Appendix P

Final Acoustic and Vibration Technical Support Document

MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Acoustic and Vibration Environment Technical Support Document: Existing Conditions & Effects Assessment

February 2026

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This limitations statement is considered an integral part of this report.

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Revision History

Report	Date	Revised By:	Revision Description
Draft	January 20, 2025	WSP Canada Inc.	Draft Report for inclusion with Draft EA / IS Report
Final	February 20, 2026	WSP Canada Inc.	Final Report for inclusion with Final EA / IS Report

Executive Summary

Marten Falls First Nation (Oji-Cree translation, *Wegwajihwana*) is a remote First Nation community in northern Ontario, approximately 430 kilometres (km) from Thunder Bay, Ontario, located at the junction of the Albany (Oji-Cree translation, *Keshijih'wano Wih Ziibih*) and Ogoki (Oji-Cree translation, *Zakamosgwanih' Ziibih*) rivers. Marten Falls First Nation is proposing a multi-purpose Community Access Road (the Project) that will connect the community to the Ontario provincial highway network.

This Report presents the existing conditions and effects assessment for the acoustic and vibration environment discipline and is being prepared in support of the *Marten Falls First Nation Community Access Road Environmental Assessment / Impact Statement Report*. Specifically, environmental effects relevant to human noise and vibration receptors are assessed. The Report provides a detailed assessment of potential effects of the Project on the acoustic and vibration environment. This assessment includes consideration of both effects from the Project and cumulative effects from the Project and other reasonably foreseeable developments. The acoustic and vibration environment assessment used widely accepted scientific practices and incorporated Indigenous Knowledge, where available.

The Project existing conditions and effects were assessed using guidance from federal and provincial guidelines, and guidelines in line with generally accepted practices within the industry. The noise effects due to the Project construction, operations and maintenance activities were assessed using the *Health Canada Noise Guidance*. Traffic noise from road use during Project operations was assessed using the *Ministry of Environment / Ministry of Transportation Noise Protocol*. Construction-related facilities expected to continue operating post-construction (i.e., pits and quarries) were assessed using the Ministry of Environment, Conservation and Parks' *Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning, Publication NPC-300*.

The Project ground vibration levels due to operations and general non-blasting construction activities were assessed for potential building damage and potential human annoyance. Potential building damage was assessed using a vibration zone of influence as described in *City of Toronto By-law 514-2008*. Potential human annoyance was assessed in accordance with the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment Manual*. *Ontario Provincial Standard Specification 120* covers the requirements for the use of explosives during construction blasting (i.e., along the Community Access Road). Both ground vibration and air overpressure effects due to blasting at quarries are subject to guidelines and limits contained in the *Ministry of Environment, Conservation and Parks NPC-119*.

The *Health Canada Noise Guidance* presents a method that was used to determine criteria for air overpressure, a blasting Mitigation Noise Level, that is expected to result in little or no public annoyance (i.e., human annoyance), based on the number of daily blasts for short-term construction (i.e., less than one year).

A combination of a desktop review and field investigations were completed to establish the existing noise and vibration conditions within the Project area. The desktop review of existing conditions included identifying potential points of reception in the vicinity of the Project where human activity is expected to occur and characterizing the existing noise and vibration levels in the Local Study Area. To identify potential points of reception, a desktop level analysis was carried out of the orthoimagery and spatial data from the Ministry of Natural Resources' Land Information Ontario and Natural Resources Canada's CanVec databases and data collected through community and Indigenous engagement. The field program included a long-term noise monitoring component, completed through unattended monitoring over a period of up to approximately 48 hours, and a short-term measurement component, completed through attended measurements for a period of approximately 20 minutes. Representative sensitive receptor locations were selected for both the long-term monitoring and short-term measurement components. Two long-term monitoring locations were identified within the Marten Falls First Nation which were expected to provide the potential range in existing ambient noise levels within the Local Study Area.

As the majority of the potential points of reception identified within the acoustic and vibration environment Local Study Area are representative of more remote locations, the noise levels from the more remote long-term monitoring location were used to establish existing noise levels. An existing daytime noise level of 38 A-weighted decibels (dBA) and an existing nighttime noise level of 33 dBA have been applied for all potential points of reception.

The existing vibration levels within the vibration environment are expected to be influenced by nature-based sources with little or no contribution from anthropogenic (i.e., human) made vibrations. Therefore, through a desktop review, the existing vibration levels were assumed to be negligible (less than 0.1 millimetres per second [mm/s]), which is typical of rural and remote areas.

Considering the components and activities related to the Project, interactions were identified between the Project components and activities to the existing conditions of noise and vibration. These interactions support the identification of potential effects, both direct and indirect, that may result in changes to noise and vibration. An effects assessment was completed, including the review of Project activities to identify potential Project–environment interactions, identification of potential environmental effects of the Preferred Route and recommended mitigation measures.

Mitigation measures include opportunities to enhance benefits to environment, prediction and assessment of residual effects after implementation of mitigation and enhancement measures, prediction of cumulative effects, and identification of monitoring requirements. The key findings of the effects assessment included the following:

- Potential effects on noise and vibration are anticipated due to Project–environment interactions during the Construction, and Operation and Maintenance Phases of the Project;
- Potential environment effects on noise and vibration can be reduced by employing technically and economically feasible mitigation and enhancement measures. The proposed measures 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 judgment;
- The residual effects assessment indicated that potential residual effects on noise and vibration due to Project–environment interactions are not significant with the proper implementation of the mitigation and enhancement measures and proposed monitoring programs;
- The residual effects were predicted to be low or high in magnitude and therefore were carried forward to a cumulative effects assessment;
- Taking into account the implementation of the mitigation measures and the potential spatial and temporal overlap with other projects, the cumulative effects assessment indicated that potential cumulative effects on noise and vibration due to Project–environment interactions are not significant; and
- Overall, prediction uncertainty levels, based on existing conditions data, the understanding of the Project-related effects, and the levels of certainty associated with the effectiveness of proposed mitigation measures, were considered to be moderate for predicted noise and vibration residual effects.

To verify the accuracy of the effects assessment and to evaluate the effectiveness of mitigation measures, monitoring programs for the Construction and Operations and Maintenance of the Project will be implemented for vibration, and apply adaptive management, if required. A noise monitoring program is not recommended for the Project. Vibration monitoring is expected to be required for both temporary and permanent quarries and general construction blasting activities to align with Ministry of Environment, Conservation and Parks / Ministry of Natural Resources requirements and general industry practices, respectively. Monitoring requirements will be considered and assessed once detailed information regarding the blast designs are available. Based on typical blasts, monitoring would be recommended for construction blasting within 250 m and quarry blasts within 500 m of receptors verified to be vibration sensitive.

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1. Introduction

This Report presents the existing conditions and effects assessment for the acoustic and vibration environment discipline and is being prepared in support of the *Marten Falls First Nation Community Access Road Environmental Assessment / Impact Statement Report*. Specifically, environmental effects relevant to human noise and vibration receptors were assessed. Assessment of the effects of the Project on wildlife, socio-economics, and human health, as related to sensory disturbance from noise and vibration, has been carried out in their respective sections.

Marten Falls First Nation (Oji-Cree translation, *Wegwajihwana*) is a remote First Nation community in northern Ontario, approximately 430 km from Thunder Bay, Ontario, located at the junction of the Albany (Oji-Cree translation, *Keshijih'wano Wih Ziibih*) and Ogoki (Oji-Cree translation, *Zakamosgwanih' Ziibih*) rivers. Marten Falls First Nation is proposing a multi-purpose Community Access Road (the Project) that will connect the community to the Ontario provincial highway network.

The Project includes the construction and operation of a Community Access Road with the following key characteristics:

- Approximately 184 km (See **Section 6** for further details on the selection of the Preferred Route) of two-lane gravel road on a new right-of-way;
- Approximately 100 m wide right-of-way cleared to a width of 60 m; and
- Proposed designated speed limit of 80 km per hour.

Marten Falls First Nation is currently accessible year-round by air transportation out of Thunder Bay, Ontario and Nakina, Ontario, and by a winter access road constructed on an annual basis, if winter conditions permit. Since the 1990s, Marten Falls First Nation has received provincial funding to maintain the 140 km of winter road to the community.

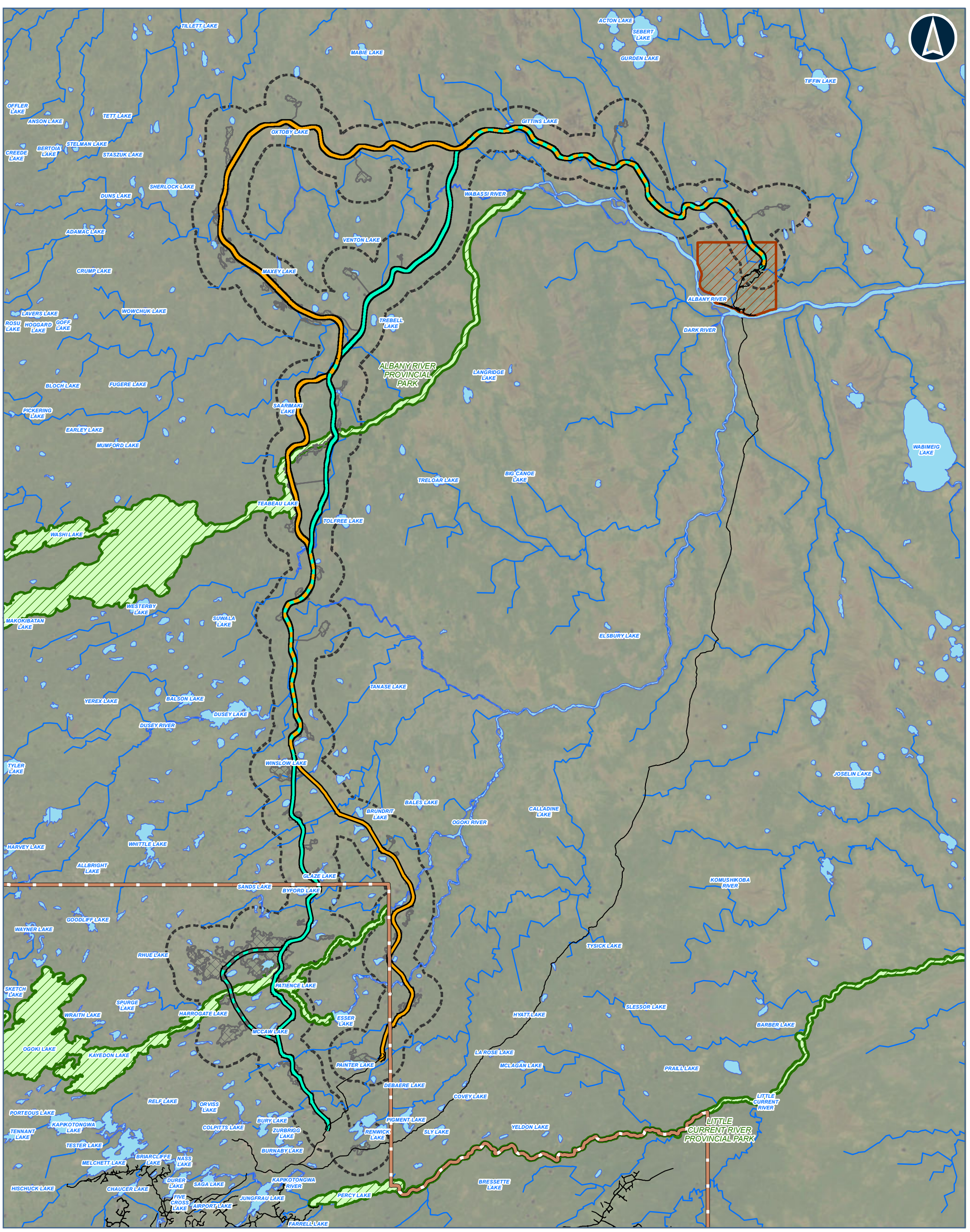
1.1 Project Overview

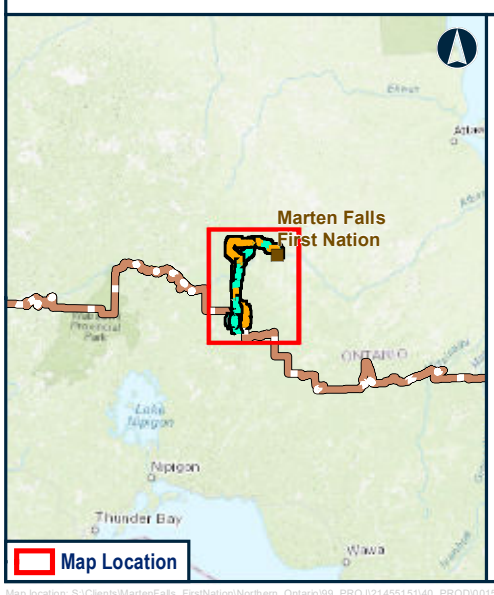
The Project consists of a Community Access Road from Painter Lake Road located approximately 57 km north of Nakina, Ontario to the community of Marten Falls First Nation (**Figure 1-1**). The Community Access Road will serve community access and industrial supply needs for both the community (e.g., fuel, construction supplies, and water treatment supplies) and industrial proponents (e.g., mining and forestry). Therefore, to minimize infrastructure corridors in the Far north, the Project will be for a multi-purpose road built to meet industrial use specifications.

In April 2018, Marten Falls First Nation signed an agreement with the Ministry of the Environment, Conservation and Parks to prepare an Environmental Assessment under the Ontario *Environmental Assessment Act*, 1990 to support the development of the Community Access Road. A study under the Ontario *Environmental Assessment Act* was formally initiated by Marten Falls First Nation in March 2019 when the *Notice of Commencement for a Terms of Reference* for the Project was published.

All-season public roads that require 75 km or more of new right-of-way, as per Schedule 1 (51) of the Physical Activities Regulations under the *Impact Assessment Act*, may be subject to the Act (Government of Canada, 2019b). After considering the detailed Project Description, the Agency determined that a federal Impact Assessment is required for the Community Access Road and an Impact Statement needs to be submitted to the Agency for review and approval. The Agency prepared and released the Marten Falls Community Access Road Project: Tailored Impact Statement Guidelines in February 2020 (Impact Assessment Agency of Canada, 2020a) to outline the information and studies necessary to conduct the Impact Assessment.

The federal and provincial governments are cooperating on the assessment of the Community Access Road, in accordance with the Cooperation Plan (Impact Assessment Agency of Canada, 2020b). The Cooperation Plan allows Marten Falls First Nation to prepare one single Environmental Assessment / Impact Statement submission to satisfy both the federal and provincial processes (Government of Canada).





Legend

- ROAD
- WATERBODY
- WATERCOURSE

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- PROJECT STUDY AREA

Notes:
None

Data Source:
Base Data: Provided by MNRF 2019; Route Infrastructure - Provided by AECOM 2019. Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

PROJECT LOCATION

0 5 10 20
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:450,000 * when printed 11"x17"
Rev:0	

Figure 1-1

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Date Saved: 2/12/2026 5:00:59 PM User Name: gld_rduval

1.2 Report Overview

This Report includes the following:

- A summary of the Project components and activities (**Section 2, Project Description**);
- A compilation of information shared by Indigenous Peoples and other interested persons related to fish and fish habitat (**Section 3, Information Shared by Indigenous Peoples and Other Interested Persons Which Informed This Report**);
- Study methods and assessment scope (**Section 4, Study Methods and Assessment Scope**);
- A description of existing conditions for noise and vibration (**Section 5, Existing Conditions**);
- A summary of the selection of the Preferred Route (**Section 6, Selection of the Preferred Route**);
- The residual effects assessment (**Section 7, Residual Effects Assessment**);
- The cumulative effects assessment (**Section 8, Cumulative Effects Assessment**);
- A summary of monitoring programs and future commitments related to noise (**Section 9, Monitoring Programs and Future Commitments**); and
- An overall summary and recommendations (**Section 10, Summary and Recommendations**).

As described in the *Environmental Assessment / Impact Statement Report* and in **Section 6** of this Report, the characterization of existing conditions for the Project was completed on two alternative routes (Alternative 1 and 4). The data collected through the characterization of existing conditions were used to inform the selection of the Preferred Route (**Section 6**). The residual (**Section 7**) and cumulative (**Section 8**) effects assessments were completed on the selected Preferred Route.

1.3 Qualifications of Individuals

A list of names and qualifications of the authors and technical reviewers of this Report is presented in **Table 1-1**.

Table 1-1: Qualifications of Individuals

Name	Title / Role	Years of Experience	Qualifications
Shira Daltrop	Senior Noise Consultant	12	M.A.Sc.
Daniel Corkery	Senior Blasting / Vibration Consultant	35	B.Sc.
Stefan Cicak	Senior Acoustics, Noise and Vibration Engineer	18	P.Eng

M.A.Sc. = Master of Applied Science; B.Sc. = Bachelor of Science; P.Eng = Professional Engineer.

2. Project Description

2.1 Project Components

2.1.1 Community Access Road

The Project consists of an approximately 184 km all-season road within a 100 m wide right-of-way, 60 m of which will be cleared of vegetation. The Community Access Road will be approximately 11 m in width to accommodate a two-lane gravel road with culverts and two-lane bridges at water crossing locations. Traffic levels for the Project have been estimated at under 700 vehicles a day for the north-south section and 100 vehicles a day for the east-west section of the Marten Falls First Nation Community Access Road. These volumes are reflective of the anticipated peak traffic in 2046.

Road embankment design mitigations are being further considered in high-suitability habitat for caribou where feasible. Operational mitigations such as lower speed limits, signage about wildlife risks, roadside vegetation management and snow berm height management will be further planned and implemented to facilitate safe wildlife crossing of the road.

The predominant building materials used to construct the Community Access Road will be blasted rockfill and composite excavation material capped with granular surface material. The majority of blasted rockfill will be obtained from rock outcrops within and / or adjacent to the right-of-way. Building materials will be primarily obtained through the pits and quarries (**Section 2.1.3**) developed specifically to support construction of the Project.

Early investigations on permafrost have shown the Project is located within the isolated patches permafrost zone (Heginbottom et al., 1995), with some possible locations identified in test holes and helicopter reconnaissance by KGS Group (2019a,b). Excavation within identified permafrost areas will be avoided, whenever possible, as cutting into surface vegetation can disturb the permafrost regime resulting in thaw and unstable ground. As a precaution, the design will primarily use fill along access roads to minimize any permafrost degradation and will follow the recommendations outlined in a Permafrost Management Plan.

The proposed approach to road construction through peatlands endeavours to keep peat in place while promoting natural water flow. A permeable embankment made of quarried rock or selected granular material will be placed over the peat, supported by heavy geogrid to prevent clogging and allow settlement. To preserve peatland hydrogeology, 900-mm equalization culverts will be installed at appropriate intervals, informed by additional field programs and studies (i.e. peatlands hydrogeological monitoring, water budget study, and a field program to develop a detailed map of peat thickness), to be carried out during

subsequent design phases of the Project. For further information on the proposed construction approach, please refer to **Appendix W** under the *Final Environmental Assessment / Impact Statement Report*.

For specific details on the Preferred Route, please refer to **Section 6**.

2.1.2 Bridges and Culverts

Permanent bridges and culverts will be required for the various waterbodies to be crossed by the Community Access Road. Based on initial design and planning, the proposed waterbody crossing structure was initially determined based on bankfull width for each waterbody identified in the crossing list as follows.

- For waterbody crossings with bankfull widths less than 5 m, it was assumed that culverts would be used (requiring in-water work);
- For waterbody crossings with bankfull widths greater than 5 m and less than 30 m, it was assumed that clear span bridges would be used (no in-water work);
- For waterbody crossings greater than 30 m, it was assumed that bridges with piers and abutments would be used (requiring in-water work); and
- For waterbody crossings in flooded / impounded wetlands where wetted widths were greater than bankfull width at the time of the assessment, it was assumed that in-water work would be required.

The type of crossing structure for individual waterbodies may change during detailed design based on site-specific conditions.

The bridges will range in size from clear span to multi-span bridges and will accommodate two lanes of traffic with appropriate shoulder widths. The foundation supports for the bridge abutments are expected to consist of driven steel piles, drilled concrete piles or concrete spread footings. Bridges will be designed to meet the 1-in-100-year flood scenario design, fish passage requirements, and navigation requirements, as required, based on federal and provincial regulations. Where feasible, bridges will be installed above the high-water mark; however, abutments and / or reinforcement material may be installed below the high-water mark. Permanent bridges along the Community Access Road will be designed to accommodate increased flooding and rainfall under expected and anticipated climate change conditions.

For certain waterbody crossings, culverts will be constructed using either corrugated steel pipe culverts or box culverts with minimum culvert diameters of 900 mm. The culverts will either be closed or open bottom depending on fisheries sensitivities and soil conditions. The culverts will be designed to accommodate fish passage, where appropriate. Permanent culverts along the Community Access Road will be designed to withstand expected and anticipated climate change conditions, such as increased rainfall, higher temperatures, frequent freeze-thaw cycles, and heightened flooding risks.

Equalization culverts will also be installed where spring-melt or storm runoff needs to pass from one side of the Community Access Road to the other to prevent flooding and / or erosion and to maintain the existing surface water drainage patterns. Culverts will be put in place as construction progresses along the Project.

Additional design measures and wildlife crossing mitigation options will be incorporated on select bridges and culverts located in high-suitability habitat for Species at Risk and road mortality vulnerable species (i.e. amphibians and reptiles). These measures will be further considered during detailed design and implemented during construction at prioritized locations to facilitate safe wildlife passage above or below the Community Access Road and reduce the risk of barriers to movement across the Project area during operations.

The type of crossing structure for individual waterbodies may change during detailed design based on site-specific conditions.

2.1.3 Pits and Quarries

Pits and quarries will be developed to provide crushed rock and granular materials for the construction of the Project and temporary access roads. Most of the rock required for construction is expected to come from quarry sites adjacent to the Project. Temporary access roads will be established to connect the various Project components, as required, and will be limited in length to the extent feasible.

All materials will be subject to a geotechnical verification process in order to confirm they possess the desired physical properties for use in construction. The development and operation of all pits and quarries will be subject to the aggregate permitting process under the *Aggregate Resources Act* (Aggregate Resources of Ontario: Site Plan [2020] Standards and Technical Reports and Information [2023]). Permitted pits and quarries will follow the progressive and final rehabilitation requirements outlined in the approved site plans under the Act.

Only material that has been cleared through a geochemical verification process will be used for the permanent and temporary roads to avoid acid rock drainage or metal leaching. Monitoring of runoff will be conducted; further details about this specific type of monitoring will be available in the Surface Water Management Plan of which the Owner / Operator will be responsible to follow all applicable Ontario permitting guidelines.

2.1.4 Temporary Infrastructure for Construction

The temporary infrastructure for the Project includes temporary access roads, staging areas, camps, and debris and / or timber stockpiles. Temporary access roads will be required to access the right-of-way during construction. The purpose of the temporary access roads is to facilitate emergency, equipment and personnel access, and to provide access to and from pits and quarries, staging areas, camps, and debris and / or timber

stockpiles. The temporary access roads will be cleared, but not grubbed, to approximately 10 m wide to accommodate equipment movement. The temporary access roads will be limited in length to the extent feasible. Temporary bridges and culverts will be required to cross the various waterbodies along the temporary access roads. Existing access roads will be used where possible; however, access is limited in the area.

Bridges and culverts will be required to cross the various waterbodies along the access roads. Based on initial design and planning, the proposed waterbody crossing structures for the *Environmental Assessment / Impact Statement Report* were initially determined based on bankfull width for each waterbody identified in the crossing list as follows:

- For waterbody crossings with bankfull widths less than 5 m, it was assumed that culverts would be used (requiring in-water work);
- For waterbody crossings with bankfull widths greater than 5 m and less than 30 m, it was assumed that clear span bridges would be used (no in-water work);
- For waterbody crossings greater than 30 m, it was assumed that bridges with piers and abutments would be used (requiring in-water work); and
- For waterbody crossings in flooded / impounded wetlands where wetted widths were greater than bankfull width at the time of the assessment, it was assumed that in-water work would be required.

Temporary construction camps, staging areas, and stockpile areas are anticipated to be established at various locations along the right-of-way and / or near other Project components. These components are proposed to support crews and to store equipment, vehicles, materials, and supplies.

Temporary access roads leading to temporary quarry areas will also be rehabilitated and surrendered in accordance with the *Aggregate Resources Act*. Temporary quarries not required for maintenance activities will be vegetated in accordance with the Rehabilitation Plan. Access roads to quarries maintained for operations will be blocked to discourage public use.

2.2 Project Activities

The Project is planned to occur in two phases: Construction and Operation and Maintenance. The following Project activities will occur in each phase, including:

- Construction Phase Project activities:
  - Clearing of the right-of-way for the Community Access Road and access roads (e.g., remove and dispose of trees, shrubs, fallen timber, and surface litter, strip organic materials, grub);
  - Blasting rock (e.g., remove rock at quarries, and as required, at specific locations in association with road and bridge construction);

- Constructing the Community Access Road (e.g., overburden excavation and removal, excavation of granular material at pits, remove unsuitable soil, place and compact rock and granular material, trim and shape the road, stockpiling of mineral soil and leaf litter [organic material], and soil handling and replacement from stockpiles at decommissioning);(e.g., remove unsuitable soil, place and compact rock and granular material, and trim and shape the road);
- Constructing bridges and installing culverts (e.g., surface water management and erosion control, dewatering of the watercourses to create ice bridges, alteration of natural drainage systems, and watercourse bank grading to improve approaches if required);
- Constructing and operating temporary infrastructure (e.g., access roads, construction camps, laydown areas and staging areas);
- Decommissioning temporary infrastructure (e.g., remove temporary culverts and bridges, remediate channels); and
- Mobilizing equipment, supplies, and personnel (e.g., haulage of materials, soil and liquid waste management, fuel storage, hazardous materials handling, sewage and effluent treatment, and water storage and effluent monitoring for temporary construction camps).

- Operation and Maintenance Phase Project activities:
  - Operating the Preferred Route.
  - Maintaining the Preferred Route, including:
    - Excavation at pits, and excavations and / or blasting at quarry sites;
    - Dewatering within pits and quarry sites;
    - Grading road surface (e.g., washout repair, correct grade);
    - Conducting erosion control (e.g., apply native seed mix).
    - Conducting dust suppression (e.g., apply environmentally friendly dust products);
    - Clearing vegetation on road shoulders (e.g., mow grass, remove brush and small trees);
    - Removing snow (e.g., plow);
    - Conducting bridge and culvert maintenance (e.g., seasonal inspections debris removal);
    - Conducting ditch maintenance (e.g., maintain drainage to design standard by excavating, filling, trimming, and shaping ditches); and
    - Conducting road maintenance (e.g., fix settlement, break-up of road surface, slope failures).

3. Information Shared by Indigenous Peoples and Other Interested Persons Which Informed This Report

In the course of completing the description of existing conditions and effects assessment for this Report, information provided by Indigenous Knowledge holders, Indigenous community members, regulators and public stakeholders was used to develop the approach and assessment conducted for this study. This information and how it informed the development of this report are described in the following section. This section does not detail all the information, comments or questions received related to the Project and is limited to the information that informed this Report. For a full description of all consultation and engagement related to the Community Access Road refer to the *Record of Consultation and Engagement for the Environmental Assessment / Impact Statement Report*. Information related to the Indigenous Knowledge Program can be found in the *Marten Falls First Nation Community Access Road: Aboriginal and / or Treaty Rights and Interests Existing Conditions Report* (Dillon, 2026).

3.1 Indigenous Knowledge

Indigenous Knowledge refers to Indigenous systems of knowledge as well as cultural practices related to the production of knowledge based on traditional belief systems, relationships to the environment, and community practices. It is the accumulated and living knowledge built upon the historical experiences of Indigenous Peoples living on the land and adapting to social, economic, environmental, spiritual, and political change (Chiefs of Ontario, n.d.). It includes knowledge about the natural environment (e.g., locations of caribou seasonal use and calving areas), the relationships between environmental changes and species or ecosystems, and how potential effects on the environment can be avoided or reduced.

Indigenous land and resource use refers to specific areas and resources used for traditional purposes when Indigenous Peoples learn and practice their Indigenous Knowledge (Garvin & Northern Forestry Centre (Canada), 2001). This includes the areas and sites used for hunting, trapping, fishing, and gathering and the resources harvested, as well as cultural sites, features, and practices, sometimes referred to as Traditional Land Use.

In 2019, the Marten Falls First Nation Community Access Road Project Team launched a program to collect Indigenous Knowledge. The Indigenous Knowledge Program is a critical component of the information base upon which the assessments will rely. The information generated through the Indigenous Knowledge Program has been woven with scientific

approaches, and both knowledge systems will be given equal consideration in forming the foundation for existing conditions, predicting potential Project effects, and determining appropriate mitigation and monitoring methods.

The Indigenous Knowledge Program occurs in two concurrent phases:

1. Collecting existing Indigenous Knowledge and information on Indigenous land and resource use to help inform the early stages of the assessments; and

2. Completing Project-specific Indigenous Knowledge and Lands & Resource Use studies.

The protection and confidentiality of Indigenous Knowledge and information on Indigenous land and resource use is of the utmost importance to the Project team. To honour and respect this important information, Indigenous Knowledge Sharing Agreements were established with interested communities prior to the use of community information. The Sharing Agreement outlines how confidential and sensitive information will be woven into the Project's environmental / impact and design processes.

All Indigenous communities and groups identified by the Ministry of the Environment, Conservation and Parks and the Impact Assessment Agency of Canada through the Indigenous Engagement and Partnership Plan have had 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 included opportunities for Indigenous communities and groups to meet with the Proponent to discuss the program, ask questions, and share concerns and interests.

The Proponent strove to respectfully collaborate with Indigenous communities on how Indigenous Knowledge and information on Indigenous land and resource use and cultural values were considered in reporting, and how potential effects on Aboriginal and Treaty Rights and Interests were assessed. Measures to support this included but were not limited to:

- Engaging Indigenous communities to solicit information on Indigenous Knowledge and Indigenous land and resource use and cultural values to inform existing conditions;
- Providing Indigenous communities with draft sections of the *Environmental Assessment / Impact Statement 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 were assessed is provided in the *Aboriginal and Treaty Rights and Interests Study Plan* (Dillon, 2021).

Information provided by Indigenous Knowledge holders, recognized as such by their Indigenous community, has been obtained through literature review and shared directly by Indigenous nations in support of this Project through face-to-face meetings or receipt of Indigenous Knowledge reports. The information, some of which is confidential, that has been used to inform this reporting is described in **Table 3-1**.

Table 3-1: Indigenous Knowledge

Topic	Indigenous Community	Details	Section Reference
■ **Location of sensitive receptors**	■ Marten Falls First Nation ■ Aroland First Nation ■ Attawapiskat First Nation ■ Neskantaga First Nation ■ (Marten Falls First Nation, n.d.a; Marten Falls First Nation, n.d.b; Marten Falls First Nation, 2017; Marten Falls First Nation, 2019; Marten Falls First Nation, 2022a; Marten Falls First Nation, 2022b)	■ The locations of sensitive features were shared by Indigenous communities who provided input on the Project. The locations of these sensitive features were considered as potential points of reception in the assessment for the acoustic and vibration environment.	■ **Informed Section 4.5** ■ **Informed Section 5.1** ■ **Informed Section 6** ■ **Informed Section 7** ■ **Informed Section 8** ■ **Informed Section 9** ■ **Informed Attachment B**
Concerns related to: ■ **Noise / vibrations** ■ **Traffic-related impacts**	■ Marten Falls First Nation (Marten Falls First Nation, 2023) ■ Weenusk First Nation (MNP LPP, 2024b)	■ Marten Falls First Nation noted concerns from the community related to overall / generalized impacts associated with increased noise and vibrations throughout Marten Falls First Nation traditional territory. ■ Some of the generalized concerns shared by Marten Falls First Nation included expected level of traffic / volume of vehicles expected to use the Community Access Road and the associated concern with noise on land use. This includes increased noise / vibrations at identified points of reception. ■ Weenusk First Nation noted concerns specific to noise concerning traffic-related impacts, and construction equipment and machinery.	■ **Informed Section 7.3.1**

3.2 Indigenous Engagement

The content presented in **Section 3.2** reflects information that was available at the time the *Draft Environmental Assessment / Impact Statement Report* was prepared. No updates have been made to this section for the Final Environmental Assessment / Impact Statement Report. For the most up-to-date and comprehensive documentation of engagement, please refer to Appendix X - *Record of Consultation and Engagement* under the *Final Environmental Assessment / Impact Statement Report*, which serves as the source for all community-specific engagement input received during later phases of the Project.

In addition to the Indigenous Knowledge provided by Indigenous Knowledge holders, information was collected from all Indigenous community members with interests in this Project. The information that has been used to inform this report is described in **Table 3-2**.

Table 3-2: Indigenous Engagement

Topic	Indigenous Community	Details	Section Reference
Input on field program	■ Local Marten Falls First Nation community members	■ Discussion with local community members during field program informed the placement of noise monitoring and measurement locations.	■ Locations were finalized accordingly.

3.3 Regulator and Public Stakeholder Input

In March 2025, the *Draft Environmental Assessment / Impact Statement Report* was submitted to Regulators, government experts and Indigenous communities for review as part of the Environmental Assessment / Impact Assessment process. Comments received on this Report during the review period have been reviewed and considered by the Marten Falls First Nation Community Access Road Project Team and this Report was updated, where warranted.

The content presented in **Section 3.3** reflects information that was available at the time the *Draft Environmental Assessment / Impact Statement Report* was prepared. No updates have been made to this section for the *Final Environmental Assessment / Impact Statement Report*. For the most up-to-date and comprehensive documentation of regulator and public stakeholder input, please refer to *Appendix X - Record of Consultation and Engagement* under the *Final Environmental Assessment / Impact Statement Report*, which serves as the source for all comments received during later phases of the Project.

The Proponent engaged with Regulators and Public Stakeholders with technical knowledge related to the Valued Components to inform aspects of this report. The information and how it informed the development of this report are described in **Table 3-3.**

Table 3-3: Public, Agency and Other Input

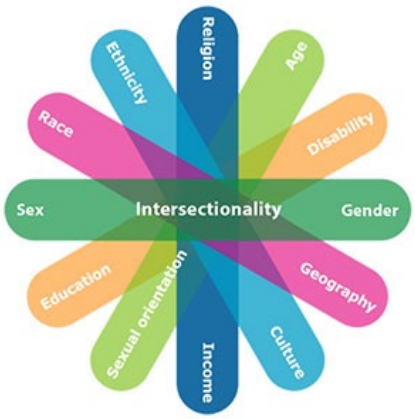
Topic	Provided By	Details	Section Reference
Input / feedback on study plans	■ Impact Assessment Agency of Canada (Impact Assessment Agency of Canada, 2022) ■ Ministry of the Environment, Conservation and Parks (Ministry of Environment, Conservation and Parks, 2022)	■ The Impact Assessment Agency of Canada noted that any edits to the Acoustic and Vibration Environment Field Logistics Workplan methodology as a result of agency comments should be reflected in the Environmental Assessment. ■ Deviations were anticipated to be required as the Project evolved due to challenges encountered in the field, alternative methodologies being developed, comments from regulators, and as updated guidance became available. These deviations are captured within the study methods and assessment scope.	■ **Section 4.1** ■ **Table 4-1**

3.4 Gender-Based Analysis Plus

The *Impact Assessment Act* of Canada (Government of Canada, 2019) requires Gender-Based Analysis Plus to be applied to Impact Assessments in Canada. Gender-Based Analysis Plus is not a specific set of methods for Impact Assessments, but rather an approach that is adapted to the Project and the communities potentially affected and / or being engaged.

Gender-Based Analysis Plus is an approach to assess the inequalities and effects of policies, programs, and projects on diverse groups and identities. These identities could include (but are not limited to): gender, sexual orientation, age, race, ethnicity, class, religion, and mental or physical disability (Women and Gender Equality Canada, 2022). These identities can also intersect or overlap; for example, where an individual identifies as being both Indigenous and an Elder or youth.

Figure 3-1: Gender-Based Analysis Plus Intersecting Identity Factors



Source: (Canadian Institutes of Health Research, 2022)

The Gender-Based Analysis Plus approach involves understanding how certain vulnerable groups such as Indigenous Peoples, women, Elders, youth, Two-Spirit, Lesbian, Gay, Bisexual, Transgender, Queer, Questioning, Intersex, and Asexual persons experience, and could be disproportionately affected by a project. Understanding how these groups could be affected by projects allow for more targeted, sensitive, and appropriate enhancement measures, mitigations, monitoring, and follow-up (Impact Assessment Agency of Canada, 2021b). It is important to understand that vulnerability in Impact Assessment is understood primarily, but not solely, as a structural vulnerability. This means that in many cases it is the systems and power structures that make certain groups more vulnerable (Impact Assessment Agency of Canada, 2021a). For Indigenous Peoples this includes historical and ongoing colonialism, loss of lands and culture, intergenerational trauma, and the residential school system that have resulted in significant social, economic, and health and well-being disparities relative to the non-Indigenous Canadian population (Kim, 2019). Exceptions to this are where vulnerability may be associated with biological sex, pregnancy, or age in relation to environmental determinants of health and exposure to contaminants, for example.

4. Study Methods and Assessment Scope

This section provides a summary of the study methods and assessment scope for the existing conditions and effects assessment for the acoustic and vibration environment.

4.1 Study and Work Plan Purpose, Objectives, and Deviations

As required by the *Impact Assessment Act* (Government of Canada, 2019) and referenced in the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020), Study Plans and Work Plans were developed for disciplines as required. The purpose of the Study Plan was to explain:

- The existing conditions study methodology that will result in a comprehensive description of the existing environment potentially affected by the Project;
- The process for ensuring efficient and transparent data management and analysis was completed; and
- Developing the discipline specific effects assessment methodology.

Work Plans included details on how to action the Study Plans and include information such as location of sampling sites, scheduling, and sequencing.

As noted previously, the Draft All Season Community Access Road: Acoustic and Vibration Environment Study Plan (AECOM, 2021) and All Season Community Access Road: Acoustic and Vibration Environment Field Logistics Workplan (Golder, 2021) can be found in **Attachment A – Draft Study Plan, Workplan and Regulator Comments**.

In some instances, through the execution of this study the approach deviated from what was described in the original Draft Study Plan; these deviations are outlined in **Table 4-1**. Deviations were required as the Project evolved due to challenges encountered in the field, alternative methodologies being developed, comments from regulators, and as updated guidance became available. General changes, such as changes to section headings, organization of sections and subsections and, changes to phrasing and tense have been made throughout. These administrative changes have not been documented in **Table 4-1**.

Table 4-1: Deviations from Draft Study Plan

Section Reference	Description of Change	Rationale
4.3.3 Spatial Boundaries	The Draft Study Plan previously used the term "Local Study Area" to define the 5 km corridor which is being studied in the Existing Conditions section, and within which the footprint of the Project will be further refined. This area has been retitled as the "Project Study Area".	This change eliminates confusion between the Project Study Area and the Discipline Specific Local Study Area.
4.9 Data Management	In Section 3.4.1, the Study Plan previously identified that data would be backed up on a "daily basis". This wording has been revised to state that data would be backed up on a "regular basis".	This change brings alignment with the Proponent's various data backup policies.
4.9 Data Management	In Section 3.4.2 wording was updated to note that datasets from all survey sites will be provided upon report finalization. No timeline had been previously identified.	The revision provides added clarity around when the data would be provided.
4.3.2 Valued Components and Indicators	Blasting Mitigation Noise Levels from the *Health Canada Noise Guidance* has been added as a vibration indicator.	This has been included based on recent approach on linear projects in northern Ontario.
Multiple	All references to the *Health Canada Noise Guidance* have been updated to reflect Health Canada's updated guidance released in December 2023.	This assessment intends to consider the most up to date guidance documents available at the time of preparing this report.

km = kilometre.

4.2 Key Concepts: Acoustics and Vibration

An introduction to key concepts used in the assessment of outdoor acoustics and vibration follows.

- "Noise", "sound", "airborne noise", "noise levels", "vibration", "vibration levels" or "ground-borne vibration" refers to the levels that can be perceived or measured at a point of reception. While noise is defined as unwanted sound, the terms noise and sound are often used interchangeably;
- A "receptor" or "point of reception" is any location on a noise and / or vibration sensitive land use where noise and / or vibration from a source is received;
- The "level" of a noise is expressed on a logarithmic scale, in units called decibels (dB). Since the scale is logarithmic, a noise that is twice the noise level of another will be three decibels (3 dB) higher;

- "Sound pressure level" is the physical quantity that is measured in the environment that describes sound waves quantitatively. It is a ratio of the absolute measured pressure relative to a reference (i.e., 20 micro-pascals [µPa]). This ratio of pressures is converted to a decibel scale;
- Noise emissions and noise levels have an associated frequency. The human ear does not respond to all frequencies in the same way. Mid-range frequencies are most readily detected by the human ear, while the human ear is generally less sensitive to low and high frequencies. Environmental noise levels used in this assessment are presented as "A-weighted decibels" (or dBA), which incorporates the typical frequency response of the human ear;
- The "percentile noise level", designated "Ln", is the noise level exceeded "n"% of a specified time period and is measured in dBA. The L90, for instance, is the noise level exceeded 90% of the time;
- Outdoor noise is usually expressed as an "equivalent noise level" (L_{eq}, T), which is a logarithmic average (i.e., energy average) of the measured or predicted noise levels over a given period of time (T). An equivalent noise level measured or predicted over a one-hour period would be referred to as $L_{eq,1h}$;
- Environmental noise levels vary throughout the day and it is important to distinguish between the times of day (i.e., daytime / evening / nighttime). For the purposes of this assessment, the 24-hour period that represents a day is divided into either two or three periods for which noise is evaluated, depending on the guidance document. In accordance with the Ontario Ministry of the Environment, Conservation and Parks (Ministry of Environment, Conservation and Parks, 2013), "daytime" noise levels occur for the period from 7 a.m. to 7 p.m., "evening" noise levels occur for the period from 7 p.m. to 11 p.m. and the "nighttime" noise levels occur for the period from 11 p.m. to 7 a.m. Health Canada (Health Canada, 2023) defines "daytime" as 7 a.m. to 10 p.m. and "nighttime" as 10 p.m. to 7 a.m.;
- Vibration consists of two components: air overpressure and ground vibration. The term "air overpressure" is used in this part of the Project to describe the vibrations that travel through the air produced by the blasting activities at rock quarries, for example. The term "ground vibration" is used in this Project to describe vibrations that travel through the ground produced by construction activity or blasting activities. An introduction to a couple of the key concepts with regard to air and ground vibrations follows.
    - **Air overpressure** is a pressure wave travelling through the air, produced by the direct action of an explosive event on air or the indirect action of a confining material subjected to explosive loading. For the purposes of this Project, air overpressure is expressed in a logarithmic scale as decibels in the Linear or Un-weighted mode (dBL).

- **Ground vibration** is an elastic effect measured in units of peak particle velocity, defined as the speed of excitation of particles within the ground resulting from vibratory motion. For the purposes of this study, peak particle velocity is measured in millimetres per second (mm/s). Peak particle velocity is a vector quantity and is typically measured in three component vectors (i.e., transverse, vertical and longitudinal). Construction vibration is assessed based on peak particle velocity as it is correlated to building damage. Human annoyance is assessed based on the root-mean-square vibration velocity.

- "Frequency of vibration" is the rate of oscillation that occurs in one second, measured in hertz where 1 Hz equals 1 cycle per second; and
- The peak vector sum is the vectoral sum of the individual peak particle velocity component values in all three vector directions measured by the seismograph.

4.3 Study Scoping

4.3.1 Temporal Boundaries

Project phases, which are temporal boundaries, are developed to establish the timeframes within which potential effects of the Project will be considered. As indicated in **Section 2.2**, The Project is planned to occur in two phases, which are briefly described in the following bullets.

- **Construction Phase**–The time from start of construction, including site preparation activities, to the start of Operations and Maintenance of the Community Access Road. Decommissioning of construction works is included in the Construction Phase. The Construction Phase is anticipated to take approximately three to ten years to complete; and
- **Operation and Maintenance Phase–**The Operation and Maintenance Phase starts once construction activities are complete and lasts for the life of the Project. The Operation and Maintenance Phase of the Project is considered to be permanent based on the expected timeline for when major refurbishment of road components (e.g., bridges) is anticipated.

There are currently no plans to decommission the Community Access Road as there is no expected / known end date for its need. Future suspension, decommissioning, and eventual abandonment will not be considered in this report. It will be considered if and when a decommissioning or abandonment application is made for the Community Access Road.

In determining the temporal boundaries, in particular the long duration of the Operation and Maintenance Phase, consideration was given to the long-term effects on the well-being of present and future generations.

4.3.2 Valued Components and Indicators

The Impact Assessment Agency of Canada describes **Valued Components** as the environmental, health, social, economic, or additional elements or conditions of the natural and human environment that may be affected by a proposed project and area of concern or value to the public, Indigenous Peoples, federal authorities and interested parties (Impact Assessment Agency of Canada, 2021b).

Indicators represent the resource, feature, or issue related to the Valued Component that, if changed, may demonstrate an effect on the environment. Indicators may be characterized quantitatively or qualitatively. For example, effects from changes to the availability and distribution of Valued Components are often expressed through quantitative assessment of direct vegetation removals as well as predicted indirect effects on retained vegetation.

The Draft Study Plan presented indicators and rationale for selection known to the Proponent at the time of drafting. The draft table and the factors that influenced it can be found in Section 9.2 of the *Draft All Season Community Access Road: Acoustic and Vibration Environment Study Plan* (AECOM, 2021) in **Attachment A**.

An updated list of Acoustic and Vibration Environment Indicators can be found in **Table 4-2**.

Table 4-2: Acoustic and Vibration Environment Indicators

Valued Component	Indicators	Rationale for Selection	Measures of Change
Noise	■ Continuous one-hour equivalent sound level ($L_{eq,1h}$) ■ Nighttime maximum sound level (L_{max}) ■ Day-night sound level (L_{dn}) ■ Daytime sound level (L_d) ■ Nighttime sound level (L_n) ■ Percent highly annoyed (%HA)	■ Field investigations ■ Agency feedback ■ Data from previous Environmental Assessments ■ *Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning, Publication NPC-300* (Ministry of Environmental, Conservation and Parks, 2013) ■ *Environmental Guide for Noise* (Ministry of Transportation, 2022) ■ *A Protocol for Dealing with Noise Concerns During the Preparation, Review, and Evaluation of Provincial Highways Environmental Assessments* (Ministry of Environment / Ministry of Transportation, 1986) ■ *Guidance for Evaluating Human Health Effects in Impact Assessment: Noise* (Health Canada, 2023) ■ *Guidelines for Community Noise* (World Health Organization, 1999) ■ *Transit Noise and Vibration Impact Assessment Manual* (Federal Transit Administration, 2018) ■ *Ontario Provincial Standard Specification 120* (Ontario Provincial Standard Specification, 2014) ■ *Model Municipal Noise Control By-law, NPC-119* (Ministry of Environment, Conservation and Parks, 1978)	■ Change in sound levels ■ Change in %HA
Vibration	■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity ■ Air overpressure		■ Change in peak particle ground vibration velocity ■ Change in root-mean square ground vibration velocity ■ Change in air overpressure

Indicators related to wildlife, socio economics and human health, as related to sensory disturbance from noise and vibration, are presented in their respective reports.

$L_{eq,\ 1h}$ = continuous one-hour equivalent sound level; L_{max} = maximum sound level; L_{dn} = day-night sound level; Ld = daytime sound level; Ln = nighttime sound level; %HA – percent highly annoyed.

4.3.3 Spatial Boundaries

This section includes a summary of the general Project study areas that were defined for the Project and also describes the discipline specific study areas that were designed to capture the geographic extents to allow for the characterization of existing conditions of the acoustic and vibration environment Valued Component for both alternatives and for the assessment of direct and indirect effects from the Preferred Route.

4.3.3.1 Project Study Areas

Study areas identify the geographic extents within which potential effects of the Project are likely to occur and will be considered in the *Environmental Assessment / Impact Statement Report*. General Project boundaries were established for scoping field programs and delineating study areas for discipline-specific surveys. These general Project study areas are described in **Table 4-3**.

Table 4-3: Project Study Areas Definition and Description

Study Area	Definition	Description
Construction Disturbance Area	Area of expected direct disturbance	100 m wide Community Access Road right-of-way, temporary construction access roads, work areas, worker camps, and pits, quarries, and temporary access roads
Project Study Area	The area where most of the direct effects of the Project are likely to occur	The area within 2.5 km (total of 5 km) of the centreline of the route alternatives

m = metre; km = kilometre.

4.3.3.2 Acoustic and Vibration Environment Study Areas

Discipline specific study areas identify the geographic extents within which potential effects of the Project are likely to occur and were considered in the *Environmental Assessment / Impact Statement Report*. Discipline-specific Local and Regional Study Areas were subsequently defined for the Project. In defining these areas, the following was considered:

- Location and other characteristics of the discipline relative to the Project;
- The anticipated extent of the potential Project effects;
- Federal, provincial, regional, and local government administrative boundaries;
- Input from Indigenous communities;
- 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.

As described in the *Environmental Assessment / Impact Statement Report* and in **Section 6** of this Report, the characterization of existing conditions for the Project was completed on two alternative routes (Alternative 1 and 4). The data collected through the characterization of existing conditions were used to inform the selection of the Preferred Route. The existing conditions Local and Regional Study Areas considered the two alternative routes (Alternative 1 and 4). As the residual and cumulative effects assessment was completed on just the selected Preferred Route, the Local and Regional Study Areas for the effects assessment only considered the one route.

4.3.3.2.1 Existing Condition Study Areas

The existing conditions spatial boundaries for acoustic and vibration environment are defined by a Local Study Area and Regional Study Area. These spatial boundaries were applied to each alternative, considering the Project components within the Construction Disturbance Area. The existing conditions study areas cover 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 were taken into consideration in the development of the cumulative effects assessment study area(s) and are further discussed in **Section 8.1**.

The **Construction Disturbance Area** includes the Project footprint, which encompasses a 100 m wide right-of-way for each Route Alternative (i.e., Alternative 1 and 4). The right-of-way is only expected to be cleared to a width of 60 m for permanent use with the remaining 40 m to be temporarily cleared to accommodate activities such as the excavation of pits and quarries, construction of temporary laydown areas, and the implementation of debris and / or timber stockpiles. Alternative 1 includes approximately 226 km of new road, while Alternative 4 comprises approximately 194 km in length of new road. The Construction Disturbance Area was designed to capture the potential direct effects of the Project at the immediate local scale.

The **Local Study Area** for the acoustic and vibration existing conditions assessment includes the area within 4 km of the Construction Disturbance Area. Therefore, it is an approximately 8 km wide area for each alternative route.

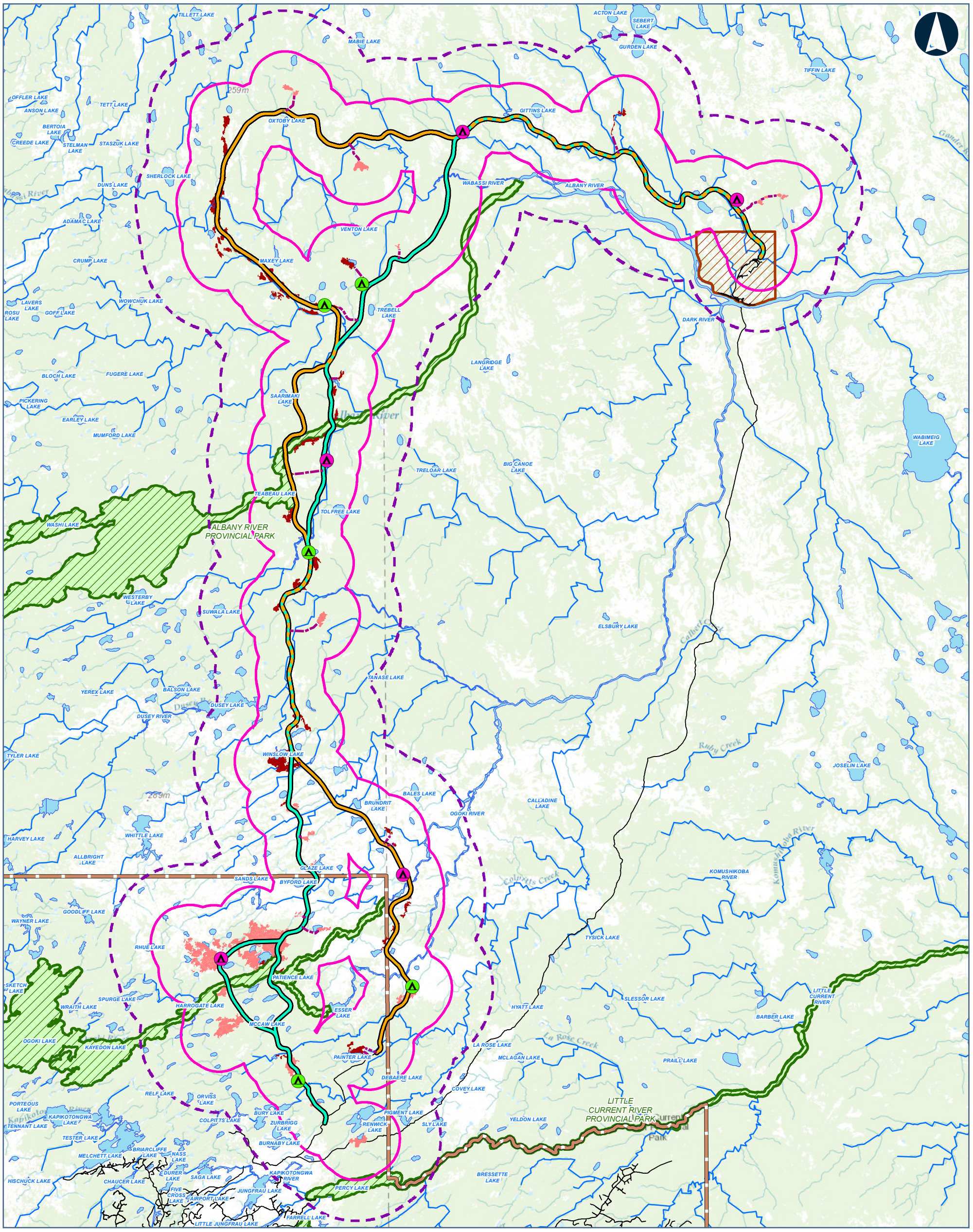
The **Regional Study Area** for the acoustic and vibration existing conditions assessment of encompasses the area 5 km beyond the acoustic and vibration Local Study Area in either direction. Therefore, it is an 18 km wide area for each alternative route.

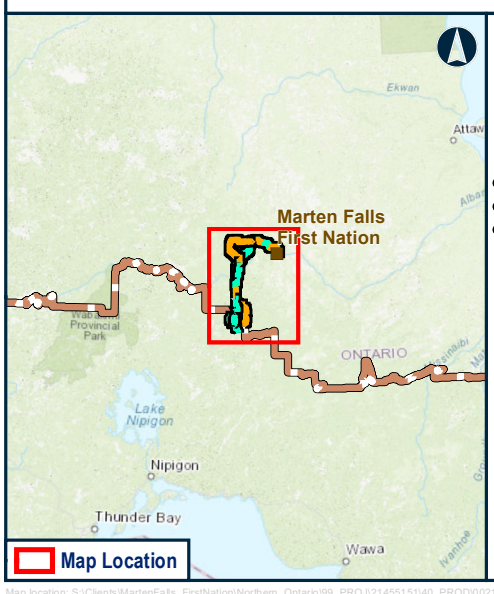
The existing conditions spatial boundaries of the acoustic and vibration environment Local Study Area and Regional Study Area are further described in **Table 4-4** and illustrated in **Table 5-1** and **Figure 4-1**.

Table 4-4: Discipline Specific Existing Condition Study Areas Description and Rationale

Study Area	Area Size	Geographic Extent	Rationale
Construction Disturbance Area	12,665 ha	The area of direct disturbance, encompassing the 100 m wide right-of-way, temporary construction access roads, work areas, worker camps, and pits, quarries, and temporary access roads	■ Direct area of disturbance
Local Study Area	310,082 ha	Construction Disturbance Area plus a 4 km buffer	■ The setback distance is based on professional judgement and guidance provided by *Directive 038: Noise Control* (Alberta Energy and Utilities Board, 2007) for noise assessments in Alberta, as no similar guidelines have been established in Ontario. Extending 4 km beyond the Construction Disturbance Area will assist in the assessment of possible route refinements. ■ Since noise and vibration attenuate with distance, potential noise and vibration effects from the Project are expected to be the highest in the acoustic and vibration environment Local Study Area, and any measurable noise and vibration effects due to the Project are predicted to be generally limited to the acoustic and vibration environment Local Study Area. In the area beyond the acoustic and vibration environment Local Study Area, noise and vibration levels from Project activities are expected to further attenuate, resulting in a lower potential contribution.
Regional Study Area	565,728 ha	Local Study Area plus a 5 km buffer	■ The 5 km setback distance (from the Local Study Area) is based on professional judgment and used to address indirect effects outside the Local Study Area. ■ Aligns with field work completed in 2019.

ha = hectare; m = metre; km = kilometre.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Acoustic and Vibration Environment Existing Condition Local and Regional Study Areas

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:450,000 * when printed 11"x17"
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Figure 4-1

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0021_Acoustics_Effects_Assessment\21455151-0021-RN-0002_4-1.mxd
Date Saved: 7/5/2024 9:52:47 AM User Name: INGU06951

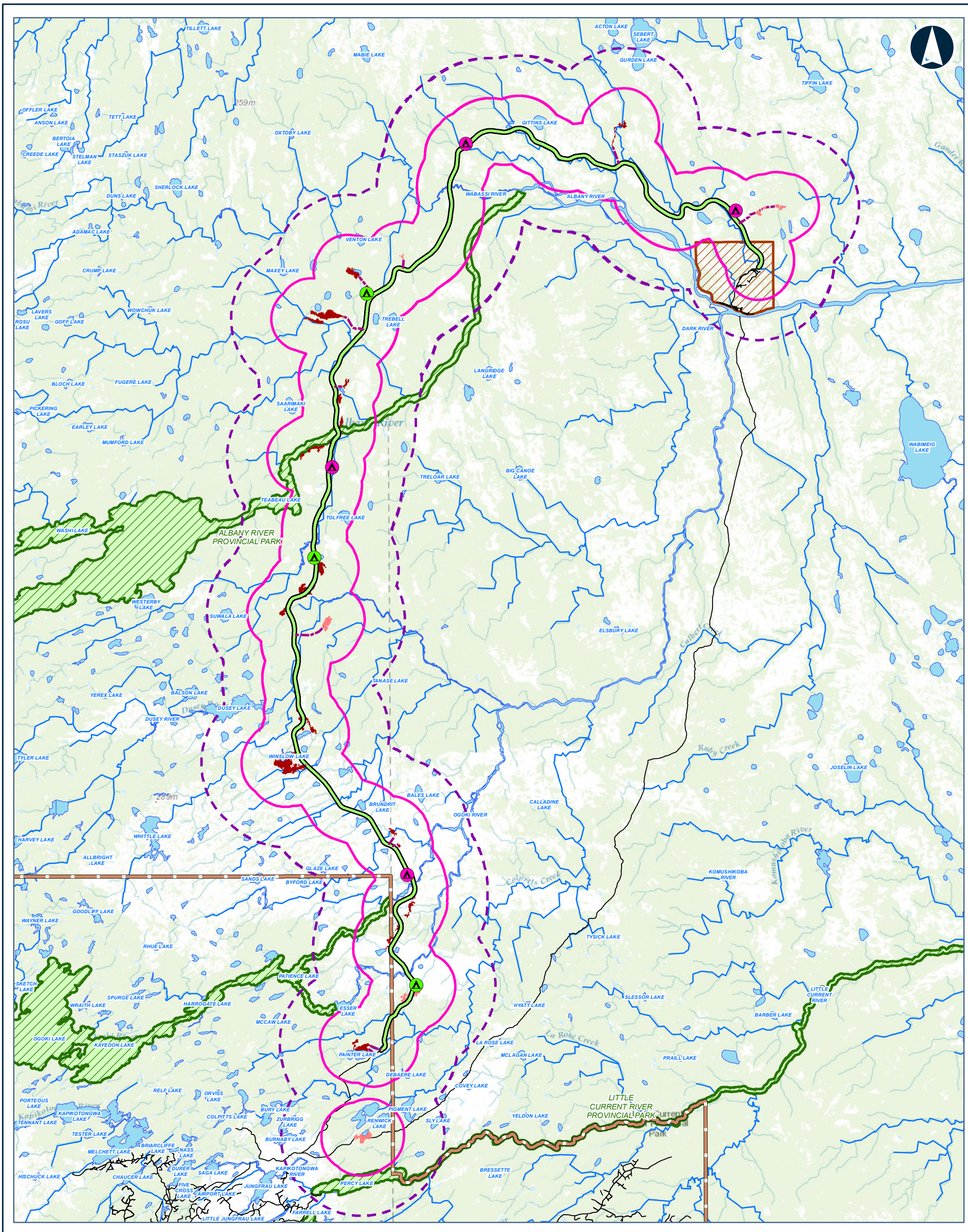
4.3.3.2.2 Effects Assessment Study Areas

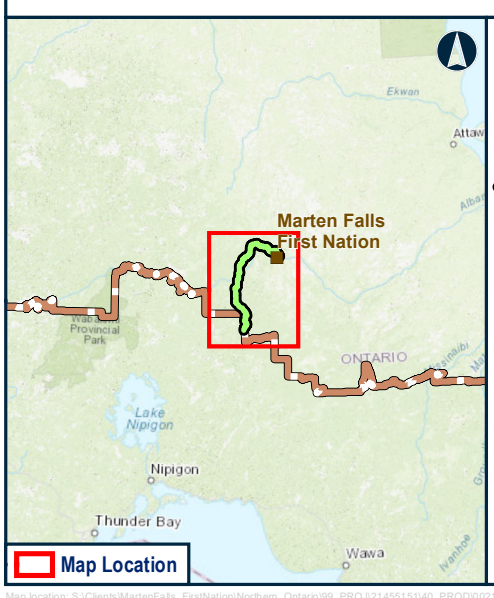
The selection of a Preferred Route resulted in refined study areas that represent the same geographic extents of the existing condition study areas; however, they are only applied to one route corridor instead of two. The revised study areas that were used for the effects assessment are described in **Table 4-5** and shown in **Figure 4-2**. These areas include temporary features such as pits and quarries, temporary access roads, and worker camps.

Table 4-5: Discipline Specific Study Areas Description and Rationale

Study Area	Area Size	Geographic Extent	Rationale
Construction Development Area	4,700 ha	The area of direct disturbance, encompassing the 100 m wide right-of-way, temporary construction access roads, work areas, worker camps, and pits, quarries, and temporary access roads	■ Direct area of disturbance
Local Study Area	93,846 ha	Construction Disturbance Area plus a 4 km buffer	■ The setback distance is based on professional judgement and guidance provided by *Directive 038: Noise Control* (Alberta Energy and Utilities Board, 2007) for noise assessments in Alberta, as no similar guidelines have been established in Ontario. Extending 4 km beyond the Construction Disturbance Area will assist in the assessment of possible route refinements. ■ Since noise and vibration attenuate with distance, potential noise and vibration effects from the Project are expected to be the highest in the acoustic and vibration environment Local Study Area, and any measurable noise and vibration effects due to the Project are predicted to be generally limited to the acoustic and vibration environment Local Study Area. In the area beyond the acoustic and vibration environment Local Study Area, noise and vibration levels from Project activities are expected to further attenuate, resulting in a lower potential contribution.
Regional Study Area	417,281 ha	Local Study Area plus a 5 km buffer	■ The 5 km setback distance (from the Local Study Area) is based on professional judgment and used to address indirect effects outside the Local Study Area. ■ Aligns with field work completed in 2019.

ha = hectare; m = metre; km = kilometre.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS

- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Acoustic and Vibration Environment Effects Assessment Local and Regional Study Areas

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-2

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Date Saved: 7/5/2024 9:53:42 AM User Name: INGU06951

4.4 Guidelines and Criteria

The Project existing conditions and effects were assessed using guidance from federal and provincial guidelines, and guidelines inline with generally accepted practices within the industry. The guidelines and limits considered for predicting and assessing the Project noise and vibration effects are described in the following section.

4.4.1 Federal Noise Guidelines and Criteria

The noise effects due to the Project Construction and Operations and Maintenance activities were assessed using the *Health Canada Noise Guidance* (Health Canada, 2023). Although Health Canada does not have enforceable noise thresholds or standards, the *Health Canada Noise Guidance* is a guidance document for the assessment of environmental noise. The *Health Canada Noise Guidance* provides general information on predicting health risks related to noise in federal Environmental Assessments of major resources and infrastructure projects.

For the purposes of the assessment of the potential effects of the Project on the noise environment, the methodology to assess existing noise levels presented in Section 6.2.2 of the *Health Canada Noise Guidance* was applied. The *Health Canada Noise Guidance* presents options to estimate existing noise levels, which include using approximate noise levels that depend on the community type and average population density. This estimation of existing noise levels is presented in **Table 4-6**.

Table 4-6: *Health Canada Noise Guidance* – Estimation of Existing Noise Levels Using Qualitative Descriptions and Population Densities of Average Types of Communities

Community Type	Population Density, Number of People per km^2	Estimated Existing Noise Level, L_{dn} (dBA)[(a)]
Quiet rural Dwelling units more than 500 m from heavily travelled roads and / or rail lines and not subject to frequent aircraft flyovers	28	≤ 45
Quiet suburban residential Remote from large cities, industrial activity, and trucking	249	48 to 52
Normal suburban residential Not located near industrial activity	791	53 to 57
Urban residential Not immediately adjacent to heavily travelled roads and industrial areas	2,493	58 to 62

Community Type	Population Density, Number of People per km^2	Estimated Existing Noise Level, L_{dn} (dBA)[(a)]
Noisy urban residential Near relatively busy roads or industrial areas	7,913	63 to 67
Very noisy urban residential	24,925	68 to 72

Notes:

(a) "Ldn" is a noise descriptor that accounts for the cumulative noise effects from a 24-hour exposure to day-night sound levels with the nighttime period (10 p.m. to 7 a.m.) including a +10 dB penalty. It accounts for all sound level fluctuations (i.e., total acoustic energy) during the 24-hour period.

dB = decibel; dBA = A-weighted decibels; km^2 = square kilometre; m = metre; L_{dn} = day-night sound level; ≤ = less than or equal to; a.m. = morning period; p.m. = afternoon period.

The *Health Canada Noise Guidance* references the Alberta Energy Regulator (previously the Energy Resources Conservation Board) document *Directive 038: Noise Control* (Alberta Energy and Utilities Board, 2007) for a quiet rural area's estimated existing nighttime noise level (L_n) of 35 dBA. It is also referenced for the difference between daytime and nighttime noise levels as approximately 10 dBA. One scenario when this may occur is when the noise levels are constant within the daytime and nighttime periods (i.e., L_d = 45 dBA, L_n = 35 dBA). Therefore, according to the *Health Canada Noise Guidance* document, a quiet rural area has an existing daytime noise level (L_d) of 45 dBA and an existing nighttime noise level (L_n) of 35 dBA.

Within the context of the Project noise, long-term duration corresponds to operation of the Community Access Road and construction sub-phases and temporary facilities that may last one year or longer. Short-term duration corresponds to construction sub-phases and temporary facilities that may operate for less than one year. The *Health Canada Noise Guidance* assesses potential noise impacts due to a project using numerous acoustical descriptors, or indicators. In assessing the long-term (i.e., lasting longer than one year) noise effects from projects, the calculated change in percent highly annoyed (%HA) is one widely accepted indicator that provides information on how an average community responds to a change in noise level. This indicator represents the change in the percentage of highly annoyed people within the community due to the change in noise levels as a result of a project. The %HA is calculated based on the day-night energy equivalent sound level (L_{dn}) using the following formula:

$$\%\mathrm{HA} = \frac{100}{1+e^{(10.4-0.132\times L_{dn})}},$$

where L_{dn} is defined in the formula below based on the 15-hour (7 a.m. to 10 p.m.) daytime equivalent energy sound level (L_d) and 9-hour (10 p.m. to 7 p.m.) nighttime equivalent energy sound level (L_n):

$$L_{dn} = 10\log_{10}\left(\frac{15\times 10^{L_d/10}+9\times 10^{(L_n+10)/10}}{24}\right).$$

Health Canada suggests that an increase in %HA of 6.5% due to a project should result in the consideration of noise mitigation to decrease the overall noise emissions and associated effects from a project. Due to the expected heightened sensitivity to noise in quiet rural areas, existing and project noise levels in quiet rural areas are adjusted by adding 10 dB for use in the equation for %HA above, which results in a greater calculated change in %HA.

Table 4-7 summarizes all indicators, the corresponding *Health Canada Noise Guidance* criteria, and how these may correlate to impacts on human receptors.

Table 4-7: *Health Canada Noise Guidance* Assessment Descriptors and Criteria

Activity	Noise Descriptor(s)	Health Canada Guide Limit	Noise Impact Correlation
Project Operations / Construction ≥ 1 year	Outdoor L_d	55 dBA	Threshold for sustaining good outdoor speech comprehension
	Outdoor L_{dn}	55 dBA	Threshold for "no reaction" response in terms of noise complaints due to intruding noise
	%HA	Increase in %HA ≤ 6.5%	Threshold for noise-induced human health effects
	Outdoor L_n	40 dBA (annual average)	Threshold for adverse health effects due to sleep disturbance
	Outdoor nighttime L_{max}	60 dBA, 10 to 15 events per night	Threshold for sleep disturbance due to individual nighttime noise events
Construction < 1 year	Outdoor L_n	45 dBA	Threshold for adverse effects due to sleep disturbance due to nighttime construction noise
	Outdoor nighttime L_{max}	60 dBA, 10 to 15 events per night	Threshold for adverse effects due to sleep disturbance due to nighttime construction noise
	Suggested Mitigation Noise Level, L_{dn}	47 dBA (Basic Mitigation Noise Level) + project-specific adjustments (i.e., +10 dB if duration is less than two months for a given receptor location)	Suggested threshold to avoid widespread complaints due to construction noise

Notes:
dB = decibel; dBA = A-weighted decibels; Ld = daytime noise level (7 a.m. to 10 p.m.); Ln = nighttime noise level (10 p.m. to 7 a.m.); Ldn = day-night noise level; Lmax = maximum noise level; %HA = percent highly annoyed; ≥ = greater than or equal to; ≤ = less than or equal to; < = less than; + = plus; a.m. = morning period; p.m. = afternoon period.

4.4.2 Provincial Noise Guidelines and Criteria

Traffic noise Impact Assessments for provincial roadways within Ontario are assessed using the Ontario Ministry of Transportation's *Environmental Guide for Noise* (the *Ontario Ministry of Transportation Noise Guide*; Ontario Ministry of Transportation, 2022). The *Ministry of Environment / Ministry of Transportation Noise Protocol* (Ontario Ministry of Environment / Ministry of Transportation, 1986) is typically currently considered on non-provincial roadways. The *Ontario Ministry of Transportation Noise Guide* superseded the *Ontario Ministry of Environment / Ministry of Transportation Noise Protocol* as it relates to provincial roadways. These guidelines assess traffic noise effects considering the change in traffic noise levels above ambient sound levels or a 'Future "No-Build" Noise Levels' scenario, but the *Ontario Ministry of Transportation Noise Guide* also includes an overall sound level limit. For this Project, the Future "No-Build" Noise Levels are the same as existing sound levels since a transportation corridor does not currently exist, therefore the term existing sound levels is used throughout this report to refer to both. **Table 4-8** summarizes the *Ontario Ministry of Transportation Noise Guide* and *Ontario Ministry of Environment / Ministry of Transportation Noise Protocol* traffic noise level criteria.

Table 4-8: Provincial Traffic Noise Assessment Descriptors and Criteria

Guideline	Noise Descriptor	Guideline Limits
Ontario Ministry of Transportation Noise Guide	L_{eq} (16-hour)[(a)]	5 dBA or greater change above Future "No-Build" Noise Levels, or 65 dBA
Ontario Ministry of Environment / Ministry of Transportation Noise Protocol	L_{eq} (16-hour)[(a)]	Greater than 5 dBA change above ambient noise level when noise levels are greater than 55 dBA

Notes:
(a) Leq (16-hour) is the daytime noise level from 7 a.m. to 11 p.m. (L_d).
dBA = A-weighted decibels; Leq = equivalent noise level; a.m. = morning period; p.m. = afternoon period.

As previously noted, the *Ontario Ministry of Transportation Noise Guide* is typically used to assess provincial freeways and highways. The *Ontario Ministry of Environment / Ministry of Transportation Noise Protocol* is typically used to assess other classes of roadways, such as arterial roads. Based on this, and the fact that it is unknown at this time who will have jurisdiction of the Community Access Road upon completion of the Project, the *Ontario Ministry of Environment / Ministry of Transportation Noise Protocol* criteria limits were used for the traffic noise assessment. Note that these limits relate to a 16-hour L_{eq} noise descriptor, for the period from 7 a.m. to 11 p.m. (L_d).

There are no provincial guidelines that provide construction noise limits at receiver locations that are temporary in nature; however, the Ministry of Environment, Conservation and Parks generally requires the use of good practices and reasonable noise mitigation measures be implemented to reduce the potential effect of construction noise on nearby noise receiver locations. In general, Project related construction activities are considered short-term and intermittent relative to the total life of a project. In addition, the construction of a road is typically carried out in a linear manner and construction activities are likely to occur sequentially. Therefore, the duration a given receiver location is exposed to a construction activity is expected to be shorter than the total Construction Phase duration. Some construction activities may include construction-related facilities with equipment that could be considered to be stationary noise sources (e.g., aggregate extraction). *NPC-300* (Ministry of Environment, Conservation and Parks, 2013) applies to stationary noise source assessments but does not provide a means of determining when construction-related facilities should be assessed as stationary facilities. A construction-related facility is expected to cease operations and be removed from the Project site once Construction is complete. If facilities are projected to continue operating post-Construction, they may constitute permanent Project facilities. For the purposes of the Environmental Assessment, if a construction-related facility is expected to continue operating post-Construction and includes sources, activities, equipment or facilities defined as stationary sources in *NPC-300*, it was assessed using *NPC-300*. Note, a noise assessment may be required in support of a permit / licence application for aggregate extraction under other municipal and / or provincial jurisdictions (i.e., Ministry of Environment, Conservation and Parks and Ministry of Natural Resources). **Table 4-9** summarizes the exclusionary sound level limits provided in *NPC-300* for urban, sub-urban and rural areas, expressed in terms of the one-hour equivalent sound level ($L_{eq,1h}$) for different periods of the day. Where existing noise levels exceed the exclusionary sound level limits for the same time period, the existing noise levels may be used as sound level limits. Alternatively, the exclusionary sound level limits may be adopted to describe existing noise levels.

Table 4-9: Ministry of Environment, Conservation and Parks Guideline *NPC-300* Sound Level Limits

Point of Reception Location	Time of Day	Class 1 (urban) Area (dBA)	Class 2 (sub-urban) Area (dBA)	Class 3 (rural) Area (dBA)
Outdoor[(a)]	7 a.m. to 7 p.m.	50	50	45
Outdoor[(a)]	7 p.m. to 11 p.m.	50	45	40
Plane of Window	7 a.m. to 7 p.m.	50	50	45
Plane of Window	7 p.m. to 11 p.m.	50	50	40
Plane of Window	11 p.m. to 7 p.m.	45	45	40

Notes:
(a) In general, the outdoor point of reception will be protected during the nighttime as a consequence of meeting the sound level limit at the adjacent Plane of Window.
dBA = A-weighted decibels; a.m. = morning period; p.m. = afternoon period.

4.4.3 Vibration Guidelines and Criteria

There are no federal or provincial guidelines that provide ground vibration and air overpressure limits for project operation or general non-blasting construction activities at locations where human activity is expected to occur. There are provincial guidelines with ground vibration and air overpressure limits for blasting activities at receptors adjacent to quarries and ground vibration limits for blasting activities associated with construction projects. There are federal guidelines with air overpressure limits for blasting activities associated with construction projects.

The vibration criteria limits further discussed below are considered appropriate at this stage of the Project and are applicable where human activity is expected to occur and do not necessarily apply to locations where human activity is not expected to occur such as a heritage structure and / or utility infrastructure. At the time of preparing this assessment, the location of heritage structures and / or utility infrastructure was not readily available. The Project is currently at the Environmental Assessment stage and therefore it is recommended prior to commencing preliminary and detailed design, discussions with the various stakeholders (i.e., residential dwellings, heritage structures, utility infrastructure) be carried out to confirm the guidance documents considered in this Environmental Assessment and their respective criteria continue to be applicable to the Project. Further vibration assessment may be carried out for specific locations where required, to determine potential vibration impacts once more detailed design and supporting information is available (e.g., locations where blasting is expected to be required).

The Project ground vibration levels due to operations and general non-blasting construction activities were assessed for potential building damage and potential human annoyance. Potential building damage was assessed using a vibration zone of influence that is non-frequency dependent, as described in *City of Toronto By-law 514-2008*. Potential human annoyance was assessed in accordance with the Federal Transit Administration *Transit Noise and Vibration Impact Assessment Manual* (Federal Transit Administration, 2018). **Table 4-10** summarizes the corresponding ground vibration criteria for the zone of influence.

Table 4-10: Vibration Assessment Descriptors and Criteria – Project Operation and General Non-Blasting Construction Activities Zone of Influence

Activity	Vibration Descriptor	Criteria Limit	Vibration Impact Correlation
Community Access Road Operations	Peak particle velocity	5 mm/s	Screening threshold for vibration-related building damage due to Community Access Road operations
	Root-mean-square velocity	0.1 mm/s[(a)]	Criteria limit for vibration effects on sleep (i.e., human annoyance) for frequent events due to Community Access Road operations
General Non-Blasting Construction	Peak particle velocity	5 mm/s	Screening threshold for vibration-related building damage due to Project construction activities
	Root-mean-square velocity	0.1 mm/s[(a)]	Criteria limit for vibration effects on sleep (i.e., human annoyance) for frequent events due to Project construction activities

Notes:
(a) Converted from United States Department of Transportation *Transit Noise and Vibration Impact Assessment Manual* root-mean-square velocity limit of 72 VdB (re 1 micro-inch/s) based on criteria for frequent events for the land use category: *Category 2: Residences and buildings where people normally sleep*.
mm/s = millimetres per second; VdB = vibration velocity level; inch/s = inch per second.

Note, according to the *Transit Noise and Vibration Impact Assessment Manual*, ground vibration levels are a concern almost exclusively inside buildings. It indicates that a vibration source such as a train, which typically produces higher vibration levels than vehicular traffic with rubber tires, may be perceptible to people who are outdoors but it is very rare for outdoor vibration to be a cause for complaints. Without the shaking of a building or noise that accompanies building vibration, the motion of the ground that may be perceived outdoors does not provoke the same adverse human reaction. Therefore, the vibration criteria limits related to human annoyance in the *Transit Noise and Vibration Impact Assessment* are for the purposes of indoor vibration levels, when the indoor space is occupied. For the purposes of this Project at the Environmental Assessment stage, the vibration criteria further discussed below were conservatively selected to address both indoor and outdoor receptor locations.

In addition, the human response differs for vibration velocity level based on frequency. For receptor locations that may be located within the vibration zone of influence, additional frequency-dependent criteria for potential building damage were considered using the construction vibration limits, as described in *City of Toronto By-law 514-2008*. For buildings where people sleep, frequency-dependent vibration criteria limits for potential human annoyance are the same as those provided in **Table 4-10** (0.1 mm/s), limited to frequencies between 8 Hz and 80 Hz, as described in the *Transit Noise and Vibration Impact Assessment Manual*. **Table 4-11** summarizes the corresponding vibration criteria within the vibration zone of influence.

Table 4-11: Vibration Assessment Criteria Within Vibration Zone of Influence

Activity	Vibration Descriptor	Frequency of Vibration (Hz)	Criteria Limit	Vibration Impact Correlation
Community Access Road Operations	Peak particle velocity	< 4	8 mm/s	Criteria limit for vibration-related building damage due to Community Access Road operations
		4 to 10	15 mm/s	
		>10	25 mm/s	
	Root-mean-square velocity	8 to 80	0.1 mm/s[(a)]	Criteria limit for vibration effects on sleep (i.e., human annoyance) for frequent events due to Community Access Road operations
General Non-Blasting Construction	Peak particle velocity	< 4	8 mm/s	Criteria limit for vibration-related building damage due to Project construction
		4 to 10	15 mm/s	
		>10	25 mm/s	
	Root-mean-square velocity	8 to 80	0.1 mm/s[(a)]	Criteria limit for vibration effects on sleep (i.e., human annoyance) for frequent events due to Project construction

Notes:
(a) Converted from United States Department of Transportation *Transit Noise and Vibration Impact Assessment Manual* root-mean-square velocity limit of 72 VdB (re 1 micro-inch/s) based on criteria for frequent events for the land use category: Category 2: Residences and buildings where people normally sleep.
< = less than; > = greater than; Hz = hertz; mm/s = millimetres per second; VdB = vibration velocity level; inch/s = inch per second.

