



WEBEQUIE SUPPLY ROAD FINAL ENVIRONMENTAL ASSESSMENT REPORT / IMPACT STATEMENT

January 30, 2026

AtkinsRéalis Ref: 661910

SECTION 9: Assessment of Effects on Atmospheric Environment



WEBEQUIE FIRST NATION

AtkinsRéalis



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9 Assessment of Effects on Atmospheric Environment

The atmospheric environment was identified as one of the valued components (VC) during the VC scoping and selection as part of the Environmental Assessment / Impact Assessment (EA/IA) process. This section describes and assesses the potential effects that the Project may have on the Atmospheric Environment VC which consists of air quality, greenhouse gases (GHGs) emissions, noise and vibration, and lighting subcomponents.

Existing conditions for the atmospheric environment have been established through the field work programs, desktop studies, and engagement and consultation activities completed by the Project Team. This includes, but not limited to, background information review, internet research, field measurements of sound levels, engagement with Indigenous communities and stakeholders, and expert opinion. The potential effects are identified in consideration of the existing conditions described in Appendix F – Natural Environment Existing Conditions (NEEC) Report, the potential interactions with the Project, and the results of the following assessments:

- Air Quality Impact Assessment completed by AtkinsRéalis (Appendix G);
- Greenhouse Gas Emissions completed by AtkinsRéalis (Appendix H);
- Climate Change Resilience Review completed by AtkinsRéalis (Appendix I); and
- Noise and Vibration Impact Assessment completed by SLR Consulting Ltd. (Appendix J).

The assessment of potential effects for the Atmospheric Environment VC is presented in the following manner:

- Scope of the Assessment;
- Existing Conditions Summary;
- Potential Effects, Pathways and Indicators;
- Mitigation and Enhancement Measures;
- Characterization of Net Effects;
- Determination of Significance;
- Cumulative Effects;
- Prediction of Confidence in the Assessment;
- Predicted future Condition of the Environment if the Project Does Not Proceed;
- Climate Change Resilience;
- Follow-up and Monitoring Programs; and
- References.

9.1 Scope of the Assessment

9.1.1 Regulatory and Policy Setting

The Atmospheric Environment VC is assessed in accordance with the requirements of the *Impact Assessment Act*, the Ontario *Environmental Assessment Act*, the Tailored Impact Statement Guidelines (TISG) for the Project (Appendix A-1), the provincial approved EA Terms of Reference (ToR) (Appendix A-2), and EA/IA guidance documents.

Table 9-1, **Table 9-2**, and **Table 9-3** outline the key regulations, legislation and policies relevant to the assessment of the air quality, GHGs, and noise and vibration subcomponents, respectively, for construction and operations of the Project. There are no specific Canada or Ontario government regulations or policies that set out requirements for controlling light pollution. Therefore, the TISG and the ToR were used to identify requirements for the assessment of lighting subcomponent.

Table 9-1: Key Regulation, Legislation, Policy Relevant to Air Quality

Regulatory Agency	Regulation, Legislation, and Policy	Project Relevance
Federal		
Impact Assessment Agency of Canada (IAAC)	<i>Impact Assessment Act</i>	The Project is subject to the federal <i>Impact Assessment Act</i> (refer to Section 1). The Tailored Impact Statement Guidelines (TISG) issued by IAAC (2020) for the Project were used to identify requirements for the assessment of Atmospheric Environment VC.
Health Canada	National Ambient Air Quality Objectives (NAAQOs)	The NAAQOs (Health Canada, 1994) are benchmarks that can be used to facilitate air quality management on a regional scale and provide goals for outdoor air quality that protect public health, the environment, or aesthetic properties of the environment. The NAAQOs do not set regulatory limits. Their purpose is to serve as an indicator of good air quality and as a comparison benchmark for monitoring data. Monitoring data in Canada periodically exceeds these criteria, objectives, and standards at different locations. This does not result in an immediate effect to human health but serves as guidance for identifying areas where air quality could potentially be improved.
Canadian Council of Ministers of the Environment (CCME)	Canadian Air Quality Standards (CAAQS)	The CAAQS were implemented to reduce emissions and ground-level concentrations of various air contaminants nationally. Similar to the NAAQOs, the CAAQSs are not regulatory limits, but rather, are used as national targets. Compounds emitted during the construction and operation phases of the Project that have limits under the CAAQS are proposed as indicators of changes to air quality.
Provincial		
Ministry of the Environment, Conservation and Parks (MECP)	<i>Ontario Environmental Assessment Act</i>	The Project is subject to the Ontario <i>Environmental Assessment Act</i> (refer to Section 1). The Terms of Reference (Webequie First Nation 2020), which was approved by the MECP on October 8, 2021, were used to identify requirements for the assessment of Atmospheric Environment VC.

