information Centres, web conferences, and other formats. All Indigenous communities identified by the MECP and the Agency will be provided information related to the Project and invited to participate at various points throughout the IA / EA process.

There are also opportunities for the MFFN CAR Project Consultant Team to engage with Indigenous communities to solicit perspectives and information relevant to the Project, including information related to collection of existing information and the development of the IS / EA Report. The Proponent also invites feedback and inputs throughout the Project via the Project website and ongoing communications with the Proponent.

The Indigenous Knowledge and Consultation and Engagement programs are designed to be complementary and provide multiple opportunities for communities to offer feedback and information, including perspectives on Aboriginal and Treaty Rights and interests and how these may be impacted by the proposed Project. Relevant information collected through both the Indigenous Knowledge and Consultation and Engagement programs, including potential effect pathways on Aboriginal and Treaty Rights and interests, will be shared with each of the relevant disciplines throughout the IA / EA to: guide and inform VCs; support characterization of the existing environment; identify the potential effects of the Project on VCs; help identify mitigation measures and potential monitoring programs; and ultimately guide Project planning. The nature of how the Indigenous Knowledge becomes integrated into the IS / EA Report will be dictated by the specific information provided by each Indigenous community and the parameters set out in





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the Indigenous Knowledge Sharing Agreements. A description of how Indigenous Knowledge was considered in the IA / EA and in each of the technical discipline areas will be included in the IS / EA Report.

It is also important to note that information collected through the various activities (e.g., field studies and programs, effects assessments) of each discipline area (e.g., wildlife, vegetation, cultural heritage) will be shared with the Indigenous Knowledge Program leads. This will support the establishment of the existing environment and the effects assessment for the Aboriginal and Treaty Rights and Interests environmental discipline, as well as the identification of potential mitigation measures and monitoring programs, given the interrelated nature of Indigenous peoples and other environmental disciplines.

The Proponent will strive to respectfully collaborate with Indigenous communities on how Indigenous Knowledge and information on Indigenous land and resource use and cultural values will become part of the IS / EA Report, and how potential effects to Aboriginal and Treaty Rights and interests will be assessed. It is expected that measures to support this may include but are not limited to: engaging Indigenous communities to solicit information on Indigenous Knowledge and Indigenous land and resource use and cultural values to inform baseline conditions; providing Indigenous communities with draft sections of the IS / EA Report to illustrate how Indigenous Knowledge and information on Indigenous land and resource use and cultural values has been integrated and to confirm it has been presented appropriately, and completing collaborative working sessions with Indigenous communities for the effects assessment on Aboriginal and Treaty Rights and Interests. Further information on how potential effects on Indigenous rights will be assessed is provided in the Aboriginal and Treaty Rights and Interests Study Plan.





6. Assessment Boundaries

6.1 Temporal Boundaries: Project Phases

Project phases, which are temporal boundaries, are developed to establish the timeframes within which potential effects of the Project will be considered in the IS / EA Report. The Project is planned to occur in two phases, which are briefly described below and shown in **Figure 6-1**.

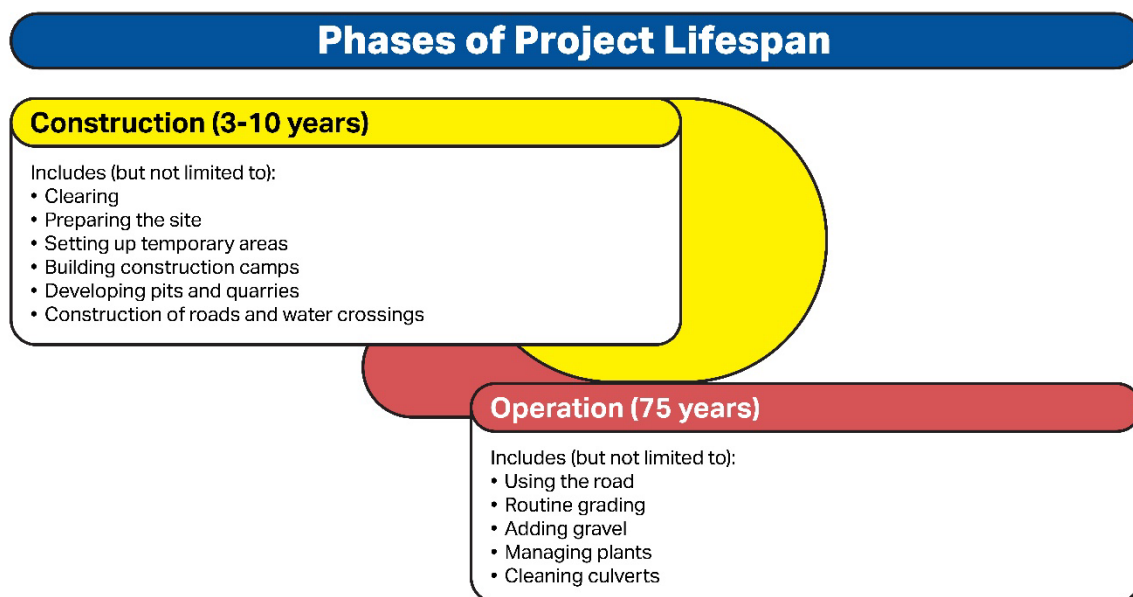
■ **Construction Phase:**

The time from start of construction, including site preparation activities, to the start of operations and maintenance of the CAR. Decommissioning of construction works is included in the construction phase. The construction phase is anticipated to take approximately 3 to 10 years to complete.

■ **Operations and Maintenance Phase:**

The operations and maintenance phase starts once construction activities are complete and lasts for the life of the Project. The operations and maintenance phase of the Project is considered to be 75 years based on the expected timeline for when major refurbishment of road components (e.g., bridges), is anticipated.

Figure 6-1: Project Schedule





There are currently no plans to decommission the CAR as there is no expected / known end date for its need. Therefore, future suspension, decommissioning and eventual abandonment of the CAR will not be considered in the IS / EA Report. It will be considered if and when a decommissioning or abandonment application is made for the road.

In determining the temporal boundaries, in particular the long operations and maintenance phase, consideration was given to the long-term effects on the well-being of present and future generations (Sustainability Principle #2⁶). The final temporal boundaries to be used in the IS / EA Report will be based on regulatory agency guidance, professional judgement and input received through the Project consultation process.

6.2 Spatial Boundaries: Study Areas

6.2.1 General Information

Study areas identify the geographic extents within which potential effects of the Project are likely to occur and will be considered in the IS / EA Report. The existing conditions and potential effects are documented for three study areas selected for the Project:

- **Project Development Area (PDA):** area of direct disturbance;
- **Local Study Area (LSA):** the area where most of the direct effects of the Project are likely to occur; and
- **Regional Study Area (RSA):** the area where indirect effects of the Project are likely to occur.

The PDA encompasses the 100 metre-wide CAR right-of-way (ROW), temporary construction access roads, work areas, worker camps, and pits, quarries and associated access roads. The preliminary LSA currently being considered within the scope of the ongoing provincial regulatory review process generally includes the area within 2.5 km of the centreline of Alternative 1 and Alternative 4. The preliminary study area generally allows for the documentation of existing conditions and prediction of potential environmental effects for the Project. A 5 km wide study area also allows for route refinements during development of Project design (e.g., adjustment of the alignment to avoid sensitive features).

6. *Sustainability Principles #2 is one of four sustainability principles included in Section 25 of the Project's TISG as further elaborated on Section 9.7.*





The specific location of Project components, including the roadway, quarries, pits and temporary infrastructure, are not yet known and will be included in the IS / EA Report. While most of the Project components are expected to be located within the preliminary 5 km wide study area, benefits (e.g., reduced environmental disturbance, avoidance of sensitive features, technical considerations, concerns received through consultation) for locating Project components on lands outside of the 5 km wide study area may become known during the IA / EA process. If the need to locate Project components outside the 5 km wide study area is determined to be required or of benefit to the Project, the study area would be adjusted.

The study area for each environmental discipline may vary from the above-described general study area based on the potential for the Project to directly or indirectly affect each environmental discipline; therefore, discipline-specific LSAs and RSAs have been defined for the Project. In defining the final LSAs and RSAs, each environmental discipline will consider:

- Location and other characteristics of the environmental discipline relative to the Project;
- The anticipated extent of the potential Project effects;
- Federal, provincial, regional, and local government administrative boundaries;
- Indigenous groups listed in **Table 4-1**;
- Community knowledge and Indigenous Knowledge;
- Current or traditional land and resource use by Indigenous communities;
- Exercise of Aboriginal and Treaty Rights of Indigenous peoples, including cultural and spiritual practices; and
- Physical, ecological, technical, social, health, economic and cultural considerations.

The study areas included in this document are preliminary, covering the extent to which readily available information suggests the Project may have noticeable effects on the environment. The size, nature and location of past, present and reasonably foreseeable projects will be taken into consideration in the development of the cumulative effects assessment study area(s). The appropriate study area(s) to assess cumulative effects are dependent on the VCs predicted to have direct residual adverse effects as a result of the Project, and therefore, cannot be defined until the IS / EA Report has sufficiently advanced.

As further detailed in **Section 4**, the Proponent will continue to provide opportunities for neighbouring Indigenous communities and interested persons to provide input and inform the effects assessment, including the LSAs and RSAs.





6.2.2 Surface Water Study Areas

The LSA and RSA boundaries for Surface Water are detailed in **Table 6-1** and shown on **Figure 6-2**.

Table 6-1: Surface Water Study Areas

Study Area	Geographic Extent	Rationale
Local Study Area	<ul style="list-style-type: none"> ■ 2.5 km buffer surrounding the PDA ■ May be refined following desktop analysis and input from other VCs that may indirectly affect Surface Water 	<ul style="list-style-type: none"> ■ To consider areas outside of the PDA where direct or indirect Project effects on surface water can occur (e.g., erosion and sedimentation, spills, leaching or deposition of blasting residue) ■ To account for potential shifts in route alignment or positioning of temporary infrastructure ■ To encompass the LSAs of other VCs that may affect surface water
Regional Study Area	<ul style="list-style-type: none"> ■ Quaternary watersheds crossed by the LSA ■ May be refined following desktop analysis and input from other VCs that may indirectly affect Surface Water 	<ul style="list-style-type: none"> ■ To consider potential regional-scale Project effects to surface water outside of the PDA and LSA, accounting for hydrological connectivity at the Quaternary subwatershed scale ■ To encompass areas of the LSAs of other VCs that may affect surface water

The LSA for Surface Water is consistent with the general LSA considered for the Project that generally includes the area within 2.5 km of the PDAs of Alternative 1 and Alternative 4, but is expanded to include a 2.5 km buffer around temporary infrastructure (e.g., pits and quarries, work camps). The buffer will account for waterbodies where direct interaction with Project components are not proposed, but where there is the potential for off-site direct or indirect Project effects that are measurable. The LSA for Surface Water encompasses the LSA for the other VCs that may affect surface water (see **Section 9.3**).

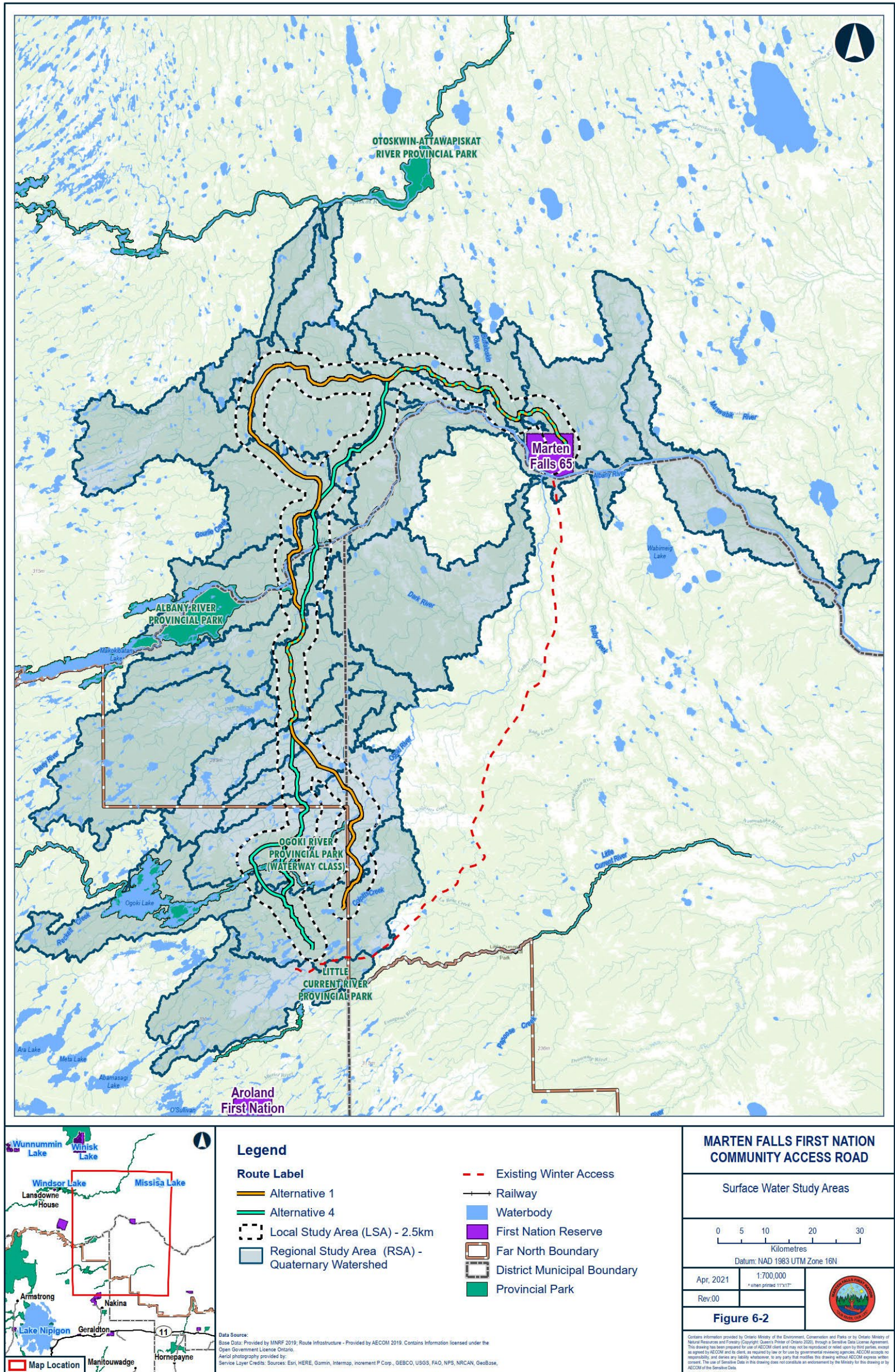
The RSA for Surface Water encompasses 21 quaternary watersheds crossed by the LSA. This area includes the area where surface water could potentially be affected by Project effects within the PDA and LSA as water flows downstream, and by regional indirect Project effects (e.g., potential regional-scale changes in groundwater-surface water interactions, changes to wetlands and peatland that could affect surface water, air quality changes resulting in long-distance transport and deposition of pollutants; see **Section 9.3**).