Ontario Provincial Standard Specification 120 (Ontario Provincial Standard Specification 2014) covers the requirements for the use of explosives during construction blasting (i.e., along the Community Access Road) and has been developed for use in provincial and municipal oriented contracts to assess potential building and / or structural damage. The ground vibration limits specified in *Ontario Provincial Standard Specification 120* are designed to mitigate potential building damage from ground vibrations induced by the use of explosives on construction blasting projects. The Project ground vibration levels due to the construction blasting activities along the Community Access Road (i.e., non quarry related) were assessed using the *Ontario Provincial Standard Specification 120*. **Table 4-12** summarizes the peak particle velocity limits specified by *Ontario Provincial Standard Specification 120*.

Table 4-12: Vibration Assessment *Ontario Provincial Standard Specification 120* (Use of Explosives During Construction Blasting) Descriptors and Criteria

Element	Frequency (Hz)	Peak Particle Velocity (mm/s)
Structures and Pipelines	≤ 40	20
	> 40	50
Concrete and Grout <72 hours from placement	Not applicable	10

< = less than; ≤ = less than or equal to; > = greater than; Hz = hertz; mm/s = millimetres per second.

Both ground vibration and air overpressure effects due to blasting produced at receptors adjacent to quarries are subject to guidelines and limits contained in the *Ministry of Environment, Conservation and Parks NPC-119* (Ministry of Environment, Conservation and Parks, 1978). The ground vibration and air overpressure limits specified in *NPC-119* are designed to minimize vibration effects due to quarry blasting. Under conditions where monitoring of the blasting operations adjacent to quarries is routinely carried out, the recommended ground vibration and air overpressure limits at the nearest receptors are 12.5 mm/s and 128 linear decibels (dBL) respectively. The Project ground vibration and air overpressure effects due to blasting adjacent to quarries were assessed using the *Ministry of Environment, Conservation and Parks NPC-119*.

The *Health Canada Noise Guidance* (Health Canada, 2023) presents a method to determine criteria for air overpressure, a blasting Mitigation Noise Level, that is expected to result in little or no public annoyance (i.e., human annoyance), based on the number of daily blasts for short-term construction (i.e., less than one year). The approach is based on the US Environmental Protection Agency 1974 criterion for sonic booms and that, according to the findings of Schomer et al. (1997), blasts and sonic booms create similar levels of annoyance for equal peaks. The Mitigation Noise Level is calculated using the formula Mitigation Noise Level = 125 – 10logN (dBL), where N is the number of daytime blasts per day. **Table 4-13** is a recreation of Table 6.4 in the *Health Canada Noise Guidance*, which summarizes the number of daytime blasts and the corresponding blasting Mitigation Noise Level in dBL.

Table 4-13: *Health Canada* Air Overpressure Criteria – Mitigation Noise Levels Related to Number of Blasts

Number of Daytime Blasts (N)	Blasting Mitigation Noise Level (125-10logN) (dBL)
10	115
25	111
50	108
100	105

dB = decibel; N = number of daytime blasts per day.

The Project air overpressure effects due to the construction blasting activities along the Community Access Road (i.e., non quarry related) were assessed using the *Health Canada Noise Guidance*. It is expected blasting activities at any one location will be completed in less than one year. Therefore, the *Health Canada Noise Guidance* (Health Canada, 2023) blasting Mitigation Noise Level approach for air overpressure was considered to support the Project construction vibration assessment of human annoyance due to blasting activities.

4.5 Existing Conditions Study Design and Methods

4.5.1 Desktop Assessment

A desktop assessment was completed to establish the existing conditions in the acoustic and vibration Local Study Area. The review of existing conditions included identifying potential points of reception in the vicinity of the Project where human activity is expected to occur and characterizing the existing acoustic and vibration levels in the Local Study Area.

4.5.1.1 Existing Potential Points of Reception

A desktop review was carried out to identify potential points of reception in the acoustic and vibration environment Local Study Area within both existing and vacant lands that are expected to be occupied by human activity. A desktop level analysis was carried out of the orthoimagery and spatial data from the Ministry of Natural Resources' Land Information Ontario and Natural Resources Canada's CanVec databases (Ministry of Natural Resources and Forestry, 2023; Natural Resources Canada, 2023) and data collected through community and Indigenous engagement. The potential points of reception in the acoustic and vibration environment Local Study Area were identified in general accordance with *NPC-300* (Ministry of Environment, Conservation and Parks, 2013) and where traditional land uses are expected to be occupied by human activity and were identified to be noise sensitive through Indigenous engagement. *NPC-300* defines points of reception as sensitive land uses with human activity, including dwellings, campsites or campgrounds, sensitive institutional uses (e.g., educational, nursery, hospital, healthcare, community centre, place of worship, or detention centre), or sensitive commercial uses (e.g., hotels or motels). The traditional land uses include, but are not limited to, cabins and camps (i.e., locations where habitation may occur), plant, animal, and fish harvest locations, and cultural, spiritual, and sacred areas. The Land Information Ontario and CanVec spatial datasets identify land uses that include, but are not limited to, parks, trails, outfitter camps and Indigenous land uses. These existing land uses have been conservatively considered as potential points of reception, but it is anticipated that a number of them will not qualify as points of reception as defined by the Ministry of Environment, Conservation and Parks or typically identified by Indigenous communities because they may not be considered noise and / or vibration sensitive spaces upon further review.

Project noise levels at points of reception known to represent land uses that do not meet *NPC-300*'s definition of a point of reception were not assessed against *NPC-300* sound level limits. Project noise levels at points of reception where sleep is not expected to occur (e.g., recreational areas, plant, animal, and fish harvest locations and cultural, spiritual, and sacred areas) and where it's not expected humans spend extended periods of time were assessed against daytime criteria only (i.e., Health Canada's speech comprehension and noise complaint criteria). For the purposes of this assessment, locations identified as habitation were considered to meet the definition of a receptor in accordance with *NPC-300*.

Information on whether specific points of reception are potentially sensitive to vibration (i.e., heritage properties and / or structures) was not readily available and therefore not further assessed.

4.5.1.2 Existing Acoustic Environment Noise Levels

The expected existing noise levels in the Local Study Area were initially assessed via desktop analysis using the *Health Canada Noise Guidance* and *NPC-300*, detailed in **Section 4.4**.

The desktop analysis to characterize the existing acoustic environment was supplemented with a field program, discussed in **Section 4.5.2.**

4.5.1.3 Existing Vibration Levels

The expected existing vibration levels in the Local Study Area were assessed using past similar project experiences and professional judgement.

4.5.2 Field Investigations

The desktop analysis to characterize the existing acoustic environment was supplemented with a field program. The field program included a long-term noise monitoring component and a short-term measurement component. The long-term noise monitoring was completed through unattended monitoring, and the short-term noise measurements were completed through attended measurements. Representative sensitive receptor locations were selected for both the monitoring and measurement components. The community of Marten Falls First Nation was identified as a location that could be representative of the entire acoustic and vibration environment Local Study Area. A receptor location within Marten Falls First Nation was identified in a more populated area where it was expected ambient levels were influenced by human activities. A second receptor location, in a more natural area of Marten Falls First Nation, was identified to document ambient levels away from human activities. These two receptor locations were expected to provide the potential range in existing ambient noise levels within the Local Study Area.

The long-term noise monitoring at the representative sensitive receptor locations were conducted using sound level meters set to record 1-hour equivalent noise levels ($L_{eq,1h}$) and noise levels exceeding 90% of the measurement period (L_{90}). The noise monitoring program was completed over a period of up to approximately 48 hours, when inclement weather (i.e., periods of precipitation and wind speeds exceeding 20 km per hour) was not expected, through unattended monitoring to document existing noise levels at various locations over various days of the week and over various periods of the day. The collected noise monitoring data were reviewed and if any data were determined to have been affected by potentially abnormal noise events (e.g., birds or insects close to microphone) or noise data collected under weather conditions not meeting favourable conditions (i.e., periods of precipitation and wind speeds exceeding 20 km per hour), were deemed invalid and removed from the dataset. The daytime and nighttime existing noise levels were calculated based on all collected valid noise data.

To supplement the long-term noise monitoring program completed at the representative sensitive-receptor locations throughout the community of Marten Falls First Nation, the field team conducted short-term, attended noise measurements, for up to approximately 20 minutes to supplement the long-term noise monitoring data, by collecting similar noise metrics. An overview of the noise monitoring and measurement equipment is provided in **Attachment B – Measurement Equipment**.

4.6 Effects Assessment

The following is a broad overview of the approach for the identification, assessment, and evaluation of the potential effects:

- Review Construction and Operation and Maintenance activities to identify potential interaction(s) that could result in environmental effects;
- Characterize the existing environment for both route alternatives, which considers past, present, and approved projects;
- Identify potential environmental effects of the Preferred Route and recommend mitigation measures to avoid or minimize identified effects, as well as identify opportunities to enhance benefits to the environment;
- Predict and assess potential environmental effects remaining after taking into consideration the recommended mitigation measures (i.e., residual effects) using direction, magnitude, geographic extent, duration, frequency, reversibility, and likelihood;
- Predict cumulative effects that may result from a combination of the residual effects of the Preferred Route with the effects of other past, present, and reasonably foreseeable projects; and

- Identify a follow-up program for the Preferred Route that includes monitoring, when deemed appropriate, to verify the prediction of the effects assessment and effectiveness of the mitigation measures, and a requirement for monitoring of the commitments made in the *Terms of Reference* and *Environmental Assessment / Impact Statement Report*.

The following sections provide discipline-specific input and considerations as they pertain to the methodology for effects assessment. For detailed descriptions of the methodology used to inform this study refer to the *Environmental Assessment / Impact Statement Report*. Refer to **Section 6** for details related to the Preferred Route and **Section 4.3.3.2.1** for a description of the revised study area that have been used in the effects assessment.

4.6.1 Project–Environment Interactions

Considering the Project components and activities presented in **Section 2**, interactions are identified between the Project components and activities, and the existing conditions of acoustic and vibration environment Valued Components. These interactions support the identification of potential effects, both direct and indirect, that may result in changes to Acoustic and Vibration Environment. The likely Project–environment interactions were identified based on professional judgment, activities planned to occur, and as described in the *Marten Falls Community Access Road Project Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020). **Table 4-14** provides the preliminary analysis of Project–environment interactions that was presented in the Acoustic and Vibration Environment. The analysis of Project–environment interactions for Acoustic and Vibration Environment that are likely to have a potential effect is provided in **Section 7.2.1**.

Table 4-14: Project–Environment Interactions

Project Phases	Project Activities	Noise and Vibration
Construction Phase	Clearing of the right-of-way (e.g., remove and dispose of trees, shrubs, fallen timber, and surface litter; strip organic materials, grub)	**x**
	Blasting rock (e.g., remove rock at quarries, and as required, at specific locations in association with road and bridge construction)	**x**
	Constructing the Community Access Road (e.g., remove unsuitable soil, place and compact rock and granular material, trim and shape the Community Access Road)	**x**
	Constructing bridges and installing culverts	**x**
	Constructing, operating, and decommissioning temporary infrastructure (e.g., remove temporary culverts and bridges, remediate channels)	**x**
Operation and Maintenance Phase	Operate the Preferred Route	**x**
	Maintain the Preferred Route[(a)]	**x**

Notes:

(a) Includes general maintenance (e.g., grading, erosion control, quarrying, excavation at pits / quarries), seasonal maintenance (e.g., snow clearing, bridge and culvert maintenance), and special maintenance (e.g., slope failures, road settlement / break-up).

4.6.2 Assessing Residual Effects

4.6.2.1 Potential Effects

Following the identification of the Project–environment interactions, the existing conditions for the Preferred Route were reviewed to determine the potential effects of the Project. The potential effects on the acoustic and vibration environment were described as either direct or indirect, and the potential effects on other disciplines were described as Discipline Interactions. The potential direct and indirect effects resulting from the Project–environment interactions were based on input received through the Indigenous Knowledge Program and Consultation and Engagement Program, regulatory agency guidance, and professional judgement.

A **direct effect** is an immediate change to an environmental component caused by a project activity at the same time and place as the activity.

An **indirect effect** occurs when a change resulting from a project activity leads to subsequent changes in other environmental component, which may occur later in time or at a different location but are reasonably foreseeable.

Residual effects are the effects that remain after the application of mitigation measures. These effects are described in Section 7 and include descriptions in detail of the potential adverse and positive residual effects in relation to each temporal phase of the Project as outlined in **Section 4.3.1**.

Discipline interactions occur when a change to one Valued Component resulting from a Project activity causes a change to another Valued Component in another discipline.

The acoustic and vibration environment may be indirectly affected by changes to other environmental disciplines. For example, changes to vegetation or topography can affect the acoustic and vibration environment by changing how sound propagates between existing noise sources, which could increase existing noise levels for areas previously mitigated by these natural barriers.

Table 4-15 provides a preliminary identification of how changes to other environmental disciplines may result in indirect effects on the acoustic and vibration environment. The degree of risk for discipline interactions to the acoustic and vibration environment as a result to changes to another discipline varies depending on activity.

Table 4-15: Potential Discipline Interactions

Discipline and Associated Valued Components	Aboriginal and Treaty Rights and Interests	Atmospheric Environment	Climate Change	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
Indirect effects on the acoustic and vibration environment as a result of changes in other disciplines	X	-	-		X	-	-	X	X	X	X	X	X	X	-	X

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.

4.6.2.2 Mitigation and Enhancement Measures

Following the identification of potential effects, the effects assessment has explored technically and economically feasible mitigation measures to avoid or minimize the identified negative effects. In addition, enhancement measures to increase positive effects beyond those that are already inherent to the design have been considered where appropriate. These measures consist of industry-standard practices, federal and provincial standard specifications, regulator-mandated measures, best management practices, Indigenous and community recommendations and recommendations from environmental professionals based on expertise, scientific publications, experience, and judgement.

It is important that mitigation and enhancement measures are achievable, measurable, verifiable, and when deemed appropriate, monitored for compliance and effectiveness during the identified temporal phases as part of the Project follow-up monitoring plan. As further discussed in **Section 9.0**, noise monitoring is not recommended for the Project; however, vibration monitoring is recommended during construction and operations. Recommended environmental monitoring will verify the potential environmental effects predicted, evaluate the effectiveness of mitigation and enhancement measures, and identify the process the Proponent will follow if mitigation and enhancement measures are not effective.

The *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) Section 20 requirements and *Terms of Reference* Requirements (AECOM, 2020) for acoustic and vibration environment are provided in **Table 4-16**. The applicability of these requirements has been evaluated and will be adapted to the needs of the site, environment, and Project activities.

Table 4-16: *Tailored Impact Statement Guidelines* Section 20 Requirements and Terms of Reference Requirements

Tailored Impact Statement Guidelines Section 20 Requirement	Section Addressed In
Describe the standard mitigation practices, policies and commitments that constitute proven technically and economically feasible mitigation measures and that are to be applied as part of standard practice regardless of location as well as any new or innovative mitigation measures being proposed. Mitigation measures must be specific, achievable, measurable, and verifiable, and must be described in a manner that avoids ambiguity in intent, interpretation, and implementation.	Mitigation measures related to the acoustic and vibration environment are presented in Section 7.3.1.
Describe mitigation measures that are specific to each environmental, health, social or economic effect identified. Mitigation measures are to be written as specific commitments that clearly describe when and how the Proponent intends to implement them, what decision-making criteria will be used, and the outcome these mitigation measures are designed to address.	Mitigation measures related to the acoustic and vibration environment are presented in Section 7.3.1.

Terms of Reference Requirement	Section Addressed In
Characterize noise and vibration levels within and surrounding the study area. The Project will undertake a field program to better understand the existing local and regional ambient noise levels. Baseline vibration levels will be determined based on available information. **The location of receptor locations will be informed by input received through the Indigenous Knowledge and consultation programs, where applicable.**	Presented in Section 4.0 and Section 5.0
Potential effects on the acoustic environment including changes in noise and vibration levels.	Presented in Section 4.0 and Section 7.0

4.6.2.3 Predicting Residual Effects

Following the identification of direct and indirect effects and identification of mitigation and enhancement measures, residual effects are predicted.

Once predicted, residual effects were characterized by residual effects characteristics, which are described in **Section 4.6.2.4**. Any predicted residual effects are also carried forward into the cumulative effects assessment which is described in **Section 4.6.3**.

4.6.2.4 Characterization of Predicted Residual Effects

Predicted residual effects, if identified, were described in terms of the effects assessment characteristics presented in **Table 4-17**. These effects characteristics are described in detail in the *Environmental Assessment / Impact Statement Report*. The section that follows outlines how these characteristics were applied as well as any discipline-specific characteristics, if applicable.

Table 4-17: Residual Effects Characteristics

Effects Characteristic	Definition	Description
Context	■ Social context ■ Ecological context ■ Timing of effect in relation to sensitive activities	■ See Description in **Section 4.6.2.4.1.1**
Direction	■ Direction of change from existing conditions	■ Positive: net gain or positive effect ■ Neutral: no change to existing condition ■ Negative: net loss or adverse effect
Magnitude	■ Magnitude is the expected change from existing conditions	■ Low, high ■ See description in **Section 4.6.2.4.1.2**

Effects Characteristic	Definition	Description
Geographic Extent	■ The spatial area that the effect is expected to occur	■ Construction Development Area: effect is confined within the direct physical disturbance of the Project ■ Local: effect extends into the Local Study Area ■ Regional: effect extends into the Regional Study Area ■ Beyond Regional: effect extends beyond the Regional Study Area
Duration	■ The period of time that the effect is expected to occur	■ Short term: effect ends before the end of Construction ■ Medium term: the effect occurs during Construction and ends soon after Operation and Maintenance begins and / or after the activity causing the effect ends ■ Long term: the effect occurs during Construction and persists into Operation and Maintenance and / or the effect is considered permanent, or the likelihood of reversibility is low or uncertain
Frequency	■ How often the effect is expected to occur	■ Infrequent: The effect is expected to occur rarely ■ Frequent: The effect is expected to occur intermittently ■ Continuous: the effect is expected to occur continuously
Reversibility	■ The ability to return to existing conditions	■ Reversible: the effect is not permanent ■ Irreversible: the effect is permanent
Likelihood	■ Probability that the effect will occur	■ Unlikely: the effect is not likely to occur ■ Possible: the effect may occur but is not likely ■ Probable: the effect is likely to occur ■ Certain: the effect will occur
Uncertainty	■ The potential for observed results to deviate from predictions made	■ See description in **Section 4.6.2.6**
Direct / Indirect	■ Nature of the pathway through which the effect occurs.	■ Direct effects are typically immediate and spatially aligned with the activity. Indirect effects may be delayed or spatially removed but are causally linked and predictable.

4.6.2.4.1 Discipline Specific Characteristics

In addition to the residual effects characteristics described in **Table 4-15**, characterization of the following discipline specific characteristics is required to characterize residual effects to determine the significance of those effects from the Project on Acoustic and Vibration Environment.

4.6.2.4.1.1 Ecological Context

The context within which the Project's potential effects may occur was taken into account when considering the effects criteria. Effects criteria considered the physical characteristics of an effect (e.g., magnitude, geographical extent, timing, duration), as well as the context-specific value characteristics (e.g., environmental, health, social and economic conditions). Context is considered one of the most critical factors when evaluating effects, and the effects assessment has considered potential or existing effects or pressures on social, economic, and health conditions affecting the sensitivity or resilience of a Valued Component.

Context for the acoustic and vibration environment Valued Component considers noise and vibration sensitivity, timing of an effect in relation to the duration and frequency of use of identified points of reception, applicable legislation and best management practices. The current and future sensitivity of the acoustic and vibration environment to change caused by the Project are considered and includes Indigenous Knowledge where it was available.

4.6.2.4.1.2 Magnitude

Magnitude refers to the amount of change in a measurable parameter relative to the baseline conditions of a Valued Component, with and without the project in place, or to other standards or guidelines.

For magnitude, environmental discipline-specific definitions are required and are provided in **Table 4-18**.

Table 4-18: Acoustic and Vibration Environment Magnitude Definition

Magnitude Level	Definition	Rationale
Low	■ Project noise levels do not exceed federal and provincial limits	■ Established noise limits based on federal and provincial guidance
	■ Project vibration levels do not exceed reference municipal and industry limits	■ Established vibration limits based on municipal (within Ontario) guidance and standard industry thresholds
High	■ Project noise levels exceed federal and provincial limits	■ Established noise limits based on federal and provincial guidance
	■ Project vibration levels exceed reference municipal and industry limits	■ Established vibration limits based on municipal (within Ontario) guidance and standard industry thresholds

4.6.2.5 Determination of Significance

A conclusion on significance was made using the characteristics described in **Section 4.4.4** as well as taking into consideration professional judgement. A predicted net effect on noise and vibration would be considered significant if it is assessed as:

- High magnitude;
- Long-term in duration; and
- Frequent or continuous in frequency.

4.6.2.6 Prediction Confidence and Uncertainty

Prediction confidence refers to the degrees of certainty in the predicted residual effects and associated determination of significance. All Impact Assessments involve some level of uncertainty, often over many geographic, biophysical and social dimensions, and observed results may deviate, to some degree, from predictions made in the assessment. Therefore, the residual effects predictions vary in their level of certainty, which could be related to a number of factors, such as project design and components, existing conditions, spatial and temporal scope, Valued Component response, effectiveness of mitigation measures, overall scope of factors considered, and natural and human causes of accidental events.

Transparency in describing sources of uncertainty is critical to understanding the confidence that can be attributed to the analysis of effects and is important to decision-making. Efforts to address uncertainties have been focused on those uncertainties that are most meaningful to decision making, such as how the biophysical and human environment will respond to changes and the efficacy of mitigation measures. The levels of uncertainty are defined as:

- **Low–**Uncertainty was considered to be low if there were baseline data representative of all points of reception available, the project-related effects are clearly understood, and the level of certainty associated with the effectiveness of proposed mitigations is high;
- **Moderate**–Uncertainty was considered to be moderate if there were baseline data representative of the majority of points of reception available, the project-related effects are mostly understood, and the level of certainty associated with the effectiveness of proposed mitigations is moderate to high; and
- **High**–Uncertainty was considered to be high if there were no baseline data available, the project-related effects are poorly understood, and the level of certainty associated with the effectiveness of proposed mitigations is low or unknown.

Discussion is provided throughout **Section 4.8** on how uncertainty was addressed to increase the level of confidence so that residual effects will not be worse than predicted.

4.6.3 Assessing Cumulative Effects

4.6.3.1 Definitions

The Impact Assessment Agency of Canada defines **Cumulative Effects** as "changes to the environment, health, social and economic conditions, as a result of the project's residual environmental, health, social and economic effects combined with the existence of other past, present and reasonably foreseeable physical activities, as well as within activities of the project itself from multiple emissions and discharges (e.g., simultaneous operations) to understand synergistic or additive effects" (Impact Assessment Agency of Canada, 2020). Cumulative effects may result if:

- The implementation of the project has the potential to cause direct residual adverse effects on the Valued Components, taking into account the application of technically and economically feasible mitigation measures; and
- The same Valued Component may be affected by other past, present, and future physical activities.

A cumulative effect on an environmental, health, social, or economic component may be important even if the project's effects on this component by themselves are minor. The method for assessment of cumulative effects is consistent with the *Tailored Impact Statement Guidelines*, *Operational Policy Statement: Assessing Cumulative Environmental Effects* under the *Canadian Environmental Assessment Act*, 2012 (Canadian Environmental Assessment Agency, 2013), and the *Interim Technical Guidance for Assessing Cumulative Environmental Effects* under the *Canadian Environmental Assessment Act*, 2012 (Canadian Environmental Assessment Agency, 2018). The identification and assessment of cumulative effects was undertaken as follows:

- Identify and assess the residual effects of the project;
- Define the spatial and temporal boundaries for cumulative effects based on the residual effects predicted;
- Identify other past, present, and reasonably foreseeable activities with effects likely to overlap in type of effect (i.e., Valued Component), temporally, and spatially with the predicted residual effects of the project; and
- Predict potential cumulative effects and identify additional mitigation.

4.6.3.2 Cumulative Effects Scoping

4.6.3.2.1 Valued Components with Residual Effects

The cumulative effects assessment builds on the results of the residual effects assessment described in **Section 8** and will consider the incremental changes that are predicted to have a likely residual adverse effect on a Valued Component. The Valued Components that do not have a residual effect predicted, or the residual adverse effect is of negligible magnitude, the likelihood is unlikely or possible to occur, or positive in direction, will not be carried forward into the cumulative effects assessment. All residual effects on Valued Components identified were brought into the cumulative effects assessment. The rationale for the exclusion of Valued Components from the cumulative effects assessment is provided.

4.6.3.2.2 Temporal and Spatial Boundaries

Temporal boundaries, as described in **Section 4.3.1,** correspond to the duration that the likely residual adverse effects of the project are predicted to occur. *The Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) indicate the cumulative effects assessment should look at potential effects throughout the life cycle of the Project, including decommissioning and abandonment; however, there are currently no plans to decommission the Project. Therefore, this assessment is limited to identifying and assessing cumulative effects during the Project Construction and Operation and Maintenance Phases.

Spatial boundaries, which are the study area(s) within which the geographic extent of cumulative effects were studied, may vary by the residual effects of each Valued Component selected. For example, the geographic extent of residual effects on the migration patterns of wildlife Valued Components may differ from the geographic extent of habitat loss to the same Valued Components as a result of the Project. The spatial boundaries used to assess cumulative effects are described in **Section 8.1.2.**

4.6.3.2.3 Identification of Past, Present, and Reasonably Foreseeable Developments

Activities that were considered in the cumulative effects assessment included other past and existing anthropogenic (i.e., human-made) developments and future activities that are reasonably foreseeable. For an activity to be considered foreseeable and included in the cumulative effects assessment, sufficient information about the activity must have been available to make a reasonable assessment of its potential effects (in the planning / approvals / design stage). This included induced development that is certain or reasonably foreseeable and activities with additive effects, where appropriate (Canadian Environmental Assessment Agency, 2018). Reasonably foreseeable activities that were not considered are those for which formal plans have not been publicly disclosed and

information is not available. For a potential future project to be considered in the cumulative effects assessment, preliminary information such as activity description, activity size, footprint, project components, and anticipated timelines are needed to evaluate if the Project and the potential future project will overlap. The full list of past, present and reasonably foreseeable developments considered in the cumulative effects assessment is presented in the *Environmental Assessment / Impact Statement Report*.

To determine which past, present and reasonably foreseeable developments and their activities should be considered in the acoustic and vibration environment cumulative effects assessment, the following questions were answered. If effects of the activities of the projects are expected to overlap in type, time, and space with the residual effects of acoustic and vibration environment Valued Components, it was assumed that those activities would act cumulatively and be assessed for cumulative effects with the Project.

- Do the Project's activities overlap in the type of effects (e.g., effects on human receptor locations)?
- Do the Project's activities overlap in the timing of effects (i.e., do they overlap with the cumulative effect temporal boundaries with the identified residual effects)?
- Do the Project's activities overlap in the location of effects (i.e., do they overlap with the cumulative effect spatial boundaries)?

Furthermore, Valued Components that did not have a residual effect predicted, or the residual effect is of negligible magnitude, unlikely or possible to occur, or positive in direction, the effect was not carried forward into the cumulative effects assessment.

4.6.3.3 Cumulative Effects Assessment

Following the scoping of the cumulative effects assessment, cumulative effects were assessed for applicable acoustic and vibration environment Valued Components. Cumulative effects on each Valued Component were identified by reviewing the effects of the Project with and without the other activities. Effects of past activities (i.e., activities that have been carried out) were used to contextualize the current state of the Valued Component.

Mitigation measures that are technically and economically feasible to eliminate or reduce adverse cumulative effects were described. A qualitative assessment of the effectiveness of the measures was provided, taking into consideration all applicable reasonably foreseeable developments to provide a regional context. Cumulative effects were characterized using the same effects characteristics presented in **Table 4-17.**

4.7 Identify Monitoring Programs and Future Commitments

Following the residual and cumulative effects assessments, effects monitoring programs are recommended to verify the prediction of the effects assessment and the effectiveness of the mitigation and enhancement measures presented in this report. Commitments made in this report are also presented to support compliance monitoring to evaluate whether the Project has been constructed, implemented, and operated in accordance with the commitments made.

4.8 Predicting Future Conditions

The effects assessment assessed all phases of the Project including Construction activities and temporary construction-related facilities (e.g., aggregate extraction and refining), and Operation and Maintenance. The Project effects were assessed using guidance from federal and provincial guidelines, and guidelines inline with generally accepted practices within the industry at the identified potential points of reception discussed in **Section 4.5.1.1**. It is understood that Project Construction will occur in phases and may expose points of reception to activities that vary in duration. This phased approach was incorporated into the noise and vibration assessments.

4.8.1 Noise

Noise levels due to construction activities and stationary sources were predicted in accordance with *International Organization for Standardization Standard 9613-2 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (International Organization for Standardization, 1996), implemented in the CadnaA noise prediction modelling software, developed by DataKustik GmbH. This modelling method is accepted by numerous regulators across Canada including the Ontario Ministry of the Environment, Conservation and Parks.

Road traffic noise due to Project operations was predicting using the Traffic Noise Model, developed by the United States Federal Highway Administration as the computerized noise prediction modelling software for use on all United States federal-aid highway projects. The *Ministry of Transportation's Noise Guide* identifies the Traffic Noise Model as the preferred noise prediction model approved for use. It was implemented using the CadnaA noise prediction modelling software, which was calibrated to the Traffic Noise Model version 3 software (**Attachment G – Traffic Noise Model Sample Calculation**).

In selecting the CadnaA software, consideration was given to the capabilities of CadnaA in dealing with Geographic Information System data and complex topography and the ability to generate noise contours. Noise contours provide a visual representation of the

acoustical environment associated with the noise sources in the vicinity of and within the Project site and are therefore useful in identifying potential noise concerns.

The following are key assumptions and modelling inputs considered in the development of the noise prediction modelling:

- Following a conservative approach, the prediction modelling did not consider potential attenuation from existing buildings or foliage between the Project and a given representative point of reception;
- A terrain dataset with 1 m elevation contours was considered that was provided by the Project team; and
- A ground absorption of 0.5 was used to represent a combination of acoustically soft (1.0) and hard (0.0) ground.

4.8.1.1 Construction

Noise sources due to construction were characterized by entering the sound power octave band spectrum associated with each source. Other parameters including source height, frequency of use and hours of operation also defined the nature of sound emissions. The *International Organization for Standardization 9613* prediction method is conservative as it assumes that all points of reception are downwind from the noise source or that a moderate ground-based temperature inversion exists. In addition, ground cover, terrain and atmospheric absorption were included as they related specifically to the Project.

Noise emissions from construction activities could increase the existing noise levels within the Local Study Area. The assessment of Project effects on noise during the Construction Phase considered four modelling scenarios, each with their own subset of construction equipment, when the greatest effects are expected:

- Construction of the Community Access Road;
- Construction of bridges;
- Construction and use of pits and quarries and temporary access roads; and
- Construction and use of sand and gravel quarries and temporary access roads.

The primary noise sources associated with these construction activities and estimated sound power levels are summarized in **Table 4-19**. For the purposes of the Environmental Assessment, the list of equipment summarized in **Table 4-19** was developed by the engineering team and used to generate noise emissions for use in the noise assessment. The list of equipment is considered to be representative of the types of equipment and associated activities for the Project. The table also summarizes the quantity and utilization (i.e., percentage of time a piece of equipment is operating at the specified sound power level) of each piece of equipment used in the noise prediction modelling. The sound power levels were established using the Project design details, WSP Canada Inc.'s database of similar noise sources, manufacturer's specifications, and publicly available data. Each piece of equipment was modelled to operate for 12 hours per day during the daytime period (defined by Health Canada as 7 a.m. to 10 p.m.).

Table 4-19: Construction Scenarios and Corresponding Equipment

Equipment	Sound Power Level (dBA)	Usage Factor (%)	Quantity – Road Construction	Quantity – Bridge Construction	Quantity – Quarries	Quantity – Pits
Rock Drills	120	65	–	–	3	–
CAT D6 Dozer	110	80	3	3	4	4
CAT D7 Dozer	115	80	2	2	–	–
CAT D8 Dozer	117	80	–	–	4	4
Crusher	115	80	1	–	1	1
Large Excavator	108	80	5	4	3	3
Small Excavator	100	80	–	1	–	–
Fuel Truck	107	80	1	1	–	–
Rock Truck	116	80	20	21	1	1
Semi Trailers	105	80	10	10	–	–
Small Loader	102	50	–	2	–	–
Medium Loader	109	80	2	1	–	–
Large Loader	112	80	1	1	–	–
Mechanic Truck	99	80	1	1	–	–
Flatbed Truck	99	80	1	2	–	–
Smooth Drum	116	80	2	2	–	–
Water Truck	107	80	2	1	–	–
Grader	114	40	1	1	–	–
Impact Pile Driver – Steady Noise	115	65	–	1	–	–
Impact Pile Driver – Impact Noise	127[(a)]	6.5	–	1	–	–
Crane	109	80	–	2	–	–
Concrete Boom Pump	107	35	–	1	–	–
Dump Truck	103	80	–	4	–	–
Conveyor	99	80	–	1	–	–
Concrete Batch Plant	117	35	–	1	–	–
Compressor	94	80	–	1	–	–
Heater	92	80	–	6	–	–
Diesel Generator	91	80	–	1	–	–
Light Tower	89	35	–	3	–	–
Forklift	107	65	–	2	–	–
Boom Lift	95	65	–	1	–	–
Gas Generator	103	80	–	2	–	–
Water Pump	99	80	–	2	–	–
Backup Alarm	115[(b)]	10	1	1	1	1

Notes:
(a) Penalty of 12 dB for a highly impulsive source added to this sound power level (International Organization for Standardization, 2016).
(b) Penalty of 5 dB for a tonal source added to this sound power level (International Organization for Standardization, 2016).
dBA = A-weighted decibel; % = percent.

4.8.1.2 Operations

Noise resulting from the operation of the Community Access Road (i.e., from road traffic) was predicted based on future road traffic, representative of the anticipated peak traffic in 2046 (AECOM, 2024). It was assumed that traffic will be free flowing along the Community Access Road. **Table 4-20** provides a summary of the future road traffic data used in the noise prediction modelling.

Table 4-20: Summary of Road Traffic Data

Parameter	North-South	East-West
Annual Average Daily Traffic	700	100
Truck % (Medium / Heavy)	7% / 64%	20% / 3%
Time of Day % (Daytime / Nighttime)[(a)]	85% / 15%	85% / 15%
Speed Limit	80 km/hr	80 km/hr

Notes
(a) Daytime (16 hours) – 7 a.m. to 11 p.m.; Nighttime (8 hours) – 11 p.m. to 7 a.m. (Ministry of Environment / Ministry of Transportation Protocol).
% = percent; km/hr = kilometre per hour; a.m. = morning period; p.m. = afternoon period.

Several of the pits and quarries will continue to operate during Project operations. The approach to predict noise levels from those pit and quarry locations was consistent with the methods provided in **Section 4.8.1.1**.

4.8.2 Vibration

Project vibration levels were assessed using the Bureau of Mines prediction formula provided in Caltrans *Transportation and Construction Vibration Guidance Manual* (Caltrans, 2020) for construction blasting, and general assessment formulae provided in the *Transit Noise and Vibration Impact Assessment Manual* (Federal Transit Administration, 2018) for general construction activities and operations. Where vibration source parameters were not available (e.g., vibration emissions), the assessment incorporated data from industry standard reference publications (e.g., *Transit Noise and Vibration Impact Assessment Manual*); or data collected from similar equipment for other projects.

4.8.2.1 Construction – Blasting

Vibration due to construction blasting was assessed. Both ground and air vibration levels lose energy and dissipate with increasing distance from the blast source. The rate at which these effects attenuate or dissipate from a particular site are dependent on geologic and environmental conditions, topography, and the particulars of the blast design. The intensity of ground and air vibration effects from any surface blasting operation are primarily

governed by the distance between the point of reception and the blast and the maximum weight of explosive detonated per delay period within the blast.

Where no site-specific data are available, the model factors can be estimated based on literature derived models or models based on applicable experience. Since blasting for the Project will occur over a large area and no previous blasting for the right-of-way is known, attenuation characteristics were estimated based on a literature review. Additionally, we are not aware of any blast vibration monitoring records for any existing quarry blasts.

The rate ground vibrations attenuate from a blast site is dependent on a number of variables. These include the characteristics of the blast (delay timing, type of explosive), topography of the site, as well as the characteristics of the bedrock and / or soil materials. The rate ground vibrations decay or attenuate from a blast site can be expressed by the Scaled Distance presented in Caltrans *Transportation and Construction Vibration Guidance Manual* (Caltrans, 2020) and defined as:

$$Scaled\ Distance\ (SD) = \left(\frac{D}{\sqrt{W}}\right)$$

where D = the distance (m) between the blast and receptor

W = the maximum weight of explosive (kg) detonated per delay period

The ground vibration level is given by:

$$PPV = K(SD)^{-e}$$

where PPV = Peak Particle Velocity (mm/s)

SD = Scaled Distance (m/kg$^{1/2}$) as defined above

K, e = Site factors typically derived from monitoring

The Ministry of Environment, Conservation and Parks provided a simplified prediction model for the evaluation of vibration impact severity (Ministry of Environment, Conservation and Parks, 1985). This model is shown below and presented graphically in **Figure 4-3**.

$$PPV_{95} = 1100\left(\frac{D}{\sqrt{W}}\right)^{-1.60}$$

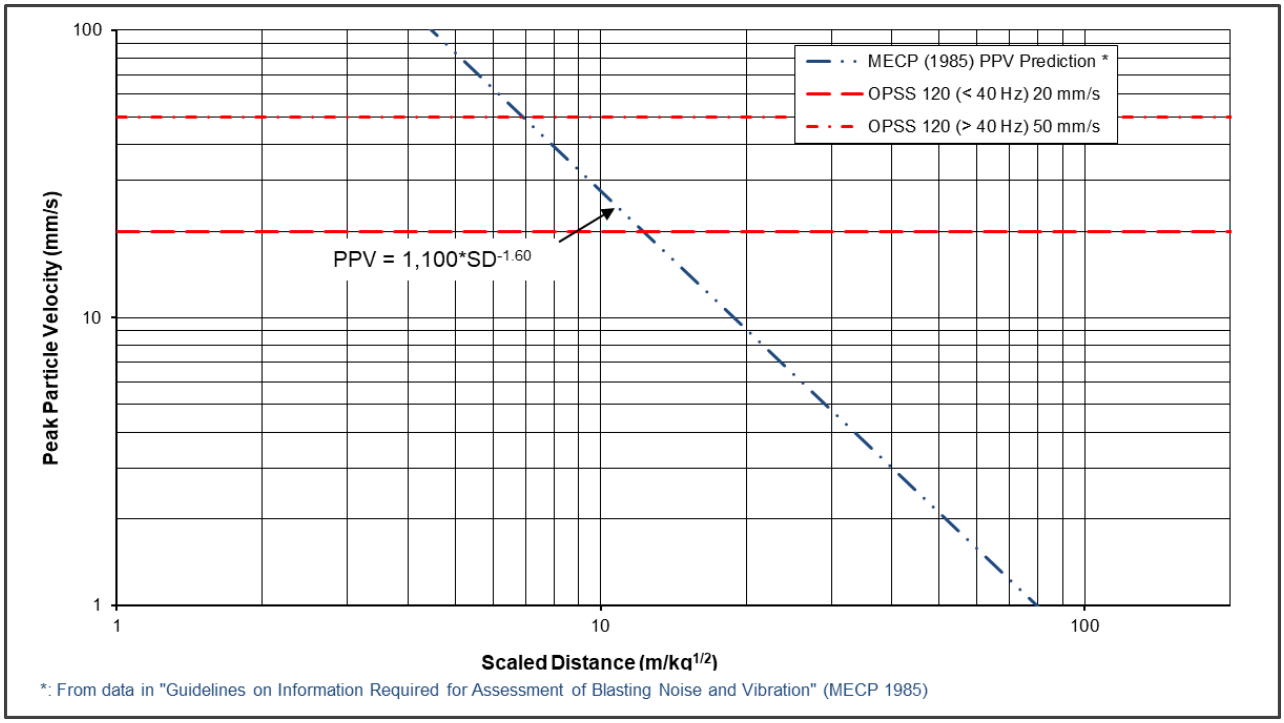
where D = the distance (m) between the blast and receptor

W = the maximum weight of explosive (kg) detonated per delay period

The calculated scaled distance values for the peak ground vibration levels described in *Ontario Provincial Standards for Roads and Public Works Standard Specification 120* and *NPC 119* are as follows:

- *Ontario Provincial Standards for Roads and Public Works Standard Specification 120*
  - 20 mm/s (less than 40 Hz) – 12.24 m/kg$^{1/2}$.
  - 50 mm/s (greater than 40 Hz) – 6.90 m/kg$^{1/2}$
- NPC 119
  - 12.5 mm/s – 16.42 m/kg$^{1/2}$

Figure 4-3: Proposed Ground Vibration Attenuation Model



mm/s = millimetre per second; MECP = Ministry of Environment, Conservation and Parks; PPV = peak particle velocity; OPSS = Ontario Provincial Standards for Roads and Public Works Standard Specification; Hz = hertz; SD = scaled distance; m/kg$^{1/2}$ = metres per square root of kilogram.

The purpose of this equation is not so much to predict what a given vibration level would be at a particular location for a given blast, but to indicate that the peak vibration would fall below the level indicated by the equation for a given distance and maximum explosive weight. The equation is, therefore, a useful blast design tool in establishing maximum charge weights for various distances from a blast site for a given maximum ground vibration level. It is important to note that the blast vibration model proposed above would need to be calibrated with site-specific data collected during the initial blasts carried out at the potential quarry.

Air overpressure attenuates from a blast site as the distance to the point of reception increases (Siskind, 2005). Air vibrations attenuate from a blast site at a slower rate than ground vibrations. The distribution of air vibration energy from a blast is strongly influenced by the prevailing weather conditions during the blast. For example, wind can increase downwind levels by 10 to 15 dBL above what would otherwise be measured (Dowding, 1985). Low cloud ceilings and temperature inversions also contribute to air vibrations propagating further than would typically be the case. Other factors influencing air vibration distribution from a blast include orientation of the blast face, local topography and vegetation, length of collar and type of stemming material, differences in explosive types and variations in burden distance. Generally, the air overpressure is expected to be lower behind the free face. However, in an operating quarry, the air overpressure wave may travel out from the face and may be reflected from an adjacent pit wall, resulting in an almost similar level behind the blast as in front of the blast.

The blasting operation will generally progress toward the extraction perimeter with the nearest sensitive receptors located behind the blast face. However, as the quarry is developed, there will likely be situations where quarry faces will not be oriented this way (e.g., open corners). As such, the overpressure model used for this study considers the peak sound pressure level expected in front of the free face.

The rate air vibrations decay or attenuate from a blast site can be expressed by the Scaled Distance presented in Caltrans *Transportation and Construction Vibration Guidance Manual* (Caltrans, 2020) and defined as:

$$Scaled\ Distance\ (SD) = \left(\frac{D}{\sqrt[3]{W}}\right)$$

where D = the distance (m) between the blast and receptor

W = the maximum weight of explosive (kg) detonated per delay period.

Where no site-specific data are available, the model factors can be estimated based on literature derived models or models based on applicable experience. The air overpressure model assumed for this study is based on the Ministry of Environment, Conservation and Parks (Ministry of Environment, Conservation and Parks, 1985) guidance and is as follows.

$$PSPL = 3.7148\left(\frac{D}{\sqrt[3]{W}}\right)^{-0.966}$$

where $PSPL$ = Peak Sound Pressure Level (kiloPascal [kPa])

D = distance (m) between the blast and receptor

W = maximum weight of explosive (kg) detonated per delay period

When expressed in term of linear decibels and scaled distance, the models are shown below:

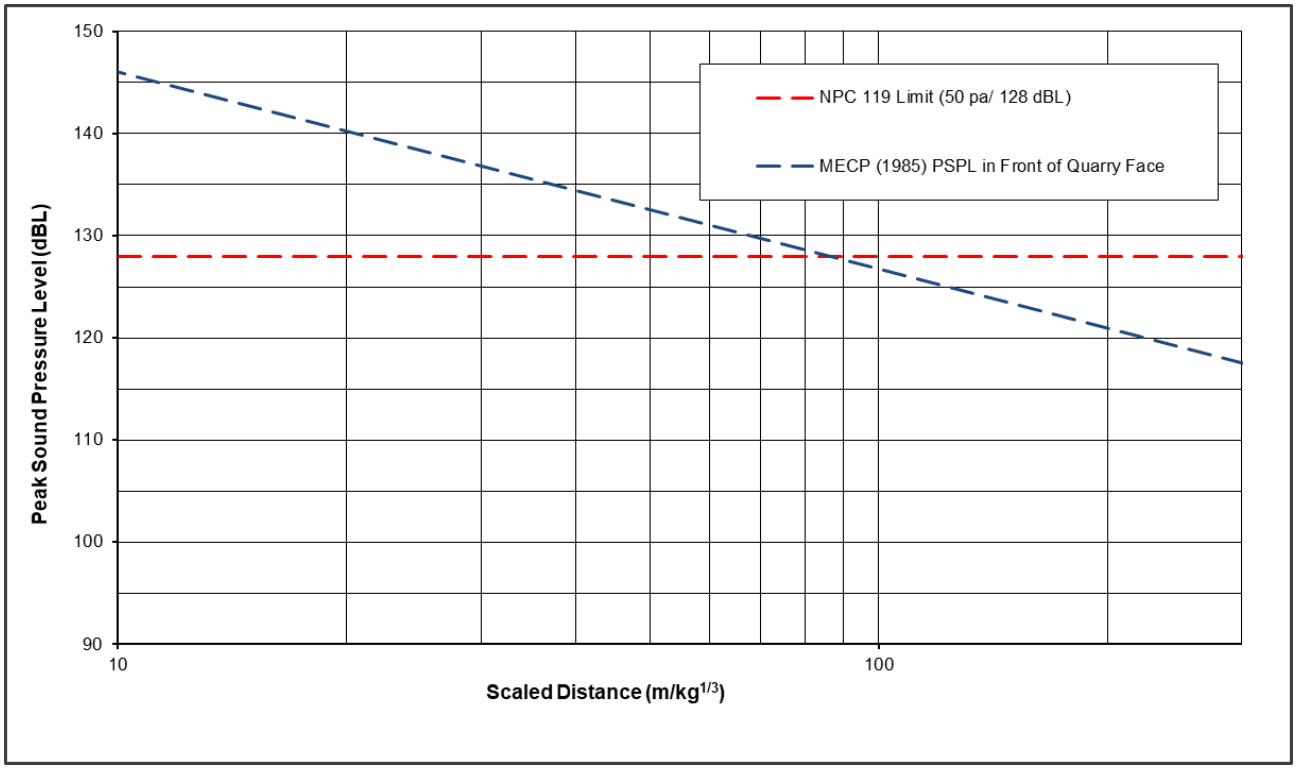
$$PSPL_{dBL} = 165.38 - 8.391 \ln(SD)$$

where PSPL = Peak Sound Pressure Level (dBL)

SD = Scaled Distance (m/kg$^{1/3}$) as defined above

The model provided above is used for air overpressure measured in front of the quarry face. The model above has been used in this air overpressure assessment and are plotted in **Figure 4-4**.

Figure 4-4: Proposed Air Overpressure Attenuation Model



dBL = linear decibel; pa = pascal; PSPL = peak sound pressure level; m/kg = metre per kilogram.

The calculated scaled distance for an air overpressure level of 128 dBL would be equal to the 86.42 m/kg$^{1/3}$.

Proposed Blast Procedure

There have been no previous blasts at the quarries. However, WSP Canada Inc. understands that the blasting procedures would be carried out by the Owner(s) / Operator(s) using the quarry. For the purposes of this assessment, hypothetical blast design details are provided for the proposed quarries and construction blasting, based on those from other blasting operations in Ontario, and are summarized in **Table 4-21**. **Attachment F – Definition and Glossary of Blasting Terms** provides a glossary of terms relating to blast design and **Figure F-1** (**Attachment F**) illustrates a typical bench blast design.

Table 4-21: Hypothetical Blast Design Details

Parameter	Quarry Details	Construction Details
Hole Diameter	102 mm	89 mm
Bench Height	up to 15 m	up to 6 m
Sub-drill	0.9 m	0.7 m
Depth of Hole	up to 15.9 m	up to 6.7 m
Blast Pattern (burden x spacing)	3.3 x 3.8 m	2.4 x 2.4 m
Stemming Length	2.2 m	1.7 m
Stemming Type	Clear crushed stone	Clear crushed stone
Explosive Type	Emulsion explosives	Emulsion explosives
Explosive Density	1.15 g/cc	1.15 g/cc
Explosive Weight per Delay	up to 129 kg[(a)]	up to 36 kg
Powder Factor	0.68 kg/m^3, 0.25 kg/tonne[(b)]	1.09 kg/m^3, 0.41 kg/tonne[(b)]

Notes:
(a) Assuming one hole detonated per delay period.
(b) Based on a rock density of 2.7 g/cc.
mm = millimetre; m = metre; g/cc = gram per cubic centimetre; kg = kilogram; kg/m^3 = kilogram per cubic metre; kg/tonne = kilogram per tonne.

If the blasting contractor implements blast designs which differ significantly from those proposed in **Table 4-21**, the results from this study may need to be reassessed.

4.8.2.2 Construction – General Construction Activities

To assess vibration due to general construction activities, a preliminary zone of influence was initially predicted. The preliminary zone of influence defines an area that may be potentially affected by vibrations at any frequency due to construction and is typically based on levels less than respective vibration limits, therefore resulting in a potential larger area of investigation. If receptor locations were located within the preliminary vibration zone of influence, a frequency-dependent assessment was carried out.

As discussed in **Section 4.8.1.1**, a list of construction equipment was provided by the Project team that was considered to be representative of the types of equipment and associated activities for the Project. Sources of construction vibrations generate waves that transmit vibrations through soil medium. The waves travel outward from the construction source and attenuate as a result of geometrical spreading and material damping.

The *Transit Noise and Vibration Impact Assessment Manual* presents the following Equation 7-2 as the vibration attenuation model for construction equipment when assessing potential building damage:

$$\mathbf{PPV}_{equip} = \boldsymbol{PPV}_{ref}\left(\frac{\mathbf{25}}{\boldsymbol{D}}\right)^{\mathbf{1.5}}$$

Where:

PPV_{equip} = the peak particle velocity of the equipment adjusted for distance, in/s

PPV_{ref} = the source vibration level at 25 ft, in/s

D = distance from the equipment to the receiver, ft

The *Transit Noise and Vibration Impact Assessment Manual* Equation 7.2 can also be represented as follows:

$$\mathbf{PPV}_{equip} = \boldsymbol{PPV}_{ref}\left(\frac{\boldsymbol{D}_{ref}}{\boldsymbol{D}}\right)^{\mathbf{n}}$$

Where:

PPV_{equip} = the peak particle velocity of the equipment adjusted for distance, mm/s

PPV_{ref} = the source vibration level at reference distance, mm/s

D = distance from the equipment to the receiver, m

D_{ref} = reference distance for PPV_{ref}, m

n = is a value related to the vibration attenuation rate through ground, also referred to as soil class designation.

The value of "n" based on site-specific soil conditions can be used for an estimation of vibration amplitude. According to *Caltrans Transportation and Construction Vibration Guidance Manual* (Caltrans, 2020), the value of "n" can range from 1.0 for bedrock to 1.5 for weak or soft soils. According to the *Caltrans Transportation and Construction Vibration Guidance Manual*, the use of values greater than 1.1 would likely result in overestimation of amplitudes at distances closer than 25 ft and would be slightly conservative at distances beyond 25 ft. For the purposes of this assessment, the *Transit Noise and Vibration Impact Assessment Manual* vibration attenuation model was applied as presented, with a "n" value of 1.5.

The *Transit Noise and Vibration Impact Assessment Manual* presents the following Equation 7.3 to assess human annoyance for each piece of equipment individually in RMS velocity levels, expressed in vibration velocity level (VdB).

$$L_{v.distance} = L_{vref} - 30\log\left(\frac{D}{25}\right)$$

Where;

$L_{v.distance}$ = the RMS velocity level adjusted for distance, VdB

L_{vref} = the source reference vibration level at 25 ft, VdB

D = distance from the equipment to the receiver, ft

The *Transit Noise and Vibration Impact Assessment Manual* provides PPV_{ref} and L_{vref} estimated average source levels for various types of construction equipment for a wide range of soil conditions. **Table 4-22** is a reproduction of the estimates.

Table 4-22: Transit Noise and Vibration Impact Assessment Manual Suggested PPV_{ref} and L_{vref} for Various Equipment Types

Equipment	Peak Particle Velocity at 7.62 m, mm/s	Approximate Lv (RMS) at 7.62 m, dB [(a)]
Pile Driver (Impact) – Upper Range	38.56	112
Pile Driver (Impact) – Typical	16.36	104
Pile Driver (Sonic) – Upper Range	18.64	105
Pile Driver (Sonic) – Typical	4.32	93
Clam Shovel Drop (Slurry Wall)	5.13	94
Hydromill (Slurry Wall) in Soil	0.20	66
Hydromill (Slurry Wall) in Rock	0.43	75
Vibratory Roller	5.33	94
Hoe Ram	2.26	87
Large Bulldozer	2.26	87
Caisson Drilling	2.26	87
Loaded Trucks	1.93	86

Equipment	Peak Particle Velocity at 7.62 m, mm/s	Approximate Lv (RMS) at 7.62 m, dB [(a)]
Jackhammer	0.89	79
Small Bulldozer	0.077	58

Notes:
(a) The approximate RMS vibration velocity levels were calculated from the PPV limits using a crest factor of 4, representing a PPV-rms difference of 12 dB.
m = metre; mm/s = millimetre per second; dB = decibel; L_v = velocity level; RMS = root-mean square; PPV = peak particle velocity.

As previously mentioned, other types of receptor locations may exist in the vicinity of the Project that are potentially sensitive to vibration (e.g., utility infrastructure, heritage structures). It is recommended prior to progressing further with the design, the presence of these types of receptor locations in the vicinity of the Project and respective applicable vibration guidelines and criteria as it relates to general construction equipment be confirmed. If required, they be considered in the Construction Vibration Workplan (see **Section 7.3.1.2.1.3**).

4.8.2.3 Operations

Vibration during the operations along the Community Access Road was assessed in general accordance with the *Transit Noise and Vibration Impact Assessment Manual* approach for rubber-tire vehicles (i.e., buses). Guidance for the vibration assessment of light vehicles and medium to large trucks on a gravel roads is not readily available. Therefore, the *Transit Noise and Vibration Impact Assessment Manual* approach for rubber-tire vehicles was considered similar and representative for the purposes of this Project.

Some quarries will remain active into the Operation and Maintenance Phase of the Project. The analysis carried out for quarry blasting during Project Construction (**Section 4.8.2.1**) will also apply for Project Operation and Maintenance.

4.9 Data Management and Analysis

Data management including quality assurance / quality control has been employed to minimize potential for data entry and analysis errors, prepare datasets for analysis and limit sensitive data distribution in accordance to established agreements.

4.9.1 Desktop Analysis

Noise and vibration existing conditions (e.g., existing land uses, potential points of reception) collected from the desktop review were compiled at the local scale to inform and supplement the field investigations for the Local Study Area.

An internal senior technical staff member checked all modelling and calculations for applicability, validity of assumptions, methodology and arithmetic.

4.9.2 Field Surveys

To maintain consistency and for quality assurance / quality control of the data collected, standardized datasheets (either digital or paper) paired with mapping software have been used in the field. Field studies have followed technical protocols that outlined specific work instructions and have been developed to follow federally and provincially acceptable methods. Completeness and accuracy of field data were verified daily during field verification and field photos and coordinate information has been backed up regularly. Noise equipment were calibrated at the start of each field day using standardized calibration methods. Calibration certifications for the equipment are provided in **Attachment C – Calibration Certificates**.

All data were entered into Excel spreadsheets, then incorporated into the report. Data entry was evaluated for errors or omissions to verify that the electronic database accurately reflected the data collected during the field investigation.

4.9.3 Geographic Information Systems

Where existing conditions data are available in Geographic Information Systems format, this information will be provided to the Impact Assessment Agency of Canada as electronic geospatial data file(s) compliant with the *International Organization for Standardization 19115* standard. This will support the Government of Canada's commitment to Open Science and Data and will facilitate the sharing of information with the public through the Canadian Impact Assessment Registry Internet Site and the Government's Open Science and Data Platform. The Impact Assessment Agency of Canada intends to make the geospatial data files available to the public under the terms of the Open Government Licence – Canada as applicable with exclusion of sensitive species at risk and Indigenous Knowledge.

Complete datasets from all survey sites will be provided upon finalization of this report. They will be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation / visit information and with observations and measurements in un-summarized form. Databases and Geographic Information Systems files will be accompanied by detailed metadata that meets *International Organization for Standardization 19115* standards. Documentation and digital files will be provided for all results of analyses that allow for a clear understanding of the methods and a replication of the results. All geographic data, along with accompanying metadata, pertaining to species at risk will be provided to Natural Heritage Information Centre and the Ministry of Environment, Conservation and Parks - Species at Risk Branch.

4.9.4 Data Analysis

The existing noise data collected for this Project were reviewed to identify any abnormalities. Abnormal noise events (e.g., birds or insects close to microphone) were removed, as well as noise data collected under unfavourable weather conditions (i.e., periods of precipitation and wind speeds exceeding 20 km per hour). The screening was completed using various tools, which included audio recordings (where deemed appropriate) and analysis of the raw noise monitoring data in combination with meteorological data obtained from the Marten Falls First Nation Ogoki Airport. The daytime and nighttime ambient noise levels were calculated based on all collected valid noise data.

5. Existing Conditions

The existing conditions are described based on a combination of information obtained through engagement and consultation, desktop assessment, field investigation, and modelling.

5.1 Existing Potential Points of Reception

The potential points of reception in the acoustic and vibration environment existing conditions Local Study Area were identified in general accordance with *NPC-300* (Ministry of Environment, Conservation and Parks, 2013) and where traditional land uses are expected to be occupied by human activity, as described in **Section 4.5.1.1.**

A desktop level analysis identified potential points of reception within the acoustic and vibration environment existing conditions Local Study Area.

The number of existing structures and land uses considered potential points of reception, based on the information sources discussed previously, are grouped by given distances to the existing conditions Construction Disturbance Area and are summarized in **Table 5-1**.

Table 5-1: Summary of Potential Points of Reception Distances within the Local Study Area

Distances from the Construction Disturbance Area	Number of Potential Points of Reception – Alternative 1	Number of Potential Points of Reception – Alternative 4
Edge of Construction Disturbance Area[(a)]	47	117
Construction Disturbance Area to 100 m	17	32
100 to 200 m	9	12
200 to 300 m	8	5
300 to 400 m	13	16
400 to 500 m	11	12
500 to 1,000 m	42	38
1,000 m to edge of Local Study Area	211	147
Total	341	379

Notes:
(a) Points of reception that are representing lines or areas that intersect with the Construction Disturbance Area were considered to be located on the edge of the Construction Disturbance Area.
m = metre.

5.2 Noise

5.2.1 Desktop Review of Existing Noise Levels

A desktop review was completed to characterize the existing noise levels in the acoustic and vibration environment existing conditions Local Study Area. A search for publicly and readily available studies confirmed that limited information regarding existing noise levels in the acoustic and vibration environment existing conditions Local Study Area is available. Based on the analysis of the orthoimagery of the majority of the extent of the Project presented in **Figure 5-1**, it was determined that the ambient noise levels within the acoustic and vibration environment existing conditions Local Study Area will be influenced by nature-based sources with little or no contribution from anthropogenic (i.e., human) made noise. Therefore, the existing noise levels for the majority of the acoustic and vibration environment existing conditions Local Study Area were assumed to be consistent with the levels described in the *Health Canada Noise Guidance* (Health Canada, 2023), with a daytime level of 45 dBA and nighttime level of 35 dBA, which is typical of rural and remote areas. *NPC-300* (Ministry of Environment, Conservation and Parks, 2013) Class 3 (i.e., rural area) has a similar daytime estimated existing noise level as the *Health Canada Noise Guidance*, but a higher estimated existing noise level during the nighttime period. Depending on the anthropogenic made noise (i.e., more populated communities), noise levels may be higher during the nighttime and therefore *NPC-300* Class 3 nighttime estimated existing noise levels may be more appropriate within the more populated areas in the community of Marten Falls First Nation.

Due to the remote nature of all potential points of reception within the acoustic and vibration environment existing conditions Local Study Area currently identified and the expected range in of human activity, both the *Health Canada Noise Guidance* and *NPC-300* were applied in the assessment of existing noise levels.

The summary of the existing acoustic environment during the daytime and nighttime periods is presented in **Table 5-2**.

Table 5-2: Summary of Desktop Review of Existing Conditions for the Acoustic Environment

Descriptor	Existing Daytime (7 a.m. to 10 p.m.) Noise Level (L_d)	Existing Nighttime (10 p.m. to 7 a.m.) Noise Level (L_n)
More populated areas where ambient levels are influenced by human activities	45	40
Rest of the acoustic and vibration environment Local Study Area	45	35

Ld = daytime sound level; Ln = nighttime sound level; a.m. = morning period; p.m. = afternoon period.

5.2.2 Acoustic Environment Field Investigations

Noise measurements and monitoring were completed in November 2019, in general accordance with Ministry of Environment, Conservation and Parks guidelines, including the methodology outlined in *NPC-300* (Ministry of Environment, Conservation and Parks, 2013) and internationally recognized standards issued by the International Organization for Standardization.

As described in **Section 4.5.2**, the field program included an unattended long-term monitoring component (Noise Monitoring) and an attended short-term measurement component (Noise Measurements).

The community of Marten Falls First Nation was identified as a location that could be representative of the acoustical environment within the majority of the acoustic and vibration environment existing conditions Local Study Area. Marten Falls First Nation is a remote community with access by either airplane or winter road. Due to the limited population, the local ambient acoustic environment within the community is dominated by nature-based sources (e.g., wind in vegetation, animals) and to the lesser degree by human activities. Road traffic within the community is limited and not expected to be a significant contributor to the overall ambient existing noise environment. Noise emissions from airplanes are also limited both in duration and in the number of flights arriving and departing daily from the local airport. Due to the remoteness of the community, there are no industry-based sources within the community or the surrounding area, except for diesel-electric generators located near the airport. However, due to the distance between the airport and the community, noise emissions from these sources are not expected to contribute to the ambient acoustic environment within the community.

As mentioned in **Section 4.5.2**, a monitoring location was identified in a more populated area of Marten Falls First Nation where it was expected that ambient levels are influenced by human activities. A second monitoring location near the community, but removed from human activities, was selected to document ambient noise levels expected in the areas associated with remote / natural sites. This location was used to represent areas along the existing conditions Construction Disturbance Area that are removed from human activities. The ground coverage and surrounding vegetation was typical for a forested area. In the absence of wind, the ambient environment could be described as very quiet. These two representative receptor locations for the long-term monitoring were expected to provide the potential range in existing ambient noise levels within the acoustic and vibration environment existing conditions Local Study Area.

To supplement the long-term monitoring program, seven short-term measurement locations were selected throughout the area of the Marten Falls First Nation community. Two locations were consistent with the locations of the long-term monitoring sites and the remaining five were selected throughout the community (e.g., near a school [Location ID

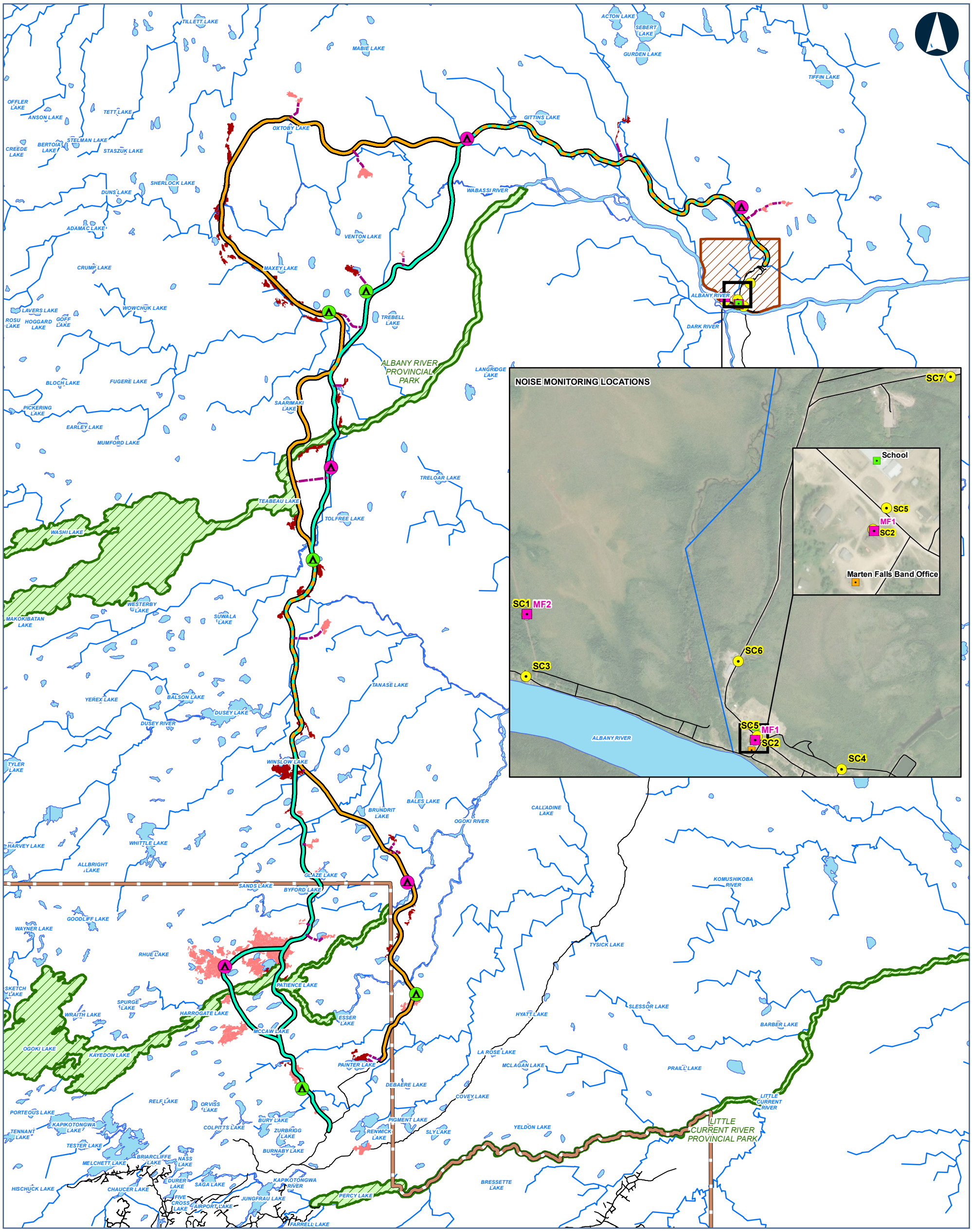
SC5], an airport [Location ID SC7] and a healthcare centre [Location ID SC6]). **Table 5-3** summarizes the locations where the long-term monitoring and short-term measurements were carried out, which are shown in **Figure 5-1**.

Table 5-3: Noise Monitoring and Measurement Locations

Monitoring / Measurement Location ID	Duration	Coordinates UTM Zone 16U	
		Easting (m)	Northing (m)
MF1	Long term (i.e., approximately 48 hours)	574261	5720776
MF2		572613	5721684
SC1	Short term (i.e., approximately up to 20 minutes)	572612	5721686
SC2		574260	5720778
SC3		572608	5721237
SC4		574886	5720568
SC5		574278	5720807
SC6		574140	5721348
SC7		575672	5723400

UTM = Universal Transverse Mercator; m = metre.

The following sections summarize the results of the noise monitoring and measurements. A summary of the invalid data is provided in **Attachment D – Filtered Noise Data**. The weather data during the monitoring are provided in **Attachment E – Weather Data**.



Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- LONG-TERM NOISE MONITORING LOCATION
- SHORT-TERM NOISE MEASUREMENT LOCATION
- Marten Falls Band Office
- School
- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK

Notes:
None

Data Source:
Base Data: Provided by MNRF 2019; Route Infrastructure - Provided by AECOM 2019. Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD BASELINE NOISE ASSESSMENT

LOCATION OF LONG-TERM AND SHORT-TERM BASELINE NOISE MEASUREMENTS

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-1

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0021_Acoustics_Effects_Assessment\21455151-0021-RN-0003_5-1.mxd
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5.2.2.1 Monitoring Location MF1 – Community Noise Levels

Monitoring Location ID MF1 was selected to characterize noise levels in a more populated area where it was expected ambient levels were influenced by human activities. The noise monitoring equipment was located in the central area of Marten Falls First Nation (i.e., near the band office and the school). The noise sources influencing the monitored noise levels at this location included: community activities, road traffic, animals (e.g., dogs) and wind. The measured daytime and nighttime L_{eq} and L_{90} noise levels are summarized in **Table 5-4**. These results include the removal of any abnormal noise events (e.g., birds or insects close to microphone) as well as noise data collected under weather conditions not meeting favourable conditions (i.e., periods of precipitation and wind speeds exceeding 20 km per hour).

Table 5-4: Monitoring Location MF1 Results

Period	Average L_{eq} (dBA)	Average L_{90} (dBA)
Daytime (7 a.m. to 10 p.m.)	43	38
Nighttime (10 p.m. to 7 a.m.)	42	35

dBA = A-weighted decibel; a.m. = morning period; p.m. = afternoon period; Leq = equivalent noise level; L90 = noise level exceeded 90% of the time; % = percent.

5.2.2.2 Monitoring Location MF2 – Remote Noise Levels

Monitoring Location ID MF2 was selected to characterize noise levels in a more remote area, away from human activities, which is consistent with the majority of the acoustic and vibration environment existing conditions Local Study Area. The noise monitoring equipment was located in a forested area near the Marten Falls First Nation community with minimal influence of noise sources associated with human activities. The noise sources influencing the monitored noise levels included sounds of nature (i.e., wind in vegetation and wildlife). The measured daytime and nighttime L_{eq} and L_{90} noise levels are summarized in **Table 5-5**. These results include the removal of any abnormal noise events (e.g., birds or insects close to microphone) as well as noise data collected under weather conditions not meeting favourable conditions (i.e., periods of precipitation and wind speeds exceeding 20 km per hour).

Table 5-5: Monitoring Location MF2 Results

Period	Average L_{eq} (dBA)	Average L_{90} (dBA)
Daytime (7 a.m. to 10 p.m.)	37	28
Nighttime (10 p.m. to 7 a.m.)	33	29

dBA = A-weighted decibel; a.m. = morning period; p.m. = afternoon period; Leq = equivalent noise level; L90 = noise level exceeded 90% of the time; % = percent.

5.2.2.3 Short-term Measurements

Short-term attended noise measurements were completed to provide additional context regarding temporal and spatial changes of the noise levels within the Marten Falls First Nation community. **Table 5-6** summarizes the noise levels measured during the short-term measurements. These noise measurements were intended to indicate variability in noise levels due to activities in the community which would include local traffic, household activities including construction, activities in the vicinity of the community health clinic, and community electricity generators located near the airport. All short-term measurements were taken during daytime hours (7 a.m. to 7 p.m.) and, depending on the location, during either the morning or afternoon periods.

Table 5-6: Short-term Measurements Results

Measurement Location ID[(a)]	Observations	Measurement Time	Measured Noise Level (dBA)	
			L_{eq}	L_{90}
SC1	At MF2 in the morning, in general low noise levels with intermittent anthropogenic activity. Sources of noise included dog barking, snowmobile on road at a distance, birds, and some occasional wind gusts.	November 4, 2019 (a.m.)	22	18
		November 5, 2019 (a.m.)	23	17
		November 6, 2019 (a.m.)	22	17
SC2	Near a school and community road. Noise sources included occasional wind gusts and truck pass-bys. (Poor road surface conditions contributed to increases in noise levels due to road traffic).	November 5, 2019 (a.m.)	50	32
SC3	Near the Community Access Road and river, south of MF2. Overall, a quiet noise environment. Low community background noise.	November 4, 2019 (a.m.)	30	23
SC4	Northeast end of community. Low noise levels with few truck pass-bys. Minimal human activity with some background environmental noise (e.g., dogs, birds, wind).	November 4, 2019 (p.m.)	38	22
SC5	Near the school at MF1. Includes construction (renovation) noise from a roof of a nearby house and some human activity (e.g., kids playing by the school yard).	November 4, 2019 (p.m.)	38	32
SC6	Near a nursery. Noise sources include a low noise generator hum and some human activity. However, site is very quiet aside from human activity.	November 4, 2019 (p.m.)	31	31

Measurement Location ID[(a)]	Observations	Measurement Time	Measured Noise Level (dBA)	
			L_{eq}	L_{90}
SC7	Near the airport and generator station. Noise sources include generator exhaust (dominant), truck pass-bys and some wind gusts.	November 5, 2019 (a.m.)	55	53

Notes:
(a) Refer to **Figure 5-1** for measurement locations.
dBA = A-weighted decibel; a.m. = morning period; p.m. = afternoon period; Leq = equivalent sound level; L90 = noise level exceeded 90% of the time; % = percent.

Noise levels collected during the attended short-term noise measurements indicate that the community noise levels generally vary between 22 to 38 dBA, indicating a generally quiet environment with occasional noise level increases due to human activity. The results of 50 dBA at SC2 were obtained during wind gusts and the noise level of 55 dBA at Location ID SC7 was measured near the diesel generators servicing the Marten Falls First Nation community. Daytime noise levels obtained in a more remote area, away from human activities, indicate low ambient noise levels not affected by human activities.

5.3 Vibration

The existing vibration levels within the vibration environment are expected to be influenced by nature-based sources with little or no contribution from anthropogenic (i.e., human) made vibrations. Therefore, the existing vibration levels for the majority of the existing conditions Construction Disturbance Area were assumed to be negligible (less than 0.1 mm/s), which is typical of rural and remote areas.

6. Selection of the Preferred Route

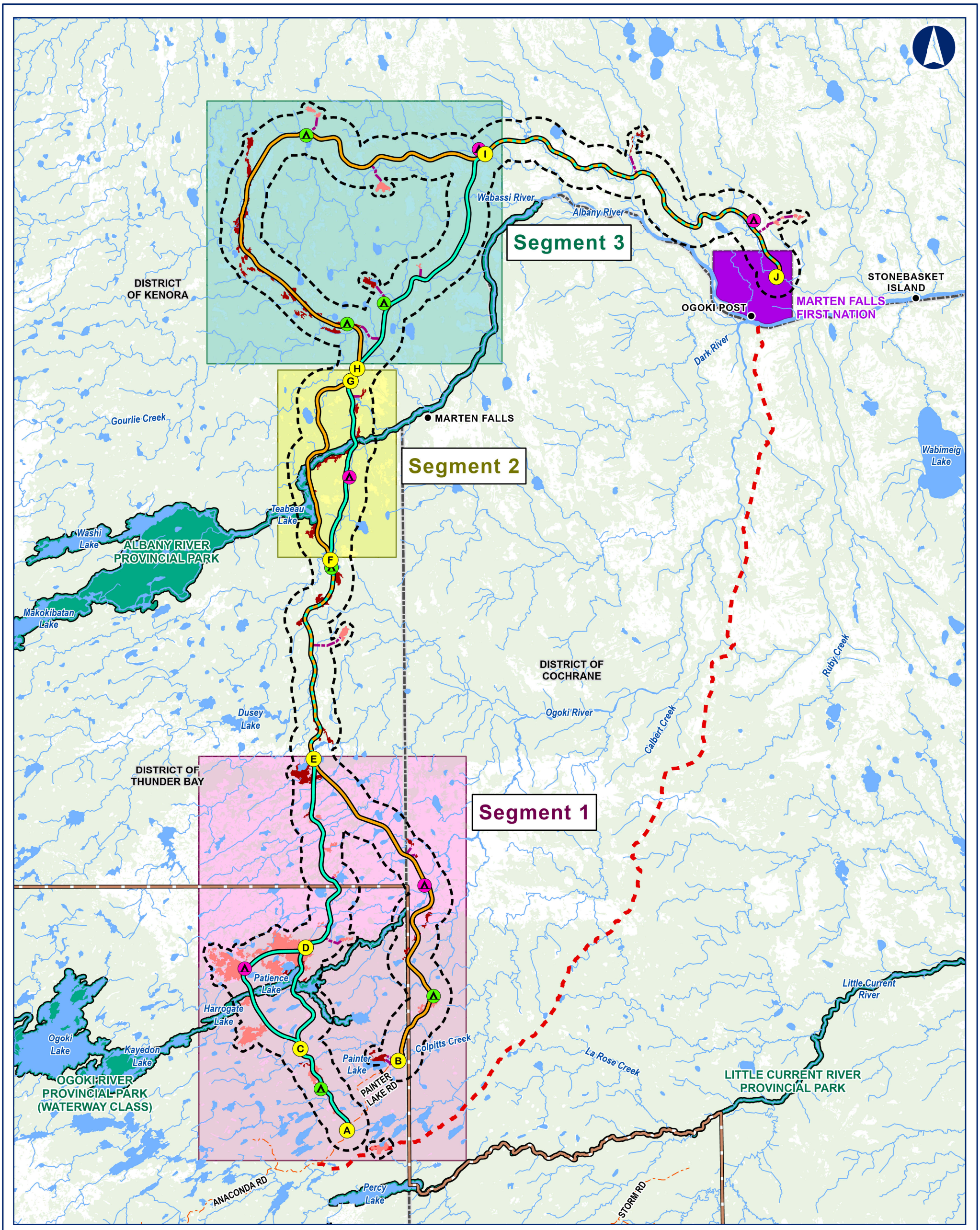
Following the collection of existing condition information on the two alternative route alignments described in **Section 4**, the Project team undertook an exercise to select a Preferred Route. The methodology and detailed results of this exercise are described in the *Environmental Assessment / Impact Statement Report* and are summarized at a high level in the following section. The Preferred Route includes the footprint of any temporary features such as pits and quarries, temporary access roads, and worker camps associated with the construction of that route. The Effects Assessment was completed using the identified Preferred Route.

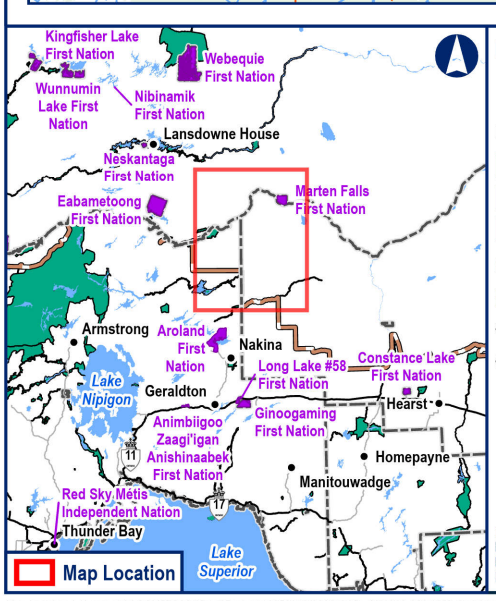
6.1 Alternative Segments and Routes Within Each Segment

To simplify the evaluation of the alternatives, the alternatives were divided into three separate segments based on their geographical locations (**Figure 6-1**). The segments were also determined so that any alternative route in one segment could connect with any alternative route in the next segment, allowing for decisions to be made based on the environment in each segment, and not based on the whole. This approach considers the variable environmental conditions within the Project area, allowing for flexibility to avoid sensitive natural features encountered within the Project disturbance area for each segment instead of requiring decision makers to balance trade offs of one long route versus the other.

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Route Alternatives and Segments





Legend

- Segment Node
- Project Study Area
- Segment 1
- Segment 2
- Segment 3

Construction Disturbance Area

Route Alternatives (100 m Right-of-Way)

- Alternative 1
- Alternative 4

Potential Camp Site

- 50 Persons (108 m x 150 m)
- 200 Persons (108 m x 150 m)
- Approximate Access Road to Potential Construction Camp (10 m Width)

Potential Aggregate Source

- Bedrock
- Sand and gravel
- Approximate Access Road to Potential Aggregate Site (10 m Width)

General Features

- Resource / Recreation Road
- MFFN Existing Winter Access Road
- Watercourse
- Waterbody
- First Nation Reserve
- District Municipal Boundary
- Far North Boundary
- Provincial Park

Data Source:
Base Data: Provided by MNRF 2023; Route Infrastructure - Provided by AECOM 2021. Contains Information licensed under the Government Licence Ontario.

Notes:
First Nation Reserves of MFFN CAR Neighboring Indigenous Communities are shown within the inset extent.