Regulatory Agency	Regulation, Legislation, and Policy	Project Relevance
MECP	Ontario Ambient Air Quality Criteria (AAQC)	The MECP has issued guidelines related to ambient air concentrations that are summarized in Ontario's Ambient Air Quality Criteria (MECP, 2020). These guidelines represent indications of good air quality, based on protection against negative effects on health or the environment. The guidelines are not regulatory enforceable limits (MECP, 2020).
MECP	Ontario Regulation 419/05 – General Air Quality	Ontario Regulation 419/05 is a set of rules related to air pollution and local air quality in Ontario. It is made under the <i>Environmental Protection Act</i> and may be amended from time to time. The regulation sets legal limits for contaminants in air, which are used to assess the contributions of a contaminant to air by a regulated facility. Compounds emitted during the construction and operation phases of the Project that have limits under Ontario Regulation 419/05 – General Air Quality are proposed as indicators of changes to air quality.
Ministry of Transportation (MTO)	Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects (MTO, 2020)	This guide recommends a systematic and generic approach to assess the potential air quality impacts and GHG emissions of provincial transportation projects for which the MTO is directly responsible. The guide also outlines mitigation options to address potential impacts. The approach described in this guide aligns with various stages of the EA process that the Project is undertaking pursuant to the Ontario <i>Environmental Assessment Act</i> (refer to Section 1).
Other		
Government of Nunavut	Nunavut Air Quality standards (NAAQS)	At the request of the Mushkegowuk Council, for the assessment of the air quality, a comparison is also made to the Nunavut Air Quality standards (NAAQS) in the cases where these are more stringent than the corresponding CAAQS and/or AAQC.
Webequie First Nation	Webequie First Nation draft Community Based Land-Use Plan (Webequie First Nation, 2019)	<p>The Webequie First Nation Community Based Land-Use Plan recommends eight land-use areas with land-use designations and activities that are permitted or not permitted in those areas to address community economic and social development goals and community direction for the protection of air, land, water, species habitat, cultural heritage features and community values. The plan identified and considered significant cultural and ecological features and land uses for areas adjacent to the proposed Webequie land-use areas. The plan informed the identification of sensitive areas that are potentially affected by air emissions from project construction and operation activities.</p> <p>Webequie First Nation and Ontario have committed to gather baseline environmental data in the Ring of Fire area and track changes in environmental and ecological conditions in the area over time.</p>



Table 9-2: Key Regulation, Legislation, Policy Relevant to GHG Emissions Assessment for the Project

Regulatory Agency	Regulation, Legislation, and Policy	Project Relevance
Federal		
Government of Canada	<i>Greenhouse Gas Pollution Pricing Act (GGPPA)</i>	The GGPPA has been established to mitigate climate change through the Pan Canadian application of pricing mechanisms to a broad set of greenhouse gas emission sources. The GGPPA includes a set of minimum national standards for carbon pricing in Canada to meet emission reduction targets under the Paris Agreement. The Act aims to put a price on all GHGs that play a significant role in trapping heat in the atmosphere through binding "minimum national standards" on the federal government and all of the provinces and territories of Canada.
Environment and Climate Change Canada (ECCC)	Strategic Assessment of Climate Change (SACC)	ECCC published the SACC (ECCC, 2020a) to enable consistent, predictable, efficient and transparent consideration of climate change throughout the federal impact assessment process. The SACC describes the GHG and climate change information that project proponents need to submit at each phase of a federal impact assessment and requires proponents of projects with a lifetime beyond 2050 to provide a credible plan that describes how the project will achieve net-zero emissions by 2050.
ECCC	Technical guide related to the SACC: Guidance on quantification of net GHG emissions impact on carbon sinks, mitigation measures, net-zero plan and upstream GHG assessment (ECCC, 2021)	This technical guide provides additional details on specific elements of the SACC, including: <ul style="list-style-type: none"> ▪ A description of how a project's GHG emissions are to be estimated throughout the impact assessment process, including upstream emissions and impact on carbon sinks, where applicable; ▪ A description of the Best Available Technologies / Best Environmental Practices Determination process that all projects are required to complete in the Impact Assessment process; and ▪ A description of the information required in the net-zero plan for projects with a lifetime beyond 2050.
Provincial		
Ministry of Transportation (MTO)	Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects (MTO, 2020)	This guide recommends a systematic and generic approach to assess the potential air quality impacts and GHG emissions of provincial transportation projects for which the MTO is directly responsible. The guide also outlines mitigation options to address potential impacts. The approach described in this guide aligns with various stages of the EA process that the Project is undertaking pursuant to the Ontario <i>Environmental Assessment Act</i> (refer to Section 1).
Other		
Intergovernmental Panel for Climate Change (IPCC)	Guidelines for National Greenhouse Gas Inventories (IPCC, 2006 and 2019)	The IPCC guidelines provide methodologies for making estimates of national anthropogenic emissions and removals of greenhouse gases. GHG emissions quantification for the Project was based on IPCC's approach.