The boundaries of the LSA and RSA will be confirmed and refined based on findings of the Baseline Study to consider flows in rivers and dilution and assimilation in water bodies, as well as the potential extent of Project effects on other VCs that may indirectly affect Surface Water, as may be required for the Effects Assessment (**Section 9**).





Figure 6-2: Surface Water Local and Regional Study Areas





7. Baseline Study Design

7.1 Desktop Assessment

A desktop review of existing information will be completed to support the baseline characterization of surface water conditions and identify information gaps that will need to be addressed through further study. A preliminary list of applicable information sources is included in **Appendix A** and reflects federal and provincial guidance received to date. The information will include extensive field records that were obtained from the Cliffs Chromite Project Environmental Assessment project in 2011-2012 (Golder 2014), publicly available sources, new high resolution imagery for the study area (i.e., LiDAR that was flown for the Project in the spring of 2019), and the results of an aerial reconnaissance survey completed in September 2019 along the full extent of the route alternatives. Based on a preliminary review of the 2019 LiDAR and field reconnaissance surveys, the Project route alternatives cross approximately 100 to 120 waterbodies (i.e., approximately 50 to 60 waterbodies per alternative).

The desktop review will include descriptions of the data sources, data collection, sampling, survey and research protocols and methods for the existing relevant information sources as they relate to baseline conditions of surface water. The desktop analyses will also involve the delineation of watersheds for each of the relevant water body crossing locations. These watershed areas will be delineated using GIS mapping with available contour and digital elevation model information.

Potable surface water sources within the local and regional study areas will be identified and characterized as part of the background review for the surface water component (including a description of their current use, potential for future use, and whether their consumption has Indigenous cultural importance), with the understanding that Project-related effects on potable surface water sources will be assessed as part of the Human Health and Community Safety VC. Identification and characterization of springs is included in the assessment for the Groundwater VC.

This Study Plan focuses on the additional studies that are anticipated to be required to gather information beyond what is currently available through existing information sources including those as described in Section 7.2 'Sources of baseline information' in the Agency's TISG for this Project (the Agency 2020c). However, all relevant sources of information will be reviewed and data will be compiled and analyzed to develop the baseline characterization for the Surface Water VC.





7.2 Field Monitoring Activities

Field surveys will be completed at select waterbody crossings along the Project route to further define the characteristic surface water conditions in the LSA and RSA. This will include assessments of surface water quantity (e.g., flows, drainage patterns, channel morphology, hydraulics) and surface water and sediment quality. The results of the field surveys will be combined with the associated results from the desktop assessment to support the baseline characterization of the surface water environment.

7.2.1 Site Selection and Multi-Season Field Campaigns

The sites for field monitoring will be selected based on the findings of the desktop assessment, including the results of the aerial survey and the reconnaissance survey. Further to this, site selection will be informed by the preliminary waterbody crossing list (to be developed as part of the desktop analysis).

The site selection process will be based primarily on a 'scaled approach', with the objective of selecting a representative number of waterbody crossings under different categories of watershed size (i.e., four categories for watersheds: greater than 500 km², between 50 and 500 km², between 2 and 50 km², and less than 2 km²). The selection of sites will also consider:

- mapped and unmapped waterbody crossing locations;
- locations previously surveyed for the Noront Cliffs Project (i.e., sections of the route alternatives that overlap with the alignment of the Noront Cliffs Project route);
- distribution along the length of Alternative 1 and Alternative 4;
- distribution among the quaternary watersheds crossed by the PDA to the extent possible / practical;
- different types of waterbodies, ranging from large rivers (e.g., Albany River, Ogoki River) to small wadable streams;
- important features such as fish and fish habitat, areas of groundwater and surface water interactions, and areas of Indigenous cultural importance for consumption; and
- access (e.g., safety, suitability for aircraft landing, ice cover).

Future field monitoring is anticipated to be completed at 35% to 40% of the waterbody crossings identified during the desktop assessment. This ratio of crossing locations aligns with recent planning experience and regulator feedback on other EAs in northwestern Ontario. It also considers that the site-specific data would be used, to the extent possible, to extrapolate results from surveyed locations to non-surveyed sites. It is understood that, for permitting purposes, site-specific ground-based surveys will be required at all waterbody crossings where work





is anticipated to occur below the highwater mark during construction. Ultimately, the approach to the field data collection program for surface water has been tailored to the objectives of each stage of the Project. Ground-based field information will be initially obtained at a subset of waterbody crossings to advance the alternatives assessment and the EA, recognizing that data obtained from this subset of crossing locations over multiple seasons and years is expected to be more than sufficient to characterize baseline conditions and complete the effects assessment. Upon selection of a preferred alternative, supplemental surveys will be conducted at waterbody crossing locations that were not surveyed as part of the EA to support the preparation and submission of permit applications, where required. To this end, every waterbody crossing location where work is to occur below the highwater mark, will have site-specific ground-based surveys completed, either as part of initial investigations in support of the EA or during the supplemental surveys.

Waterbody crossings will be sampled and monitored in the spring and summer to characterize the seasonal patterns in flow and water quality, with the understanding that the spring field survey will be targeted during a period of high flow, while the summer field survey will be timed with a period of low flow. The existing field survey results from 2019 and 2020 (i.e., field data from 11 waterbody crossing locations in the summer of 2019 and 30 waterbody crossing locations in the fall of 2020), coupled with the previous field monitoring records from the Cliffs Chromite Project, will be relied on to further define the characteristic variability in surface water quantity and quality conditions.

Proposed locations for surface water field surveys and monitoring are listed in **Table 7-1** and illustrated on **Figure 7-1**.

Table 7-1: List of Surface Water Field Monitoring Locations

Water Body Crossings Targeted for Future Surface Water Field Surveys	Waterbody Name	Route	UTM Zone 16U		Mapped or Unmapped Water Body	Category of Water Body Size (Small, Medium, or Large)	Surveyed by Cliff's Team (Yes or No (-))
			Easting	Northing			
RA1-WC-1	-	Alternative-1	530917	5629153	Mapped	S	-
RA1-WC-2	-	Alternative-1	532382	5632976	Mapped	S	-
RA1-WC-4	-	Alternative-1	534432	5635846	Unmapped	S	-
RA1-WC-5	Ogoki River	Alternative-1	534174	5637961	Mapped	L	-
RA1-WC-09	-	Alternative-1	532606	5644605	Mapped	S	-
RA1-WC-14	-	Alternative-1	529515	5656013	Mapped	S	-
RA1-WC-16	-	Alternative-1	526864	5658007	Mapped	M	-
RA1-WC-23	Albany River	Alternative-1	521732	5691515	Mapped	S	Y
RA1-WC-26	-	Alternative-1	519376	5700621	Mapped	S	-
RA1-WC-27	-	Alternative-1	519244	5702193	Unmapped	L	Y
RA1-WC-28	-	Alternative-1	520172	5703819	Unmapped	S	-
RA1-WC-30	-	Alternative-1	520534	5709379	Mapped	S	-
RA1-WC-42	-	Alternative-1	519909	5721171	Mapped	S	-
RA1-WC-51	Wabassi River	Alternative-1	510970	5732829	Unmapped	L	Y





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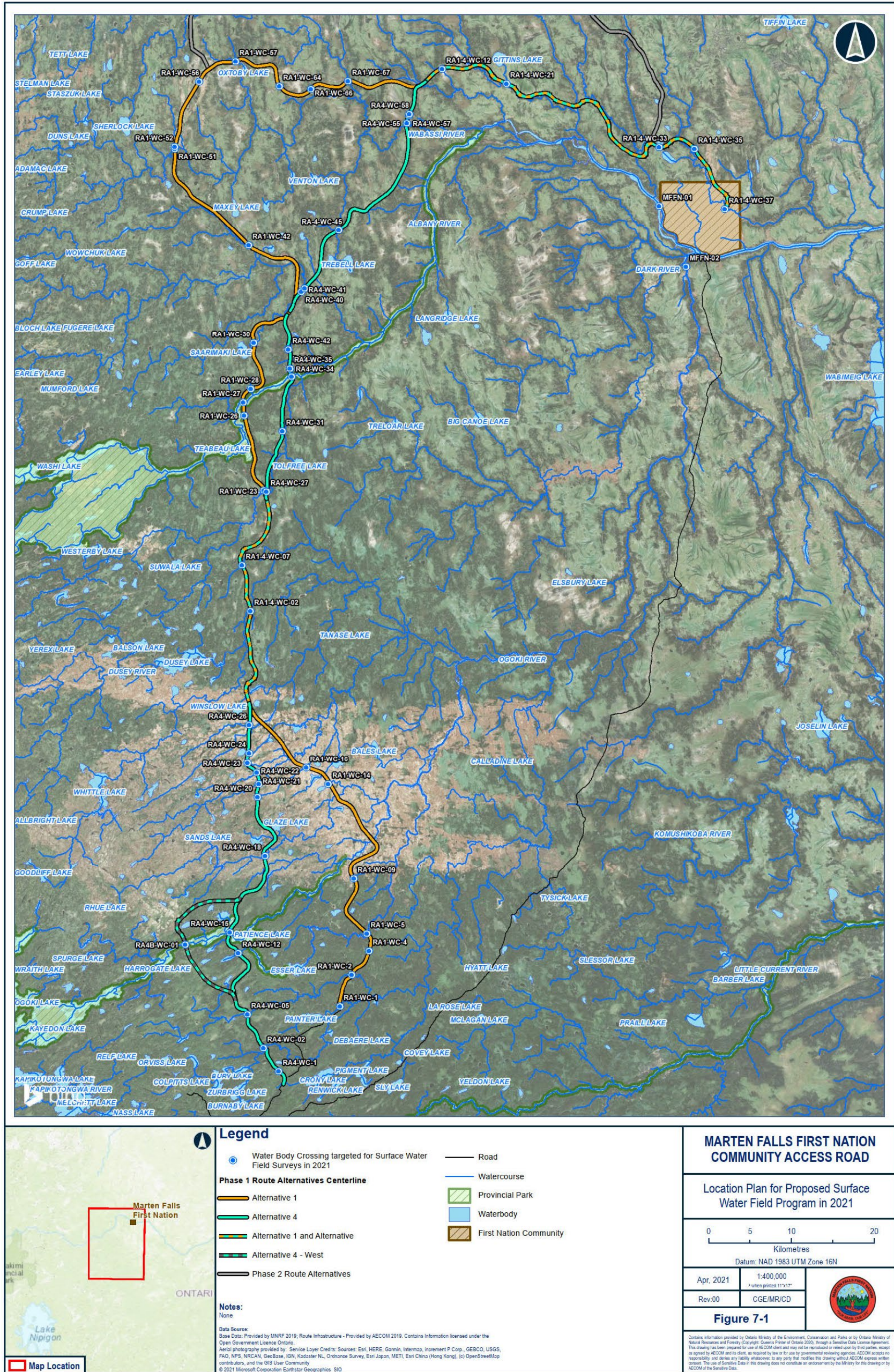
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Water Body Crossings Targeted for Future Surface Water Field Surveys	Waterbody Name	Route	UTM Zone 16U		Mapped or Unmapped Water Body	Category of Water Body Size (Small, Medium, or Large)	Surveyed by Cliff's Team (Yes or No (-))
			Easting	Northing			
RA1-WC-52	-	Alternative-1	510968	5733080	Unmapped	M	-
RA1-WC-56	-	Alternative-1	513924	5740981	Unmapped	S	-
RA1-WC-57	-	Alternative-1	518320	5743418	Mapped	M	-
RA1-WC-64	-	Alternative-1	523623	5740411	Unmapped	S	-
RA1-WC-66	-	Alternative-1	527414	5740047	Mapped	M	-
RA1-WC-67	-	Alternative-1	531917	5741009	Unmapped	S	-
RA4-WC-1	-	Alternative-4	523540	5621345	Unmapped	S	-
RA4B-WC-01	Ogoki River	Alternative-4	512247	5636612	Mapped	L	-
RA4-WC-02	Colpitts Creek	Alternative-4	521688	5624119	Mapped	L	Y
RA4-WC-05	-	Alternative-4	519747	5628176	Mapped	L	Y
RA4-WC-12	-	Alternative-4	518647	5635591	Mapped	M	Y
RA4-WC-15	Patience Lake	Alternative-4	517655	5638092	Mapped	L	Y
RA4-WC-18	-	Alternative-4	521894	5647392	Mapped	M	Y
RA4-WC-20	-	Alternative-4	520992	5654446	Unmapped	M	Y
RA4-WC-21	-	Alternative-4	521131	5656047	Unmapped	M	Y
RA4-WC-22	-	Alternative-4	520890	5657391	Mapped	L	Y
RA4-WC-23	-	Alternative-4	519751	5658577	Unmapped	M	Y
RA4-WC-24	-	Alternative-4	519967	5659797	Unmapped	S	Y
RA4-WC-26	-	Alternative-4	519974	5663183	Mapped	L	Y
RA4-WC-27	-	Alternative-4	522053	5691380	Mapped	L	-
RA4-WC-31	-	Alternative-4	523972	5698738	Mapped	S	-
RA4-WC-34	Albany River	Alternative-4	525100	5705282	Mapped	L	-
RA4-WC-35	-	Alternative-4	524911	5706281	Unmapped	S	-
RA4-WC-37	-	Alternative-4	524696	5708582	Unmapped	M	-
RA4-WC-40	-	Alternative-4	526271	5715544	Unmapped	S	-
RA4-WC-41	Gourlie Creek	Alternative-4	526664	5715962	Mapped	L	-
RA4-WC-42	-	Alternative-4	526664	5708581	Mapped	M	-
RA4-WC-45	-	Alternative-4	530801	5722972	Mapped	S	-
RA4-WC-55	Wabassi River	Alternative-4	539004	5735928	Mapped	L	-
RA4-WC-57	-	Alternative-4	539258	5736888	Unmapped	S	-
RA4-WC-58	-	Alternative-4	539324	5737051	Mapped	M	-
RA1-4-WC-02	Dusey River	Alternative-1-and-Alternative-4	520105	5676979	Mapped	L	Y
RA1-4-WC-07	-	Alternative-1-and-Alternative-4	519091	5682476	Mapped	L	Y
RA1-4-WC-12	-	Alternative-1-and-Alternative-4	543279	5742500	Unmapped	S	-
RA1-4-WC-21	-	Alternative-1-and-Alternative-4	551025	5740733	Unmapped	M	-
RA1-4-WC-33	-	Alternative-1-and-Alternative-4	569502	5733028	Mapped	S	-
RA1-4-WC-35	-	Alternative-1-and-Alternative-4	573750	5732816	Mapped	S	-
RA1-4-WC-37	-	Alternative-1-and-Alternative-4	577418	5725568	Mapped	S	-
MFFN-01	Albany River	N/A	569470	5725937	Mapped	L	-
MFFN-02	Ogoki River	N/A	572725	5718562	Mapped	L	-





Figure 7-1: Surface Water Field Monitoring Locations





7.2.2 Surface Water Quantity

The planned field surveys at the select waterbody crossing locations will include the following tasks to assess surface water quantity conditions, with the understanding that the assessments will be completed along a 100 m stretch of the waterbody (i.e., 50 m upstream and downstream of the crossing location):