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Figure 6-1

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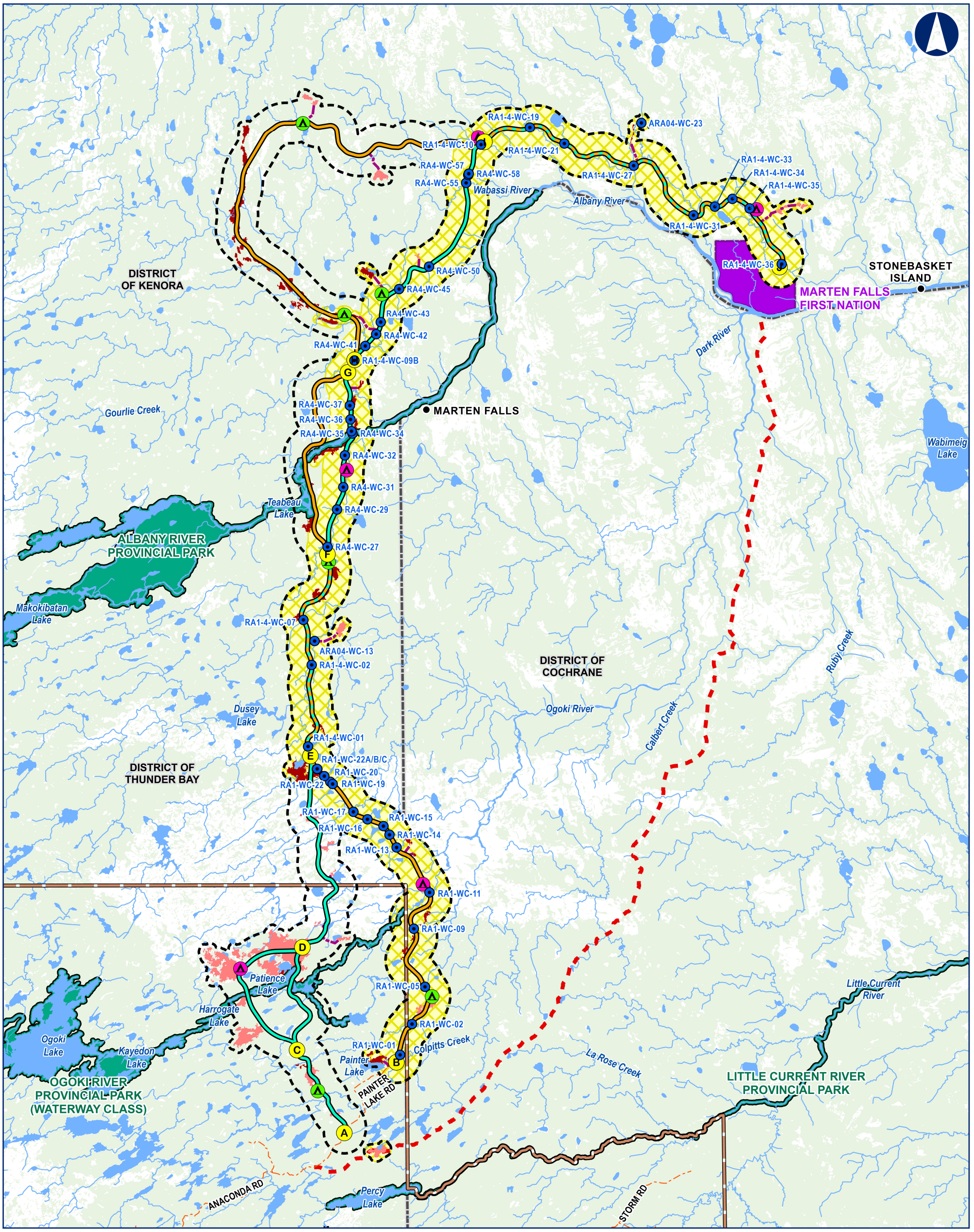
6.2 Preferred Route

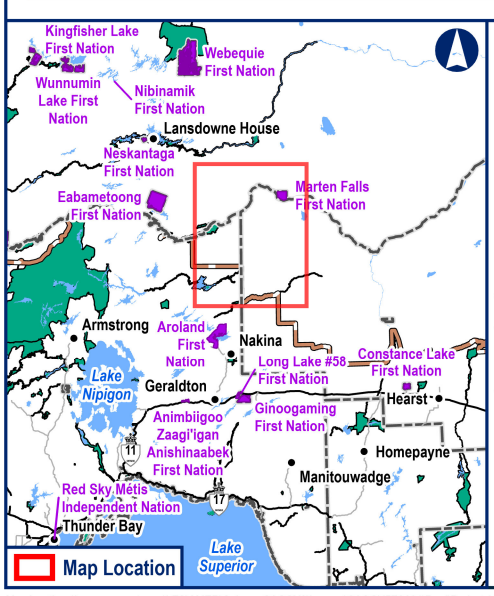
The selection of the Preferred Route within each segment involved a thorough analysis of technical, economic, natural, social, and cultural factors. The route alternative evaluation took into account the potential effects and standard or known mitigation approaches to determine the net positive or negative effects of each alternative and was completed using the reasoned argument (trade-off) method. The reasoned argument method qualitatively compares the advantages and disadvantages of each alternative including the relative significance of the potential residual effects.

Following the completion of the steps outlined previously, and direction from the community of Marten Falls First Nation, Aroland First Nation, and input from the public and regulators, the Proponent identified a Preferred Route alignment for each segment.

- Segment 1 – Ogoki Crossing: Alternative 1;
- Segment 2 – Albany Crossing: Alternative 4; and
- Segment 3 – North of the Albany: Alternative 4.

The combination of Segments 1, 2 and 3 create the final Preferred Route (**Figure 6-2**).





Legend

- Water Crossing
- Segment Node (A)
- Project Study Area
- Final Route Recommendation

Construction Disturbance Area

Route Alternatives (100 m Right-of-Way)

- Alternative 1
- Alternative 4

N/A

- Alternative 1 and Alternative 4

Potential Camp Site

- 50 Persons (108 m x 150 m)
- 200 Persons (108 m x 150 m)

Potential Aggregate Source

- Bedrock
- Sand and gravel
- Approximate Access Road to Potential Aggregate Site (10 m Width)

General Features

- Resource / Recreation Road
- MFFN Existing Winter Access Road
- Watercourse
- Waterbody
- First Nation Reserve
- District Municipal Boundary
- Far North Boundary
- Provincial Park

Data Source:
Base Data: Provided by MNRF 2023; Route Infrastructure - Provided by AECOM 2021. Contains Information licensed under the Government Licence Ontario.

Notes:
First Nation Reserves of MFFN CAR Neighboring Indigenous Communities are shown within the inset extent.

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Final Route Recommendation

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Figure 6-2

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7. Residual Effects Assessment

Effects assessment results are provided for the Preferred Route, by each temporal phase of the Project as described in **Section 4.2**. This includes the potential effects (positive and negative), mitigation and enhancement measures, residual effects, and indirect effects. Where applicable, Gender-Based Analysis Plus has been considered within the assessment for each Valued Component. See **Section 3.4** for more information.

7.1 Summary of the Existing Environment Within the Effects Study Areas

The number of existing structures and land uses considered potential points of reception, based on the approach discussed in **Section 5.1,** for the Preferred Route are grouped by given distances to the effects assessment Construction Disturbance Area and are summarized in **Table 7-1.**

Table 7-1: Summary of Potential Points of Reception Distances within the Local Study Area

Distances from the Construction Disturbance Area	Number of Potential Points of Reception – Preferred Route
Edge of Construction Disturbance Area[(a)]	141
Construction Disturbance Area to 100 m	7
100 to 200 m	9
200 to 300 m	6
300 to 400 m	8
400 to 500 m	9
500 to 1,000 m	36
1,000 m to edge of Local Study Area	142
Total	**358**

Notes:
(a) Points of reception that are representing lines or areas that intersect with the Construction Disturbance Area were considered to be located on the edge of the Construction Disturbance Area.
m = metre.

As described in **Section 5**, both a desktop review and a field program were completed to characterize the existing noise levels in the acoustic and vibration environment Local Study Area. Based on the results provided in **Section 5**, the noise levels that were established through long term monitoring were used.

Long term noise monitoring was carried out at two locations: one was identified in a more populated area of Marten Falls First Nation where it was expected that existing noise levels are influenced by human activities, and the other was removed from human activities which was selected to represent areas associated with remote / natural sites. **Table 7-2** summarizes the existing conditions carried forward in the noise assessment of the Preferred Route.

Table 7-2: Summary of Existing Conditions for the Acoustic Environment

Descriptor	Existing Daytime (7 a.m. to 10 p.m.) Noise Level (L_d)	Existing Nighttime (10 p.m. to 7 a.m.) Noise Level (L_n)
More populated areas where ambient levels are influenced by human activities	43	42
Rest of the acoustic and vibration environment Local Study Area	38	33

a.m. = morning period; p.m. = afternoon period; Ld = daytime noise level; Ln = nighttime noise level.

As the majority of the potential points of reception identified within the acoustic and vibration environment Local Study Area are representative of more remote locations, an existing daytime noise level of 38 dBA and an existing nighttime noise level of 33 dBA have been applied for all potential points of reception.

As described in **Section 5.3**, the existing vibration levels within the vibration environment are expected to be influenced by nature-based sources with little or no contribution from anthropogenic (i.e., human) made vibrations. Therefore, the existing vibration levels for the majority of the effects assessment Construction Disturbance Area were assumed to be negligible (less than 0.1 mm/s), which is typical of rural and remote areas.

7.2 Project–Environment Interactions

The analysis of Project–environment interactions for acoustic and vibration environment that are likely to have a potential effect is provided in **Table 7-3.**

Table 7-3: Project–Environment Interactions

Project Phase	Project Activities	Valued Component	Indicator	Description of Project–Environment Interaction
Construction Phase	Temporary Construction Staging Areas	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ $L_d^{(a)}$ ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between temporary construction staging areas construction and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Temporary Access Roads and Trails	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ $L_d^{(a)}$ ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between temporary access road and trail construction and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Temporary Construction Camps	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ $L_d^{(a)}$ ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between temporary construction camp construction and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Right-of-way Clearing and Grubbing	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ $L_d^{(a)}$ ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between right-of-way clearing and grubbing and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Pits and Quarries	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ $L_d^{(a)}$ ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity ■ Air overpressure	■ Negative interactions between pit and quarry use and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Temporary Concrete Batch Plants	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ $L_d^{(a)}$ ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between the use of temporary concrete batch plants and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Drilling / Blasting / Aggregate Production	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ $L_d^{(a)}$ ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity ■ Air overpressure	■ Negative interactions between aggregate production, including drilling and blasting, and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.

Project Phase	Project Activities	Valued Component	Indicator	Description of Project–Environment Interaction
	Road Construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ L_d[(a)] ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between road construction and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Bridge and Culvert Installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ L_d[(a)] ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between bridge and culvert construction and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Construction Site Restoration	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ L_d[(a)] ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between construction site restoration and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Pits and quarries will be rehabilitated (progressive and final rehabilitation) and surrendered in accordance with the *Aggregate Resources Act*	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ L_d[(a)] ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between pit and quarry rehabilitation and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Decommissioning of Temporary Camps, Roads / Trails, and Staging Areas	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ L_d[(a)] ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between decommissioning of temporary camps, roads, trails and staging areas and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
Operation and Maintenance Phase	Road Usage	Noise and Vibration	■ L_{dn} ■ L_d[(a)] ■ L_n ■ L_{max} ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between road usage and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.
	Maintenance[(b)]	Noise and Vibration	■ $L_{eq,1h}$ ■ L_{dn} ■ L_d[(a)] ■ %HA ■ Peak particle ground vibration velocity ■ Root-mean square ground vibration velocity	■ Negative interactions between maintenance and noise and vibration are anticipated. ■ Potential effects associated with this activity are further described in this Application.

Notes:
(a) The definition of L_d (daytime sound level) depends on the guidance document being considered. When assessing construction and maintenance activities, Ld is defined as 7 a.m. to 10 p.m. When assessing road usage, L_d is defined as 7 a.m. to 11 p.m.
(b) Includes general maintenance (e.g., grading, erosion control, quarrying, pits), seasonal maintenance (e.g., snow clearing, bridge and culvert maintenance), and special maintenance (e.g., slope failures, road settlement / break-up).
L_{eq}, 1h = continuous one-hour equivalent sound level; L_{dn} = day-night sound level; L_d = daytime sound level; %HA = percent highly annoyed; L_{max} = maximum nighttime sound level; L_n = nighttime sound level.

7.3 Assessing Residual Effects

This section presents the potential effects, appropriate mitigation and enhancement measures, and predicted residual Project effects for acoustic and vibration environment. A summary of the potential effects, mitigation and enhancement measures and residual effects are presented in **Table 7-11**. Residual effects are brought forward for characterization into **Section 7.3.2** and into the cumulative effects assessment in **Section 8.**

7.3.1 Potential Effects, Mitigation and Enhancement Measures, and Predicted Residual Effects

The potential effects of the Project on acoustic and vibration environment for each Valued Component follow.

7.3.1.1 Noise

7.3.1.1.1 Increase in Noise Level during Construction

7.3.1.1.1.1 Potential Effects

Noise levels can be expected to increase, on occasion, due to construction activities at the potential points of reception, but construction noise will be temporary in nature and localized within the Local Study Area. The range in increased noise levels associated with construction activities will depend primarily on the number and type of noise sources and their proximity to the points of reception (i.e., the Project noise levels in the environment decrease as the distance between the points of reception and construction activities increases).

Table 7-4, **Table 7-5** and **Table 7-6** and **Figure 7-1**, **Figure 7-2** and **Figure 7-3** present the predicted noise levels from road construction, bridge construction, and pit and quarry construction and use, respectively, associated with the Project. The tables also indicate the applicable noise limit for each parameter and indicates where noise levels exceed these limits in bold / underline. **Figure 7-4**, **Figure 7-5** and **Figure 7-6** present the predicted change in noise levels from existing noise levels due to road construction, bridge construction, and pit and quarry construction and use, respectively, associated with the Project.

Table 7-4: Summary of Predicted Noise Levels at Points of Reception During Road Construction

Distances from the Construction Disturbance Area	Number of Potential Points of Reception – No Habitation Expected[a]	Number of Potential Points of Reception – Habitation May Occur[b]	Project Daytime[c] Noise Level (dBA)	Existing + Project Daytime[c] Noise Level (dBA)	Existing + Project Ldn Noise Level (dBA)[d],[e]	Change in %HA (%)[d]
Applicable Noise Limit	N/A	N/A	N/A	55[f]	55[f]	6.5[f]
Edge of Construction Disturbance Area[a]	76	0	74 to 75	**74 to 75**	N/A	N/A
Construction Disturbance Area to 100 m	3	1	71 to 75	**71 to 75**	**68**	**44.9**
100 to 200 m	11	1	62 to 70	**62 to 70**	**65**	**35.3**
200 to 300 m	4	1	61 to 64	**61 to 64**	**61**	**24.0**
300 to 400 m	9	2	58 to 64	**58 to 64**	**56 to 59**	**13.4 to 19.2**
400 to 500 m	5	1	56 to 62	**56 to 62**	**60**	**21.5**
500 to 600 m	11	3	55 to 62	55 to **62**	**58 to 58**	**17.1 to 17.1**
600 to 1,000 m	16	7	49 to 60	49 to **60**	48 to **56**	3.6 to **13.4**
1,000 to edge of Local Study Area	103	48	27 to 55	38 to 55	41 to 52	0.1 to **7.8**

Notes:
Bold and underlined indicates exceedance of applicable noise limit
(a) Land uses where habitation (i.e., sleep) is not expected to occur included recreation, animal, fish and plant harvest, and cultural, spiritual, and sacred.
(b) Locations where habitation may occur included outfitter camps and locations identified as habitation through Indigenous Knowledge.
(c) Daytime is defined as 7 a.m. to 10 p.m.
(d) Day-night (Ldn) noise level and %HA criteria are only applicable for points of reception where habitation may occur.
(e) As no Project Construction is expected to occur during the nighttime, the existing nighttime noise level of 33 dBA was used to calculate the Ldn.
(f) Source: *Health Canada Noise Guidance* (Health Canada, 2023).
m = metre; dBA = A-weighted decibel; % = percent; %HA = percent highly annoyed; Ldn = day-night noise level; N/A = not applicable.

Table 7-5: Summary of Predicted Noise Levels at Points of Reception During Bridge Construction

Distances from the Construction Disturbance Area	Number of Potential Points of Reception – No Habitation Expected[a]	Number of Potential Points of Reception – Habitation May Occur[b]	Project Daytime[c] Noise Level (dBA)	Existing + Project Daytime[c] Noise Level (dBA)	Existing + Project Ldn Noise Level (dBA)[d],[e]	Change in %HA (%)[d]
Applicable Noise Limit	N/A	N/A	N/A	55[f]	55[f]	6.5[f]
Edge of Construction Disturbance Area[a]	18	0	83 to 84	**83 to 84**	N/A	N/A
Construction Disturbance Area to 100 m	2	0	76	**76**	N/A	N/A
100 to 200 m	6	1	71 to 76	**71 to 76**	**69**	**48.2**
200 to 300 m	2	0	68 to 70	**68 to 70**	N/A	N/A
300 to 400 m	9	2	56 to 67	**56 to 67**	**62 to 65**	**26.6 to 35.3**
400 to 500 m	1	0	60	**60**	N/A	N/A
500 to 600 m	7	4	57 to 64	**57 to 64**	55 to **62**	**11.8 to 26.6**
600 to 1,000 m	17	4	49 to 61	49 to **61**	55 to **56**	**11.8 to 13.4**
1,000 to edge of Local Study Area	109	32	26 to 56	38 to **56**	41 to 53	0 to **9.0**

Notes:

Bold and underlined indicates exceedance of applicable noise limit

(a) Land uses where habitation (i.e., sleep) is not expected to occur included recreation, animal, fish and plant harvest, and cultural, spiritual, and sacred.

(b) Locations where habitation may occur included outfitter camps and locations identified as habitation through Indigenous Knowledge.

(c) Daytime is defined as 7 a.m. to 10 p.m.

(d) Day-night (Ldn) noise level and %HA criteria are only applicable for points of reception where habitation may occur.

(e) As no Project Construction is expected to occur during the nighttime, the existing nighttime noise level of 33 dBA was used to calculate the Ldn.

(f) Source: *Health Canada Noise Guidance* (Health Canada, 2023).

m = metre; dBA = A-weighted decibel; % = percent; %HA = percent highly annoyed; Ldn = day-night noise level; N/A = not applicable.

Table 7-6: Summary of Predicted Noise Levels at Points of Reception During Pit and Quarry Use During Construction

Distances from the Construction Disturbance Area	Number of Potential Points of Reception – No Habitation Expected[a]	Number of Potential Points of Reception – Habitation May Occur[b]	Project Daytime[c] Noise Level (dBA)	Existing + Project Daytime[c] Noise Level (dBA)	Existing + Project Ldn Noise Level (dBA)[d],[e]	Change in %HA (%)[d]
Applicable Noise Limit	N/A	N/A	N/A	55[f]	55[f]	6.5[f]
Edge of Construction Disturbance Area[a]	44	3	55 to 81	55 to **81**	**56 to 68**	**13.4 to 44.9**
Construction Disturbance Area to 100 m	15	0	56 to 68	**56 to 68**	N/A	N/A
100 to 200 m	5	2	46 to 60	47 to **60**	46 to **58**	2.5 to **17.1**
200 to 300 m	6	0	42 to 55	43 to 55	N/A	N/A
300 to 400 m	10	0	42 to 54	43 to 54	N/A	N/A
400 to 500 m	1	2	44 to 50	45 to 50	47 to 49	3.0 to 4.2
500 to 600 m	9	3	46 to 54	47 to 54	46 to 49	2.1 to 4.2
600 to 1,000 m	17	7	40 to 52	42 to 52	44 to 47	1.5 to 3.0
1,000 to edge of Local Study Area	94	23	10 to 44	38 to 45	38 to 44	0.0 to 1.2

Notes:
Bold and underlined indicates exceedance of applicable noise limit
(a) Land uses where habitation (i.e., sleep) is not expected to occur included recreation, animal, fish and plant harvest, and cultural, spiritual, and sacred.
(b) Locations where habitation may occur included outfitter camps and locations identified as habitation through Indigenous Knowledge.
(c) Daytime is defined as 7 a.m. to 10 p.m.
(d) Day-night (Ldn) noise level and %HA criteria are only applicable for points of reception where habitation may occur.
(e) As no Project Construction is expected to occur during the nighttime, the existing nighttime noise level of 33 dBA was used to calculate the Ldn.
(f) Source: *Health Canada Noise Guidance* (Health Canada, 2023).
m = metre; dBA = A-weighted decibel; % = percent; %HA = percent highly annoyed; Ldn = day-night noise level; N/A = not applicable.

The results in **Table 7-4** and **Figure 7-1** indicate that during road construction, noise levels may exceed Health Canada's daytime criteria for speech comprehension and day-night criteria for noise complaints (i.e., 55 dBA) at points of reception within 1,000 m of the effects assessment Construction Disturbance Area along the Community Access Road. It also indicates that exceedances of Health Canada's change in %HA criteria may occur at points of reception within the Local Study Area.

The results in **Table 7-5** and **Figure 7-2** indicate that during bridge construction, noise levels may exceed Health Canada's daytime criteria for speech comprehension and day-night criteria for noise complaints (i.e., 55 dBA) and change in %HA criteria at points of reception within the Local Study Area.

The results in **Table 7-6** and **Figure 7-3** indicate that during construction and use of pits and quarries, noise levels may exceed Health Canada's daytime criteria for speech comprehension and day-night criteria for noise complaints (i.e., 55 dBA) and change in %HA criteria at points of reception within 200 m of the effects assessment Construction Disturbance Area surrounding the pits and quarries.

OGOKI RIVER
PROVINCIAL PARK
(WATERWAY CLASS)

PATIENCE LAKE

ESSER LAKE

OGOKI RIVER

PAINTER LAKE

DEBAERE LAKE

LA ROSE LAKE

COVEY LAKE

PIGMENT LAKE

BURY LAKE

CRONY LAKE

RENWICK LAKE

SLY LAKE

ZURBRIGG LAKE

BURNABY LAKE

LITTLE
CURRENT RIVER
PROVINCIAL PARK

LITTLE
CURRENT RIVER
PROVINCIAL PARK

KAPIKOTONGWA
RIVER

PERCY LAKE

LITTLE
CURRENT
RIVER

BRESSETTE
LAKE

Marten Falls
First Nation

ONTARIO

Nipigon

Thunder Bay

Wawa

Map Location

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Road Construction

0 2.25 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-1.1

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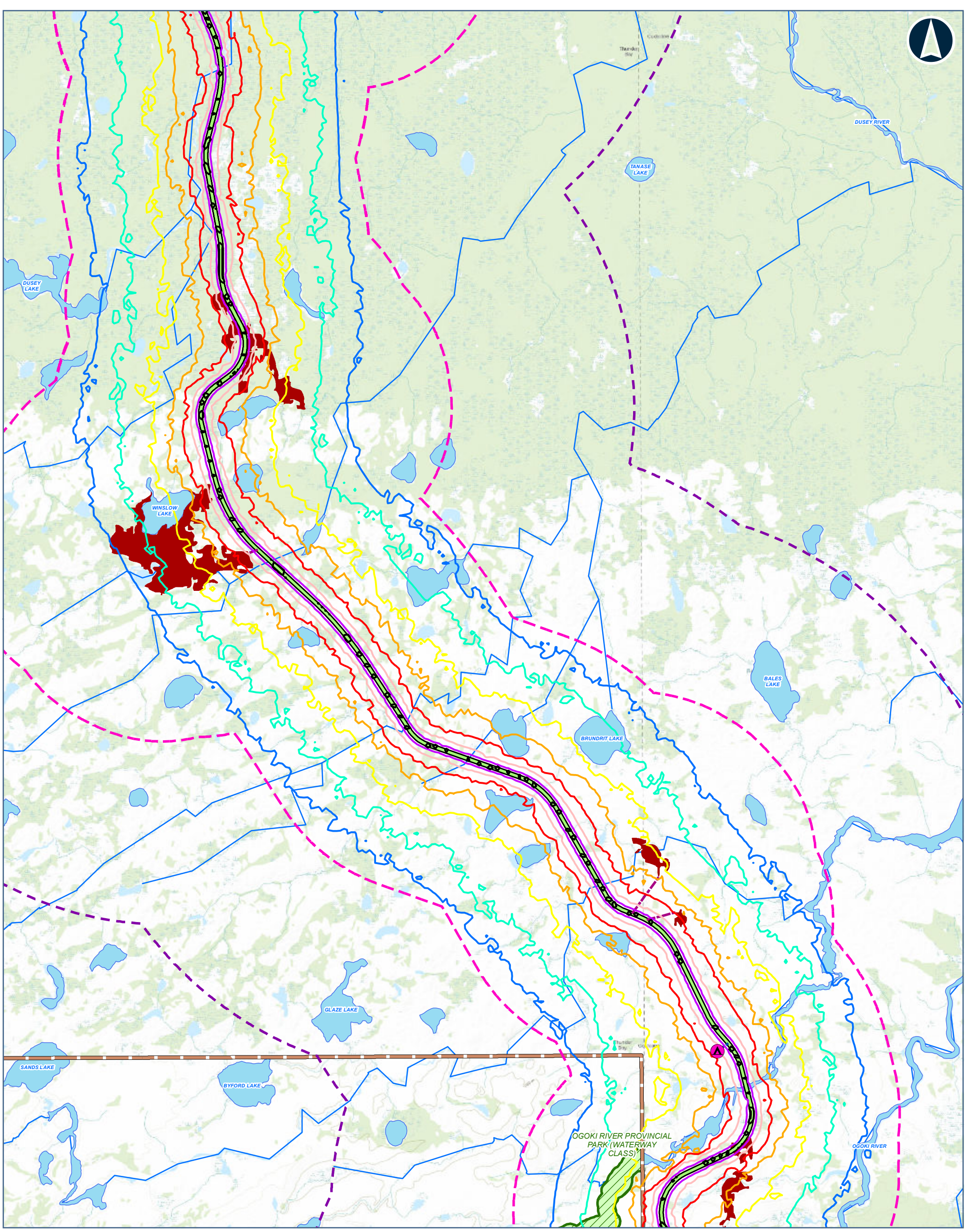

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

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Noise Modelling Results – Road Construction

0 — 2.25 — 4.5
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Figure 7-1.2

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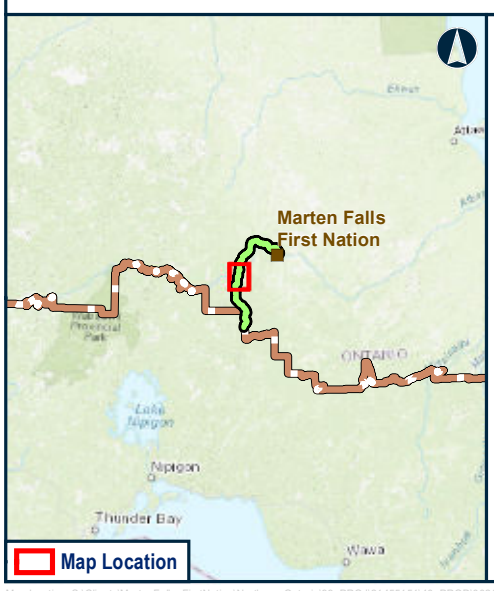
SAARIMAKI LAKE
ALBANY RIVER
ALBANY RIVER PROVINCIAL PARK
TEABEAU LAKE
TOLFREE LAKE
SUWALA LAKE
DUSEY RIVER
FRENCH BAY COCHRANE



Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

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Noise Modelling Results – Road Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-1.3

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OXTOBY LAKE
VENTON LAKE
MAXEY LAKE
TREBELL LAKE
WABASSI RIVER
ALBANY RIVER PROVINCIAL PARK
ALBANY RIVER

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Road Construction

0 2.25 4.5
Kilometres

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Figure 7-1.4

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ACTON LAKE
SEBERT LAKE
GURDEN LAKE
GITTINS LAKE
WABASSI RIVER
ALBANY RIVER PROVINCIAL PARK
ALBANY RIVER

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Road Construction

0 — 2.25 — 4.5
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Figure 7-1.5

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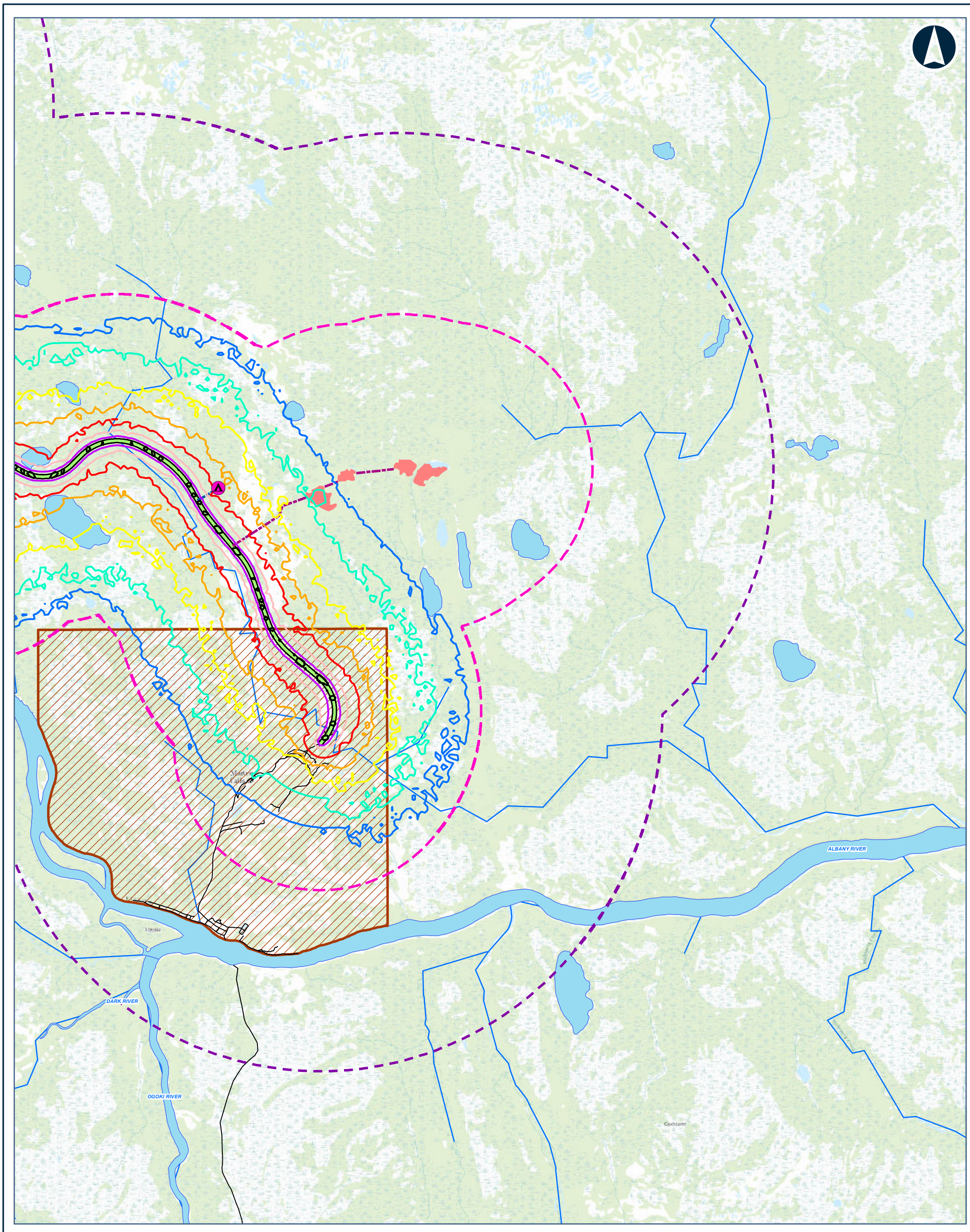

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK

- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Road Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-1.6

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OGOKI RIVER
PROVINCIAL PARK
(WATERWAY CLASS)
PATIENCE LAKE
ESSER LAKE
OGOKI RIVER
PAINTER LAKE
DEBAERE LAKE
COVEY LAKE
LA ROSE LAKE
PIGMENT LAKE
BURY LAKE
CRONY LAKE
RENWICK LAKE
SLY LAKE
ZURBRIGG LAKE
BURNABY LAKE
LITTLE
CURRENT RIVER
PROVINCIAL PARK
KAPIKOTONGWA RIVER
PERCY LAKE
LITTLE CURRENT RIVER
BRESSETTE LAKE

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Bridge Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-2.1

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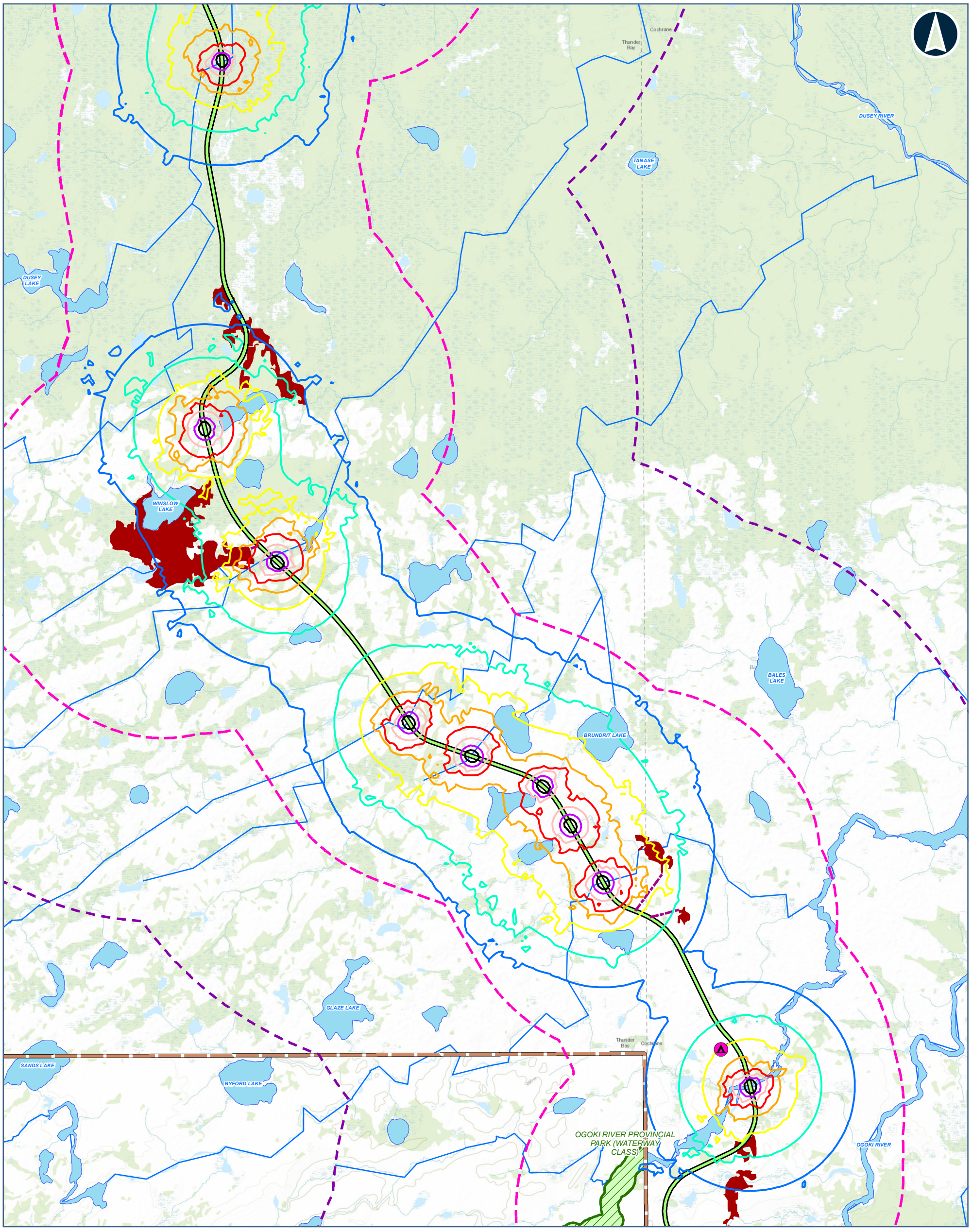

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Bridge Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-2.2

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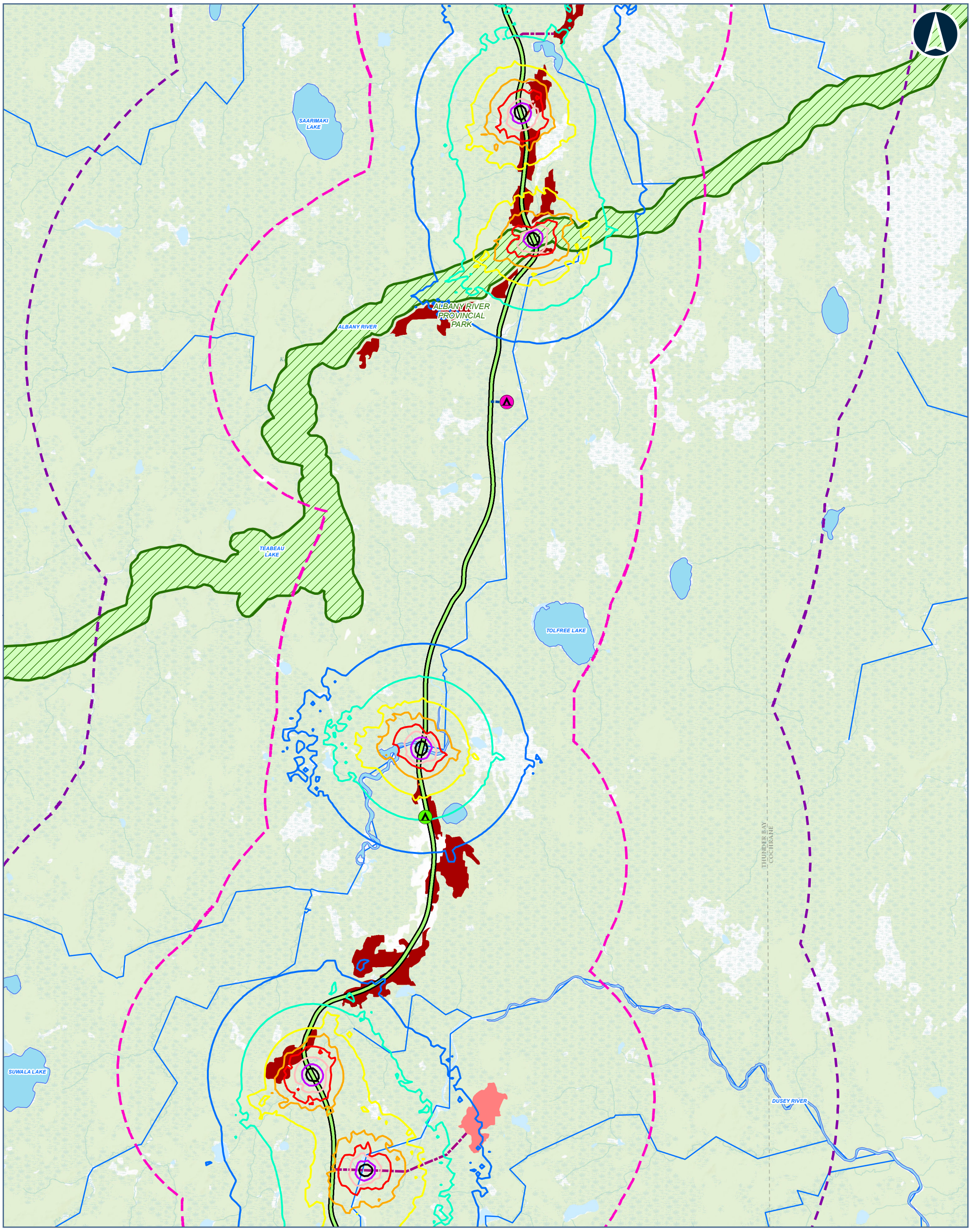

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Bridge Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-2.3

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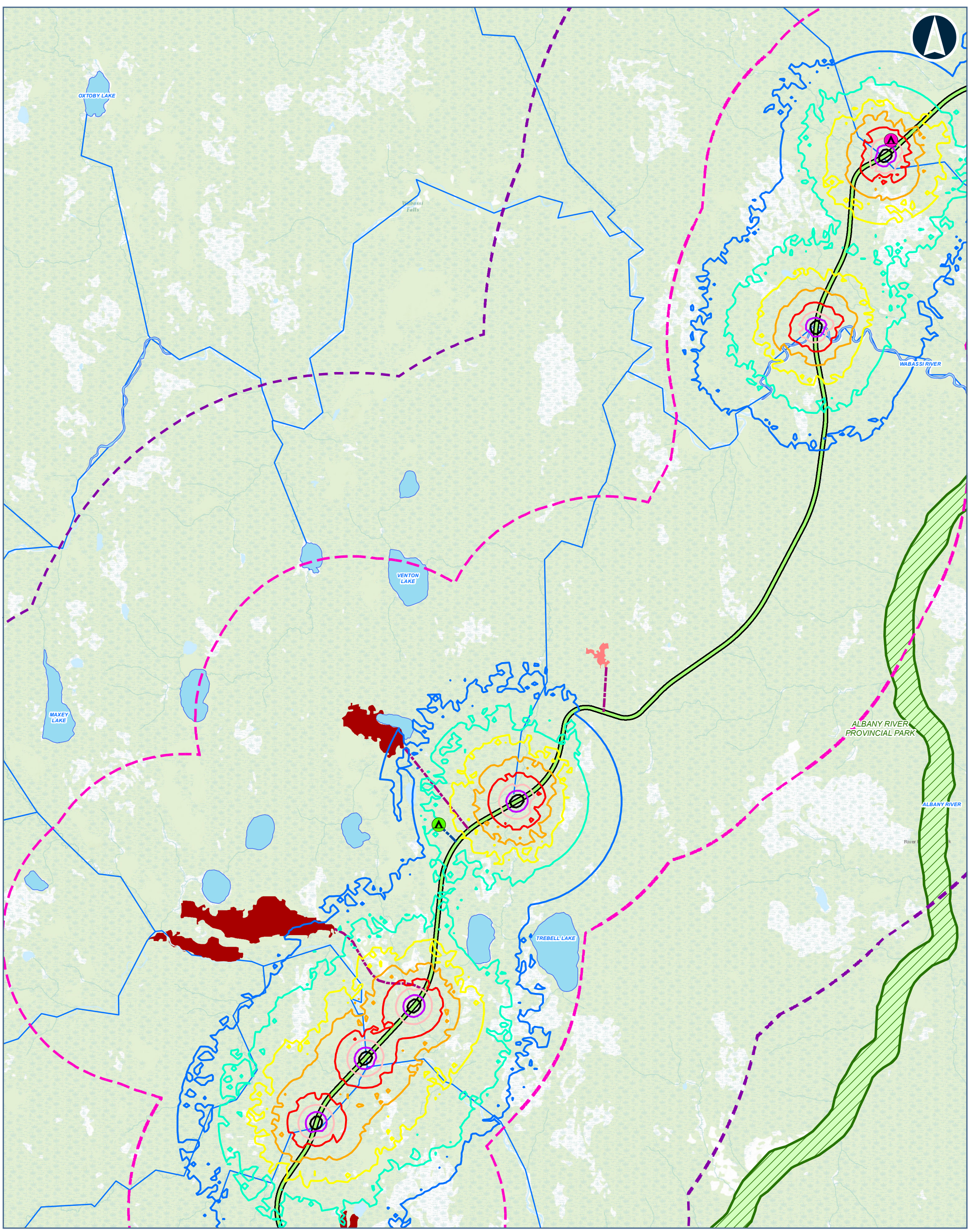

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Bridge Construction

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-2.4

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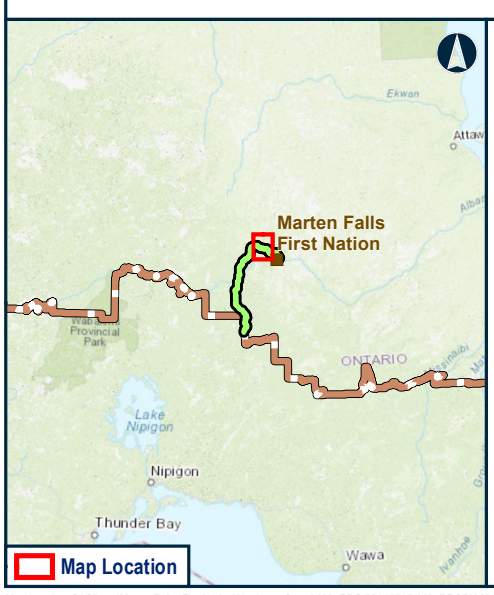
ACTON LAKE
SEBERT LAKE
GURDEN LAKE
GITTINS LAKE
WABASSI RIVER
Albany
Cochrane
Peacock Island
Robins Island
ALBANY RIVER
ALBANY RIVER PROVINCIAL PARK



Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Bridge Construction

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-2.5

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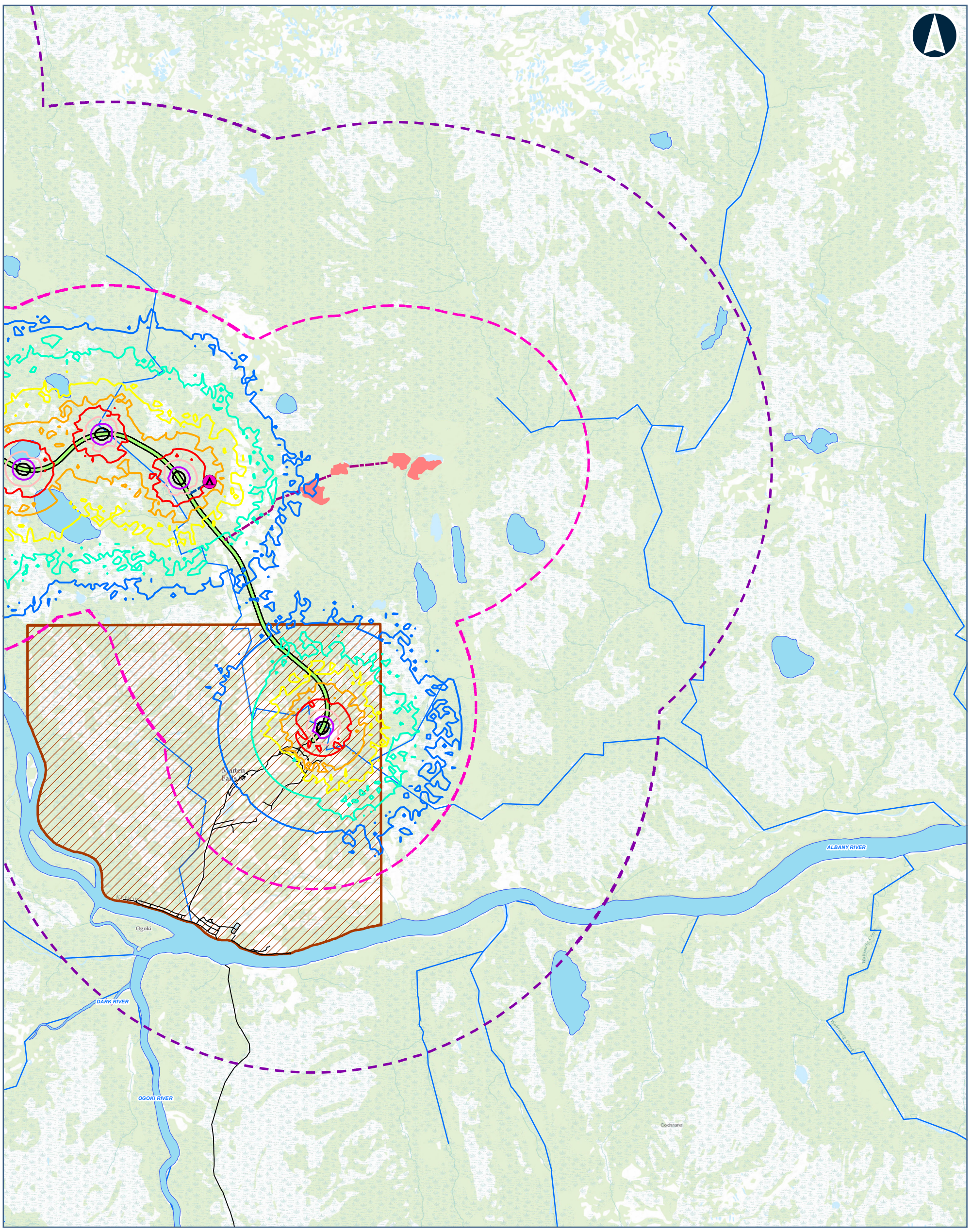

Legend

NOISE LEVEL
dBA
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK

- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Bridge Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-2.6

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PATIENCE LAKE
OGOKI RIVER
ESSER LAKE
PAINTER LAKE
DEBAERE LAKE
COVEY LAKE
LA ROSE LAKE
BURY LAKE
CRONY LAKE
PIGMENT LAKE
RENWICK LAKE
SLY LAKE
ZURBRIGG LAKE
BURNABY LAKE
KAPIKOTONGWA RIVER
LITTLE CURRENT RIVER PROVINCIAL PARK
PERCY LAKE
LITTLE CURRENT RIVER

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- QUARRIES REMAINING OPERATIONAL (BEDROCK)
- QUARRIES REMAINING OPERATIONAL (SAND AND GRAVEL)
- QUARRIES TO CLOSE AFTER OPERATION (SAND AND GRAVEL)

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Quarry Use

0 0.5 1 2 3 4
Kilometres

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Figure 7-3.1

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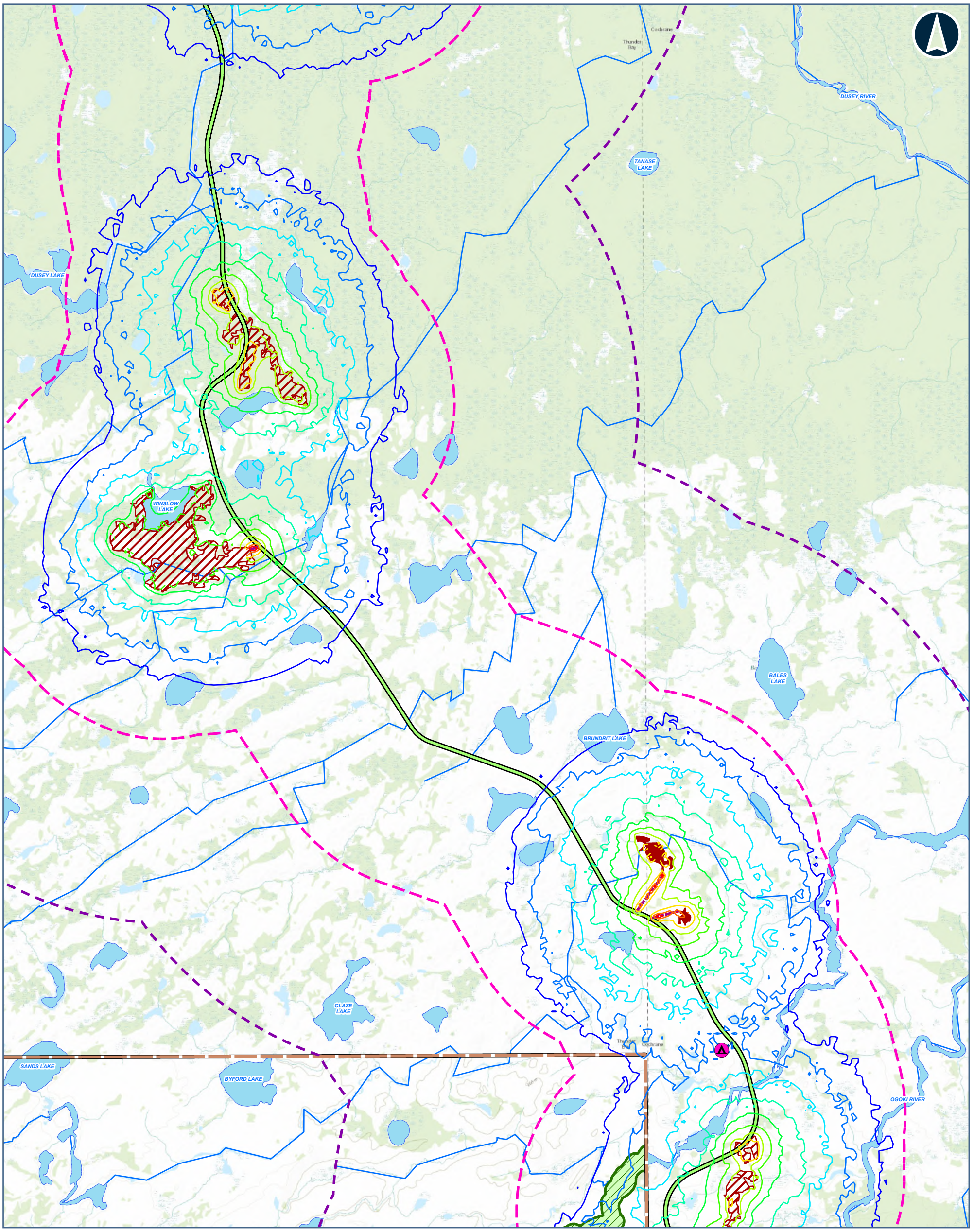

Legend

NOISE CONTOUR dBA	CONSTRUCTION DISTURBANCE AREA
30	POTENTIAL CAMP SITE (SIZE)
35	50 PERSONS
40	200 PERSONS
45	COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
50	APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
55	APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
60	QUARRIES REMAINING OPERATIONAL (BEDROCK)
65	QUARRIES REMAINING OPERATIONAL (SAND AND GRAVEL)
70	QUARRIES TO CLOSE AFTER OPERATION (SAND AND GRAVEL)
75	

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Quarry Use

0 0.5 1 2 3 4
Kilometres

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Figure 7-3.2

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SAARIMAKI LAKE

ALBANY RIVER PROVINCIAL PARK

ALBANY RIVER

TEABEAU LAKE

TOLFREE LAKE

THUNDER BAY COCHRANE

SUWALA LAKE

DUSEY RIVER

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- QUARRIES REMAINING OPERATIONAL (BEDROCK)
- QUARRIES REMAINING OPERATIONAL (SAND AND GRAVEL)
- QUARRIES TO CLOSE AFTER OPERATION (SAND AND GRAVEL)
- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Quarry Use

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-3.3

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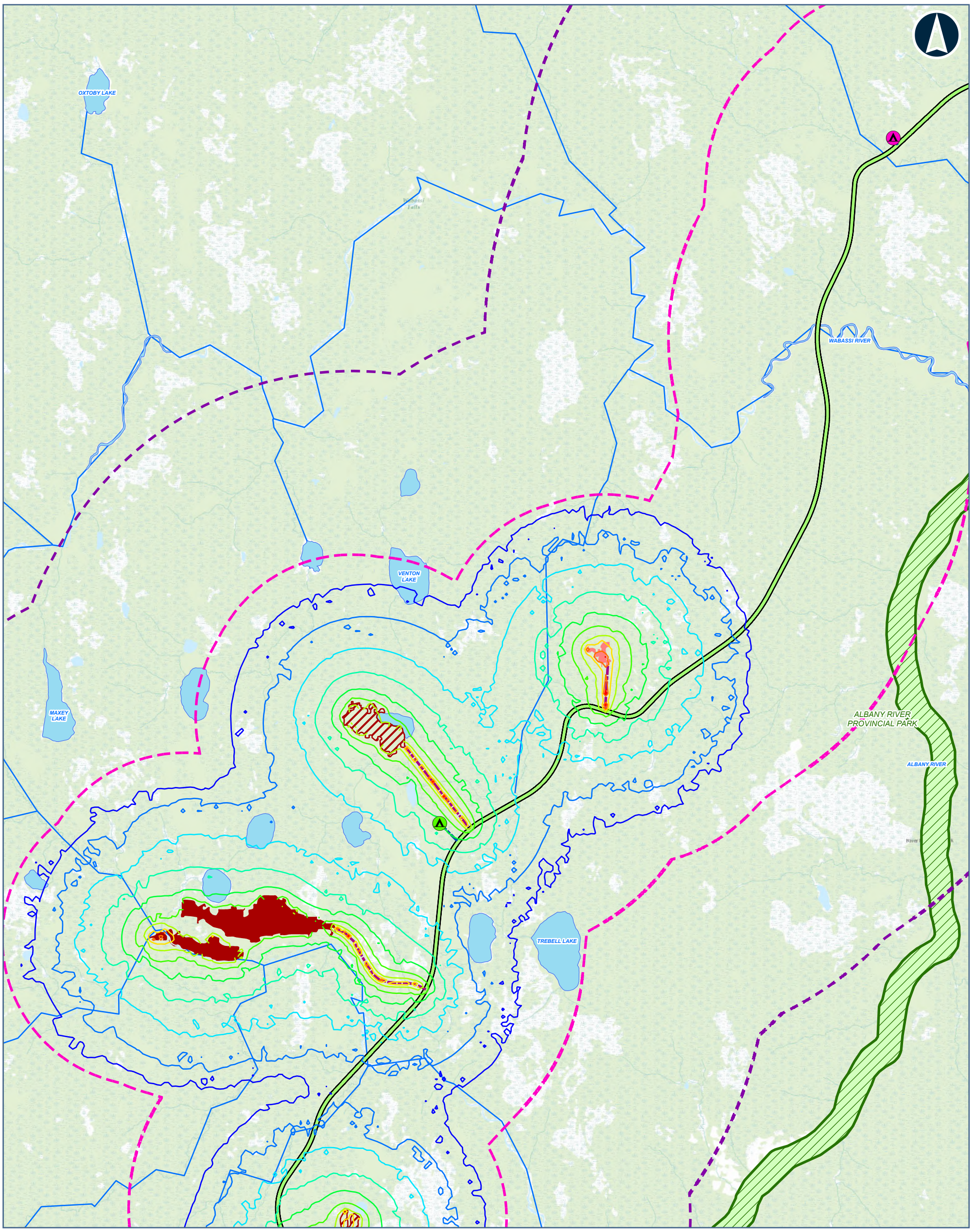

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- QUARRIES REMAINING OPERATIONAL (BEDROCK)
- QUARRIES REMAINING OPERATIONAL (SAND AND GRAVEL)
- QUARRIES TO CLOSE AFTER OPERATION (SAND AND GRAVEL)

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Quarry Use

0 0.5 1 2 3 4
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

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Rev:0	

Figure 7-3.4

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ACTON LAKE
SEBERT LAKE
GURDEN LAKE
GITTINS LAKE
WABASSI RIVER
ALBANY RIVER
Albany
Cochrane
Peacock Island
Robins Island

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- QUARRIES REMAINING OPERATIONAL (BEDROCK)
- QUARRIES REMAINING OPERATIONAL (SAND AND GRAVEL)
- QUARRIES TO CLOSE AFTER OPERATION (SAND AND GRAVEL)

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Quarry Use

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-3.5

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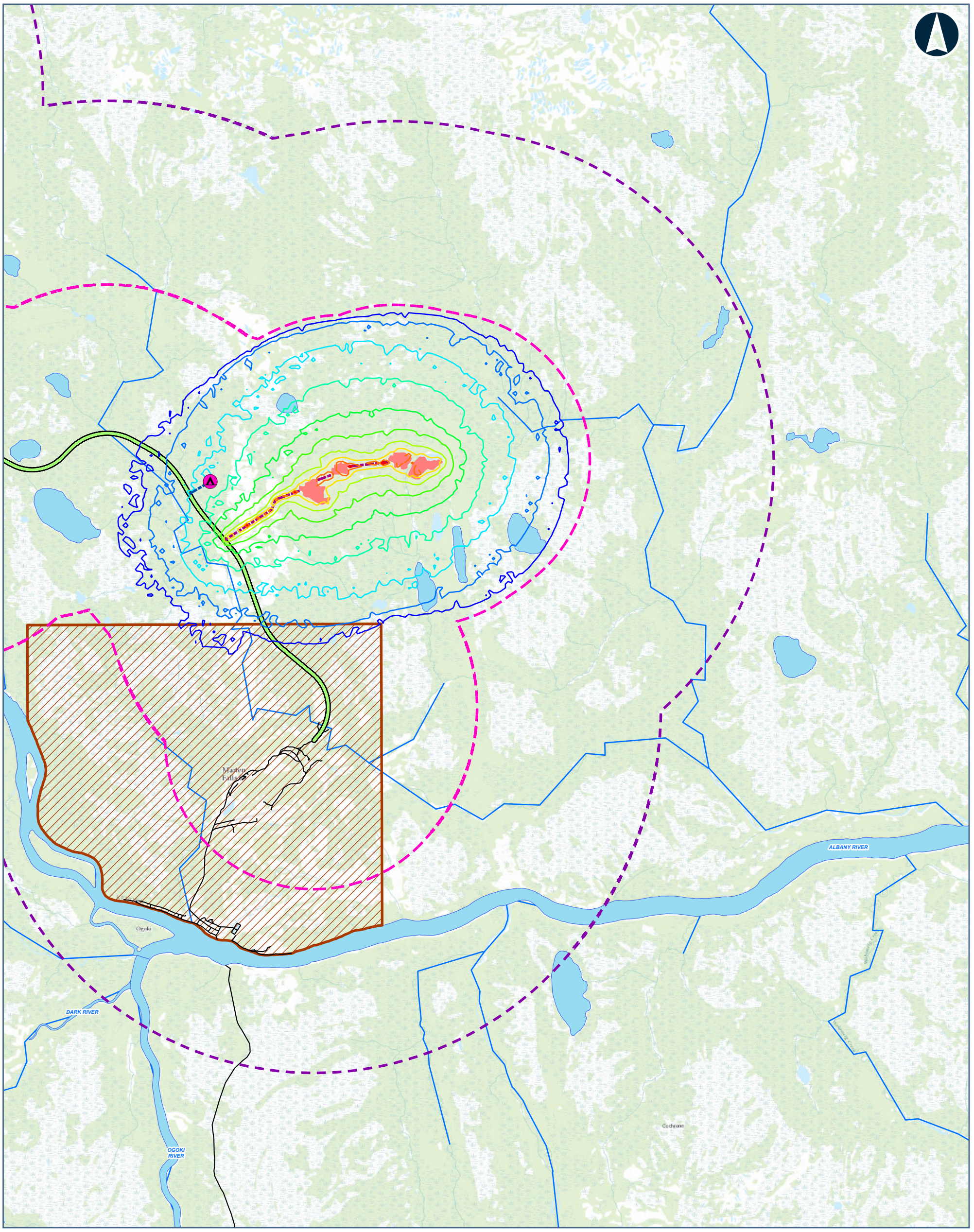

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- QUARRIES REMAINING OPERATIONAL (BEDROCK)
- QUARRIES REMAINING OPERATIONAL (SAND AND GRAVEL)
- QUARRIES TO CLOSE AFTER OPERATION (SAND AND GRAVEL)

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Quarry Use

0 0.5 1 2 3 4
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-3.6

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OGOKI RIVER
PROVINCIAL PARK
(WATERWAY CLASS)
PATIENCE LAKE
ESSER LAKE
OGOKI RIVER
PAINTER LAKE
DEBAERE LAKE
LA ROSE LAKE
COVEY LAKE
BURY LAKE
PIGMENT LAKE
CRONY LAKE
RENWICK LAKE
SLY LAKE
ZURBRIGG LAKE
BURNABY LAKE
LITTLE
CURRENT RIVER
PROVINCIAL PARK
KAPIKOTONGWA
RIVER
PERCY LAKE
LITTLE
CURRENT
RIVER
BRESSETTE
LAKE

Marten Falls
First Nation
ONTARIO
Lake
Nipigon
Nipigon
Thunder Bay
Wawa
Map Location

Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Change in Noise Level – Road Construction

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-4.1

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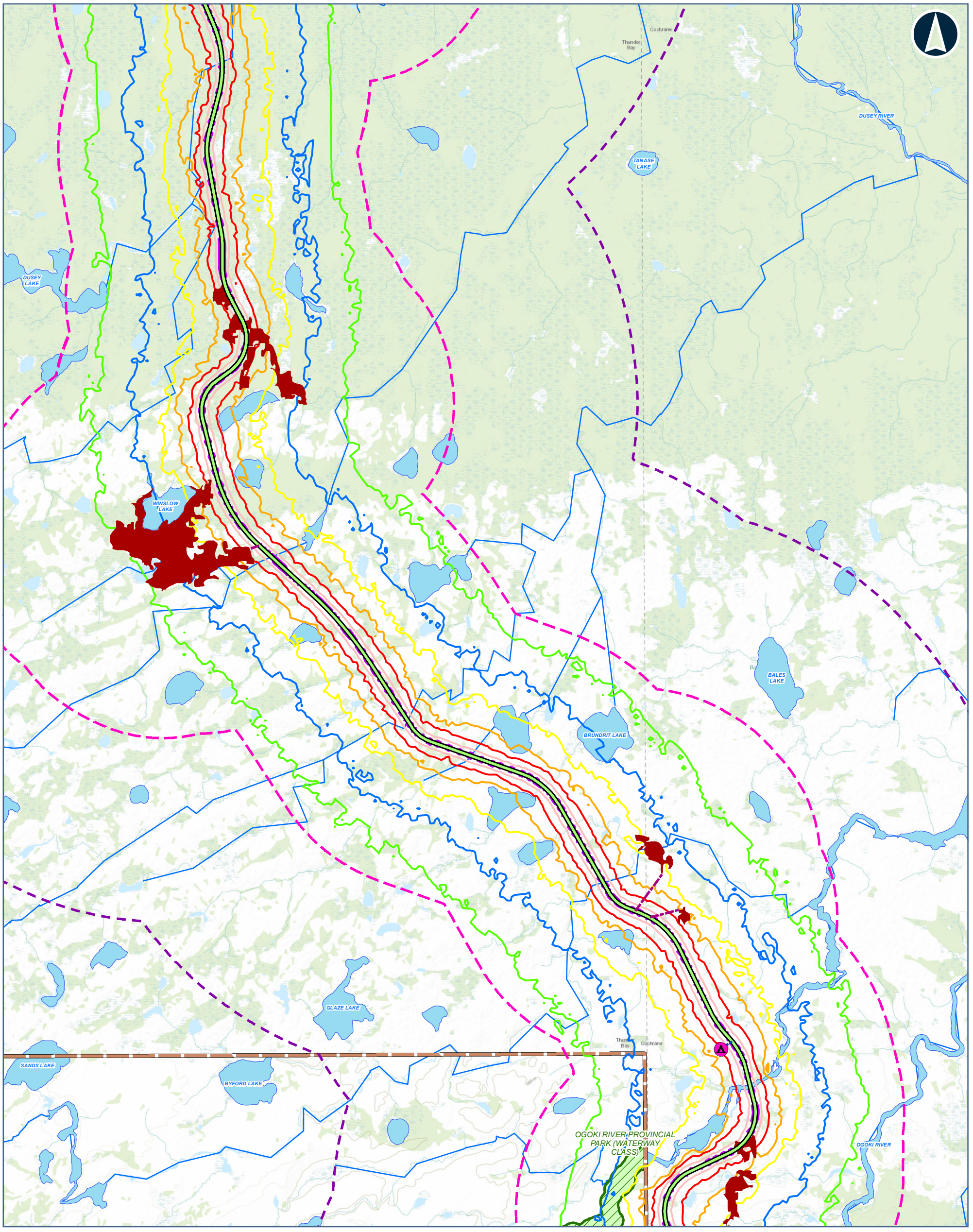

Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

SAND AND GRAVEL

ROAD

WATERBODY

WATERCOURSE

FAR NORTH BOUNDARY

PROVINCIAL PARK

ACOUSTIC AND VIBRATION LOCAL STUDY

ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Road Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-4.2

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SAARIMAKI LAKE

ALBANY RIVER PROVINCIAL PARK

ALBANY RIVER

TEABEAU LAKE

TOLFREE LAKE

THUNDER BAY COCHRANE

SUWALA LAKE

DUSEY RIVER

Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Road Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-4.3

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OXTOBY LAKE
Wabassi Falls
WABASSI RIVER
VENTON LAKE
MAXEY LAKE
ALBANY RIVER PROVINCIAL PARK
ALBANY RIVER
TREBELL LAKE

Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Road Construction

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-4.4

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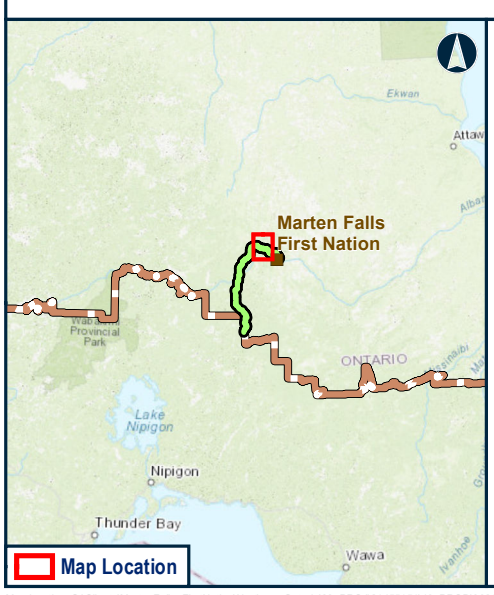
ACTON LAKE
SEBERT LAKE
GURDEN LAKE
GITTINS LAKE
WABASSI RIVER
Albany
Cochrane
Peacock Island
Robins Island
ALBANY RIVER
ALBANY RIVER PROVINCIAL PARK



Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Road Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-4.5

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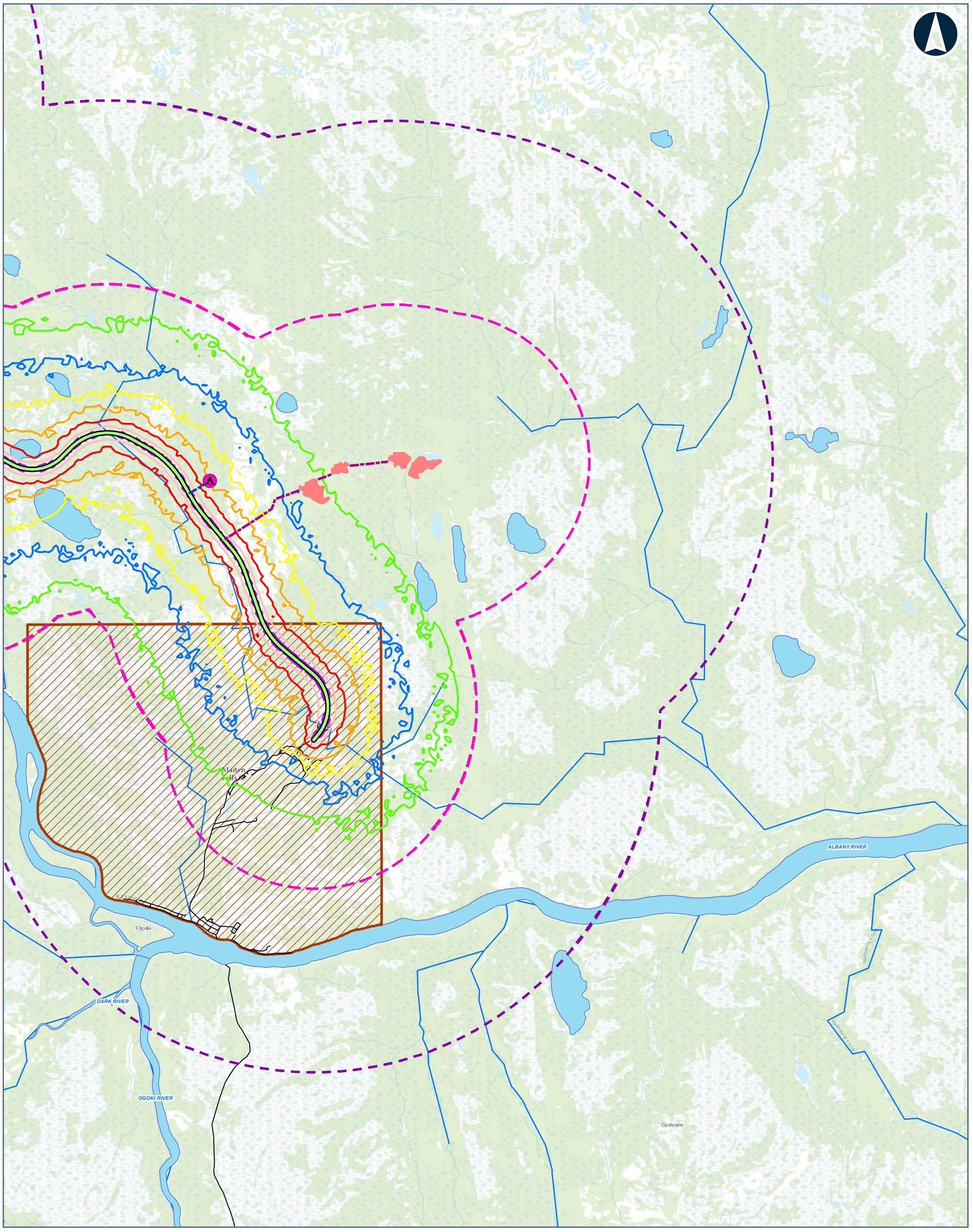

Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK

- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Road Construction

0 — 2.25 — 4.5
Kilometres

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Figure 7-4.6

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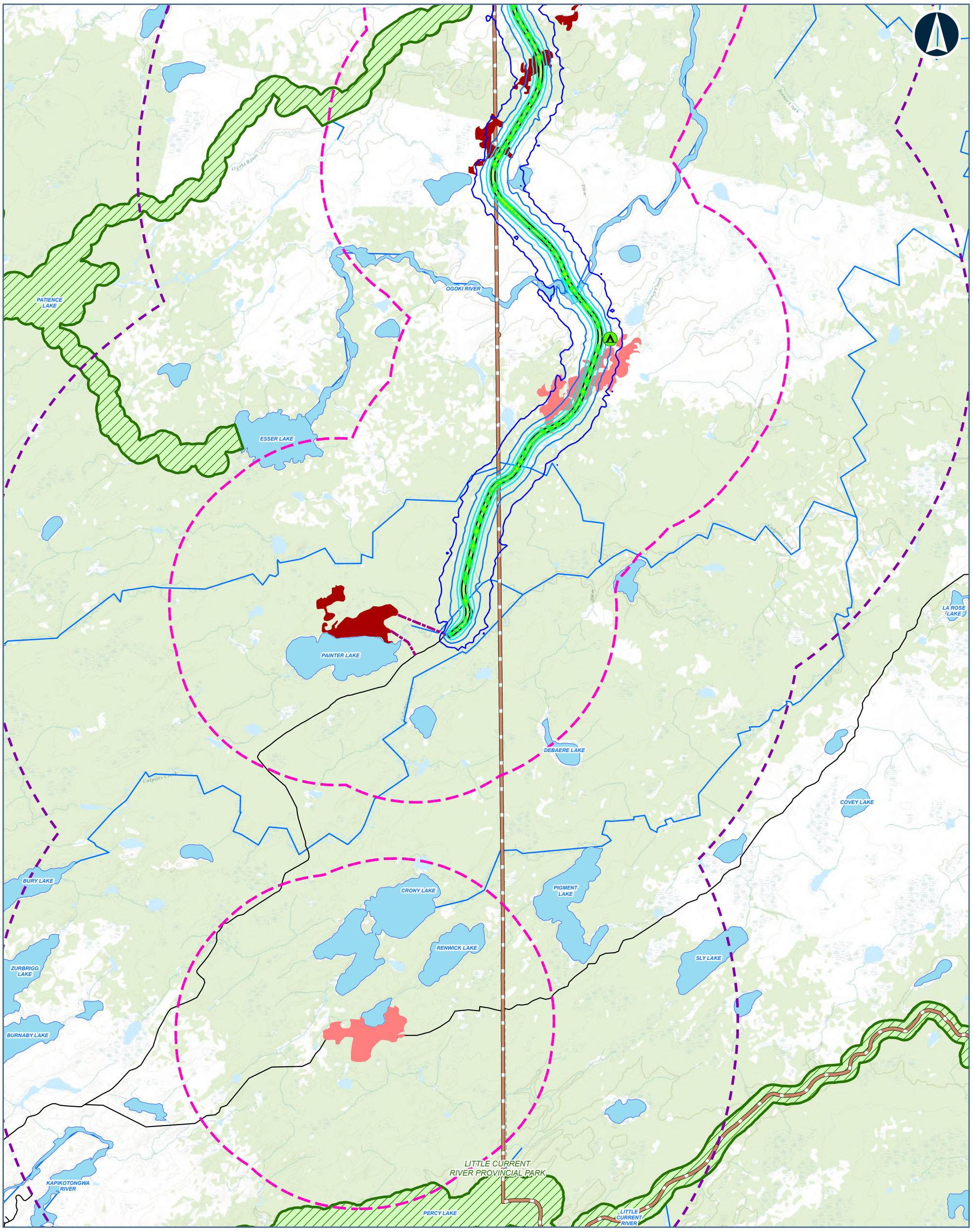

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- <all other values>

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

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Figure 7-5.1

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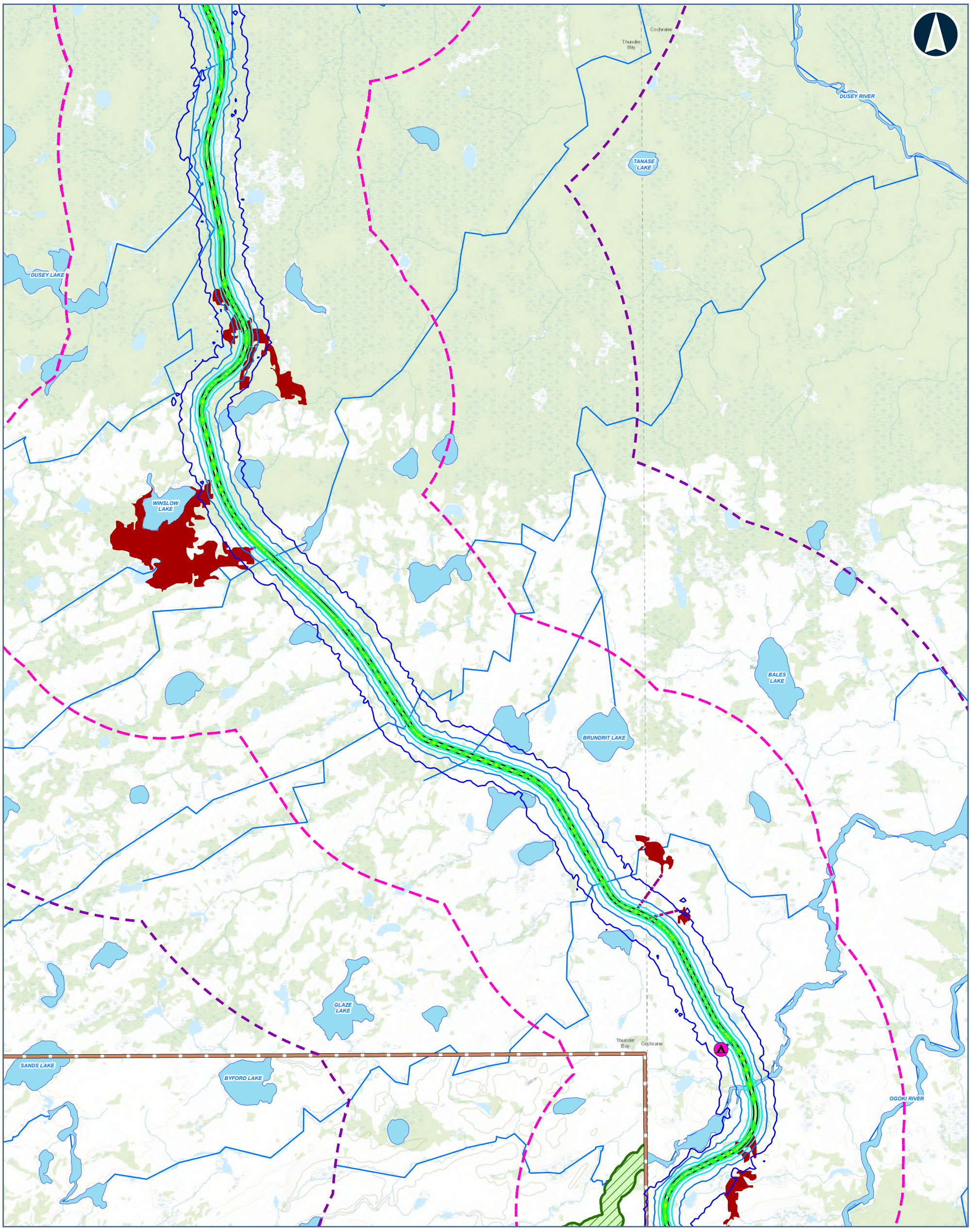