Table 9-3: Key Regulation, Legislation, Policy Relevant to Noise and Vibration Assessment for the Project

Regulatory Agency	Regulation, Legislation, and Policy	Project Relevance
Federal		
Health Canada	Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (2017)	Health Canada’s Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (2017) is typically used in assessing the potential effects of noise on communities as part of the environmental and social impact assessments of large projects undergoing environmental permitting. The Health Canada Guidance presents criteria related to the change in Percent Highly Annoyed (%HA) for assessing Project-related effects on the acoustic environment in their community.
Fisheries and Oceans Canada	Department of Fisheries and Oceans Canada (DFO’s) document “Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters” (Wright and Hopky, 1998)	DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters set criteria for peak overpressure and maximum peak particle velocity (PPV) vibration levels. This is the peak vibration level from an event and is often used in determining the potential for construction impacts on fish and aquatic life.
Provincial		
Ministry of the Environment, Conservation and Parks (MECP)	MECP Publication NPC-102 – <i>Instrumentation</i> MECP Publication NPC-103 – <i>Procedures</i> MECP Publication NPC-233 – <i>Information To Be Submitted For Approval Of Stationary Sources Of Sound</i> (MOE, 1995)	The MECP NPC-102, NPC-103, and NPC-233 guidelines include procedure requirements for conducting ambient sound level measurements, which were used to establish existing background ambient sound levels at representative Noise Sensitive Areas (NSAs) identified for the Project.
MECP	MECP Publication NPC-115 – <i>Construction Equipment</i> (MOE, 1978a); MECP Publication NPC-118 – <i>Motorized Conveyances</i>	The MECP NPC-115 and NPC-118 stipulates limits on noise emissions from individual items of equipment, rather than for overall construction noise. Although the MECP does not specify any particular sound level limits for temporary construction sound levels at noise sensitive land uses, the MECP requires the implementation of good practices to limit sound levels and the implementation of reasonable noise mitigation measures to reduce the potential impact of construction noise on nearby noise sensitive land uses.
MECP	MECP Publication NPC-119 – <i>Blasting</i> (MOE, 1978b)	The limits specified in the MECP’s NPC-119 are designed to minimize vibration effects due to quarry or mine blasting. Peak overpressure sound levels from blasting should be controlled by the blasting contractor to ensure the criteria are met.

Regulatory Agency	Regulation, Legislation, and Policy	Project Relevance
MECP	MECP Publication NPC-300 – <i>Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning</i> (MECP, 2013)	The MECP’s NPC-300 guideline’s main objective is to address the proper control of sources of noise emissions to the environment within the province of Ontario. According to NPC-300, the exclusionary sound level limits may be adopted to describe the expected sound levels at potential receptors based on a classification system dependent on the existing acoustic environment. The MECP NPC-300 guideline defines four area classifications dependent on the proximity to roads/rail-lines, nature of land uses and activities in the area. The project study area is defined as Class 3, as per the MECP NPC-300 which can be described as “a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic.”
Ministry of Transportation (MTO)	MTO Environmental Guide for Noise (MTO, 2022)	The MTO Environmental Guide for Noise was developed to provide guidance for MTO personnel and consultants in the analysis of highway/freeway noise, its effects, and mitigation options. The MTO Environmental Guide for Noise is used for provincially owned and operated facilities and is the most extensive and up-to-date. Under this guideline, the importance of changes from a noise impact perspective is based on the objective level and change from existing conditions.
MTO	MTO Provincial Standard Specification (OPSS) 120, General Specification of the Use of Explosives	The OPSS 120 provides the requirements for the use of explosives during construction blasting and has been developed for use in provincial and municipal oriented contracts. It is common for OPSS 120 to be referenced for blasting during general construction activities within the province of Ontario.
Other		
International Organization for Standardization	ISO 1996-2:2007, Acoustics – Description, measurement and assessment of environmental noise Part 2: Determination of sound pressure levels	ISO 1996-2:2007 describes how sound pressure levels can be determined by direct measurement, by extrapolation of measurement results by means of calculation, or exclusively by calculation, intended as a basis for assessing environmental noise.
Webequie First Nation	Webequie First Nation draft Community Based Land-Use Plan (in-progress/early version) (2025)	The Webequie First Nation Community Based Land-Use Plan (in-progress/early version) recommends land-use designations and activities that are permitted or not permitted to address community economic and social development goals and community direction for the protection of air, land, water, species habitat, cultural heritage features and community values. The plan informed the identification of NSAs that are potentially affected by project construction and operation activities.