- **General Waterbody Conditions and Channel Morphology** – A walkover will be completed along the full length of the study section to broadly define channel and flow characteristics. Visual inspections will be completed in the vicinity of the proposed crossing location to assess and document the characteristic bed and bank morphology including any erosion / deposition features, channel substrate, and riparian vegetation. The conditions at the water body will be documented every 25 m in photographs looking upstream and downstream with full view of the channel and the surrounding floodplain.
- **Channel Stability** – A Rapid Geomorphic Assessment will be completed at the channel site in accordance with the Ministry of Environment (MOE 2003) to provide a preliminary assessment of channel stability based on the presence or absence of various indicators of channel degradation, aggradation, widening, and planform adjustment. Instances of channel instability will be documented via photographs and field notes.
- **Channel Geometry** – Basic measurements of channel geometry will be taken at the proposed crossing, 50 m upstream of the crossing, and 50 m downstream of the crossing. The measurements will include estimates of bankfull width and depth, wetted width and depth, and side and channel slopes.
- **Instantaneous Streamflow** – Instantaneous streamflow will be estimated at a single cross-section of the waterbody in the vicinity of the crossing location using the velocity-area method. A tape measure will be extended across the length of the cross-section and streamflow velocities and corresponding water depths will be measured at discrete intervals along the cross-section using an electromagnetic or impeller flow meter and a wading rod. The intervals will be spaced to allow for approximately 20 water current velocity and depth readings with a minimal interval width of 0.1 m. Current velocities will be measured at 60% of the total water depth for water depths less than 0.50 m and at 20% and 80% of the total water depth for water depths greater than 0.50 m.
- **Basic Channel Topography and Bathymetry** – A basic topographic channel survey will be completed to provide data for coarse level hydraulic calculations at the planned crossing structures, as well as to define bathymetric conditions at the larger waterbody crossings that have





been targeted for bridge installations. Survey measurements will be taken using Real Time Kinematic level survey equipment and tied to a local benchmark installed and marked in the vicinity of the waterbody crossing location. The survey will target the proposed crossing location and include a few bed elevation shots at locations upstream and downstream of the crossing to define the characteristic channel slope and significant controls. Elevations within the channel will be surveyed at intervals of approximately 0.25 m to 0.5 m extending from the top of bank on each side of the stream. A higher level of detail (i.e., intervals of 0.25 m or less) will be used where bed or bank topography is noticeably more variable. Elevations within the channel will also be collected for the edge of water on each side of the water body. Elevations at the floodplain will be surveyed at intervals of approximately 5 m to 10 m. Prominent topographic high points along the length of the channel (e.g., riffles, beaver dam, existing crossing structures) will also be surveyed.

7.2.3 Surface Water and Sediment Quality

Surface water and sediment quality monitoring will be conducted to support baseline characterization and the assessment of potential Project effects on surface water quality.

The surface water quality monitoring will include field measurements of physicochemical parameters (i.e., temperature, pH, electrical conductivity, dissolved oxygen, turbidity) and the collection of surface water grab samples for laboratory analysis of relevant constituents identified in the TISG including pH, electrical conductivity, turbidity, alkalinity, hardness, total suspended solids, cations (H^+ , Mg^{2+} , Na^+ , Ca^{2+} , K^+ , NH_4^+ , CH_3Hg^+), anions (Cl^- , SO_4^{2-} , F^- , NO_3^- , HCO_3^- , CO_3^{2-} , PO_4^{3-}), total metals, oil and grease, nutrients (total phosphorus, total Kjeldahl nitrogen), and total and dissolved organic carbon (the Agency 2020c). Dissolved metals will not be included in the parameter list as total metals are used for direct assessment against water quality guidelines. Organic contaminants (i.e., volatile organic contaminants and poly-aromatic hydrocarbons) and radionuclides will be added to the parameter list at a limited set of waterbody crossing locations that are identified as an existing source of potable water as concentrations of these parameters are expected to be generally low in the subject environment. Monitoring parameters may be added or removed from the parameter list over the program based on a review of data (e.g., to remove parameters that are consistently below detection limits).

The sediment quality sampling will involve the collection of triplicate sediment samples for laboratory analysis of grain size, total metals and nutrients (total organic carbon, total phosphorus, total Kjeldahl nitrogen) on a single sampling event (in the spring or the summer). Seasonal or multi-year sampling for sediments is not proposed as sediment quality conditions are unlikely to change significantly over short timescales.





Field monitoring protocols will follow the Protocols Manual for Water Quality Sampling in Canada (Canadian Council of the Ministers of the Environment 2011) and the sample collection methods will be adjusted on a site-specific basis to consider the characteristics of the water body being sampled and to help ensure safety of the sampling crew. Wadable streams and ponds will be sampled by wading into the stream or pond, or by using an extension rod to sample from shore. Non-wadable rivers and lakes may be sampled by boat / watercraft. The sampling location within the waterbodies will be located as near to the centreline of the crossing as possible, provided that it is safe to do so. For larger rivers that require substantial water crossings, additional locations may be sampled along the width of the river to account for spatial variability.

The results from the three field campaigns are expected to provide a means of characterizing the baseline water quality and quantity parameters over varying climatic conditions to define the range of natural variability on a seasonal basis. It is anticipated that the Noront Cliffs data from 2011-2012 will help to further define the range of natural variability in surface water quantity and quality between seasons and years given that the Noront Cliffs project occurred in a similar geographic context as this Project.

7.2.4 Desktop Analyses for Hydrology

A desktop assessment will be completed for surface water quantity aspects of the baseline study. This desktop assessment will be used to define typical freeze / thaw cycles, ice cover, and ice conditions for the waterbody crossing locations, as well as to determine the characteristic climate conditions on a watershed basis. The desktop efforts will also be used to advance additional hydrologic and hydraulic analyses to support the environmental effects assessment and preliminary design for the Project. These hydrologic and hydraulic analyses are outlined in **Section 8.2**.





8. Data Management and Analysis

8.1 Data Management

Data management including quality assurance / quality control (QA / QC) will be employed to minimize potential for data entry and analysis errors, prepare data sets for analysis and limit sensitive data distribution in accordance to established agreements.

QC procedures will adhere to recommendations of CCME (2011) for sample collection. For surface water quality, QC samples will be collected to include travel blanks, field blanks and duplicate samples. For sediment quality, QC samples will be collected to include duplicate samples only. The total number of QC samples will represent a minimum of 10% of the total samples collected during the program. The QC samples will be submitted “blind” to the laboratory for analysis of the full suite of water quality parameters being analyzed for the program.

Water and sediment samples will be analyzed at a Canadian Association for Laboratory Accreditation certified laboratory, where possible, and using the lowest feasible method detection limit.

A standard spreadsheet software package, such as MS-Excel, will be used to manage and analyze surface water data collected for the Project. Field sheets and laboratory-issued data files including Laboratory Certificates of Analysis and original electronic data files will be archived as reference materials.

8.2 Data Analysis

8.2.1 Surface Water Quantity

The data analysis for hydrology will include preliminary sizing of hydraulic structures to support design. These sizing estimates will be based on provincial and federal design criteria including freeboard, velocity, and navigation criteria as required. Where possible, one-dimensional modelling tools (i.e., CulvertMaster, HEC-RAS) or basis calculations (Mannings or equivalent) will be used to determine the appropriate preliminary hydraulic structure type and size at each crossing location. Data collected during the future field campaigns will be used to inform calculations and modelling exercises during the detailed design and permitting phases of the Project.

The data analysis for hydrology will also involve the derivation of design flows / floods at each waterbody crossing to inform the preliminary sizing estimates for the crossing structures, as well as to build on the





baseline studies for surface water. Provincially accepted hydrologic methods will be used to determine the design flows. The hydrologic method chosen is based on the size and complexity of the specific watershed (e.g., Rational Method or Northern Ontario Hydrology Method for small crossings, gauging streams for large crossings). Un-gauged watersheds may be estimated by using regional index stream methods where data from nearby gauged watersheds with similar runoff characteristics can be used to estimate the design flows in the un-gauged watershed.

The results from the data analysis for hydrology will be used to develop a preliminary design report. This report will include details on the preliminary sizing estimates for the waterbody crossing structures (e.g., design flows, structure type, structure size) The information will be updated as part of the detailed design phase of the Project.

8.2.2 Surface Water and Sediment Quality

Surface water quality data will be summarized by crossing location, season, and year using descriptive statistics. Where applicable, water quality parameters will be compared to Provincial Water Quality Objectives (PWQO; Province of Ontario 1994) and Canadian Water Quality Guidelines (CWQG) for the Protection of Aquatic Life (CCME 1999a), and the more stringent of the two will be acknowledged. Water quality parameters will also be compared to Ontario Drinking Water Quality Standards (ODWQS; O. reg. 169/03 under the *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32) and Guidelines for Canadian Drinking Water Quality (Health Canada 2019) for water bodies used or potentially used as a source of potable water (including sources of Indigenous cultural importance for consumption), and the more stringent of the two criteria will be acknowledged.

Sediment quality data will be summarized by site using descriptive statistics. Where applicable, sediment quality parameters will be compared to Provincial Sediment Quality Guidelines (MOE 1993) and Canadian Sediment Quality Guidelines for the Protection of Aquatic Life (CCME 1999b), and the more stringent of the two criteria will be acknowledged.

Surrogate baseline data from reference sites may be used to characterize water and sediment quality conditions at sites with no site-specific data. The reference site or sites will be selected based on a comparison of physical water body characteristics that influence water and sediment quality (e.g., catchment area, flows, land cover and soil types; waterbody type and geographic location) and the representativeness of the surrogate data will be described. If baseline data are extrapolated or otherwise manipulated to depict surface or sediment quality conditions within the study area for water bodies that were not directly monitored, data extraction and manipulation methods will be described and include assumptions, calculations of margins of error and other relevant statistical information.





9. Effects Assessment

The following sections provide discipline-specific input and considerations as they pertain to the methodology for the effects assessment. The Project is in the early stage of the IS / EA Report preparation and it is expected that the effects assessment methodology will be refined iteratively based on regulatory agency guidance, professional judgment and input received through the Project consultation and engagement process.

9.1 Project-Environment Interactions

The Project activities that may result in changes to the environment are described within the identified temporal and spatial boundaries (**Section 6**). This includes identification of both direct and indirect changes by comparing the existing setting to the conditions anticipated to occur as a result of the Project. For each environmental discipline, the likely Project-environment interactions will be identified based on professional judgment, activities listed in TISG Section 3.2 (the Agency 2020c) as well as projects of similar magnitude and / or location.

A preliminary analysis of Project-environment interactions for Surface Water is provided in **Table 9-1** and will be confirmed during the IA / EA process to identify the Project-environment interactions that are likely to have a potential effect, and to identify measures to avoid or minimize potential negative effects and enhance benefits.

Table 9-1: Project – Environment Interactions

Project Phases	Project Activities	Surface Water
Construction Phase	<i>Mobilization of Equipment and Supplies</i>	
	<i>Temporary Construction Staging Areas¹</i>	x
	<i>Temporary Access Roads and Trails¹</i>	x
	<i>Temporary Construction Camps¹</i>	x
	<i>ROW Clearing and Grubbing</i>	x
	<i>Brush and Timber Disposal</i>	
	<i>Pits and Quarries¹</i>	x
	<i>Drilling / Blasting / Aggregate Production</i>	x
	<i>Road Construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)</i>	x
	<i>Bridge and Culvert Installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)</i>	x
	<i>Construction Site Restoration</i>	x
Construction Phase: Decommissioning	<i>Pits and Quarries</i>	x
	<i>Temporary Camps, Roads / Trails and Staging Areas</i>	x





Project Phases	Project Activities	Surface Water
Operations Phase	Road Usage	x
	Maintenance ²	x

Notes: 1. Includes construction and use of
 2. Includes General Maintenance (e.g., grading, erosion control, quarrying, borrow pits), Seasonal Maintenance (e.g., snow clearing, bridge and culvert maintenance), and Special Maintenance (e.g., slope failures, road settlement / break-up).

9.2 Valued Components and Indicators

VCs are the environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties (the Agency 2020b). Indicators represent the resource, feature, or issue related to the VC that, if changed, may demonstrate an effect on the environment. The indicators and rationale for selection and measurement of potential effects, to be used to assess and evaluate the alternative routes in the IS / EA Report are provided in **Table 9-2**. The table includes both quantitative and qualitative indicators. The final list of VCs and indicators to be used in the IS / EA Report will be based on regulatory agency guidance, professional judgement and input received through the Project consultation and engagement process.

The Surface Water VC has been determined through consideration of the following factors listed in the TISG⁷:

- VC presence in the study area;
- the extent to which the VC is linked to the interests or exercise of Aboriginal and Treaty Rights of Indigenous peoples, and whether an Indigenous group has requested the VC;
- the extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the VC;
- the extent to which the VC may be under cumulative stress from other past, existing or future undertakings in combination with other human activities and natural processes;
- the extent to which the VC is linked to federal, provincial, territorial or municipal government priorities (e.g., legislation, programs, policies);

7. The TISG also states that information from ongoing and completed regional assessments in the proposed area of the Project should be used to inform VCs for the Project. In February 2020 a regional assessment of the Ring of Fire region commenced; however, it is not sufficiently advanced at this time to inform the Project VCs. The VCs will be consulted and engaged on early in the IA/ EA process and finalized taking into consideration the input received. Therefore, only information relevant to the Project that arises from the regional assessment of the Ring of Fire within an appropriate timeline will inform the VCs for the Project.





- the possibility that adverse or positive effects on the VC would be of particular concern to Indigenous groups, the public, or federal, provincial, territorial, municipal or Indigenous governments; and
- whether the potential effects of the Project on the VC can be measured and / or monitored or would be better ascertained through the analysis of a proxy VC.

Inputs received to date from Indigenous communities, agencies and interested persons through the Consultation and Engagement Program, including inputs received on the Draft ToR, have also been used to inform the selection of the VCs and indicators for Surface Water.

Table 9-2: Surface Water Indicators

Valued Component	Indicators	Rationale for Selection
Surface Water	<ul style="list-style-type: none"> ■ Surface Water Quantity: <ul style="list-style-type: none"> – changes in drainage patterns – changes in flow – changes in water levels – changes in channel hydraulics – changes in channel stability or erosion-sedimentation processes 	<ul style="list-style-type: none"> ■ Importance for the protection of aquatic habitat ■ Importance for potable water supplies ■ Importance for areas of Indigenous cultural importance for consumption ■ Directly linked to surface water and sediment quality ■ Directly linked to groundwater quality and quantity and affects groundwater-surface water interactions
	<ul style="list-style-type: none"> ■ Surface Water Quality: <ul style="list-style-type: none"> – change in physical parameters (temperature, turbidity, total suspended solids) – change in chemical parameters (pH, electrical conductivity, alkalinity, hardness, dissolved oxygen major and minor ions, trace metals, nutrients, dissolved organic carbon organic compounds, radionuclides, oil / grease) 	<ul style="list-style-type: none"> ■ Importance for the protection of aquatic habitat ■ Importance for potable water supplies ■ Importance for areas of Indigenous cultural importance for consumption ■ Directly linked to sediment quality ■ Directly linked to groundwater quality
	<ul style="list-style-type: none"> ■ Sediment Quality: change of physical and chemical characteristics of sediment 	<ul style="list-style-type: none"> ■ Importance for the protection of aquatic habitat ■ Directly linked to surface water quality

9.3 Potential Effects

A direct effect occurs through the direct interaction of an activity with an environmental discipline. The Project-environment interactions currently anticipated, based upon preliminary analysis, to result in direct effects to Surface Water have been identified in **Table 9-1**. The potential direct effects resulting from the Project-environment interactions will be confirmed during the IA / EA process and will be based on input





received through the Indigenous Knowledge Program and Consultation and Engagement Program, regulatory agency guidance, and professional judgement.