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- <all other values>

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-5.2

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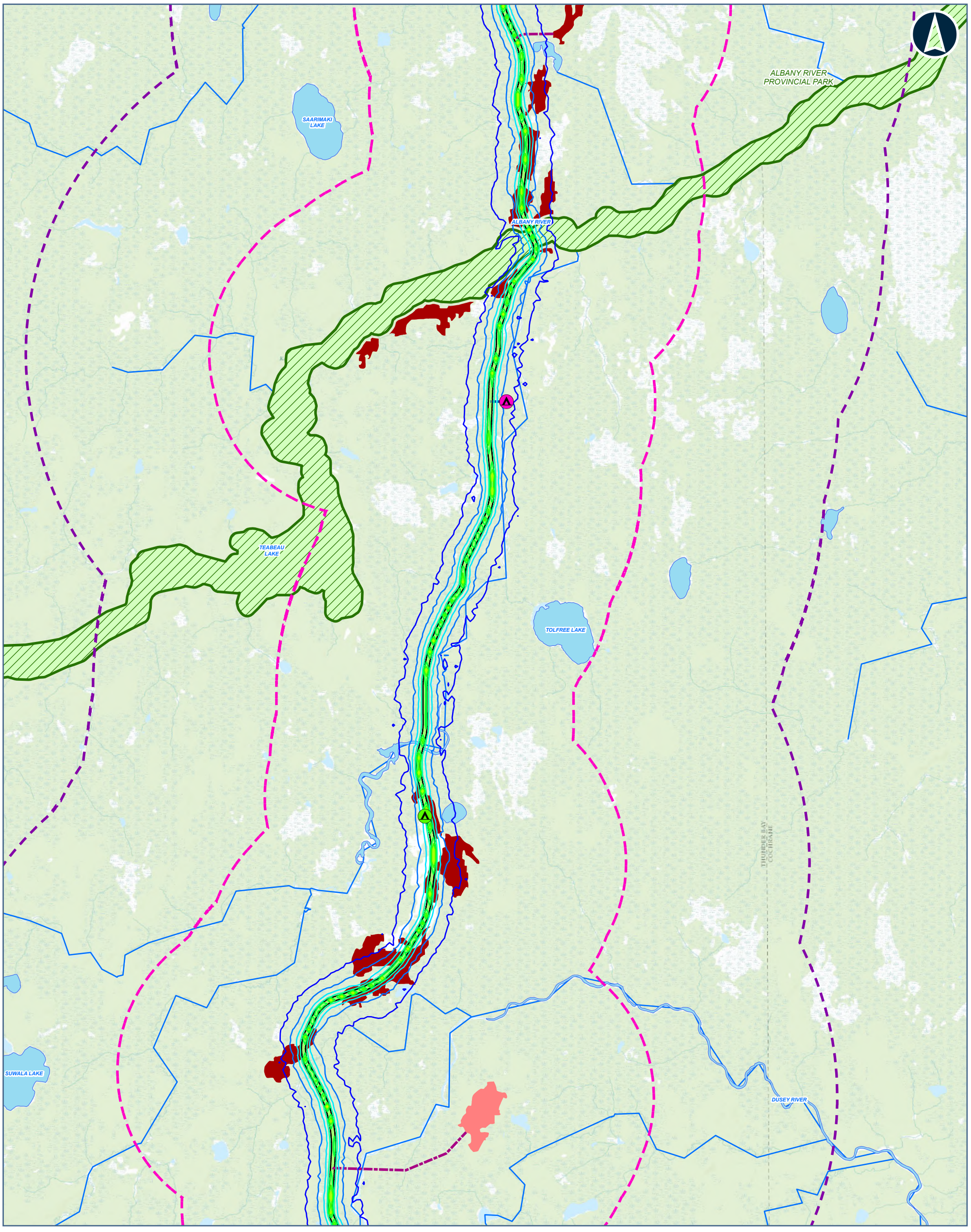

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- <all other values>

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-5.3

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OXTOBY LAKE
VENTON LAKE
MAXEY LAKE
TREBELL LAKE
WABASSI RIVER
ALBANY RIVER PROVINCIAL PARK
ALBANY RIVER

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- <all other values>

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-5.4

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ACTON LAKE
SEBERT LAKE
GURDEN LAKE
GITTINS LAKE
WABASSI RIVER
ALBANY RIVER
Albany
Cochrane
Peacock Island
Robins Island

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- <all other values>

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

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Figure 7-5.5

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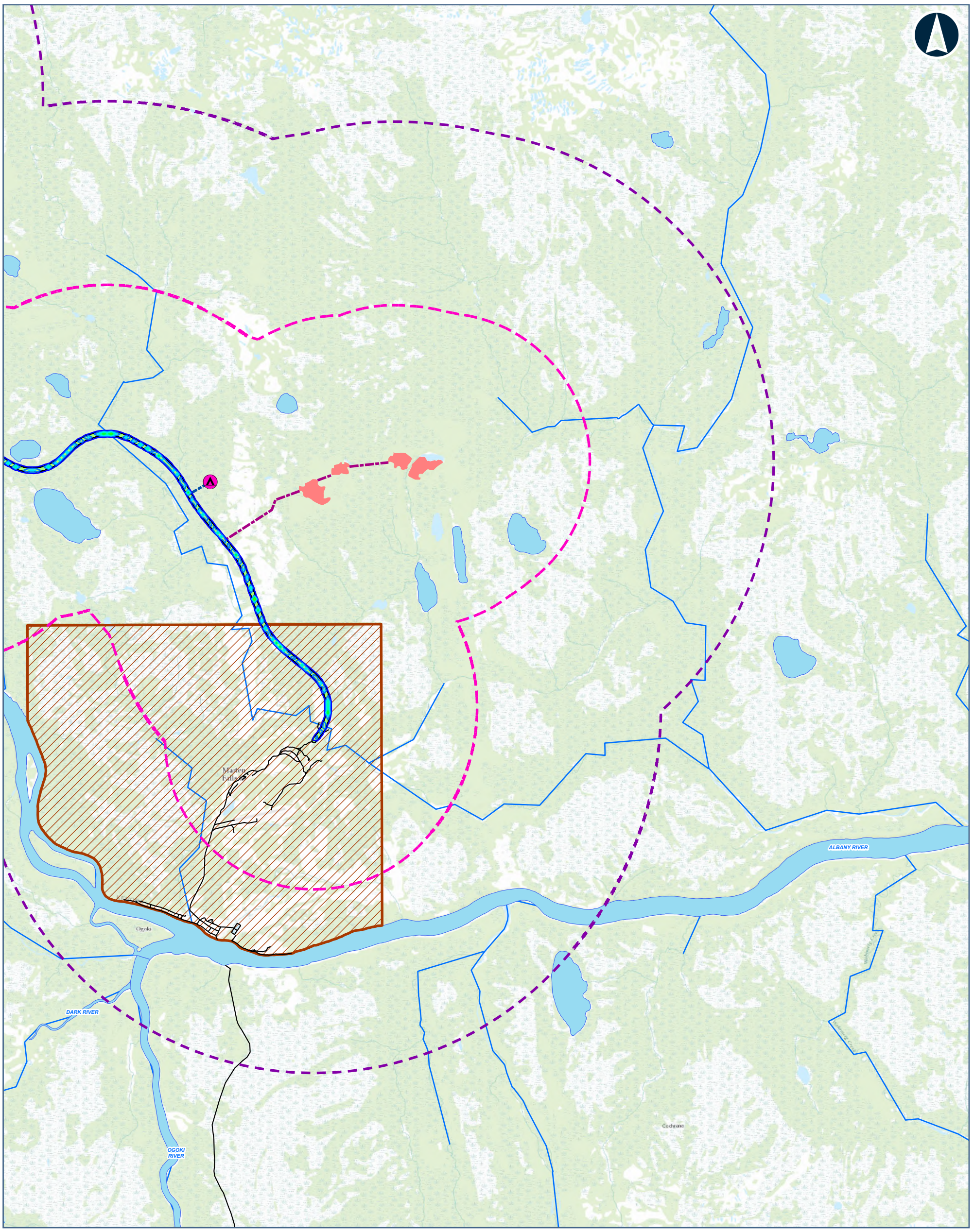

Legend

NOISE CONTOUR
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- <all other values>

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

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Figure 7-5.6

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OGOKI RIVER
OGOKI RIVER PROVINCIAL PARK (WATERWAY CLASS)
PATIENCE LAKE
ESSER LAKE
PAINTER LAKE
DEBAERE LAKE
COVEY LAKE
LA ROSE LAKE
PIGMENT LAKE
BURY LAKE
CRONY LAKE
RENWICK LAKE
SLY LAKE
ZURBRIGG LAKE
BURNABY LAKE
LITTLE CURRENT RIVER PROVINCIAL PARK
KAPIKOTONGWA RIVER
PERCY LAKE
LITTLE CURRENT RIVER
BRESSETTE LAKE
Ogoki River
Colpitts Creek
Jenner Creek
250 m
200m

Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Quarry Use

0 2.25 4.5
Kilometres

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Figure 7-6.1

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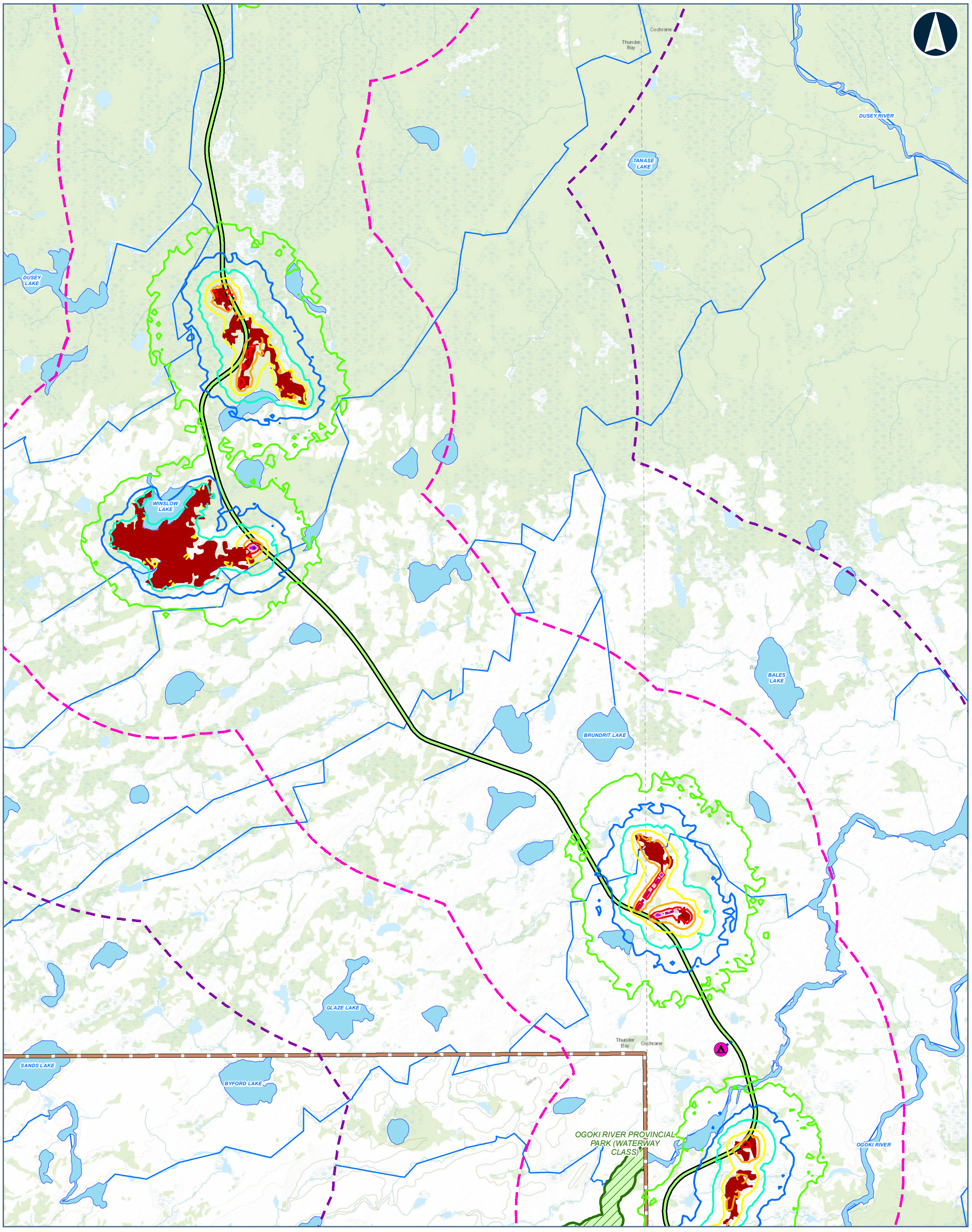

Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Quarry Use

0 — 2.25 — 4.5
Kilometres

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Figure 7-6.2

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SAARIMAKI LAKE

ALBANY RIVER PROVINCIAL PARK

ALBANY RIVER

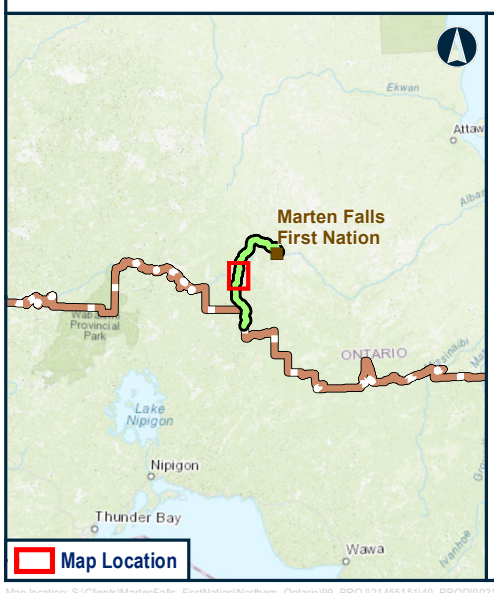
TEABEAU LAKE

TOLFREE LAKE

THUNDER BAY COCHRANE

SUWALA LAKE

DUSEY RIVER



Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Quarry Use

0 — 2.25 — 4.5
Kilometres

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Figure 7-6.3

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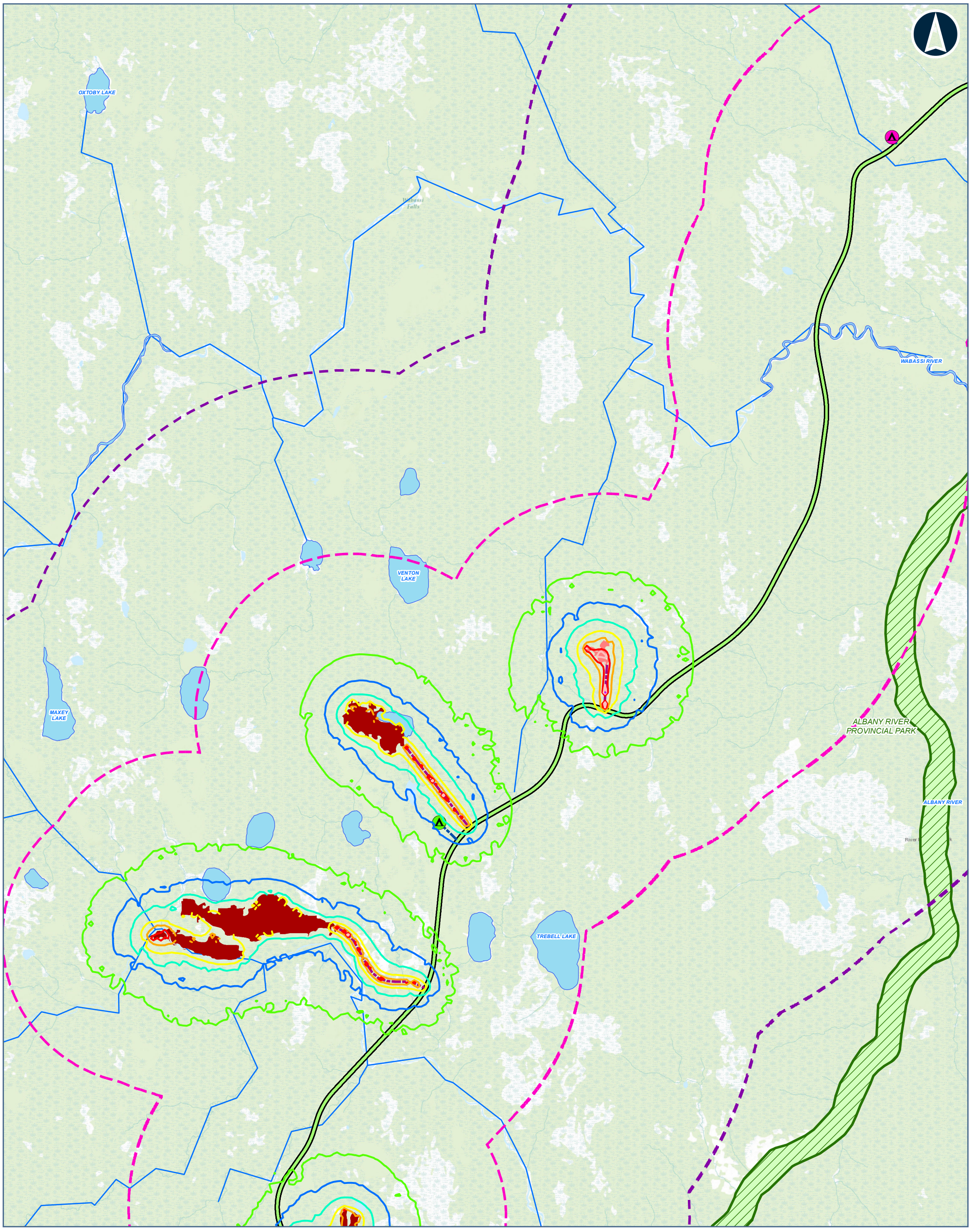

Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Quarry Use

0 — 2.25 — 4.5
Kilometres

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Figure 7-6.4

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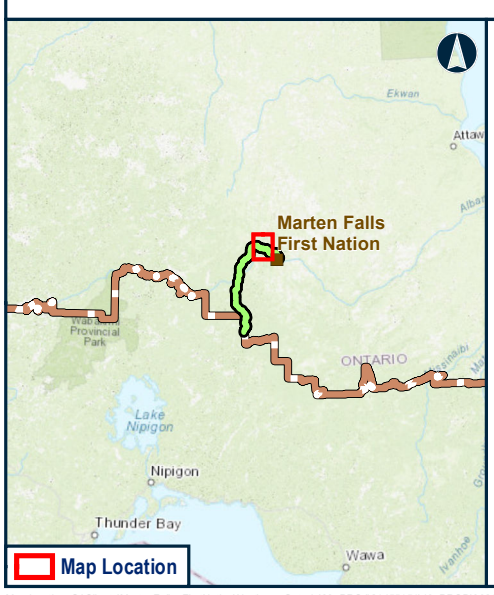
ACTON LAKE
SEBERT LAKE
GURDEN LAKE
GITTINS LAKE
WABASSI RIVER
Albany
Cochrane
Peacock Island
Robins Island
ALBANY RIVER
ALBANY RIVER PROVINCIAL PARK



Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase,

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Quarry Use

0 — 2.25 — 4.5
Kilometres

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Figure 7-6.5

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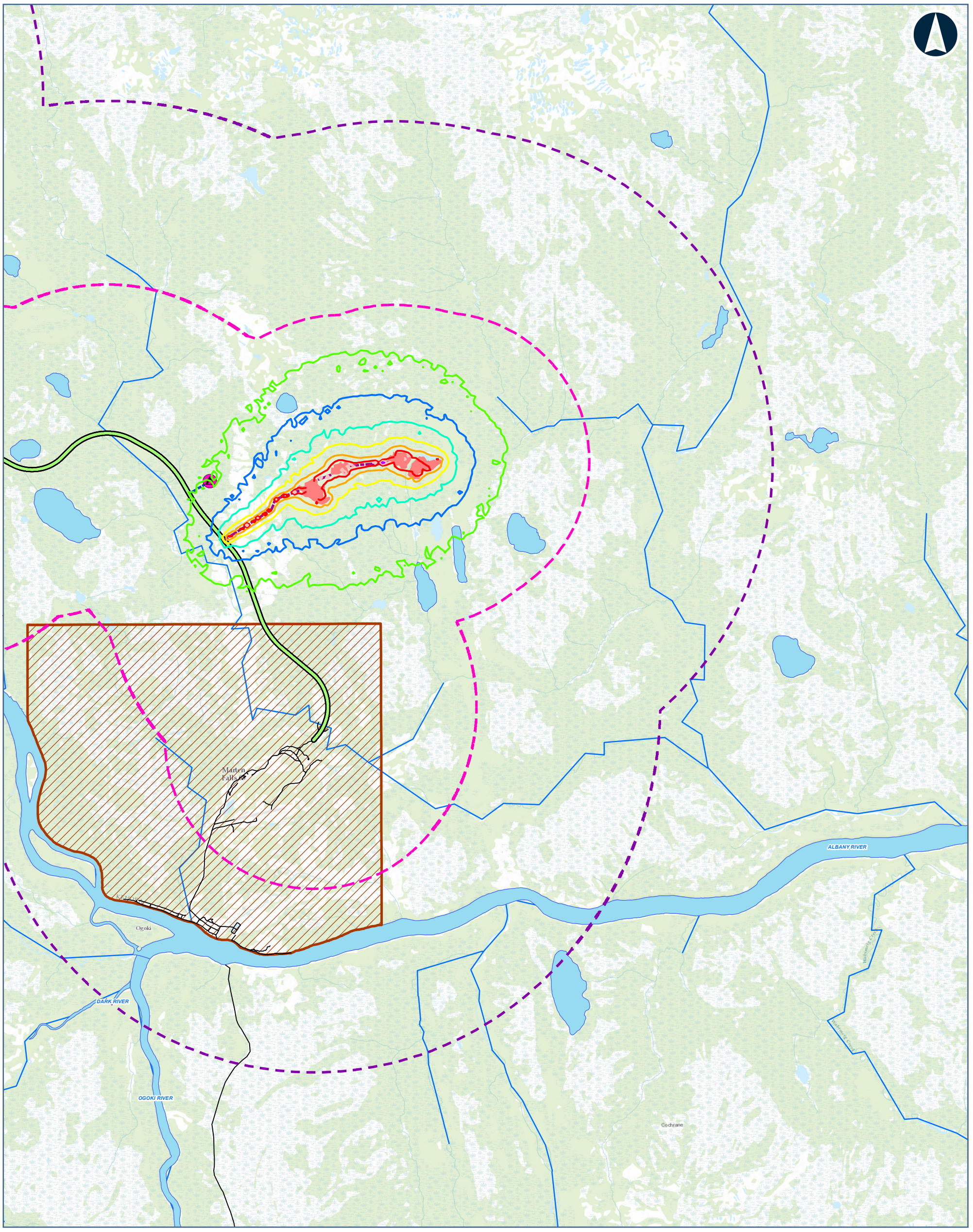

Legend

CHANGE IN NOISE LEVEL
dBA
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK

- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Quarry Use

0 — 2.25 — 4.5
Kilometres

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7.3.1.1.1.2 Mitigation and Enhancement Measures

The following is a general summary of the items to be considered relating to construction noise according to the *Ontario Ministry of Transportation Noise Guide* (Ontario Ministry of Transportation, 2022).

As noise during Project construction could affect points of reception in the vicinity of the Project, some general recommendations to assist in minimizing noise effects due to the Project's construction equipment and activities follow.

- Conduct construction activities, including quarry use, during the daytime period (i.e., 7 a.m. to 7 p.m.). Nighttime work is not anticipated. In the event construction will occur beyond the daytime period, applicable mitigation measures will be reviewed and implemented as required;
- Check that equipment and machinery used on site is maintained in good working conditions through regular maintenance and inspection;
- Design access roads to minimize reversing, which is expected to minimize use of backup beepers, where possible;
- Locate and operate construction equipment as far as possible from points of reception;
- Engage with Indigenous communities and relevant stakeholders to coordinate the planned construction schedule before the start of construction and prior to specific noisy activities to minimize overlap with the timing of traditional land use activities (e.g., fall and spring hunting seasons);
- Where reasonable and practicable, turn off vehicles and equipment when idle, unless weather and / or safety conditions dictate the need for them to remain turned on and in a safe operating condition;
- Maintain the surface of the roadway such that rough surface conditions are avoided;
- Investigate noise concerns as they arise through a complaint resolution mechanism developed by the Owner / Operator whereby persons can contact the Project team if there are perceived noise issues; and
- Operate vehicles and equipment to minimize impulsive noise, where possible.

7.3.1.1.1.3 Predicted Residual Effects

Noise emissions during Construction may result in a potential effect because it is predicted that, after the implementation of mitigation measures, exceedances of applicable criteria at potential points of reception may occur. This potential effect is therefore carried through for further assessment in the following sections, including an assessment of significance.

7.3.1.1.2 Increase in Noise Level during Operation and Maintenance

7.3.1.1.2.1 Potential Effects

Noise levels can be expected to increase during Operation and Maintenance due to road traffic and maintenance activities. Noise levels due to maintenance activities at the potential points of reception are expected to be similar to (or lower than) construction noise levels, temporary in nature and localized within the Local Study Area. Therefore, noise levels due to maintenance during Project Operation and Maintenance are considered to be bounded by those assessed for Project Construction and are not further assessed.

Table 7-7 and **Figure 7-7** and **Figure 7-8** present the predicted daytime and nighttime noise levels from road traffic during Project operations at the potential points of reception. **Figure 7-9** and **Figure 7-10** present the predicted change in noise levels from existing noise levels due to road traffic during Project operations during the daytime and nighttime, respectively. **Table 7-8** presents the predicted noise levels from the pit and quarry operations at those locations which will operate during Project operations (**Figure 7-3**). The following tables also indicate the applicable noise limit for each parameter and indicates where noise levels exceed these limits in bold / underline. Note, the criteria related to the nighttime L_{max} to address potential sleep disturbance was not further assessed as the road traffic noise prediction algorithm does not predict this parameter. For the purposes of this assessment, sleep disturbance was assessed considering the Health Canada criteria L_n.

The range in increased noise levels associated with operations will depend primarily on the distance from the Community Access Road or pit and quarry to the points of reception (i.e., the Project noise levels in the environment generally decrease as the distance between the points of reception and noise sources increases).

Table 7-7: Summary of Predicted Noise Levels at Points of Reception During Operation – Road Use

Distances from the Construction Disturbance Area	Number of Potential Points of Reception – No Habitation Expected[a]	Number of Potential Points of Reception – Habitation May Occur[b]	Project Daytime[c] Noise Level (dBA)	Project Nighttime[c] Noise Level (dBA)[d]	Existing + Project Daytime[c] Noise Level (dBA)	Existing + Project Nighttime[c] Noise Level (dBA)[d]	Existing + Project Ldn Noise Level (dBA)[d]	Change in %HA (%)[d]
Applicable Noise Limit	N/A	N/A	55[e]	N/A	55[f]	40[f]	55[f]	6.5[f]
Edge of Construction Disturbance Area[a]	77	0	38 to 53	N/A	41 to 53	N/A	N/A	N/A
Construction Disturbance Area to 100 m	1	0	49	N/A	49	N/A	N/A	N/A
100 to 200 m	10	2	27 to 47	22 to 26	38 to 48	33 to 34	41	0.1 to 0.3
200 to 300 m	5	0	20 to 44	N/A	38 to 45	N/A	N/A	N/A
300 to 400 m	7	3	37 to 41	33 to 35	41 to 43	36 to 37	43 to 45	1.0 to 1.5
400 to 500 m	6	1	21 to 38	34	38 to 41	37	44	1.3
500 to 600 m	11	2	21 to 38	16	38 to 41	33	41	0.0
600 to 1,000 m	17	8	5 to 35	0 to 30	38 to 40	33 to 35	41 to 42	0.0 to 0.6
1,000 to edge of Local Study Area	103	48	0 to 31	0 to 26	38 to 39	33 to 34	41	0.0 to 0.3

Notes:
(a) Land uses where habitation (i.e., sleep) is not expected to occur included recreation, animal, fish and plant harvest, and cultural, spiritual, and sacred.
(b) Locations where habitation may occur included outfitter camps and locations identified as habitation through Indigenous Knowledge.
(c) Daytime is defined as 7 a.m. to 11 p.m. and nighttime is defined as 11 p.m. to 7 a.m.
(d) Nighttime and day-night (Ldn) noise level and %HA criteria are only applicable for points of reception where habitation may occur.
(e) Source: *Ministry of Environment / Ministry of Transportation Noise Protocol* (Ministry of Environment / Ministry of Transportation 1986).
(f) Source: *Health Canada Noise Guidance* (Health Canada, 2023).
m = metre; dBA = A-weighted decibel; % = percent; %HA = percent highly annoyed; Ldn = day-night noise level; N/A = not applicable

Table 7-8: Summary of Predicted Noise Levels at Points of Reception During Pit and Quarry Operations

Distances from the Construction Disturbance Area	Number of Potential Points of Reception – No Habitation Expected[a]	Number of Potential Points of Reception – Habitation May Occur[b]	Project Daytime[c] Noise Level (dBA)	Project Daytime[c] Noise Level (dBA) at Points of Reception – Habitation May Occur	Existing + Project Daytime[c] Noise Level (dBA)	Existing + Project Ldn Noise Level (dBA)[d],[e]	Change in %HA (%)[d]
Applicable Noise Limit	N/A	N/A	N/A	45[f]	55[g]	55[g]	6.5[g]
Edge of Construction Disturbance Area[a]	11	0	55 to 77	N/A	**55 to 77**	N/A	N/A
Construction Disturbance Area to 100 m	7	0	60 to 64	N/A	**60 to 64**	N/A	N/A
100 to 200 m	1	0	55	N/A	55	N/A	N/A
200 to 300 m	0	0	N/A	N/A	N/A	N/A	N/A
300 to 400 m	2	0	51 to 53	N/A	51 to 53	N/A	N/A
400 to 500 m	0	0	N/A	N/A	N/A	N/A	N/A
500 to 600 m	3	1	45 to 54	**46**	46 to 54	46	2.1
600 to 1,000 m	4	1	42 to 52	44	43 to 52	44	1.5
1,000 to edge of Local Study Area	47	4	10 to 46	10 to 30	38 to 47	41 to 41	0.0 to 0.1

Notes:
Bold and underlined indicates exceedance of applicable noise limit
(a) Land uses where habitation (i.e., sleep) is not expected to occur included recreation, animal, fish and plant harvest, and cultural, spiritual, and sacred.
(b) Locations where habitation may occur included outfitter camps and locations identified as habitation through Indigenous Knowledge.
(c) Daytime is defined as 7 a.m. to 10 p.m.
(d) Day-night (Ldn) noise level and %HA criteria are only applicable for points of reception where habitation may occur.
(e) As quarry operations are expected to occur during the daytime only, the existing nighttime noise level of 33 dBA was used to calculate the Ldn.
(f) Source: *NPC-300* (Ministry of Environment, Conservation and Parks, 2013).
(g) Source: *Health Canada Noise Guidance* (Health Canada, 2023).
m = metre; dBA = A-weighted decibel; % = percent; %HA = percent highly annoyed; Ldn = day-night noise level; N/A = not applicable.

The results in **Table 7-7** and **Figure 7-7** and **Figure 7-8** indicate that for the operation of the Community Access Road, predicted noise levels were below applicable thresholds.

The results in **Table 7-8** indicate that for the operation of pits and quarries, at one point of reception where habitation may occur (i.e., a potential receptor as defined by *NPC-300*), the predicted daytime noise level of 46 dBA exceeds the *NPC-300* daytime sound level limit of 45 dBA by 1 dB. The results also indicate that at points of reception within 100 m of the effects assessment Construction Disturbance Area surrounding pits and quarries that are active during Project operations, predicted daytime noise levels exceed the Health Canada criteria of 55 dBA for good speech comprehension. Note that no potential habitation locations were identified within 100 m of the effects assessment Construction Disturbance Area.

It is expected that the pits and quarries that continue operating during Project operations will require a permit / licence application for aggregate extraction under other municipal and / or provincial jurisdictions (i.e., Ministry of Environment, Conservation and Parks and Ministry of Natural Resources). This permitting process is expected to include a quantitative noise assessment for each quarry in accordance with *NPC-300*. As part of these noise assessments, it is expected that the points of reception in the vicinity of the quarries and the equipment operating at the quarries will be refined, and noise mitigation requirements will be determined if needed. It is expected that, through this process, the noise assessments will demonstrate that the quarries comply with the applicable *NPC-300* sound level limits.

OGOKI RIVER
OGOKI RIVER PROVINCIAL PARK (WATERWAY CLASS)
PATIENCE LAKE
ESSER LAKE
PAINTER LAKE
DEBAERE LAKE
COVEY LAKE
LA ROSE LAKE
PIGMENT LAKE
SLY LAKE
BURY LAKE
CRONY LAKE
RENWICK LAKE
ZURBRIGG LAKE
BURNABY LAKE
KAPIKOTONGWA RIVER
PERCY LAKE
LITTLE CURRENT RIVER PROVINCIAL PARK
LITTLE CURRENT RIVER
BRESSETTE LAKE
Ogoki River
Colpitts Creek
Jenner Creek

Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65

CONSTRUCTION DISTURBANCE
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Daytime Road Operations

0 — 2.25 — 4.5
Kilometres

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Figure 7-7.1

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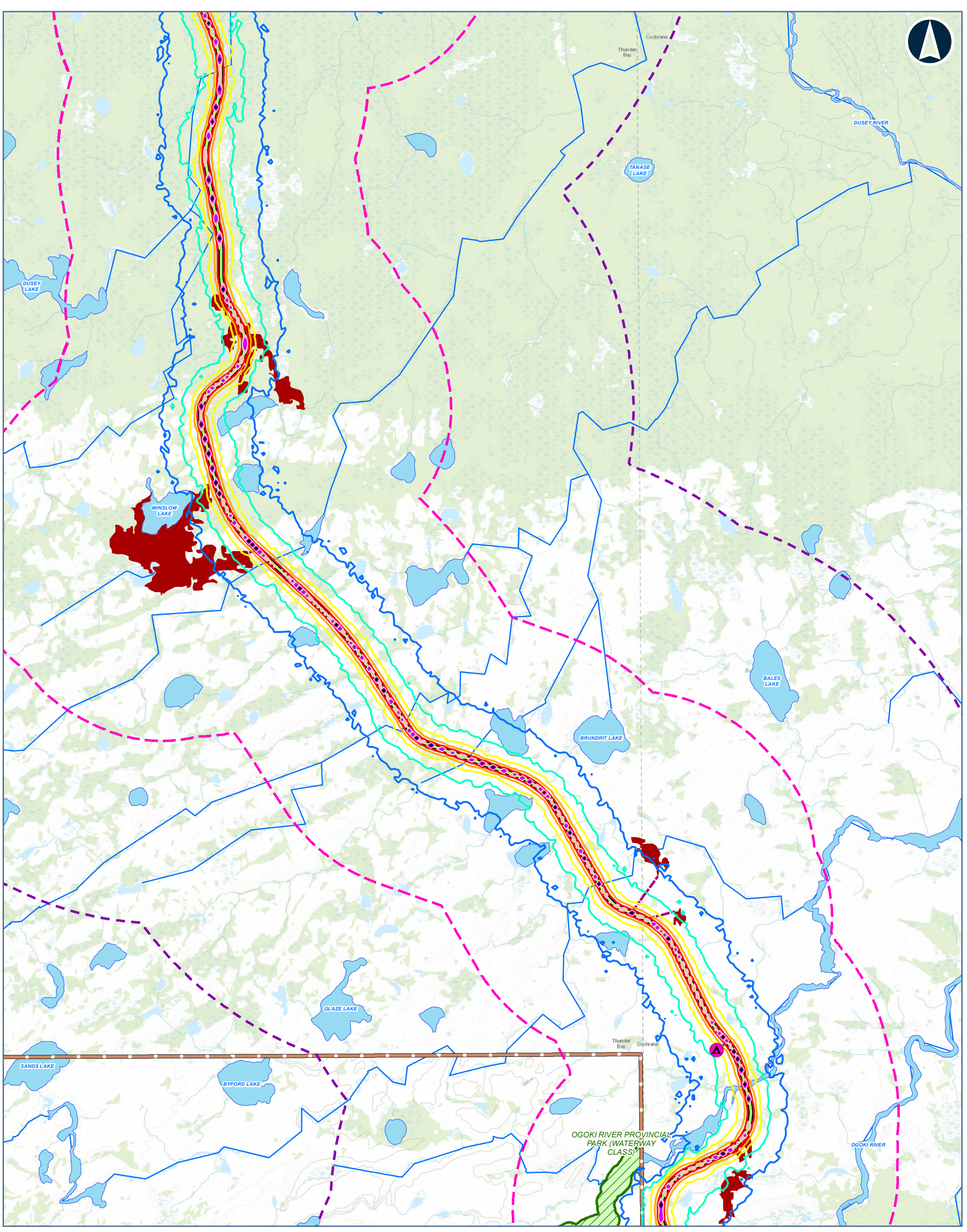

Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65

CONSTRUCTION DISTURBANCE
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

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Figure 7-7.2

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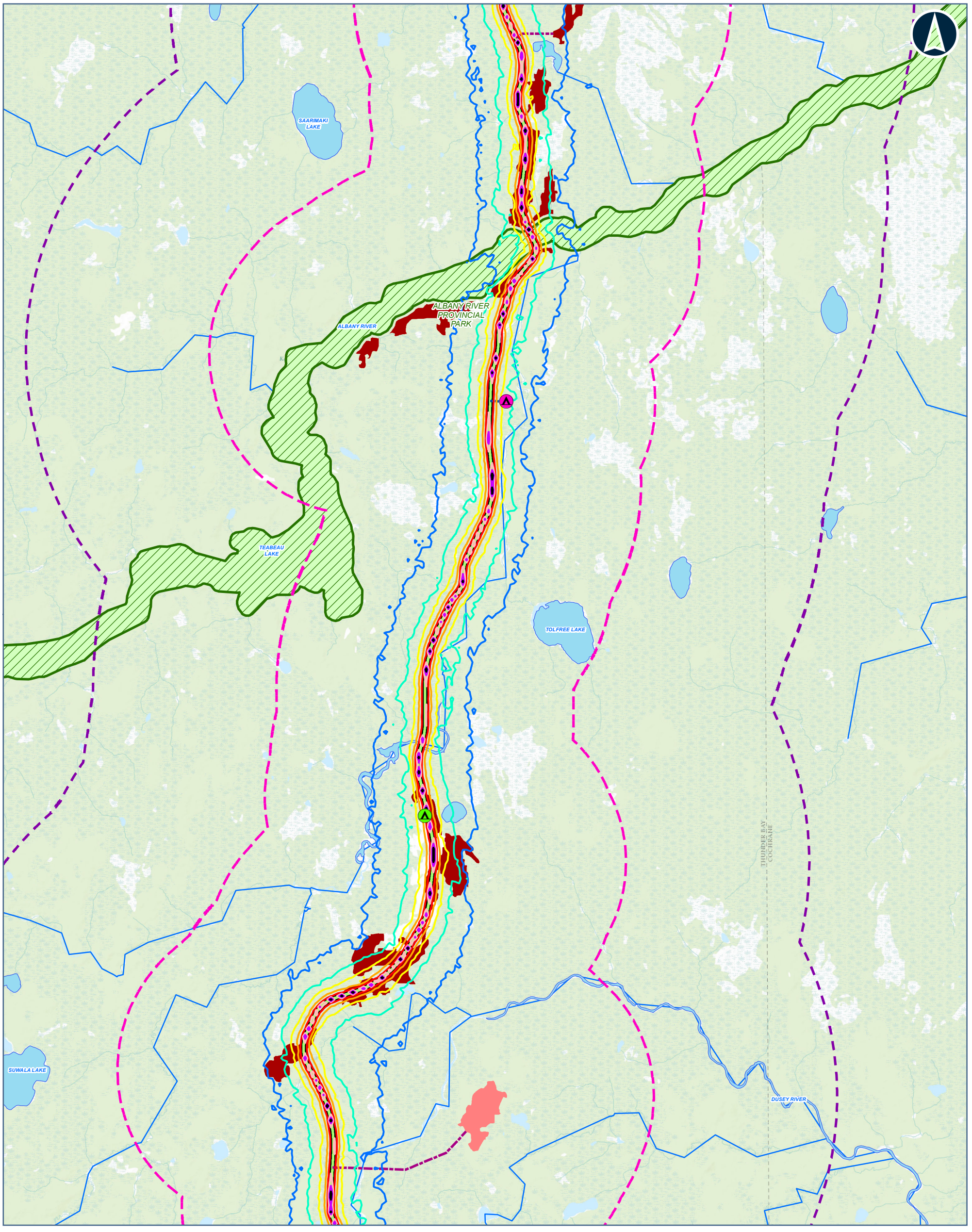

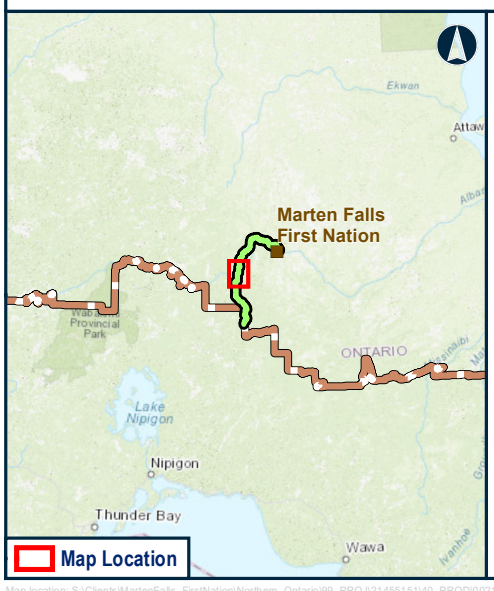

Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Daytime Road Operations

0 — 2.25 — 4.5
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Figure 7-7.3

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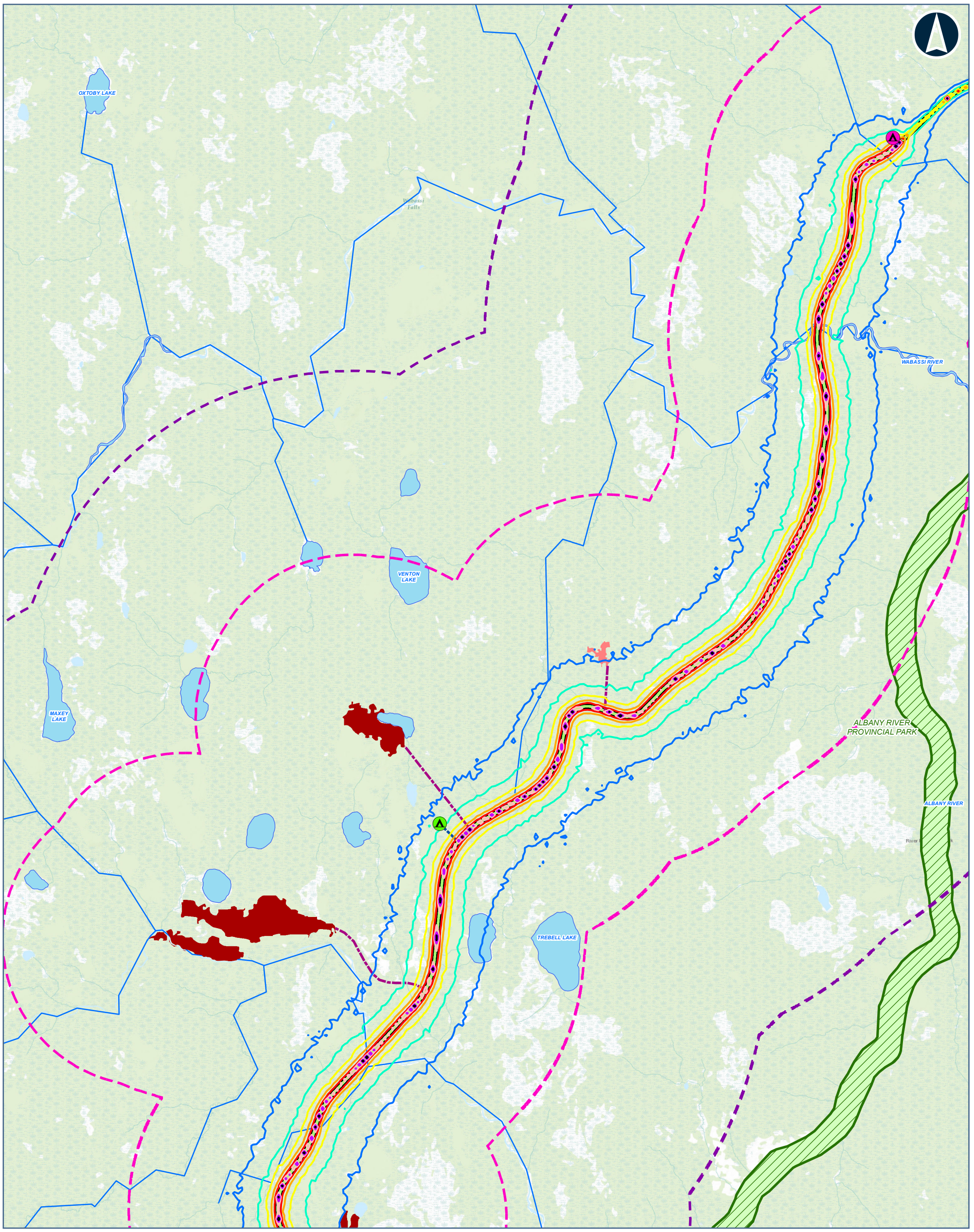

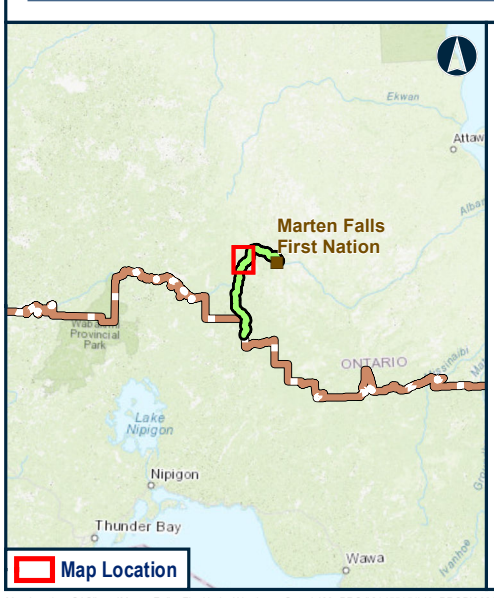

Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Daytime Road Operations

0 — 2.25 — 4.5
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Figure 7-7.4

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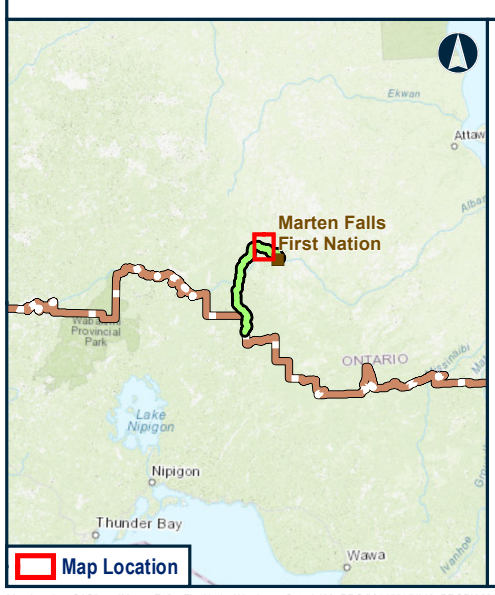
ACTON LAKE
SEBERT LAKE
GURDEN LAKE
GITTINS LAKE
WABASSI RIVER
Albany
Cochrane
Peacock Island
Robins Island
ALBANY RIVER
ALBANY RIVER PROVINCIAL PARK



Legend

NOISE LEVEL
dBA
30
35
40
45
50
55

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
50 PERSONS
200 PERSONS
COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
SAND AND GRAVEL

ROAD
WATERBODY
WATERCOURSE
PROVINCIAL PARK
ACOUSTIC AND VIBRATION LOCAL STUDY
ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Daytime Road Operations

0 2.25 4.5
Kilometres

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Figure 7-7.5

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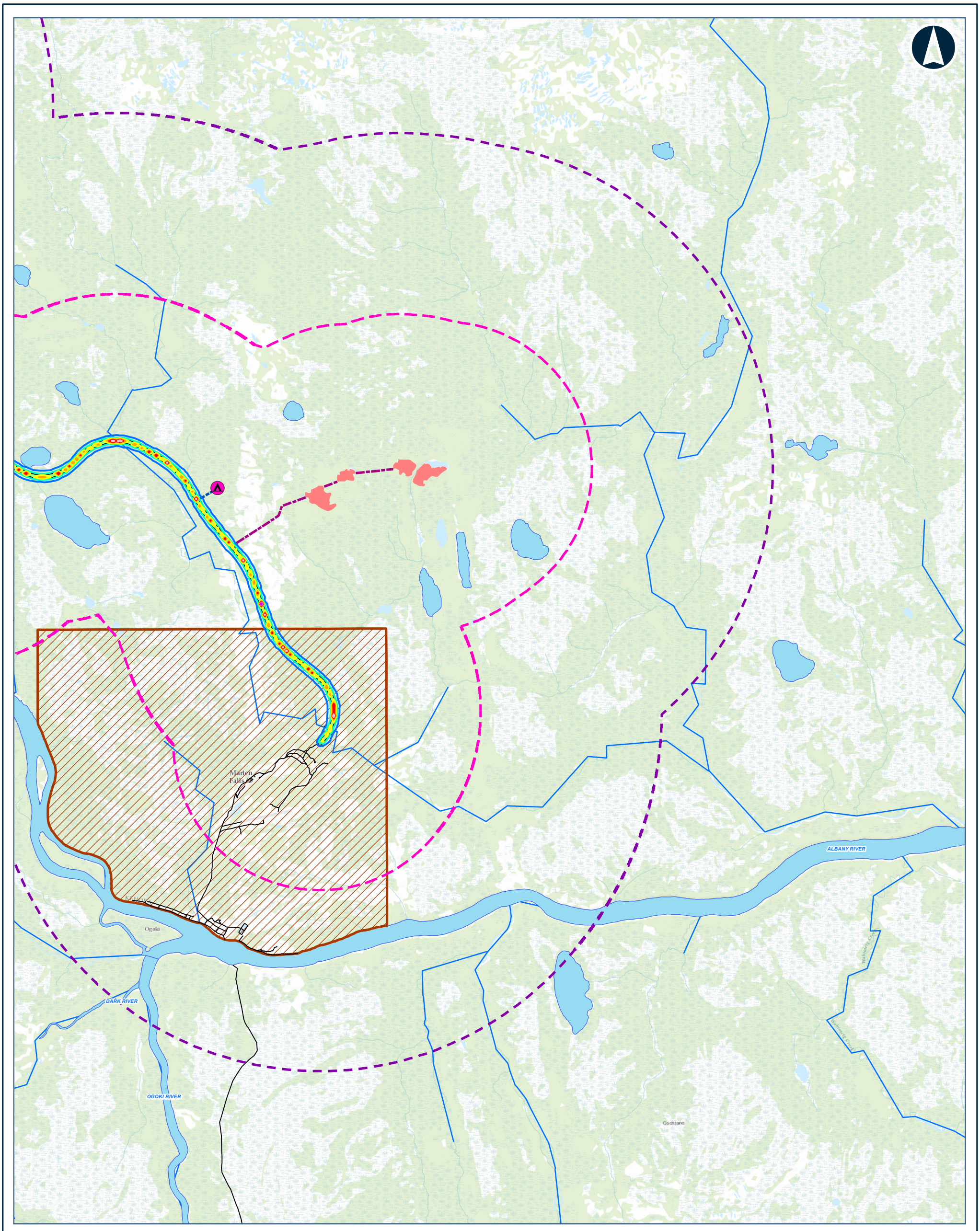

Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60

CONSTRUCTION DISTURBANCE
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK

- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Daytime Road Operations

0 — 2.25 — 4.5
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Figure 7-7.6

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OGOKI RIVER

OGOKI RIVER PROVINCIAL PARK (WATERWAY CLASS)

PATIENCE LAKE

ESSER LAKE

PAINTER LAKE

DEBAERE LAKE

COVEY LAKE

PIGMENT LAKE

SLY LAKE

LA ROSE LAKE

BURY LAKE

ZURBRIGG LAKE

CRONY LAKE

RENWICK LAKE

BURNABY LAKE

KAPIKOTONGWA RIVER

PERCY LAKE

LITTLE CURRENT RIVER PROVINCIAL PARK

LITTLE CURRENT RIVER

BRESSETTE LAKE

Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 — 2.25 — 4.5
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Figure 7-8.1

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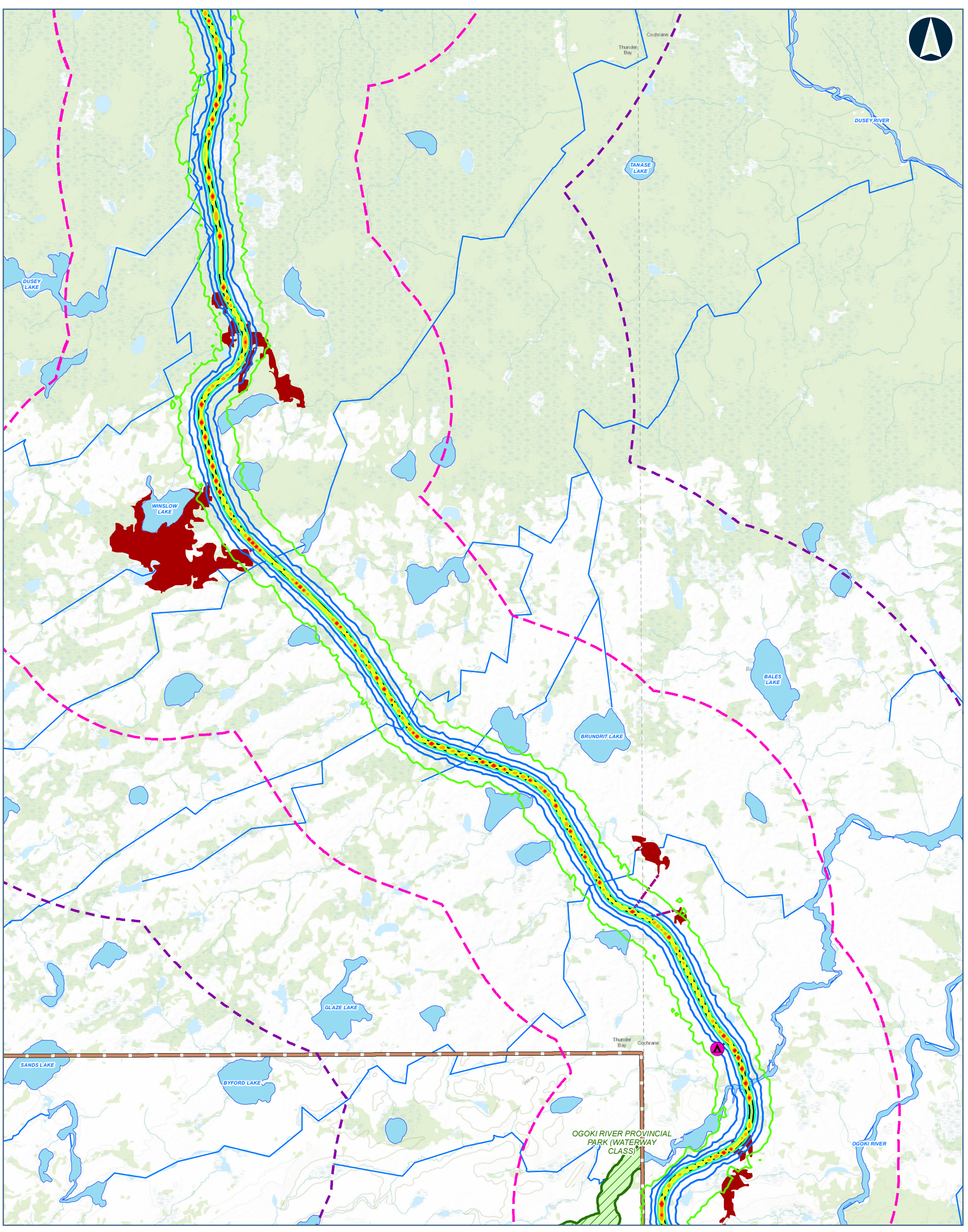

Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 — 2.25 — 4.5
Kilometres

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Figure 7-8.2

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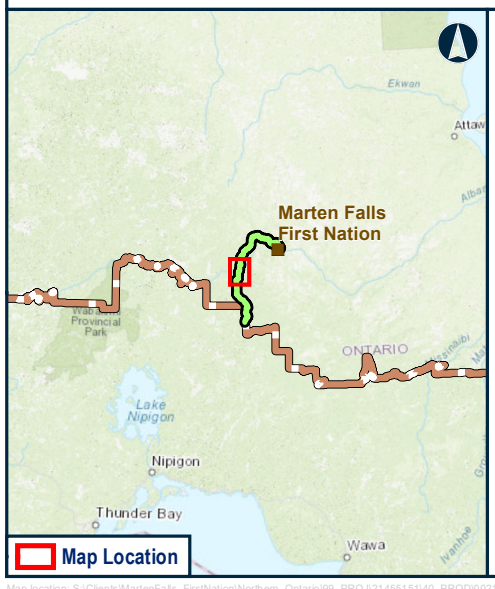
SAARIMAKI LAKE
ALBANY RIVER PROVINCIAL PARK
ALBANY RIVER
TEABEAU LAKE
TOLFREE LAKE
THUNDER BAY COCHRANE
SUWALA LAKE
DUSEY RIVER



Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 — 2.25 — 4.5
Kilometres

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Figure 7-8.3

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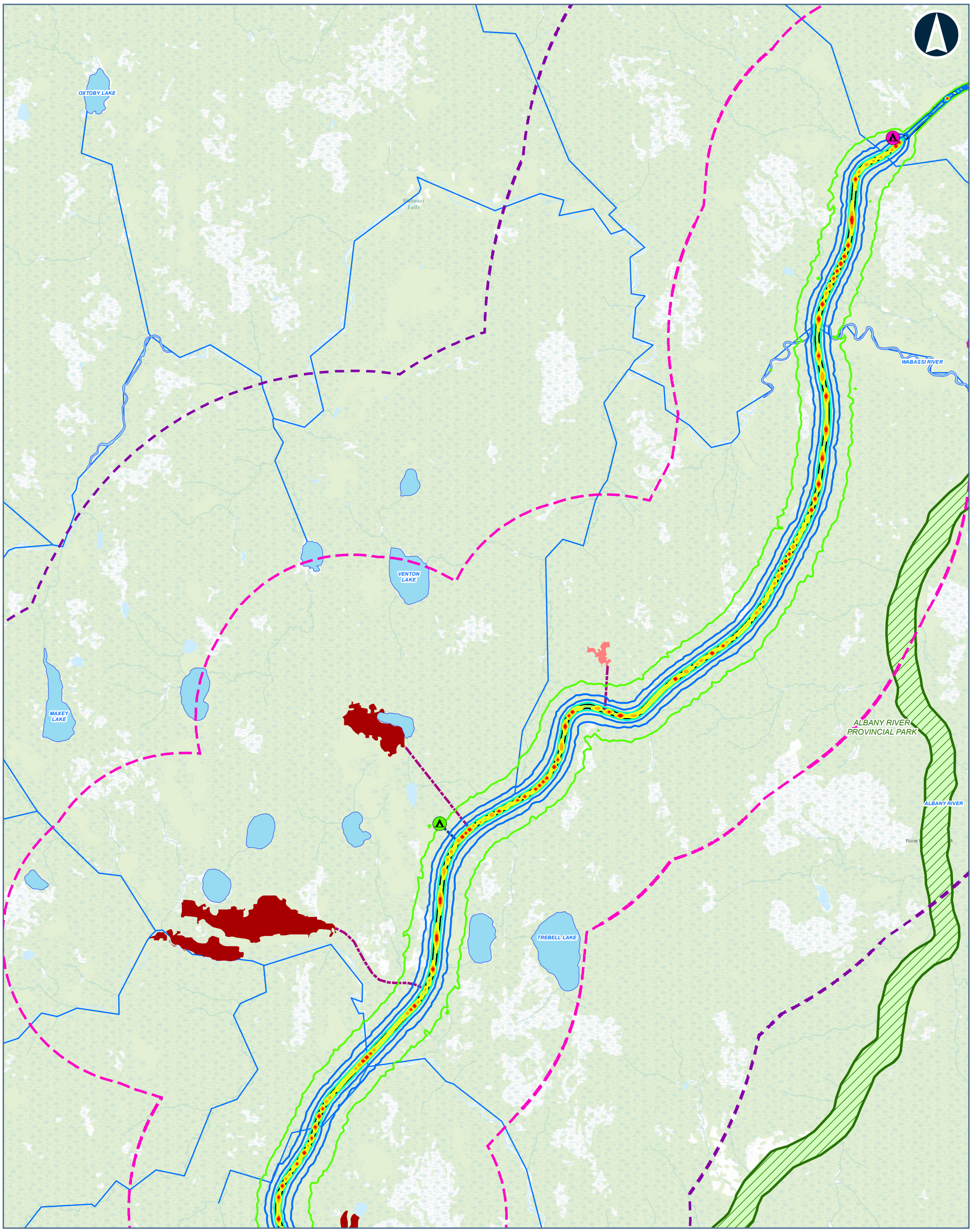

Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55
- 60

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-8.4

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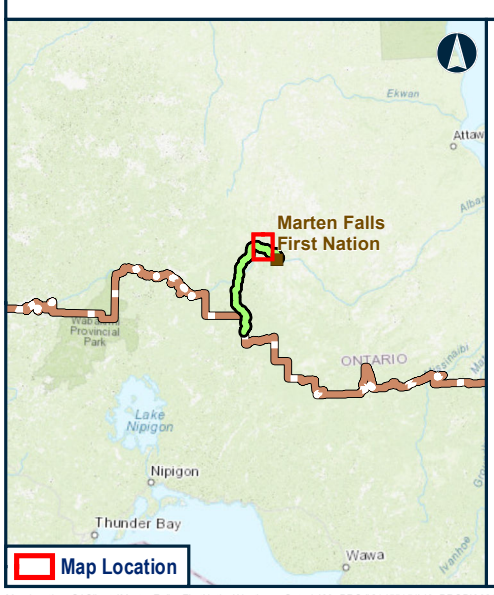
ACTON LAKE
SEBERT LAKE
GURDEN LAKE
GITTINS LAKE
WABASSI RIVER
Albany
Cochrane
Peacock Island
Robins Island
ALBANY RIVER
ALBANY RIVER PROVINCIAL PARK



Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY
- ACOUSTIC AND VIBRATION REGIONAL STUDY

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-8.5

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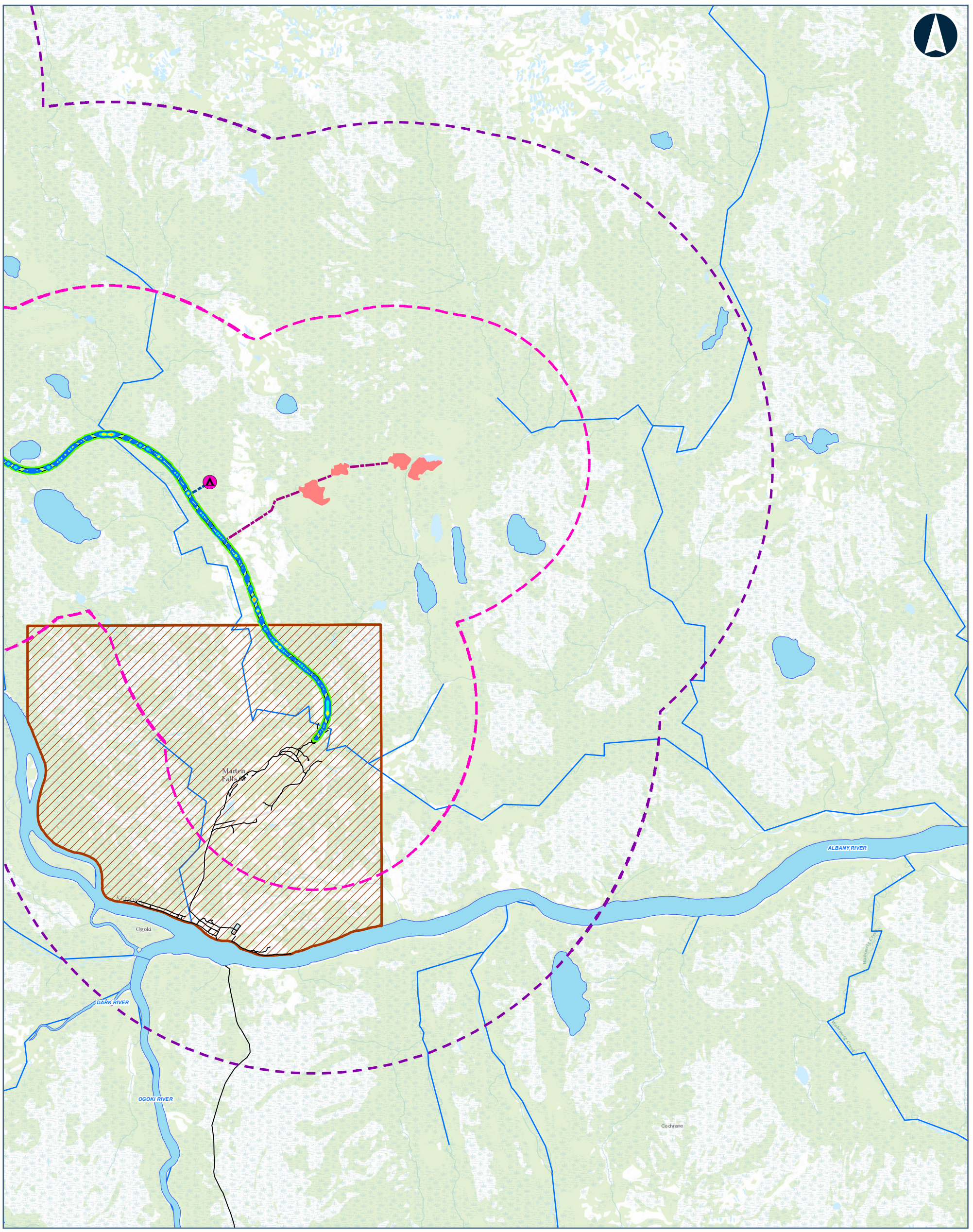

Legend

NOISE LEVEL
dBA
- 30
- 35
- 40
- 45
- 50
- 55

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK

- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Noise Modelling Results – Nighttime Road Operations

0 — 2.25 — 4.5
Kilometres

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PATIENCE LAKE
OGOKI RIVER
ESSER LAKE
PAINTER LAKE
DEBAERE LAKE
LA ROSE LAKE
COVEY LAKE
BURY LAKE
CRONY LAKE
PIGMENT LAKE
RENWICK LAKE
SLY LAKE
ZURBRIGG LAKE
BURNABY LAKE
KAPIKOTONGWA RIVER
LITTLE CURRENT RIVER PROVINCIAL PARK
PERCY LAKE
LITTLE CURRENT RIVER

S:\Clients\MartenFalls_FirstNation\Northern_O

Marten Falls First Nation
ONTARIO
Lake Nipigon
Nipigon
Thunder Bay
Wawa
Map Location

Legend

CHANGE IN NOISE LEVEL
DB
- 5
- 10
- 15
- 20
- 25
- 30

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Daytime Road Operations

0 0.5 1 2 3 4
Kilometres

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Figure 7-9.1

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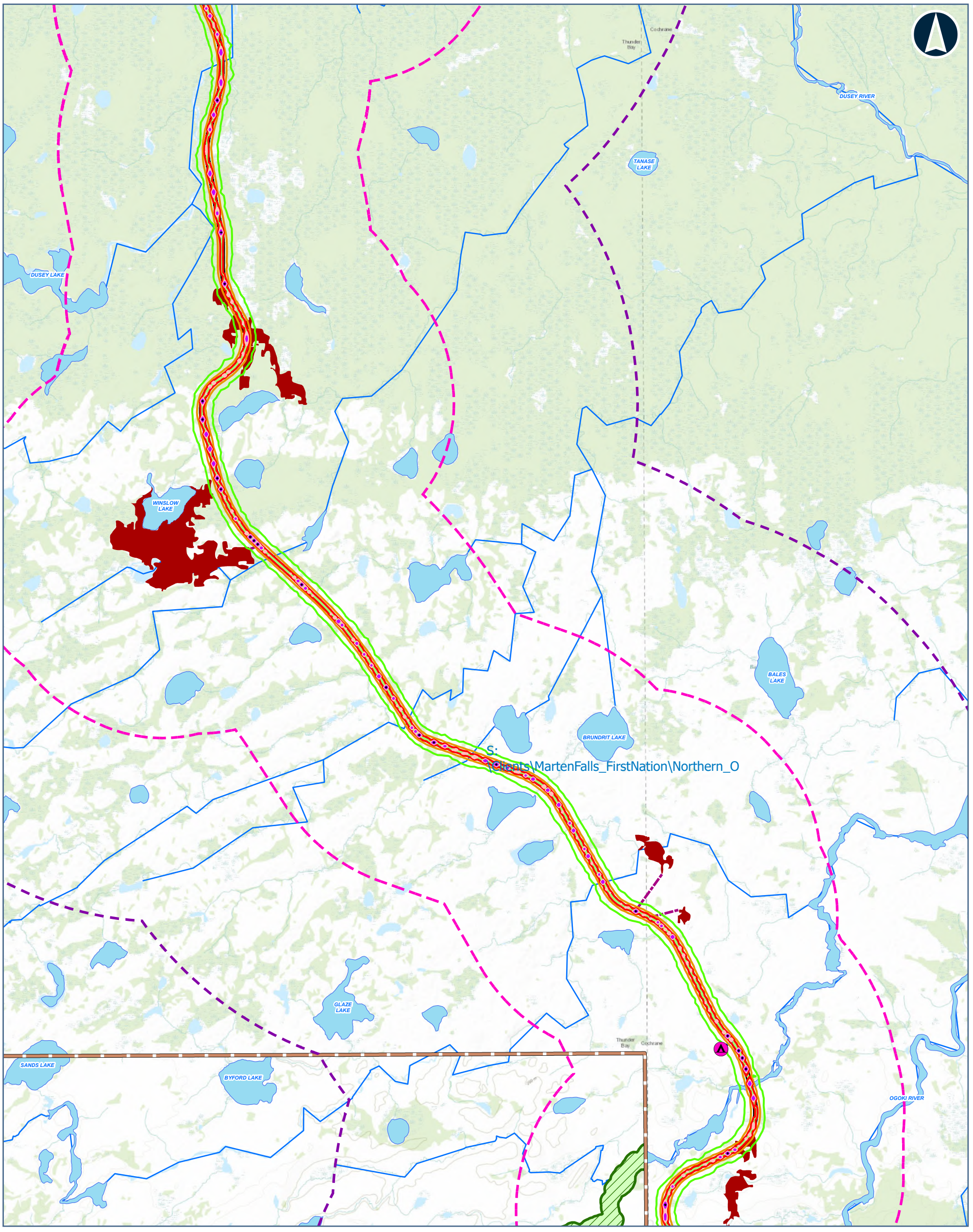

Legend

CHANGE IN NOISE LEVEL

DB

- 5
- 10
- 15
- 20
- 25
- 30

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Daytime Road Operations

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-9.2

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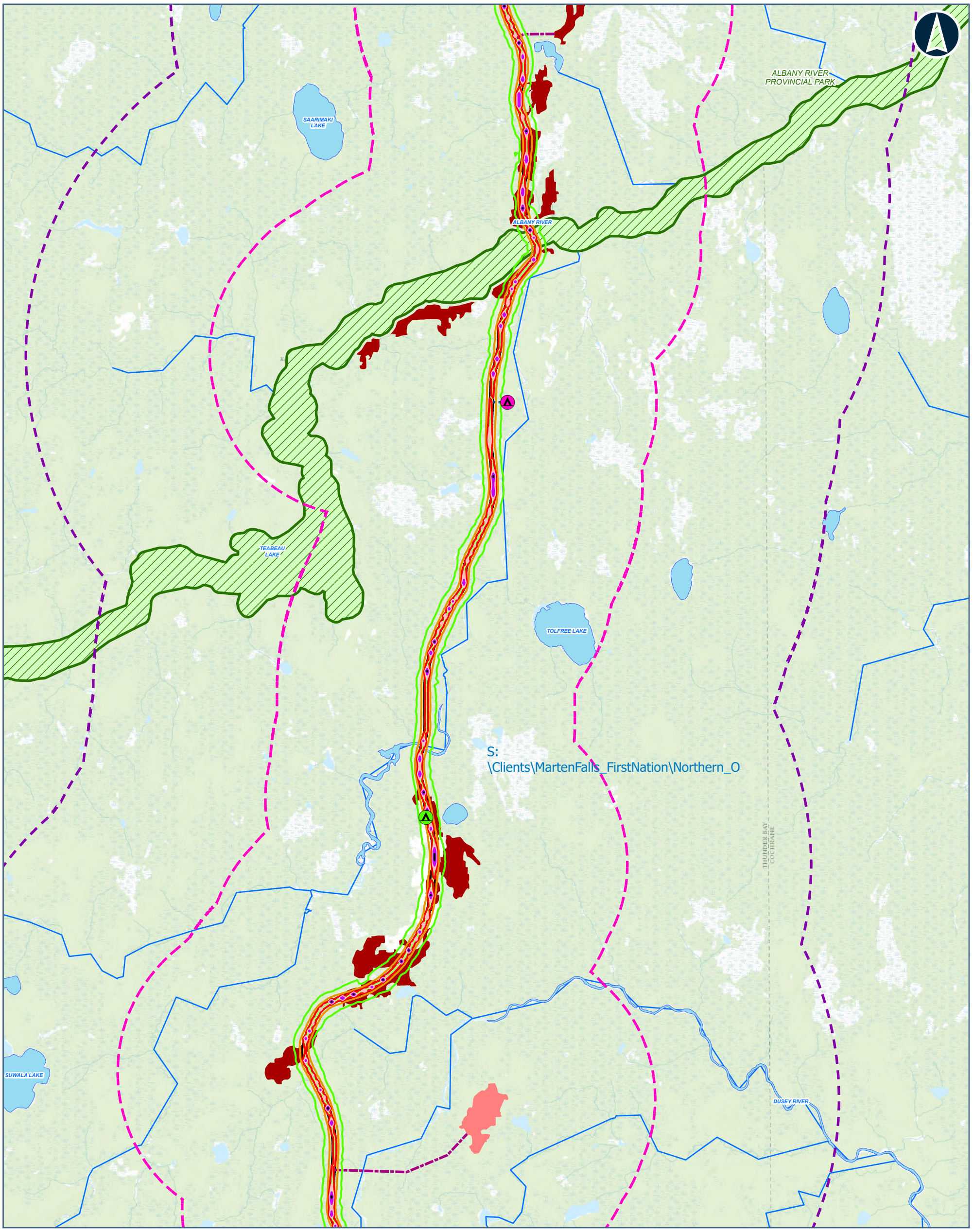

Legend

CHANGE IN NOISE LEVEL
DB
- 5
- 10
- 15
- 20
- 25
- 30

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Daytime Road Operations

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-9.3

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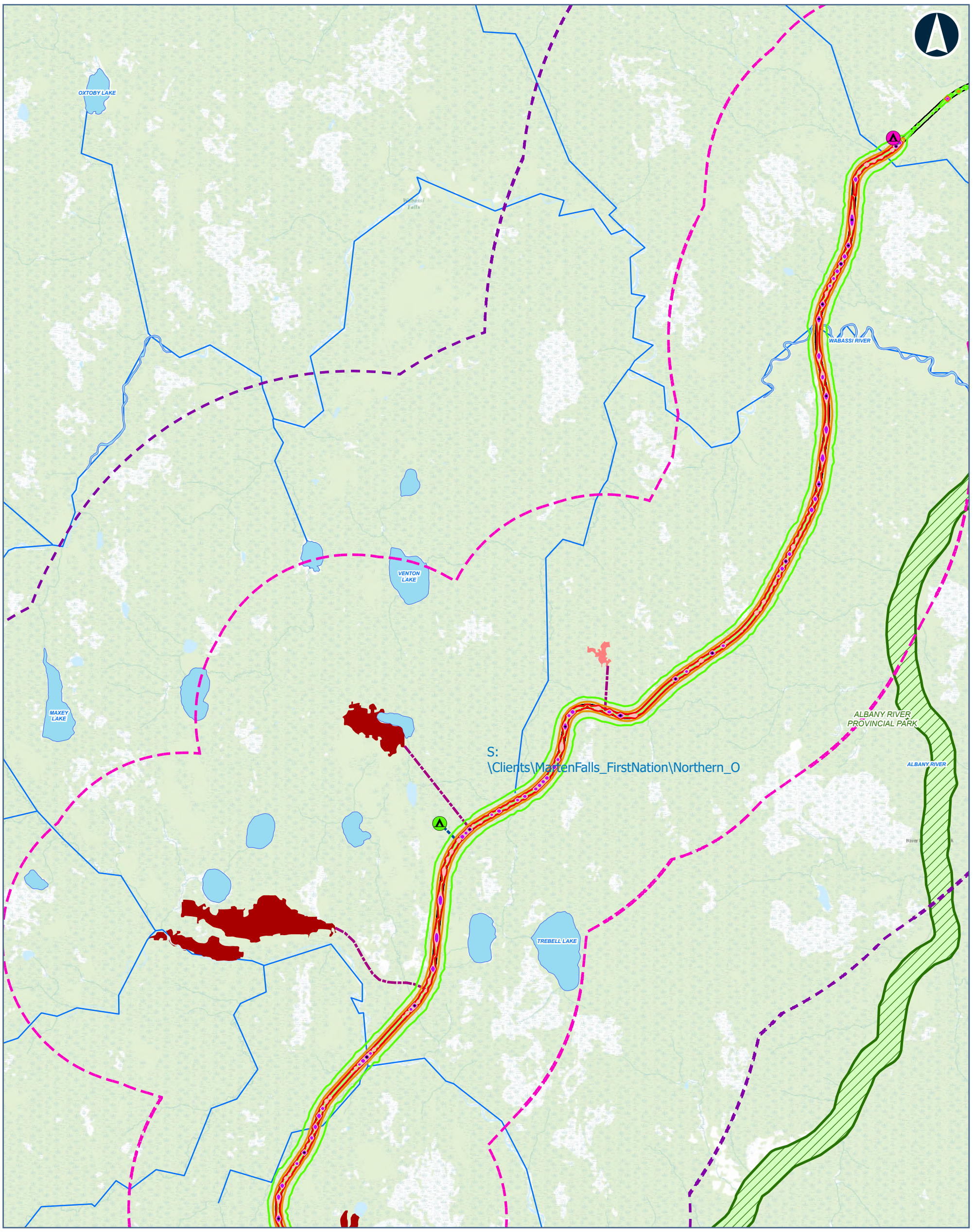

Legend

CHANGE IN NOISE LEVEL

DB

- 5
- 10
- 15
- 20
- 25
- 30

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Daytime Road Operations

0 0.5 1 2 3 4

Kilometres

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Figure 7-9.4

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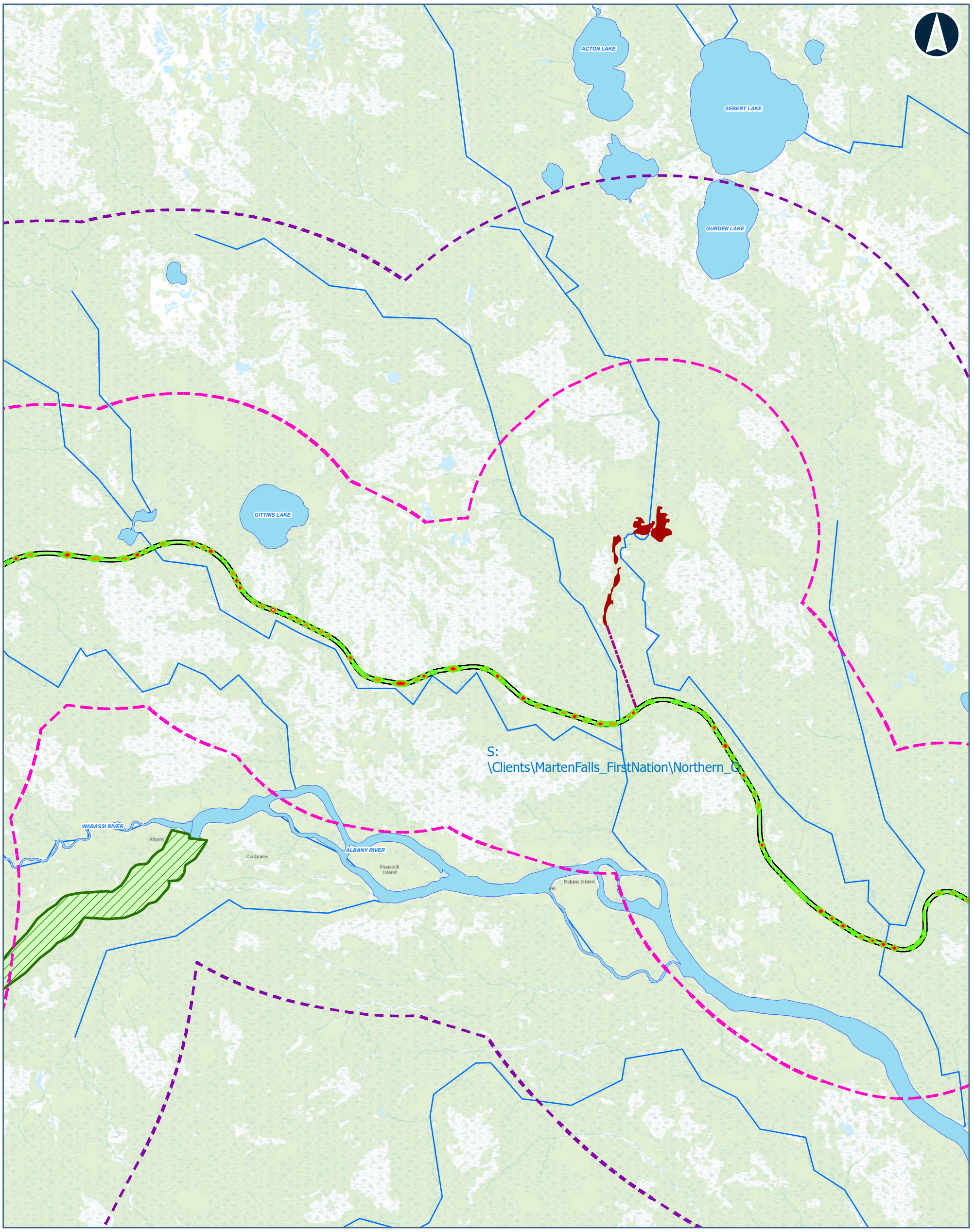

Legend

CHANGE IN NOISE LEVEL
DB
- 5
- 10
- 15
- 20

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Daytime Road Operations

0 0.5 1 2 3 4
Kilometres

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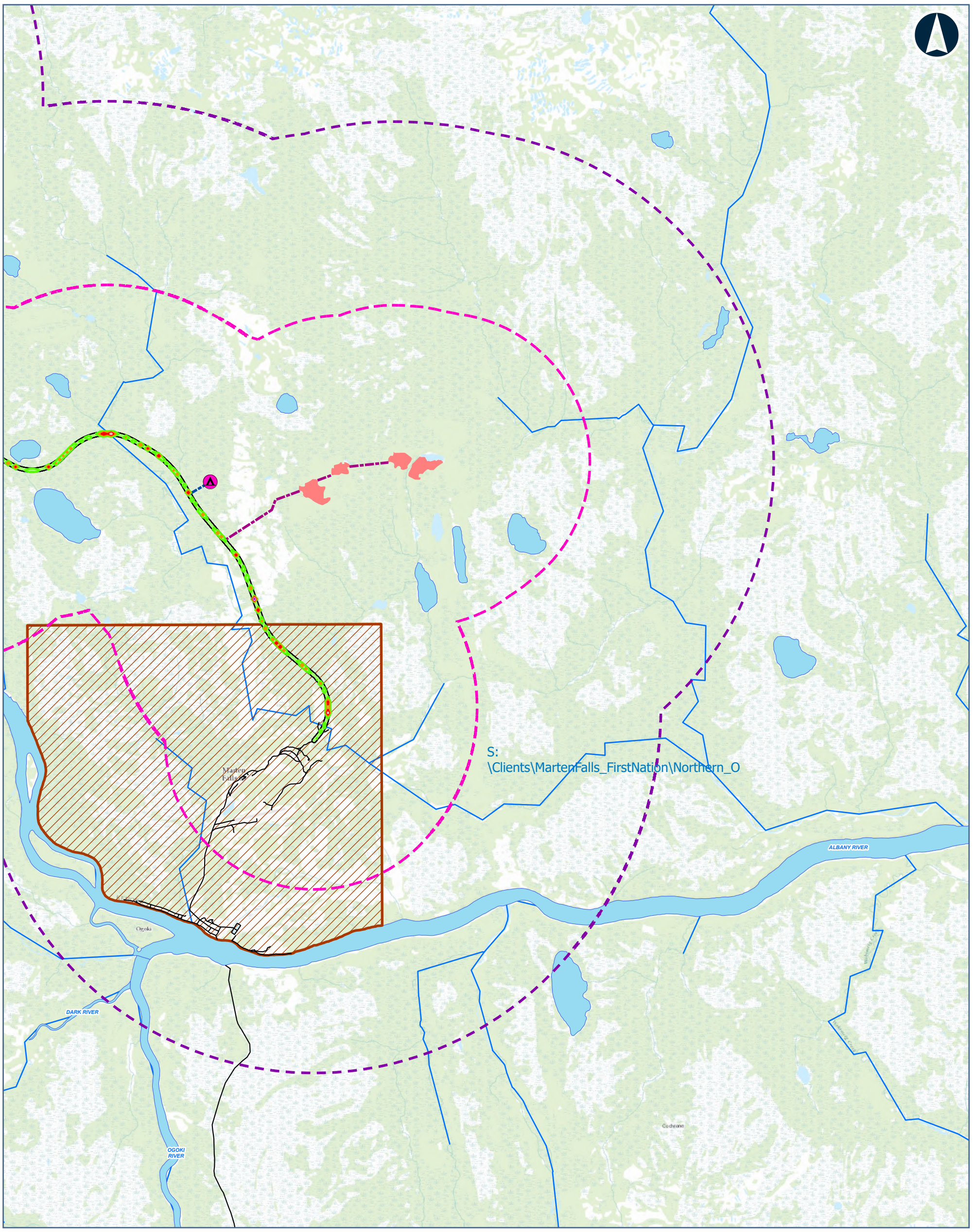

Legend

CHANGE IN NOISE LEVEL
DB
- 5
- 10
- 15
- 20
- 25

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Daytime Road Operations

0 0.5 1 2 3 4
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-9.6

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PATIENCE LAKE
OGOKI RIVER
ESSER LAKE
PAINTER LAKE
DEBAERE LAKE
LA ROSE LAKE
COVEY LAKE
BURY LAKE
CRONY LAKE
PIGMENT LAKE
RENWICK LAKE
SLY LAKE
ZURBRIGG LAKE
BURNABY LAKE
KAPIKOTONGWA RIVER
LITTLE CURRENT RIVER PROVINCIAL PARK
PERCY LAKE
LITTLE CURRENT RIVER

Marten Falls First Nation
ONTARIO
Lake Nipigon
Nipigon
Thunder Bay
Wawa
Map Location

Legend

CHANGE IN NOISE LEVEL
DB
- 5
- 10
- 15
- 20
- 25
- 30

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-10.1

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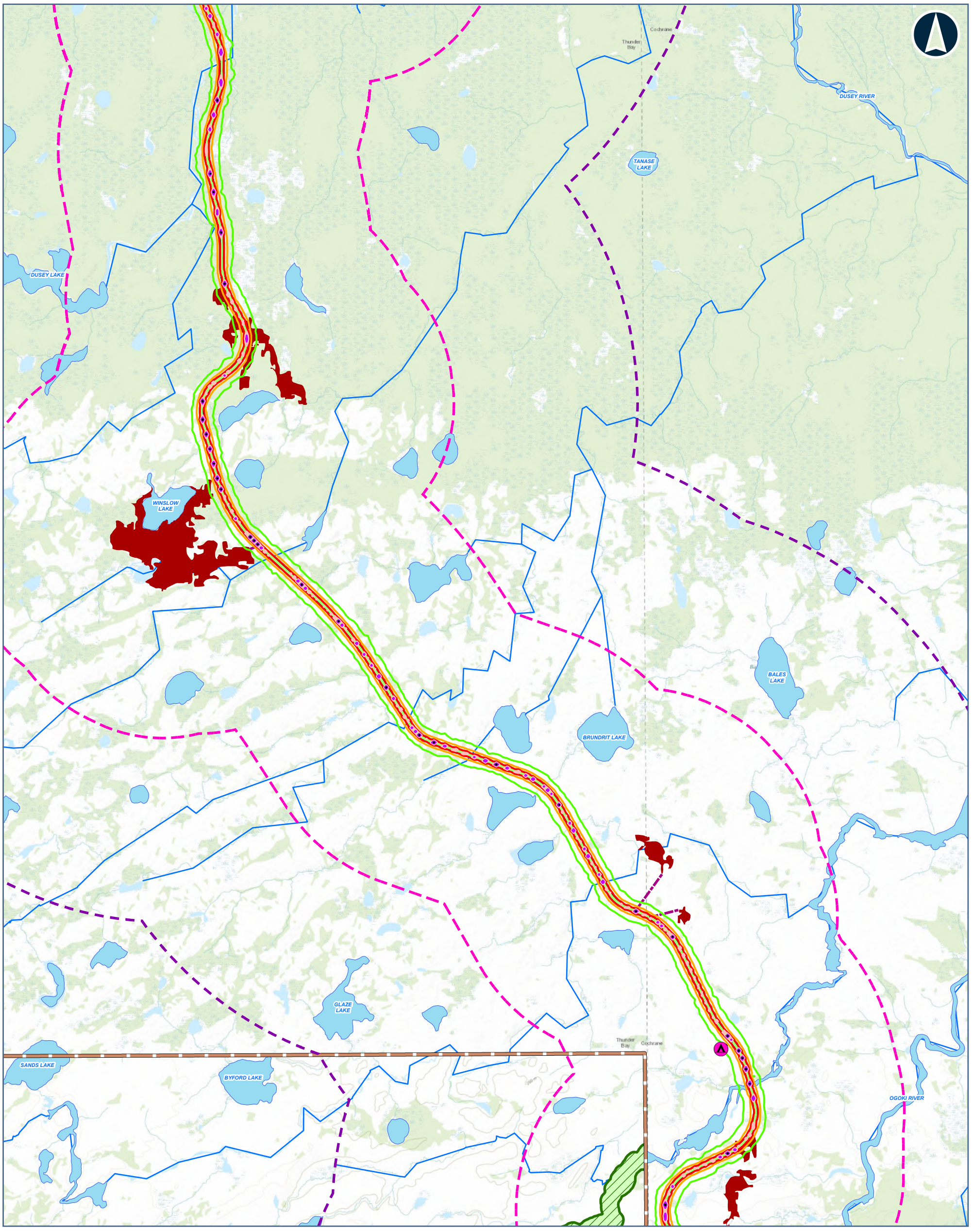

Legend

CHANGE IN NOISE LEVEL

DB

- 5
- 10
- 15
- 20
- 25
- 30

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-10.2

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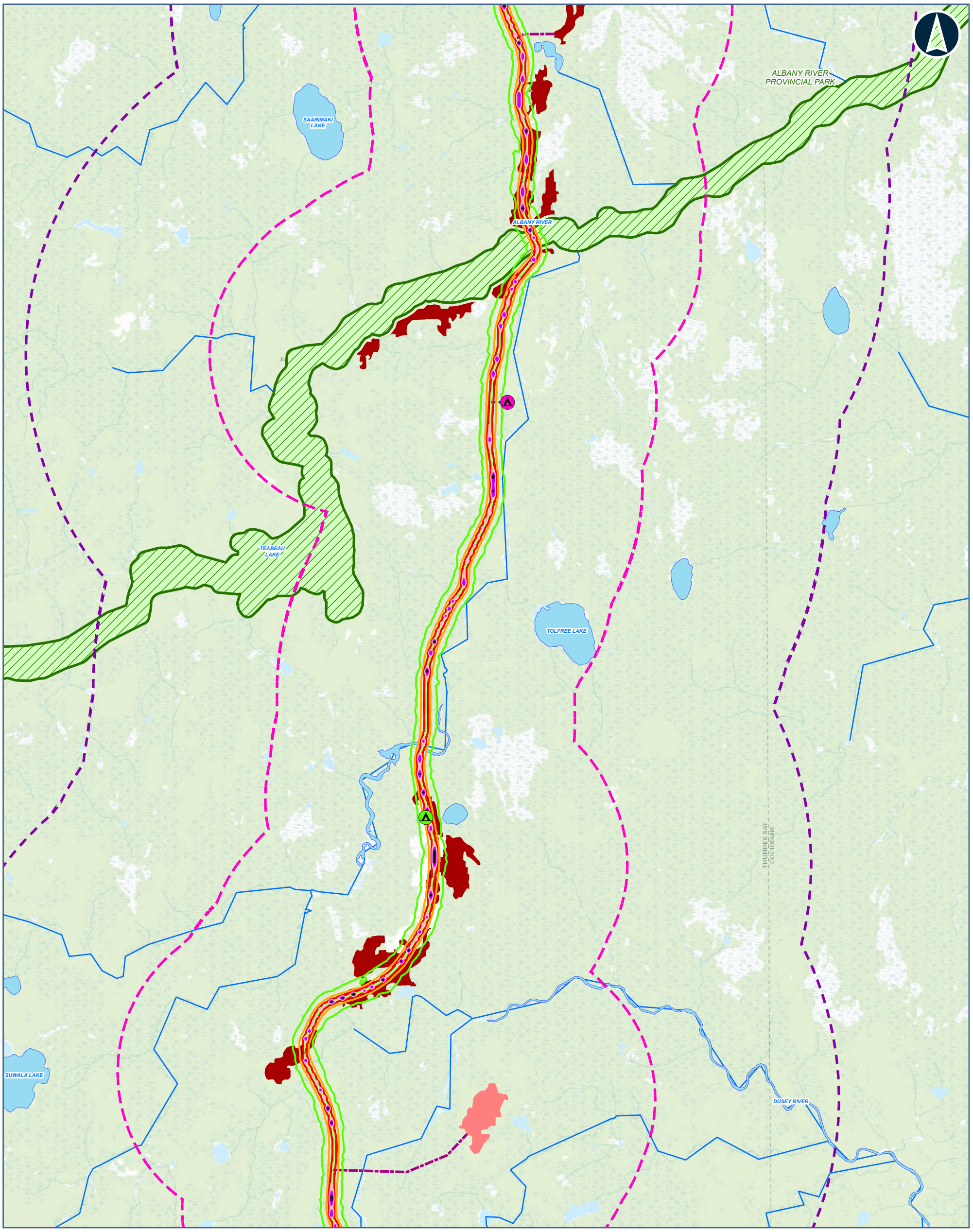

Legend

CHANGE IN NOISE LEVEL
DB
- 5
- 10
- 15
- 20
- 25
- 30

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-10.3

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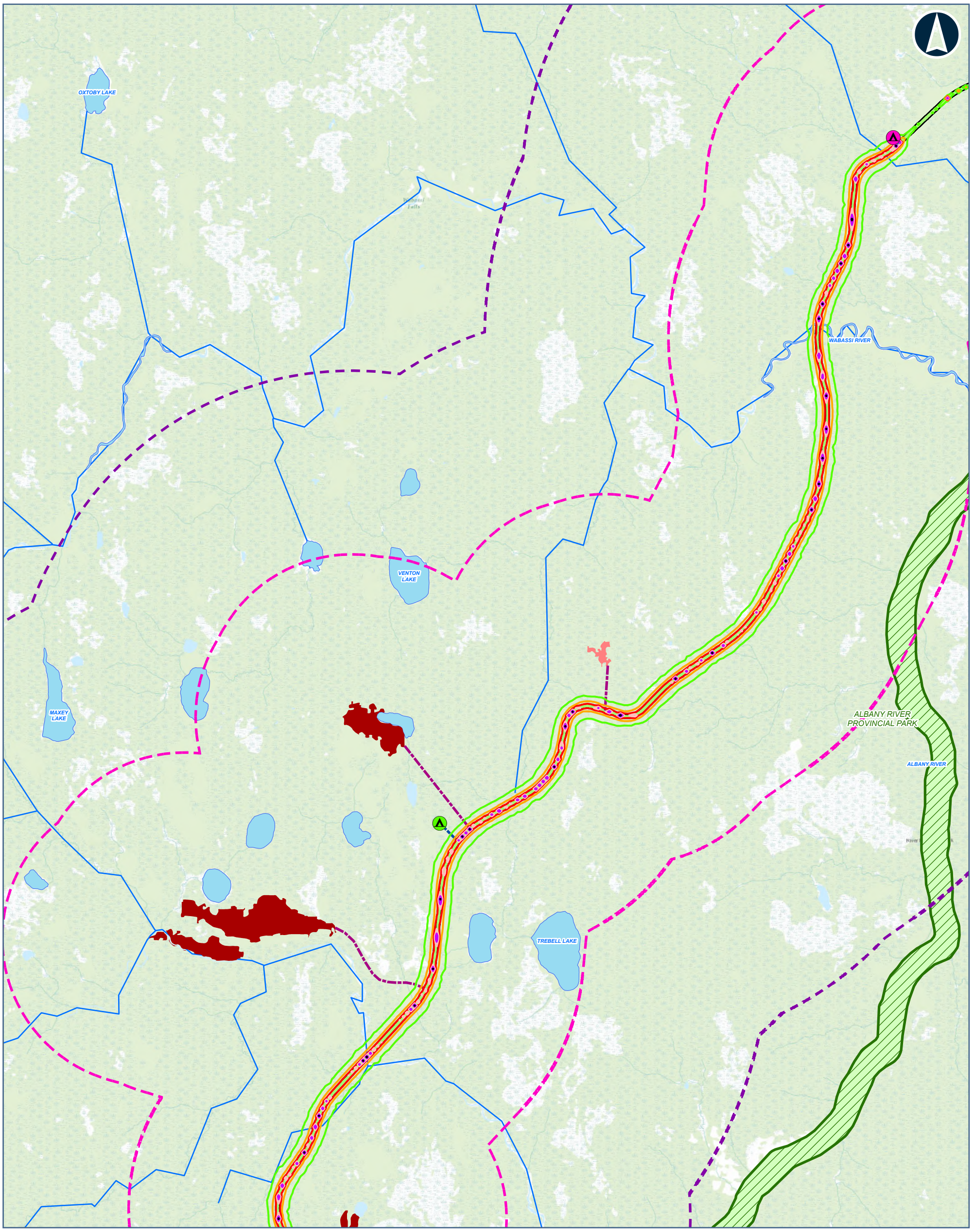

Legend

CHANGE IN NOISE LEVEL
DB
- 5
- 10
- 15
- 20
- 25
- 30

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-10.4

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ACTON LAKE
SEBERT LAKE
GURDEN LAKE
GITTINS LAKE
WABASSI RIVER
ALBANY RIVER
Albany
Cochrane
Peacock Island
Robins Island

Legend

CHANGE IN NOISE LEVEL
DB
- 5
- 10
- 15
- 20

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- SAND AND GRAVEL
- ROAD
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-10.5

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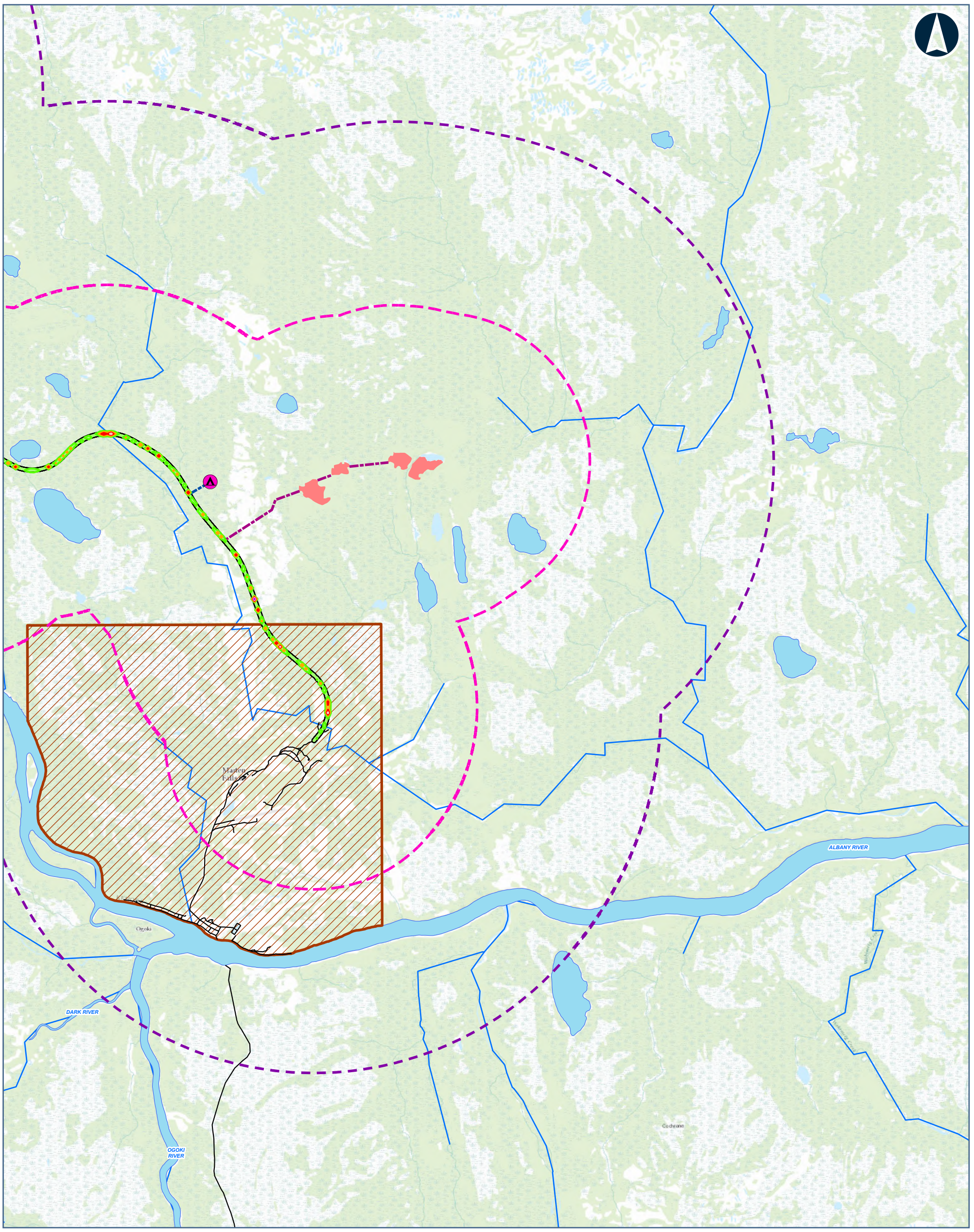

Legend

CHANGE IN NOISE LEVEL
DB
- 5
- 10
- 15
- 20
- 25

CONSTRUCTION DISTURBANCE AREA
POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTIONS CAMP
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- BEDROCK

- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- ACOUSTIC AND VIBRATION LOCAL STUDY AREA
- ACOUSTIC AND VIBRATION REGIONAL STUDY AREA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Change in Noise Level – Nighttime Road Operations

0 0.5 1 2 3 4
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-10.6

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7.3.1.1.2.2 Mitigation and Enhancement Measures

As described in **Section 7.3.1.1.2.1**, it is expected that it will be demonstrated through the permitting process that noise levels from the pits and quarries comply with the applicable *NPC-300* sound level limits. If required, mitigation measures will be designed during the permitting process.

For maintenance, it is expected that applicable mitigation measures listed in **Section 7.3.1.1.1.2** will be followed.

7.3.1.1.2.3 Predicted Residual Effects

Noise emissions during Operation and Maintenance may result in a potential effect because it is predicted that, after the implementation of mitigation measures, exceedances of applicable criteria at potential points of reception within 100 m of an active pit and quarry may occur. This potential effect is therefore carried through for further assessment in the following sections, including an assessment of significance.

7.3.1.2 Vibration

7.3.1.2.1 Increase in Vibration Level during Construction

7.3.1.2.1.1 Potential Effects – Blasting

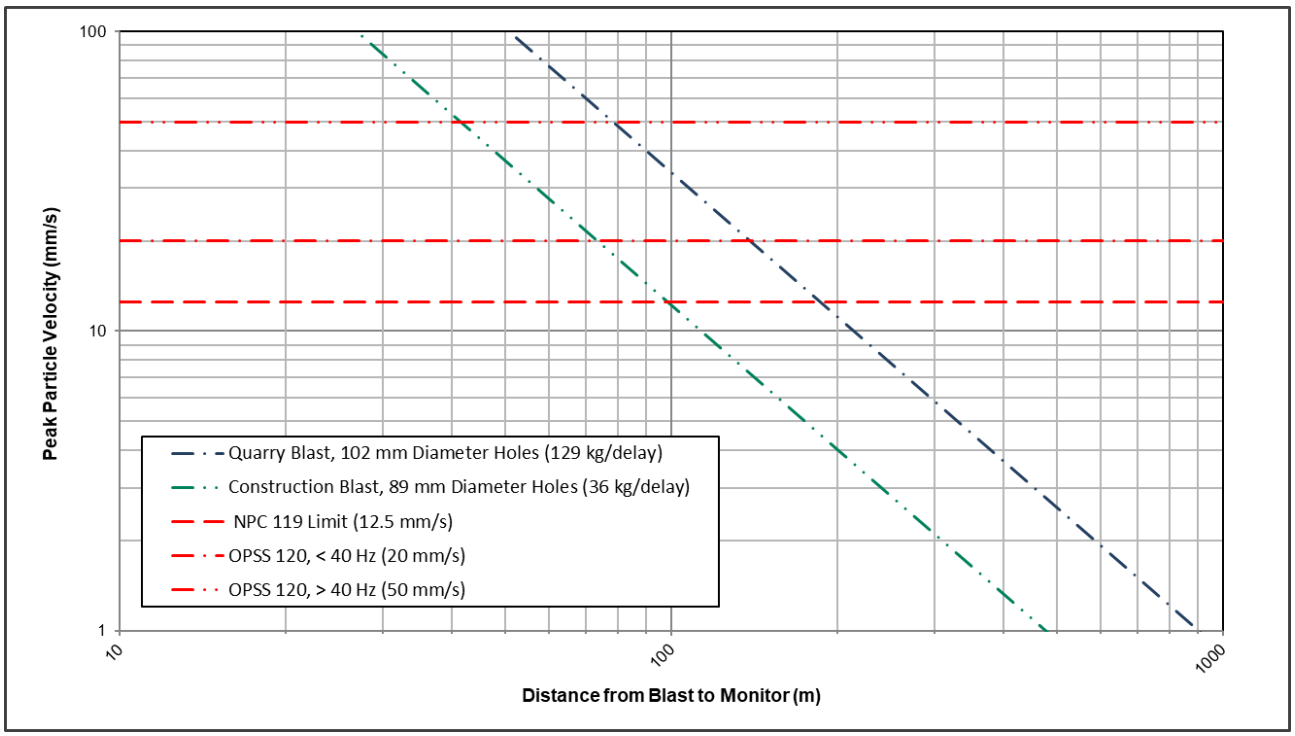
Existing vibration levels can be expected to increase, on occasion, due to the construction blasting and quarry blasting activities at nearby points of reception, but blast induced vibration is expected to be temporary in nature, occur only during specific activities, and limited to the vicinity of the Project footprint within the Study Area. The range in increased vibration levels associated with construction blasting will depend primarily on the maximum explosive weight detonated at any given instance and the proximity to the points of reception (i.e., the Project vibration levels in the environment generally decrease as the distance between the point of reception and maximum charge weight detonated at a given instance [i.e., delay period]).

Potential effects on vibration levels during blasting for the Construction Phase will vary based on type of blasting, but for the Project, vibration effects are expected to be greatest during quarry blasting and when construction blasting is required near an existing point of reception.

A semi-quantitative assessment of the potential blasting during the Project's Construction Phase was carried out using the Ministry of Environment, Conservation and Parks (1985) vibration attenuation model and the blast parameters described in **Table 4-21**. It is assumed the blasting activities will occur near where aggregate materials are required and / or where the local bedrock profile require construction blasts to achieve the proper elevations.

As the exact locations for the required blasting are not currently known, the results are presented as distance between the blast and the nearest sensitive receptor. When the blast locations are identified, the effect on specific vibration sensitive receptors can be estimated. The predictive vibration and air overpressure models developed for the proposed blasting methods are shown graphically in **Figure 7-11** and **Figure 7-12**, respectively. These are summarized in **Table 7-9** and **Table 7-10**.

Figure 7-11: Estimated Vibration Level with Distance from Receptor



mm/s = millimetre per second; mm = millimetre; kg/delay = kilogram per delay; < = less than; > = greater than; Hz = hertz; m = metre.

The estimated vibration levels shown in **Figure 7-11** are summarized in **Table 7-9**.

Table 7-9: Estimated Ground Vibrations for the Assessed Blast Design at a Range of Distances

Distance [(a)] (m)	Peak Particle Velocity [(b)] (mm/s)	
	Quarry Blasts	Construction Blasts
100	33.9	12.2
200	11.2	4.0
300	5.8	2.1
400	3.7	1.3
500	2.6	0.9
600	1.9	0.7
700	1.5	0.5
800	1.2	0.4
900	1.0	0.4
1,000	0.9	0.3

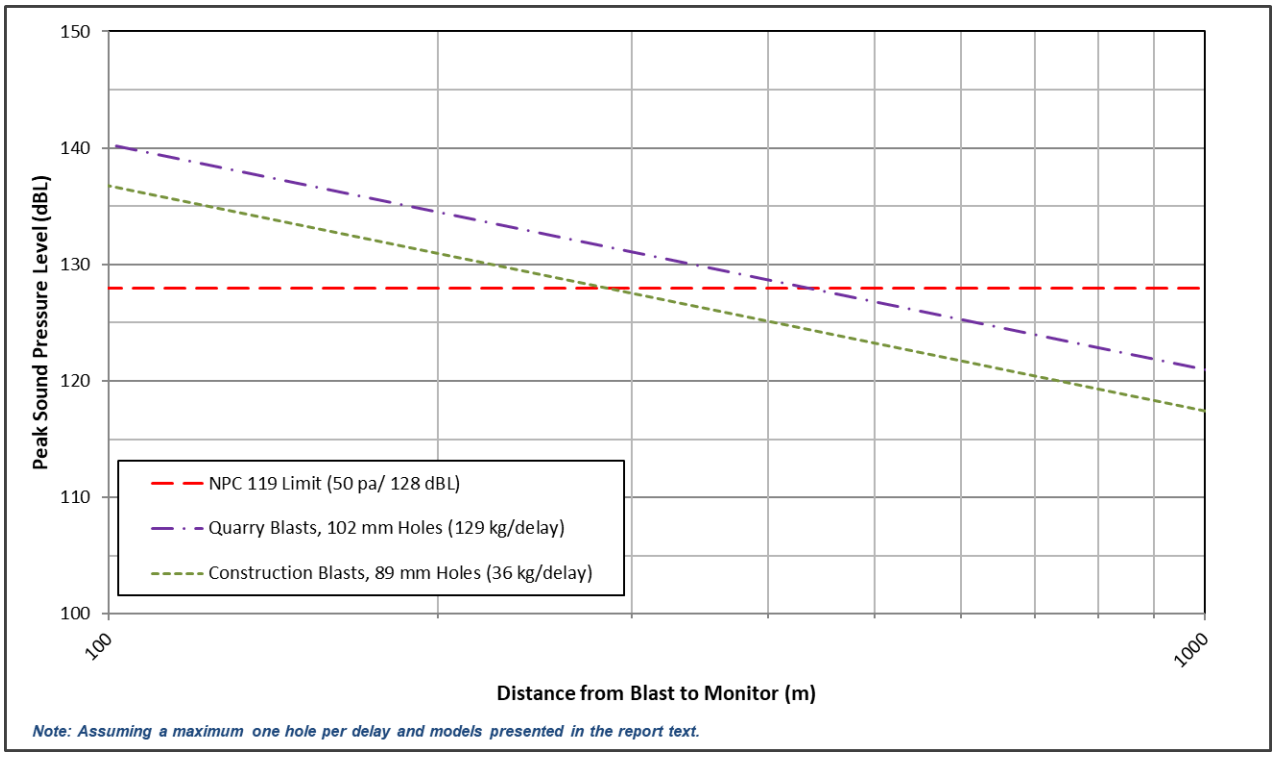
Notes:
(a) Distance between the blast and the sensitive receptor.
(b) Assuming the attenuation models proposed previously.
m = metre; mm/s = millimetre per second.

Assuming a single hole per delay, the Ministry of Environment, Conservation and Parks guideline limit of 12.5 mm/s may be complied with for all blasting beyond the following estimated standoff distances:

- Quarry blasts - 187 m from the nearest receptor residence; and
- Construction blasts - 98 m from the nearest receptor residence.

The estimated air overpressure levels are shown in **Figure 7-12** and summarized in **Table 7-10.**

Figure 7-12: Estimated Air Overpressure Level with Distance from Receptor



dBL = linear decibel; pa = pascal; mm = millimetre; kg/delay = kilogram per delay; m = metre.

Table 7-10: Estimated Ground Air Overpressure for the Proposed Blast Design at a Range of Distances

Distance[(a)] (m)	Peak Sound Pressure Level[(b)] (dBL)	
	Quarry Blasts	Construction Blasts
75	143	139
100	140	137
200	135	131
300	131	128
400	129	125
500	127	123
600	125	122
700	124	120
800	123	119
900	122	118
1000	121	117

Notes:
(a) Distance between the blast and the sensitive receptor
(b) Assuming the attenuation models proposed.
m = metre; dBL = linear decibel.

Assuming a single hole per delay, the Ministry of Environment, Conservation and Parks guideline limit of 128 dBL may be complied with for all blasting measured in front of the face beyond the following estimated standoff distances from adjacent receptor locations:

- Quarry blasts – 430 m; and
- Construction blasts – 300 m.

Assuming a single hole per delay, the Health Canada guideline limit of 125 dBL for a single blast per day may be complied with for all blasting measured in front the face beyond the following estimated standoff distances from adjacent receptor locations:

- Quarry blasts – 600 m; and
- Construction blasts – 400 m.

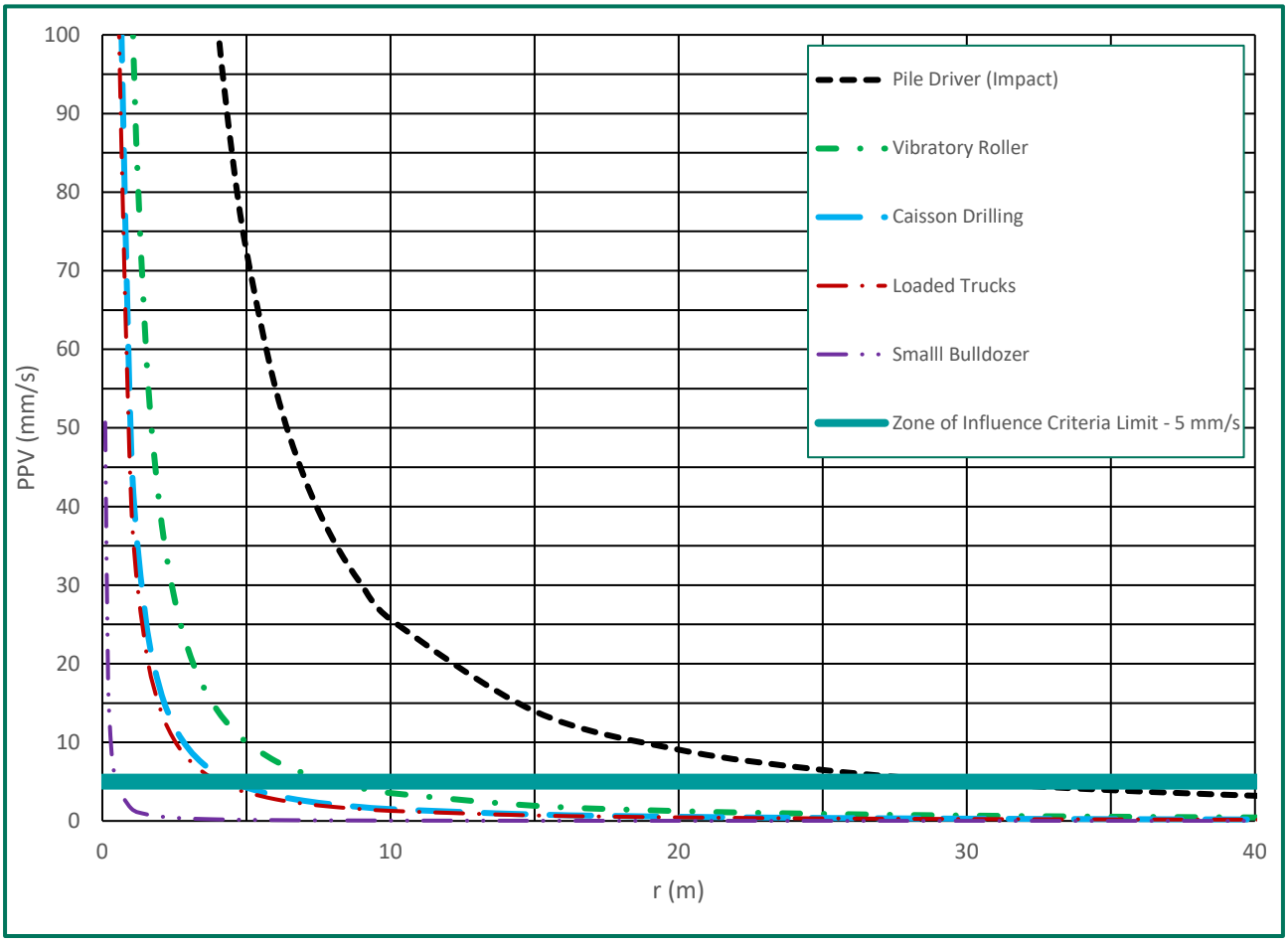
The estimated standoff distances do not consider the effect of vegetation (e.g., trees) and local topography on the air vibration levels. If the construction blasts require the use of blast mats to control flyrock (i.e., ejected rock fragments and debris) the air overpressure will be reduced significantly.

7.3.1.2.1.2 Potential Effects – General Construction Activities

Existing vibration levels can be expected to increase, on occasion, due to the general construction activities at nearby points of reception, but general construction vibration is expected to be temporary in nature, occur only during specific activities, and limited to the vicinity of the Project footprint within the Study Area. The range in increased vibration levels associated with general construction activities will depend primarily on the number and type of vibration sources and their proximity to the points of reception (i.e., the Project vibration levels in the environment generally decrease as the distance between the point of reception and construction activities increase). Potential effects on vibration levels during Construction will vary based on type of general construction activities, but for the Project, vibration effects are expected to be greatest during impact pile driving.

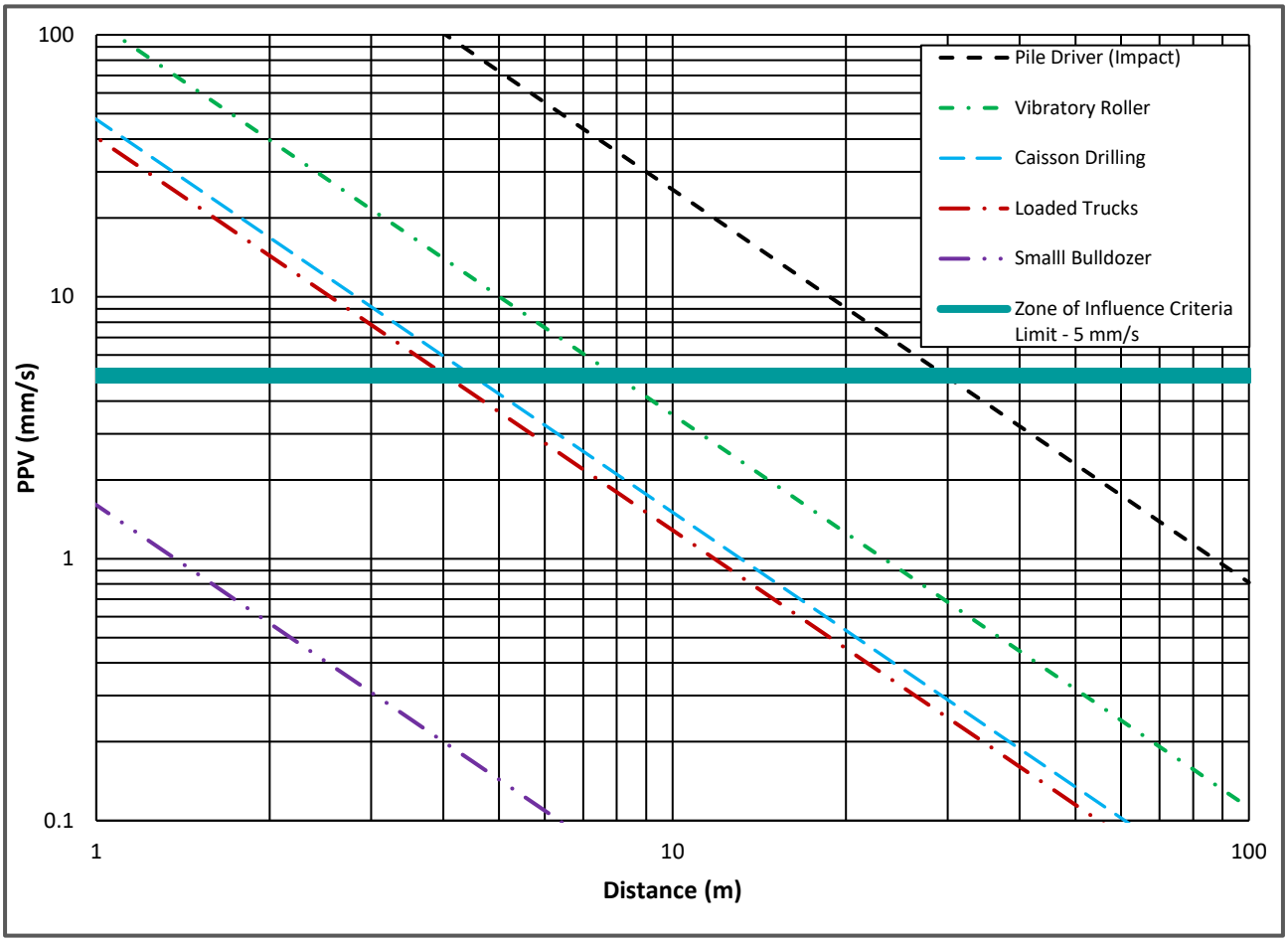
The assessment of the Project's general construction activities was carried out using the *Transit Noise and Vibration Impact Assessment Manual* vibration attenuation model. Select pieces of construction equipment presented in **Section 4.8.2.2** were selected to present a range in potential vibration levels due to the Project general construction activities. It is assumed the general construction activities will occur anywhere within the Project right-of-way; therefore, the predicted zone of influence was considered to begin at the edge of the cleared section of the Project right-of-way (i.e., 30 m from the Community Access Road centreline), unless otherwise stated below. The predictive vibration models developed for various proposed selected construction equipment and the zone of influence levels are shown graphically in linear and logarithmic scales in **Figure 7-13** and **Figure 7-14**, respectively.

Figure 7-13: Ground Vibration Attenuation Model for Various Proposed General Construction Activities – Linear Scale



PPV = peak particle velocity; ZOI = zone of influence; mm/s = millimetre per second.

Figure 7-14: Ground Attenuation Model for Various Proposed General Construction Activities – Logarithmic Scale



PPV = peak particle velocity; ZOI = zone of influence; mm/s = millimetre per second.

The *City of Toronto By-law 514-2008* preliminary zone of influence criteria (i.e., 5 mm/s) for building damage may exist for some general construction equipment, which are expected to be the greatest source of vibrations, within the following estimated standoff distances:

- Impact pile driving - 30 m from impact pile driving location. It is assumed any impact pile driving would occur within the edges of the road, therefore approximately 6 m from the Community Access Road centreline (i.e., edge of road width);
- Vibratory Roller - 8 m from the cleared section of the Project right-of-way; and
- Caisson Drilling - 5 m from the cleared section of the Project right-of-way.

The *Transit Noise and Vibration Impact Assessment Manual* guideline limit of 0.1 mm/s for human annoyance may be complied with for some general construction equipment, which are expected to be the greatest source of vibration, beyond the following estimated standoff distances:

- Impact pile driving - 175 m from impact pile driving location. It is assumed any impact pile driving would occur within the edges of the road, therefore approximately 6 m from the Community Access Road centreline (i.e., edge of road width);
- Vibratory Roller - 50 m from the cleared section of the Project right-of-way; and
- Caisson Drilling - 25 m from the cleared section of the Project right-of-way.

Based on the results of the vibration attenuation model, the predicted preliminary zone of influence (i.e., 5 mm/s) for building damage is within the right-of-way. Therefore, for the purposes of this assessment, a frequency-dependent analysis was not carried out for building damage.

Based on the results of the vibration attenuation model, the predicted general construction activities vibration levels at some of the identified representative points of reception exceed the human annoyance criteria considered for this vibration assessment. For the purposes of this assessment, a frequency-dependent analysis was not carried out for human annoyance. Therefore, potential vibration effects are expected during Project Construction at some of the points of reception and a detailed vibration assessment, including a frequency-dependent analysis, mitigation assessment as required and a monitoring program, is recommended to be carried out during detailed design.

7.3.1.2.1.3 Mitigation and Enhancement Measures

The Construction Phase of any project is typically considered temporary or short term relative to the entire life cycle of a project. The following is a general summary of the items to be considered relating to construction vibration according to the various guidance documents presented in **Section 4.4** and past experience on similar projects.

As potential construction vibration effects are expected at some of the points of reception in the vicinity of the Project, some general recommendations to assist in minimizing vibration effects due to the Project's construction activities follow.

- Develop a Construction Vibration Workplan prior to the start of construction describing the construction schedule, list of construction equipment, list of point of reception locations (i.e., traditional land use, residential, heritage structures and utilities), applicable guidance documents including criteria and control measures;
- Consider the use of frequency-dependent vibration limits as more detailed information regarding the construction activities is known;

- Engage with Indigenous communities and relevant stakeholders to coordinate the planned construction schedule before the start of construction and prior to specific activities that may generate vibration to minimize overlap with the timing of traditional land use activities (e.g., fall and spring hunting seasons);
- Investigate vibration concerns as they arise through a complaint resolution mechanism whereby persons can contact the Project team if there are perceived vibration issues;
- Conduct construction activities during the daytime period (i.e., 7 a.m. to 7 p.m.). Nighttime work is not anticipated. In the event construction will occur beyond the daytime period, applicable mitigation measures will be reviewed and implemented as required;
- Locate and operate construction equipment as far as possible from points of reception;
- Maintain the surface of the roadway such that rough surface conditions are avoided;
- Avoid operating equipment that is expected to generate significant vibrations at the same time. Operating them separately may reduce overall vibration levels;
- Construction blasting will be carried out in compliance with the Ontario Provincial Standard Specification 120 and NPC-119.The Ontario Provincial Standard Specification 120 details items such as vibration limits, protective measures, pre-blast surveys and notification to nearby owners and tenants. All blasts which might impact local structures or disrupt humans will be monitored for ground and air vibrations;
- Blasting at temporary or existing quarries will be carried out to comply with the conditions provided in the licence or aggregate permit, if a licence or aggregate permit exists or is required; and
- Blasting delays and blast mats will be used, as appropriate, to control vibration and fly rock as required.

7.3.1.2.1.4 Predicted Residual Effects

Vibration during Construction may result in a potential effect because it is predicted that, after the implementation of mitigation measures, exceedances of applicable criteria at potential points of reception may occur. This potential effect is therefore carried through for further assessment in the following sections, including an assessment of significance.

7.3.1.2.2 Increase in Vibration Level during Operations

7.3.1.2.2.1 Potential Effects

The vibrations induced by vehicle traffic due to the operation of the Community Access Road (i.e. from road traffic) were estimated to meet the human annoyance criteria beyond 25 m of the edge of the Community Access Road (i.e., approximately 31 m from the Community Access Road centreline). The *City of Toronto By-law 514-2008* preliminary zone of influence criteria (i.e., 5 mm/s) for building damage is expected to be within the

edges of the road when assuming a crest factor of 4 to estimate peak particle velocity vibration levels due to the operation of the Community Access Road (i.e., from road traffic).

The existing vibration levels due to quarry blasting activities can be expected to increase, on occasion, at nearby points of reception, but blast induced vibration is expected to be temporary in nature, occur only during specific activities, and limited to the vicinity of the Project footprint within the Study Area. The range in increased vibration levels associated with blasting during operations will depend primarily on the maximum explosive weight detonated at any given instance and the proximity to the points of reception (i.e., the Project vibration levels in the environment generally decrease as the distance between the point of reception and maximum charge weight detonated at a given instance [i.e., delay period]). The potential effects are consistent with those summarized in **Section 7.3.1.2.1.1.**

7.3.1.2.2.2 Mitigation and Enhancement Measures

No mitigation is expected for vibration from the vehicle traffic along the road due to the operation of the Community Access Road.

See **Section 7.3.1.2.1.3** for mitigation measures that relate to blasting. These will be carried forward to the quarry blasting that occurs during the Operation and Maintenance Phase.

7.3.1.2.2.3 Predicted Residual Effects

Vehicle use on the road due to the operation of the Community Access Road has not been carried forward for further assessment as no residual effect is expected.

Vibration during operations from quarry blasting may result in a potential effect because it is predicted that, after the implementation of mitigation measures, exceedances of applicable criteria at potential points of reception may occur. This potential effect is therefore carried through for further assessment in the following sections, including an assessment of significance.

7.3.1.3 Summary of Potential Effects, Mitigation and Enhancement Measures, and Identification of Residual Effects

Table 7-11 provides a summary of the potential effects due to Project–environment interactions during Construction and Operation and Maintenance of the Project, mitigation and enhancement measures, identification of residual effects identified in previous sections.

Table 7-11: Summary of Potential Effects, Mitigation and Enhancement Measures and Predicted Residual Effects on Acoustic and Vibration Environment

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures	Predicted Residual Effect
Noise	■ Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the right-of-way and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turn-around areas, and temporary construction camps) ■ Reclamation and decommissioning of access roads, temporary laydown areas, staging areas and construction camps ■ Use of pits and quarries	Construction	Project construction activities may result in an increase in noise levels	■ Conduct construction activities during the daytime period (i.e., 7 a.m. to 7 p.m.). Nighttime work is not anticipated. In the event construction will occur beyond the daytime period, applicable mitigation measures will be reviewed and implemented as required. ■ Check that equipment and machinery used on site is maintained in good working conditions through regular maintenance and inspection. ■ Design access roads to minimize reversing, which is expected to minimize use of backup beepers, where possible. ■ Locate and operate construction equipment as far as possible from points of reception. ■ Engage with Indigenous communities and relevant stakeholders to coordinate the planned construction schedule before the start of construction and prior to specific noisy activities to minimize overlap with the timing of traditional land use activities (e.g., fall and spring hunting seasons). ■ Where reasonable and practicable, turn off vehicles and equipment when idle, unless weather and / or safety conditions dictate the need for them to remain turned on and in a safe operating condition. ■ Investigate noise concerns as they arise through a complaint resolution mechanism developed by the Owner / Operator whereby persons can contact the Project team if there are perceived noise issues. ■ Operate vehicles and equipment to minimize impulsive noise, where possible.	Net residual effect in noise levels during construction activities
	■ Operation and maintenance of the right-of-way, fencing, and permanent access roads ■ Use of pits and quarries	Operation and Maintenance	Project operation and maintenance activities may result in an increase in noise levels	■ Maintain the surface of the roadway such that rough surface conditions are avoided. ■ Operate pits and quarries in accordance with NPC-300 and applicable permitting requirements. ■ Conduct maintenance activities during the daytime period (i.e., 7 a.m. to 7 p.m.). ■ Check that equipment and machinery used for site maintenance is maintained in good working conditions through regular maintenance and inspection. ■ Where reasonable and practicable, turn off maintenance equipment when idle, unless weather and / or safety conditions dictate the need for them to remain turned on and in a safe operating condition. ■ Operate maintenance equipment to minimize impulsive noise, where possible.	Net residual effect in noise levels during operation and maintenance activities
Vibration	■ Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the right-of-way and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turn-around areas, and temporary construction camps) ■ Reclamation and decommissioning of access roads, temporary laydown areas, staging areas and construction camps ■ Use of pits and quarries	Construction	Project construction activities may result in an increase in vibration levels	■ Develop a Construction Vibration Workplan prior to the start of construction describing the construction schedule, list of construction equipment, list of point of reception locations (i.e., traditional land use, residential, heritage structures and utilities), applicable guidance documents including criteria and control measures. ■ Consider the use of frequency-dependent vibration limits as more detailed information regarding the construction activities is known. ■ Engage with Indigenous communities and relevant stakeholders to coordinate the planned construction schedule before the start of construction and prior to specific activities that may generate vibration to minimize overlap with the timing of traditional land use activities (e.g., fall and spring hunting seasons). ■ Investigate vibration concerns as they arise through a complaint resolution mechanism whereby persons can contact the Project team if there are perceived vibration issues. ■ Construction activities should be limited to the daytime period (i.e., 7 a.m. to 7 p.m.). Nighttime work is not anticipated. In the event construction will occur beyond the daytime period, applicable mitigation measures will be reviewed and implemented as required. ■ Locate and operate construction equipment as far as possible from points of reception.	Net residual effect in vibration levels during construction activities

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures	Predicted Residual Effect
				■ Avoid operating equipment that is expected to generate significant vibration at the same time. Operating them separately may reduce overall vibration levels. ■ Construction blasting will be carried out in compliance with the Ontario Provincial Standard Specification 120 and NPC-119.The Ontario Provincial Standard Specification 120 details items such as vibration limits, protective measures, pre-blast surveys and notification to nearby owners and tenants. All blasts, which might impact local structures or disrupt humans, will be monitored for ground and air vibrations. ■ Blasting at temporary or existing quarries will be carried out to comply with the conditions provided in the licence or aggregate permit, if a licence or aggregate permit exists or is required. ■ Blasting delays and blast mats will be used, as appropriate, to control vibration and fly rock as required.	
	■ Operation and maintenance of the right-of-way, fencing, and permanent access roads ■ Use of pits and quarries	Operation and Maintenance	Project operation and maintenance activities may result in an increase in vibration levels	■ Maintain the surface of the roadway such that rough surface conditions are avoided. ■ Blasting will be carried out in compliance with NPC-119. ■ Quarry blasting will be carried out to comply with the conditions provided in the licence or aggregate permit, if a licence or aggregate permit exists or is required. ■ Blasting delays and blast mats will be used, as appropriate, to control vibration and fly rock as required.	Net residual effect in vibration levels during operations and maintenance activities (quarry blasting)

a.m. = morning period; p.m. = afternoon period.

7.3.2 Characterization of Predicted Residual Effects

Assuming effective implementation of all mitigation and enhancement measures presented in **Table 7-11**, residual effects as a result of the Project are predicted for noise and vibration, and are included in the characterization of predicted residual effects and cumulative effects assessment. Predicted residual effects are characterized according to the effect characteristics of context, direction, magnitude, geographic extent, duration, frequency, reversibility, and likelihood (**Section 4.6.2.4**). Uncertainty was assessed based on existing conditions data, the understanding of the Project-related effects, and the levels of certainty associated with the effectiveness of proposed mitigation measures. Remaining uncertainty was primarily addressed by making assumptions that overestimated rather than underestimated potential effects of the Project.

A description of the predicted residual effects of the Project on acoustic and vibration environment is presented below and summarized in **Table 7-12**.

7.3.2.1 Increase in Noise Level during Construction

Taking into account the implementation of the mitigation measures, the magnitude of the residual effects from the increased noise during Construction has the potential to range from low to high, depending on the distance between the points of reception and the construction activities. Therefore, for a conservative assessment, the residual effects were assessed to be high. The residual effects were assessed to be local in geographic extent, short-term and reversible. Due to the expected intermittent use of specific point of reception locations and the infrequent nature of construction activities in the proximity of a given point of reception, the frequency was assessed to be infrequent. Uncertainty was considered to be moderate, as the Project-related effects are mostly understood, there is a level of certainty associated with the effectiveness of proposed mitigations, and conservative assumptions were applied.

Because the residual effects from the increased noise during Construction are not predicted to be long-term in duration or frequent, the residual effects during Construction are assessed as not significant.

7.3.2.2 Increase in Noise Level during Operation and Maintenance

Taking into account the implementation of the mitigation measures, the magnitude of the residual effects from the increased noise from the operation of the Community Access Road was assessed to be low. The magnitude of the residual effects from the operation of quarries has the potential to range from low to high and therefore, for a conservative assessment, was assessed to be high. The residual effects were assessed to be local in geographic extent, long-term and reversible. For operation of the Community Access Road, due to the expected intermittent use of specific point of reception locations, the frequency was assessed to be frequent. For operation of the quarries, due to the expected

intermittent use of specific point of reception locations and the infrequent nature of quarry use in the proximity of a given point of reception, the frequency was assessed to be infrequent. Uncertainty was considered to be moderate, as the Project-related effects are mostly understood, there is a level of certainty associated with the effectiveness of proposed mitigations, and conservative assumptions were applied.

As the magnitude of the residual effects from the increased noise due to road operations is low, and the residual effects from the increased noise due to quarry use are not predicted to be frequent, the residual effects during Operation and Maintenance are assessed as not significant.

7.3.2.3 Increase in Vibration Level during Construction

Taking into account the implementation of the mitigation measures, the magnitude of the residual effects from the increased vibration during Construction has the potential to range from low to high, depending on the distance between the points of reception and the construction activities. Therefore, for a conservative assessment, the residual effects were assessed to be high. The residual effects were assessed to be local in geographic extent, short-term and reversible. Due to the expected intermittent use of specific point of reception locations and the infrequent nature of construction activities in the proximity of a given point of reception, the frequency was assessed to be infrequent. Uncertainty was considered to be moderate, as the Project-related effects are mostly understood, there is a level of certainty associated with the effectiveness of proposed mitigations, and conservative assumptions were applied.

Because the residual effects from the increased vibration during Construction are not predicted to be long term in duration or frequent, the residual effects during Construction are assessed as not significant.

7.3.2.4 Increase in Vibration Level during Operation and Maintenance

Taking into account the implementation of the mitigation measures, the magnitude of the residual effects from the increased vibration during operations (i.e., quarry blasting) has the potential to range from low to high, depending on the distance between the points of reception and the construction activities. Therefore, for a conservative assessment, the residual effects were assessed to be high. The residual effects were assessed to be local in geographic extent, short-term and reversible. Due to the expected intermittent use of specific point of reception locations and the infrequent nature of construction activities in the proximity of a given point of reception, the frequency was assessed to be infrequent. Uncertainty was considered to be moderate, as the Project-related effects are mostly understood, there is a level of certainty associated with the effectiveness of proposed mitigations, and conservative assumptions were applied.

Because the residual effects from the increased vibration during Operation and Maintenance (i.e., from quarry blasting) are not predicted to be long-term in duration or frequent, the residual effects during Operation and Maintenance are assessed as not significant.

7.3.2.5 Summary

Table 7-12 provides a summary of the residual effects related to the acoustic and vibration environment.

Table 7-12: Characterization of Predicted Residual Effects and Determination of Significance for Acoustic and Vibration Environment Valued Components

Valued Component	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Probability of Occurrence	Significance (Significant, Not Significant)	Uncertainty	Direct / Indirect
Noise	Net change in noise levels during construction activities	Identified noise sensitive points of reception are expected to be used intermittently for short periods of time.	Negative	High	Local	Short term	Infrequent	Reversible	Certain	Not significant	Moderate	Direct
Noise	Net change in noise levels during operations and maintenance activities (road / quarry)	Identified noise sensitive points of reception are expected to be used intermittently for short periods of time.	Negative	Low / High	Local	Long term	Frequent / Infrequent	Reversible	Certain	Not significant	Moderate	Direct
Vibration	Net change in vibration levels during construction activities	Identified vibration sensitive points of reception are expected to be used intermittently for short periods of time.	Negative	High	Local	Short term	Infrequent	Reversible	Certain	Not significant	Moderate	Direct
Vibration	Net change in vibration levels during operations and maintenance activities (quarry blasting)	Identified vibration sensitive points of reception are expected to be used intermittently for short periods of time.	Negative	High	Local	Short term	Infrequent	Reversible	Certain	Not significant	Moderate	Direct

8. Cumulative Effects Assessment

The *Canadian Environmental Assessment Act,* 2012 (Government of Canada, 2019) requires that each Environmental Assessment of a project take into account any cumulative environmental effects that are likely to result from the project in combination with the environmental effects of other physical activities that have been or will be carried out.

This section presents the assessment of potential cumulative effects completed as part of the Project. The effects of past and present activities on the study area and Valued Components identified for the Project were assessed and results are described in the following sections.

The cumulative effects assessment builds on the results of the effects assessment described in **Section 7** and will consider the incremental changes that are predicted to have a likely residual adverse effect on a Valued Component.

8.1 Cumulative Effects Scoping

8.1.1 Valued Components with Residual Effects

Where residual effects identified in **Section 7** were negligible magnitude, unlikely or possible to occur, or positive in direction, the effect was not carried forward into the cumulative effects assessment. The residual effects that have been carried forward for assessment are described in **Table 8-1.**

Table 8-1: Valued Components and Residual Effects

Valued Component	Residual Effect
Noise	Increase in noise level during Construction Increase in noise level during Operations and Maintenance
Vibration	Increase in vibration level during Construction Increase in vibration level during Operations and Maintenance

8.1.2 Spatial and Temporal Boundaries

The spatial boundary for the cumulative effects assessment corresponds to the geographic extent that the likely residual adverse effects of the Project are predicted to occur. The study area used in the cumulative effects assessment is the same as the acoustic and vibration environment effects assessment Local Study Area used for the residual effects assessment (**Section 4.3.3.2.2**).

Temporal boundaries for the cumulative effects assessment correspond to the duration that the likely residual adverse effects of the Project are predicted to occur. There are currently no plans to decommission the Community Access Road as there is no expected / known end date for its need. Therefore, future suspension, decommissioning, and eventual abandonment was not considered in this report. It will be considered if and when a decommissioning or abandonment application is made for the Community Access Road.

The Project is planned to occur in two phases:

- **Construction Phase**—The time from start of Construction, including site preparation activities, to the start of Operations and Maintenance of the Community Access Road. Decommissioning of construction works is included in the Construction Phase. The Construction Phase is anticipated to take approximately three to ten years to complete; and
- **Operation and Maintenance Phase**—The Operation and Maintenance Phase starts once construction activities are complete and lasts for the life of the Project. The Operation and Maintenance Phase of the Project is considered to be permanent based on the expected timeline for when major refurbishment of road components (e.g., bridges) is anticipated.

In determining the temporal boundaries for the cumulative effects assessment, in particular the long duration of the Operation and Maintenance Phase, consideration was given to the long-term effects on the well-being of present and future generations. **Table 8-2** summarizes the spatial and temporal boundaries for the cumulative effects assessment.

Table 8-2: Spatial and Temporal Boundaries

Valued Component	Spatial Boundary	Temporal Boundary
Noise	Construction Disturbance Area plus a 4 km buffer	Construction Operation and Maintenance
Vibration	Construction Disturbance Area plus a 4 km buffer	Construction Operation and Maintenance

8.1.3 Physical Activities Inclusion List

To determine the spatial boundaries of potential cumulative effects, two related projects within the noise and vibration Regional Study Area were considered for the cumulative effects assessment (**Table 8-3, Figure 8-1**).

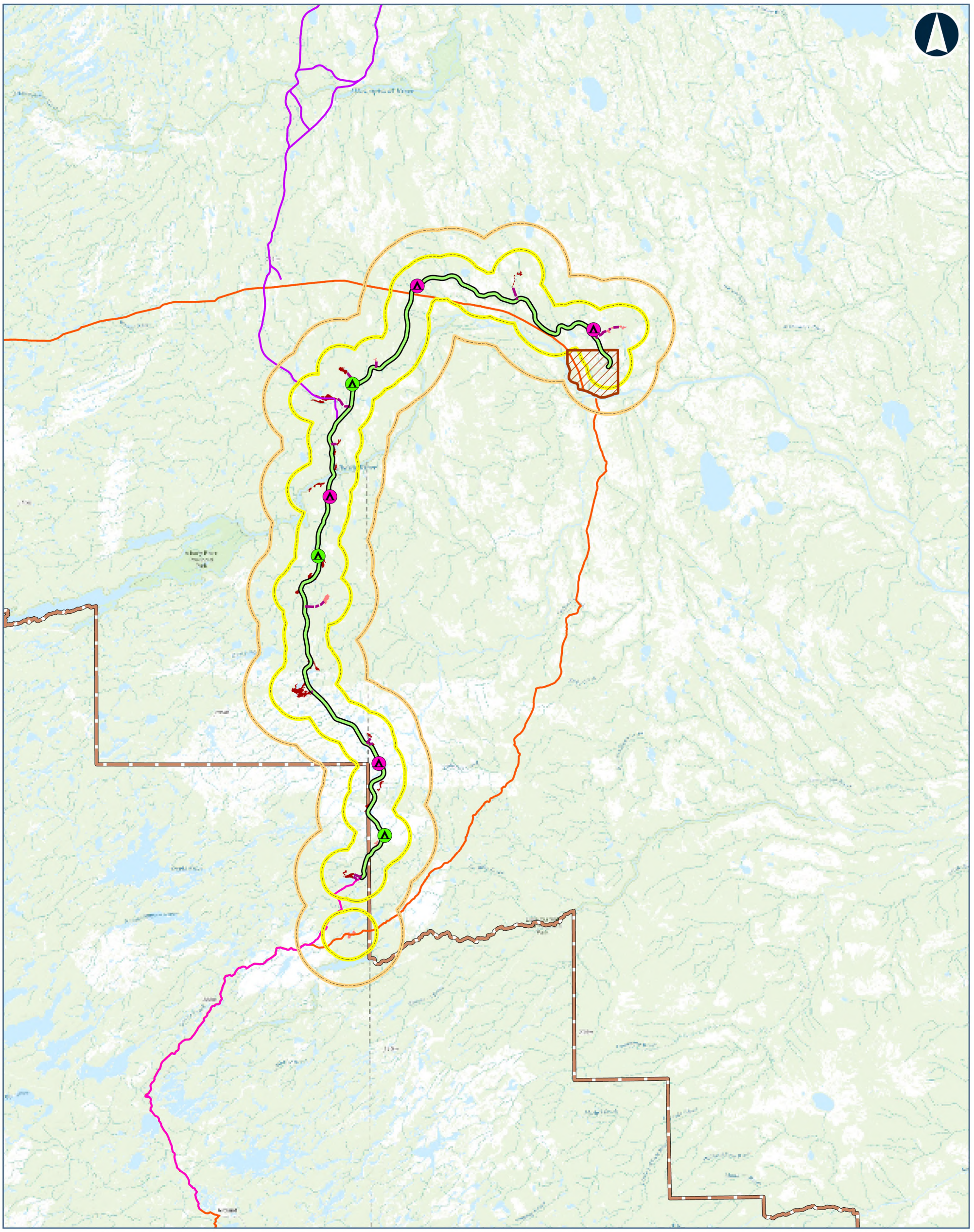
The proposed Northern Road Link would be a new all-season multi-use gravel road to be constructed between the Marten Falls First Nation Community Access Road and the Webequie Supply Road in northwestern Ontario (**Table 8-3**). The construction schedule is not finalized however, the expectation is for the Northern Road Link to begin construction during the construction of the northern portion of Community Access Road.

The Anaconda and Painter Lake Road Upgrades will be completed to allow construction of the Project as they are required for heavy vehicles accessing the Project route during the Community Access Road Construction and Operation and Maintenance phases. The potential scope of work is expected to include roadway widening, culvert and bridge replacements / rehabilitations to accommodate higher weight vehicles, and road base improvements. These upgrades would be completed in advance of the Community Access Road Construction phase. The road upgrades are in the planning and design study phase.

Table 8-3: Project and Physical Activity Inclusion List for Noise and Vibration

Project	Identified in *Tailored Impact Statement Guidelines* (Y / N)	Location	Status	Distance (km) and Direction from the Project	Developer / Company	Project Start Date	Project Duration	Project Completion Date	Assumed Temporal Overlap with Community Access Road Activities (Y / N)	Project Description	Acoustic and Vibration Environment Valued Components Temporal Overlap with Project (Y / N)	Acoustic and Vibration Environment Valued Components Spatial Overlap with Project (Y / N)	Included in Cumulative Effects Assessment (Y / N)
Northern Road Link	Yes	Between the Community Access Road and Webequie Supply Road, northwestern Ontario	Impact Assessment ongoing	0 (adjacent or overlapping)	Webequie First Nation Marten Falls First Nation	October 28, 2020	Unknown	Unknown	Yes – construction and operation will overlap with Community Access Road construction (expected for Northern Road Link to begin construction during construction of northern portion of Community Access Road.	■ Marten Falls First Nation and Webequie First Nation are proposing to build, operate and maintain an all-season multi-use road and associated infrastructure between the Community Access Road that has been proposed by Marten Falls First Nation and the supply road that has been proposed by Webequie First Nation. ■ *Terms of Reference* for the preparation of an Environmental Assessment were approved March 3, 2023.	Yes	Local Study Area – Yes Regional Study Area – Yes	Yes
Anaconda and Painter Lake Road Upgrades	Yes	James Bay Lowlands	Unknown	0 (adjacent or overlapping)	In discussions: Ministry of Transportation, Ontario and Aroland First Nation	Not Started	2-5 years	Unknown	Yes –operation expected to overlap with Community Access Road construction and operation	■ Upgrades to existing road will be required for heavy vehicles accessing the Community Access Route during construction and operations. ■ Currently discussions on proponency and scope of work are underway. ■ Potential scope of work is expected to include roadway widening, culvert and bridge replacements / rehabilitations to accommodate higher weight vehicles, and road base improvements. ■ This project will be completed prior to the start of the construction of the Community Access Road and therefore the upgrades to these roads is not expected to overlap with the construction of the Community Access Road.	Yes	Local Study Area – Yes Regional Study Area – Yes	Yes
Winter Road Realignment Project	No	Various	Ongoing	0	Ministry of Northern Economic Development and Growth	2025	Unknown	Unknown	Yes – construction and operations will overlap with CAR construction (expected to occur concurrently)	■ Funding to remote northern communities for projects involving installation of water crossing infrastructure, such as pre-engineered bridges and culverts, and repairs to existing structures. ■ Funding for approximately 3,200 kilometres of winter roads in Northern Ontario.	Yes	Yes	No, the winter roads are included in the landcover for existing condition.

km = kilometre.



LEGEND

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY

PHYSICAL ACTIVITIY PROJECT INCLUSION

RFD
- ANACONDA AND PAINTER LAKE ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPIDLYNX BROADBAND PROJECT

Data Source:
Base Data: Provided by MNRF 2019; Route Infrastructure - Provided by AECOM 2019. Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Physical Activities Inclusions in the Acoustic Local and Regional Study Areas

0 4 8 16 24 32
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:700,000 * when printed 11"x17"
Rev:0	

Figure 8-1

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2024), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0021_Acoustics_Effects_Assessment\0021_Acoustics_Effects_Assessment.aprx
Date Saved: 2/12/2026 5:33 PM User Name: gld_rduval

8.1.4 Summary of Outcome

Two projects identified within **Table 8-3** have the potential for residual effects to overlap with the spatial and temporal boundaries of the acoustic and vibration environment Valued Components (**Table 8-1**). Both projects and Valued Components have been considered for the cumulative effects assessment (**Section 8.2**). **Table 8-4** summarizes the outcome of the cumulative effects scoping.

Table 8-4: Summary of Outcome

Past, Existing and Future Physical Activities / Projects	Valued Component Carried Forward	Results of Scoping
Northern Road Link	■ Noise ■ Vibration	Construction and operations are expected to overlap with the Project Construction and Operation and Maintenance Phases. This has the potential to affect noise and vibration through similar noise and vibration sources during construction and operations as Project Construction and Operation and Maintenance (e.g., use of heavily mobile equipment, road traffic, potential blasting). Both the Marten Falls First Nation Community Access Road Project and Northern Road Link project have the potential for residual effects on the noise and vibration Valued Components through the use of construction equipment, road traffic, and potential blasting. The residual effects from both projects may overlap temporally during the Project's Construction and Operation and Maintenance Phases. Spatially, residual effects from the Northern Road Link project may overlap with the residual effects from the Marten Falls First Nation Community Access Road Project within the Local Study Area.
Anaconda and Painter Lake road upgrades	■ Noise ■ Vibration	Operations are expected to overlap with the Project Construction and Operation and Maintenance Phases. This has the potential to affect noise and vibration through similar noise and vibration sources as Project Operations (e.g., use of heavily mobile equipment for maintenance, road traffic). Both the Marten Falls First Nation Community Access Road Project and Anaconda and Painter Lake road upgrades Project have the potential for residual effects on the noise and vibration Valued Components through the use of construction equipment and road traffic. The residual effects from both projects may overlap temporally during the Construction and Operation and Maintenance Phases. Spatially, residual effects from the Anaconda and Painter Lake road project may overlap with the residual effects from the Marten Falls First Nation Community Access Road project within the Local Study Area.

8.2 Cumulative Effects Assessment

8.2.1 Increase in Noise Level during Construction

8.2.1.1 Potential Cumulative Effects

As discussed in **Section 8.1**, the construction of the Northern Road Link project, the operations of the Anaconda and Painter Lake road upgrades project, and the construction of the Project have the potential for cumulative effects on noise through the use of heavy mobile equipment and road traffic. The potential for cumulative effects on noise during Project Construction will depend on a number of factors including:

- The locations of active heavy mobile equipment and road traffic and potential for spatial overlap of effects;
- The distance of any nearby points of reception to any spatial overlap of effects; and
- The timing of the use of active heavy mobile equipment and the potential for temporal overlap of effects.

Predictive noise modelling of cumulative effects was not completed due to a lack of detailed information related to the other projects; a qualitative cumulative effects assessment was carried out.

8.2.1.2 Mitigation Measures

It is anticipated that mitigation measures will be, or have been, implemented to limit noise levels during the construction of the Northern Road Link project and the operations of the Anaconda and Painter Lake road upgrades project, and that these mitigation measures will be similar to those implemented for the Project. Mitigations expected to be followed are those listed in **Section 7.3.1.1.1.2**. No additional Project mitigation is required based on the cumulative effects assessment.

8.2.1.3 Predicted Cumulative Effects

Noise emissions from the construction of the Northern Road Link project, the operations of the Anaconda and Painter Lake road upgrades project and construction of the Project may result in a potential effect because it is predicted that, after the implementation of mitigation measures, exceedances of applicable criteria at potential points of reception may occur. This potential cumulative effect is therefore carried through to the characterization of cumulative effects.

8.2.1.4 Characterization of Cumulative Effects

Taking into account the implementation of the mitigation measures and the potential spatial and temporal overlap with other projects, the magnitude of the cumulative effects from the increased noise during Construction has the potential to range from low to high, depending on the distance between the points of reception and the construction activities. Therefore, for a conservative assessment, the cumulative effects were assessed to be high. The cumulative effects were assessed to be local in geographic extent, short-term and reversible. Due to the expected intermittent use of specific point of reception locations and the infrequent nature of Project construction activities and any temporal and spatial overlap with other projects in the proximity of a given point of reception, the frequency was assessed to be infrequent.

8.2.2 Increase in Noise Level during Operations and Maintenance

8.2.2.1 Potential Cumulative Effects

As discussed in **Section 8.1**, the construction and operations and maintenance of the Northern Road Link project, the operations of the Anaconda and Painter Lake road upgrades project, and the operations and maintenance of the Project have the potential for cumulative effects on noise through the use of heavy mobile equipment and road traffic. The potential for cumulative effects on noise during Project Operations and Maintenance will depend on a number of factors including:

- The locations of active heavy mobile equipment and road traffic and potential for spatial overlap of effects;
- The distance of any nearby points of reception to any spatial overlap of effects; and
- The timing of the use of active heavy mobile equipment and the potential for temporal overlap of effects.

Note that the road traffic volumes provided in **Table 4-20** included traffic volumes expected from other future projects (e.g., Northern Road Link), so an increase in road traffic is not anticipated compared to those volumes considered in the Project residual effects assessment.

8.2.2.2 Mitigation Measures

It is anticipated that mitigation measures will be, or have been, implemented to limit noise levels during the construction and operations and maintenance of the Northern Road Link project and the operations of the Anaconda and Painter Lake road upgrades project and that these mitigation measures will be similar to those implemented for the Project. Mitigations expected to be followed are those listed in **Section 7.3.1.1.1.2**. No additional Project mitigation is required based on the cumulative effects assessment.

8.2.2.3 Predicted Cumulative Effects

Noise emissions from the construction and operations and maintenance of the Northern Road Link project, the operations of the Anaconda and Painter Lake road upgrades project, and operations and maintenance of the Project may result in a potential effect because it is predicted that, after the implementation of mitigation measures, exceedances of applicable criteria at potential points of reception may occur. This potential cumulative effect is therefore carried through to the characterization of cumulative effects.

8.2.2.4 Characterization of Cumulative Effects

Taking into account the implementation of the mitigation measures and the potential spatial and temporal overlap with other projects, the magnitude of the cumulative effects from the increased noise from the operation of the Community Access Road was assessed to be low. The magnitude of the cumulative effects from the operation of quarries has the potential to range from low to high and therefore, for a conservative assessment, was assessed to be high. The cumulative effects were assessed to be local in geographic extent, long-term and reversible. For operations of the Community Access Road, due to the expected intermittent use of specific point of reception locations, the frequency was assessed to be frequent. For operation of the quarry, due to the expected intermittent use of specific point of reception locations and the infrequent nature of quarry use and any spatial and temporal overlap with other projects in the proximity of a given point of reception, the frequency was assessed to be infrequent.

8.2.3 Increase in Vibration Level during Construction

8.2.3.1 Potential Cumulative Effects

As discussed in **Section 8.1**, the construction of the Northern Road Link project, the operations of the Anaconda and Painter Lake road upgrades project, and construction of the Project have the potential for cumulative effects on vibration through the use of heavy mobile equipment and blasting. The potential for cumulative effects on vibration during Project Construction will depend on a number of factors including:

- The locations of active heavy mobile equipment and blasting and potential for spatial overlap of effects;
- The distance of any nearby points of reception to any spatial overlap of effects; and
- The timing of the use of active heavy mobile equipment and blasting and the potential for temporal overlap of effects.

8.2.3.2 Mitigation Measures

It is anticipated that mitigation measures will be, or have been, implemented to limit vibration levels during the construction of the Northern Road Link project and the operations of the Anaconda and Painter Lake road upgrades project, and that these mitigation measures will be similar to those implemented for the Project. Mitigations expected to be followed are those listed in **Section 7.3.1.2.1.3**. No additional Project mitigation is required based on the cumulative effects assessment.

8.2.3.3 Predicted Cumulative Effects

Vibration during construction of the Northern Road Link project, the operations of the Anaconda and Painter Lake road upgrades project, and construction of the Project may result in a potential effect because it is predicted that, after the implementation of mitigation measures, exceedances of applicable criteria at potential points of reception may occur. This potential cumulative effect is therefore carried through to the characterization of cumulative effects.

8.2.3.4 Characterization of Cumulative Effects

Taking into account the implementation of the mitigation measures and the potential spatial and temporal overlap with other projects, the magnitude of the cumulative effects from the increased vibration during construction has the potential to range from low to high, depending on the distance between the points of reception and the construction activities. Therefore, for a conservative assessment, the cumulative effects were assessed to be high. The cumulative effects were assessed to be local in geographic extent, short-term and reversible. Due to the expected intermittent use of specific point of reception locations and the infrequent nature of construction activities in the proximity of a given point of reception, the frequency was assessed to be infrequent.

8.2.4 Increase in Vibration Level during Operations and Maintenance

8.2.4.1 Potential Cumulative Effects

As discussed in **Section 8.1**, the construction and operations and maintenance of the Northern Road Link project, the operations of the Anaconda and Painter Lake road upgrades project, and the operations and maintenance of the Project have the potential for cumulative effects on vibration through the use of heavy mobile equipment and blasting, if applicable. The potential for cumulative effects on vibration during Project Operations and Maintenance will depend on a number of factors including:

- The locations of active heavy mobile equipment and blasting and potential for spatial overlap of effects;

- The distance of any nearby points of reception to any spatial overlap of effects; and
- The timing of the use of active heavy mobile equipment and blasting and the potential for temporal overlap of effects.

8.2.4.2 Mitigation Measures

It is anticipated that mitigation measures will be, or have been, implemented to limit vibration levels during the construction and operations and maintenance of the Northern Road Link project and the operations of the Anaconda and Painter Lake road upgrades project, and that these mitigation measures will be similar to those implemented for the Project. Mitigations expected to be followed are those listed in **Section 7.3.1.2.1.3**. No additional Project mitigation is required based on the cumulative effects assessment.

8.2.4.3 Predicted Cumulative Effects

Vibration during construction and operations and maintenance of the Northern Road Link project, the operations of the Anaconda and Painter Lake road upgrades project, and construction of the Project may result in a potential effect because it is predicted that, after the implementation of mitigation measures, exceedances of applicable criteria at potential points of reception may occur. This potential cumulative effect is therefore carried through to the characterization of cumulative effects.

8.2.4.4 Characterization of Cumulative Effects

Taking into account the implementation of the mitigation measures and the potential spatial and temporal overlap with other projects, the magnitude of the cumulative effects from the increased vibration during operations (i.e., quarry blasting) has the potential to range from low to high, depending on the distance between the points of reception and the construction activities. Therefore, for a conservative assessment, the cumulative effects were assessed to be high. The cumulative effects were assessed to be local in geographic extent, short-term and reversible. Due to the expected intermittent use of specific point of reception locations and the infrequent nature of construction activities in the proximity of a given point of reception, the frequency was assessed to be infrequent.