An indirect effect occurs when a change to one environmental discipline resulting from a Project activity causes a change to another environmental discipline (e.g., changes in surface water quality and quantity could indirectly affect wildlife). **Table 9-3** provides a preliminary identification of how changes to Surface Water may result in indirect effects to other environmental disciplines.

Direct effects of the Project to surface water that alter hydrology and water quality can have indirect effects on abiotic and biotic features and functions. Changes in the quality and quantity of surface water can affect the quality and quantity of water that is available for groundwater recharge. Hydrological changes can also affect Physiography, Geology, Terrain and Soils by altering physical processes such as erosion, leaching of minerals and nutrients, and the decomposition of organic matter. Changes to flow, fluvial geomorphic processes, freeze-thaw patterns and water quality can affect the availability and quality of water and ice to support Wildlife, Fish and Fish Habitat, and Vegetation VCs.

Project effects on surface water can also indirectly affect human valued components. Effects on Aboriginal and Treaty Rights and Interests can occur where changes affect surface water of cultural spiritual significance and the availability and quality of traditional foods and medicine. Surface water changes can also affect the quantity and quality of water for Land and Resource Use including water to support recreation and tourism. Human Health and Community Safety can be affected by changes to quality and quantity of drinking water sources and food (i.e., fish and game). Changes to ice conditions potentially caused by project-related activities can also pose safety issues for winter travel and recreation on water bodies.

Surface water may be indirectly affected by changes to other environmental disciplines. The Atmospheric Environment can affect water quality by aerial deposition of pollutants from Project activities directly to surface water bodies or to the terrestrial environment where pollutants can be transported to water bodies with runoff. Changes to Physiography, Geology, Terrain and Soils as well as Vegetation can alter flow patterns and the interaction of water with soils and vegetation thereby affecting hydrology and water quality. Changes to Groundwater that affect the quality or quantity of groundwater can affect surface water in areas with prominent groundwater-surface water interactions (e.g., springs, groundwater-dominated baseflow periods at permanent watercourses). Land and Resource Use that may be affected by the Project, such as expansion of industry (i.e., forestry, extraction, recreation and tourism) can affect surface water due to water consumptive use and potential for pollution associated with those industries.





Table 9-3: Potential Discipline Interactions

Discipline and Associated Valued Components	Aboriginal and Treaty Rights and Interests	Atmospheric Environment	Acoustic and Vibration Environment	Physiography, Geology, Terrain and Soils	Surface Water	Groundwater and Geochemistry	Vegetation	Wildlife	Fish and Fish Habitat	Social	Economy	Land and Resource Use	Human Health and Community Safety	Visual Aesthetics	Archaeological and Cultural Heritage
Surface Water	X	-	-	X		X	X	X	X	-	-	X	X	-	-

Notes: X = Potential pathway for indirect effect as a result of the Project.
 - = No pathway for indirect effect is anticipated as a result of the Project.





9.4 Methods for Predicting Future Conditions

With respect to quantitative models and predictions, the IS / EA Report must detail the model assumptions, parameters, the quality of the data and the degree of certainty of the predictions obtained.

9.4.1 Surface Water Quality

Quantitative and qualitative methods will be used to infer spatial and temporal (i.e., over Project life cycle) changes to surface water quality at potential receptor locations, including traditional land users, due to all Project components and physical activities including changes to physicochemical parameters (temperature, pH, salinity, dissolved oxygen, turbidity, dissolved organic carbon, total suspended solids) and chemical constituents (major and minor ions, trace metals, nutrients, organic compounds). Project activities to be considered will include all Project-related effluent streams. Water quality parameters for potable sources of water will be compared to ODWQS and CWQGs. Note that requirements for an Environmental Compliance Approval for sewage works discharge to surface water are beyond the scope of an effects assessment and would be considered in the design / permitting stage, if required.

Qualitative methods will be used to assess potential effects of the Project to surface water quality based on an understanding of baseline surface water quality, likely parameters / contaminants of potential concern associated with different Project activities, and consideration of mitigation measures inherent to the Project design.

9.4.2 Hydrology

Project-related effects on hydrology will be assessed, where possible, based on the proportion of the catchment area for a given waterbody that is expected to be disturbed or influenced by Project activities. This approach considers drainage area as a proxy or analog for streamflow and, to a lesser extent, the potential for sediment erosion and transport. Mitigation measures may be designed to offset negative impacts.

9.5 Mitigation and Enhancement Measures

Once potential effects have been identified, the effects assessment will explore technically and economically feasible mitigation measures to avoid or minimize the identified negative effects and enhancement measures to increase positive effects beyond those that are already inherent to the design.





These measures will consist of industry-standard practices, federal and provincial standard specifications, regulator-mandated measures, best management practices, Indigenous and community recommendations and recommendations from industry and environmental professionals based on expertise, scientific publications, experience and judgement.

It is important that mitigation and enhancement measures are achievable, measurable and verifiable and monitored for compliance and effectiveness during all temporal phases as part of the Project follow-up monitoring plan. Required environmental monitoring will verify the potential environmental effects predicted in the IS / EA Report, evaluate the effectiveness of mitigation and enhancement measures, and identify the process the Proponent will follow if mitigation and enhancement measures are not effective.

9.5.1 TISG Section 20 Requirements

Mitigation requirements will be provided in the IS / EA Report and will include the general requirements for all VCs in addition to requirements that are specific to Surface Water as set out in Section 20 of the TISG (the Agency 2020c). The requirements specific to Surface Water are as follows:

- A description of the Sediment and Erosion Control Plan, including the proposed mitigation measures and their effectiveness on the contaminants of concern affecting Surface Water;
- Identification of measures to avoid the deposit of substances harmful to fish or migratory birds in water; and
- Identification of measures to prevent surface water conditions at water crossings (i.e., culverts) from negatively impacting freshwater fish movement (e.g., due to flow, debris, or “perching”).

9.6 Residual Effects

Residual effects are the effects remaining after the application of mitigation measures. The IS / EA Report will describe in detail the potential adverse and positive residual effects in relation to each temporal phase of the Project (e.g., construction, operation). Residual effects will be described using criteria to quantify or qualify adverse and positive effects, taking into account any important contextual factors. The residual effects will therefore be described in terms of the direction, magnitude, geographic extent, duration, frequency, likelihood, and whether effects are reversible or irreversible⁸. Ecological and socio-economic

8. TISG Section 13.1 identifies additional effects characteristics for certain disciplines (e.g., wetlands, birds, terrestrial wildlife, species at risk). These additional effects characteristics are described in the respective discipline-specific study plans.





context may also be relevant when describing a residual effect. Context relates to the existing setting, its level of disturbance and resilience to adverse effects. Context can also relate to timing as it applies to assessing the worst-case scenario (e.g., effect during migratory or calving season for wildlife). Where appropriate, information regarding residual effects will be disaggregated by sex, gender, age and other community relevant identifying factors to identify disproportionate residual effects for diverse subgroups.

For magnitude, environmental discipline-specific definitions are required and are proposed below in **Table 9-4 and Table 9-5**. The magnitude of anticipated effects for hydrology and surface water quality will be assessed from a largely qualitative standpoint with a plan to evaluate change in surface water indicators from existing conditions and in consideration of natural variability (as defined by the results of the baseline studies) and the design methodology for the Project (including all of the incorporated best management practices and mitigation).

For hydrology, the magnitude of anticipated effects will be based on the proportion of the catchment area for a given waterbody that is expected to be disturbed or influenced by Project activities. This approach considers drainage area as a proxy or analog for streamflow and, to a lesser extent, the potential for sediment erosion and transport. More specifically, the rationale for an effects magnitude of 'Low' (identified in **Table 9-4 and Table 9-5**) reflects the level of reliability of typical flow monitoring instrumentation (i.e., +/- 15%), coupled with observations and inferences from the literature that suggest minimal changes (if any) in streamflow and channel stability as a result of land disturbance if less than approximately 20% of the contributing drainage area is disturbed or influenced.

For surface water and sediment quality, the magnitude of anticipated effects will also consider the following federal and provincial water and sediment quality guidelines and objectives:

- CWQGs for the Protection of Aquatic Life, PWQOs, Guidelines for Canadian Drinking Water Quality and ODWQs as may be applicable for surface water quality parameters; and
- Provincial Sediment Quality Guidelines and Canadian Sediment Quality Guidelines for the Protection of Aquatic Life as may be applicable for sediment quality parameters.

For parameters with multiple guidelines or objectives, the most stringent guideline or objective will be relied on for the assessment.





Table 9-4: Magnitude Definition for Surface Water Quantity (Hydrology)

Magnitude Level	Definition ¹	Rationale
Negligible	There is little to no variation predicted in indicator parameters, meaning that, where applicable for a given water body, the proportion of the catchment area disturbed or influenced by a specific Project activity is < 5%. As such, indicator parameters are expected to remain within the range of natural variation.	No discernable changes to hydrology, and, hence, no anticipated changes to aquatic life or potable sources of water.
Low	There is a small variation predicted in indicator parameters, meaning that, where applicable for a given water body, the proportion of the catchment area disturbed or influenced by a specific Project activity is between 5% and 20%. As such, the indicator parameters are expected to vary to within the upper or lower limits of, or just outside, the range of natural variation.	Changes to hydrology are discernable, but it is anticipated that surface water quantity conditions remain protective of aquatic life and potable sources of water.
Medium	There is a moderate variation predicted indicator parameters, meaning that, where applicable for a given water body, the proportion of the catchment area disturbed or influenced by a specific Project activity is between 20% and 50%. As such, the indicator parameters are expected to vary outside the range of natural variation.	Changes to hydrology are discernable and / or statistically significant, but it is anticipated that surface water quantity conditions remain protective of aquatic life and potable sources of water.
High	There is a large variation predicted in indicator parameters, meaning that, where applicable for a given water body, the proportion of the catchment area disturbed or influenced by a specific Project activity is greater than 50%. As such, indicator parameters are expected to vary outside the range of natural variation.	Changes to hydrology are discernable and / or statistically significant and may impair aquatic life or potable sources of water.

Notes: 1. The relative (percent) change may be modified as appropriate for specific parameters of interest to consider measurement / monitoring instrumentation error, laboratory detection limits, accepted practice or findings in the scientific literature, and professional judgement.

Table 9-5: Magnitude Definition for Surface Water and Sediment Quality

Magnitude Level	Definition ¹	Rationale
Negligible	There is little to no variation predicted in indicator parameters and, as such, the indicator parameters are expected to remain within the range of natural variation.	No changes to surface water and / or sediment quality are discernable, and, therefore, no changes to aquatic life or potable sources of water are anticipated.
Low	There is a small variation predicted in the indicator parameters such that the indicator parameters are expected to vary within or just outside the range of natural variation (i.e., by less than 20% outside the range of natural variation), but remain below applicable guideline/objective or threshold values (assuming that indicator parameters satisfy the relevant guideline/objective or threshold values under existing conditions).	Changes to surface water and / or sediment quality are discernable but are anticipated to remain protective of aquatic life and potable sources of water.





Magnitude Level	Definition ¹	Rationale
Medium	There is a modest variation predicted in the indicator parameters such that indicator parameters are expected to vary outside the range of natural variation (i.e., by 20% to 50%), but remain below the applicable guideline / objective or threshold values (assuming that indicator parameters satisfy the relevant guideline / objective or threshold values under existing conditions).	Changes to surface water and / or sediment quality are readily discernable, and, where applicable, of potentially statistical significance, but are anticipated to remain protective of aquatic life and potable sources of water.
High	There is a large variation predicted in the indicator parameters such that indicator parameters are expected to vary outside the range of natural variation (i.e., by more than 50%), and / or, exceed applicable guideline / objective or threshold values.	Changes to surface water and / or sediment quality are readily discernable and / or could potentially impair aquatic life or potable sources of water.

Notes: 1. The relative (percent) change may be modified as appropriate for specific parameters of interest to consider measurement / monitoring instrumentation error, laboratory detection limits, accepted practice or findings in the scientific literature, and professional judgement.

9.7 Consideration of Sustainability Principles

The following provides a generic description of how sustainability principles will be considered in the effects assessment. The extent to which sustainability principles apply to a specific VC will vary depending on the nature of the VC and the potential for Project effects on the VC.

The effects assessment approach for the Project has included the consideration of the sustainability principles outlined in the Project TISG and the Agency’s guidance on sustainability. The sustainability principles that have been considered include:

1. Consider the interconnectedness and interdependence of human-ecological systems;
2. Consider the well-being of present and future generations;
3. Consider positive effects and reduce adverse effects of the Project; and
4. Apply the precautionary principle by considering uncertainty and risk of irreversible harm.

The interconnectedness and interdependence of human-ecological systems will be considered through the assessment of potential indirect effects of each alternative. An indirect effect occurs when a change to one environmental discipline resulting from a Project activity causes a change to another environmental discipline (e.g., changes in vegetation could indirectly affect wildlife). A preliminary assessment of indirect effects has been included in **Section 9.3**.





The well-being of present and future generations will be considered in the effects assessment through the application of the long-term operations phase temporal boundary of 75 years (**Section 6.1**) and through the effects characteristics description of duration and reversibility for each residual effect predicted.

The consideration of positive effects and reducing adverse effects of the Project is fundamental to the effects assessment methodology through the identification of mitigation measures to reduce potential adverse effects and the identification of the preferred alternative through the evaluation of advantages (e.g., positive effects) and disadvantages (e.g., adverse effects).

The effects assessment will apply the precautionary principle by clearly describing and documenting all uncertainties and assumptions underpinning the analysis and identifying information sources. The effects assessment will consider risk of irreversible harm through the effects characteristics description of reversibility for each residual effect predicted and will describe any uncertainty associated with the assessment of residual effects.

The scope of the sustainability assessment will be defined by issues of importance identified by Indigenous communities and interested persons through consultation and engagement activities, while also ensuring to be inclusive of the diversity of views expressed. The selection of VCs that will be the focus of the sustainability assessment will be aligned with the issues of importance identified by Indigenous communities and interested persons, as well as residual effects identified through the effects assessment process. The sustainability assessment will describe how the planning and design of the Project, in all phases including follow-up monitoring, considered the sustainability principles.

9.8 Consideration of Identity and Gender-Based Analysis Plus in Effects Assessment

The Proponent recognizes that communities and sub-populations within those communities may be impacted differently by the Project with respect to VCs and indicators. As such, the Project aims to collect baseline information for the purpose of assessing differential effects and establishing relevant mitigation measures, as further elaborated on in **Section 4.3**. Gender-Based Analysis Plus will not be limited to community feedback, when offered or discussed in secondary texts, additional sub-population information as is applicable to the relevant assessment will be incorporated.