8.2.5 Prediction Confidence and Uncertainty

Within a cumulative effects assessment, there is inherently a level of uncertainty due to the level of information available regarding other projects, including reasonably foreseeable developments. However, this uncertainty is managed by making conservative assumptions regarding these projects' design or activities. There is a good understanding of the effects on noise and vibration related to permanent roads and road upgrade projects. Similarly, the mitigation measures and best management practices for these types of projects are standard, routinely and effectively implemented across Canada, and required as part of permit conditions.

There is also a good understanding of the noise and vibration existing conditions within the Local Study Area and the resilience and adaptability of the noise and vibration Valued Components.

Overall, uncertainty levels for the cumulative effects assessment were considered to be **moderate**, as the Project-related effects are mostly understood, there is a level of certainty associated with the effectiveness of proposed mitigations, and conservative assumptions were applied.

8.2.6 Summary

Table 8-5 provides a summary of the cumulative effects related to the acoustic and vibration environment.

Table 8-5: Characterization of Predicted Cumulative Effects and Determination of Significance for Acoustic and Vibration Environment Valued Components

Valued Component	Cumulative Effect	Context	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Probability of Occurrence	Uncertainty
Noise	Increase in noise level during Construction	Identified noise sensitive points of reception are expected to be used intermittently for short periods of time.	Negative	High	Local	Short term	Infrequent	Reversible	Certain	Moderate
Noise	Increase in noise level during Operations and Maintenance (road / quarry)	Identified noise sensitive points of reception are expected to be used intermittently for short periods of time.	Negative	Low / High	Local	Long term	Frequent / Infrequent	Reversible	Certain	Moderate
Vibration	Increase in vibration level during Construction	Identified vibration sensitive points of reception are expected to be used intermittently for short periods of time.	Negative	High	Local	Short term	Infrequent	Reversible	Certain	Moderate
Vibration	Increase in vibration level during Operations and Maintenance	Identified vibration sensitive points of reception are expected to be used intermittently for short periods of time.	Negative	High	Local	Short term	Infrequent	Reversible	Certain	Moderate

9. Monitoring Programs and Future Commitments

A monitoring program verifies the accuracy of the effects assessment and evaluates the effectiveness of mitigation measures. Monitoring programs also include future commitments related to mitigating residual effects and addressing uncertainty. A Project-specific Environmental Monitoring Program will be developed and implemented that includes the monitoring commitments related to acoustic and vibration environment Valued Components presented in this section.

9.1 Pre-Construction Monitoring Program

No pre-construction noise or vibration monitoring is recommended for the Project.

9.2 Construction Monitoring Program

A noise monitoring program is not recommended for the Project. Vibration monitoring is expected to be required for both temporary quarries and general construction blasting activities to align with Ministry of the Environment, Conservation and Parks / Ministry of Natural Resources requirements and general industry practices, respectively. Monitoring requirements will be considered and assessed once detailed information regarding the blast designs are available. Based on typical blasts, monitoring would be recommended for construction blasting within 250 m and quarry blasts within 500 m of receptors verified to be vibration sensitive.

9.3 Operations Monitoring Program

No operations noise monitoring is recommended for the Project.

Vibration monitoring is expected to be required for permanent quarries to align with Ministry of the Environment, Conservation and Parks / Ministry of Natural Resources requirements. Monitoring requirements will be considered and assessed once detailed information regarding the blast designs are available. Based on typical blasts, monitoring would be recommended for quarry blasts within 500 m of receptors verified to be vibration sensitive.

9.4 Future Commitments

All mitigation and enhancement measures outlined in **Section 7.0** will be adhered to, including future commitments outlined in **Table 9-1**.

Table 9-1: Summary of Future Commitments

Valued Component	Commitment	Phase	Section Reference
Noise	Obtain Ministry of the Environment, Conservation and Parks / Ministry of Natural Resources permit or licence, if required, for pits and quarries operating during Project operations	Pre-construction	**Section 7.3.1.1.2.1**
Vibration	Develop a Construction Vibration Workplan prior to the start of construction describing the construction schedule, list of construction equipment, list of point of reception locations (i.e., traditional land use, residential, heritage structures and utilities), applicable guidance documents including criteria and control measures	Pre-construction	**Section 7.3.1.2.1.3**

9.5 Future Permits and Approvals

To facilitate the construction of the Community Access Road, including construction activities and temporary infrastructure, permits and approvals from provincial, federal government and other jurisdictional agencies will need to be acquired. A preliminary list of permits and approvals anticipated to be applicable or potentially applicable to the Project for acoustics and vibration are detailed in **Table 9-2**. This list is based on a conceptual level of design, and the final determination of permits and approvals that will be required will occur as the design is further.

Table 9-2: Summary of Potential Permits and Approvals List

Permit / Approval	Issuing Authority	Purpose / Scope	Considerations / Next Steps
Aggregate Resources Permit Application	Ministry of Natural Resources and Forestry	Authorizes the extraction of aggregate from a pit and quarry	To be confirmed in detailed design
Environmental Compliance Approval	Ministry of Environment, Conservation and Parks	Required to assess noise due to the extraction of aggregate from a pit and quarry	To be confirmed in detailed design.

The pits and quarries that are proposed through the Community Access Road Project will be subject to permitting requirements outlined within the *Aggregate Resources Act* and its regulations. For a permit to be issued, additional studies, mitigation plans, consultation and monitoring commitments may be required. In addition to permitting requirements under *the Aggregate Resources Act*, permitting and approvals under other pieces of legislation may also be required for pit and quarry development, including:

- Ontario *Planning Act*;
- Ontario *Water Resources Act*;
- Ontario *Environmental Protection Act*;
- Ontario *Endangered Species Act*; and
- Federal *Species at Risk Act*.

10. Summary and Recommendations

The potential effects summary and recommendations for acoustic and vibration environment Valued Components are provided in **Table 10-1**. Through the permitting stage of the Project, a Project-specific Environmental Protection Plan and Environmental Monitoring Plan will be developed and implemented that includes an implementation plan for the mitigation and monitoring commitments related to acoustic and vibration environment Valued Components that are presented in **Table 10-1**.

The potential effects and associated mitigations provided in **Table 10-1** are also applicable for the cumulative effects related to the acoustic and vibration environment Valued Components.

Table 10-1: Potential Effects Summary and Recommendations

ID	Valued Component	Environmental Concern and Potential Effect	Project Phase	Concerned Agencies	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Detailed Design	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Construction / Operation
ACOUSTIC-01	Noise	Increase in noise level during Construction	Construction	Health Canada	■ Design access roads to minimize reversing, which is expected to minimize use of backup beepers, where possible. ■ Obtain a licence and/or permit for pits and quarries, if a licence and/or permit is required.	■ Conduct construction activities during the daytime period (i.e., 7 a.m. to 7 p.m.). Nighttime work is not anticipated. In the event construction will occur beyond the daytime period, applicable mitigation measures will be reviewed and implemented as required. ■ Check that equipment and machinery used on site is maintained in good working conditions through regular maintenance and inspection. ■ Locate and operate construction equipment as far as possible from points of reception. ■ Engage with Indigenous communities and relevant stakeholders to coordinate the planned construction schedule before the start of construction and prior to specific noisy activities to minimize overlap with the timing of traditional land use activities (e.g., fall and spring hunting seasons). ■ Where reasonable and practicable, turn off vehicles and equipment when idle, unless weather and / or safety conditions dictate the need for them to remain turned on and in a safe operating condition. ■ Investigate noise concerns as they arise through a complaint resolution mechanism developed by the Owner / Operator whereby persons can contact the Project team if there are perceived noise issues. ■ Operate vehicles and equipment to minimize impulsive noise, where possible.
ACOUSTIC-02	Noise	Increase in noise level during Operations and Maintenance	Operation and Maintenance	Ministry of the Environment, Conservation and Parks / Health Canada	■ Obtain a licence and / or permit for pits and quarries continuing to operate during Project Operations, if licence and/or permit is required, which includes the completion of a noise assessment	■ Operate pits and quarries in accordance with *NPC-300* and applicable permitting requirements. ■ Conduct maintenance activities during the daytime period (i.e., 7 a.m. to 7 p.m.). ■ Check that equipment and machinery used for site maintenance is maintained in good working conditions through regular maintenance and inspection. ■ Where reasonable and practicable, turn off maintenance equipment when idle, unless weather and / or safety conditions dictate the need for them to remain turned on and in a safe operating condition. ■ Operate maintenance equipment to minimize impulsive noise, where possible.

ID	Valued Component	Environmental Concern and Potential Effect	Project Phase	Concerned Agencies	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Detailed Design	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Construction / Operation
ACOUSTIC-03	Vibration	Increase in vibration level during Construction	Construction	Ministry of the Environment, Conservation and Parks / Ministry of Natural Resources / Health Canada	■ Develop a Construction Vibration Workplan prior to the start of construction describing the construction schedule, list of construction equipment, list of point of reception locations (i.e., traditional land use, residential, heritage structures and utilities), applicable guidance documents including criteria and control measures. ■ Consider the use of frequency-dependent vibration limits as more detailed information regarding the construction activities is known. ■ Obtain a licence or aggregate permit for quarries, if a licence or aggregate permit is required.	■ Engage with Indigenous communities and relevant stakeholders to coordinate the planned construction schedule before the start of construction and prior to specific activities that may generate vibration to minimize overlap with the timing of traditional land use activities (e.g., fall and spring hunting seasons). ■ Investigate vibration concerns as they arise through a complaint resolution mechanism whereby persons can contact the Project team if there are perceived vibration issues. ■ Construction activities should be limited to the daytime period (i.e., 7 a.m. to 7 p.m.). Nighttime work is not anticipated. In the event construction will occur beyond the daytime period, applicable mitigation measures will be reviewed and implemented as required. ■ Locate and operate construction equipment as far as possible from points of reception. ■ Avoid operating equipment that is expected to generate significant vibration at the same time. Operating them separately may reduce overall vibration levels. ■ Construction blasting will be carried out in compliance with the *Ontario Provincial Standard Specification 120* and *NPC-119*.The *Ontario Provincial Standard Specification 120* details items such as vibration limits, protective measures, pre-blast surveys and notification to nearby owners and tenants. All blasts, which might impact local structures or disrupt humans, will be monitored for ground and air vibrations. ■ Blasting at temporary or existing quarries will be carried out to comply with the conditions provided in the licence or aggregate permit, if a licence or aggregate permit exists or is required. ■ Blasting delays and blast mats will be used, as appropriate, to control vibration and fly rock as required.
ACOUSTIC-04	Vibration	Increase in vibration level during Operations	Operations	Ministry of the Environment, Conservation and Parks / Ministry of Natural Resources / Health Canada	■ Obtain a licence or aggregate permit for quarries continuing to operate during Project Operations, if a licence or aggregate permit is required.	■ Blasting will be carried out in compliance with *NPC-119*. ■ Quarry blasting will be carried out to comply with the conditions provided in the licence or aggregate permit, if a licence or aggregate permit exists or is required. ■ Blasting delays and blast mats will be used, as appropriate, to control vibration and fly rock as required.

a.m. = morning period; p.m. = afternoon period.

11. References

AECOM. (2021, May). Acoustic and Vibration Environment Study Plan.

AECOM. (2024, March 13). Marten Falls Community Access Road PD EA – Traffic Data Review.

Alberta Energy and Utilities Board. (2007). Energy Resources Conservation Board – Directive 038: Noise Control. Revised edition.

Caltrans. (2020, April). *Caltrans Transportation and Construction Vibration Guidance Manual*.

Canadian Environmental Assessment Agency. (2013). Technical guidance for assessing cumulative environmental effects under the Canadian Environmental Assessment Act, 2012.

Canadian Environmental Assessment Agency. (2018). Interim Technical Guidance for Assessing Cumulative Environmental Effects under the Canada Environmental Assessment Act, 2012. https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/assessing-cumulative-environmental-effects-ceaa2012.html.

Canadian Institutes of Health Research. (2022, August 19). *Gender-Based Analysis Plus*. Retrieved from Government of Canada: https://cihr-irsc.gc.ca/e/50968.html

Chiefs of Ontario. (n.d.). *Traditional Knowledge*. Retrieved from Chiefs of Ontario: http://www.chiefs-of-ontario.org/priorities/environment/traditional-knowledge/.

Dillon. (2021). *Aboriginal and Treaty Rights and Interests Study Plan*.

Dillon. (2026). Marten Falls Community Access Road: Aboriginal and / or Treaty Rights and Interests Existing Conditions & Effects Assessment *Report*.

Dowding, C.H. (1985). *Blast Vibration Monitoring and Control*.

Federal Transit Administration. (2018). *Transit Noise and Vibration Impact Assessment Manual*.

Garvin, T., & Northern Forestry Centre (Canada). (2001). *A Guide to Conducting a Traditional Knowledge and Land Use Study. Northern Forestry Centre*.

Golder. (2021). *All Season Community Access Road: Acoustic and Vibration Environment Field Logistics Workplan*.

Government of Canada. (2019, August 28). *Impact Assessment Act (S.C. 2019, c. 28, s. 1)*. Retrieved from Justice Laws Website: https://laws.justice.gc.ca/eng/acts/I-2.75/index.html

Health Canada. (2023). *Guidance for Evaluating Human Health Effects in Impact Assessment: Noise*.

Heginbottom, J.A., M.-A. Dubreuil and P. Harker. (1995). *Permafrost – Canada. National Atlas of Canada MCR 4177*. Scale 1:7,500,000.

Impact Assessment Agency of Canada. (2020, February 24). *Marten Falls Community Access Road Project Tailored Impact Statement Guidelines*. Retrieved from https://iaac-aeic.gc.ca/050/documents/p80184/133937E.pdf

Impact Assessment Agency of Canada. (2021a, September 17). *Guidance: Gender-Based Analysis Plus in Impact Assessment*. Retrieved from Government of Canada: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/gender-based-analysis.html

Impact Assessment Agency of Canada. (2021b, July). *Glossary of Terms*. Retrieved from Canada.ca: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/glossary-of-terms.html

Impact Assessment Agency of Canada. (2022). *Acoustic and Vibration Environment Field Logistics Workplan Comments*.

International Organization for Standardization. (1996). ISO-9613-2. Acoustics – Attenuation of Sound during propagation outdoors. Part 2 – General method of calculation, 1996. (n.d.).

International Organization for Standardization. (2016). ISO 1996-1:2017 Acoustics – Description, Measurement and Assessment of Environmental Noise – Part 1: Basic Quantities and Assessment Measurement and Assessment of Environmental Noise.

International Society of Explosives Engineers (ISEE). (2016). *ISEE Blasters' Handbook*, 18th Edition, ed. J.F. Stiehr. 2016. pp. 1030

KGS Group. (2019a). MFFN Testhole Logs & Lab Testing Data – KGS Sept-Oct 2019.

KGS Group. (2019b). Environmental Assessment and Preliminary Design Services for Marten Falls Community Access Road 3-Day Helicopter Reconnaissance – Phase 1 – Final (letter to AECOM).

Kim, P. J. (2019, July 25). *Social Determinants of Health Inequities in Indigenous Canadians through a Life Course Approach to Colonialism and the Residential*

School Systems. Health Equity(3.1), 378-381. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6657289/

Marten Falls First Nation. (2017). CONFIDENTIAL. Community based land use planning mapping provided by Marten Falls First Nation regarding Trapline Areas and Wildlife Values.

Marten Falls First Nation. (2019). Indigenous Knowledge obtained by Four Rivers Environmental Services Group.

Marten Falls First Nation. (2022a). Digitized features that were sketched on a map at a meeting in Thunder Bay with Marten Falls First Nation in December 2022.

Marten Falls First Nation. (2022b). Public Information Centre #4 held December 7, 2022 (Thunder Bay) - December 8, 2022 (Geraldton).

Marten Falls First Nation. (2023). Marten Falls First Nation Indigenous Knowledge Land Use and Occupancy Study for the Northern Access Roads.

Marten Falls First Nation. (n.d.a). Confidential Indigenous Knowledge provided by Marten Falls First Nation regarding archaeological and cultural resources.

Marten Falls First Nation. (n.d.b). Mapping provided by Marten Falls First Nation community coordinator collected at the Aboriginal and Treaty Rights Information Forum Cultural Heritage Workshop.

Ministry of Environment, Conservation and Parks. (1985). *Guidelines on Information Required for Assessment of Blasting Noise and Vibration*.

Ministry of Environment, Conservation and Parks. (1978). *Model Municipal Noise Control By-law, NPC-119*.

Ministry and Environment, Conservation and Parks. (2013). *Environmental Noise Guideline - Stationary and Transportation Sources - Approval and Planning (NPC-300)*. Retrieved from https://www.ontario.ca/page/environmental-noise-guideline-stationary-and-transportation-sources-approval-and-planning

Ministry of Environment, Conservation and Parks. (2022). *Acoustic and Vibration Environment Field Logistics Workplan Comments*.

Ministry of Environment / Minstry of Transportation. (1986). *A Protocol for Dealing with Noise Concerns During the Preparation, Review, and Evaluation of Provincial Highways Environmental Assessments*.

Ministry of Natural Resources and Forestry. (2023). Ontario GeoHub: Land Information Ontario (LIO). Available at: https://geohub.lio.gov.on.ca/. Accessed January 2023.

Minstry of Transportation. (2022). *Environmental Guide for Noise*.

Natural Resources Canada. (2023). *Topographic Data of Canada – CanVec Series*. Available at https://open.canada.ca/data/en/dataset/8ba2aa2a-7bb9-4448-b4d7-f164409fe056

Ontario Provincial Standard Specification. (2014). *Ontario Provincial Standard Specification 120 General Specification for the Use of Explosives*.

Schomer, P., J. Sias and D. Maglieri. (1997). *A comparitive study of human response, indoors, to blast noise and sonic booms*. Noise Control Engineering Journal 45(4).

Siskind, D.E. (2005). *Vibrations from Blasting*. International Society of Explosives Engineers.

Women and Gender Equality Canada. (2022, June). *Gender-based Analysis Plus*. Retrieved from Government of Canada: https://women-gender-equality.canada.ca/en/gender-based-analysis-plus/what-gender-based-analysis-plus.html

World Health Organization. (1999). *Guidelines for Community Noise*.

Attachment A - Draft Study Plan, Workplan and Regulator Comments

Comments on Marten Falls Community Access Road Project (Project) revised Acoustic Environment Study Plan– January 7, 2022

It is essential that the Impact Statement for the Marten Falls Community Access Road Project (the Project) address all requirements outlined in the Tailored Impact Statement Guidelines (the Guidelines), and that the study plans outline a clear approach to achieving these requirements. The Impact Assessment Agency of Canada (the Agency) has highlighted sections of the Guidelines where requirements for the Impact Statement may not be met, based on content of the study plan submitted to the Agency. Note that this table does not provide an exhaustive list of the requirements described in the Guidelines. The Guidelines should be reviewed in their entirety, including the sections identified below.

General Comments from the Impact Assessment Agency of Canada on the Marten Falls Community Access Road Draft Study Plans – July 2, 2020					
#	**Guidelines Section[1]**	**Required Action for Proponent**	**Proponent Response**	**Final Study Plan Section Reference**	**Agency comments**
GC-01	**Section 5 - Public Participation and views (including 5.1, 5.2)**	Provide a clear description in the study plans of how public engagement opportunities have been and/or will be integrated into the impact statement phase. This must include detail on how the public will have opportunities to provide input to contribute to the development of the Impact Statement, as required in Section 5 of the Guidelines. Describe what engagement with the members of the public listed in the Public Participation Plan has been done in the development of the study plans, and/or any planned engagement with members of the public on the proposed study plans.	Section 4: describes how the Proponent will provide Project notices and opportunities with members of the public listed in the Public Partnership Plan. This will also 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.	**Section 4.1** "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."	Section 4.1 of the study plan mentions that "*a variety of activities will be offered*"; however, no details on the likely engagement activities are provided. As required by Section 5 of the Guidelines, the Impact Statement must provide a record of engagement that describes all efforts taken to seek the views of local communities and other stakeholders with respect to the Project, including on the study plans. This record of engagement is to include all engagement activities undertaken prior to the submission of the Impact Statement, including prior to and during the planning phase, and in the preparation of the Impact Statement. Provide details on the timeline for public engagement relative to the project workplan, including engagement relative to the schedule for baseline work, and in consideration of the project team's timeline for the development of the Impact Statement. Demonstrate in the Impact Statement that comments provided by members of the public on the acoustic environment conditions were taken into consideration. Comments provided to the Agency are available on the Canadian Impact Assessment Registry Internet site at: https://iaac-aeic.gc.ca/050/evaluations/proj/80184/contributions
GC-02	**Section 6 - Description of Engagement with Indigenous Groups (including 6.1, 6.2, 6.3)**	Provide a clear description in the study plans of how all Indigenous groups listed in the Indigenous Engagement and Partnership Plan will have opportunities to provide Indigenous knowledge, including the validation of how information they provided was applied. The study plan should include a description of the proposed methods for data collection, management of confidentiality, and information storage. This should also include a methodology for tracking information that has been approved by the group, to demonstrate that the guidance outlined in Section 6.2 of the Guidelines has been incorporated into the study plans. Describe what engagement with all the Indigenous groups listed in the Indigenous Engagement and Partnership Plan has been done in the development of the study plans, and/or any planned engagement	In Section 4.2 it is noted that the Proponent will provide Project notices and opportunities for consultation and engagement with Indigenous communities identified in the Indigenous Partnership and Engagement Plan. A variety of activities will be offered so that Indigenous communities are informed of the IS / EA Report as it progresses and are aware of the opportunities, means and timelines to provide their input. Section 2.1.1 outlines the approach to handling confidential information, by means of permission from Indigenous communities to include Indigenous Knowledge in the IS / EA Report, regardless of the source of the Indigenous Knowledge. The study plans have recognized Indigenous community input received on the Project to date.	**Section 4.2** "…A variety of activities will be offered so that Indigenous communities are informed of the IS / EA Report as it progresses and are aware of the opportunities, means and timelines to provide their input…" "…Indigenous communities will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process…"	Section 4.2 of the study plan states that "a variety of activities will be offered", however, no details on the planned engagement activities are provided. Section 4.2 of the study plan also states that "*Indigenous communities will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process*", however, it is unclear on which components of the study plans the project team plans to engage. It is also unclear whether Indigenous groups will be provided with a meaningful opportunity to provide input on a preliminary approach/method for baseline data collection, as required in Section 6 of the Guidelines, or if engagement will take place after the baseline data collection is complete. Provide details on the timeline for Indigenous engagement on the acoustic environment conditions, including engagement relative to the schedule for baseline work, and spatial and temporal boundaries determinations, and particularly in relation to collection of Indigenous knowledge, and in consideration of the project team's timeline for the development of the Impact Statement. Demonstrate in the Impact Statement that comments provided by Indigenous groups on the acoustic environment were taken into

[1] Refer to complete sections of the Guidelines for more context.

General Comments from the Impact Assessment Agency of Canada on the Marten Falls Community Access Road Draft Study Plans – July 2, 2020					
#	**Guidelines Section[1]**	**Required Action for Proponent**	**Proponent Response**	**Final Study Plan Section Reference**	**Agency comments**
		with Indigenous groups on the proposed study plans, particularly in relation to collection of Indigenous knowledge (i.e. develop the work plan in collaboration with those Indigenous groups that would need to provide knowledge).			consideration. Comments provided to the Agency are available on the Canadian Impact Assessment Registry Internet site at: https://iaac-aeic.gc.ca/050/evaluations/proj/80184/contributions
GC-03	**Section 6.2 - Analysis and response to questions, comments, and issues raised**	Revise the study plans to include an approach to handling confidential information that demonstrates adherence to the guidance provided in Section 6.2 of the Guidelines.	Section 2.1.1: Section has been updated to include information regarding both confidentiality and permission information on all collected Indigenous Knowledge, regardless of the source. This section also includes how information regarding the Indigenous Knowledge Sharing Agreements will be established by the Proponent and Indigenous community participating in the Program.	**Section 2.1.1** "…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)…"	As required in Section 6 of the Guidelines, describe the confidential information provided by each Indigenous group. Present the content in sufficient detail to support understanding of the potential effects and impacts on rights, while also protecting confidential/sensitive specifics and respecting stipulations in the confidentiality agreements (e.g, use buffer areas instead of specific locations, etc.). Provide to the Agency, in the form of a letter from the Indigenous group that shared confidential information, a letter confirming that: • the Indigenous group that provided confidential information is satisfied with the way the Impact Statement was informed; • the Indigenous group that provided confidential information is satisfied with the way the issue was solved or addressed.
GC-04	**Study plans spatial boundaries**	Describe the approach to be implemented to demonstrate how the definitions of the proposed study area boundaries: • encompass the anticipated boundaries of the Project's effects, including all potentially impacted local communities, municipalities and all Indigenous groups listed in the Indigenous Engagement and Partnership Plan; and • take into account 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; physical, ecological, technical, social, health, economic and cultural considerations; and the size, nature and location of past, present and foreseeable future projects and activities.	Section 6.2: General information on study areas for the Project, including a detailed list of what was considered to develop the discipline-specific local and region study areas, is included in each study plan. Each study area has been proposed taking into consideration community knowledge and Indigenous Knowledge, current or traditional land and resource use by Indigenous communities, and the exercise of Aboriginal and Treaty Rights of Indigenous peoples, including cultural and spiritual practices, physical, ecological, technical, social, health, economic and cultural considerations available at this time. The proposed discipline-specific study areas are preliminary. The proposed study areas will be consulted and engaged on early in the IA / EA process. In addition, the Indigenous Knowledge Program provides additional opportunities for community knowledge and Indigenous Knowledge, current or traditional land and resource use by Indigenous communities, and the exercise of Aboriginal and Treaty Rights of Indigenous peoples to be shared in greater detail.	**Section 6.2** "…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)..." "…The LSA and RSA boundaries for the Atmospheric Environment are detailed in Table 6-1 and on Figure 6-2…" **<u>Local Study Area</u>** Geographic Extent: - PDA plus a 4 km buffer Rationale: - The setback distance is based on professional judgement and guidance provided by AER Directive 038: Noise	As required in Section 7.4.1 of the Guidelines, provide information regarding how the following were/will be taken into account in defining the spatial boundaries: community knowledge and Indigenous knowledge; current and traditional land and resource use by Indigenous groups; exercise of Aboriginal and Treaty rights, including cultural and spiritual practices; physical, ecological, technical, social, health, economic and cultural considerations; and the size, nature and location of past, present and reasonably foreseeable future projects and activities. Provide the above information in a way that allows those who provided the knowledge to the proponent and the Agency to see their input reflected in the Impact Statement. It is not sufficient to state that "input from participants will be/was taken into account".

General Comments from the Impact Assessment Agency of Canada on the Marten Falls Community Access Road Draft Study Plans – July 2, 2020					
#	**Guidelines Section[1]**	**Required Action for Proponent**	**Proponent Response**	**Final Study Plan Section Reference**	**Agency comments**
				Control Directive (Directive 038) (EUB 2007) for noise assessments in Alberta, as no similar guidelines have been established in Ontario. Extending 4 km beyond the PDA will assist in the assessment of possible route refinements. - Since noise and vibration attenuate with distance, potential noise and vibration effects from the Project are expected to be the highest in the Acoustic and Vibration LSA, and any measurable noise and vibration effects due to the Project are predicted to be generally limited to the Acoustic and Vibration LSA. In the area beyond the Acoustic and Vibration LSA, noise and vibration levels from Project activities are expected to further attenuate, resulting in a lower potential contribution.. **<u>Regional Study Area</u>** Geographic Extent: - LSA plus a 5 km buffer Rationale: - The 5 km setback distance (from the LSA) is based on professional judgment and used to address indirect impacts outside the LSA. - Aligns with field work completed in 2019.	
GC-06	**Section 7 - Baseline Methodologies (Including 7.1, 7.2, 7.3, 7.4)**	Provide further details in the study plans on how GBA+ has been integrated into all aspects of data collection methodology, as per Section 7.1 of the Guidelines, and into the assessment of effects and impacts, as mentioned in Sections 13, 20, 21, and others, related to effects assessments of the Guidelines	Section 4.3 has been updated to include the consideration of Identity and Gender-Based Analysis Plus (GBA+) including both Indigenous communities and their relevant subpopulations and non-Indigenous communities and their subpopulations. During consultation and engagement activities these groups (and any others defined during consultation) will be engaged with on targeted input.	**Section 4.3**	Describe how Gender Based Analysis Plus (GBA Plus) has been or will be applied to the consideration of engagement activities. Identify specific methods targeted to specific subgroups. Provide detail on how GBA Plus has been integrated into all aspects of data collection methodology, as per Section 7.1 of the Guidelines, and into the assessment of effects and impacts, as mentioned in Sections 13, 20, 21, and others, related to effects assessments of the Guidelines. It is not sufficient to mention that GBA Plus will be applied to the assessment. Clear descriptions of how GBA Plus was integrated (including to which variables, method, and how it influenced results' interpretation) are needed in the Impact Statement.
GC-07	**Section 13 - Effects Assessment (including 13.1, 13.2)**	Provide details to demonstrate how the Project's potential effects will be considered, as per the requirements in Sections 13 to 19 of the Guidelines. Ensure that the effects assessment considers the effects of each of the project components and physical activities, in all phases, and that it is based on a comparison to the proposed baseline work.	Project environmental interaction are separated into Project phases, and Project activities for each environmental discipline in their VC-specific study plan listed as Table 9-1. 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	**Throughout the study plan, Section 9**	As required in Sections 7 and 13 of the Guidelines, ensure that the effects assessment considers the effects of each of the project components (including but not limited to all alternative routes brought forward in the Impact Statement, all aggregates sources, access roads, etc.) and physical activities, in all phases, and that the assessment is based on a comparison to the data and information gathered during the proposed baseline work. Clarify the level of information that will be shared with, and explained to, the Indigenous Knowledge Program leads and whether study plans will be made available to all Indigenous groups listed in the Indigenous Engagement and Partnership Plan.

General Comments from the Impact Assessment Agency of Canada on the Marten Falls Community Access Road Draft Study Plans – July 2, 2020					
#	**Guidelines Section[1]**	**Required Action for Proponent**	**Proponent Response**	**Final Study Plan Section Reference**	**Agency comments**
		Provide detail on how engagement with all Indigenous groups listed in the Indigenous Engagement and Partnership Plan and the public will inform the effects assessment and the selection of mitigation measures and follow-up program measures.	Treaty Rights and Interests environmental discipline, as well as the identification of potential mitigation measures and monitoring programs.		
GC-08	**Section 13.1**	Provide clear descriptions of the rationale behind the assumptions, including but not limited to the assumed average daily traffic and vehicles composition during the construction and operation phases that will be considered for the effects assessment and the cumulative effects assessment.	Section 10: Current assumptions to be used in the effects assessment have been identified. Any additional assumptions will be identified and rationale will be provided in the IS / EA Report.	**Section 10** "The assumptions that have been made in developing the Study Plan are detailed in Section 9. Any additional assumptions required to complete 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..."	Before conducting the effects assessment analysis, the Agency advises the proponent to seek the Federal Review Team's confirmation of the assumptions that will be used in the analysis or, at a minimum, to discuss the type of assumptions that will be considered. As required by Section 13.1 of the Guidelines, ensure that the Impact Statement clearly outlines the assumptions used for the assessment of effects, including cumulative effects, on each valued component.
GC-09	**Section 19.2 - Impacts on the Exercise of Aboriginal and Treaty Rights**	Describe an approach for identifying the potentially impacted rights of Indigenous peoples of Canada that are recognized and affirmed by section 35 of the *Constitution Act, 1982*, and for integrating the potential impacts on those rights into the collection of baseline information and the effects assessment.	All study plans reference how potential effects on Indigenous rights will be assessed in the Aboriginal and Treaty Rights and Interests Study Plan. Impacts on Rights considerations are explained in the rationale for defining a Local Study Area and Regional Study Area for Aboriginal and Treaty Rights and Interests VCs. Further information for this is listed in Section 6.2.2 in the Aboriginal and Treaty Rights and Interests Study Plan.	**Section 5, and Section 6.2.2 in the Aboriginal and Treaty Rights and Interests Study Plan**	Feedback was provided in the Federal Review Team's comments package on the Aboriginal and Treaty Rights and Interests Study Plan.
GC-11	**Section 25 – Description of the Project's contribution to sustainability**	Provide detail on the approach to meeting the requirements of Section 25 of the Guidelines regarding the description of the Project's contribution to sustainability.	Section 9: the sustainability assessment for the Project will be undertaken on the preferred alternative and will characterize the Project's contribution to sustainability incorporating the requirements set out in Section 25 of the TISG.	**Section 9.7**	Section 9.7 of the study plan is listing the requirements outlined in Section 25 of the Guidelines. Ensure that the Impact Statement provides a description of the method or approach followed to meet the requirements of Section 25 of the Guidelines.

Federal Review Team comments on the Marten Falls Community Access Road Project Draft Acoustic Study Plan submitted in 2020						
#	**Study Plan (2020) Reference**	**Guidelines Section[2]**	**Required Action for Proponent**	**Proponent Response**	**Study Plan (2021) Reference**	**Agency comments**
AC-02	**General Comment**	**Sections 9, 12.2, 12.4, 15.2, 15.3, 15.4, 16.1, 17.2, 19.1 and 20**	The Guidelines include requirements beyond those in Sections 8.1 and 14.1 that are related to the acoustic environment (such as Sections 9, 12.2, 12.4, 15.2, 15.3, 15.4, 16.1, 17.2, 19.1 and 20). Changes to the acoustic environment could have effects on environmental, social, health and economic valued components, as well as effects to Indigenous peoples' current use of lands and resources for traditional purposes and conditions related to the impacts on rights of Indigenous peoples, for example. Whether in the acoustic environment study plan or in other topic specific study plans, there must be a demonstration of the approach to meet all requirements of the Guidelines, including those related to effects on community well-being from changes to soundscapes, and impacts of noise on the experience of a practice or the exercise of rights. The interactions of effects and the interconnectedness of the valued components is not apparent in this and other study plans.	Section 9.3 of the updated Study Plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Further information will be provided in the IS / EA Report.	Section 9.3	The required action was partially addressed. While Table 9-3 of the study plan acknowledges potential interactions and pathways of effects, the approaches to assess the potential impacts from changes to the acoustic environment were not included. Include in the Impact Statement an acoustic effects assessment that meets the requirements of the Guidelines, including those related to effects on community well-being from changes to soundscapes, impacts of noise on the experience of a practice or the exercise of rights, or interactions of effects and the interconnectedness of the valued components.
AC-03	**Section 3: Spatial Boundaries:** **Study Area** "Noise may affect nearby wildlife, which may affect outdoor recreational and teaching activities of the community and Indigenous groups such as hunting and trapping for recreational and food purposes. However, the federal and provincial noise guidelines do not quantify indirect acoustic effects; and the direct and quantifiable acoustics effects are expected to be limited to the LSA."	**Section 19.1** "…The potential effects, to consider assessing include both adverse and positive effects to the current use of land and resources for traditional purposes, physical and cultural heritage, and environmental, health, social and economic conditions of Indigenous peoples impacted by the Project, including interferences of the Project with the following: • quantity and quality of resources available for harvesting (e.g., species of cultural importance, including traditional and medicinal plants);… • experiences of being on the land, including ability to pass on Indigenous knowledge and language (e.g., impacted from: changes in air quality, noise exposure, effects of vibrations from blasting and other activities);…"	Provide further details that demonstrate the methodologies and approaches to studying the impacts of noise to Indigenous peoples, as required in Section 19 of the Guidelines. Cross-reference any specific acoustic/noise methodologies and indicators that are to be found in other plans.	As identified in Section 4.2 of the Study Plan, 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 Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment (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 Study Plan. Section 5 of the Study Plan provides further details on the 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. Section 9.3 of the updated Study Plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Further information will be provided in the IS / EA Report.	Section 4.2, 5 and 9.3	The required action was not addressed. Provide a work plan that outlines how Indigenous groups and members of the public will be engaged on the acoustic study plan. The work plan should include scheduling and sequencing of engagement activities relative to proposed baseline work, engagement on the study plan, spatial and temporal boundaries determinations, and particularly in relation to collection of Indigenous knowledge. See also GC-02 above.

[2] Refer to complete sections of the Guidelines for more context

Federal Review Team comments on the Marten Falls Community Access Road Project Draft Acoustic Study Plan submitted in 2020						
#	**Study Plan (2020) Reference**	**Guidelines Section[2]**	**Required Action for Proponent**	**Proponent Response**	**Study Plan (2021) Reference**	**Agency comments**
AC-04	**Section 3: Spatial Boundaries:** **Study Area** "the direct and quantifiable acoustics effects are expected to be limited to the Local Study Area.	**Section 13.1** "…Predictions must be made on clearly stated assumptions and the Impact Statement must clearly describe how it has tested each assumption…"	Provide details to demonstrate that direct and quantifiable acoustics effects are expected to be limited to the Local Study Area, considering the life of the Project and future uses of the road (including for mining purposes), and clearly identify the various noise receptors that are taken into account.	The Study Areas are defined and described in this Study Plan. Section 9.5 describes how the worst-case receptors will be assessed and their relevance to meeting noise and vibration criteria. The worst-case receptors are generally those located closest to the noise and vibration generating activities, and are likely located within the Local Study Area. As noted in Section 9.4.1, if residual acoustic effects from the Project are predicted, a cumulative effects assessment will be carried out to assess the combined impact of the Project and other existing physical activities, as well as future physical activities that are certain and reasonably foreseeable. The cumulative effects assessment will consider other existing or future certain and reasonably foreseeable physical activities located within 5 km of Project receptors.	Section 6	The required action was addressed.
AC-05	**Section 4.1: 2019 Baseline Noise** **Field Program** "The field program was conducted in November 2019 and included a monitoring component (Baseline Noise Monitoring) and measurement component (Baseline Noise Measurements)… As a result of discussions with the Project Team, two representative sensitive receptor locations were selected for both the Baseline Noise Monitoring and Baseline Noise Measurements. The first receptor location was selected to correspond to a populated area where it was expected that the ambient levels would be influenced by human activities. A second receptor location, within the area located further from the community, was identified to document ambient levels characteristic of natural environment without the influence of human activities. These two locations are	**Section 8.1** "The Impact Statement must:… • provide current ambient noise levels at key receptor points to traditional land users and sensitive human receptors, including the results of a baseline ambient noise survey and permissible sound levels for each receptor. Information on typical sound sources (both natural and anthropogenic), geographic extent and temporal variations will be included. When collecting baseline ambient noise survey data at human receptor locations, consider the following recommended questions: o Does the community or land users value certain non-anthropogenic (i.e., natural) sounds? o Is there an expectation of quiet at any specific locations or times? o What are typical sleep hours (10pm to 7am being the default assumption)? o What is the baseline prevalence of noise annoyance toward existing	a) Update the study plan to describe how the 2019 monitoring locations are representative of baseline conditions at sensitive receptor locations (as per Section 8.1 of the Guidelines) and provide further details about the locations (e.g. provide a map). b) Clarify the length and timing of monitoring and how temporal variability will be considered (e.g., seasonal variation in levels, types of community activity, weather conditions) (as per Section 8.1 of the Guidelines). c) Clarify whether the collected baseline data includes audio recordings and whether any baseline ambient noise survey data [e.g., community annoyance with noise, measured as percent highly annoyed (%HA)] were collected from community members (as per Section 8.1 of the Guidelines).	The acoustic field program was only one session (late fall 2019) in MFFN covering two (2) locations for long-term monitoring. There are no additional field monitoring programs proposed as part of the Study Plan. The results of the desktop and field assessment studies will be provided at a later date. Sufficient information is available through desktop information and historic and/or recent field investigations to understand annual and seasonal variation. We have provided information regarding anticipated seasonal changes in noise levels in the project area in the Study Plan. Please refer to Table 11-3 for further information. As identified in Section 4.2 of the Study Plan, 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 Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment (the Agency 2020a).	Section 7.2	a) This part of the comment was addressed. b) This part of the comment was partially addressed. In the Impact Statement clarify whether the monitored/measured data captured seasonal variations of ambient sounds and noise levels over a complete 24-hour period. Explain how the data is representative of a yearly Day-Night Sound Level. c) This part of the comment was partially addressed. The baseline noise field program indicates that ambient sound data collected during abnormal noise events or under unfavourable weather conditions was screened out to establish valid baseline noise data. Depending on the amount of remaining baseline data and specific times of data gaps, this screening process may affect the level of certainty in the %HA calculations. In the Impact Statement, provide detailed information about baseline data used in the %HA calculations, including the amount of data used and the timing of its collection. Furthermore, discuss the level of uncertainty in the %HA calculations due to screening of baseline data.

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#	**Study Plan (2020) Reference**	**Guidelines Section[2]**	**Required Action for Proponent**	**Proponent Response**	**Study Plan (2021) Reference**	**Agency comments**
	expected to allow the team to document the range in existing ambient noise levels within the LSA [local study area]. Data for the monitoring/measurements, and the corresponding reporting includes the following information for each location: … • Recording mode; (…)" **5. Data Management and Analysis** "(…) The screening will be completed using various tools, which may include audio recording (where deemed appropriate), analysis of the raw noise monitoring data in combination with meteorological data, or similar."	noise sources (e.g., road traffic, aircraft, and other industrial sounds)?... • Provide the approximate number, distance and identity factors of likely human receptors, including any foreseeable future receptors, that may be impacted by changes in air, water, country food quality (e.g., dust deposition on vegetation), and noise levels. At minimum, provide a map showing approximate locations of permanent residences, temporary land uses (e.g., cabins and traditional sites) and known locations of sensitive human receptors (e.g., schools, hospitals, community centres, retirement complexes or assisted care homes)."				From the study plan, it seems that only Marten Fall First Nation was consulted for the 2019 monitoring program. Ensure that the Impact Statement demonstrates that all potentially impacted Indigenous groups listed in the Indigenous Engagement and Partnership Plan were consulted on potential acoustic impacts in order to meet the requirements of Section 6 of the Guidelines. See also comment GC-02, GC-03 and GC-04 above.
AC-06	**Section 4.2: Desktop Assessment** "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". **Section 7: Conformance with Federal and Provincial Guidance** Acoustic Environment Study will include a baseline ambient study that will inform permissible sound levels at sensitive receptors. Monitoring locations were selected to capture the range of existing noise sources considering numerous factors, including geographic and temporal variations. The baseline prevalence of noise annoyance will be captured by determining the baseline percent highly annoyed (%HA) level. This determination is required as part of the Acoustic Environment Study's change in %HA assessment.	**Section 8.1** ""The Impact Statement must:… • provide current ambient noise levels at key receptor points to traditional land users and sensitive human receptors, including the results of a baseline ambient noise survey and permissible sound levels for each receptor. Information on typical sound sources (both natural and anthropogenic), geographic extent and temporal variations will be included. When collecting baseline ambient noise survey data at human receptor locations, consider the following recommended questions: o Does the community or land users value certain non-anthropogenic (i.e., natural) sounds? o Is there an expectation of quiet at any specific locations or times? What are typical sleep hours (10pm to7am being the default assumption)? o What is the baseline prevalence of noise annoyance toward existing noise sources (e.g., road, traffic, aircraft, and other industrial sounds)?..."	Provide detail to demonstrate the proposed approach and methods used to meet the requirements of the Guidelines, particularly Section 8.1. Update the study plan to include the list of all Indigenous groups that will be engaged, at a minimum the Indigenous groups listed in the Indigenous Engagement and Partnership Plan (IEPP), as part of the baseline data collection, defining the list of criteria and indicators, and effects assessment analysis. The list should be consistent throughout the study plan. Provide further detail to describe how Indigenous groups and the public have been, or will be, provided an opportunity to inform the acoustic baseline data collection and effects assessment.	Section 9.2 details the assessment VCs and indicators. A description of how these correlate to effects on humans is also provided. Section 9.4 has been revised to include numerous indicators related to night-time operations and noise events.	Sections 9.2 and 9.4	The required action was partially addressed. Provide a work plan that outlines how Indigenous groups and members of the public will be engaged on the acoustic study plan. The work plan should include scheduling and sequencing of engagement activities relative to proposed baseline work, engagement on the study plan, spatial and temporal boundaries determinations, and particularly in relation to collection of Indigenous knowledge. See also GC-01, GC-02, and AC-03 above.

Federal Review Team comments on the Marten Falls Community Access Road Project Draft Acoustic Study Plan submitted in 2020						
#	**Study Plan (2020) Reference**	**Guidelines Section[2]**	**Required Action for Proponent**	**Proponent Response**	**Study Plan (2021) Reference**	**Agency comments**
AC-07	**Section 6.1 Indicators and Expression of Change** "The indicators have been determined for the Acoustic Environment through consideration of the following: • human health effects; • consultation with regulatory agencies and industrial stakeholders; • potential presence within the area associated with the Project, and potential for alteration or disturbance as a result; • social or economic importance; and • any other relevant and credible source, such as scientific or academic publications or input from the public. (…)" **Table 6-1: Acoustic Environment Indicators** - " Expressions of change: Leq(1); Leq(16) - Rationale for selection: Used in provincial guidelines to describe baseline noise levels, and assess stationary noise source effects; to assess road traffic noise effects - Expression of change: %HA - Rationale for selection: Used in federal guidelines to assess noise effects on human health and potential for complaints due to noise exposure"	**Section 6** "…the proponent must provide Indigenous groups with an opportunity to: • comment on the list of valued components and indicators;…" **Section 14.1** "The Impact Statement must:… • describe consultation with regulators, stakeholders, community groups, landowners and Indigenous groups about potential effects to the atmospheric, acoustic, and visual environment; … • identify and justify the approach to determine the extent to which sound effects resulting from the Project are adverse…" **Section 16.1** "With respect to biophysical determinants of health, the Impact Statement must (…) • describe nuisances and environmental, social and economic changes that could potentially be sources of adverse human health effects and the potential human receptors of these effects; • in situations where project related air, water or noise emissions meet local, provincial, territorial or federal guidelines, and yet public concerns were raised regarding human health effects, provide a description of the public concerns and how they were or are to be addressed. (…) The proponent should provide a detailed rationale/explanation for any deviation from recommended assessment approaches/methods, including Health Canada's guidance, or when determining such assessment is not warranted."	Revise the study plan to provide a description of each indicator presented and describe each indicator's expression of change and potential interpretation for the effect analysis. Clarify how the proposed indicators are appropriate to assess health- related effects at receptors due to noise-induced hearing loss, sleep disturbance, or interference with speech comprehension. Provide details to demonstrate how Indigenous groups listed in the Indigenous Engagement and Partnership Plan that may have views on these studies have been/will be provided with an opportunity to comment on the list of indicators. Clarify whether concerns relating to increased noise were raised by the public or Indigenous groups.	The requested information has been provided in the updated Study Plan. As identified in Section 4.2 of the Study Plan, 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 Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment (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 Study Plan. Section 5 of the Study Plan provides further details on the 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.	Sections 4.2, 5, 9.2, and 9.3	The required action was partially addressed. Provide a work plan that outlines how Indigenous groups and members of the public will be engaged on the acoustic study plan. The work plan should include scheduling and sequencing of engagement activities relative to proposed baseline work, engagement on the study plan, spatial and temporal boundaries determinations, and particularly in relation to collection of Indigenous knowledge. See also GC-01, GC-02, AC-03 and AC-06 above.
AC-08	**Section 6.2 Methods for Predicting Future Conditions** "Where roadway parameters are not available (e.g., traffic composition), the assessment	**Section 13.1** "…Predictions must be made on clearly stated assumptions and the Impact Statement must clearly describe how it has tested each assumption…"	Where roadway parameters are not available, ensure that the parameters incorporated in the assessment are clearly described in the Impact Statement and confirm that are approved by Ontario.	Section 9.4.2 describes the provincial guidelines that will be used to assess traffic noise impacts.	**Section 9.4.2**	The required action was addressed.

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#	**Study Plan (2020) Reference**	**Guidelines Section[2]**	**Required Action for Proponent**	**Proponent Response**	**Study Plan (2021) Reference**	**Agency comments**
	will incorporate standard parameters provided in provincial traffic noise guidelines".					
AC-09	**Section 6.2 Methods for Predicting Future Conditions** **"**Road traffic noise due to the Project will be predicted using an algorithm that is acceptable to the MECP [Ontario ministry of environment, conservation and parks] and MTO [Ontario ministry of transportation]. The traffic noise assessment will incorporate the following (…) Predicted future day/night traffic volumes and vehicle composition; Noise due to Project construction activities will be predicted using industry standard methods. Construction equipment noise emissions may be estimated using a combination of industry standard reference publications and noise levels collected from similar equipment for other projects. (…) Where possible, receptor locations and time periods should be incorporated with consideration of relevant input collected through community consultations and the Indigenous Knowledge Program, such as: typical sleep hours, and the expectation of quiet at specific locations or times."	**Section 14.1** "The Impact Statement must:… • describe changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, including changes to the perception of non- anthropogenic sounds; • quantify sound levels at appropriate distances from any Project facility and/or activities and describe for each contributing source the timing (e.g., hours of night-time activities), number and duration of noise events and their sound characteristics, including frequency spectrum; • provide the hourly distribution of baseline noise events at night in comparison to predicted individual noise events at night at each receptor location;… • consider the expectation of peace and quiet at receptors (e.g., in a quiet rural area or during Indigenous land use) and the applicable community-based policies concerning noise (e.g., complaints resolution processes); • identify and justify the approach to determine the extent to which sound effects resulting from the Project are adverse and describe any changes in night-time light levels as a result of the Project;…" **Section 22** "The proponent must identify and assess the Project's cumulative effects using the approach described in the Agency's guidance documents related to cumulative environmental, health, social and economic effects… Finalizing the choice of valued components and the appropriate boundaries, including potential transboundary areas, to assess cumulative effects, is informed and confirmed as part of the tailoring	Provide detail in the study plan to demonstrate that road traffic noise will be assessed for all relevant phases of the Project. Provide details to demonstrate that the effects assessment for the operation phase will include the effect cause by all different users (traffic volume, type of vehicles, etc.), including Indigenous groups, the general public, and mining proponents of reasonably foreseeable future projects (e.g., Eagle's Nest, Blackbird, Black Thor, Black Label, Big Daddy, anticipated future community access roads). Explain whether the noise assessment will consider increases in individual night-time noise events and their potential effect on sleep disturbance. Provide detail to demonstrate that construction noise lasting longer than one year at any given location will be assessed. Provide a rationale for excluding noise-related complaints as an indicator of adverse health effects. Clarify how complaints resolution process will be considered in the Impact Statement. Describe any applicable noise adjustments (e.g. for "quiet rural areas", time-of-day, tonal and/or impulsive noise) that are being considered and provide a description when they have been used or when it has been decided they are not applicable in a given scenario. Provide details to demonstrate how the noise assessment will inform the decision whether to assess cumulative effects on human health due to noise.	Section 9.2 details the assessment VCs and indicators. A description of how these correlate to effects on humans is also provided. As noted in Section 9.4.1, if residual acoustic effects from the Project are predicted, a cumulative effects assessment will be carried out to assess the combined impact of the Project and other existing physical activities, as well as future physical activities that are certain and reasonably foreseeable. The cumulative effects assessment will consider other existing or future certain and reasonably foreseeable physical activities located within 5 km of Project receptors. Section 9.4 has been revised to include numerous indicators related to night-time operations and noise events. Acoustic and Vibration Environment Study will consider community input and applicable policies (related to noise complaint resolution processes) where applicable and relevant. Further information will be provided in the IS / EA Report. Section 9.4 details the federal, provincial and applicable guidance that will be used to assess all phases of the Project, including construction durations of less than one year and greater than one year. Section 9.4.4 describes the potential adjustments that may be applied according to federal / World Health Organization and provincial guidelines. Section 9.3 of the updated study plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Refer to the Human Health and Community Safety Study Plan for more information on human health effects. Further information will be provided in the IS / EA Report.	**Sections 9.2 and 9.4**	The required action was partially addressed. The study plan does not explain how consultation with the public, Indigenous groups, federal authorities and other interested parties will inform and confirm the approach for the cumulative effects assessment, as required by Section 22 of the Guidelines. Include in the Impact Statement an acoustic effects assessment that meets the requirements of the Guidelines, including the requirements related to cumulative effects assessment.

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#	**Study Plan (2020) Reference**	**Guidelines Section[2]**	**Required Action for Proponent**	**Proponent Response**	**Study Plan (2021) Reference**	**Agency comments**
		process through consultation with the public, Indigenous groups, lifecycle regulators, jurisdictions, federal authorities and other interested parties… The Impact Statement must: … • assess the cumulative effects to each valued component selected by comparing the future scenarios with the Project and without the Project…"				
AC-10	**Section 6.2 Methods for Predicting Future Conditions** "If needed, noise due to Project construction involving stationary sources (e.g., aggregate extraction and refining) will be predicted in accordance…".	**Section 14.1** "The Impact Statement must:… • describe changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, including changes to the perception of non-anthropogenic sounds;…"	Provide detail to explain the criteria or circumstances that will determine whether there is a need for predicting noise due to Project construction involving stationary sources.	Section 9.4.2 describes the circumstances for assessing stationary noise due to construction activities and how provincial and federal guidelines will inform the assessment.	Section 9.4.2	The required action was addressed.
AC-11	**Section 6.3 Magnitude of Effect** **Table 6-2: Acoustic Environment Magnitude** - "Definition of magnitude level: Increase of (1-3; 3-5; 5 or more) dB above baseline noise level - Rationale: Industry references for human perception of changes in sound level."	**Section 14.1** "The Impact Statement must: … • describe changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, including changes to the perception of non- anthropogenic sounds;…"	Broaden the scope of the proposed magnitude definition to include changes to the characteristics of the sound from baseline, in addition to the comparison of predicted and baseline noise levels. Other criteria that could contribute to magnitude could include changes in frequency, changes in sound modulation, increased impulsiveness, a shift in noise from the daytime to being more at night, a shift from quiet rural to traffic or construction-related noise, etc.	Section 9.6 describes magnitude definitions in terms of the federal, provincial and other applicable criteria presented in Section 9. The VCs, indicators, and adjustments for sound character that will be used in the effects assessments are described in Section 9.2.	Sections 9.2, Section 9.4.4 and 9.6.	The required action was partially addressed. Section 9.4.4 of the study plan indicates that to account for increased annoyance associated with changes to sound characteristics, the noise assessment will consider adjustments for certain sound characteristics as well as for receptor characteristics. However, the study plan does not clarify whether all applicable adjustments or assessments for sound sources, sound characteristics, and time periods will be followed, as per Health Canada's noise guidance document (2017) and ISO 1996-1:2016, which include: • Evening sounds require 5 dB adjustment; • Night sounds require a 10 dB adjustment; • Weekend day-time sounds require a 5 dB adjustment; • High-energy impulsive sounds (e.g., blasting) requires a separate assessment where US EPA (1974)'s sonic boom criterion (i.e., 125-10 log N dBZ, or Z-weighted decibels) be used as a mitigation noise level for blasting that lasts less than one year. In the Impact Statement, clarify whether all applicable adjustments or assessments for sound sources, sound characteristics, and time periods will be followed, as per Health

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#	**Study Plan (2020) Reference**	**Guidelines Section[2]**	**Required Action for Proponent**	**Proponent Response**	**Study Plan (2021) Reference**	**Agency comments**
						Canada's noise guidance document (2017) and ISO 1996-1:2016. [3]
AC-12	**Section 7 Conformance with Federal and Provincial Guidance** "Federal and Provincial noise guidelines have been developed based on research into human response to noise exposure. The noise guidelines do not address whether these criteria are applicable to wildlife, nor do the guidelines provide separate criteria for wildlife assessment. We are not aware of any underwater noise or vibration thresholds that would be applicable for this project. As such, the Acoustic Environment Study Plan will assess acoustic impacts on human receptors only. Acoustic impacts and existing conditions related to underwater environments will not be determined or measured."	**Section 8.1** "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;…" **Section 13.1** "The Impact Statement must describe in detail the project's potential adverse and positive effects in relation to each phase of the Project (construction, operation, maintenance, suspension, decommissioning, and abandonment)…"	Describe an approach and methods to provide current underwater soundscape and vibration descriptions of the study area and at the project site from various sources that are based on acoustic measurements. Provide information on how vibration and sound sources, geographic extent and spatial and temporal variations within the water column will be studied. Provide details to clarify if acoustic effects from any works, undertakings, or activities will occur in fish and fish habitat.	MFFN is not aware of any underwater noise or vibration thresholds that would be applicable for this project. As such, the Acoustic and Vibration Environment Study Plan will assess acoustic impacts on human receptors only. Acoustic impacts and existing conditions related to underwater environments will not be determined or measured. Industry-standard mitigation, avoidance and protections measures will be implemented into the work plan, and includes those to avoid impacts to fish as a result of activities likely to produce underwater noise and vibration. This includes all DFO Fish and Fish Habitat Protection Program Measures to Protect Fish and Fish Habitat (general measures as well as applicable Measures from standard codes of practice) that apply, including those relating to vibration and noise. Further details can be found in the Fish and Fish Habitat Study Plan. Section 9.3 of the updated study plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Further information will be provided in the IS / EA Report.	Section 9.3	The required action was addressed. It is understood that construction type at each crossing will dictate the need for piling or vibro-piling activities, which may or may not affect fish and/or fish habitat. During the permitting phase of the Project, this information will be required. At the current stage of the Project, the Federal Review Team understands that no plans are in place to conduct piling or vibro-piling. This information may not be required for the baseline phase of the Project, but will be required by the Department of Fisheries and Oceans at the permitting phase, depending on the design of specific watercourse crossings.
AC-13	**Section 7 Conformance with Federal and Provincial Guidance** "The ambient noise monitoring results will serve as a baseline for the traffic noise assessment of the CAR. Road traffic is typically considered a source of ambient noise. Therefore, an increase in road traffic noise is considered an increase in ambient noise. This principle will be used to assess the operations of the CAR, including describing human perceptibility of the increase in noise. Ambient noise includes	**Section 13.1** "The Impact Statement must describe in detail the project's potential adverse and positive effects in relation to each phase of the Project (construction, operation, maintenance, suspension, decommissioning, and abandonment)…" **Section 14.1** "The Impact Statement must:… • describe changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, including changes to the perception of non- anthropogenic sounds;…"	Provide detail to demonstrate that ambient vibration and other sound levels resulting from the Project will be described for each phase of the Project.	Section 9.4 details how federal, provincial and other applicable guidance that will be used to assess all phases of the Project.	Section 9.4	The required action was addressed.

[3] References: 1) Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: NOISE. Available at: https://publications.gc.ca/site/eng/9.832514/publication.html
2) International Organization for Standardization (ISO). 2016. ISO 1996-1:2016 Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures.
3) US Environmental Protection Agency (USEPA).1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.

Federal Review Team comments on the Marten Falls Community Access Road Project Draft Acoustic Study Plan submitted in 2020						
#	**Study Plan (2020) Reference**	**Guidelines Section[2]**	**Required Action for Proponent**	**Proponent Response**	**Study Plan (2021) Reference**	**Agency comments**
	both anthropogenic and non-anthropogenic sounds. Ambient monitoring datasets include thousands of datapoints, and it is impractical to separate anthropogenic and non-anthropogenic events. As such, the Acoustic Environment Study will describe changes to the perception of sound with respect to the baseline ambient levels (e.g., anthropogenic + non-anthropogenic sounds)."					
AC-14	**Section 7 Conformance with Federal and Provincial Guidance** "Acoustic Environment Study will describe noise source characteristics used in the noise impact assessment(s). Acoustic Environment Study will present hourly baseline results of the field monitoring program. Noise impact assessment will include a comparison of predicted noise levels and measured baseline levels. Acoustic Environment Study will include community input and applicable policies Acoustic Environment Study will gauge adverse noise impacts using accepted industry, Provincial, and Federal descriptors."	**Section 14.1** "The Impact Statement must:… • quantify sound levels at appropriate distances from any Project facility and/or activities and describe for each contributing source the timing (e.g., hours of night-time activities), number and duration of noise events and their sound characteristics, including frequency spectrum; • provide the hourly distribution of baseline noise events at night in comparison to predicted individual noise events at night at each receptor location; • consider the expectation of peace and quiet at receptors (e.g., in a quiet rural area or during Indigenous land use) and the applicable community-based policies concerning noise (e.g., complaints resolution processes); • identify and justify the approach to determine the extent to which sound effects resulting from the Project are adverse and describe any changes in night-time light levels as a result of the Project;…"	Provide detail to demonstrate that the proposed approaches and methods will meet the requirements of the Guidelines, particularly Section 14.1.	Section 9.2 details the assessment VCs and indicators. A description of how these correlate to effects on humans is also provided. Section 9.4 has been revised to include numerous indicators related to night-time operations and noise events. Acoustic and Vibration Environment Study will assess adverse noise impacts using accepted industry, provincial, and federal descriptors, including noise at night, if applicable.	Section 9.2, 9.4 and 11	The required action was addressed.

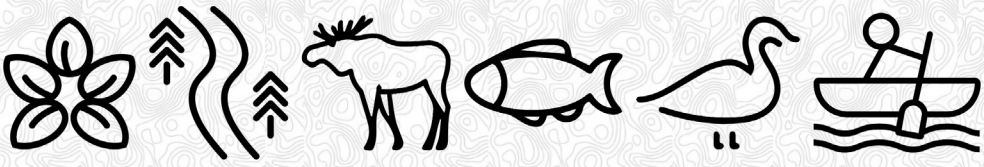
New comments from the Federal Review Team on the revised Acoustic Study Plan submitted in 2021.				
#	**Study Plan (2021) Section**	**Tailored Impact Statement Guidelines Section**	**Context**	**Required Action for the Proponent**
AC-15	**Footnote 8, Section 9.2** "In February 2020 a regional assessment 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."	**Editorial comment**	The statement in the footnote 8 in Section 9.2 "*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."* is inaccurate, as the Regional Assessment in the Ring of Fire area has not yet begun.	Replace the text in footnote 8 with "*In February 2020, the Minister of Environment and Climate Change determined that a regional assessment will be conducted in an area centred on the Ring of Fire mineral deposits in northern Ontario. Relevant information available in relation to the Regional Assessment in the Ring of Fire area would be considered in the impact assessment of the Project."*
AC-16		**Section 7.3** "…For each of the valued components that will be assessed in the Impact Statement, the proponent must create a study plan and a work plan to be validated by the Agency. Upon receipt of a study plan, the Agency may request that the proponent present and discuss the study plan at technical meetings, which will be scheduled during the impact statement phase."	In order to meet the requirements of Section 7.3 of the Guidelines, a work plan or work plans for the valued components to be assessed in the Impact Statement must be submitted to the Agency for validation. Since this acoustic study plan does not include content for a work plan, notably this plan does not outline when baseline data will be collected for each Indigenous group (i.e., scheduling, sequencing), the submission of a work plan is an outstanding requirement of the Guidelines.	Provide a work plan that outlines how the acoustic study plan will be executed in the field, including when baseline data will be collected. The work plan should include scheduling and sequencing of engagement activities relative to proposed baseline work, engagement on the study plan, spatial and temporal boundaries determinations, and particularly in relation to collection of Indigenous knowledge.
AC-17	**Table 11-3: Study Plan Federal and Provincial Concordance – Requirement Deviations**		Proposed amendments and/or deviations from the Guidelines will not be reviewed or approved during the study plans review process. The Agency will provide guidance on the process to propose amendments and/or deviations to the Guidelines to the project team.	

MARTEN FALLS FIRST NATION
ALL SEASON COMMUNITY ACCESS ROAD

FINAL

Acoustic and Vibration Environment Study Plan

May 2021



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Revision History

Rev #	Date	Revision Description
Draft	May 2020	Submitted “Study Plan – Acoustic Environment DRAFT FOR DISCUSSION” to the Agency
Final	May 2021	Revised to address federal and provincial agency comments

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Appendices

Appendix A. Preliminary List of Data Sources
Appendix B. Agency Comments on the Draft Study Plan

Acronyms

Agency, the ... Impact Assessment Agency of Canada
CAR ..... Community Access Road
dB ..... Decibel
dBA ..... A-weighted decibel
EA ..... Environmental Assessment
%HA ..... Percent highly annoyed
IA ..... Impact Assessment
IAA ..... *Impact Assessment Act*
IS ..... Impact Statement
ISO ..... International Organization for Standardization
km ..... kilometre
Ldn ..... Day-night sound level

L_{eq} ..... Continuous equivalent sound level
Lmax ..... Maximum sound level
Ln ..... Night-time sound level
LSA ..... Local Study Area
MECP ..... Ontario Ministry of the Environment, Conservation and Parks
MFFN ..... Marten Falls First Nation
MNL ..... Suggested mitigation noise level
MTO ..... Ontario Ministry of Transportation
NPC ..... Noise Pollution Control
PDA ..... Project Development Area
POR ..... Point(s) of Reception
PPV ..... Peak Particle Velocity
PSA ..... Project Study Area
RMSV ..... Root-mean Square Velocity
RSA ..... Regional Study Area
SAR ..... Species at Risk
TISG ..... Tailored Impact Statement Guidelines
TNM ..... Traffic Noise Model
ToR ..... Terms of Reference
USFHWA ..... United States Federal Highway Administration
FTA ..... United States Federal Transit Administration
VdB ..... Vibration velocity level using a decibel scale
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 the Acoustic and Vibration Environment 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 environmental[1] 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	■ Indigenous Current Use of Lands and Resources for Traditional Purposes ■ Cultural Continuity (ability to practice and transmit cultural traditions)
Atmospheric Environment	■ Atmospheric Environment Study Plan	■ Air Quality ■ Greenhouse Gas Emissions
Climate Change	■ Climate Adaptation and Resiliency Study Plan	■ Climate Change
Acoustic and Vibration Environment	■ Acoustic and Vibration Environment Study Plan	■ Noise ■ Vibration
Physiography, Geology, Terrain and Soils	■ Physiography, Terrain and Soils Study Plan	■ Physiography, Terrain and Soils
Surface Water	■ Surface Water Study Plan	■ Surface Water
Groundwater and Geochemistry	■ Groundwater and Geochemistry Study Plan	■ Groundwater
Vegetation	■ Vegetation Study Plan	■ 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	■ Peatland Ecosystems (bogs and fens)
Wildlife	■ Wildlife Study Plan	■ Bats (including SAR-bats such as: Little Brown Myotis [*Myotis lucifugus*], Northern Myotis [*Myotis septentrionalis*] and Tricolored Bat [*Perimyotis subflavus*])

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.*

Environmental Discipline	Study Plan Name	Valued Component(s)
		■ Fur Bearers (proxy VC[2] American Marten [*Martes americana*], Beaver [*Castor canadensis*] and Wolverine [*Gulo gulo*]) ■ Amphibians and Reptiles ■ Pollinating Insects
	■ Ungulates (Moose and Caribou) Study Plan	■ Moose (*Alces alces*) ■ Caribou, boreal population (*Rangifer tarandus*)
	■ Bird Study Plan	■ Forest Birds (proxy VC of Red-eyed Vireo [*Vireo olivaceus*] for deciduous forest, Ovenbird [*Seirus aurocapilla*] for mixedwood forest, Dark-eyed Junco [*Junco hyemalis*] for coniferous forest and disturbed forest ■ Raptors (proxy VC of Osprey [*Pandion haliaetus*] for diurnal raptors and Boreal Owl [*Aegolius funereus*] for nocturnal raptors ■ Shorebirds (proxy VC of Wilson's Snipe [*Gallingo delicata*]) ■ Waterfowl (proxy VC of Mallard [*Anas platyrhynchos*]) ■ Bog / Fen Birds and Other Wetland Birds (proxy VC of Palm Warbler [*Setophaga palmarum*] for bogs, Common Yellowthroat [*Geothlypis trichas*] for fens; and Northern Waterthrush [*Parkesia noveboracensis*] for swamps . ■ SAR birds: Canada Warbler (*Cardellina canadensis*), Chimney Swift (*Chaetura pelagica*), Common Nighthawk (*Chordeiles minor*), Eastern Whip-poor-will (*Antrostomus vociferous*), Eastern Wood-Pewee (*Contopus virens*), Evening Grosbeak (*Coccothraustes vespertinus*), Olive-sided Flycatcher (*Contopus cooperi*), Bald Eagle (*Haliaeetus leucocephalus)*, Peregrine Falcon (*Falco peregrinus*), Short-eared Owl (*Asio flammeus)*, Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Black Tern (*Childonias niger*), Rusty Blackbird (*Euphagus carolinus*), Yellow Rail (*Coturnicops noveboracensis*)
Fish and Fish Habitat	■ Fish and Fish Habitat Study Plan	■ Lake Sturgeon (*Acipenser fulvescens*) ■ Walleye (*Sander vitreus*) ■ Brook Trout (*Salvelinus fontinalis*) ■ Northern Pike (*Esox lucius*) ■ Lake Whitefish (*Coregonus clupeaformis*) ■ Chain Pickerel (*Esox niger*) ■ Yellow Perch (*Perca flavescens*) ■ Cisco (*Coregonus artedii*)

[2] *A proxy VC is used when looking at the effects of one species that represents many others.*

Environmental Discipline	Study Plan Name	Valued Component(s)
		■ Burbot (*Lota lota*) ■ Longnose Sucker (*Catostomus catostomus*) ■ White Sucker (*Catostomus commersonii*) ■ Forage / Prey Species (including species such as Lake Chub [*Couesius plumbeus*]) ■ Lower Trophic Organisms (e.g., benthic invertebrates)
Social	■ Social Study Plan	■ Housing and Accommodation ■ Community Service and Infrastructure ■ Transportation ■ Community Well-being ■ Populations and Demographics
Economy	■ Economic Study Plan	■ Regional Economy ■ Labour Force and Employment ■ Government Finances
Land and Resource Use	■ Land and Resource Use Study Plan	■ 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	■ Public Safety ■ Public Health ■ Diet ■ Environmental Factors Influencing Health
Visual Aesthetics	■ Visual Aesthetics Study Plan	■ Visual Contrast / Character ■ Visibility ■ Visual Sensitivity
Archaeological and Cultural Heritage	■ Cultural Heritage Study Plan	■ 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 baseline[3] 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 the Acoustic and Vibration Environment 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, 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: Summary of Study Plan Technical Discussions

Attendees / Responsible Party	Correspondence	Discussion Points	Solution
■ **The Agency**	■ Comments received following the Agency review of draft Study Plan.	■ **27-August-2020:** Comments and clarification questions received, including editorial comments, additional information requirements regarding study plan, assessment and desktop analysis.	■ Additional details and clarification provided within the Study Plan, and responses to these comments are attached in **Appendix B.**
■ **Ministry of Heritage, Sport, Tourism, and Culture Industries (Tourism Policy and Research Branch)**	■ Comments received following the MECP review of draft Study Plan.	■ **06-August-2020:** Identification of sensitive receptors within and outside of the RSA.	■ Additional details and clarification provided within the Study Plan, and responses to these comments are attached in **Appendix B**.
■ **The Agency** ■ **Health Canada** ■ **Ministry of Energy, Northern Development, and Mines (ENDM)** ■ **Fisheries and Oceans Canada (DFO)** ■ **MFFN CAR Project Team**	■ Technical discussion of comments received following agency review of draft Study Plan, teleconference meeting.	■ **03-November-2020:** Project phases and construction lasting less than one year; and more than one year.	■ Added additional details to Methods for Predicting Future Conditions in Study Plan. Revised study plan indicators and magnitude definitions.
		■ **03-November-2020:** Assessment of noise during night-time periods, and the effects of individual events.	■ Added additional details to Methods for Predicting Future Conditions in Study Plan. Revised study plan indicators and magnitude definitions.
		■ **03-November-2020:** Suggestion to build construction camps to reduce impact on outdoor activities (e.g., hunting, fishing and trapping).	■ Added additional details to Mitigation and Enhancement Measures in the Study Plan.
		■ **03-November-2020:** ISO sound level adjustments.	■ Added additional details to Methods for Predicting Future Conditions in Study Plan.
		03-November-2020: Comparison of ambient and Project effects.	Revised Methods for Predicting Future Conditions in Study Plan.
		03-November-2020: Underwater acoustic environment and assessment.	Methods for assessing underwater soundscapes will be considered as part of the Fish and Fish Habitat Study Plan.

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 persons[5] 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 *(Nishnawbe Aski Nation)*	■ **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	■ Long Lake #58 First Nation**
Mushkegowuk Council *(Nishnawbe Aski Nation)*	■ Attawapiskat First Nation ■ Fort Albany First Nation ■ Kashechewan First Nation
Shibogama First Nations Council *(Nishnawbe Aski Nation)*	■ Kasabonika Lake First Nation ■ Kingfisher Lake First Nation ■ Wapekeka First Nation ■ Wawakapewin First Nation ■ Wunnumin Lake First Nation
Independent First Nations Alliance *(Nishnawbe Aski Nation)*	■ Kitchenuhmaykoosib Inninuwug First Nation
Independent First Nations *(Nishnawbe Aski Nation)*	■ Mishkeegogamang First Nation ■ Weenusk First Nation
Nokiiwin Tribal Council	■ Animbiigoo Zaagi'igan Anishinaabek First Nation*
Métis Nation of Ontario	■ Métis Nation of Ontario; Region 2*
Independent Métis Nation	■ 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. 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 technical teams 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 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, 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 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.

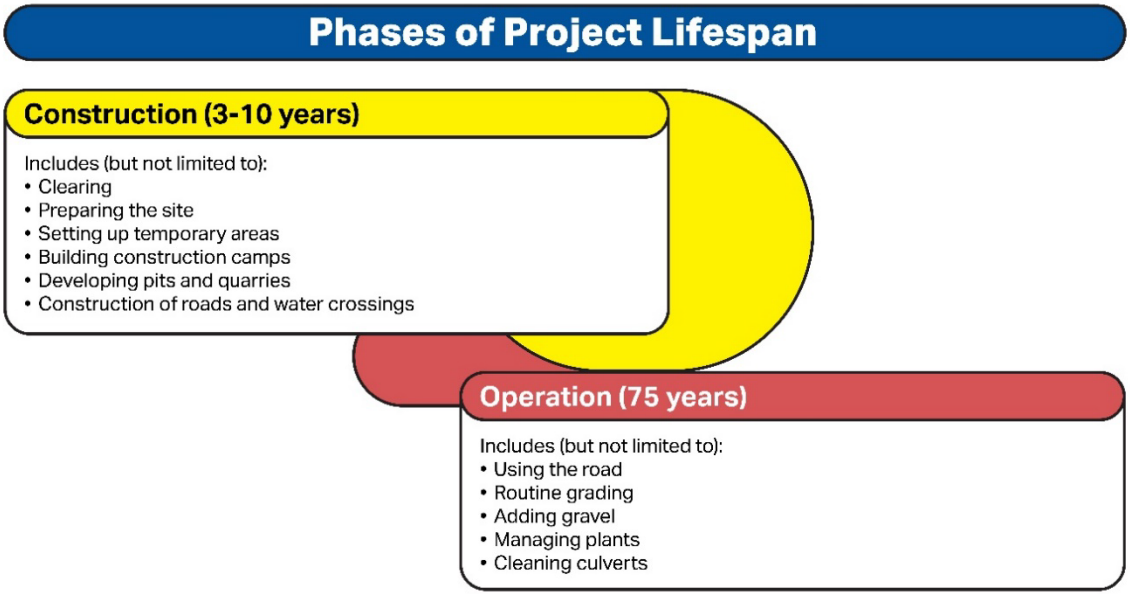
6. Assessment Boundaries

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 for the entire CAR is anticipated to take approximately 3 to 10 years to complete, but the construction activities in any one location are generally expected to be limited to a shorter duration.
- **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 #2[6]). 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 on either side 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 5 km wide Preliminary LSA, 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 Acoustic and Vibration Environment Study Areas

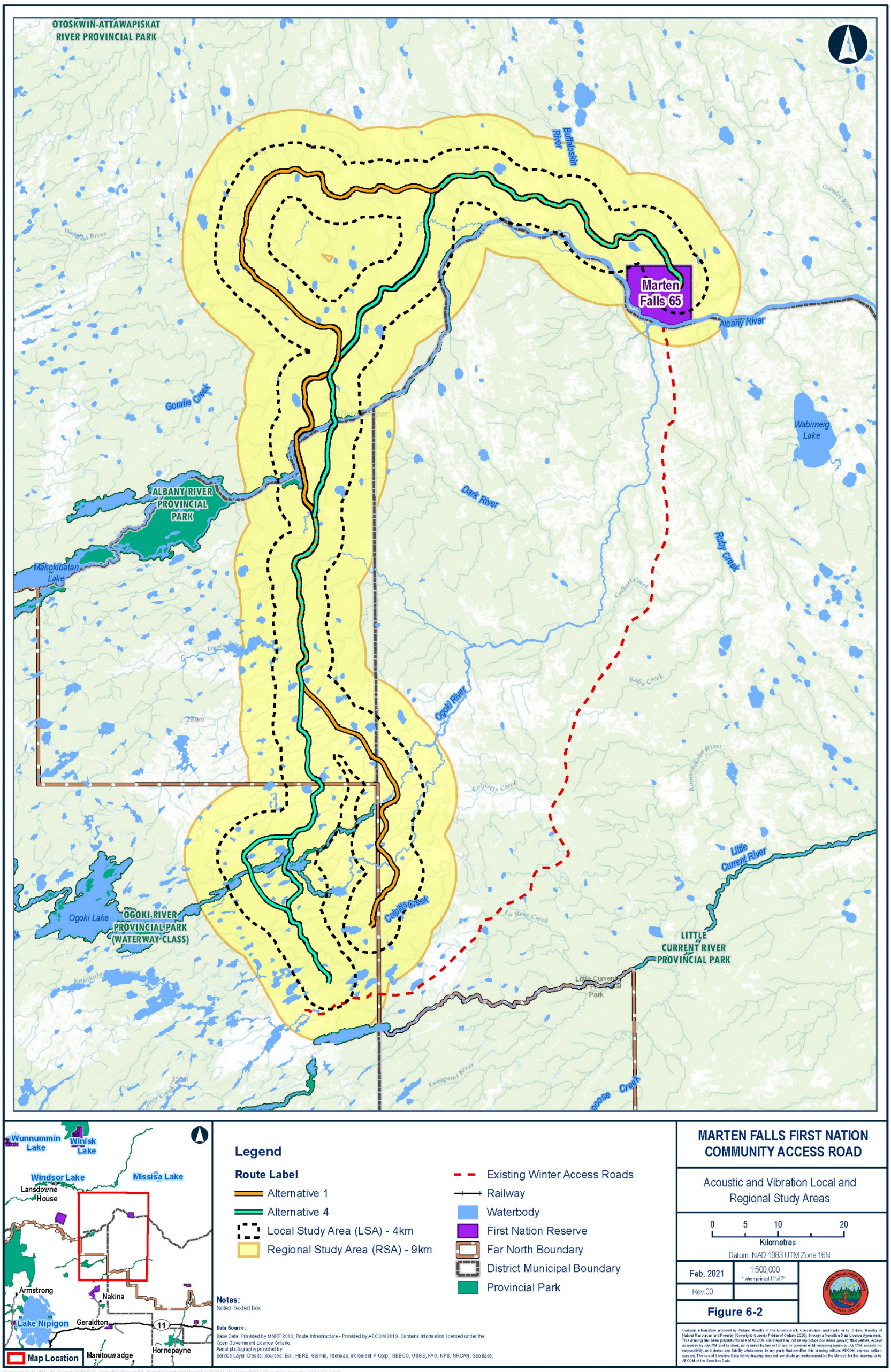
The LSA and RSA boundaries for the Acoustic and Vibration Environment are detailed in **Table 6-1** and shown on **Figure 6-2**.

Table 6-1: Acoustic and Vibration Environment Study Areas

Study Area	Geographic Extent	Rationale
Acoustic and Vibration Local Study Area	■ PDA plus a 4 km buffer	■ The setback distance is based on professional judgement and guidance provided by AER Directive 038: Noise Control Directive (Directive 038) (EUB 2007) for noise assessments in Alberta, as no similar guidelines have been established in Ontario. Extending 4 km beyond the PDA will assist in the assessment of possible route refinements. ■ Since noise and vibration attenuate with distance, potential noise and vibration effects from the Project are expected to be the highest in the Acoustic and Vibration LSA, and any measurable noise and vibration effects due to the Project are predicted to be generally limited to the Acoustic and Vibration LSA. In the area beyond the Acoustic and Vibration LSA, noise and vibration levels from Project activities are expected to further attenuate, resulting in a lower potential contribution.
Acoustic and Vibration Regional Study Area	■ LSA plus a 5 km buffer	■ The 5 km setback distance (from the LSA) is based on professional judgment and used to address indirect impacts outside the LSA. ■ Aligns with field work completed in 2019.

Noise and vibration may affect nearby wildlife, which may affect outdoor recreational and traditional activities of the community, including activities of Indigenous groups, such as hunting and trapping for recreational and food purposes. The assessment of noise and vibration of the Project on wildlife, socio economics, and human health, as related to sensory disturbance from noise and vibration, is carried out in their respective discipline assessments. However, the federal and provincial noise guidelines do not quantify indirect acoustic and vibration effects, and the direct and quantifiable acoustic and vibration effects are expected to be limited to the Acoustic and Vibration LSA.