9.9 Follow-up Programs

A follow-up monitoring program will be used to verify the accuracy of the effects assessment and evaluates the effectiveness of mitigation measures. Identification of follow-up programs for the Project are not described in this Study Plan as the information needed to determine environmental monitoring requirements is dependent on the outcome of the effects assessment and consultation with Indigenous communities, agencies and interested persons. Therefore, the Proponent will include information on follow-up programs that addresses the requirements outlined in Section 26 of the TISG (the Agency 2020c), in the IS / EA Report and will identify the compliance and effects monitoring activities to be undertaken during all phases of the Project, as required.

9.9.1 TISG Section 26 Requirements

A follow-up program will be developed to verify the accuracy of predicted Project effects and to evaluate the effectiveness of the mitigation measures for Surface Water if required in consideration of the following:

- predicted or uncertain residual adverse Project effects to Surface Water;
- the nature of concerns raised by the public and Indigenous groups about the Project;
- the accuracy of predictions;
- an evaluation of the effectiveness of mitigation measures;
- the efficacy of new or unproven techniques and technology;
- the nature of cumulative effects;
- the degree of uncertainty about the effectiveness of proposed mitigation measures;
- any technically and economically feasible measures to manage effects if the applied mitigation measures do not work as intended; and
- whether there was limited scientific knowledge about the effects in the impact assessment.





10. Assumptions

Any assumption used in the effects assessment, for example the assumed average daily traffic on the CAR, will be clearly identified and a rationale provided in the IS / EA Report.





11. Concordance with Federal and Provincial Guidance

This section provides the best information currently available on how federal and provincial requirements identified for the Project to date will be addressed. The final concordance with federal and provincial requirements will be included in the IS / EA Report, and will be based on regulatory agency guidance, professional judgement and input received through the Project consultation and engagement process.





Table 11-1: Study Plan Federal Concordance – Conformance with Requirements

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
1	TISG Section 8.6	■ Provide the timing of freeze/thaw cycles, ice cover, and ice conditions for surface water bodies in the Project area	■ Characteristic ice conditions and freeze / thaw cycles for the LSA / RSA will be determined based on available climate data, and where possible, observations from the planned field surveys.	■ Section 7.2.2
2	TISG Section 8.6	■ Develop a quantitative surface water balance for components of the Project that may result in significant changes to surface water flow patterns (e.g., large quarry/aggregate extraction/stockpiles).	■ Water balance analyses will be advanced to support groundwater studies at a discrete set of the proposed quarry/aggregate sites. The scope of work to conduct these water balance assessments has been documented in the Ground Water Study Plan.	■ Section 7.2.2
3	TISG Section 8.6	■ Identify all springs and any other potable surface water resources within the local and regional project areas and describe their current use, potential for future use, and whether their consumption has Indigenous cultural importance.	■ The identification and characterization of springs is included in the study plan for the Groundwater VC. ■ The identification and characterization of surface water drinking sources is captured in the Surface Water VC, with the understanding that Project-related effects on these drinking water sources will be addressed in the Human Health and Community Safety VC.	■ Section 7.1 ■ Section 8.1.2
4	TISG Section 8.6	■ Describe the surface water quality baseline characterization program, including sampling site, selection, monitoring duration and frequency, sampling protocol, and analytical protocol, including quality assurance and quality control measures.	■ The updated version of the Surface Water Study Plan includes the full details of the proposed surface water field program. The specific monitoring locations, frequency and duration of sampling activities and measurements, and the relevant parameter list and QA / QC protocols for water and sediment quality testing has been aligned with Section 8.6 of the TISG and past communications with the regulatory agencies, noting, in particular, that streamflow and water quality monitoring will be conducted at a subset of water body crossing locations (approximately 40% of the total number of crossing locations) over multiple seasons and varying catchment scales to characterize the natural variation in flow and water quality conditions, as well as to inform the preliminary design efforts.	■ Section 7.2.1.3
5	TISG Section 8.6	■ Provide baseline surface water quality data, for a minimum of two years, for physicochemical parameters (temperature, pH, electrical conductivity, dissolved oxygen, turbidity, suspended solids) and relevant chemical constituents (major and minor ions, trace metals, radionuclides, nutrients, and organic compounds, including those of potential concern); the data should illustrate the seasonal and inter-annual variability in baseline surface water quality, including possible changes due to groundwater–surface water interactions.	■ A comprehensive surface water baseline monitoring/investigation program is proposed for the Surface Water VC. The details of this program are described in the updated version of the Surface Water Study Plan, noting, in particular, that streamflow and water quality monitoring for the future field campaigns will be conducted at a subset of water body crossing locations in the spring and summer to further characterize the natural variation in flow and water quality conditions. The results from the completed and planned field campaigns over multiple seasons and years are expected to provide a means to define the characteristic range of natural variation in flows and the water quality parameters of interest, recognizing that, to the extent possible, data from surveyed crossing locations will be extrapolated to non-surveyed sites with similar catchment areas, physiography, and flow regimes. In addition, it is anticipated that the ground-based field surveys conducted in 2011-2012 by Golder in support of the Cliffs Chromite Project (Project EA since terminated) will help to further augment this understanding of natural fluctuations of baseline surface water and aquatic conditions, both on an inter- and intra-annual basis, given that these previous studies occurred in a similar geographic setting as the Project, and, in many cases, the locations of waterbody crossings overlap.	■ Section 7.2.1
6	TISG Section 8.6	■ Provide baseline sediment quality and characteristic data for key surface water sites likely to be effected by the road (i.e., from runoff, spills, erosion and sedimentation, etc.).	■ A comprehensive surface water and sediment quality baseline monitoring / investigation program is proposed for the Surface Water VC.	■ Section 7.2.1
7	TISG Section 14.2	■ Provide a project-specific water use assessment identifying and describing the quantity and quality of water resources potentially affected by the Project, including: – any withdrawal of groundwater or surface water; changes to the groundwater recharge/discharge areas; – temporal and spatial changes in groundwater quantity, quality and flow (e.g., long-term changes in water levels), including how these changes may relate to domestic, communal or municipal water supply wells; – the flow or volume of water available in the water bodies; and – how any waste waters or dewatering water would be managed and where it would be discharged.	■ The effects assessment for the Surface Water VC will consider all Project-related uses of, and interactions with, surface water resources (e.g., water takings or other), with potential implications on the quantity or quality of surface water in the receiving environment. Any required regulatory approvals to address the withdrawal or discharge of surface water (e.g., ECA, PTTW, EASR) will be addressed as part of the permitting stage of the Project. ■ The study plan for the Groundwater VC should be referred to for all groundwater-related comments.	■ Section 9.9; Groundwater VC Study Plan





ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
8	TISG Section 14.2	<ul style="list-style-type: none"> Present estimates of surface water runoff rates for major project components, including aggregate and overburden stockpiles. 	<ul style="list-style-type: none"> The baseline studies and effects assessments for the Surface Water VC will be used to evaluate the characteristic flow / runoff rates at a range of watershed scales, as well as to estimate the potential for Project-related changes to these flow conditions. 	<ul style="list-style-type: none"> Section 7.2.2 Section 8.2
9	TISG Section 14.2	<ul style="list-style-type: none"> Describe groundwater and surface water monitoring programs during the construction, operation and decommissioning and abandonment 	<ul style="list-style-type: none"> The relevant surface water and groundwater monitoring programs will be identified as part of the EA. 	<ul style="list-style-type: none"> Section 7.2.1
10	TISG Section 14.2	<ul style="list-style-type: none"> Describe spatial and temporal (i.e., over project life cycle) changes to surface water quality at potential receptor locations, including traditional land users, due to effluents and atmospheric deposition from the Project including changes to physicochemical parameters (temperature, pH, salinity, dissolved oxygen, turbidity, dissolved organic carbon, total suspended solids), chemical constituents (major and minor ions, trace metals, nutrients, organic compounds) 	<ul style="list-style-type: none"> The effects assessment for the Surface Water VC will consider all Project-related influences on surface water conditions, with potential implications on the quantity or quality of surface water in the receiving environment (including receptor locations). 	<ul style="list-style-type: none"> Section 9





Table 11-2: Study Plan Provincial Concordance – Conformance with Requirements

ID #	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
1	ToR Section 7.1.4.4 Surface Water	<ul style="list-style-type: none"> ■ Additional representative baseline surface water quality data is required at water crossings along the road corridor. In addition to the in-situ parameters listed, turbidity must also be measured, and representative samples collected must be analyzed for alkalinity, total suspended solids, cations, anions, and total metals. These will provide appropriate baseline data from representative watercourses, for comparison with data collected during the project for assessment of impact. ■ The 'scaled approach' to site selection appears appropriate; however, those rivers that may require more substantial water crossings, e.g. Albany, Ogoki, Dusey, Wabassi, Buffaloskin Rivers, and Gourlie Creek, etc. must be included in the list of surface water features requiring ground-based surface water field surveys, including water chemistry assessments. ■ Best available water quality guidelines should be used respecting the assessment of the surface water results. In most cases sample results are to be compared against Provincial Water Quality Objectives; however, the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guideline for the Protection of Aquatic Life may be more appropriate, specifically for suspended sediment and turbidity. 	<ul style="list-style-type: none"> ■ A comprehensive surface water and sediment quality baseline monitoring/investigation program is proposed for the Surface Water VC. The details of this program are described in the updated version of the Surface Water Study Plan. Of particular note, the surface water quality sampling will be conducted at a subset of water body crossing locations over multiple seasons and catchment scales to characterize the natural variation in water quality conditions. The testing of these water quality samples (in-situ and laboratory-based) will account for the requested water quality parameters (including turbidity). ■ Where possible, small watercraft will be used to complete the surface water field studies at the larger river crossings (where wading would be deemed as unsafe). ■ The analysis of the water and sediment quality data will rely on the applicable federal and provincial guidelines and objectives (including PWQO and CCME) as comparison criteria. 	<ul style="list-style-type: none"> ■ Section 7.2.1 ■ Section 8.1





Table 11-3: Study Plan Federal and Provincial Concordance – Requirement Deviations

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response (Rationale for not meeting requirement)	Justification (for not complying with requirement including for example scientific research, precedence)	Proposed TISG Amendment
1	TISG Section 8.1	<ul style="list-style-type: none"> ■ “The Impact Statement must:... – for the aquatic environment, provide current underwater soundscape and vibration descriptions of the study area and at the project site from various sources based on acoustic measurements. Provide information on vibration and sound sources, geographic extent and spatial and temporal variations within the water column;...” 	<ul style="list-style-type: none"> ■ Based on the proposed engineering and anticipated construction methods of the CAR, there are no anticipated pathways of effects associated with changes in underwater noise and vibration. 	<ul style="list-style-type: none"> ■ There are no established underwater noise or vibration criteria associated with road development. 	<ul style="list-style-type: none"> ■ Remove this requirement





12. References

AECOM Canada Ltd., 2020:

Marten Falls First Nation Proposed Terms of Reference Marten Falls Community Access Road – Environmental Assessment, Appendix B: Consultation & Engagement Plan to Support the Environmental Assessment / Impact Statement.

Canadian Council of Ministers of the Environment (CCME), 1999a:

Canadian water quality guidelines for the protection of aquatic life. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.
<http://ceqgrcqe.ccme.ca/en/index.html#void>

Canadian Council of Ministers of the Environment (CCME), 1999b:

Canadian sediment quality guidelines for the protection of aquatic life. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.
<http://ceqgrcqe.ccme.ca/en/index.html#void>

Canadian Council of Ministers of the Environment (CCME), 2011:

Protocols manual for water quality sampling in Canada. PN 1462. ISBN 978-1-896997-7-0
https://www.ccme.ca/files/Resources/water/water_quality/protocols_document_e_final_101.pdf

Golder Associates Ltd. (Golder), 2014:

Cliffs Chromite Project EIS/EA Report. Technical report prepared for Cliffs Ferroalloys, Thunder Bay Ontario.

Health Canada, 2019:

Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

<https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html>

Impact Assessment Agency of Canada (the Agency), 2020:

Public Participation Plan for the Marten Falls Community Access Road Project Impact Assessment.





Impact Assessment Agency of Canada (the Agency), 2020a:

Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment.

Impact Assessment Agency of Canada (the Agency), 2020b:

Glossary of Terms for the impact assessment of designated projects under the IAA.

<https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/glossary-of-terms.html>

Impact Assessment Agency of Canada (the Agency), 2020c:

Tailored Impact Statement Guidelines for the Marten Falls Community Access Road Project Impact Assessment.

Ministry of the Environment (MOE), 1993:

Guidelines for the protection and management of aquatic sediments in Ontario. Queen's Printer for Ontario.

Ministry of the Environment (MOE), 2003:

Stormwater Management Planning and Design Manual, Ontario Ministry of Environment, March 2003.

Province of Ontario, 1994:

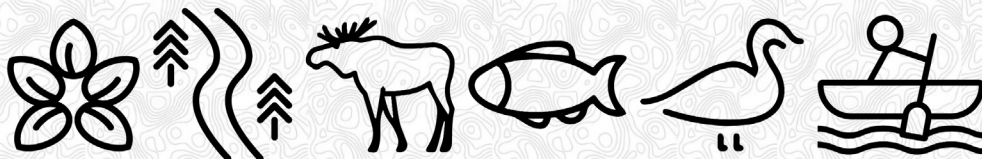
Water management: policies, guidelines, provincial water quality objectives. Queen's Printer for Ontario, 1994. <https://www.ontario.ca/page/water-management-policies-guidelines-provincial-waterquality-objectives>





Appendix A

Preliminary List of Data Sources





MARTEN FALLS FIRST NATION ALL SEASON COMMUNITY ACCESS ROAD

Surface Water Study Plan

- Field investigation (undertaken for surface water and other environmental disciplines)
- Indigenous Knowledge
- Data from previous environmental assessments
- Ontario Integrated Hydrology Data
- Ontario Ministry of Natural Resources and Forestry (MNR), 2020: Natural Heritage Information Centre Make-a-Map: Natural Heritage Areas. <https://www.ontario.ca/page/make-natural-heritage-area-map>
- Natural Heritage Information Centre
- Ontario Flow Assessment Tool Version 3
- Hydrometric data from Water Survey of Canada and the MECP, or from Ontario Hydro
- Archived water quality data from the MECP provincial (Stream) Water Quality Monitoring Network
- MECP Source Protection Information Atlas
- Archived water taking data from the MECP Permits to Take Water Database
- MECP Water Well Inventory
- Aquatic Ecosystem Assessments for Rivers (Metcalf *et al.* 2013)
- Support for development of a long-term environmental monitoring strategy for the Ring of Fire area: Background documents, workshop report, pathway diagrams and indicator list (Rempel *et al.*, 2016)