Figure 6-2: Acoustic and Vibration Environment Local and Regional Study Areas



7. Baseline Study Design

This section describes the methods used to characterize the existing Acoustic and Vibration Environment of the Project. The Project phases and study areas within which potential effects will be considered and can be reasonably expected to be affected by the Project are those described in **Section 6** above. The characterization of the existing environment serves as the baseline condition for which the environmental effects of the Project will be predicted.

Characterization of the existing environment for noise and vibration within the Acoustic and Vibration LSA was completed by undertaking primarily a desktop review of publicly readily available information, supplemented by field investigations completed specifically for the Project. The approach to characterize the existing environment for noise and vibration in the Acoustic and Vibration LSA is detailed in the following sections and includes:

- identification of information and data sources used in the assessment, including consideration of input from various stakeholders;
- consideration of the spatial boundaries for the assessment of effects identified in **Section 6**;
- identification of potential sensitive receptors in the vicinity of the Project where human activity is expected to occur; and,
- characterize the existing noise and vibration levels through a desktop analysis, supplemented with a field program.

A desktop review of existing information sources will be completed to identify information gaps that will need to be addressed through further study. Information to characterize the existing environment for noise and vibration was collected from a review of information sources as they were made readily available. A preliminary list of applicable information sources has been included in **Appendix A** and reflects federal and provincial guidance received to date. 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.

7.1 Existing Points of Reception

The review of existing conditions of the Acoustic and Vibration Environment included identifying potential sensitive receptors or Point(s) of Reception (POR(s)) in the vicinity of the Project where human activity is expected to occur in the Acoustic and Vibration LSA.

In October 2019, a preliminary desktop review was carried out to identify potential PORs in the Acoustic and Vibration LSA, including both existing and vacant lands that are expected to be occupied by human activity. A desktop level analysis of the information sources presented in **Appendix A** was carried out. The potential PORs in the Acoustic and Vibration LSA were identified in general accordance with NPC-300[7] guidelines (MECP 2013) and where traditional land uses are expected to be occupied by human activity. NPC-300 defines PORs as sensitive land uses with human activity, including dwellings, campsites or campgrounds, sensitive institutional uses (e.g., educational, nursery, hospital, healthcare, community centre, place of worship, or detention centre), or sensitive commercial uses (e.g., hotel or motel). The traditional land uses include, but are not limited to: cabins, camps, hunting and fishing grounds, travel routes, burial grounds, and archaeological sites.

The review of potential PORs was limited to a preliminary review and therefore a detailed review of existing structures, including the quantity, exact locations and land uses, was not available at the time. Additional information regarding potential PORs within the Acoustic and Vibration LSA will be collected, including through input from the Indigenous Knowledge Program, to develop a more comprehensive list of potential PORs.

7.2 Existing Acoustic Environment Noise and Vibration Levels

The characterization of the existing environment for noise and vibration in the Acoustic and Vibration LSA was primarily completed by undertaking a desktop review of the information sources identified in **Appendix A**, followed by referencing information from similar project experiences and using professional judgement. The Health Canada (HC) guide (Health Canada 2017) presents options to estimate existing noise levels, which include using approximate noise levels that depend on the community type and average

[7] *Noise Pollution Control (NPC) Guidelines are set by the MECP to ensure sources of noise emissions to the environment are adequately controlled to prevent potential negative effects (MECP 2013).*

population density, and according to NPC-300, the exclusionary sound level limits may be adopted to describe the expected noise levels at PORs based on a classification system.

The desktop analysis to characterize the existing acoustic environment noise levels was supplemented with a field program. A baseline noise field program was completed in November 2019 to document existing ambient noise levels before the Project components are implemented. The baseline noise measurements / monitoring were completed in general accordance with guidelines provided by the MECP, the methodology outlined in NPC-300, and internationally recognized standards issued by the International Organization for Standardization (ISO). The field program included a long-term monitoring component (Baseline Noise Monitoring) and a short-term measurement component (Baseline Noise Measurements). The Baseline Noise Monitoring was completed through unattended monitoring, and the Baseline Noise Measurements were completed through attended measurements where field staff documented ambient conditions while the noise measurements were being completed.

Through discussions with the MFFN CAR Project Team, representative sensitive receptor locations were selected for both the Baseline Noise Monitoring and Baseline Noise Measurements. The community of MFFN was identified as a location that could be representative of all PORs within the Acoustic and Vibration LSA. A receptor location within the community of MFFN was identified in a more populated area where it was expected ambient levels were influenced by human activities. A second receptor location, in a more natural area of MFFN, was identified to document ambient levels away from human activities. These two receptor locations were expected to provide the potential range in existing ambient noise levels within the Acoustic and Vibration LSA.

Baseline Noise Monitoring at the representative sensitive receptor locations was conducted using sound level meters set to record one-minute equivalent noise levels (Leq) and noise levels exceeding 90% of the measurement period (L90). The Baseline Noise Monitoring program was completed over a period of up to approximately 48 hours, when unfavourable weather (i.e., periods of precipitation and wind speeds exceeding 20 km/h) was not expected. Weather data was obtained from the Marten Falls Ogoki Airport weather station. The monitoring was completed through unattended monitoring to document baseline noise levels over various days of the week and over various periods of the day at each location, to quantify variability in monitored noise levels. The collected Baseline Noise Monitoring noise data was reviewed, and if it was determined that some of the data may be abnormal, these data was screened to remove any abnormal noise events (e.g., birds or insects close to microphone) as well as noise data collected under unfavourable weather conditions (i.e., periods of precipitation and wind speeds exceeding 20 km/h). The daytime and night-time ambient noise levels were calculated based on all collected valid noise data. The collected data included noise levels as well audio recordings of discrete noise events to aid in data analysis.

During the noise monitoring, the following community activities were observed at the monitor location representative of the community: house construction / renovation activity, local road traffic and human outdoor activities. The duration of such activities was specific to the time of the day and season (i.e., late autumn).

Short-term attended **Baseline Noise Measurements** were conducted for up to approximately 20 minutes to supplement the Baseline Noise Monitoring data, collecting similar noise metrics. Community noise annoyance, expressed in percentage of highly annoyed (%HA), was determined based on the daytime and the night-time baseline noise levels measured during the field program.

The field program was completed during late autumn with conditions representative of those during wintertime (i.e., presence of snow on the ground, periods of high wind and absence of wildlife and insects). The existing noise levels measured in the more populated area during this time of year would likely represent the lower range of the typical seasonal variability of the ambient noise levels expected to be present in such an area. It is expected that during the summertime, due to increased frequency and duration of human activities, the ambient noise levels may increase in comparison to the ambient noise levels measured during the field program. In the more natural area, a similar trend is expected during the spring and summer seasons due to increased activities of wildlife and insects.

Data for the noise field program includes the following information for each location:

- Sound level meter / monitor make and model;
- Microphone make and model;
- Monitoring/measurement location;
- Mounting method;
- Height of microphone;
- Information on microphone protection (e.g., wind screen);
- Sound level meter / monitor settings;
- Recording mode;
- Meteorological conditions during the monitoring obtained from a community met station (e.g., wind speed and precipitation);
- Summary of any issues with equipment (e.g., failure);
- Summary of field calibrations completed; and,
- Hourly baseline noise levels.

8. Data Management and Analysis

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.

The noise data collected for this Project was reviewed to identify any abnormalities. Abnormal noise events (e.g., birds or insects close to microphone) were removed, as well as noise data collected under unfavourable weather conditions (i.e., periods of precipitation and wind speeds exceeding 20 km/h). The screening was completed using various tools, which included audio recordings (where deemed appropriate) and analysis of the raw noise monitoring data in combination with meteorological data obtained from the Marten Falls Ogoki Airport. The daytime and night-time ambient noise levels were calculated based on all collected valid noise data.

Noise modelling predictions and supporting calculations will be thoroughly reviewed and all technical reviews will be documented. Technical review documentation will be retained along with all other Project files.

9. Effects Assessment

The following sections provide discipline-specific input and considerations as they pertain to the methodology for 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. 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 as well as projects of similar magnitude and / or location.

A preliminary analysis of Project-environment interactions for the Acoustic and Vibration Environment 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	Noise and Vibration
Construction Phase	*Mobilization of Equipment and Supplies*	X
	Temporary Construction Staging Areas[1]	X
	Temporary Access Roads and Trails[1]	X
	Temporary Construction Camps[1]	X
	ROW Clearing and Grubbing	X
	Brush and Timber Disposal	X
	Pits and Quarries[1]	X
	Drilling / Blasting / Aggregate Production	X
	Road Construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	X
	Bridge and Culvert Installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	X
	Construction Site Restoration	X
Construction Phase: Decommissioning	*Pits and Quarries*	X
	Temporary Camps, Roads / Trails and Staging Areas	X
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 VCs of the Acoustic and Vibration Environment have been determined through consideration of the following factors listed in the TISG[8]:

- 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);
- 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.

8. *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.*

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 the Acoustic and Vibration Environment.

Table 9-2: Acoustic and Vibration Environment Indicators

Valued Component	Indicators	Rationale for Selection
Noise	■ Continuous one hour equivalent sound level ($L_{eq,1hr}$) ■ Maximum night-time sound level (L_{max}) ■ Day-night sound level (L_{dn}) ■ Day-time sound level (L_d) ■ Night-time sound level (L_n) ■ Percent highly annoyed (%HA)	■ Field investigations ■ Agency feedback ■ Data from previous EAs ■ Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning – NPC-300 (MECP 2013) ■ Environmental Guide for Noise (MTO 2006) ■ A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways and Environmental Assessments (MTO / MECP 1996) ■ Guidance for Evaluating Health Impacts in Environmental Assessment: Noise (Health Canada 2017) ■ World Health Organization (WHO) Guidelines for Community Noise (WHO 1999) ■ United States Federal Transit Administration (USFTA) Transit Noise and Vibration Impact Assessment Manual (U.S. Department of Transportation 2018) ■ OPSS (Ontario Provincial Standard Specification). 2014. OPSS 120 General Specification for the Use of Explosives. November 2014 ■ MECP Model Municipal Noise Control By-law, Publication NPC 119 (NPC 119). August 1978.
Vibration	■ Peak particle vibration velocity (PPV) ■ Root-mean square vibration velocity (RMSV)	

Note: Indicators related to wildlife, socio economics and human health, as related to sensory disturbance from noise and vibration, are presented in their respective reports.

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 the Acoustic and Vibration Environment 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 vegetation could indirectly affect wildlife). **Table 9-3** provides a preliminary identification of how changes to the Acoustic and Vibration Environment may result in indirect effects to other environmental disciplines.

Table 9-3: Potential Discipline Interactions

Discipline and Associated Valued Components	Aboriginal and Treaty Rights and Interests	Atmospheric Environment	Climate Change	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
Acoustic and Vibration Environment ■ **Noise** ■ **Vibration**	X	-	-		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 will detail the model assumptions, parameters, the quality of the data and the degree of certainty of the predictions obtained.

The effects assessment will assess all phases of the Project including the CAR operations, construction activities and sub-phases, and temporary construction-related facilities (e.g., aggregate extraction and refining). The Project effects will be assessed using guidance from federal and provincial guidelines, and guidelines inline with generally accepted practices within the industry. It is understood that Project construction will occur in phases and may expose receptors to activities that vary in duration. This phased approach will be incorporated into the noise and vibration assessments. To provide some context for the change in the acoustic environment due to the Project, noise due to all phases of Project operation and construction may be compared to baseline levels. However, any recommendations for mitigating Project noise and vibration will be based on federal and provincial guideline limits and thresholds. The guidelines, limits and methods for predicting and assessing the Project noise and vibration effects are described below.

9.4.1 Federal Noise Guidelines and Limits

The noise effects due to the Project operations and construction activities will be assessed using the Health Canada guide (Health Canada 2017). Although Health Canada does not have enforceable noise thresholds or standards, the HC guide is a guidance document for the assessment of environmental noise. The Health Canada guide provides general information on predicting health risks related to noise in federal EAs of major resources and infrastructure projects. Within the context of the MFFN CAR Project noise and vibration assessment, operations will correspond to operation of the CAR and construction sub-phases and temporary facilities that may last one year or longer. Short-term construction will correspond to construction sub-phases and temporary facilities that may operate for less than one year. The Health Canada guide assesses potential noise impacts due to a project using numerous acoustical descriptors, or indicators. **Table 9-4** summarizes these indicators, the corresponding Health Canada guide criteria, and how these may correlate to impacts on human receptors. The effects assessment will evaluate the noise descriptors described in **Table 9-4** below.

Table 9-4: Health Canada Guide Noise Assessment Descriptors and Criteria

Activity	Noise Descriptor(s)	HC Guide Limit[9]	Noise Impact Correlation
Project Operations / Construction ≥ 1 year	Outdoor L_d	55 dBA	■ Threshold for sustaining good outdoor speech comprehension
	Outdoor L_{dn}	55 dBA	■ Threshold for "no reaction" response in terms of noise complaints due to intruding noise
	%HA	%HA ≤ 6.5%	■ Threshold for noise-induced human health effects
	Outdoor L_n	40 dBA (annual average)	■ Threshold for adverse health effects due to sleep disturbance
	Outdoor L_{max}	60 dBA, 10-15 events per night	■ Threshold for sleep disturbance due to individual night-time noise events
Construction < 1 year	Outdoor L_n	45 dBA	■ Threshold for adverse effects due to sleep disturbance due to night-time construction noise
	Outdoor L_{max}	60 dBA, 10-15 events per night	■ Threshold for adverse effects due to sleep disturbance due to night-time construction noise
	Suggested mitigation noise level (MNL), L_{dn}	47 dBA (Basic MNL) + project-specific adjustments (i.e., +10 dB if duration is less than two months for a given receptor location)	■ Suggested threshold to avoid widespread complaints due to construction noise

In assessing impacts on human health, baseline levels will be added to Project noise levels.

Receiver locations near the Project may also be exposed to noise from other projects or facilities. If residual acoustic effects from the Project are predicted, a cumulative effects assessment will be carried out to assess the combined impact of the Project and other existing physical activities, as well as future physical activities that are certain and reasonably foreseeable. The cumulative effects assessment will consider other existing or future certain and reasonably foreseeable physical activities located within 5 km of Project receptors. The cumulative effects assessment will incorporate publicly available information for the other facilities and operations. Where information for these projects is not publicly available, the effects assessment will assume these projects comply with federal noise limits.

9. *For the purposes of this EA, in the event the baseline study indicates noise levels greater than any of the HC Guide Limits for a specific noise descriptor at a receptor location, a maximum increase of 3 dB will be considered as the limit for that noise descriptor at that receptor location.*

9.4.2 Provincial Noise Guidelines and Limits

Traffic noise impact assessments within Ontario are assessed using the Ontario Ministry of Transportation's (MTO) *Environmental Guide for Noise* (the MTO Guide – MTO 2006); and the MTO / MECP joint guideline *A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways and Environmental Assessments* (the MTO / MECP Protocol – MTO / MECP 1996). Both guidelines assess traffic noise impacts considering the change in traffic noise levels above ambient sound levels but the MTO Guide also includes an overall sound level limit. **Table 9-5** below summarizes the MTO Guide and MTO / MECP Protocol traffic noise level criteria.

Table 9-5: Provincial Traffic Noise Assessment Descriptors and Criteria

Guideline	Noise Descriptor	Guideline Limits
MTO Guide	L_{eq} (16-hour)	■ 5 dBA or greater change above ambient level, or 65 dBA
MTO / MECP Protocol	L_{eq} (16-hour)	■ Greater than 5 dBA change above ambient noise level when noise levels are greater than 55 dBA

The MTO Guide is typically used to assess provincial freeways and highways. The MTO / MECP Protocol is typically used to assess other classes of roadways, such as arterial roads. Based on this, and the fact that it is unknown at this time who will have jurisdiction of the CAR upon completion of the Project, the MTO / MECP Protocol criteria limits will be used for the traffic noise assessment. Note that these limits relate to a 16-hour L_{eq} noise descriptor, for the period from 07:00 to 23:00.

There are no provincial guidelines that provide construction noise limits at receiver locations. Some long-term construction activities may include temporary facilities with stationary noise sources (e.g., aggregate extraction). The NPC-300 guidelines apply to stationary noise source assessments but do not provide a means of determining when long-term construction activities should be assessed as stationary facilities. For the purposes of the EA, referencing the construction durations provided in the Health Canada guide, construction-related facilities that may operate for one year or longer will be assessed using NPC-300. **Table 9-6** below summarizes the minimum sound level limits provided in NPC-300 for urban, sub-urban and rural areas, expressed in terms of the one-hour equivalent sound level (Leq,1hr) for different periods of the day. Where baseline levels exceed the NPC-300 minimum sound level limits for the same time of day, the baseline levels may be used as the sound level limits.

Table 9-6: MECP Guideline NPC-300 Sound Level Limits

Point of Reception Location	Time of Day	Class 1 (urban) Area (dBA)	Class 2 (sub-urban) Area (dBA)	Class 3 (rural) Area (dBA)
Outdoor	07:00 – 19:00	50	50	45
Outdoor	19:00 – 23:00	50	45	40
Plane of Window	07:00 – 19:00	50	50	45
Plane of Window	19:00 – 23:00	50	50	40
Plane of Window	23:00 – 07:00	45	45	40

9.4.3 Vibration Guidelines and Criteria

Depending on the Project related activities, there are various vibration limits that can be considered. There are no provincial or federal guidelines that provide vibration limits for Project operation or general non-blasting construction activities. The Project vibration levels due to the CAR operations and general non-blasting construction activities will be assessed using a vibration Zone of Influence, as described in City of Toronto By-law 514-2008; and vibration criteria limits for buildings where people sleep, as described in the U.S. Department of Transportation / Federal Transit Administration (USFTA) *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018). **Table 9-7** below summarizes the corresponding vibration criteria.

Table 9-7: Vibration Assessment Descriptors and Criteria – Project Operation and General Non-Blasting Construction Activities

Activity	Vibration Descriptor	Criteria Limit	Vibration Impact Correlation
CAR Operations	PPV	5 mm/s	■ Screening threshold for vibration-related building damage due to CAR operations
	RMSV	0.1 mm/s [10]	■ Criteria limit for vibration impacts on sleep due to CAR operations
General Non-Blasting Construction	PPV	5 mm/s	■ Screening threshold for vibration-related building damage due to Project construction
	RMSV	0.1 mm/s (3)	■ Criteria limit for vibration impacts on sleep due to Project construction

10. Converted from FTA Manual RMSV limit of 72 VdB, (re: 1 micro-inch/sec).

If receptor locations are identified within the vibration Zone of Influence, the Project vibration levels due to the CAR operations and general non-blasting construction activities will be assessed using the prohibited construction vibration limits, as described in City of Toronto By-law 514-2008; and vibration criteria limits for buildings where people sleep, as described in the USFTA Manual. **Table 9-8** below summarizes the corresponding vibration criteria.

Table 9-8: Vibration Assessment Criteria Within Vibration Zone of Influence

Activity	Vibration Descriptor	Frequency of Vibration (Hz)	Criteria Limit	Vibration Impact Correlation
CAR Operations	PPV	< 4	8 mm/s	■ Criteria limit for vibration-related building damage due to CAR operations
		4 to 10	15 mm/s	
		>10	25 mm/s	
	RMSV	-	0.1 mm/s (11)	■ Criteria limit for vibration impacts on sleep due to CAR operations
General Non-Blasting Construction	PPV	< 4	8 mm/s	■ Criteria limit for vibration-related building damage due to Project construction
		4 to 10	15 mm/s	
		>10	25 mm/s	
	RMSV	-	0.1 mm/s (4)	■ Criteria limit for vibration impacts on sleep due to Project construction

The OPSS 120 2014 covers the requirements for the use of explosives during construction blasting (i.e., along the CAR) and has been developed for use in provincial and municipal oriented contracts. The limits specified in OPSS 120 2014 are designed to mitigate damage from vibrations induced by the use of explosives on construction blasting projects. **Table 9-9** below summarizes the PPV limits specified by OPSS 120 2014.

Table 9-9: Vibration Assessment OPSS 120 (Use of Explosives During Construction Blasting) Descriptors and Criteria

Element	Proposed Limit	Peak Particle Velocity (mm/s)
Structures and Pipelines	≤ 40 Hz	20
	> 40 Hz	50
Concrete and Grout <72 hours from placement	N/A	10

Note: < = less than; ≤ = less than or equal to; > = more than; Hz = hertz; mm/s = millimetres per second

11. Converted from FTA Manual RMSV limit of 72 VdB, (re: 1 micro-inch/sec).

Both ground and air vibration effects due to blasting produced at receptors adjacent to quarries are subject to guidelines and limits contained in the MECP's NPC-119 (Ontario Ministry of the Environment 1978). The limits specified in the MECP's NPC-119 are designed to minimize vibration effects due to quarry blasting. Under conditions where monitoring of the blasting operations is routinely carried out, the recommended ground and air vibration limits at the nearest receptors are 12.5 mm/s and 128 dBL respectively.

9.4.4 Noise and Vibration Prediction Methods

Road traffic noise due to the Project will be predicted with one of several prediction modelling approaches generally accepted by the MECP:

- The Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) algorithm, developed by the MECP. This algorithm is implemented in the STAMSON modelling software application.
- The Traffic Noise Model (TNM), developed by the United States Federal Highway Administration (USFHWA) as the computerized noise prediction modelling software for use on all U.S. Federal-aid highway projects.
- The Computer Aided Noise Attenuation (CadnaA) noise prediction modelling software, developed by DataKustik GmbH, implementing the RLS-90 road prediction algorithm. STAMSON would be used to verify the CadnaA model's prediction results at a number of receptor locations.

The preferred modelling algorithm will be selected depending on the number of sensitive receptors identified and the complexity of the relevant modelling inputs, such as topography. ORNAMENT is the preferred traffic noise modelling algorithm by the MECP, however it is limited in its ability to consider certain modelling inputs such as complex geography and therefore if such inputs are required, either TNM or CadnaA will be considered. According to the FHWA, TNM replaced the previous computerized noise prediction modelling software STAMINA 2.0 / OPTIMA and previous prediction model FHWA-RD-77-108. ORNAMENT is a modification of the FHWA-RD-77-108 model to simplify calculations and to account for Ontario's then-current vehicle fleet. The MTO Guide identifies both ORNAMENT and STAMINA 2.0 as the two noise prediction models approved for use by the MTO. TNM's capabilities in handling receptors and complex modelling inputs is better than ORNAMENT but still has its limitations. The CadnaA software has the strongest capabilities in dealing with GIS data, complex topography and generating noise contours. Based on past experience, using RLS 90 for the road traffic sources provide prediction results consistent with actual noise levels and those predicted using the MECP's ORNAMENT.

The traffic noise assessment will incorporate the following:

- Community-based polices concerning noise, if applicable;
- Existing and foreseeable future noise sensitive receptors, as defined under TISG requirements, and provincial and federal noise guidelines;
- Permissible sound levels at the assessed receptors;
- CAR plan and profile alignments;
- Receptor setback distance from CAR;
- Predicted future day / night traffic volumes and vehicle composition;
- Anticipated speed limits;
- CAR and receiver ground elevations;
- Screening effects due to berms and other structures (e.g., dwellings), where applicable; and
- Ground absorption.

Where roadway parameters are not available (e.g., traffic composition), the assessment will incorporate standard parameters (e.g., heavy and medium truck percentages) considered appropriate for the Project provided from readily available public information (e.g., MTO, MECP, American Association of State Highway and Transportation Officials, US Environmental Protection Agency, USFHWA) but subject to approval by MFFN. The road traffic noise predictions will be used for the calculation of the descriptors and criteria described above. Given the remote location of the Project area and value placed on “peace and quiet”, calculation of the change in %HA will incorporate the appropriate adjustments described in the Health Canada guide (e.g., +10 dB adjustment added to both the baseline and Project noise levels).

Noise levels due to construction activities and stationary sources will be predicted in accordance with ISO Standard 9613-1 (Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of absorption of sound by the atmosphere); and ISO Standard 9613-2 (Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation). This modelling method is accepted by numerous regulators across Canada including the MECP. The construction activities and stationary source noise assessment will incorporate the following:

- Community-based policies concerning noise, if applicable;
- Existing and foreseeable future noise sensitive receptors, as defined under TISG requirements, and provincial and federal noise guidelines;
- Source operating times / durations and spectral source noise emissions using manufacturers data or data collected from similar equipment for other projects;

- Assessment against provincial guidelines:
  - The MECP noise guideline NPC-104 adjustments (e.g., +5 dB adjustment to tonal and cyclic noise sources, +10 dB adjustment to quasi-steady noise sources, and +3 to +20 dB adjustment to intermittent noise sources) for the provincial noise impact assessment;
- Assessment against federal guidelines:
  - Health Canada guide adjustments (e.g., +10 dB adjustment for quiet rural areas added to both the baseline and Project construction noise levels, +5 dB adjustment to audibly tonal and regular impulsive noise sources, and +12 dB adjustment to highly impulsive noise sources) for the %HA assessment;
- Source-receptor separation distance and geometric divergence (e.g., distance attenuation);
- Atmospheric and ground absorption;
- Topography; and
- Screening effects due to intervening structures.

Where construction and stationary noise source parameters are not available (e.g., sound level spectrum), the assessment may incorporate data from industry standard reference publications (e.g., BSI BS 5228-2:2009 or USFTA Noise and Vibration Manual), manufacturers' noise data, or data collected from similar equipment for other projects.

Project vibration levels will be predicted using the general assessment formulae provided in the USFTA manual. Where vibration source parameters are not available (e.g., vibration emissions), the assessment may incorporate data from industry standard reference publications (e.g., BSI BS 5228-1:2009 or USFTA Noise and Vibration Manual); or data collected from similar equipment for other projects. Note, the necessity of construction vibration studies is dependent on the proximity of the project activities to vibration sensitive receptors. The Project includes quarries and pits to provide crushed rock and granular materials for the construction of the road and temporary access roads. The need for construction vibration studies will be determined once the locations of ancillary Project operations have been confirmed, and sensitive receptors have been identified.

Where possible, receptor locations and time periods will be incorporated with consideration of relevant input collected through community consultations and the Indigenous Knowledge Program, such as: typical sleep hours, and the expectation of quiet at specific locations or times. Hourly baseline noise levels will be calculated to support identification of time periods that tend to be quieter than others.

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. General noise and vibration mitigation measures and recommendations include:

- Where noise barriers are recommended, incorporate continuous construction (e.g., no gaps, voids, or holes) using a material that meets a minimum surface density of 20 kg/m^{2,} or a sound transmission class (STC) rating of 32, and construct the barriers to a height that provides a minimum 5 dB reduction;
- Maintain equipment in an operating condition that prevents unnecessary noise, including but not limited to, effective muffler systems, properly secured components, and the lubrication of moving parts;
- Restrict idling of equipment to the minimum necessary to perform the specified work;
- Ensure vehicles employed continuously on site for extended periods of time (two days or more) are fitted with sound reducing back-up (reversing) alarms;
- Avoid unnecessary revving of engines and switch off equipment when not required (do not idle);
- Adhere to local by-law requirements and the terms of any granted by-law exemptions, particularly if construction activities need to be undertaken at night-time;
- If construction needs to be undertaken outside of the normal daytime hours, inform residents beforehand of the type of construction planned and the expected duration;
- Use construction equipment compliant with noise level specifications in the MECP guidelines NPC-115 and NPC-118;
- Minimize drop heights of materials;
- Offset usage of active heavy equipment (schedule non-concurrent use);
- Implement noise compliance checks to ensure equipment levels comply with the MECP guidelines NPC-115 and NPC-118;

- Implement vibration compliance checks when blasting in quarries to ensure levels comply with the MECP guideline NPC-119;
- Implement vibration compliance checks when blasting during construction to ensure levels comply with OPSS 120;
- Implement vibration compliance checks during general non-blasting construction activities to ensure levels comply with reference vibration limits from applicable by-laws;
- Reroute construction and truck traffic, when and where feasible and as required;
- Co-ordinate 'noisy' operations such that they will not occur simultaneously, where possible;
- Implement the use of alternative construction equipment or methods to reduce noise emissions from construction as required.
- Utilize alternative equipment that generates lower noise levels or optimize silencer / muffler / enclosure performance as required;
- Use rubber linings in chutes and dumpers to reduce impact noise;
- Install acoustic enclosures, noise shrouds or noise curtains around noisy equipment;
- Install temporary noise barriers / solid construction hoarding on site boundary to screen affected locations as required;
- Where possible, build construction camps away from areas that are traditionally used for outdoor activities (e.g., hunting, fishing and trapping);
- Develop a complaint resolution process to describe what action will be taken in the event of noise and vibration complaints during Project construction or operations.

At a minimum, the noise and vibration assessments will assess the worst-case receptors which are generally those closest to the noise and vibration generating activities. If the corresponding criteria is met at the near receptors, the criteria is also expected to be met at further receptors. If mitigation is required to meet the criteria at the nearest receptors, and the mitigation enables the Project noise and vibration levels to meet the criteria, the further receptors are also expected to meet the criteria.

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.

9.6 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 irreversible[12]. Ecological and socio-economic 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 9-10**.

Table 9-10: Acoustic and Vibration Environment Magnitude Definition

Valued Component	Magnitude Level	Definition	Rationale
Noise	Low	■ Project noise levels do not exceed federal and provincial limits	■ Established noise limits based on federal and provincial guidance
Noise	High	■ Project noise levels exceed federal and provincial limits	
Vibration	Low	■ Project vibration levels do not exceed reference Municipal and industry limits	■ Municipal (within Ontario) guidance and standard industry thresholds
Vibration	High	■ Project vibration levels exceed reference Municipal and industry limits	

12. 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.

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 program verifies 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 address the requirements outlined in Section 26 of the TISG, 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.

10. Assumptions

The assumptions that have been made in developing the Study Plan are detailed in **Section 9**. Any additional assumptions required to complete 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 [13]	Requirement / Comment / Concern	Response	Study Plan Reference
1	TISG Section 05.1, page 22	■ Any proposed mitigation measures are to be clearly linked, to the extent possible, to valued components in the Impact Statement as well as to specific project components or activities, as well as comments raised during engagement activities.	■ Mitigation measures will be included in the IA/EA.	■ Section 9.5
2	TISG Section 07.1, page 30	■ The Impact Statement must establish appropriate study area boundaries to describe the baseline conditions. The study area boundaries need to encompass the spatial boundaries of the Project, including any associated project components or activities, and the anticipated boundaries of the Project effects, including all potentially impacted local communities, municipalities and Indigenous groups. 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; • 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.	■ The Study Areas are defined and described in this Study Plan.	■ Section 6.2 ■ Section 7.2
3	TISG Section 07.1, page 30	■ If the baseline data have been extrapolated or otherwise manipulated to depict environmental, health, social and/or economic conditions within the study area, modelling methods must be described and must include assumptions, calculations of margins of error and other relevant statistical information. Models that are developed should be validated using field data from the appropriate local and regional study areas. Ensure baseline data is representative of project site conditions. If surrogate data from reference sites are used rather than site-specific surveys, the proponent should demonstrate that the data are representative of project site conditions.	■ We will include details on modeling methods and discuss confidence in using desktop and/or field studies when describing baseline conditions.	■ Section 7.2 ■ Section 8
4	TISG Section 07.1, page 31	■ Where baseline data are available in geographic information system (GIS) format, this information is to be provided to the Agency as electronic geospatial data file(s) compliant with the ISO 19115 standard. This would support the Government of Canada's commitment to Open Science and Data and would facilitate the sharing of information with the public through the Canadian Impact Assessment Registry Internet Site and the Government's Open Science and Data Platform. The Agency intends to make the geospatial data files available to the public under the terms of the Open Government License – Canada.	■ Data provided will meet ISO 19115 standards.	■ Section 8
5	TISG Section 07.2, page 32	■ 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.	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IA/EA and are summarized in this Study Plan.	■ Section 7.2 ■ Section 9.2 ■ Section 9.4

13. Federal TISG Reference should be the Section or subsection, page etc. that clearly identifies where comment/issue we are addressing can be found (ex. Section 8.1 of TISG)

ID #	Federal TISG Reference [13]	Requirement / Comment / Concern	Response	Study Plan Reference
6	TISG Section 07.2, page 33	■ Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options. Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IA/EA and are summarized in this Study Plan.	■ Section 7
7	TISG Section 07.2, page 33	■ 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.	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS/EA reports.	■ No reference
8	TISG Section 07.2, pages 31-33	■ Information sources and data collection methods used for describing the baseline environmental, health, social and economic setting may consist of the following sources of information. For specific sources of baseline information, see Appendix 1. Federal government (e.g., Environment and Climate Change Canada, Health Canada, Indigenous Services Canada, Statistics Canada, Women and Gender Equality Canada); • Ontario provincial government (e.g., Ministry of Environment, Conservation, and Parks, Ministry of Natural Resources and Forestry; • Bird Conservation Region plans; • academic institutions; • field studies, including site-specific survey methods; • database searches, including: • federal, provincial, territorial, municipal and local data banks; • Breeding Bird Atlas - Ontario (2001-2005) • monitoring program databases protected areas, watershed or coastal management plans; • natural resource management plans; • species recovery and restoration plans; • field measurements to gather data on ambient or background levels for air, water, soil and sediment quality, light levels or acoustic environment (soundscape); • land cover data, including: • terrestrial ecosystem mapping products; • forest cover maps; • remote sensing resources; • important habitats and features to include: ▪ water bodies, wetlands, watercourses; ▪ riparian habitat; ▪ river banks or other eroded habitats; ▪ artificial water sources; ▪ forest, tree patches, solitary trees (especially old decaying trees); ▪ forest edges and tree rows; ▪ ridges, including eskers; ▪ caves and mines; ▪ cliffs, rock outcrops, exposed bedrock, talus, and other karst topography; ▪ buildings, bridges, and other anthropogenic features, including linear features; ▪ sources of artificial lighting attracting insects; ▪ critical habitat; and	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS/EA reports.	■ Section 5 ■ Section 7

ID #	Federal TISG Reference [13]	Requirement / Comment / Concern	Response	Study Plan Reference
		▪ and any other habitat features known to be important in the area. • Published literature, such as peer reviewed journals, reports by think tanks, non-government organizations and government reports; • environmental assessment documentation, including monitoring reports, from prior projects in the area and similar projects outside the area; • regional studies, project assessments and strategic assessments; • renewable harvest data; • Indigenous knowledge, including oral histories and knowledge gathered by spending time on the land with knowledge holders; • community based monitoring and studies conducted by Indigenous communities; • expert, community, public and Indigenous engagement and consultation activities, including workshops, meetings, open houses, surveys; • qualitative information gathered from interviews, focus groups or observation; • census data; • baseline human health risk assessments; • community and regional economic profiles; • community well-being studies; and • statistical surveys, as applicable.		
9	TISG Section 07.4.1, page 36	■ For valued components establish three study area spatial boundaries to assess impacts to each valued component: 1) Project Study Area: defined as the project footprint for each alternative route; 2) Local Study Area: defined for each valued component – see below; 3) Regional Study Area: defined for each valued component – see below ■ Provide a rationale for boundaries of the project study area, local study area, and regional study area for each valued component and indicate how the above objectives were met in establishing the boundaries.	■ The Study Areas are defined and described in this Study Plan.	■ Section 6.2
10	TISG Section 07.4.1, pages 35-36	■ The Impact Statement must describe the spatial boundaries, including project, local and regional study areas, for each valued component included in assessing the potential adverse and positive environmental, health, social and economic effects of the Project and provide a rationale for each boundary. 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. The size, nature and location of past, present and foreseeable future projects and activities are factors that should be included in the definition of spatial boundaries. It should be noted that in some cases, spatial boundaries might extend to areas outside of Canada. These transboundary spatial boundaries should be identified where transboundary effects are expected.	■ The Study Areas are defined and described in this Study Plan.	■ Section 6.2
11	TISG Section 07.4.2, page 37	■ The temporal boundaries of the impact assessment span all phases of the Project determined to be within the impact assessment. If potential effects are predicted after project decommissioning or abandonment, this should be taken into consideration in defining specific boundaries. In order to assess a project's contribution to sustainability, consideration should be given to the long-term effects on the well-being of present and future generations. When defining temporal boundaries, the proponent should consider how elements of environmental, health, social and economic well-being that local communities, including municipalities, and Indigenous groups identify as being valuable could change over time.	■ The Study Areas are defined and described in the Study Plan.	■ No reference
12	TISG Section 08.1, page 39	■ The Impact Statement must provide current ambient noise levels at key receptor points to traditional land users and sensitive human receptors, including the results of a baseline ambient noise survey and permissible sound levels for each receptor. Information on typical sound sources (both natural and anthropogenic), geographic extent and temporal variations will be	■ Section 7.1 includes details on POR and how they will be identified for the purposes of baseline and effects assessment. ■ Section 9.2 details the assessment VCs and indicators. A description of how these correlate to effects on humans is also provided.	■ Section 7.1 ■ Section 9.2 ■ Section 9.4

ID #	Federal TISG Reference [13]	Requirement / Comment / Concern	Response	Study Plan Reference
		included. When collecting baseline ambient noise survey data at human receptor locations, consider the following recommended questions: • Does the community or land users value certain non-anthropogenic (i.e., natural) sounds? • Is there an expectation of quiet at any specific locations or times? • What are typical sleep hours (10:00 pm to 7:00 am being the default assumption)? • What is the baseline prevalence of noise annoyance toward existing noise sources (e.g., road traffic, aircraft, and other industrial sounds)?	■ Section 9.4 has been revised to include numerous indicators related to night-time operations and noise events.	
13	TISG Section 08.1, page 39	■ The Impact Statement must provide the approximate number, distance and identity factors of likely human receptors, including any foreseeable future receptors, that may be impacted by changes in air, water, country food quality (e.g., dust deposition on vegetation), and noise levels. At minimum, provide a map showing approximate locations of permanent residences, temporary land uses (e.g., cabins and traditional sites) and known locations of sensitive human receptors (e.g., schools, hospitals, community centres, retirement complexes or assisted care homes).	■ Acoustic and Vibration Environment Study will identify noise sensitive receptors and will include corresponding visual aids.	Section 9.4.4
14	TISG Section 13, pages 80-83	■ This section of the TISG describes the methodology for the effects assessment, including definitions of scope, severity, and irreversibility.	■ This information will be included in the EA/IS Report and is summarized in the Study Plan.	■ Section 9
15	TISG Section 14.1, page 85	■ The Impact Statement must describe changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, including changes to the perception of non-anthropogenic sounds.	■ Ambient noise includes both anthropogenic and non-anthropogenic sounds. Ambient monitoring datasets include thousands of datapoints, and it is impractical to separate anthropogenic and non-anthropogenic events. Where applicable, the Acoustic and Vibration Environment Study will describe changes to the perception of sound with respect to the baseline ambient levels (e.g., anthropogenic + non-anthropogenic sounds).	■ Section 9.4
16	TISG Section 14.1, page 85	■ The Impact Statement must quantify sound levels at appropriate distances from any Project facility and/or activities and describe for each contributing source the timing (e.g., hours of night-time activities), number and duration of noise events and their sound characteristics, including frequency spectrum.	■ We will describe noise source characteristics used in the noise impact assessment(s).	■ Section 9.4
17	TISG Section 14.1, page 86	■ In regards to changes to the atmospheric, acoustic, and visual environment, the Impact Statement must describe any positive changes.	■ The effects assessment will identify positive and adverse effects that may be caused by the Project, on the environment.	■ Section 9
18	TISG Section 14.1, page 86	■ The Impact Statement must consider the expectation of peace and quiet at receptors (e.g., in a quiet rural area or during Indigenous land use) and the applicable community-based policies concerning noise (e.g., complaints resolution processes).	■ Acoustic and Vibration Environment Study will consider community input and applicable policies. Further information will be provided in the IS/EA Report.	■ Section 4 ■ Section 9.4
19	TISG Section 14.1, page 86	■ The Impact Statement must describe the locations and characteristics of the most sensitive receptors including species at risk and differential effects for sensitive receptors.	■ Section 7.1 of the updated study plan provides preliminary information on the selection criteria for sensitive receptors based on existing and potential human activity. Section 9.3 of the updated study plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Effects on species at risk as a result of changes in noise and vibration will be assessed, where applicable (refer to Wildlife and Ungulates Study Plans). Further information will be provided in the IS / EA Report.	■ Section 7.1 ■ Section 9.3; ■ Wildlife Study Plan ■ Ungulates Study Plan
20	TISG Section 14.1, page 86	■ The Impact Statement must identify and justify the approach to determine the extent to which sound effects resulting from the Project are adverse and describe any changes in night-time light levels as a result of the Project.	■ Acoustic and Vibration Environment Study will assess adverse noise impacts using accepted industry, Provincial, and Federal descriptors, including noise at night, if applicable.	■ Section 9.4
21	TISG Section 14.1, page 86	■ The Impact Statement must provide the hourly distribution of baseline noise events at night in comparison to predicted individual noise events at night at each receptor location.	■ Acoustic and Vibration Environment Study will present hourly baseline results of the field monitoring program. Noise impact assessment will include a comparison of predicted noise levels and measured baseline levels.	■ Section 4.1 ■ Section 9

ID #	Federal TISG Reference [13]	Requirement / Comment / Concern	Response	Study Plan Reference
22	TISG Section 15.2, page 94	■ The Impact Statement must describe the incidental effects caused by increased disturbance (e.g., sound, artificial light, presence of workers), relative abundance movements, considering the critical periods for the birds, including but not limited to breeding, migration and overwintering.	■ The identification of Points of Reception (POR) is described in Section 7.1 of the Study Plan and will include sensitive features, such as species at risk and other wildlife. Effects on species at risk as a result of changes in noise and vibration will be assessed, where applicable. ■ Section 9.3 of the updated study plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Effects on species at risk as a result of changes in noise and vibration will be assessed, where applicable (refer to Wildlife Study Plans). Further information will be provided in the IS / EA Report. ■ Refer to the Visual Study Plan for information on light assessment.	■ Section 7.1 ■ Section 9.3; ■ Wildlife Study Plan ■ Visual Environment Study Plan
23	TISG Section 16.1, Page 103	■ With respect to biophysical determinants of health, the Impact Statement must provide an assessment of adverse and positive effects on human health in consideration of, but not limited to, potential changes in: • noise exposure; • effects of vibration;	■ The effects assessment will identify positive and adverse effects that may be caused by the Project, on the environment. Refer to the Human Health and Community Safety Study Plan for more information on human health effects.	■ Section 9.4; Human Health and Community Safety Study Plan
24	TISG Section 20, page 119-128	■ Section 20 of the TISG describes the requirements around mitigation and enhancement measures that must be considered in the Impact Statement.	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Section 9.5
25	TISG Section 21, pages 129-130	■ Section 21 of the TISG describes the requirements and guidance associated with determining residual effects.	■ Residual effects will be assessed in the IA/EA.	■ Section 9.6
26	TISG Section 22, pages 131-133	■ Section 22 of the TISG describes the guidance around conducting cumulative effects assessment for the project.	■ Cumulative effects assessment will be conducted as part of the IA/EA.	■ No reference
27	TISG Section 25, pages 139-140	■ Section 25 of the TISG provides guidance on how to demonstrate the Project's contributions to sustainability.	■ The IA/EA will include discussion on how the project contributes to sustainability and is summarized in the Study Plan.	■ Section 9.7
28	TISG Section 26, pages 141-144	■ Section 26 of the TISG includes a description of the considerations for developing a follow-up program for environmental, health, social or economic effects, as applicable.	■ The IA/EA will include descriptions of follow up programs, as required by VC.	■ No reference

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

ID #	Comment from Regulatory Agency	Comment Type	Requirement / Comment / Concern	Response	Study Plan Reference
1	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ Study areas are missing and lack clarity – maps show study area for 4 routes even though only 2 (or 1?) routes are proposed to be assessed; no indication of local and regional study areas for each environmental component (e.g. ground water, surface water, caribou, etc.).	■ The Study Areas are defined and described in this Study Plan.	■ Section 6.2
2	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental, MECP Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ Assessment Methods – For the most part, section 7.2 provides a description of potential environmental effects for each discipline. However this section also includes assessment methodologies for some subsections (7.2.1 and 7.2.2 AERMOD modelling, quantitative noise assessment) while the majority do not (7.2.3 – 12). The level of detail in the ToR about assessment methods should be consistent for all environmental components. It is strongly recommended to include commitments to develop work plans at the outset of the EA phase, including opportunities for technical review by agencies and others. The work plans should include assessment methodology appropriate for each environmental component. The ToR could include a high level summary table for each environmental discipline listing data collection and assessment methods, with a commitment to develop the work plans at the outset of the EA phase to provide more details. Consider where the information about air and noise modelling is best placed.	■ The Study Plan meets this requirement.	■ Section 7 ■ Section 8
3	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental, MECP Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ #16 Section 8 Page 54 – Work Plans - Section 8 describes the approach that will be taken to evaluate alternative methods during the EA, including proposed criteria and indicators (presented in Appendix A). The information presented is high level and does not provide an opportunity for technical review of the methodologies that will be applied to evaluate those specific criteria and indicators. It is strongly recommended to include commitments to develop work plans at the outset of the EA phase, including opportunities for technical review by agencies and others.	■ The Study Plan meets this requirement.	■ Section 9
4	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ #17 Section 8 Page 54 Consultation on Assessment Methodology – MFFN acknowledges that the proposed methodology will be open to input during the draft ToR review, but also says a more detailed method will be presented in the EA. Page 47 indicates the effects assessment criteria will be developed during the EA. While it is appropriate to defer some detailed work planning to the EA phase, the ToR should include commitments for how technical reviewers, and other interested persons, will be consulted during the development of specific evaluation methodologies or technical work plans. It is strongly recommended that those opportunities for review occur prior to the completion of studies (e.g. prior to the submission of a draft or final EA document).It is not clear whether MFFN plans to consult on the more detailed methodology and criteria during the EA phase or if the ToR phase is the main opportunity to provide input. Please indicate how consultation on the ToR has informed the preliminary criteria and indicators. Please clarify when MFFN will consult and provide opportunity for input on the detailed assessment method, including criteria and indicators (and work plans as MECP has proposed), with agencies, communities and stakeholders during the EA phase in order to finalize the methodologies before EA studies get advanced.	■ The Study Plan meets this requirement. As identified in Section 4.2 of the Study Plan, 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 Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment (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 Study Plan. Section 5 of the Study Plan provides further details on the 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.	■ Section 4.2 ■ Section 5

ID #	Comment from Regulatory Agency	Comment Type	Requirement / Comment / Concern	Response	Study Plan Reference
5	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ #21 Section 10.2.4 Page 73 Technical Work Plans – – Page 73 states that MECP has indicated it will not be commenting on work plans associated with field work until the ToR is finalized. This statement does not reflect MECP's guidance to the project team. MECP's guidance, which is documented on page 69 of the RoC, is that the ToR is the mechanism to seek technical review of work plans and that discipline- specific work plans should be included with the ToR. As well, discussions that MECP has had with the project team to date are considered pre-consultation, since it is the ToR that sets out what work is to be done during the EA phase. Please revise the statement on page 73 to state: "MFFN provided MECP and MNRF work plans associated with field work planned during 2019 for review, however MECP advised this is considered-consultation and that discipline-specific work plans should be appended to the ToR to allow full technical review. "As the draft ToR did not include detailed discipline-specific work plans, the other option the ministry strongly recommends is to include commitments to develop workplans at the outset of the EA phase, including opportunities for technical review.	■ The Study Plan meets this requirement.	■ No reference
6	MECP	■ Email from Mike Landers, Senior Environmental Officer, Thunder Bay District Office, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ #3 7.1.4.2 Acoustic Environment 23 7.2.2 Acoustic Environment Pg. 49 – Due to the nature of the potential road base, vibration may also become an issue if road is located near sensitive receptors.	■ Acoustic and Vibration Environment Study will use screening and Zone of Influence assessments to confirm if vibration due to Project activities may potentially impact receptors; and if detailed vibration studies are required.	■ Section 9.4
7	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ Sec. 10.2.3 Public and other interested stakeholders (pg.71)& 7.1.4.1 (Atmospheric environment) (pg.23) & 7.1.4.2 (Acoustic environment) (pg.24) & Appendix A draft criteria and indicators – There is a listing of public and interested stakeholders identified in [the draft ToR]. … These stakeholders may also be considered for Points of Receptors for consideration of atmospheric (dust) and acoustic monitoring (for road construction and operation). We recommend that MFFN contact MECP for further information/consideration.	■ Where possible, the Acoustic and Vibration Environment baseline study will consider relevant input from public and interested stakeholders.	■ Section 4.1
8	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ Draft Criteria and Indicators for Alternatives Evaluation Appendix A – Available resources to help inform the draft criteria and indicators include research publications and expert knowledge on topics such as stressor-effects pathways, cumulative effects, and associated environmental components and indicators.Contacting researchers such as Rob Mackereth (MNRF) who has published research on these topics and related subjects is encouraged. -Rempel, R.S., et. al. 2016. Support for development of a long term environmental monitoring strategy for the Ring of Fire area. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Science and Research Information Report IR-08. 34 p. + append. Catalogue-natural-resource-scientific-and-technical-publicationsWhile no specifics are provided in this submission, MNRF welcomes a discussion with MECP and ENDM to explore what (if any) role this project could play in advancing baseline information and long-term environmental monitoring for the Ring of Fire in partnership with First Nations communities.	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS/EA reports.	■ Section 7 ■ Appendix A

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

ID #	Federal TISG Reference[14] or Provincial Draft ToR Comment Reference[15]	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 7.2, page 33	■ 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. Existing data should be considered as a limited augmentation of this new data. See the "Establishing Baseline Conditions" (sections 8.5, 8.9, 8.10, 8.11) in this Tailored Impact Statement Guidelines for recommendations on survey design and methodology. Surveys and analyses should be conducted by qualified experts. Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options. Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IA/EA and are summarized in this Study Plan. The acoustic field program was only one session (late fall 2019) in Marten Falls covering two (2) locations for long-term monitoring. There are no additional field monitoring programs proposed as part of the Study Plan.	■ Sufficient field information is available through historic and/or recent field investigations to understand annual and seasonal variation. We have provided information regarding anticipated seasonal changes in noise levels in the project area in the Study Plan.	■ Reword the requirement: With regard to field studies, survey work must consider including multiple sampling locations and/or multiple visits to each location to support all required assessment analyses. Applicability of using existing data should be described in the IS report. See the "Establishing Baseline Conditions" (sections 8.5, 8.9, 8.10, 8.11) in this Tailored Impact Statement Guidelines for recommendations on survey design and methodology. Surveys and analyses should be conducted by qualified experts. Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per Section 7.1). Justification should be provided to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options. Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.
2	TISG Section 8.1, page 39	■ 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;	■ The Acoustic Environment Study Plan will assess acoustic impacts on human receptors only. Acoustic impacts and existing conditions related to underwater environments will not be determined or measured.	■ Federal and Provincial noise guidelines have been developed based on research into human response to noise exposure. The noise guidelines do not address whether these criteria are applicable to wildlife, nor do the guidelines provide separate criteria for wildlife assessment. We are not aware of any underwater noise or vibration thresholds that would be applicable for this project.	■ Remove this requirement.

14. Federal TISG Reference should be the Section or subsection, page etc. that clearly identifies where comment/issue we are addressing can be found (ex. Section 8.1 of TISG)
15. This should include ID # reference (from excel table you were provided with all Draft ToR comments) and commenter.

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.

Alberta Energy and Utilities Board, 2007:
Energy Resources Conservation Board – Directive 038: Noise Control. Revised edition.

City of Toronto, 2008:
By-law No. 514-2008, City of Toronto Municipal Code Chapter 363, Building Construction and Demolition, with respect to regulation of vibrations from construction activity

Health Canada, 2017:
Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise https://www.ceaa.gc.ca/050/documents/p80054/119378E.pdf

Impact Assessment Agency of Canada, 2019:
Impact Assessment Act. https://laws-lois.justice.gc.ca/eng/acts/I-2.75/

Impact Assessment Agency of Canada, 2020:
Public Participation Plan for the Marten Falls Community Access Road Project Impact Assessment.

Impact Assessment Agency of Canada, 2020a:
Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment.

Impact Assessment Agency of Canada, 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, 2020c:
Tailored Impact Statement Guidelines for the Marten Falls Community Access Road Project. https://iaac-aeic.gc.ca/050/documents/p80184/133937E.pdf

Ministry of Environment, Conservation and Parks, 1978:
Model Municipal Noise Control By-Law Noise Pollution Control Guideline (NPC) Blasting, Publication NPC-119 (NPC-119). August 1978.

Ministry of Environment, Conservation and Parks, 2013:
Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300 https://www.ontario.ca/page/environmental-noise-guideline-stationary-and-transportation-sources-approval-and-planning

Ministry of Transportation / Ministry of Environment, Conservation and Parks, 1996:
A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments

Ministry of Transportation, 2006:
Environmental Guide for Noise

Ontario Government, 1990a:
Environmental Assessment Act. https://www.ontario.ca/laws/statute/90e18

Ontario Ministry of the Environment, 1978:
Model Municipal Noise Control By-Law - Final Report.

Ontario Provincial Standard Specification, 2014:
OPSS 120 General Specification for the Use of Explosives. November 2014.

U.S. Department of Transportation Federal Transit Administration, 2018:
Transit Noise and Vibration Impact Assessment Manual. September 2018.

Appendix A

Preliminary List of Data Sources

Alberta Energy and Utilities Board, 2007:
Alberta Energy Regulator (AER) Directive 038: Noise Control (Directive 038).

British Standards Institute (BSI), 2009:
British Standards Institute (BSI) BS 5228-1:2009, Code of practice for noise and vibration control on construction and open sites – Part 2 Vibration

British Standards Institute (BSI), 2009:
BS 5228-1:2009, Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

Ministry of Transportation/Ministry of the Environment, Conservation and Parks, 1996:
A Protocol for Dealing with Noise Concerns During the Preparation, Review and Evaluation of Provincial Highways and Environmental Assessments.

Ministry of Transportation/Ministry of the Environment, Conservation and Parks:
MTO/MECP Noise Protocol; A Protocol for Dealing with Noise Concerns During the Preparation, Review, and Evaluation of Provincial Highways Environmental Assessments

Data from Previous EAs

Ministry of Transportation, 2006:
Environmental Guide for Noise

Ministry of the Environment, Conservation and Parks, 2013:
Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300

Field investigations

Health Canada, 2017:
Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise

Health Canada, 2017:
Health Canada Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (Health Canada guide)

Indigenous Knowledge

Dillon, 2019:

Information on sensitive noise receptors from Indigenous communities, Indigenous groups, and traditional land-based rights holders (i.e., Indigenous Traditional Knowledge [ITK] (data provided by AECOM, generated by Dillon; non-buffered data received August 2019, buffered data received October 2019);

ISO, 1996:

ISO Standard 9613-1: Acoustics – Attenuation of sound during propagation outdoors – Part 1: Calculation of absorption of sound by the atmosphere

ISO, 1996:

ISO Standard 9613-2: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

Ministry of the Environment, Conservation and Parks, 2013:

MECP Environmental Noise Guideline - Stationary and Transportation Sources – Approval and Planning, Publication NPC-300 (NPC-300)

Ministry of the Environment, Conservation and Parks, 1978:

MECP Model Municipal Noise Control By-law Noise Pollution Control Guideline (NPC) Blasting, Publication NPC 119 (NPC 119).

Ministry of the Environment, Conservation and Parks, 1978:

MECP Model Municipal Noise Control By-law Noise Pollution Control Guideline (NPC) Construction Equipment, Publication NPC 115 (NPC 115)

Ministry of Natural Resources and Forestry:

MNRF Land Information Ontario (LIO) geographic datasets; and,

Natural Resources Canada CANVEC:

Natural Resources Canada CANVEC (CANVEC) geographic datasets.

Ontario Ministry of Transportation, October 2006:

Environmental Guide for Noise (MTO Guide).

Ontario Provincial Standard Specification, 2014:

Ontario Provincial Standard Specification (OPSS) 120, 2014: General Specification for the Use of Explosives;

Orthoimagery;

Proposed Project locations for the corridors;

U.S. Department of Transportation Federal Transit Administration (USFTA), 2018:

Transit Noise and Vibration Impact Assessment Manual

World Health Organization (WHO), 1999:

Guidelines for Community Noise (WHO, 1999)

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
AC-01	■ General Comment	■ **Section 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 (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
AC-02	■ General Comment	■ **Section 9, 12.2, 12.4, 15.2, 15.3, 15.4, 16.1, 17.2, 19.1, and 20**	■ The Guidelines include requirements beyond those in Sections 8.1 and 14.1 that are related to the acoustic environment (such as Sections 9, 12.2, 12.4, 15.2, 15.3, 15.4, 16.1, 17.2, 19.1 and 20). Changes to the acoustic environment could have effects on environmental, social, health and economic valued components, as well as effects to Indigenous peoples' current use of lands and resources for traditional purposes and conditions related to the impacts on rights of Indigenous peoples, for example. Whether in the acoustic environment study plan or in other topic specific study plans, there must be a demonstration of the approach to meet all requirements of the Guidelines, including those related to effects on community well-being from changes to soundscapes, and impacts of noise on the experience of a practice or the exercise of rights. The interactions of effects and the interconnectedness of the valued components is not apparent in this and other study plans.		■ Section 9.3 of the updated Study Plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Further information will be provided in the IS / EA Report.	■ Section 9.3
AC-03	■ **Section 3: Spatial Boundaries: Study Area** – "Noise may affect nearby wildlife, which may affect outdoor recreational and teaching activities of the community and Indigenous groups such as hunting and trapping for recreational and food purposes. However, the federal and provincial noise guidelines do not quantify indirect acoustic effects; and the direct and quantifiable acoustics effects are expected to be limited to the LSA."	■ **Section 19.1** – "…The potential effects, to consider assessing include both adverse and positive effects to the current use of land and resources for traditional purposes, physical and cultural heritage, and environmental, health, social and economic conditions of Indigenous peoples impacted by the Project, including interferences of the Project with the following: • quantity and quality of resources available for harvesting (e.g., species of cultural importance, including traditional and medicinal plants);… • experiences of being on the land, including ability to pass on Indigenous knowledge and language (e.g., impacted from: changes in air quality, noise exposure, effects of vibrations from blasting and other activities);…"	■ The study plan provides inadequate detail on the data that will be collected and analyzed to meet the noise impact assessment on the requirements related to Indigenous peoples described in Sections 19.1 of the Guidelines. ■ If information on impacts on Indigenous peoples from noise are expected to be assessed in other study plans (e.g., Indigenous peoples valued components, social, and land and resource use), this should be clearly presented.	■ Provide further details that demonstrate the methodologies and approaches to studying the impacts of noise to Indigenous peoples, as required in Section 19 of the Guidelines. ■ Cross-reference any specific acoustic/noise methodologies and indicators that are to be found in other plans.	■ As identified in Section 4.2 of the Study Plan, 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 Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment (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 Study Plan. Section 5 of the Study Plan provides further details on the 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. ■ Section 9.3 of the updated Study Plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Further information will be provided in the IS / EA Report.	■ Section 4.2 ■ Section 5 ■ Section 9.3

Comment # / Ref #	DRAFT Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
AC-04	■ **Section 3: Spatial Boundaries: Study Area** – "the direct and quantifiable acoustics effects are expected to be limited to the Local Study Area."	■ **Section 13.1** – "…Predictions must be made on clearly stated assumptions and the Impact Statement must clearly describe how it has tested each assumption…"	■ It is unclear how it was determined that the direct and quantifiable acoustics effects are expected to be limited to the Local Study Area.	■ Provide details to demonstrate that direct and quantifiable acoustics effects are expected to be limited to the Local Study Area, considering the life of the Project and future uses of the road (including for mining purposes), and clearly identify the various noise receptors that are taken into account.	■ The Study Areas are defined and described in this Study Plan. ■ Section 9.5 describes how the worst-case receptors will be assessed and their relevance to meeting noise and vibration criteria. The worst-case receptors are generally those located closest to the noise and vibration generating activities, and are likely located within the Local Study Area. ■ As noted in Section 9.4.1, if residual acoustic effects from the Project are predicted, a cumulative effects assessment will be carried out to assess the combined impact of the Project and other existing physical activities, as well as future physical activities that are certain and reasonably foreseeable. The cumulative effects assessment will consider other existing or future certain and reasonably foreseeable physical activities located within 5 km of Project receptors.	■ Section 6
AC-05	■ **Section 4.1: 2019 Baseline Noise Field Program** – "The field program was conducted in November 2019 and included a monitoring component (Baseline Noise Monitoring) and measurement component (Baseline Noise Measurements)… As a result of discussions with the Project Team, two representative sensitive receptor locations were selected for both the Baseline Noise Monitoring and Baseline Noise Measurements. The first receptor location was selected to correspond to a populated area where it was expected that the ambient levels would be influenced by human activities. A second receptor location, within the area located further from the community, was identified to document ambient levels characteristic of natural environment without the influence of human activities. These two locations are expected to allow the team to document the range in existing ambient noise levels within the LSA [local study area]. Data for the monitoring/measurements, and the corresponding reporting includes the following information for each location:	■ **Section 8.1** – "The Impact Statement must:… • provide current ambient noise levels at key receptor points to traditional land users and sensitive human receptors, including the results of a baseline ambient noise survey and permissible sound levels for each receptor. Information on typical sound sources (both natural and anthropogenic), geographic extent and temporal variations will be included. When collecting baseline ambient noise survey data at human receptor locations, consider the following recommended questions: ▪ Does the community or land users value certain non-anthropogenic (i.e., natural) sounds? ▪ Is there an expectation of quiet at any specific locations or times? ▪ What are typical sleep hours (10:00 pm to 7:00 am being the default assumption)? ▪ What is the baseline prevalence of noise annoyance toward existing	■ The study plan does not provide sufficient details on the methods used for the 2019 baseline noise field program. For example, it is unclear what the "populated area" and "further from the community" represents, or how they are representative of other communities in the LSA. ■ It is also unclear whether audio recordings were collected. This information is required to confirm that the 2019 study results and further work outlined in the study plan satisfy the requirements of Section 8.1 of the Guidelines and Health Canada's guidance on baseline noise measurements for the purpose of assessing effects of project-related noise on human health. ■ Health Canada recommends that noise assessments identify and describe any particular receptors that may have a heightened sensitivity to noise exposure (e.g.	■ Update the study plan to describe how the 2019 monitoring locations are representative of baseline conditions at sensitive receptor locations (as per Section 8.1 of the Guidelines) and provide further details about the locations (e.g. provide a map). ■ Clarify the length and timing of monitoring and how temporal variability will be considered (e.g., seasonal variation in levels, types of community activity, weather conditions) (as per Section 8.1 of the Guidelines). ■ Clarify whether the collected baseline data includes audio recordings and whether any baseline ambient noise survey data [e.g., community annoyance with noise, measured as percent highly annoyed (%HA)] were collected from community members (as per Section 8.1 of the Guidelines).	■ The acoustic field program was only one session (late fall 2019) in MFFN covering two (2) locations for long-term monitoring. There are no additional field monitoring programs proposed as part of the Study Plan. The results of the desktop and field assessment studies will be provided at a later date. ■ Sufficient information is available through desktop information and historic and/or recent field investigations to understand annual and seasonal variation. We have provided information regarding anticipated seasonal changes in noise levels in the project area in the Study Plan. Please refer to Table 11-3 for further information. ■ As identified in Section 4.2 of the Study Plan, 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 Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment (the Agency 2020a).	■ Section 7.2

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	• (…) • Recording mode; (…)" ■ **5. Data Management and Analysis** – "(…) The screening will be completed using various tools, which may include audio recording (where deemed appropriate), analysis of the raw noise monitoring data in combination with meteorological data, or similar."	noise sources (e.g., road traffic, aircraft, and other industrial sounds)?... remote sensing resources; • provide the approximate number, distance and identity factors of likely human receptors, including any foreseeable future receptors, that may be impacted by changes in air, water, country food quality (e.g., dust deposition on vegetation), and noise levels. At minimum, provide a map showing approximate locations of permanent residences, temporary land uses (e.g., cabins and traditional sites) and known locations of sensitive human receptors (e.g., schools, hospitals, community centres, retirement complexes or assisted care homes)."	Indigenous peoples, schools, child care centres, hospitals). Measured baseline noise levels should be provided for both daytime (Ld) and night-time (Ln) at all representative receptor locations. It is a good practice to identify the exact location of the baseline measurement (e.g. outdoors at a building facade, elevation, road intersection, etc.). ■ Observations on timing (i.e., weekday/weekend, seasonal activity), weather conditions, and noise sources also provide useful information on the context surrounding the baseline measurements. ■ Additional information on how to minimize uncertainty of the validity of measured baseline sound-level data can be found in Section 6.2.1 (page 13) of Health Canada Noise Guidance Document.			
AC-06	■ **Section 4.2: Desktop Assessment** – "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". ■ **Section 7: Conformance with Federal and Provincial Guidance** – Acoustic Environment Study will include a baseline ambient study that will inform permissible sound levels at sensitive receptors. Monitoring locations were selected to capture the range of existing noise sources considering numerous factors, including geographic and temporal variations. The baseline prevalence of noise annoyance will be captured by determining the baseline percent highly annoyed (%HA) level. This determination is required as part of the Acoustic Environment Study's change in %HA assessment.	■ **Section 8.1** – ""The Impact Statement must:…provide current ambient noise levels at key receptor points to traditional land users and sensitive human receptors, including the results of a baseline ambient noise survey and permissible sound levels for each receptor. Information on typical sound sources (both natural and anthropogenic), geographic extent and temporal variations will be included. When collecting baseline ambient noise survey data at human receptor locations, consider the following recommended questions: • Does the community or land users value certain non-anthropogenic (i.e., natural) sounds? • Is there an expectation of quiet at any specific locations or times? What are	■ The study plan does not describe any additional baseline studies, suggesting that nothing more is anticipated and information on all sensitive human receptors and sensitive receptor locations are known and taken into account. ■ It is unclear how the approach proposed in the study plan will meet the requirements of Section 8.1 of the Guidelines. ■ The study plan does not describe how the proponent is planning to provide Indigenous groups and the public with an opportunity to share information on existing noise perception, concerns about the Project, and to comment on the list of valued components and indicators. ■ The Guidelines recommend that the proponent considers a	■ Provide detail to demonstrate the proposed approach and methods used to meet the requirements of the Guidelines, particularly Section 8.1. ■ Update the study plan to include the list of all Indigenous groups that will be engaged, at a minimum the Indigenous groups listed in the Indigenous Engagement and Partnership Plan (IEPP), as part of the baseline data collection, defining the list of criteria and indicators, and effects assessment analysis. The list should be consistent throughout the study plan. ■ Provide further detail to describe how Indigenous groups and the public have been, or will be, provided an opportunity to inform	■ Section 9.2 details the assessment VCs and indicators. A description of how these correlate to effects on humans is also provided. ■ Section 9.4 has been revised to include numerous indicators related to night-time operations and noise events.	■ Section 9.2 ■ Section 9.4

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		typical sleep hours (10:00 pm to 7:00 am being the default assumption)? • What is the baseline prevalence of noise annoyance toward existing noise sources (e.g., road, traffic, aircraft, and other industrial sounds)?..."	baseline ambient noise survey and provides examples of recommended questions for gathering community feedback as part of a baseline noise study.	the acoustic baseline data collection and effects assessment.		
AC-07	■ **6.1 Indicators and Expression of Change** – "The indicators have been determined for the Acoustic Environment through consideration of the following: • human health effects; • consultation with regulatory agencies and industrial stakeholders; • potential presence within the area associated with the Project, and potential for alteration or disturbance as a result; • social or economic importance; and • any other relevant and credible source, such as scientific or academic publications or input from the public.(…)" ■ **Table 6-1: Acoustic Environment Indicators** – "Expressions of change: Leq(1); Leq(16) Rationale for selection: Used in provincial guidelines to describe baseline noise levels, and assess stationary noise source effects; to assess road traffic noise effect – Expression of change: %HA Rationale for selection: Used in federal guidelines to assess noise effects on human health and potential for complaints due to noise exposure"	■ **Section 6** – "…the proponent must provide Indigenous groups with an opportunity to: • comment on the list of valued components and indicators;…" ■ **Section 14.1** – "The Impact Statement must:… • describe consultation with regulators, stakeholders, community groups, landowners and Indigenous groups about potential effects to the atmospheric, acoustic, and visual environment; … • identify and justify the approach to determine the extent to which sound effects resulting from the Project are adverse…" ■ **16.1 Biophysical Determinants of Health** – "With respect to biophysical determinants of health, the Impact Statement must(…) • describe nuisances and environmental, social and economic changes that could potentially be sources of adverse human health effects and the potential human receptors of these effects; • in situations where project related air, water or noise emissions meet local, provincial, territorial or federal guidelines, and yet public concerns were raised regarding human health effects, provide a description of the public concerns and how they were or are to be addressed." • (…) The proponent should provide a detailed rationale/explanation for any	■ Table 6-1 of the study plan provides a limited description of the indicators and their expression of change. It is unclear what each indicator measures, the rationale for including it and how a change will be interpreted. ■ It is important to consider that human health effects related to noise may be evaluated by a variety of endpoints and indicators. The evaluation of each potential noise-induced human health effect by one method alone is not necessarily representative of all possible human health effects related to noise exposure. For example, when using %HA as an indicator in a noise impact assessment, the change in %HA of receptors exposed to long-term noise may not exceed 6.5%, but these receptors may experience noise-induced hearing loss, sleep disturbance, or interference with speech comprehension. ■ Additionally, the indicators do not appear to have been selected considering public concerns. It is unclear why Indigenous groups are not listed among the elements taken under consideration for the determination of the list of indicators.	■ Revise the study plan to provide a description of each indicator presented and describe each indicator's expression of change and potential interpretation for the effect analysis. ■ Clarify how the proposed indicators are appropriate to assess health-related effects at receptors due to noise-induced hearing loss, sleep disturbance, or interference with speech comprehension. ■ Provide details to demonstrate how Indigenous groups listed in the Indigenous Engagement and Partnership Plan that may have views on these studies have been/will be provided with an opportunity to comment on the list of indicators. ■ Clarify whether concerns relating to increased noise were raised by the public or Indigenous groups.	■ The requested information has been provided in the updated Study Plan. ■ As identified in Section 4.2 of the Study Plan, 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 Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment (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 Study Plan. Section 5 of the Study Plan provides further details on the 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.	■ Section 4.2 ■ Section 5 ■ Section 9.2 ■ Section 9.3

Comment # / Ref #	DRAFT Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
		deviation from recommended assessment approaches/ methods, including Health Canada's guidance, or when determining such assessment is not warranted."				
AC-08	■ **Section 6.2 Methods for Predicting Future Conditions** – "Where roadway parameters are not available (e.g., traffic composition), the assessment will incorporate standard parameters provided in provincial traffic noise guidelines".	■ **Section 13.1** – "…Predictions must be made on clearly stated assumptions and the Impact Statement must clearly describe how it has tested each assumption…"	■ Where roadway parameters are not available, ensure that the parameters incorporated in the assessment are clearly described in the Impact Statement and confirm that are approved by Ontario.		■ Section 9.4.2 describes the provincial guidelines that will be used to assess traffic noise impacts.	■ Section 9.4.2
AC-09	■ **6.2 Methods for Predicting Future Conditions** – "Road traffic noise due to the Project will be predicted using an algorithm that is acceptable to the MECP [Ontario ministry of environment, conservation and parks] and MTO [Ontario ministry of transportation]. The traffic noise assessment will incorporate the following (…) Predicted future day/night traffic volumes and vehicle composition; – Noise due to Project construction activities will be predicted using industry standard methods. Construction equipment noise emissions may be estimated using a combination of industry standard reference publications and noise levels collected from similar equipment for other projects. (…) – Where possible, receptor locations and time periods should be incorporated with consideration of relevant input collected through community consultations and the Indigenous Knowledge Program, such as: typical sleep hours, and the expectation of quiet at specific locations or times."	■ **Section 14.1** – "The Impact Statement must:… • describe changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, including changes to the perception of non-anthropogenic sounds; • quantify sound levels at appropriate distances from any Project facility and/or activities and describe for each contributing source the timing (e.g., hours of night-time activities), number and duration of noise events and their sound characteristics, including frequency spectrum; • provide the hourly distribution of baseline noise events at night in comparison to predicted individual noise events at night at each receptor location;… consider the expectation of peace and quiet at receptors (e.g., in a quiet rural area or during Indigenous land use) and the applicable community-based policies concerning noise (e.g., complaints resolution processes); • identify and justify the approach to determine the extent to which sound effects resulting from the Project are adverse and describe any changes in night-time light levels as a result of the Project;…"	■ The study plan does not provide sufficient details to confirm whether or how the following will be considered in the noise assessment: – road traffic noise for the construction and operation phases of the Project; – hourly distribution of noise events at night; – construction lasting for periods greater than one year at any given location; – noise-related complaints; – anticipated relevant adjustment factors (e.g. for "quiet rural areas", time-of-day, tonal and/or impulsive noise); and – cumulative effects with reasonably foreseeable future projects. ■ Additionally, the study plan does not specify which decision factors will be used to determine whether relevant input will be collected through community consultations and the Indigenous Knowledge Program.	■ Provide detail in the study plan to demonstrate that road traffic noise will be assessed for all relevant phases of the Project. ■ Provide details to demonstrate that the effects assessment for the operation phase will include the effect cause by all different users (traffic volume, type of vehicles, etc.), including Indigenous groups, the general public, and mining proponents of reasonably foreseeable future projects ((e.g., Eagle's Nest, Blackbird, Black Thor, Black Label, Big Daddy, anticipated future community access roads). ■ Explain whether the noise assessment will consider increases in individual night-time noise events and their potential effect on sleep disturbance. ■ Provide detail to demonstrate that construction noise lasting longer than one year at any given location will be assessed. Provide a rationale for excluding noise-related complaints as an indicator of adverse health effects. Clarify how complaints resolution process will be considered in the Impact Statement. ■ Describe any applicable noise adjustments (e.g. for "quiet rural	■ Section 9.4 details the assessment VCs and indicators. A description of how these correlate to effects on humans is also provided. ■ As noted in Section 9.4.1, if residual acoustic effects from the Project are predicted, a cumulative effects assessment will be carried out to assess the combined impact of the Project and other existing physical activities, as well as future physical activities that are certain and reasonably foreseeable. The cumulative effects assessment will consider other existing or future certain and reasonably foreseeable physical activities located within 5 km of Project receptors. Section 9.4 has been revised to include numerous indicators related to night-time operations and noise events. ■ Acoustic and Vibration Environment Study will consider community input and applicable policies (related to noise complaint resolution processes) where applicable and relevant. Further information will be provided in the IS / EA Report. ■ Section 9.4 details the federal, provincial and applicable guidance that will be used to assess all phases of the Project, including construction durations of less than one year and greater than one year. Section 9.4.4 describes the potential adjustments that may be applied according to federal / World Health Organization and provincial guidelines.	Section 9.4

Comment # / Ref #	DRAFT Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
		■ **Section 22** – "The proponent must identify and assess the Project's cumulative effects using the approach described in the Agency's guidance documents related to cumulative environmental, health, social and economic effects… – Finalizing the choice of valued components and the appropriate boundaries, including potential transboundary areas, to assess cumulative effects, is informed and confirmed as part of the tailoring process through consultation with the public, Indigenous groups, lifecycle regulators, jurisdictions, federal authorities and other interested parties… – The Impact Statement must: … • assess the cumulative effects to each valued component selected by comparing the future scenarios with the Project and without the Project…"		areas", time-of-day, tonal and/or impulsive noise) that are being considered and provide a description when they have been used or when it has been decided they are not applicable in a given scenario. ■ Provide details to demonstrate how the noise assessment will inform the decision whether to assess cumulative effects on human health due to noise.	■ Section 9.3 of the updated study plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Refer to the Human Health and Community Safety Study Plan for more information on human health effects. Further information will be provided in the IS / EA Report.	
AC-10	■ **Section 6.2 Methods for Predicting Future Conditions** – "If needed, noise due to Project construction involving stationary sources (e.g., aggregate extraction and refining) will be predicted in accordance…".	■ **Section 14.1** – "The Impact Statement must:… • describe changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, including changes to the perception of non-anthropogenic sounds;…"	■ The study plan does not provide information regarding the criteria on how to determine whether there is a need for predicting noise due to project construction involving stationary sources.	■ Provide detail to explain the criteria or circumstances that will determine whether there is a need for predicting noise due to Project construction involving stationary sources.	■ Section 9.4.2 describes the circumstances for assessing stationary noise due to construction activities and how provincial and federal guidelines will inform the assessment.	■ Section 9.4
AC-11	■ **6.3 Magnitude of Effect Table 6-2: Acoustic Environment Magnitude Definition** – "Definition of magnitude level: Increase of (1-3; 3-5; 5 or more) dB above baseline noise level Rationale: Industry references for human perception of changes in sound level."	■ **Section 14.1** – "The Impact Statement must: … • describe changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, including changes to the perception of non-anthropogenic sounds;…"	■ It is important to consider that people respond to sound characteristics that do not necessarily appreciably increase the sound level. Therefore, it is suggested that statements relating to perceptibility or whether changes in noise are noticeable based solely on decibel levels be avoided. Health Canada advises that such statements may give the public the impression that the sounds will not be heard, which may increase public complaints regarding noise during construction and operation.	■ Broaden the scope of the proposed magnitude definition to include changes to the characteristics of the sound from baseline, in addition to the comparison of predicted and baseline noise levels. Other criteria that could contribute to magnitude could include changes in frequency, changes in sound modulation, increased impulsiveness, a shift in noise from the daytime to being more at night, a shift from quiet rural to traffic or construction-related noise, etc.	■ Section 9.6 describes magnitude definitions in terms of the federal, provincial and other applicable criteria presented in Section 9. The VCs, indicators, and adjustments for sound character that will be used in the effects assessments are described in Section 9.2.	■ Section 9.2 ■ Section 9.6.