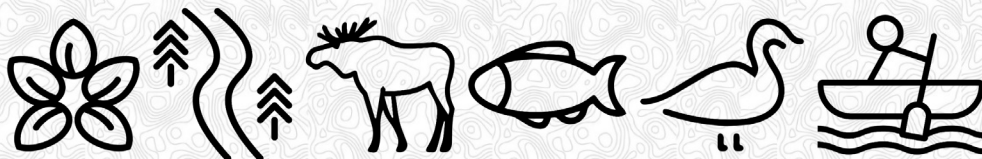
Appendix B

Agency Comments on the Draft Study Plan





Draft Study Plan Comments – Federal





Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
General Comment	■ General Comment	■ Sections 5, 6, 7, 13, 19.2, and 25	■ In addition to the required actions detailed below, other required actions to be addressed in the update to this study plan are detailed in a separate table titled "2020-07-02 – IAAC to MFFN - General Comments on MFCAR Draft Study Plans". The Agency has provided these other required actions to highlight common sections of the Tailored Impact Statement Guidelines (the Guidelines) where requirements were not met in the draft study plans submitted to the Agency. These additional actions must be addressed in the updated study plans.	■ We have reviewed the relevant comments and incorporated where appropriate. Please refer to the General Comments Table Response submitted separately to the Agency for specific responses.		■ Various Sections
Editorial Comment	■ Section 4.2.2: Surface Water Quality Figure 4-1: Proposed Surface Water Survey Locations	■ Editorial Comment	■ It is unclear if Figure 4-1 is showing the proposed locations of future, surface water sampling and in situ parameter measurements or the locations of surface water sampling and in situ parameter measurements of the 2019 sampling program. Also, there is no reference to Figure 4-1 in the study plan.	■ Provide a clear description of Figure 4-1 and reference the figure in the body of the study plan.	■ A location plan for the proposed surface water monitoring program (proposed water body crossing locations for ground-based field studies of water quantity and quality) has been included in the updated version of the Surface Water Study Plan.	■ Figure 7-1 ■ Section 7.2.1
Editorial Comment	■ Section 4.2.2: Surface Water Quality – “Proposed locations for surface water sampling are illustrated on Figure 4-2.... – In situ parameters and water samples will be collected at the subset of water crossings (Figure 4-2)”	■ Editorial Comment	■ Section 4.2.2 refers to Figure 4-2, however there is no Figure 4-2 in the study plan.	■ Provide Figure 4-2 to clearly indicate the proposed locations for future surface water sampling and in situ parameter measurements.	■ The reference in Section 4.2.2 of the Draft Study Plan should have been Figure 4-1 (rather than Figure 4-2). Note as well that a location plan for the proposed surface water monitoring program has been included in the updated version of the Surface Water Study Plan.	■ Figure 7-1 ■ Section 7.2.1
SW-01	■ Section 3: Spatial Boundaries: Study Areas – “The boundaries of the LSA will be confirmed and refined during the Baseline Study to consider flows in rivers and dilution and assimilation in water bodies, as may be required to capture the extent of direct and indirect project-related effects on surface water (Section 4.1). The RSA for the Water Quality VC encompasses Quaternary subwatersheds crossed by route Alternative 1 and Alternative 4 downstream of the PSA and LSA. This area includes the area where	■ Section 7.1 – “...Considerations in assigning appropriate study areas or boundaries would include, but not be limited to: • areas potentially effected by changes to water quality and quantity or changes in flow in the watershed and hydrologically connected waters; • areas potentially effected by airborne emissions or odours; • areas determined by dispersion and deposition modelling; • areas within the range of vision, light and sound and the locations and characteristics of the most sensitive receptors;	■ The RSA appears to extend 25 kilometres downstream of the PSA on the Albany River. No detail is provided for why project effects would cease to occur as water continues to flow further downstream. Additionally, there is no indication of how communities will be engaged to confirm the spatial boundaries of the surface water study. The study plan suggests that surface water quality monitoring sites will be selected partly in consultation with Marten Falls First Nation only. It is unclear if all Indigenous groups listed in the Indigenous Engagement and Partnership Plan (IEPP) will be engaged with.	■ Provide details to demonstrate how the RSA spatial boundary was defined, given that water continues to flow further downstream. Provide detail to demonstrate how Indigenous knowledge has been, or will be, incorporated into the design of the field studies, including site selection. All Indigenous groups listed in the IEPP must be provided opportunities to: – provide Indigenous knowledge during baseline data collection; – comment on the list of valued components and indicators;	■ The Surface Water Study Plan has updated to provide additional details on the RSA for Surface Water, with the understanding that the LSA and RSA are preliminary and cover the extent to which surface water could potentially be affected by Project activities. Provisions have been included to refine the LSA and RSA based on the results of the baseline studies, as well as future input from communities and Indigenous groups through consultation and engagement. As identified in Section 4.2, the Proponent will provide opportunities for consultation and engagement with Indigenous communities (identified in Table 4-1), which is inclusive of all Indigenous communities identified in the	■ Section 6.2 ■ Section 4.2 ■ Section 5





Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
	<p>water bodies could potentially be affected by project effects within the PSA and LSA as water flows downstream, and by broad-scale indirect project effects (e.g., potential regional-scale changes in groundwater-surface water interactions and changes to wetlands and peatland hydrology that could affect surface water)."</p> <p>■ Section 4.2.2: Surface Water Quality</p> <p>– “Water quality and sediment quality monitoring (...). The sites will be selected based on findings of the Desktop Assessment, field surveys conducted in 2019, and in consultation with MFFN. The sites selected will aim to capture the range of waterbody types and to consider important features such as fish and fish habitat, areas of groundwater-surface water interactions, and areas of Indigenous cultural importance for consumption.”</p> <p>■ Section: 6.1 Indicators and Expression of Change</p> <p>– “The indicators have been determined for the Surface Water through consideration of the following:</p> <ul style="list-style-type: none"> • consultation with Indigenous stakeholders, communities and Indigenous Knowledge;” 	<ul style="list-style-type: none"> • species habitat areas, usage timing and migratory patterns; • emergency planning and emergency response zones; • the geographic extent of local and regional services; • any impacted local communities, including municipalities; • all potentially impacted Indigenous groups; • areas of known Indigenous land, cultural, spiritual and resource use; and • existing effected infrastructure...” <p>■ Section 7.4.1</p> <p>– “...Spatial boundaries are defined taking into account the appropriate scale and spatial extent of potential effects and impacts of the Project; community knowledge and Indigenous knowledge; current or traditional land and resource use by Indigenous groups; exercise of Aboriginal and Treaty rights of Indigenous peoples, including cultural and spiritual practices; and physical, ecological, technical, social, health, economic and cultural considerations...”</p> <p>■ Section 8.6</p> <p>– “The Impact Statement must:...</p> <ul style="list-style-type: none"> • identify all springs and any other potable surface water resources within the local and regional project areas and describe their current use, potential for future use, and whether their consumption has Indigenous cultural importance; • describe the surface water quality baseline characterization program, including sampling site selection, monitoring duration and frequency, sampling protocol, and analytical protocol, including quality assurance and quality control measures;...” 		<ul style="list-style-type: none"> – inform the effects assessment and review its conclusions; and – inform the development of mitigation measures and follow-up programs. 	<p><i>Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment</i> (the Agency 2020a). Further information on how Indigenous Knowledge will be considered in the IS / EA Report has been included in Section 5 of the Surface Water Study Plan. This includes further details on the two concurrent and complementary avenues for Indigenous communities and groups to be engaged with, and provide input on, the Project, i.e. the Indigenous Knowledge Program and the Consultation and Engagement Program.</p>	





Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
SW-02	<p>■ Section 4.1: Desktop Assessment</p> <p>– “The desktop assessment will include identification potable surface water sources within the local and regional project areas and a description of their current use, potential for future use, and whether their consumption has Indigenous cultural importance.”</p>	<p>■ Section 7.2</p> <p>– “...The Impact Statement must provide detailed descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental, health, social and economic condition that is described, in order to corroborate the validity and accuracy of the baseline information collected...”</p> <p>■ Section 8.6</p> <p>– “The Impact Statement must:...</p> <ul style="list-style-type: none"> • identify all springs and any other potable surface water resources within the local and regional project areas and describe their current use, potential for future use and whether their consumption has Indigenous cultural importance;... 	<p>■ It is unclear how a desktop assessment will be able to determine whether consumption of potable surface water sources has Indigenous cultural Importance.</p> <p>■ It is unclear how Indigenous groups will be provided opportunities to provide Indigenous knowledge and validate the collected baseline data.</p>	<p>■ Provide detail to demonstrate how the desktop assessment will determine whether consumption of potable surface water sources has Indigenous cultural Importance.</p> <p>■ Describe in the study plan how Indigenous groups will have opportunities to provide Indigenous knowledge on potable surface water sources and validate the baseline data collected.</p>	<p>■ The identification and characterization of surface water drinking sources is captured in the Surface Water VC, with the understanding that Project-related effects on these drinking water sources will be addressed in the Human Health and Community Safety VC. The identification and characterization of springs (and other groundwater-based potable water sources) is included in the study plan for the Groundwater VC.</p>	<p>■ Section 7.1</p>
SW-03	<p>■ Section 4.1: Desktop Assessment</p> <p>– “The information will include extensive field records that were obtained from the Cliffs Chromite Project Environmental Assessment project in 2011-2012 (Golder 2014) and other publicly available sources... A preliminary list of applicable information sources has been included in Appendix A and reflects federal and provincial guidance received to date.”</p>	<p>■ Section 7.2</p> <p>– “...The Impact Statement must provide detailed descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental, health, social and economic condition that is described, in order to corroborate the validity and accuracy of the baseline information collected... If using existing data sources, the Impact Statement must provide justification to show that the data sources are relevant in spatial and temporal coverage to the Project. Some data sources may have good coverage in Southern Ontario or existing road networks but be unsuitable as a baseline for these northern areas where there are not roads...”</p>	<p>■ It is unclear what publicly available data sources will be used and if they will be relevant to the Project. More detail is required about the specific data sources in order to corroborate the validity and accuracy of the information.</p>	<p>■ Provide detailed descriptions of specific data sources that will be used to identify gaps and inform baseline characterization of surface water. Sources should be listed and clearly correlated to the criteria and indicators that they will inform. Provide justifications to demonstrate that each data source is relevant in spatial and temporal coverage to the Project.</p>	<p>■ A preliminary list of background materials to support the surface water baseline characterization has been included in the updated version of the Surface Water Study Plan. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.</p>	<p>■ Appendix A</p>





Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
SW-04	<p>■ Section 4.2.1.1: Introduction and Objectives</p> <ul style="list-style-type: none"> – “Based on a preliminary review of the alignment for Alternatives 1 and 4 (provided by AECOM on May 30, 2019) relative to available mapping and imagery, 164 waterbodies were identified as potentially being crossed by the Project. On-the-ground field data collection was completed at a subset of the identified waterbody crossings from the aerial reconnaissance to verify or augment the results and assumptions from the desktop analysis.” <p>■ Section 4.2.3: Hydrology</p> <ul style="list-style-type: none"> – “Additional bathymetric information will only be collected at larger water crossings where more detailed hydraulic modelling is required. Location of bathymetry collection will be determined during detailed design phase and will generally be limited to locations where it has been determined that fish passage requirements must be met.” 	<p>■ Section 8.6</p> <ul style="list-style-type: none"> – “...The Impact Statement must:... • provide the design flood at each water crossing; • provide details on the hydraulic design of the water crossings; • quantify the effects of the Project on the hydrological regime of both the local and regional study area; in particular, in case of any watercourse diversions, describe the effects on the flow upstream and downstream of the diversion; • provide the timing of freeze/thaw cycles, ice cover, and ice conditions for surface water bodies in the Project area; • provide for each water body potentially effected by the Project, the total surface area, bathymetry, bank and bottom features, biological components, flows, maximum and mean depths, and type of substrate (sediments); ...” 	<ul style="list-style-type: none"> ■ The outcomes of the desktop exercise for the water bodies crossed by the Project are not clear. ■ It is unclear which water crossings were selected for the on-the-ground field survey and how these water crossing were selected. Information at each water crossing including channel geometry and design flood are needed for the preliminary design of the crossing and the evaluation of the project effect at the water crossings. ■ It is unclear if effects on the hydrological regime of both the local and regional study area will be quantified. ■ It is unclear if the upstream and downstream effects of any watercourse diversion will be described. 	<ul style="list-style-type: none"> ■ Describe the information that will be determined during the desktop assessment for each waterbody crossing in a manner that demonstrates the requirements of Section 8.6 of the Guidelines will be met. ■ Provide details on the rationale for the selection of the list of waterbody crossings that were selected during the 2019 on-the-ground field surveys. ■ Provide the list of selected water crossings. ■ Provide details to demonstrate how the effects on the hydrological regime of both the local and regional study area will be quantified, including upstream and downstream effects of any watercourse diversion, as per the requirement in Section 8.6 of the Guidelines. 	<ul style="list-style-type: none"> ■ The development of the preliminary water body crossing list for the Project, coupled with the site selection process for the surface water field program, has been detailed in the updated version of the Surface Water Study Plan and aligns with Section 8.6 of the TISG (the Agency 2020c) and past communications with the regulatory agencies. Of particular note, streamflow and water quality monitoring will be conducted at a subset of water body crossing locations (approximately 40% of the total number of crossing locations) over multiple seasons and varying catchment scales to characterize the natural variation in flow and water quality conditions, as well as to inform the preliminary design efforts. ■ The effects assessment for the surface water VC will include an evaluation of Project-related changes on flow/runoff volumes, as well as for water diversion activities (e.g., dam and pump bypass to support the installation of water body crossing structures. 	<ul style="list-style-type: none"> ■ Section 7.2.1.1 ■ Figure 7.1 ■ Table 7.1 ■ Section 8.2
SW-05	<p>■ Section 4.2.2: Surface Water Quality</p> <ul style="list-style-type: none"> – “The sites selected will aim to capture the range of waterbody types and to consider important features such as fish and fish habitat, areas of groundwater-surface water interactions, and areas of Indigenous cultural importance for consumption. Sites will include rivers that will require more substantial water crossings or requiring longer construction times (i.e., Albany River, Ogoki River, Dusey River, Wabassi River, Buffaloskin River, and Gourlie Creek) and approximately 10% of the wadable water bodies crossed by the route alternatives. Proposed locations for surface water sampling are illustrated on Figure 4-2.” 	<p>■ Section 8.6</p> <ul style="list-style-type: none"> – “...The Impact Statement must:... • describe the surface water quality baseline characterization program, including sampling site selection, monitoring duration and frequency, sampling protocol, and analytical protocol, including quality assurance and quality control measures...” 	<ul style="list-style-type: none"> ■ It is unclear as to the exact number of surface water sampling locations for each of the alternative routes. 	<ul style="list-style-type: none"> ■ Provide the number of surface water sampling locations and a description of each of these locations for each of the alternative routes in the surface water study plan. 	<ul style="list-style-type: none"> ■ The site selection process for the surface water field program has been detailed in the updated version of the Surface Water Study Plan and aligns with Section 8.6 of the TISG and past communications with the regulatory agencies. Note that streamflow and water quality monitoring will be conducted at a subset of water body crossing locations (approximately 40% of the total number of crossing locations) over multiple seasons and varying catchment scales to characterize the natural variation in flow and water quality conditions. Further to the above, a location plan for the proposed surface water monitoring program (proposed water body crossing locations for ground-based field studies of water quantity and quality) has been included in the updated version of the Surface Water Study Plan. 	<ul style="list-style-type: none"> ■ Section 7.2.1 ■ Figure 7.1





Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
SW-06	<p>■ Section 4.2.2: Surface Water Quality</p> <ul style="list-style-type: none"> – “The monitoring will be conducted to provide seasonal baseline surface water quality data for a duration of one year. Sampling will occur in spring (during high-flow conditions), and fall (during low-flow conditions). Winter sampling is not proposed due to winter access and safety concerns.” 	<p>■ Section 7.2 Sources of Baseline Information</p> <ul style="list-style-type: none"> – “...With regard to field studies, survey work must be planned to include multiple sampling locations and multiple visits to each location to support all required assessment analyses...” <p>■ Section 8.6</p> <ul style="list-style-type: none"> – “The Impact Statement must:... <ul style="list-style-type: none"> • provide baseline surface water quality data, for a minimum of two years, for physicochemical parameters (temperature, pH, electrical conductivity, dissolved oxygen, turbidity, suspended solids) and relevant chemical constituents (major and minor ions, trace metals, radionuclides, nutrients, and organic compounds, including those of potential concern); the data should illustrate the seasonal and inter-annual variability in baseline surface water quality, including possible changes due to groundwater–surface water interactions;...” 	<p>■ Section 8.6 of the Guidelines requires baseline surface water quality data for a minimum of 2 years to illustrate seasonal and inter-annual variability in baseline surface water quality, including possible changes due to groundwater-surface water interactions. The surface water study plan is proposing to monitor seasonal baseline surface water quality data for a duration of one year only, and no monitoring in the summer. The study plan as proposed will not illustrate the seasonal and inter-annual variability in baseline surface water quality, including possible changes due to groundwater–surface water interactions.</p> <p>■ The study plan identified winter access and safety concerns as reasons for not conducting winter sampling. However, no justification was provided for not conducting summer sampling.</p>	<p>■ Provide details to demonstrate how baseline surface water quality data will be collected for a minimum of 2 years to illustrate inter-annual variability in baseline surface water quality, including possible changes due to groundwater-surface water interactions.</p> <p>■ Provide details to demonstrate how summer sampling will be conducted to illustrate seasonal variability in baseline surface water quality, including possible changes due to groundwater-surface water interactions.</p>	<p>■ A comprehensive surface water baseline monitoring / investigation program is proposed for the Surface Water VC. The details of this program are described in the updated version of the Surface Water Study Plan. Note that streamflow and water quality monitoring for future field studies will be conducted at a subset of water body crossing locations in the spring and summer to further characterize the natural variation in flow and water quality conditions. The results from the completed and future field studies over multiple seasons and years are expected to provide a means to define the characteristic range of natural variation in flows and water quality, recognizing that, to the extent possible, data from surveyed crossing locations will be extrapolated to non-surveyed sites with similar catchment areas, physiography, and flow regimes. In addition, it is anticipated that the ground-based field surveys conducted in 2011-2012 by Golder in support of the Cliffs Chromite Project (Project EA since terminated) will help to further augment this understanding of natural fluctuations of baseline surface water and aquatic conditions, both on an inter- and intra-annual basis, given that these previous studies occurred in a similar geographic setting as the Project, and, in many cases, the locations of waterbody crossings overlap.</p>	<p>■ Section 7.2.1</p>
SW-07	<p>■ Section 4.2.2: Surface Water Quality</p> <ul style="list-style-type: none"> – “The surface water quality monitoring will include field measurements of physicochemical parameters (i.e., temperature, pH, electrical conductivity, dissolved oxygen, turbidity) and the collection of surface water grab samples for laboratory analysis of relevant constituents including alkalinity, total suspended solids, major and minor ions, total metals, nutrients (total phosphorus, total ammonia, total Kjeldahl nitrogen), and total and dissolved organic carbon. Field 	<p>■ Section 8.6</p> <ul style="list-style-type: none"> – “The Impact Statement must:... <ul style="list-style-type: none"> • provide baseline surface water quality data, for a minimum of two years, for physicochemical parameters (temperature, pH, electrical conductivity, dissolved oxygen, turbidity, suspended solids) and relevant chemical constituents (major and minor ions, trace metals, radionuclides, nutrients, and organic compounds, including those of potential concern); the data should illustrate the seasonal and inter-annual variability in baseline surface water 	<p>■ The study plan does not indicate whether it will analyze pH, conductivity, and turbidity in the surface water grab samples in the laboratory to determine if samples changed during transport, as recommended by the Protocols Manual for Water Quality Sampling in Canada (CCME 2011). The study plan also does not indicate if it will analyze surface water grab samples for dissolved metals in the laboratory.</p>	<p>■ Provide details to demonstrate that all of the physicochemical parameters listed in the Guidelines, including pH, conductivity, and turbidity, will be analyzed in the surface water grab samples in the laboratory. Provide details to demonstrate that surface water grab samples will be analyzed in the laboratory for both total and dissolved metals.</p>	<p>■ A comprehensive surface water and sediment quality baseline monitoring / investigation program is proposed for the Surface Water VC. The details of this program are described in the updated version of the Surface Water Study Plan. Of particular note, the surface water quality sampling will be conducted at a subset of water body crossing locations over multiple seasons and catchment scales to characterize the natural variation in water quality conditions. The testing of these water quality samples (in-situ and laboratory-based) has considered the requested water quality parameters from Section 8.6 of TISG and includes plans to obtain measurements of pH,</p>	<p>■ Section 7.2.1.3</p>





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	monitoring protocols will follow the Protocols Manual for Water Quality Sampling in Canada (CCME 2011) and the sample collection methods will be adjusted on a site-specific basis to consider characteristics of the water body being sampled and to ensure safety of the sampling crew.”	quality, including possible changes due to groundwater–surface water interactions;...”			conductivity, and turbidity both in the field and in the lab. The proposed parameter suite for the laboratory-based tests of water quality samples will be focused on total metals alone (for direct comparison to Provincial Water Quality Objectives).	
SW-08	<p>■ Section 4.2.2: Surface Water Quality</p> <ul style="list-style-type: none"> – “Triplicate sediment samples will be collected at each monitoring site for laboratory analysis of grain size, total metals and nutrients (total organic carbon, total phosphorus, total Kjeldahl nitrogen) on a single sampling event during the monitoring period.” 	<p>■ Section 8.6</p> <ul style="list-style-type: none"> – “The Impact Statement must:... <ul style="list-style-type: none"> • describe the surface water quality baseline characterization program, including sampling site selection, monitoring duration and frequency, sampling protocol, and analytical protocol, including quality assurance and quality control measures;...” 	<p>■ It is unclear whether triplicate sediment samples will be collected at all monitoring sites for both Alternatives routes 1 and 4.</p>	<p>■ Clarify whether triplicate sediment samples will be collected at all monitoring sites.</p>	<p>■ Triplicate samples will be obtained at the sediment quality sampling locations.</p>	<p>■ Section 7.2.1.3</p>
SW-09	<p>■ Section 4.2.2: Surface Water Quality</p> <ul style="list-style-type: none"> – “The surface water quality monitoring will include field measurements of physicochemical parameters (i.e., temperature, pH, electrical conductivity, dissolved oxygen, turbidity) and the collection of surface water grab samples for laboratory analysis of relevant constituents including alkalinity, total suspended solids, major and minor ions, total metals, nutrients (total phosphorus, total ammonia, total Kjeldahl nitrogen), and total and dissolved organic carbon.” <p>■ Section 5.1.2: Data Analysis</p> <ul style="list-style-type: none"> – “Water quality parameters will also be compared to Ontario Drinking Water Quality Standards (O. reg. 169/03 under the Safe Drinking Water Act, 2002, S.O. 2002, c. 32) for water bodies used or potentially used as a source of potable water including sources of Indigenous cultural importance for consumption.” 	<p>■ Section 8.6</p> <ul style="list-style-type: none"> – “The Impact Statement must:... <ul style="list-style-type: none"> • provide baseline surface water quality data, for a minimum of two years, for physicochemical parameters (temperature, pH, electrical conductivity, dissolved oxygen, turbidity, suspended solids) and relevant chemical constituents (major and minor ions, trace metals, radionuclides, nutrients, and organic compounds, including those of potential concern);...” <p>■ Section 16.1</p> <ul style="list-style-type: none"> – “With respect to biophysical determinants of health, the Impact Statement must:... <ul style="list-style-type: none"> • identify predicted effects of the Project on the quality and quantity of ground or surface water used for domestic uses based on the most stringent guideline values of the following criteria; Canadian Drinking Water Quality Guidelines (CDWQG), Ontario Drinking Water Quality Standards (ODWQS), or Ontario Soil, Groundwater and Sediment Standards (SGSS);...” 	<p>■ The study plan does not specify monitoring of organic contaminants (e.g., combustion by-product, blasting by-product, petroleum product, etc.) that may affect surface water quality by atmospheric deposition and/or chemical spills at construction camps and along the construction corridor.</p> <p>■ In addition to the monitoring parameters proposed in the surface water study plan, the groundwater study plan includes dissolved metals, organic contaminants (e.g., volatile organic compounds (VOCs) and poly-aromatic hydrocarbons (PAHs)) and radionuclide parameters. (See Section 4.2.6.2 of the groundwater study plan.)</p> <p>■ If surface water bodies are used as a source of potable water, the surface water quality parameters should be expanded to include these additional contaminants of potential concern (COPCs).</p> <p>■ Additionally, please note that the ODWQS include less stringent criteria than the most recent CDWQG for lead, manganese and strontium.</p>	<p>■ Update the study plan to provide a full list of COPCs to be addressed in the surface water study, including radionuclides and organic contaminants, as per Section 8.6 of the Guidelines.</p> <p>■ Revise the study plan to confirm that the most stringent guideline values will be used to compare data, as per Section 16.1 of the Guidelines.</p>	<p>■ The updated version of the Surface Water Study Plan includes the full list of relevant Chemicals of Potential Concern, with the understanding that the most stringent guideline value will be considered as part of the baseline studies and effects assessment.</p>	<p>■ Section 7.2.1.3</p> <p>■ Section 8.1.2</p> <p>■ Section 9.4.1</p>





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SW-10	<ul style="list-style-type: none"> ■ Section 5.1.2: Data Analysis <ul style="list-style-type: none"> – “Water quality data will be summarized by site, season, and year using descriptive statistics... Sediment quality data will be summarized by site using descriptive statistics.” 	<ul style="list-style-type: none"> ■ Section 8.6 <ul style="list-style-type: none"> – “The Impact Statement must:... <ul style="list-style-type: none"> • provide baseline surface water quality data, for a minimum of two years, for physicochemical parameters (temperature, pH, electrical conductivity, dissolved oxygen, turbidity, suspended solids) and relevant chemical constituents (major and minor ions, trace metals, radionuclides, nutrients, and organic compounds, including those of potential concern); the data should illustrate the seasonal and inter-annual variability in baseline surface water quality, including possible changes due to groundwater–surface water interactions;...” 	<ul style="list-style-type: none"> ■ It is unclear whether the proponent will present all water quality and sediment quality data in the Impact Statement to meet requirements of Section 8.6 of the Guidelines. 	<ul style="list-style-type: none"> ■ Update the study plan to provide detail regarding the water quality and sediment quality data that will be gathered and provided in the Impact Statement, per Section 8.6 of the Guidelines. 	<ul style="list-style-type: none"> ■ The updated version of the Surface Water Study Plan includes the full details of the proposed surface water field program. The specific monitoring locations, frequency and duration of sampling activities and measurements, and the relevant parameter list for water and sediment quality testing has been aligned with Section 8.6 of the TISG (the Agency 2020c) and past communications with the regulatory agencies, noting, in particular, that streamflow and water quality monitoring will be conducted at a subset of water body crossing locations (approximately 40% of the total number of crossing locations) over multiple seasons and varying catchment scales to characterize the natural variation in flow and water quality conditions, as well as to inform the preliminary design efforts. 	<ul style="list-style-type: none"> ■ Section 7 ■ Section 8
SW-11	<ul style="list-style-type: none"> ■ Table 6-2: Magnitude Definition <ul style="list-style-type: none"> – “Negligible <u>Definition:</u> There is little to no variation predicted in measurable parameters and is within the range of natural variation. <u>Rationale:</u> No discernable change to surface water therefore no impact on aquatic life or potable use. – Low <u>Definition:</u> There is a small variation predicted in measurable parameters, that are outside the range of natural variation and below the applicable guideline/objective or threshold value or within 20% of existing condition values. <u>Rationale:</u> Change to surface water is discernable but remains protective of aquatic life and potable water sources. – Medium <u>Definition:</u> There is a modest variation predicted in measurable parameters, is significantly different from existing conditions and is below the applicable guideline/objective or threshold 	<ul style="list-style-type: none"> ■ Section 21 <ul style="list-style-type: none"> – “...Proponents must describe the extent to which residual effects are adverse. Where relevant, or where best practice or evidence-based thresholds exist, effects should be described using criteria to quantify adverse effects. This includes criteria such as whether the effects are high or low in magnitude, the geographical extent, timing, frequency, duration and reversibility of the effects, taking into account any important contextual factors. – Where the potential for human health effects exist due to exposure to a particular contaminant at any level (e.g., non-threshold air pollutants, including particulate matter and nitrogen dioxide, and water pollutants, such as but not limited to arsenic and lead) mitigation measures should aim to reduce the residual effects to as low as reasonably achievable. – In addition, effects should be characterized using language most appropriate for the effect (for example, impacts on the exercise of Aboriginal and Treaty rights and social effects may be described differently from biophysical effects)... 	<ul style="list-style-type: none"> ■ According to the study plan, the magnitude of residual effects will be determined partly based on the percentage deviation (e.g., between 20% and 50%) from the baseline condition. No explanation is provided in the study plan on how the proposed judgement criteria are developed or whether they are adequate to protect human health. ■ Furthermore, the study plan assumes that surface water quality remains protective of human health as long as contaminant levels are below the water quality criteria. However, there is no evidence of a health effect threshold at the population level upon exposure to certain water contaminants, such as arsenic and lead. The characterization of potential health impacts should acknowledge that health risks exist below criteria levels along the continuum of concentrations for these non-threshold pollutants/contaminants. ■ Health Canada encourages the use of all available technologies to reduce emissions as low as reasonably achievable (ALARA) and beyond those required to achieve applicable thresholds 	<ul style="list-style-type: none"> ■ Update the study plan to include, in the definitions for magnitude, criteria that are relevant to the protection of human health. ■ Describe the approach that will be used to ensure that these criteria are appropriate for the human health impact assessment. 	<ul style="list-style-type: none"> ■ The updated version of the Surface Water Study Plan includes added details and rationale for the magnitude definition and residual effects. ■ The identification and characterization of surface water drinking sources is captured in the Surface Water VC, with the understanding that Project-related effects on these drinking water sources will be addressed in the Human Health and Community Safety Study Plan. 	<ul style="list-style-type: none"> ■ Section 9