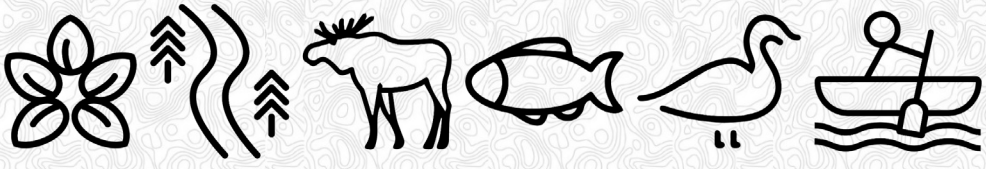
Comment # / Ref #	DRAFT Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
AC-12	■ **Section 7 Conformance with Federal and Provincial Guidance** – "Federal and Provincial noise guidelines have been developed based on research into human response to noise exposure. The noise guidelines do not address whether these criteria are applicable to wildlife, nor do the guidelines provide separate criteria for wildlife assessment. We are not aware of any underwater noise or vibration thresholds that would be applicable for this project. As such, the Acoustic Environment Study Plan will assess acoustic impacts on human receptors only. Acoustic impacts and existing conditions related to underwater environments will not be determined or measured."	■ **Section 8.1** – "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;…" ■ **Section 13.1** – "The Impact Statement must describe in detail the project's potential adverse and positive effects in relation to each phase of the Project (construction, operation, maintenance, suspension, decommissioning, and abandonment)…"	■ It is unclear how the approach proposed in the study plan will meet the requirement of Section 8.1 of the Guidelines to provide a description of the current underwater soundscape and vibrations. ■ It is unclear if no acoustic effects is anticipated. This would include blasting of bedrock or vibrational effects from pile driving bridge piers. If any of these works, undertakings, or activities will occur in fish and fish habitat (below the high water mark), details on mitigation and guidelines to be followed are required.	■ Describe an approach and methods to provide current underwater soundscape and vibration descriptions of the study area and at the project site from various sources that are based on acoustic measurements. ■ Provide information on how vibration and sound sources, geographic extent and spatial and temporal variations within the water column will be studied. ■ Provide details to clarify if acoustic effects from any works, undertakings, or activities will occur in fish and fish habitat.	■ MFFN is not aware of any underwater noise or vibration thresholds that would be applicable for this project. As such, the Acoustic and Vibration Environment Study Plan will assess acoustic impacts on human receptors only. Acoustic impacts and existing conditions related to underwater environments will not be determined or measured. ■ Industry-standard mitigation, avoidance and protections measures will be implemented into the work plan, and includes those to avoid impacts to fish as a result of activities likely to produce underwater noise and vibration. This includes all DFO Fish and Fish Habitat Protection Program Measures to Protect Fish and Fish Habitat (general measures as well as applicable Measures from standard codes of practice) that apply, including those relating to vibration and noise. Further details can be found in the Fish and Fish Habitat Study Plan. ■ Section 9.3 of the updated study plan provides preliminary information on the interaction of effects and the interconnectedness of the VCs. Further information will be provided in the IS / EA Report.	■ Section 9.3; Fish and Fish Habitat Study Plan
AC-13	■ **Section 7 Conformance with Federal and Provincial Guidance** – "The ambient noise monitoring results will serve as a baseline for the traffic noise assessment of the CAR. Road traffic is typically considered a source of ambient noise. Therefore, an increase in road traffic noise is considered an increase in ambient noise. This principle will be used to assess the operations of the CAR, including describing human perceptibility of the increase in noise. Ambient noise includes both anthropogenic and non-anthropogenic sounds. Ambient monitoring datasets include thousands of datapoints, and it is impractical to separate anthropogenic and non-anthropogenic events. As such, the Acoustic Environment Study will describe changes to the perception of sound with respect to the baseline ambient levels (e.g., anthropogenic + non-anthropogenic sounds)."	■ **Section 13.1** – "The Impact Statement must describe in detail the project's potential adverse and positive effects in relation to each phase of the Project (construction, operation, maintenance, suspension, decommissioning, and abandonment)…" ■ **Section 14.1** – "The Impact Statement must:… • describe changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, including changes to the perception of non-anthropogenic sounds;…"	■ It is unclear if all phases of the Project will be included in the description of changes in ambient vibration and other sound levels resulting from the Project at potential receptor locations, as per Sections 13.1 and 14.1 of the Guidelines. ■ It is unclear what other ambient vibration and sound levels will be described, as the study plan only discusses road traffic.	■ Provide detail to demonstrate that ambient vibration and other sound levels resulting from the Project will be described for each phase of the Project.	■ Section 9.4 details how federal, provincial and other applicable guidance that will be used to assess all phases of the Project.	■ Section 9.4

Comment # / Ref #	DRAFT Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Reference
AC-14	■ **Section 7 Conformance with Federal and Provincial Guidance** – "Acoustic Environment Study will describe noise source characteristics used in the noise impact assessment(s). – Acoustic Environment Study will present hourly baseline results of the field monitoring program. Noise impact assessment will include a comparison of predicted noise levels and measured baseline levels. – Acoustic Environment Study will include community input and applicable policies Acoustic Environment Study will gauge adverse noise impacts using accepted industry, Provincial, and Federal descriptors."	■ **Section 14.1** – "The Impact Statement must:… • quantify sound levels at appropriate distances from any Project facility and/or activities and describe for each contributing source the timing (e.g., hours of night-time activities), number and duration of noise events and their sound characteristics, including frequency spectrum; • provide the hourly distribution of baseline noise events at night in comparison to predicted individual noise events at night at each receptor location; • consider the expectation of peace and quiet at receptors (e.g., in a quiet rural area or during Indigenous land use) and the applicable community-based policies concerning noise (e.g., complaints resolution processes); • identify and justify the approach to determine the extent to which sound effects resulting from the Project are adverse and describe any changes in night-time light levels as a result of the Project;…"	■ It is unclear how the approach proposed in the study plan will meet many of the requirements of Section 14.1 of the Guidelines. ■ Table 7.1 provides general statements that the requirements will be included in the Impact Statement. More detail is needed to determine how the requirements will be met. The Impact Statement must address all requirements outlined in the Guidelines and the study plan should demonstrate a clear approach to meet those requirements.	■ Provide detail to demonstrate that the proposed approaches and methods will meet the requirements of the Guidelines, particularly Section 14.1.	■ Section 9.2 details the assessment VCs and indicators. A description of how these correlate to effects on humans is also provided. ■ Section 9.4 has been revised to include numerous indicators related to night-time operations and noise events. ■ Acoustic and Vibration Environment Study will assess adverse noise impacts using accepted industry, provincial, and federal descriptors, including noise at night, if applicable.	■ Section 9.2 ■ Section 9.4 ■ Section 11

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	N/A	■ MECP, Environmental Assessment Branch	■ Please review EAB comments on the Wildlife, Ungulates, Vegetation and Groundwater work plans that may apply to this work plan.		■ We have reviewed the relevant comments and incorporated where appropriate. Please refer to the Comment Tables appended to the Wildlife, Ungulates and Vegetation Study Plans for specific responses.	■ Wildlife Study Plan, Ungulates Study Plan, Vegetation Study Plan, Groundwater Study Plan
1	Page 2	■ MHSTCI (Tourism Policy and Research Branch)	■ The Regional Study Area (RSA) is 2.5 kilometres on either side of the centreline of the two alternative routes under consideration. ■ Will all sensitive receptors be identified and mapped within the RSA? Will any receptors outside the RSA be mapped?	■ Include mapping of all sensitive receptors located within the RSA, including tourism facilities (i.e. accommodations, boat caches if any, etc.). Exceptions could be made for sensitive Indigenous or other Cultural/Heritage features that would be at potential risk from identification. ■ Consider mapping of receptors outside the RSA based on feedback from stakeholders. We do not know the specific location of potential tourism receptors inside or outside the RSA but if a business in question is concerned about potential noise impacts, the proponent should work with businesses to address those concerns, including consideration as a sensitive receptor.	■ Acoustic and Vibration Environment Study will identify noise sensitive receptors within the projects study areas. All information obtained from the interested stakeholders and Indigenous groups will be recorded and considered in the effects assessment, where appropriate.	■ Section 9.4.4

Phone: 1-800-764-9114 **Email:** info@martenfallsaccessroad.ca **Web:** http://www.martenfallsaccessroad.ca



August 20, 2021

Comments Table

Proposal: Marten Falls Community Access Road Project
Proponent: Marten Falls First Nation

Work Plan Title: Revised Acoustic and Vibration Environment Study Plan, May 2021
Commenter Name, Job Title and Ministry: Jim Antler, Policy Advisor, Tourism Policy Unit, Heritage, Tourism and Culture Division, Ministry of Heritage, Sport, Tourism and Culture Industries

With regard to the Acoustic and Vibration Environment Study Plan, we provided comment on an earlier version of the work plan in July 2020. That comment is referenced in the most recent version of the Study Plan along with the following response from the proponent.

Agency / Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response
▪ MHSTCI (Tourism Policy and Research Branch)	▪ The Regional Study Area (RSA) is 2.5 kilometres on either side of the centreline of the two alternative routes under consideration. ▪ ¡ Will all sensitive receptors be identified and mapped within the RSA? Will any receptors outside the RSA be mapped?	▪ Include mapping of all sensitive receptors located within the RSA, including tourism facilities (i.e. accommodations, boat caches if any, etc.). Exceptions could be made for sensitive Indigenous or other Cultural/Heritage features that would be at potential risk from identification. ▪ ¡ Consider mapping of receptors outside the RSA based on feedback from stakeholders. We do not know the specific location of potential tourism receptors inside or outside the RSA but if a business in question is concerned about potential noise impacts, the proponent should work with businesses to address those concerns, including consideration as a sensitive receptor.	▪ Acoustic and Vibration Environment Study will identify noise sensitive receptors within the projects study areas. All information obtained from the interested stakeholders and Indigenous groups will be recorded and considered in the effects assessment, where appropriate.

The proponent's response is acceptable though some additional clarity would be useful given the content in Section 7.1 of the revised Study Plan. The response states sensitive receptors will be identified within the project's study areas. Section 7.1, on the

other hand, notes the review of existing conditions of the Acoustic and Vibration Environment included identifying potential sensitive receptors or Point(s) of Reception (POR) in only the Local Study Area (LSA). It also states additional information regarding potential PORs within the Acoustic and Vibration LSA will be collected. This is positive, but there is no reference to potential PORs in the Regional Study Area (RSA), despite our specific comments relating to the RSA. If the proponent could provide additional clarity in writing regarding their intent as it relates to potential PORs in the RSA, a meeting should not be required.

Attachment B – Measurement Equipment

This attachment provides information regarding noise measurement equipment and settings used during noise monitoring. Details regarding measurement equipment are shown in Table B1. Photos 1 and 2 show the noise monitoring equipment deployed at Monitoring Location 1 and Location 2, respectively.

Table B1: Measurement Equipment

Equipment and Parameter	Details
Sound level meter / monitor make and model	Larson Davis 831
Equipment 1 SN (Meter / Microphone / PreAmp) - Far field	0001669/112206/019104
Equipment 2 SN (Meter / Microphone / PreAmp) – Community	0001702/115034/019106
Equipment 3 SN (Meter / Microphone / PreAmp) - Spot Checks	0002825/143530/021364
Sound level meter / monitor settings	RMS Weight - A Weighting
	Peak Weight - Z Weighting
	Detector - Slow
	Preamp - PRM831
	Microphone Correction - Off
	Integration Method - Linear
	OBA Range - Low
	OBA Bandwidth - 1/1 and 1/3
	OBA Freq. Weighting -Z Weighting
	OBA Max Spectrum - At L_{max}
	RMS Weight - A Weighting
	Peak Weight - Z Weighting
Mounting method	Tripod (photos of deployment sites below)
Height of microphone above ground	1.5 m
Orientation of microphone	Vertical
Special housing that may affect microphone sensitivity	wind screen installed - EPS2106 long term, standard spherical short-term measurements
Recording mode	1 min continuous recording, sound recording trigger at 40 dB

Equipment and Parameter	Details
Procedures used to assure equipment was operational during deployment	- Pre / post calibration within 1 dB - Clap by the microphone and read the levels on the meter - Protect microphone wire against interferences of wildlife - Ensure battery is functional and meter is charging - Add heat packs to keep equipment warm in below zero temperatures
Summary of any issues with equipment failure	Potential equipment interferences identified and removed from analysis

SN = Serial Number; RMS = root mean square; OBA = octave band analysis; Lmax = maximum noise level; m = metre; min = minute; dB = decibel

Photo 1 - Noise Monitoring Equipment Deployed at Monitoring Location 1

Photo 2 - Noise Monitoring Equipment Deployed at Monitoring Location 2

Attachment C – Calibration Certificates

Calibration Certificate

Certificate Number 2019012153

Customer:

Golder Associates
Suite 100
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	831	***Procedure Number***	D0001.8378	
Serial Number	0001702	***Technician***	Ron Harris	
Test Results	**Pass**	***Calibration Date***	30 Sep 2019	
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	30 Sep 2021	
Description	Larson Davis Model 831 Class 1 Sound Level Meter Firmware Revision: 2.402	***Temperature***	23.14 °C	± 0.25 °C
		Humidity	51.1 %RH	± 2.0 %RH
		Static Pressure	85.89 kPa	± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRM831 S/N 019106 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis Model 831 Sound Level Meter Manual, I831.01 Rev O, 2016-09-19

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa; Reference Range: 0 dB gain

Periodic tests were performed in accordance with precedures from IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part3.

Calibration Certificate

Certificate Number 2019012151

Customer:

Golder Associates
Suite 100
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	PRM831	***Procedure Number***	D0001.8383		
Serial Number	019106	***Technician***	Ron Harris		
Test Results	**Pass**	***Calibration Date***	30 Sep 2019		
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	30 Sep 2021		
		Temperature	23.03	°C	± 0.01 °C
Description	Larson Davis 1/2" Preamplifier for Model 831 Type 1	***Humidity***	51.6	%RH	± 0.5 %RH
		Static Pressure	85.88	kPa	± 0.03 kPa

Evaluation Method Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

This report may not be reproduced, except in full, unless permission for the publication of an approved abstract is obtained in writing from the organization issuing this report.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	03/07/2019	03/07/2020	003003
Hart Scientific 2626-S Humidity/Temperature Sensor	07/18/2019	07/18/2020	006946
Agilent 34401A DMM	07/01/2019	07/01/2020	007165
SRS DS360 Ultra Low Distortion Generator	10/04/2018	10/04/2019	007167

LARSON DAVIS - A PCB PIEZOTRONICS DIV.
1681 West 820 North
Provo, UT 84601, United States
716-684-0001

ilac-MRA A2LA ACCREDITED Cert. #3622.01

LARSON DAVIS A PCB PIEZOTRONICS DIV.

Calibration Certificate

Certificate Number 2019012150

Customer:

Golder Associates
Suite 100
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	831
Serial Number	0001669
Test Results	**Pass**
Initial Condition	AS RECEIVED same as shipped
Description	Larson Davis Model 831 Class 1 Sound Level Meter Firmware Revision: 2.402

Procedure Number	D0001.8378		
Technician	Ron Harris		
Calibration Date	30 Sep 2019		
Calibration Due	30 Sep 2021		
Temperature	23.73	°C	± 0.25 °C
Humidity	49.6	%RH	± 2.0 %RH
Static Pressure	85.98	kPa	± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRM831 S/N 019104 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Larson Davis, a division of PCB Piezotronics, Inc. certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances will be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis Model 831 Sound Level Meter Manual, I831.01 Rev O, 2016-09-19

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa; Reference Range: 0 dB gain

Periodic tests were performed in accordance with precedures from IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part3.

Calibration Certificate

Certificate Number 2019012186

Customer:

Golder Associates
Suite 100
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	831	***Procedure Number***	D0001.8384	
Serial Number	0001669	***Technician***	Ron Harris	
Test Results	**Pass**	***Calibration Date***	30 Sep 2019	
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	30 Sep 2021	
		Temperature	23.76 °C	± 0.25 °C
Description	Larson Davis Model 831 Class 1 Sound Level Meter Firmware Revision: 2.402	***Humidity***	49.7 %RH	± 2.0 %RH
		Static Pressure	85.89 kPa	± 0.13 kPa

Evaluation Method ***Tested with:*** ***Data reported in dB re 20 µPa.***

Larson Davis PRM831. S/N 019104
PCB 377B20. S/N 112206
Larson Davis CAL200. S/N 9079
Larson Davis CAL291. S/N 0108

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis Model 831 Sound Level Meter Manual, I831.01 Rev O, 2016-09-19

For 1/4" microphones, the Larson Davis ADP024 1/4" to 1/2" adaptor is used with the calibrators and the Larson Davis ADP043 1/4" to

Calibration Certificate

Certificate Number 2019012173

Customer:

Golder Associates
Suite 100
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	831	***Procedure Number***	D0001.8384		
Serial Number	0001702	***Technician***	Ron Harris		
Test Results	**Pass**	***Calibration Date***	30 Sep 2019		
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	30 Sep 2021		
Description	Larson Davis Model 831 Class 1 Sound Level Meter Firmware Revision: 2.402	***Temperature***	23.72	°C	± 0.25 °C
		Humidity	49.4	%RH	± 2.0 %RH
		Static Pressure	85.96	kPa	± 0.13 kPa

Evaluation Method ***Tested with:*** ***Data reported in dB re 20 µPa.***

Larson Davis PRM831. S/N 019106
PCB 377B20. S/N 115034
Larson Davis CAL200. S/N 9079
Larson Davis CAL291. S/N 0108

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis Model 831 Sound Level Meter Manual, I831.01 Rev O, 2016-09-19

For 1/4" microphones, the Larson Davis ADP024 1/4" to 1/2" adaptor is used with the calibrators and the Larson Davis ADP043 1/4" to

Calibration Certificate

Certificate Number 2019012147
Customer:
Golder Associates
Suite 100
6925 Century Avenue
Mississauga, ON L5N 7K2, Canada

Model Number	PRM831	***Procedure Number***	D0001.8383		
Serial Number	019104	***Technician***	Ron Harris		
Test Results	**Pass**	***Calibration Date***	30 Sep 2019		
Initial Condition	AS RECEIVED same as shipped	***Calibration Due***	30 Sep 2021		
		Temperature	23.05	°C	± 0.01 °C
Description	Larson Davis 1/2" Preamplifier for Model 831 Type 1	***Humidity***	51.6	%RH	± 0.5 %RH
		Static Pressure	85.85	kPa	± 0.03 kPa

Evaluation Method Tested electrically using a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis Model 2900 Real Time Analyzer	03/07/2019	03/07/2020	003003
Hart Scientific 2626-S Humidity/Temperature Sensor	07/18/2019	07/18/2020	006946
Agilent 34401A DMM	07/01/2019	07/01/2020	007165
SRS DS360 Ultra Low Distortion Generator	10/04/2018	10/04/2019	007167

Attachment D – Filtered Noise Data

MONITORING LOCATION 1

Filtered out noise samples collected at the Monitoring Location1 are summarized in the Table D1.

Table D1: Filtered Out Noise Data Monitoring Location 1

Measurement Date and Time / Period	Reason to Remove from Analysis
November 4, 2019 10:05 a.m.	Vehicle nearby
November 4, 2019 10:31 a.m.	Vehicle nearby
November 4, 2019 10:39 a.m.	Vehicle nearby
November 4, 2019 10:40 a.m.	Vehicle nearby
November 4, 2019 10:42 a.m.	Vehicle nearby
November 4, 2019 10:44 a.m.	Not representative
November 4, 2019 11:00 a.m.	Vehicle nearby
November 4, 2019 11:01 a.m.	Vehicle nearby
November 4, 2019 11:14 a.m.	Vehicle nearby
November 4, 2019 11:18 a.m.	Vehicle nearby
November 4, 2019 11:19 a.m.	Vehicle nearby
November 4, 2019 11:27 a.m.	Vehicle nearby
November 4, 2019 12:01 p.m.	Vehicle nearby
November 4, 2019 12:11 p.m.	Vehicle nearby
November 4, 2019 12:29 p.m.	Vehicle nearby
November 4, 2019 12:37 p.m.	Vehicle nearby
November 4, 2019 12:39 p.m.	Vehicle nearby
November 4, 2019 1:02 p.m.	Unknown tapping
November 4, 2019 1:03 p.m.	Unknown tapping
November 4, 2019 1:06 p.m.	Vehicle nearby
November 4, 2019 1:09 p.m.	Unknown tapping
November 4, 2019 1:24 p.m.	Vehicle nearby
November 4, 2019 1:41 p.m.	Vehicle nearby
November 4, 2019 1:42 p.m.	Unknown banging
November 4, 2019 2:43 p.m.	Vehicle nearby
November 4, 2019 2:48 p.m.	Vehicle nearby
November 4, 2019 2:55 p.m.	Vehicle nearby
November 4, 2019 3:09 p.m.	Vehicle nearby
November 4, 2019 3:10 p.m.	Vehicle nearby

Measurement Date and Time / Period	Reason to Remove from Analysis
November 4, 2019 3:25 p.m.	Vehicle nearby
November 4, 2019 3:45 p.m.	Airplane
November 4, 2019 3:50 p.m.	Vehicle nearby
November 4, 2019 3:53 p.m.	Vehicle nearby
November 4, 2019 4:09 p.m.	Vehicle nearby
November 4, 2019 4:10 p.m.	Vehicle nearby
November 4, 2019 4:21 p.m.	Vehicle nearby
November 4, 2019 4:33 p.m.	Animals
November 4, 2019 4:42 p.m.	Vehicle nearby
November 4, 2019 4:51 p.m.	Vehicle nearby
November 4, 2019 4:53 p.m.	Vehicle nearby
November 4, 2019 4:58 p.m.	Vehicle nearby
November 4, 2019 5:05 p.m.	Unknown tapping
November 4, 2019 5:21 p.m.	Not representative / Squeaking noise
November 4, 2019 5:47 p.m.	Not representative / Squeaking noise
November 4, 2019 6:32 p.m.	Vehicle nearby
November 4, 2019 6:37 p.m.	Vehicle nearby
November 4, 2019 7:20 p.m.	Animals
November 4, 2019 7:21 p.m.	Animals
November 4, 2019 7:22 p.m.	Animals
November 4, 2019 7:30 p.m.	Animals
November 4, 2019 7:31 p.m.	Animals
November 4, 2019 8:53 p.m.	Unknown tapping
November 4, 2019 9:00 p.m. to 9:59 p.m.	Outside weather limits (wind speed)
November 5, 2019 12 a.m. to 12:59 a.m.	Outside weather limits (wind speed)
November 5, 2019 1:38 a.m.	Unknown tapping
November 5, 2019 2:00 a.m. to 2:59 a.m.	Outside weather limits (wind speed)
November 5, 2019 3:00 a.m. to 4:59 a.m.	Outside weather limits (wind speed)
November 5, 2019 8:00 a.m. to 8:59 a.m.	Outside weather limits (temperature)
November 5, 2019 9:00 a.m. to 9:59 a.m.	Outside weather limits (temperature and wind speed)
November 5, 2019 11:00 a.m. to 1:59 p.m.	Outside weather limits (temperature and wind speed)
November 5, 2019 2:00 p.m. to 3:59 p.m.	Data not available
November 5, 2019 6:00 p.m. to November 6, 2019 2:59 a.m.	Outside weather limits (wind speed)

Measurement Date and Time / Period	Reason to Remove from Analysis
November 6, 2019 3:00 a.m. to 4:59 a.m.	Not representative
November 6, 2019 5:00 a.m. to 5:59 a.m.	Outside weather limits (wind speed)
November 6, 2019 6:00 a.m. to 6:59 a.m.	Not representative
November 6, 2019 7:00 a.m. to 8:59 a.m.	Outside weather limits (wind speed)
November 6, 2019 9:00 a.m. to 9:59 a.m.	Wind induced noise
November 6, 2019 10:00 a.m. to 10:59 a.m.	Outside weather limits (wind speed)

Monitoring Location 2

Filtered out noise samples collected at the Monitoring Location2 are summarized in the Table D2.

Table D2: Filtered Out Noise Data Monitoring Location 2

Measurement Date and Time / Period	Reason to Remove from Analysis
2019-11-03 17:18	Invalid data / Potential interference of the equipment
2019-11-03 17:19	Invalid data / Potential interference of the equipment
2019-11-03 17:20	Invalid data / Potential interference of the equipment
2019-11-03 17:21	Invalid data / Potential interference of the equipment
2019-11-03 17:47	Invalid data / Potential interference of the equipment
2019-11-03 17:48	Invalid data / Potential interference of the equipment
2019-11-03 17:49	Invalid data / Potential interference of the equipment
2019-11-03 17:50	Invalid data / Potential interference of the equipment
2019-11-03 17:51	Invalid data / Potential interference of the equipment
2019-11-03 17:52	Invalid data / Potential interference of the equipment
2019-11-03 17:53	Invalid data / Potential interference of the equipment
2019-11-03 18:00	Invalid data / Potential interference of the equipment
2019-11-03 18:01	Invalid data / Potential interference of the equipment
2019-11-03 18:02	Invalid data / Potential interference of the equipment
2019-11-03 18:03	Invalid data / Potential interference of the equipment
2019-11-03 18:04	Invalid data / Potential interference of the equipment
2019-11-03 18:09	Invalid data / Potential interference of the equipment
2019-11-03 18:10	Invalid data / Potential interference of the equipment
2019-11-03 18:11	Invalid data / Potential interference of the equipment
2019-11-03 18:12	Invalid data / Potential interference of the equipment
2019-11-03 18:13	Invalid data / Potential interference of the equipment
2019-11-03 18:14	Invalid data / Potential interference of the equipment
2019-11-03 18:15	Invalid data / Potential interference of the equipment
2019-11-03 18:16	Invalid data / Potential interference of the equipment
2019-11-03 18:17	Invalid data / Potential interference of the equipment
2019-11-03 18:24	Invalid data / Potential interference of the equipment
2019-11-03 18:28	Invalid data / Potential interference of the equipment
2019-11-03 18:29	Invalid data / Potential interference of the equipment
2019-11-03 18:30	Invalid data / Potential interference of the equipment

Measurement Date and Time / Period	Reason to Remove from Analysis
2019-11-03 18:31	Invalid data / Potential interference of the equipment
2019-11-03 18:37	Invalid data / Potential interference of the equipment
2019-11-03 18:38	Invalid data / Potential interference of the equipment
2019-11-03 18:39	Invalid data / Potential interference of the equipment
2019-11-03 18:40	Invalid data / Potential interference of the equipment
2019-11-03 18:43	Invalid data / Potential interference of the equipment
2019-11-03 18:44	Invalid data / Potential interference of the equipment
2019-11-03 18:47	Invalid data / Potential interference of the equipment
2019-11-03 19:16	Invalid data / Potential interference of the equipment
2019-11-03 19:17	Invalid data / Potential interference of the equipment
2019-11-03 19:18	Invalid data / Potential interference of the equipment
2019-11-03 19:19	Invalid data / Potential interference of the equipment
2019-11-03 19:39	Invalid data / Potential interference of the equipment
2019-11-03 19:40	Invalid data / Potential interference of the equipment
2019-11-03 19:41	Invalid data / Potential interference of the equipment
2019-11-03 19:42	Invalid data / Potential interference of the equipment
2019-11-03 19:43	Invalid data / Potential interference of the equipment
2019-11-03 19:44	Invalid data / Potential interference of the equipment
2019-11-03 19:45	Invalid data / Potential interference of the equipment
2019-11-03 19:46	Invalid data / Potential interference of the equipment
2019-11-03 21:15	Invalid data / Potential interference of the equipment
2019-11-03 21:18	Invalid data / Potential interference of the equipment
2019-11-03 21:21	Invalid data / Potential interference of the equipment
2019-11-03 21:26	Invalid data / Potential interference of the equipment
2019-11-03 21:27	Invalid data / Potential interference of the equipment
2019-11-03 21:37	Invalid data / Potential interference of the equipment
2019-11-03 21:48	Invalid data / Potential interference of the equipment
2019-11-03 21:49	Invalid data / Potential interference of the equipment
2019-11-03 21:50	Invalid data / Potential interference of the equipment
2019-11-03 21:51	Invalid data / Potential interference of the equipment
2019-11-03 21:52	Invalid data / Potential interference of the equipment
2019-11-03 21:53	Invalid data / Potential interference of the equipment
2019-11-03 21:54	Invalid data / Potential interference of the equipment
2019-11-03 22:21	Invalid data / Potential interference of the equipment

Measurement Date and Time / Period	Reason to Remove from Analysis
2019-11-03 22:22	Invalid data / Potential interference of the equipment
2019-11-03 22:24	Invalid data / Potential interference of the equipment
2019-11-03 23:06	Invalid data / Potential interference of the equipment
2019-11-03 23:07	Invalid data / Potential interference of the equipment
2019-11-03 23:08	Invalid data / Potential interference of the equipment
2019-11-03 23:10	Invalid data / Potential interference of the equipment
2019-11-03 23:12	Invalid data / Potential interference of the equipment
2019-11-03 23:16	Invalid data / Potential interference of the equipment
2019-11-03 23:25	Invalid data / Potential interference of the equipment
2019-11-03 23:26	Invalid data / Potential interference of the equipment
2019-11-03 23:48	Invalid data / Potential interference of the equipment
2019-11-03 23:49	Invalid data / Potential interference of the equipment
2019-11-04 0:39	Invalid data / Potential interference of the equipment
2019-11-04 0:40	Invalid data / Potential interference of the equipment
2019-11-04 0:41	Invalid data / Potential interference of the equipment
2019-11-04 0:42	Invalid data / Potential interference of the equipment
2019-11-04 0:43	Invalid data / Potential interference of the equipment
2019-11-04 0:44	Invalid data / Potential interference of the equipment
2019-11-04 0:45	Invalid data / Potential interference of the equipment
2019-11-04 0:46	Invalid data / Potential interference of the equipment
2019-11-04 1:00	Invalid data / Potential interference of the equipment
2019-11-04 1:01	Invalid data / Potential interference of the equipment
2019-11-04 1:02	Invalid data / Potential interference of the equipment
2019-11-04 1:03	Invalid data / Potential interference of the equipment
2019-11-04 1:04	Invalid data / Potential interference of the equipment
2019-11-04 1:25	Invalid data / Potential interference of the equipment
2019-11-04 1:28	Invalid data / Potential interference of the equipment
2019-11-04 1:42	Invalid data / Potential interference of the equipment
2019-11-04 1:43	Invalid data / Potential interference of the equipment
2019-11-04 2:48	Invalid data / Potential interference of the equipment
2019-11-04 7:54	Invalid data / Potential interference of the equipment
2019-11-04 7:55	Invalid data / Potential interference of the equipment
2019-11-04 7:56	Invalid data / Potential interference of the equipment
2019-11-04 7:57	Invalid data / Potential interference of the equipment

Measurement Date and Time / Period	Reason to Remove from Analysis
2019-11-04 7:58	Invalid data / Potential interference of the equipment
2019-11-04 7:59	Invalid data / Potential interference of the equipment
2019-11-04 8:00	Invalid data / Potential interference of the equipment
2019-11-04 8:01	Invalid data / Potential interference of the equipment
2019-11-04 8:02	Invalid data / Potential interference of the equipment
2019-11-04 8:03	Invalid data / Potential interference of the equipment
2019-11-04 8:10	Invalid data / Potential interference of the equipment
2019-11-04 8:34	Invalid data / Potential interference of the equipment
2019-11-04 8:35	Invalid data / Potential interference of the equipment
2019-11-04 8:36	Invalid data / Potential interference of the equipment
2019-11-04 8:37	Invalid data / Potential interference of the equipment
2019-11-04 8:38	Invalid data / Potential interference of the equipment
2019-11-04 8:42	Invalid data / Potential interference of the equipment
2019-11-04 8:43	Invalid data / Potential interference of the equipment
2019-11-04 8:44	Invalid data / Potential interference of the equipment
2019-11-04 8:45	Invalid data / Potential interference of the equipment
2019-11-04 9:08	Invalid data / Potential interference of the equipment
2019-11-04 9:09	Invalid data / Potential interference of the equipment
2019-11-04 9:12	Invalid data / Potential interference of the equipment
2019-11-04 9:13	Invalid data / Potential interference of the equipment
2019-11-04 9:14	Invalid data / Potential interference of the equipment
2019-11-04 9:15	Invalid data / Potential interference of the equipment
2019-11-04 9:16	Invalid data / Potential interference of the equipment
2019-11-04 9:17	Invalid data / Potential interference of the equipment
2019-11-04 10:10	Invalid data / Potential interference of the equipment
2019-11-04 10:11	Invalid data / Potential interference of the equipment
2019-11-04 10:17	Invalid data / Potential interference of the equipment
2019-11-04 10:18	Invalid data / Potential interference of the equipment
2019-11-04 10:19	Invalid data / Potential interference of the equipment
2019-11-04 10:20	Invalid data / Potential interference of the equipment
2019-11-04 10:21	Invalid data / Potential interference of the equipment
2019-11-04 10:22	Invalid data / Potential interference of the equipment
2019-11-04 10:23	Invalid data / Potential interference of the equipment
2019-11-04 10:24	Invalid data / Potential interference of the equipment

Measurement Date and Time / Period	Reason to Remove from Analysis
2019-11-04 10:25	Invalid data / Potential interference of the equipment
2019-11-04 10:26	Invalid data / Potential interference of the equipment
2019-11-04 10:27	Invalid data / Potential interference of the equipment
2019-11-04 10:28	Invalid data / Potential interference of the equipment
2019-11-04 10:29 to 10:44	Data not available
2019-11-04 10:45 to 13:59	Invalid data / Potential interference of the equipment
2019-11-04 15:44	Invalid data / Potential interference of the equipment
2019-11-04 15:45	Invalid data / Potential interference of the equipment
2019-11-04 21:00 to 2019-11-05 21:59	Outside weather limits (wind speed)
2019-11-05 00:00 to 00:59	Outside weather limits (wind speed)
2019-11-05 02:00 to 04:59	Outside weather limits (wind speed)
2019-11-05 08:00 to 08:36	Outside weather limits (temperature)
2019-11-05 08:37 to 08:59	Data not available
2019-11-05 08:59 to 12:59	Outside weather limits (temperature)
2019-11-05 13:00 to 13:59	Outside weather limits (wind speed)
2019-11-05 17:03	Invalid data / Potential interference of the equipment
2019-11-05 17:04	Invalid data / Potential interference of the equipment
2019-11-05 18:00 to 19:59	Outside weather limits (wind speed)
2019-11-05 20:00 to 20:59	Outside weather limits (wind speed and temperature)
2019-11-05 21:00 to 21:59	Outside weather limits (wind speed)
2019-11-05 22:00 to 2019-11-06 02:59:00	Outside weather limits (temperature)
2019-11-06 05:00 to 05:59	Outside weather limits (wind speed)
2019-11-06 07:00 to 08:59	Outside weather limits (wind speed)
2019-11-06 10:00 to 10:51	Outside weather limits (wind speed)

Attachment E – Weather Data

Ogoki Post A, Ontario Weather Data for Nov 03, 2019 from NAVCAN (http://weather.gc.ca/)

Station Name	Ogoki Post A
Province	Ontario
Latitude	51°39'31.000" N
Longitude	85°54'04.000" W
Elevation	181 m
Climate Identifier	6075786
WMO Identifier	71652
TC Identifier	YKP

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and

Time	Temp (°C)	Dew Point Temp (°C)	Rel Hum (%)	Wind Dir (10s deg)	Wind Spd (km/h)	Stn Press (kPa)	Weather
0:00	-4.7	-5.2	96	30	13	98.75	NA
1:00	-5.3	-5.7	97	29	13	98.76	NA
2:00	-6.8	-6.9	99	28	11	98.78	NA
3:00	-6.4	-6.7	98	29	13	98.8	NA
4:00	-5.6	-6.7	92	29	15	98.79	Snow
5:00	-5.2	-6	94	30	8	98.83	Snow
6:00	-5.4	-6.4	93	28	15	98.84	Snow
7:00	-6	-7.2	91	27	15	98.85	NA
8:00	-5.9	-7.7	87	28	13	98.87	NA
9:00	-5.5	-7.5	86	27	13	98.9	NA
10:00	-5	-7.9	80	29	22	98.9	NA
11:00	-4.6	-7.5	80	26	21	98.91	NA
12:00	-4.1	-7.4	78	27	11	98.88	NA
13:00	-3.4	-6.8	78	25	11	98.86	NA
14:00	-2.8	-6.2	78	23	9	98.84	NA
15:00	-2.6	-6	78	27	11	98.83	NA
16:00	-2.4	-5.6	79	24	9	98.86	NA
17:00	-2.5	-5.5	80	25	5	98.88	NA
18:00	-2.8	-5.5	82	20	5	98.89	NA
19:00	-3	-5.2	85	19	4	98.89	NA
20:00	-3.8	-5.5	88	17	8	98.88	NA
21:00	-4.5	-5.6	92	15	5	98.88	NA
22:00	-4.7	-5.8	92	14	5	98.88	NA
23:00	-4.8	-5.9	92	M	4	98.86	NA

Ogoki Post A, Ontario Weather Data for Nov 04, 2019 from NAVCAN (http://weather.gc.ca/)

Station Name	Ogoki Post A
Province	Ontario
Latitude	51°39'31.000" N
Longitude	85°54'04.000" W
Elevation	181 m
Climate Identifier	6075786
WMO Identifier	71652
TC Identifier	YKP

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time where and

Time	Temp (°C)	Dew Point Temp (°C)	Rel Hum (%)	Wind Dir (10s deg)	Wind Spd (km/h)	Stn Press (kPa)	Weather
0:00	-5.1	-5.6	96	M	0	98.85	NA
1:00	-5.7	-6	98	16	8	98.88	NA
2:00	-6.2	-6.2	100	14	5	98.85	NA
3:00	-6.5	-6.5	100	16	5	98.86	NA
4:00	-7	-7.3	98	17	4	98.82	Fog
5:00	-7.6	-7.8	99	12	5	98.8	Freezing Fog
6:00	-7.8	-8.1	98	13	5	98.78	Freezing Fog
7:00	-7.1	-7.4	98	11	8	98.76	Snow
8:00	-6.1	-6.2	99	M	4	98.76	Snow
9:00	-4.9	-5	99	12	8	98.74	Snow
10:00	-3.1	-3.1	100	14	11	98.7	Snow
11:00	-1.9	-1.9	100	15	8	98.68	NA
12:00	-0.4	-0.4	100	14	5	98.62	NA
13:00	1.6	0.4	92	14	8	98.56	NA
14:00	2.8	-0.7	78	18	15	98.53	NA
15:00	3.5	-1.7	69	20	11	98.5	NA
16:00	2.8	-2.9	66	20	11	98.48	NA
17:00	2.1	-3	69	19	9	98.49	NA
18:00	1.4	-1	84	24	9	98.52	Rain
19:00	0.4	-0.5	94	22	4	98.52	Rain,Snow
20:00	-0.1	-0.1	100	22	5	98.52	Snow
21:00	-1.7	-2	98	29	21	98.54	Snow
22:00	-2.4	-2.8	97	28	15	98.58	Snow
23:00	-3.1	-3.5	97	28	18	98.6	Snow

Ogoki Post A, Ontario Weather Data for Nov 05, 2019 from NAVCAN (http://weather.gc.ca/)

Station Name	Ogoki Post A
Province	Ontario
Latitude	51°39'31.000" N
Longitude	85°54'04.000" W
Elevation	181 m
Climate Identifier	6075786
WMO Identifier	71652
TC Identifier	YKP

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time

Time	Temp (°C)	Dew Point Temp (°C)	Rel Hum (%)	Wind Dir (10s deg)	Wind Spd (km/h)	Stn Press (kPa)	Weather
0:00	-3.8	-4.6	94	29	22	98.64	Snow
1:00	-4.2	-4.8	96	28	15	98.68	Snow
2:00	-5	-6	93	28	28	98.72	Snow
3:00	-7.4	-8.7	90	28	22	98.76	Snow
4:00	-8.8	-10.3	89	29	21	98.82	NA
5:00	-9.8	-11	91	28	17	98.87	Snow
6:00	-9.3	-10.7	90	28	18	98.88	Snow
7:00	-9.5	-11.3	87	29	18	98.91	Snow
8:00	-10.3	-12.1	87	27	18	98.97	Snow
9:00	-10.9	-13.1	84	26	21	99.01	NA
10:00	-10.6	-13.7	78	28	28	99.03	NA
11:00	-10.4	-13.9	76	26	24	99.02	NA
12:00	-10.4	-13.9	76	27	21	99.04	NA
13:00	-9.9	-13.6	75	28	22	99.02	NA
14:00	-9.2	-12.9	75	27	17	99.04	Snow
15:00	-9.3	-12.2	80	26	17	99.07	Snow
16:00	-9.6	-11.4	87	27	17	99.09	Snow
17:00	-9.6	-11.1	89	26	18	99.11	Snow
18:00	-9.5	-11.4	86	28	22	99.15	Snow
19:00	-9.7	-11.6	86	26	26	99.2	Snow
20:00	-10.5	-12.1	88	27	21	99.2	Snow
21:00	-9.9	-12.2	84	28	21	99.2	Snow
22:00	-10.7	-12.6	86	25	13	99.17	NA
23:00	-10.4	-12.6	84	24	11	99.13	NA

Ogoki Post A, Ontario Weather Data for Nov 06, 2019 from NAVCAN (http://weather.gc.ca/)

Station Name	Ogoki Post A
Province	Ontario
Latitude	51°39'31.000" N
Longitude	85°54'04.000" W
Elevation	181 m
Climate Identifier	6075786
WMO Identifier	71652
TC Identifier	YKP

All times are specified in Local Standard Time (LST). Add 1 hour to adjust for Daylight Saving Time

Time	Temp (°C)	Dew Point Temp (°C)	Rel Hum (%)	Wind Dir (10s deg)	Wind Spd (km/h)	Stn Press (kPa)	Weather
0:00	-11.1	-13.2	85	25	18	99.1	NA
1:00	-11.1	-13	86	25	15	99.07	Snow
2:00	-10.6	-12.7	85	24	15	99.01	Snow
3:00	-9.8	-12	84	25	17	98.97	Snow
4:00	-9.4	-11.2	87	25	18	98.93	Snow
5:00	-9.2	-11.1	86	25	24	98.91	Snow
6:00	-9.3	-10.7	90	26	18	98.91	Snow
7:00	-9.4	-10.6	91	25	21	98.91	Snow
8:00	-9.3	-10.7	90	26	21	98.95	Snow
9:00	-8.8	-10.3	89	25	18	98.99	Snow
10:00	-8.3	-10	88	27	26	99.02	Snow
11:00	-7.4	-8.9	89	27	18	99.08	Snow
12:00	-6	-7.7	88	29	17	99.11	Snow
13:00	-4.7	-7.5	81	34	13	99.15	NA
14:00	-4.9	-6.4	89	32	11	99.2	Snow
15:00	-4.4	-5.2	94	32	17	99.27	Snow
16:00	-4.3	-5.4	92	33	24	99.39	Snow
17:00	-5.1	-7.1	86	34	37	99.51	Snow
18:00	-5.7	-8	84	33	24	99.7	Snow
19:00	-7.2	-8.3	92	32	22	99.83	Snow
20:00	-8	-9.1	92	31	26	99.92	Snow
21:00	-8.5	-9.9	90	33	21	100.02	Snow
22:00	-9.1	-10.7	89	31	22	100.12	Snow
23:00	-10.3	-12.4	85	32	30	100.2	Snow

Attachment F – Definition and Glossary of Blasting Terms

DEFINITIONS OF BLASTING TERMS

Figure F-1 illustrates blasting terminology used in this report.

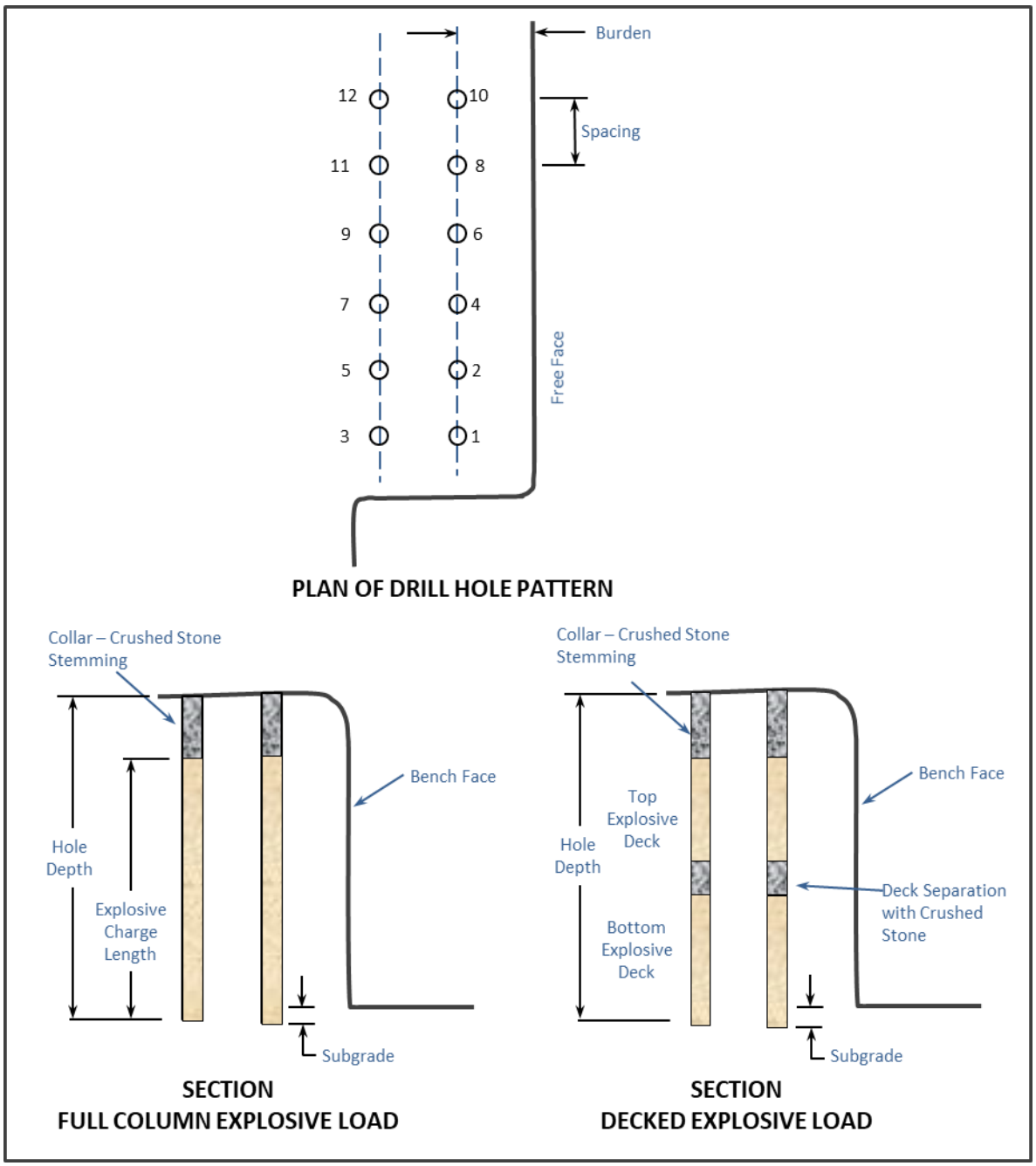


Figure F-1: Definition of Blasting Terms

GLOSSARY OF TERMS

The following is a glossary of blasting terms that were used in this report.

Bench Height	-	This is the vertical distance from the top of the bench to the floor or to the top of the next lower bench (ISEE 2016).
Blast	-	The operation of rending (breaking) rock by means of explosives.
Blast Area	-	The area of a blast within the influence of flying rock missiles, gases and concussion (ISEE 2016).
Blast Hole	-	A hole drilled in rock or other material for the purpose of containing an explosive change (ISEE 2016).
Booster	-	This is an explosive charge, usually of high detonation velocity and detonation pressure designed to be used in an explosive initiation sequence between an initiator or primer and the main explosive charge (ISEE 2016).
Burden	-	Generally considered the distance from an explosive charge to the nearest free or open face.
Collar	-	This is the mouth or opening of a borehole (ISEE 2016).
Deck	-	In blasting a portion of a blast hole loaded with explosives that are separated from other charges in the blasthole by stemming or crushed stone (ISEE 2016).
Detonation	-	This is an explosive reaction that moves through an explosive material at a velocity greater than the speed of sound in the material (ISEE 2016).
Detonator	-	This is any device containing any initiating or primary explosive that is used for initiating detonation. This includes blasting caps. (ISEE 2016)
Electronic Detonator	-	This is a detonator that provides better precision for delays. They are that are variably and individually programmable.
Explosive	-	This is a chemical, compound, mixture or device the primary or common purpose of which is to function by explosion (ISEE 2016).
Flyrock	-	Rocks propelled from the blast area by the force of an explosion (ISEE 2016).
Free Face	-	The bench face to which the blast will move. It is also any rock surface exposed to air or water which provides room for expansion upon fragmentation (ISEE 2016).
Highwall	-	Nearly vertical face at the edge of a bench, bluff or ledge on a surface excavation (ISEE 2016).
Initiation	-	To the start of detonate or deflagrate in an explosive (ISEE 2016).
Muckpile	-	The pile of broken material resulting from a blast (ISEE 2016).
Powder Factor	-	The amount of explosive used per unit volume or weight of rock (ISEE 2016).
Spacing	-	This is the distance between boreholes or charges in a row (ISEE 2016).

Stemming	-	The inert material, such as drill cuttings or crushed stone, placed in a borehole on top of or between separate charges of explosive material. Used for the purpose of confining explosive materials or to separate charges of explosive material in the same borehole (ISEE 2016).
Subdrill	-	The practice of drilling boreholes below the floor level or working or working elevation to ensure breakage of rock to the working elevation (ISEE 2016).

Attachment G – Traffic Noise Model Sample Calculation

REPORT:	**Results: Sound Levels - No Barrier Objects**		
TNM VERSION	3.1.7970.37608	REPORT DATE:	4 June 2024
CALCULATED WITH:	3.1.7970.37608	CALCULATION DATE:	2024-06-04 10:08:48 AM
CASE:	Noise Impact Assessment - MFFN	ORGANIZATION:	WSP Canada Inc.
UNITS:	Metric	ANALYSIS BY:	hayley.cahill
DEFAULT GROUND TYPE:	LooseSoil	PROJECT/CONTRACT	GLD-21455151,AECOM MFFN CAR FY2021 ON
ATMOSPHERICS:	10°C, 70%	Average pavement type shall be used unless a state highway agency substantiates the use of a different type with approval FHWA.	
PAVEMENT TYPE(S) USED:	Average		

Receiver				Modeled Traffic Noise Levels				
				LAeq		Increase over Existing		
Name	No.	Nb. R.R.	Existing LAeq	Calc.	Absolute Criterion	Calc.	Relative Criterion	Type of Impact
			dBA	dBA	dBA	dBA	dBA	
R059003_380_A	1	1	---	42.3	0.0	---	---	Sound Level
R059012_783_3664	3	1	---	52.6	0.0	---	---	Sound Level
R059012_67_2651-4	4	1	---	37.3	0.0	---	---	Sound Level

REPORT: **Sound-level Input: Receivers**

TNM VERSION:	3.1.7970.37608	REPORT DATE:	4 June 2024
CALCULATED WITH:	3.1.7970.37608	CALCULATION DATE:	2024-06-04 10:08:48 AM
CASE:	Noise Impact Assessment - MFFN	ORGANIZATION:	WSP Canada Inc.
ANALYSIS BY:	hayley.cahill	PROJECT/CONTRACT:	GLD-21455151,AECOM MFFN CAR FY2021 ON

Receiver Name	Sequence Number	Nb. R.R.	Coordinates (ground)			Height above Ground	Input Sound Levels and Criteria				Active in Calc.	Notes
			X	Y	Z		Existing LAeq	Absolute Criterion	Relative Criterion	Noise Reduction Goal		
			[m]	[m]	[m]	[m]	[dBA]	[dBA]	[dBA]	[dBA]		
R059003_380_A	1	1	522152.40	5694199.00	0.00	1.50	---	0	---	8	Y	
R059012_783_3664	3	1	522390.70	5694118.00	0.00	1.50	---	0	---	8	Y	
R059012_67_2651-4	4	1	575261.20	5730835.00	0.00	1.50	---	0	---	8	Y	

REPORT:	**INPUT ROADWAYS**		
TNM VERSION:	3.1.7970.37608	REPORT DATE:	4 June 2024
CALCULATED WITH:	3.1.7970.37608	CALCULATION DATE:	2024-06-04 10:08:48 AM
CASE:	Noise Impact Assessment - MFFN	ORGANIZATION:	WSP Canada Inc.
ANALYSIS BY:	hayley.cahill	PROJECT/CONTRACT:	GLD-21455151,AECOM MFFN CAR FY2021 ON

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-1		Point-1	90	522164.10	5692947.00	0.00	4.00		Mainline	Average	No
		Point-2	92	522164.40	5692995.00	0.00	4.00		Mainline	Average	No
		Point-3	93	522165.20	5693043.00	0.00	4.00		Mainline	Average	No
		Point-4	94	522166.20	5693078.00	0.00	4.00		Mainline	Average	No
		Point-5	95	522167.50	5693114.00	0.00	4.00		Mainline	Average	No
		Point-6	96	522169.10	5693150.00	0.00	4.00		Mainline	Average	No
		Point-7	97	522171.10	5693186.00	0.00	4.00		Mainline	Average	No
		Point-8	98	522173.30	5693221.00	0.00	4.00		Mainline	Average	No
		Point-9	99	522175.90	5693257.00	0.00	4.00		Mainline	Average	No
		Point-10	100	522178.80	5693293.00	0.00	4.00		Mainline	Average	No
		Point-11	101	522182.10	5693328.00	0.00	4.00		Mainline	Average	No
		Point-12	102	522186.60	5693373.00	0.00	4.00		Mainline	Average	No
		Point-13	103	522191.60	5693418.00	0.00	4.00		Mainline	Average	No
		Point-14	104	522197.00	5693462.00	0.00	4.00		Mainline	Average	No
		Point-15	105	522203.00	5693506.00	0.00	4.00		Mainline	Average	No
		Point-16	106	522209.50	5693551.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-1		Point-17	107	522216.40	5693594.00	0.00	4.00		Mainline	Average	No
		Point-18	108	522223.70	5693638.00	0.00	4.00		Mainline	Average	No
		Point-19	109	522231.70	5693682.00	0.00	4.00		Mainline	Average	No
		Point-20	110	522240.20	5693726.00	0.00	4.00		Mainline	Average	No
		Point-21	111	522249.20	5693770.00	0.00	4.00		Mainline	Average	No
		Point-22	112	522258.40	5693813.00	0.00	4.00		Mainline	Average	No
		Point-23	113	522268.40	5693857.00	0.00	4.00		Mainline	Average	No
		Point-24	114	522278.60	5693900.00	0.00	4.00		Mainline	Average	No
		Point-25	115	522289.50	5693943.00	0.00	4.00		Mainline	Average	No
		Point-26	116	522301.00	5693987.00	0.00	4.00		Mainline	Average	No
		Point-27	117	522312.90	5694030.00	0.00	4.00		Mainline	Average	No
		Point-28	118	522325.30	5694074.00	0.00	4.00		Mainline	Average	No
		Point-29	119	522337.90	5694116.00	0.00	4.00		Mainline	Average	No
		Point-30	120	522351.30	5694159.00	0.00	4.00		Mainline	Average	No
		Point-31	121	522365.10	5694202.00	0.00	4.00		Mainline	Average	No
		Point-32	122	522379.40	5694244.00	0.00	4.00		Mainline	Average	No
		Point-33	123	522393.90	5694286.00	0.00	4.00		Mainline	Average	No
		Point-34	124	522409.20	5694328.00	0.00	4.00		Mainline	Average	No
		Point-35	125	522424.50	5694369.00	0.00	4.00		Mainline	Average	No
		Point-36	126	522440.80	5694411.00	0.00	4.00		Mainline	Average	No
		Point-37	127	522457.10	5694452.00	0.00	4.00		Mainline	Average	No
		Point-38	128	522474.20	5694494.00	0.00	4.00		Mainline	Average	No
		Point-39	129	522491.40	5694534.00	0.00	4.00		Mainline	Average	No
		Point-40	130	522509.10	5694575.00	0.00	4.00		Mainline	Average	No
		Point-41	131	522527.10	5694615.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-1		Point-42	132	522544.80	5694653.00	0.00	4.00		Mainline	Average	No
		Point-43	133	522566.30	5694698.00	0.00	4.00		Mainline	Average	No
		Point-44	0	522849.40	5695291.00	0.00	4.00		Mainline	Average	No
Roadway-2		Point-0	1	568113.20	5733274.00	0.00	4.00		Mainline	Average	No
		Point-1	3	568124.30	5733284.00	0.00	4.00		Mainline	Average	No
		Point-2	4	568135.60	5733294.00	0.00	4.00		Mainline	Average	No
		Point-3	5	568147.10	5733303.00	0.00	4.00		Mainline	Average	No
		Point-4	6	568158.90	5733313.00	0.00	4.00		Mainline	Average	No
		Point-5	7	568170.90	5733321.00	0.00	4.00		Mainline	Average	No
		Point-6	8	568183.10	5733330.00	0.00	4.00		Mainline	Average	No
		Point-7	9	568195.60	5733339.00	0.00	4.00		Mainline	Average	No
		Point-8	10	568208.30	5733347.00	0.00	4.00		Mainline	Average	No
		Point-9	11	568221.10	5733354.00	0.00	4.00		Mainline	Average	No
		Point-10	12	568234.10	5733362.00	0.00	4.00		Mainline	Average	No
		Point-11	13	568247.40	5733369.00	0.00	4.00		Mainline	Average	No
		Point-12	14	568260.80	5733376.00	0.00	4.00		Mainline	Average	No
		Point-13	15	568272.50	5733381.00	0.00	4.00		Mainline	Average	No
		Point-14	16	568283.40	5733386.00	0.00	4.00		Mainline	Average	No
		Point-15	17	568295.40	5733391.00	0.00	4.00		Mainline	Average	No
		Point-16	18	568307.50	5733396.00	0.00	4.00		Mainline	Average	No
		Point-17	19	568319.70	5733400.00	0.00	4.00		Mainline	Average	No
		Point-18	20	568331.90	5733405.00	0.00	4.00		Mainline	Average	No
		Point-19	21	568344.30	5733409.00	0.00	4.00		Mainline	Average	No
		Point-20	22	568356.80	5733413.00	0.00	4.00		Mainline	Average	No
		Point-21	23	568369.30	5733416.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-2		Point-22	24	568381.90	5733419.00	0.00	4.00		Mainline	Average	No
		Point-23	25	568394.50	5733422.00	0.00	4.00		Mainline	Average	No
		Point-24	26	568407.30	5733425.00	0.00	4.00		Mainline	Average	No
		Point-25	27	568420.00	5733427.00	0.00	4.00		Mainline	Average	No
		Point-26	28	568432.90	5733429.00	0.00	4.00		Mainline	Average	No
		Point-27	29	568445.80	5733431.00	0.00	4.00		Mainline	Average	No
		Point-28	30	568458.60	5733433.00	0.00	4.00		Mainline	Average	No
		Point-29	31	568471.60	5733434.00	0.00	4.00		Mainline	Average	No
		Point-30	32	568484.50	5733435.00	0.00	4.00		Mainline	Average	No
		Point-31	33	568497.50	5733436.00	0.00	4.00		Mainline	Average	No
		Point-32	34	568510.50	5733436.00	0.00	4.00		Mainline	Average	No
		Point-33	35	568523.50	5733436.00	0.00	4.00		Mainline	Average	No
		Point-34	36	568536.50	5733436.00	0.00	4.00		Mainline	Average	No
		Point-35	37	568549.50	5733436.00	0.00	4.00		Mainline	Average	No
		Point-36	38	568562.50	5733435.00	0.00	4.00		Mainline	Average	No
		Point-37	39	568575.40	5733434.00	0.00	4.00		Mainline	Average	No
		Point-38	40	568588.40	5733433.00	0.00	4.00		Mainline	Average	No
		Point-39	41	568601.30	5733431.00	0.00	4.00		Mainline	Average	No
		Point-40	42	568613.20	5733430.00	0.00	4.00		Mainline	Average	No
		Point-41	43	568626.00	5733428.00	0.00	4.00		Mainline	Average	No
		Point-42	44	568638.80	5733425.00	0.00	4.00		Mainline	Average	No
		Point-43	45	568651.50	5733423.00	0.00	4.00		Mainline	Average	No
		Point-44	46	568664.20	5733420.00	0.00	4.00		Mainline	Average	No
		Point-45	47	568679.70	5733416.00	0.00	4.00		Mainline	Average	No
		Point-46	48	568695.10	5733411.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-2		Point-47	49	568710.40	5733407.00	0.00	4.00		Mainline	Average	No
		Point-48	50	568726.40	5733401.00	0.00	4.00		Mainline	Average	No
		Point-49	51	568741.40	5733396.00	0.00	4.00		Mainline	Average	No
		Point-50	52	568757.20	5733389.00	0.00	4.00		Mainline	Average	No
		Point-51	53	568772.80	5733382.00	0.00	4.00		Mainline	Average	No
		Point-52	54	568787.30	5733375.00	0.00	4.00		Mainline	Average	No
		Point-53	55	568797.90	5733370.00	0.00	4.00		Mainline	Average	No
		Point-54	56	568808.60	5733365.00	0.00	4.00		Mainline	Average	No
		Point-55	57	569204.40	5733151.00	0.00	4.00		Mainline	Average	No
		Point-56	58	569223.00	5733141.00	0.00	4.00		Mainline	Average	No
		Point-57	59	569239.10	5733133.00	0.00	4.00		Mainline	Average	No
		Point-58	60	569255.30	5733125.00	0.00	4.00		Mainline	Average	No
		Point-59	61	569271.60	5733117.00	0.00	4.00		Mainline	Average	No
		Point-60	62	569287.10	5733110.00	0.00	4.00		Mainline	Average	No
		Point-61	63	569303.60	5733103.00	0.00	4.00		Mainline	Average	No
		Point-62	64	569319.30	5733097.00	0.00	4.00		Mainline	Average	No
		Point-63	65	569336.10	5733090.00	0.00	4.00		Mainline	Average	No
		Point-64	66	569352.90	5733084.00	0.00	4.00		Mainline	Average	No
		Point-65	67	569377.40	5733075.00	0.00	4.00		Mainline	Average	No
		Point-66	68	569402.10	5733067.00	0.00	4.00		Mainline	Average	No
		Point-67	69	569426.90	5733059.00	0.00	4.00		Mainline	Average	No
		Point-68	70	569452.90	5733052.00	0.00	4.00		Mainline	Average	No
		Point-69	71	569478.10	5733045.00	0.00	4.00		Mainline	Average	No
		Point-70	72	569504.40	5733039.00	0.00	4.00		Mainline	Average	No
		Point-71	73	569530.90	5733034.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-2		Point-72	74	569556.40	5733029.00	0.00	4.00		Mainline	Average	No
		Point-73	75	569583.10	5733025.00	0.00	4.00		Mainline	Average	No
		Point-74	76	569608.90	5733021.00	0.00	4.00		Mainline	Average	No
		Point-75	77	569634.80	5733018.00	0.00	4.00		Mainline	Average	No
		Point-76	78	569661.60	5733016.00	0.00	4.00		Mainline	Average	No
		Point-77	79	569687.60	5733014.00	0.00	4.00		Mainline	Average	No
		Point-78	80	569714.50	5733013.00	0.00	4.00		Mainline	Average	No
		Point-79	81	569741.50	5733013.00	0.00	4.00		Mainline	Average	No
		Point-80	82	569767.50	5733013.00	0.00	4.00		Mainline	Average	No
		Point-81	83	569797.50	5733014.00	0.00	4.00		Mainline	Average	No
		Point-82	84	569827.50	5733015.00	0.00	4.00		Mainline	Average	No
		Point-83	85	569857.40	5733018.00	0.00	4.00		Mainline	Average	No
		Point-84	86	569873.30	5733019.00	0.00	4.00		Mainline	Average	No
		Point-85	87	569888.20	5733021.00	0.00	4.00		Mainline	Average	No
		Point-86	88	569917.90	5733025.00	0.00	4.00		Mainline	Average	No
		Point-87	89	569947.60	5733030.00	0.00	4.00		Mainline	Average	No
		Point-88	91	569962.30	5733032.00	0.00	4.00		Mainline	Average	No
		Point-89	134	569978.00	5733035.00	0.00	4.00		Mainline	Average	No
		Point-90	135	570007.30	5733042.00	0.00	4.00		Mainline	Average	No
		Point-91	136	570036.50	5733049.00	0.00	4.00		Mainline	Average	No
		Point-92	137	570065.40	5733057.00	0.00	4.00		Mainline	Average	No
		Point-93	138	570094.20	5733065.00	0.00	4.00		Mainline	Average	No
		Point-94	139	570122.70	5733075.00	0.00	4.00		Mainline	Average	No
		Point-95	140	570150.90	5733085.00	0.00	4.00		Mainline	Average	No
		Point-96	141	570178.90	5733095.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-2		Point-97	142	570193.80	5733101.00	0.00	4.00		Mainline	Average	No
		Point-98	143	570207.60	5733107.00	0.00	4.00		Mainline	Average	No
		Point-99	144	570234.90	5733120.00	0.00	4.00		Mainline	Average	No
		Point-100	145	570261.10	5733132.00	0.00	4.00		Mainline	Average	No
		Point-101	146	570287.80	5733146.00	0.00	4.00		Mainline	Average	No
		Point-102	147	570314.10	5733160.00	0.00	4.00		Mainline	Average	No
		Point-103	148	570340.10	5733175.00	0.00	4.00		Mainline	Average	No
		Point-104	149	570365.60	5733191.00	0.00	4.00		Mainline	Average	No
		Point-105	150	570390.80	5733207.00	0.00	4.00		Mainline	Average	No
		Point-106	151	570415.40	5733224.00	0.00	4.00		Mainline	Average	No
		Point-107	152	570438.90	5733241.00	0.00	4.00		Mainline	Average	No
		Point-108	153	570461.10	5733258.00	0.00	4.00		Mainline	Average	No
		Point-109	154	570483.70	5733277.00	0.00	4.00		Mainline	Average	No
		Point-110	155	570505.10	5733295.00	0.00	4.00		Mainline	Average	No
		Point-111	156	570526.70	5733314.00	0.00	4.00		Mainline	Average	No
		Point-112	157	570544.30	5733330.00	0.00	4.00		Mainline	Average	No
		Point-113	158	570560.70	5733347.00	0.00	4.00		Mainline	Average	No
		Point-114	159	570623.30	5733410.00	0.00	4.00		Mainline	Average	No
		Point-115	160	570798.50	5733588.00	0.00	4.00		Mainline	Average	No
		Point-116	161	570812.60	5733602.00	0.00	4.00		Mainline	Average	No
		Point-117	162	570830.60	5733620.00	0.00	4.00		Mainline	Average	No
		Point-118	163	570849.60	5733637.00	0.00	4.00		Mainline	Average	No
		Point-119	164	570868.90	5733655.00	0.00	4.00		Mainline	Average	No
		Point-120	165	570887.80	5733671.00	0.00	4.00		Mainline	Average	No
		Point-121	166	570900.80	5733682.00	0.00	4.00		Mainline	Average	No

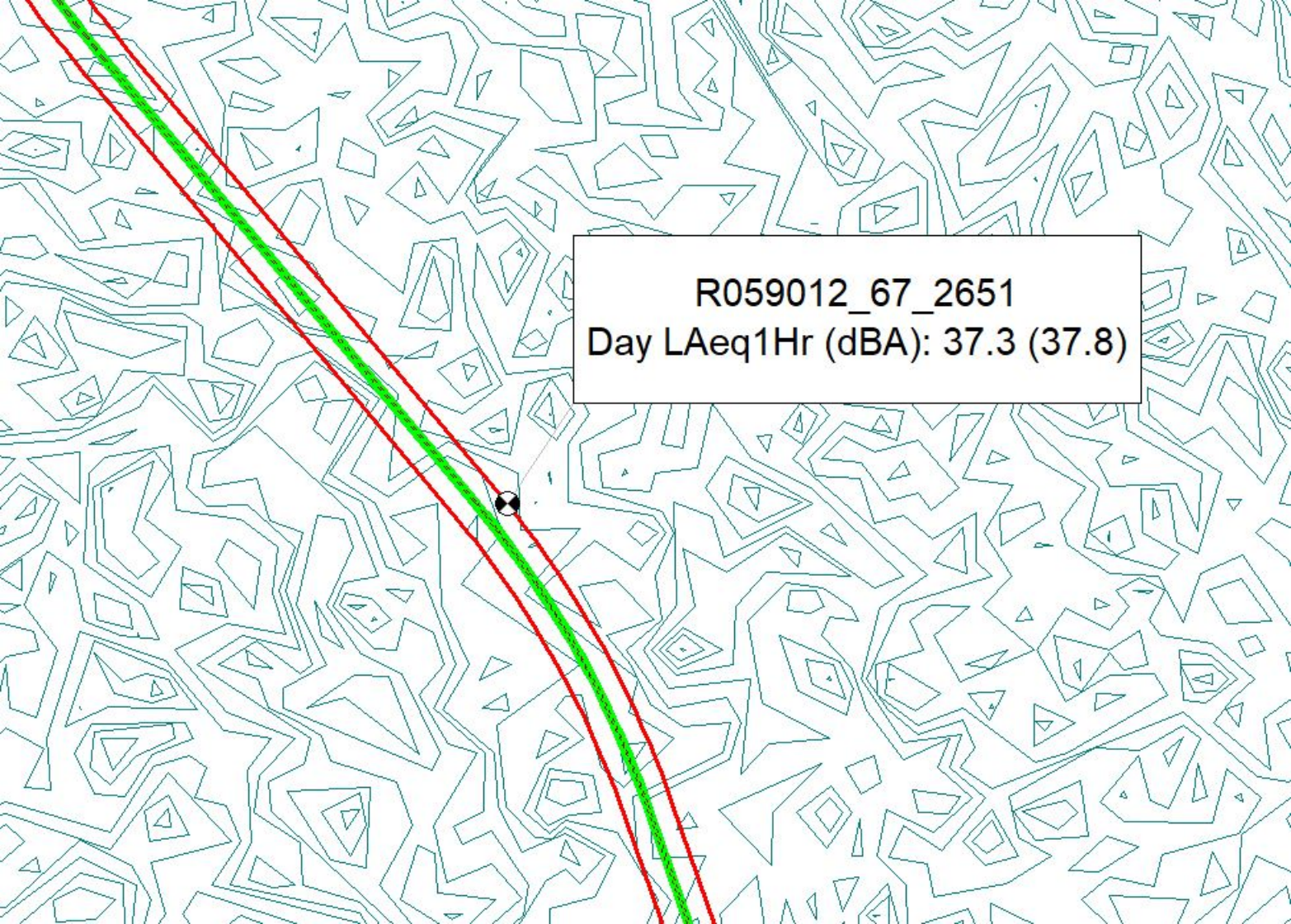
Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-2		Point-122	167	570914.70	5733694.00	0.00	4.00		Mainline	Average	No
		Point-123	168	570928.80	5733705.00	0.00	4.00		Mainline	Average	No
		Point-124	169	570942.10	5733715.00	0.00	4.00		Mainline	Average	No
		Point-125	170	570955.70	5733726.00	0.00	4.00		Mainline	Average	No
		Point-126	171	570970.10	5733736.00	0.00	4.00		Mainline	Average	No
		Point-127	172	570983.90	5733746.00	0.00	4.00		Mainline	Average	No
		Point-128	173	570997.80	5733756.00	0.00	4.00		Mainline	Average	No
		Point-129	174	571011.90	5733766.00	0.00	4.00		Mainline	Average	No
		Point-130	175	571026.00	5733775.00	0.00	4.00		Mainline	Average	No
		Point-131	176	571041.10	5733785.00	0.00	4.00		Mainline	Average	No
		Point-132	177	571055.40	5733794.00	0.00	4.00		Mainline	Average	No
		Point-133	178	571069.90	5733803.00	0.00	4.00		Mainline	Average	No
		Point-134	179	571085.40	5733812.00	0.00	4.00		Mainline	Average	No
		Point-135	180	571100.10	5733821.00	0.00	4.00		Mainline	Average	No
		Point-136	181	571114.90	5733829.00	0.00	4.00		Mainline	Average	No
		Point-137	182	571131.60	5733838.00	0.00	4.00		Mainline	Average	No
		Point-138	183	571148.30	5733847.00	0.00	4.00		Mainline	Average	No
		Point-139	184	571165.30	5733856.00	0.00	4.00		Mainline	Average	No
		Point-140	185	571181.40	5733864.00	0.00	4.00		Mainline	Average	No
		Point-141	186	571198.50	5733872.00	0.00	4.00		Mainline	Average	No
		Point-142	187	571215.70	5733880.00	0.00	4.00		Mainline	Average	No
		Point-143	188	571232.10	5733887.00	0.00	4.00		Mainline	Average	No
		Point-144	189	571249.60	5733895.00	0.00	4.00		Mainline	Average	No
		Point-145	190	571266.20	5733902.00	0.00	4.00		Mainline	Average	No
		Point-146	191	571283.80	5733909.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-2		Point-147	192	571301.60	5733916.00	0.00	4.00		Mainline	Average	No
		Point-148	193	571319.40	5733922.00	0.00	4.00		Mainline	Average	No
		Point-149	194	571337.30	5733929.00	0.00	4.00		Mainline	Average	No
		Point-150	195	571355.30	5733935.00	0.00	4.00		Mainline	Average	No
		Point-151	196	571372.40	5733940.00	0.00	4.00		Mainline	Average	No
		Point-152	197	571390.60	5733946.00	0.00	4.00		Mainline	Average	No
		Point-153	198	571408.80	5733951.00	0.00	4.00		Mainline	Average	No
		Point-154	199	571427.10	5733956.00	0.00	4.00		Mainline	Average	No
		Point-155	200	571445.40	5733961.00	0.00	4.00		Mainline	Average	No
		Point-156	201	571462.90	5733966.00	0.00	4.00		Mainline	Average	No
		Point-157	202	571481.40	5733970.00	0.00	4.00		Mainline	Average	No
		Point-158	203	571499.90	5733974.00	0.00	4.00		Mainline	Average	No
		Point-159	204	571517.50	5733978.00	0.00	4.00		Mainline	Average	No
		Point-160	205	571536.20	5733982.00	0.00	4.00		Mainline	Average	No
		Point-161	206	571553.90	5733985.00	0.00	4.00		Mainline	Average	No
		Point-162	207	571572.60	5733988.00	0.00	4.00		Mainline	Average	No
		Point-163	208	571591.40	5733991.00	0.00	4.00		Mainline	Average	No
		Point-164	209	571610.20	5733994.00	0.00	4.00		Mainline	Average	No
		Point-165	210	571628.10	5733996.00	0.00	4.00		Mainline	Average	No
		Point-166	211	571646.90	5733998.00	0.00	4.00		Mainline	Average	No
		Point-167	212	571665.80	5734000.00	0.00	4.00		Mainline	Average	No
		Point-168	213	571684.80	5734002.00	0.00	4.00		Mainline	Average	No
		Point-169	214	571701.80	5734003.00	0.00	4.00		Mainline	Average	No
		Point-170	215	571719.70	5734004.00	0.00	4.00		Mainline	Average	No
		Point-171	216	571737.70	5734005.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-2		Point-172	217	571754.60	5734005.00	0.00	4.00		Mainline	Average	No
		Point-173	218	571772.60	5734006.00	0.00	4.00		Mainline	Average	No
		Point-174	219	571790.60	5734006.00	0.00	4.00		Mainline	Average	No
		Point-175	220	571807.60	5734006.00	0.00	4.00		Mainline	Average	No
		Point-176	221	571825.60	5734006.00	0.00	4.00		Mainline	Average	No
		Point-177	222	571842.60	5734005.00	0.00	4.00		Mainline	Average	No
		Point-178	223	571860.60	5734004.00	0.00	4.00		Mainline	Average	No
		Point-179	224	571878.60	5734004.00	0.00	4.00		Mainline	Average	No
		Point-180	225	571896.60	5734002.00	0.00	4.00		Mainline	Average	No
		Point-181	226	571914.50	5734001.00	0.00	4.00		Mainline	Average	No
		Point-182	227	571931.40	5733999.00	0.00	4.00		Mainline	Average	No
		Point-183	228	571948.30	5733998.00	0.00	4.00		Mainline	Average	No
		Point-184	229	571966.30	5733996.00	0.00	4.00		Mainline	Average	No
		Point-185	230	571984.10	5733993.00	0.00	4.00		Mainline	Average	No
		Point-186	231	572000.90	5733991.00	0.00	4.00		Mainline	Average	No
		Point-187	232	572017.70	5733988.00	0.00	4.00		Mainline	Average	No
		Point-188	233	572035.50	5733985.00	0.00	4.00		Mainline	Average	No
		Point-189	234	572053.20	5733982.00	0.00	4.00		Mainline	Average	No
		Point-190	235	572070.90	5733979.00	0.00	4.00		Mainline	Average	No
		Point-191	236	572087.50	5733975.00	0.00	4.00		Mainline	Average	No
		Point-192	237	572105.10	5733971.00	0.00	4.00		Mainline	Average	No
		Point-193	238	572122.60	5733967.00	0.00	4.00		Mainline	Average	No
		Point-194	239	572139.10	5733963.00	0.00	4.00		Mainline	Average	No
		Point-195	240	572155.60	5733959.00	0.00	4.00		Mainline	Average	No
		Point-196	241	572172.90	5733954.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-2		Point-197	242	572190.30	5733949.00	0.00	4.00		Mainline	Average	No
		Point-198	243	572207.50	5733944.00	0.00	4.00		Mainline	Average	No
		Point-199	244	572223.70	5733939.00	0.00	4.00		Mainline	Average	No
		Point-200	245	572240.80	5733933.00	0.00	4.00		Mainline	Average	No
		Point-201	246	572265.40	5733925.00	0.00	4.00		Mainline	Average	No
		Point-202	247	572289.80	5733916.00	0.00	4.00		Mainline	Average	No
		Point-203	248	572315.00	5733906.00	0.00	4.00		Mainline	Average	No
		Point-204	249	572339.00	5733896.00	0.00	4.00		Mainline	Average	No
		Point-205	250	572363.80	5733886.00	0.00	4.00		Mainline	Average	No
		Point-206	251	572387.50	5733875.00	0.00	4.00		Mainline	Average	No
		Point-207	252	572411.90	5733863.00	0.00	4.00		Mainline	Average	No
		Point-208	253	572435.10	5733852.00	0.00	4.00		Mainline	Average	No
		Point-209	254	572452.80	5733842.00	0.00	4.00		Mainline	Average	No
		Point-210	255	572471.30	5733832.00	0.00	4.00		Mainline	Average	No
		Point-211	2	572907.30	5733592.00	0.00	4.00		Mainline	Average	No
Roadway-3		Point-0	256	574456.50	5731719.00	0.00	4.00		Mainline	Average	No
		Point-1	258	575194.50	5730838.00	0.00	4.00		Mainline	Average	No
		Point-2	259	575216.90	5730811.00	0.00	4.00		Mainline	Average	No
		Point-3	260	575238.60	5730783.00	0.00	4.00		Mainline	Average	No
		Point-4	261	575260.50	5730755.00	0.00	4.00		Mainline	Average	No
		Point-5	262	575281.20	5730726.00	0.00	4.00		Mainline	Average	No
		Point-6	263	575302.00	5730697.00	0.00	4.00		Mainline	Average	No
		Point-7	264	575321.80	5730668.00	0.00	4.00		Mainline	Average	No
		Point-8	265	575340.90	5730639.00	0.00	4.00		Mainline	Average	No
		Point-9	266	575360.10	5730608.00	0.00	4.00		Mainline	Average	No

Roadway Name	Roadway Notes	Road Segment Start Point		Coordinates (pavement)			Width	Point Notes	Road Segment		
		Name	Number	X	Y	Z			Road Category	Pavement Type	On Structure
				[m]	[m]	[m]	[m]				
Roadway-3		Point-10	267	575378.30	5730578.00	0.00	4.00		Mainline	Average	No
		Point-11	268	575396.40	5730547.00	0.00	4.00		Mainline	Average	No
		Point-12	269	575413.50	5730517.00	0.00	4.00		Mainline	Average	No
		Point-13	270	575430.50	5730485.00	0.00	4.00		Mainline	Average	No
		Point-14	271	575446.90	5730453.00	0.00	4.00		Mainline	Average	No
		Point-15	272	575462.40	5730422.00	0.00	4.00		Mainline	Average	No
		Point-16	273	575477.30	5730390.00	0.00	4.00		Mainline	Average	No
		Point-17	274	575491.60	5730358.00	0.00	4.00		Mainline	Average	No
		Point-18	275	575505.30	5730326.00	0.00	4.00		Mainline	Average	No
		Point-19	276	575518.80	5730292.00	0.00	4.00		Mainline	Average	No
		Point-20	277	575531.40	5730260.00	0.00	4.00		Mainline	Average	No
		Point-21	278	575543.80	5730226.00	0.00	4.00		Mainline	Average	No
		Point-22	278	575972.70	5729001.00	0.00	4.00		Mainline	Average	No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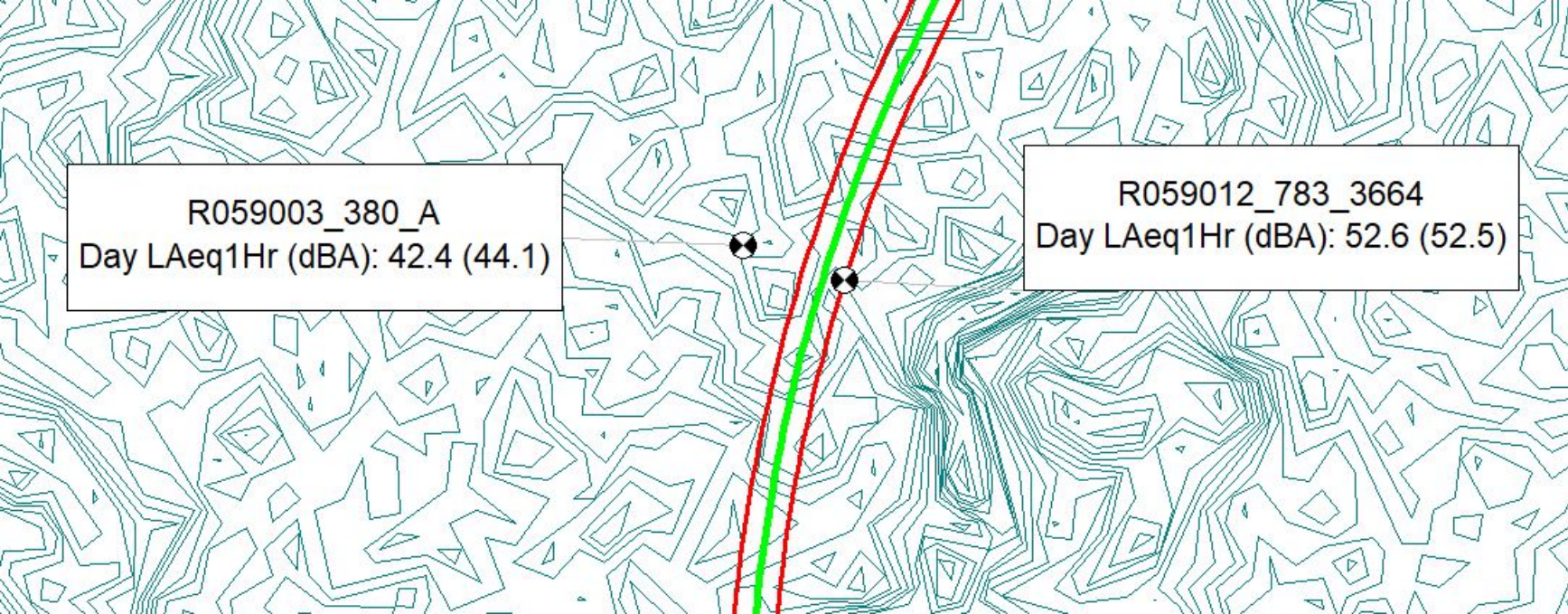
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Day LAeq1Hr (dBA): 52.6 (52.5)

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