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	<p>value, or is between 20% to 50% of existing condition values. <u>Rationale:</u> Change to surface water is significant but remains protective of aquatic life and potable water sources</p> <ul style="list-style-type: none"> – High <u>Definition:</u> There is a large variation predicted in measurable parameters, exceeds an applicable guideline/ objective or threshold value, or is greater than 50% of existing condition values. <u>Rationale:</u> Change to surface water is discernable and can potentially impair aquatic life or potable uses of water.” 	<ul style="list-style-type: none"> – The Impact Statement must: <ul style="list-style-type: none"> • characterize the residual effects using criteria most appropriate for the effect; • characterize residual effects for human health using human health-related criteria most appropriate for the carcinogenic and non-carcinogenic health effects of non-threshold contaminants;... • provide the rationale for the choice of criteria used to determine the extent to which the predicted effects are adverse. – The information provided must be clear and sufficient to enable the Agency, review panel, technical and regulatory agencies, Indigenous groups, and the public to review the proponent's analysis of effects;...” 	<p>(i.e., CDWQG levels) in order to reduce the burden of surface water pollution on the population.</p>			
SW-12	<ul style="list-style-type: none"> ■ Section 7: Conformance with Federal and Provincial Guidance <ul style="list-style-type: none"> – “The hydrologic analysis will include changes to the runoff characteristics and drainage patterns on a watershed basis. Hydrologic analyses will be conducted as a high-level, quantitative assessment, given that information on watershed boundaries and runoff characteristics will be coarse.... ...Runoff rates will be calculated for the pre-construction (existing), during construction, and post construction conditions.” 	<ul style="list-style-type: none"> ■ Section 8.6 <ul style="list-style-type: none"> – “The Impact Statement must:... <ul style="list-style-type: none"> • develop a quantitative surface water balance for components of the Project that may result in significant changes to surface water flow patterns (e.g., large quarry/aggregate extraction/stockpiles)...” ■ Section 14.2 <ul style="list-style-type: none"> – “...With respect to potential project effects on water quality in the receiving environment, the Impact Statement must: <ul style="list-style-type: none"> • present estimates of surface water runoff rates for major project components, including aggregate and overburden stockpiles;...” 	<ul style="list-style-type: none"> ■ It is unclear if surface water balances will be developed for components of the Project that may result in significant changes to flow patterns (including large quarry/ aggregate extraction /stockpiles). It is unclear if estimates of surface water runoff rates for major components of the Project will be presented. The information provided in Section 7 of the study plan states that the analysis will be conducted at a high level. More information is needed to determine if the requirements in Sections 8.6 and 14.2 of the Guidelines will be met. 	<ul style="list-style-type: none"> ■ Update the study plan to provide further detail to demonstrate how the requirements in Sections 8.6 and 14.2 of the Guidelines regarding the development of a surface water balance for components of the Project and the estimates of surface water runoff rates for major components of the Project, will be met. 	<ul style="list-style-type: none"> ■ Water balance analyses will be advanced to support groundwater studies at a discrete set of the proposed pits and quarries. The scope of work to conduct these water balance assessments has been documented in the Groundwater Study Plan. The baseline studies and effects assessments for the Surface Water VC will be used to evaluate the characteristic flow / runoff rates at a range of watershed scales and under existing and proposed conditions. 	<ul style="list-style-type: none"> ■ Section 8.2
SW-13	<ul style="list-style-type: none"> ■ Section 6: Effects Assessment Scoping ■ Section 7: Conformance with Federal and Provincial Guidance <ul style="list-style-type: none"> – “Monitoring programs will be identified as part of the EA.” 	<ul style="list-style-type: none"> ■ Section 14.2 <ul style="list-style-type: none"> – “...With respect to potential project effects on water quality in the receiving environment, the Impact Statement must:... <ul style="list-style-type: none"> • describe any applicable water quality treatment measures and provide evidence supporting the effectiveness of these measures; • compare the quality of all effluent streams to the Canadian Council of Ministers of the Environment (CCME) 	<ul style="list-style-type: none"> ■ Section 6 of the study plan provides very general information about the effects assessment. It is unclear how many of the requirements in Section 14.2 of the Guidelines related to potential project effects on water quality in the receiving environment will be met. ■ The effects assessment must consider the effects of each of the project components and physical activities, in all 	<ul style="list-style-type: none"> ■ Provide more detail on the methodology for the effects assessment, and how it will meet the requirements described in Section 14.2 of the Guidelines. 	<ul style="list-style-type: none"> ■ The study plan is updated to provide additional detail on methodology for the Effects Assessment per Section 14.2 of the TISG (the Agency 2020c). ■ Additional information specific to groundwater quality is included in the Groundwater Study Plan. 	<ul style="list-style-type: none"> ■ Section 9





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		<p>Water Quality Guidelines for the Protection of Aquatic Life, and to provincial water quality objectives for contaminants of concern (e.g., arsenic, chromium, mercury) that do not have CCME guidelines. CCME's Water Quality Guideline values are national science-based voluntary guidelines developed collaboratively among provincial, territorial, and federal jurisdictions for the protection of freshwater and marine life;</p> <ul style="list-style-type: none"> describe any changes to groundwater quality that could affect surface water quality; provide an assessment for off-site migration pathways for impacted groundwater, and an analysis of contaminant attenuation capacities within the hydrogeological units of the project study area; and describe groundwater and surface water monitoring programs during the construction, operation and decommissioning and abandonment..." 	<p>phases, and be based on a comparison to the proposed baseline work.</p>			
SW-14	<p>■ Section 6: Effects Assessment Scoping</p>	<p>■ Section 14.2</p> <p>– "...If the proponent undertakes quarrying activities to extract aggregate material that may results in effects on groundwater and surface water levels (i.e., quarrying below the water table), the Impact Statement must:</p> <ul style="list-style-type: none"> present an integrated site water balance model incorporating surface and groundwater fluxes for the construction, operation and decommissioning of large quarrying sites; describe the risk to the receiving environment related to effects to the quantity and quality of all effluent streams released from the site, including surface runoff from aggregate and overburden stockpiles, and dewatering discharge;... 	<p>■ Section 6 of the study plan provides very general information about the effects assessment. It is unclear how many of the requirements in Section 14.2 of the Guidelines related to undertaking quarrying activities to extract aggregate material will be met.</p> <p>■ The effects assessment must consider the effects of each of the project components and physical activities, in all phases, and be based on a comparison to the proposed baseline work.</p>	<p>■ Provide more detail on the methodology for the effects assessment, and how it will meet the requirements described in Section 14.2 of the Guidelines.</p>	<p>■ The study plan is updated to provide additional detail on Project-environment Interactions and methodology for the Effects Assessment per Section 14.2 of the TISG (the Agency 2020c).</p> <p>■ Additional information specific to groundwater quality is included in the Groundwater Study Plan.</p>	<p>■ Section 9</p>



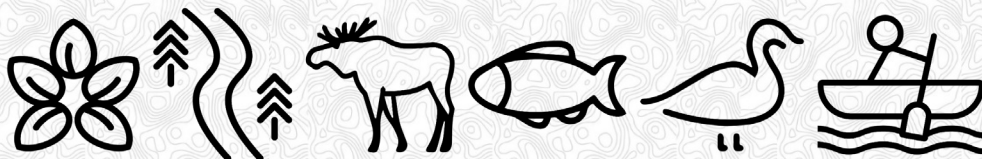


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		<ul style="list-style-type: none">• identify potential risks to surface and seepage water quality from the aggregate and overburden stockpiles and project infrastructure during construction, and operation, decommissioning and abandonment;• provide aggregate sources, volumes and tonnage, and extraction construction methods;...”				





Draft Study Plan Comments – Provincial





Comment # / Ref #	Draft Study Plan Section	Agency / Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Reference
1	■ Page 11/Section 4.2.2 Surface Water Quality	■ MECP (Surface Water Specialist Comments)	■ Section 4.2.2 states that water and sediment quality monitoring will be carried out at select water crossings along the proposed road corridor; however, it does not indicate that such monitoring will also occur in water bodies within close proximity of other project infrastructure such as construction camps, laydown areas, aggregate sources, etc.	■ This section should outline which water bodies will be assessed, supported by a map clearly outlining sampling locations respecting water crossings, and other project infrastructure such as construction camps, laydown areas, aggregate sources, etc.	■ A location plan for the proposed surface water monitoring program (proposed water body crossing locations for ground-based field studies of water quantity and quality) has been included in the updated version of the Surface Water Study Plan. The selected sites for field studies will consider, to the extent possible, water body crossings that are located in close proximity to Project infrastructure.	■ Figure 7-1 ■ Section 7.2.1
2	■ Page 12/ Section 4.2.2 Surface Water Quality	■ MECP (Surface Water Specialist Comments)	■ Surface water quality sampling for baseline data is proposed to take place seasonally for the duration of one year. The proponent has proposed to sample in the spring (during high-flow conditions) and fall (during low-flow conditions). However, a commitment should be made to include one additional seasonal sampling event to help determine variability during the ice-free season. It is agreed that winter sampling is not conducted due to safety concerns.	■ Commit to the completion of an additional seasonal surface water quality sampling during the Environmental Assessment process to determine variability during different seasons and under different flow conditions. It is recommended that sampling be conducted under differing flow regimes (ideally corresponding to 25th, 50th and 75th percentile flow) and provide insight into seasonal variability, such that they are indicative of the following seasonal low, average and high flow conditions: spring freshet high flows (typical April and May); summer low flow periods (typically July, August and September); and fall secondary peak flows (typically October).	■ A comprehensive surface water baseline monitoring / investigation program is proposed for the Surface Water VC. The details of this program are described in the updated version of the Surface Water Study Plan, noting, in particular, that streamflow and water quality monitoring for the future field campaigns will be conducted at a subset of water body crossing locations in the spring and summer to further characterize the natural variation in flow and water quality conditions. The results from the completed and planned field studies over multiple seasons and years are expected to provide a means to define the characteristic range of natural variation in flows and water quality, recognizing that, to the extent possible, data from surveyed crossing locations will be extrapolated to non-surveyed sites with similar catchment areas, physiography, and flow regimes. In addition, it is anticipated that the ground-based field surveys conducted in 2011-2012 by Golder in support of the Cliffs Chromite Project (Project EA since terminated) will help to further augment this understanding of natural fluctuations of baseline surface water and aquatic conditions, both on an inter- and intra-annual basis, given that these previous studies occurred in a similar geographic setting as the Project, and, in many cases, the locations of waterbody crossings overlap.	■ Section 7.2.1
3	■ Page 13/ Section 4.2.2 Surface Water Quality	■ MECP (Surface Water Specialist Comments)	■ Surface water quality samples to be sent for laboratory analysis will be analyzed for alkalinity, total suspended solids, major and minor ions, total metals, nutrients (total phosphorus, total ammonia, total Kjeldahl nitrogen), and total and dissolved organic carbon. The specific ions to be analyzed should be specified in the Study Plan.	■ Section 4.2.2 to be updated to include the following specific cations and anions: <ul style="list-style-type: none"> - cations (i.e. H⁺, Mg²⁺, Na⁺, Ca²⁺, K⁺, NH₄⁺) and - anions (i.e. Cl⁻, SO₄²⁻, F⁻, NO₃⁻, HCO₃⁻, CO₃²⁻, PO₄³⁻). 	■ The updated version of the Surface Water Study Plan has been revised to include the requested water quality parameters for sampling / testing.	■ Section 7.2.1.3
4	■ Page 13/Section 4.2.3 Hydrology	■ MECP (Surface Water Specialist Comments)	■ The Study Plan earlier provides specifics regarding water and sediment sampling; however, section 4.2.3 study methods simply provide a description respecting information to be collected and the objective of the water crossing designs. This section should make reference to Section 5.2 Hydrology so the reader is aware that the details pertaining to how hydrologic calculations/models will be performed is found further in the Plan.	■ Section 4.2.3 to reference Section 5.2 Hydrology for detail respecting how hydrologic calculations/models will be performed.	■ The baseline studies and effects assessments for the Surface Water VC will be used to evaluate the characteristic flow / runoff rates at a range of watershed scales, as well as to estimate the potential for Project-related changes to these flow conditions.	■ Section 7.2.2
5	■ Page 14/ 5.1.2 Data Analysis	■ MECP (Surface Water Specialist Comments)	■ The Study Plan indicates that surface water quality data will be compared to Provincial Water Quality Objectives (PWQOs); and in the absence of PWQOs, against the Canadian Water Quality Guidelines for the Protection of Aquatic Life (CWQG-CCME). Surface water quality results should be compared against both but the more stringent of the two criteria acknowledged.	■ Section 5.1.2 should be edited to state that results of baseline surface water sampling will be compared and assessed against CCME's Water Quality Guidelines for the Protection of Aquatic Life and Ontario's Provincial Water Quality Objectives for the purpose of considering potential impacts to the environment and aquatic life; however, the more stringent of the two criteria will be acknowledged.	■ The updated version of the Surface Water Study Plan includes the full list of relevant Chemicals of Potential Concern, with the understanding that the most stringent guideline criteria will be considered as part of the baseline studies and effects assessment.	■ Section 8.1.2





Comment # / Ref #	Draft Study Plan Section	Agency / Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Reference
6	■ Pages 14 and 15/5.2 Hydrology	■ MECP (Surface Water Specialist Comments)	<p>■ The Study Plan indicates that design flows/floods will be calculated for each water crossing for the purposes of hydraulic structure design and that provincially accepted hydrologic methods will be used to determine the design flows. This section can be further expanded to acknowledge that where there is no flow-related information available (flow station), flow may have to be estimated based entirely on flows from adjacent areas (pro-rating). Such information should be collected from existing flow stations in the project area and hydrology/hydraulic modelling to be used to assess waterbody crossings. However, it should also be recognized that Water Survey of Canada stations may not be available for all sites and that a prorating method may be required. Where there is no flow-related information available, flow may have to be estimated based entirely on flow from adjacent areas. Regional methods for pro-rating flow data are published in hydrological textbooks for low flows as well as other flow regimes. The methods are commonly known as: isoline, graphical index, statistical index, and regression. The use of these methods is generally qualified based on the transferability of the data. Caution should be exercised when using these extrapolation techniques and their selection thoroughly justified. Transferability of flow data to an ungauged watershed depends on several factors: type and characteristics of the system, proximity, drainage area, water use requirements and in-stream flow method used. The potential to transfer approaches across watersheds is increased where common characteristics can be identified, such as physiography, stream order, ground water regime, regulated versus unregulated flows, availability of historic information, cold water fish communities.</p>	<p>■ The Study Plan should acknowledge that where there is no flow-related information available (flow station), flow may have to be estimated based entirely on flows from adjacent areas. The method selected to determine these flows should be included and the direction included in the Comments & Rationale column should be considered when calculating flows.</p>	<p>■ The updated version of the Surface Water Study Plan provides details on the various methods to estimate flows at ungauged watersheds (including the pro-rate technique).</p>	■ Section 8.2
7	■ Page 16 and 17/ Section 6.2.1 Surface Water Quality	■ MECP (Surface Water Specialist Comments)	<p>■ Section 6.2.1 speaks to methods for predicting future conditions respecting surface water quality. It states: "The modelling will consider seasonal flows and water quality characteristics of the receiver as appropriate for the timing and duration of the Project activity or component that causes the residual effect. The model predictions will assume the condition of fully mixed water in the receiver." It should be noted that should an Environmental Compliance Approval (ECA) be required for an Industrial Sewage Works for this project, the information required to predict impacts to the receiver may differ from those discussed above. The ECA application process is initiated through pre-submission consultation with District and Technical Support MECP staff. Detail pertaining to application requirements would be provided to the proponent at this time.</p>	<p>■ Section 6.2.1 should recognize that should an Environmental Compliance Approval (ECA) be required for an Industrial Sewage Works discharge, additional information may be required to predict impacts to the receiver.</p>	<p>■ The updated version of the Surface Water Study Plan references the potential need to secure discharge approvals for the Project (Environmental Compliance Approval or other).</p>	■ Section 9.4.1





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