9.1.2 Consideration of Input from Engagement and Consultation Activities

Table 9-4 summarizes input related to the Atmospheric Environment VC received during the engagement and consultation for the EA/IA and how inputs are addressed in the EAR/IS. This input includes concerns raised by the public, stakeholders and Indigenous communities/groups prior to the formal commencement of the federal IA and provincial EA, during the Planning Phase of the IA and ToR phase of the EA. The Project Team considered the comments received on the Draft EAR/IS in finalizing the EAR/IS. Details of responses and how the comments have been addressed are provided in the Record of Engagement and Consultation.

Table 9-4: Atmospheric Environment VC – Summary of Inputs Received During Engagement and Consultation

Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
Concerns about impacts of dust (deposition of particulate matter) on caribou alongside its impacts on vegetation.	<p>The extent of dustfall (presented as maximum amount of dust per square metres over 30 days period; in g/m²/30-days) during the construction and operation phases of the Project was predicted by using an air dispersion model as summarized in Section 9.3.1 and detailed in the Air Quality Impact Assessment Report (Appendix G).</p> <p>The potential effects of dustfall to vegetation are assessed in Section 11 (Assessment of Effects on Vegetation and Wetlands).</p> <p>The potential effects of dustfall to caribou and other wildlife are assessed in Section 12 (Assessment of Effects on Terrestrial Habitat and Wildlife) and Section 13 (Assessment of Effects on Species at Risk).</p>	Attawapiskat First Nation
Concerns about examining the dustfall from aggregate mining and construction activities as part of the assessment of impacts to air quality as dustfall may be an important factor in driving caribou avoidance of industrial developments. Attawapiskat First Nation requires that the proponent design a rigorous monitoring plan for the dustfall resulting from rock crushing and construction activities on vegetation, snow, and waterways. There must also be a plan in place to monitor impacts of this dustfall to caribou and other wildlife.	<p>The extent of dustfall from construction activities including aggregate production at the proposed quarry was predicted by using an air dispersion model as summarized in Section 9.3.1 and detailed in the Air Quality Impact Assessment Report (Appendix G).</p> <p>The potential effects of dustfall to caribou and other wildlife are assessed in Section 12 (Assessment of Effects on Terrestrial Habitat and Wildlife) and Section 13 (Assessment of Effects on Species at Risk).</p> <p>An Air Quality and Dust Control Management Plan will be developed and implemented to manage and reduce air contaminant emissions during construction and operation phases. The plan will integrate a monitoring procedure for dustfall effects.</p>	Attawapiskat First Nation

Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
Concerns about how climate change during the lifespan of the all-season road will be investigated as part of the EA/IA.	A climate change resilience assessment has been conducted for the Project as part of the EA/IA (refer to Section 9.9 and Appendix I – Climate Change Resilience Review Report). This assessment was based on the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol, formerly from Engineers Canada, which respects the requirements from the Strategic Assessment for Climate Change (SACC) and Ontario’s guidelines within the framework of environmental impact assessments. The PIEVC and guidelines in the assessment were used to identify all potential interactions between climate hazards and project components and their impact on the infrastructure but also on the health and safety of users of the proposed road and the natural environment. The detailed methodology for the climate change resilience assessment is provided in Appendix I (Climate Change Resilience Review Report).	Attawapiskat First Nation
Concerned that the EA/IA should address how the project construction will accommodate future climate change realities related to fluctuating seasonal temperatures, rainfall events, wildfires and the potential loss of permafrost conditions.	As noted above, a climate change resilience assessment has been conducted for the Project as part of the EA/IA (refer to Appendix I – Climate Change Resilience Review Report). The assessed climate hazards included thick fog conditions, high-intensity short-duration rainfalls, blizzards, freezing rain, freeze-thaw cycles, rain on snow events, extreme winds, permafrost degradation, freshets, riverbank erosion, and wildfires. Details on projected climate conditions for the region are also provided in Appendix I (Climate Change Resilience Review Report).	Constance Lake First Nation
Community members are concerned about climate change through Indigenous Knowledge interviews with Elders and Land Users.	A discussion on how the Project could impact global GHG emissions is provided in Appendix H (Greenhouse Gas Emissions Report). A climate change resilience assessment has been conducted for the Project as part of the EA/IA (refer to Appendix I – Climate Change Resilience Review Report). The assessment analyzed risks to the Project due to climate change.	Webequie First Nation
Concerns for the proponent to prepare an Air Quality and Dustfall Monitoring Plan with dustfall sampling methods and reporting for review by all impacted Indigenous communities through the suggested terrestrial advisory group. Also, provide sampling methodology of air pollutants and compare with existing Nunavut Air Quality standards along with ECCC recommended federal targets.	An Air Quality and Dust Control Management Plan will be developed and implemented during construction and operation phases (refer to Section 9.4.1). The plan will integrate a monitoring procedure for dustfall effects and measures to control or limit particulate emissions that would mostly come from the passage of vehicles on the road or the handling of soil or aggregates by mobile equipment during construction. The Air Quality and Dust Control Management Plan will also include a procedure for documenting compliance with applicable standards and required conditions as stipulated in permits, approvals, licenses and/or authorizations.	Mushkegowuk Council



Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
<p>Recommendation to develop an ecological risk assessment to consider ingestion of contaminants of dust and other air pollutants as a pathway for all wildlife, including the caribou and other species at risk.</p>	<p>The extent of air contaminants and dustfall during the construction and operation phases of the Project was predicted by using an air dispersion model as summarized in Section 9.3.1 and detailed in the Air Quality Impact Assessment Report (Appendix G).</p> <p>The potential effects of air emissions including dustfall to vegetation are assessed in Section 11 (Assessment of Effects on Vegetation and Wetlands).</p> <p>The potential effects of air emissions including dustfall to caribou and other wildlife are assessed in Section 12 (Assessment of Effects on Terrestrial Habitat and Wildlife) and Section 13 (Assessment of Effects on Species at Risk).</p> <p>As part of the Human Health Risk Assessment conducted for the Project, the exposure assessment estimated concentrations of chemicals of potential concern, including dust and other air pollutants within the project study areas for each project phase. Appendix P (Human Health Risk Assessment Report) provides details on the methods and results of the exposure assessment.</p> <p>The results include a predicted acute (short-term) exposure risks to total suspended particulate (TSP), inferior to 10 (micrometres) μm (PM_{10}) and inferior to 2.5 μm ($\text{PM}_{2.5}$) and nitrogen dioxide (NO_2) during the construction phase at sensitive receptors located proximate to the proposed road centerline over a short period of 1-2 days given that the emission sources will be moving as road construction progresses. Chronic exposures to hexavalent chromium in TSP during the construction and operation phases of the Project are predicted at two sensitive receptors located within 60 m of the proposed road centreline. However, as noted in Appendix P (Human Health Risk Assessment Report) these results are conservative and have likely overpredicted the exposure risks. It is inferred that there are similar exposure risks to wildlife if present in proximate areas of the proposed road right-of-way.</p> <p>An Air Quality and Dust Control Management Plan that will be developed and implemented for the Project will integrate a monitoring procedure for dustfall effects and measures to control or limit particulate emissions.</p>	<p>Mushkegowuk Council</p>
<p>Concerns about the insufficiency of the instructions to “provide a qualitative description of a project’s positive or negative impacts on carbon sinks, including from the removal and alteration of wetlands,” considering the disproportionate value of the peatland systems in the region for carbon storage. MECP noted that the proponent should ensure the EAR/IS outlines the specific action(s)</p>	<p>As summarized in Section 9.3.2, Section 9.5.2.2, and detailed in Sections 3 and 4 within Appendix H (Greenhouse Gas Emissions Report), GHG emissions, including disturbed carbon sinks associated with biomass clearing (during construction) and land-use change emissions (during operations), have been estimated for the Project based on current preliminary engineering design and carbon stock estimates relevant to the general project area.</p> <p>The methodology followed the guidance from ECCC SACC (2021) which provides instructions on how to calculate the net impact of the project on carbon stocks and sinks as described in detail in Appendix H</p>	<p>Mushkegowuk Council MECP (Revised Climate Change and Air Quality Work Plan)</p>

Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
they intend to take to limit negative impacts on carbon sinks affected by this Project.	(Greenhouse Gas Emissions Report). The assessment included the removal and disposal of living biomass and dead organic matter (DOM) from the site, as well as the net emissions related to the disturbance of living biomass, mineral soil and peatland due to the Project. Mitigation measures for GHG emissions are described in Appendix H (Greenhouse Gas Emissions Report) and outlined in this EAR/IS section (refer to Section 9.4.2). Section 11 (Assessment of Effects of Vegetation and Wetlands) assesses the potential effects on wetlands and includes proposed mitigation measures to eliminate or reduce the potential effects of the Project on wetlands.	
Suggestion for the proponent to conduct a climate impact analysis using the information that has been gathered by the Ontario Forest Research Institute and expertise within this research unit.	The Greenhouse Gas Emissions Report (Appendix H) provides details regarding the calculation methods and inputs used as part of the assessment. Inputs related to the carbon stock and carbon sinks were inferred from site-specific data where available and sourced data from the literature relevant to the project area. Data from the Ontario Forest Research Institute were unavailable. Uncertainty levels (from very low to very high) were also attributed to inputs based on the assumptions, models, emission factors and other data used to calculate the emission estimates in accordance with the level of planning and understanding of required work at this stage of the Project. This was used to attribute overall uncertainties to the total GHG emissions estimate during construction and operation phases.	Mushkegowuk Council
Concerned to know if fugitive dust from vehicle traffic on the road will be quantified (estimate of tons of dust per year) and considered as a main contributor to contaminant emissions, and if not, what would be the reason for that.	Fugitive dust emission rates during the construction and operation phases, mainly from the road surface and the handling of soil/aggregates, were estimated based on best information available relevant to construction planning and daily traffic, amongst others. These inputs were used to assess the impact of the Project on particulate concentrations in ambient air but also on dust deposition on the ground using an air dispersion model as summarized in Section 9.3.1 , Section 9.5.2.1 , and detailed in the Air Quality Impact Assessment Report (Appendix G). Table 9-47 includes a summary of the estimated dustfall results for the operation phase. The tonnage of dust generated annually during construction and operation of the Webequie Supply Road (WSR) was not specifically calculated.	Neskantaga First Nation
Concerned to know how the fugitive dust impacts from runoff from bridges will be addressed.	As noted in Section 7, Table 7-2 in Section 7.1.2, potential impact of fugitive dust will be addressed using typical best management practices to suppress dust such as application of water via tanker truck and use of erosion and sediment control measures (e.g., erosion control blankets on newly graded soil embankments; check dams in drainage ditches/channels). Appendix E (Mitigation Measures) of this EAR/IS outlines measures to control fugitive dust impacts.	Neskantaga First Nation



Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
	<p>The potential impact of runoff from bridges will be addressed through stormwater management designs. Conduits to direct stormwater runoff for treatment, such as stormwater management ponds, will be incorporated into the road design if deemed necessary to minimize the impacts to water quality in watercourses.</p>	
<p>Concerned to know which Ministries would be responsible for fugitive dust compliance and enforcement.</p>	<p>Dust (particulate matter) is typically deemed to be primarily an air quality concern, the mandate for which normally lies with the Ontario Ministry of the Environment, Conservation and Parks and Health Canada. During the EA/IA phase, dust deposition effects on vegetation (including country foods) and surface water may also draw in the Ontario Ministry of Natural Resources, Fisheries and Oceans Canada and Environment and Climate Change Canada. Following the EA/IA phase, if dustfall effects and mitigation are a component of required permitting and approval for the project implementation, the aforementioned authorities (and others) could become involved in compliance and enforcement of any related conditions of approval, in addition to ensuring compliance with EA/IA phase commitments.</p>	<p>Neskantaga First Nation</p>
<p>Concerned that there is no accurate forest or carbon inventory in the region, as accurate inventory data is a prerequisite for determining the “baseline,” for any potential carbon offset project that may be needed to achieve climate change goals</p>	<p>Information on carbon sequestration and storage capacity is gleaned primarily from the vegetation and wetland baseline information. Available data on forest and peatlands from many information sources and guidance documents were used to help characterize existing conditions for vegetation, including wetland and riparian environments. Refer to Section 9.2.1 (Review of Background Information Sources) in the NEEC Report (Appendix F) for the list of references.</p> <p>To gather the information required to support the EA / IA, vegetation field surveys in accordance with provincial standards for Ecological Land Classification were used to identify and classify vegetative communities in the project study areas (refer to Section 9 in Appendix F – NEEC Report). Ecological Land Classification uses a hierarchical approach to identify recurring ecological patterns on the landscape in order to compartmentalize complex natural variation into a reasonable number of meaningful ecosystem units. The functional units from field assessments followed the Ecosites of Ontario (Operational Draft) – Boreal Region (Banton et al., 2009), which is the current standard arising from the previous Forest Ecosystem and Wetland Ecosystem Classification systems for the northeast and northwest regions of the province. Each sample location survey was conducted in alignment with the guidelines and methodologies outlined in the Ontario Parks Inventory and Monitoring Program Guidelines (Draft, Ver. 1.4, 2012).</p> <p>Based on a highly accurate vegetation inventory, changes to the landscape that are important in determining potential impacts to carbon sequestration/storage (i.e., permanent removal of peatland and forested areas) can be readily assessed</p>	<p>Neskantaga First Nation</p>

Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
	<p>for capacity loss in terms of carbon stock. Carbon stocks were assessed based on default Tier 1 parameters provided by the IPCC per type of forest, trees, soils, etc. Use of the IPCC guidelines is included as a commitment in Appendix C of the ToR Summary of Commitments Made During Terms of Reference Phase – Item No. 54, PDF page 234.</p>	
<p>Concerned about whether business model for the Project will be compatible with a net-zero economy.</p>	<p>The Greenhouse Gas Emissions Report (Appendix H) and Section 9.4.2 (GHGs mitigation) outline commitments to reduce GHG emissions and limit adverse impacts to carbon sinks during construction and operation of the WSR, including in the context of how the Project may affect or contribute to Canada’s effort to curb the adverse effects of climate change in compliance with the Paris Agreement (e.g., construction related emissions will be weighted over 25 years and added to the yearly net GHG emissions from the operations phase).</p> <p>In this respect, it is expected that objectives related to contributing to a net-zero carbon economy will be considered in the business model for construction and operation of the WSR. However, the logistics of the business model, including project ownership and control, have not yet crystallized and Webequie First Nation continues to engage Ontario in attempts to move forward on this front. It is also expected that whichever entity owns and operates the road will be responsible for fulfilling the EA/IA commitments, including any offsetting measures for emissions generated (e.g., replacement tree planting), if applicable.</p>	<p>Neskantaga First Nation</p>
<p>Concerns about assessing impacts related to climate change (mitigation and adaptation).</p>	<p>The assessment of impacts related to climate change are assessed and presented in the following sections and appendices of the EAR/IS:</p> <ul style="list-style-type: none"> ▪ Section 9 (Assessment of Effects on Atmospheric Environment); ▪ Section 24 (Effects of the Environment on the Project); ▪ Greenhouse Gas Emissions completed by AtkinsRéalis (Appendix H); and ▪ Climate Change Resilience Review completed by AtkinsRéalis (Appendix I). <p>The assessment was based on the Air Quality and Climate Change Study Plan for the Project provided to MECP and IAAC and is based on the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol from Engineers Canada and Natural Resources Canada. The PIEVC Protocol respects the requirements from the SACC and Ontario’s guidelines within the framework of environmental impact assessments.</p>	<p>MECP</p>

Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
Concerns about developing an air quality work plan with technical details in consultation with government agencies.	An Air Quality and Climate Change Study Plan was prepared at the outset of the EA/IA for MECP and IAAC review and guidance on the detailed field methodologies to be used and specific data that would be collected for the purpose of the EA/IA. Elements of this work plan have informed the methodologies and assessment of air quality impacts as describe in Appendix G (Air Quality Impact Assessment Report).	MECP
Concerns that the ToR should commit to the EA including a quantitative GHG emission prediction that includes explanation for the calculations. As well the preliminary mitigation measures for GHG emissions should be included in the ToR, with complete mitigation measures identified in the EA.	As summarized in Section 9.3.2 and detailed in Sections 3 and 4 within Appendix H (Greenhouse Gas Emissions Report), GHG emissions have been quantitatively estimated for the construction and operation phases of the Project based on current preliminary engineering design and vehicle/equipment emission estimates. The methodology for calculations of GHG emissions was based on the Air Quality and Climate Change Study Plan for the Project, IPCC guidelines, and ECCC SACC guidance and is described in detail in Appendix H (Greenhouse Gas Emissions Report). As the construction execution plan may be subject to change and traffic volumes and maintenance work during the operation phase are based on best estimates at this stage of the Project, and the level uncertainty in assessment is provided in Section 4.3 in Appendix H. Mitigation measures for GHG emissions are described in Appendix H (Greenhouse Gas Emissions Report) and outlined in this EAR/IS section (refer to Section 9.4.2).	MECP
Concerns regarding consideration of a carbon and GHG evaluation as part of the EA or a review of literature on-road construction effects on carbon needs to be undertaken for this EA (as a minimum). It is further recommended the project should test the IPCC calculations against data collected along the length of road network.	As summarized in Section 9.3.2 and detailed in Sections 3 and 4 within Appendix H (Greenhouse Gas Emissions Report), GHG emissions, including disturbed carbon sinks associated with biomass clearing (during construction) and land-use change emissions (during operations), have been estimated for the Project based on current preliminary engineering design, vehicle/equipment estimates and carbon stock estimates relevant to the general project area. As noted in Section 9.8.2 and detailed in Appendix H (Greenhouse Gas Emissions Report), uncertainty levels in inputs for calculating GHG emissions are from very low to very high based on the assumptions, models, emission factors and any other data used to calculate the emission estimates in accordance with the level of planning and understanding of required work at this stage of the Project. Therefore, it is the Project Team's view that testing the calculated GHG emissions against data collected along the length of road network will not yield a meaningful comparison.	MNR
Requirement for details to demonstrate how noise sensitive receptors, as defined in Section 8.1 of the TISG, will be documented, mapped, and evaluated as representative of	As summarized in Sections 9.2.1.3.2 and 9.2.2.3.2 and detailed in Appendix J – Noise and Vibration Impact Assessment Report, the SLR Consulting Ltd. Project Team worked with socio-economic specialists of the AtkinsRéalès Project Team and Webequie First Nation to identify noise sensitive areas (NSAs) which are representative of potential effects from noise and	IAAC (Acoustic Environment Study Plan)



Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
<p>worst-case locations for noise exposure from Project activities.</p>	<p>vibration at a group or cluster of receptors. If the applicable guidelines are met at these NSAs which are considered “worst-case locations”, they will be met elsewhere in the study areas.</p> <p>The NSAs are also summarized in Table 4 in Appendix J – Noise and Vibration Impact Assessment Report and include the following:</p> <ul style="list-style-type: none"> ▪ Permanent residences, including homes within the Webequie community; ▪ Schools, hospitals, community centres, retirement complexes, or assisted care homes; ▪ Seasonal residences, such as trapper cabins or hunting and fishing campsites, which are used by members of the Webequie First Nation, other Indigenous communities, and stakeholders; ▪ Spiritual or sacred spaces which members of the Webequie First Nation, other Indigenous communities, and stakeholders may identify as requiring quiet or being sensitive to disruptions from noise; ▪ Other locations which members of the Webequie First Nation, other Indigenous communities, and stakeholders and/or other Project disciplines may identify as requiring quiet or being sensitive to disruptions from noise (e.g., wildlife – Caribou), and include for instance locations important for harvesting of country foods; and ▪ The mine exploration camp at the McFaulds Lake area operated by Wyloo Pty Ltd. (formerly Noront Resources). 	
<p>Provide details to demonstrate that all applicable sound level adjustments (e.g., for time-of-day and tonal and/or impulsive noise as per Health Canada’s guidance (2017)) will be applied in the assessment. Identify the appropriate sound level adjustments that apply to the assessment and provide detail on why they were selected as the appropriate adjustments for the assessment.</p> <p>Provide details to demonstrate that the data from the noise surveys conducted at the Eagle’s Nest Mine are representative of the project site conditions for the WSR and will be relevant in spatial and temporal coverage to the Project.</p>	<p>To address the heightened annoyance caused by night-time noise in a single metric, the U.S. Environmental Protection Agency (EPA) created the L_{DN} (Day-Night Average Sound Level) metric. This is a specific type of 24-hour average sound level (L_{eq}) that includes a +10 dB penalty for night-time noise. Health Canada’s Guidelines for evaluating human health impacts in environmental assessments incorporate L_{DN} values. These were considered in development of the valued components (VC) and indicators and in the assessment, as mentioned in Table 9-3 and Section 9.1.4.3.1.</p> <p>Data from the noise surveys conducted at the Eagle’s Nest Mine are not available for the Project Team to reference in this assessment. However, the exploration camp at the McFaulds Lake area operated by Wyloo Pty Ltd. (formally Noront Resources) was identified by the Project Team as a noise sensitive area (NSA) and included in the Noise Impact Modelling conducted for the Project. As described in Section 9.2.1.3, the existing sound environment at this NSA is represented by the background ambient sound levels measured at the monitoring location M3 (refer to Figure 9.3).</p>	<p>IAAC (Acoustic Environment Study Plan)</p>



Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
<p>Requirement for details to demonstrate how the proposed monitoring locations are representative of baseline conditions at all sensitive receptor locations, as required in Section 8.1 of the TISG. Provide details regarding the timing of monitoring and how temporal variability will be considered (e.g., seasonal variation in levels and types of community activity) as per Section 8.1 of the TISG. Provide details to demonstrate how current ambient noise levels at all key receptor points will be included in the Impact Statement.</p>	<p>Please refer to Section 9.2.1.3 for methodology on measurement of background ambient sound levels, identification of noise sensitive receptors and background sound levels, and Section 9.2.2.3 for results. Ambient sound level measurements were conducted at three representative monitoring locations, as per MECP Publication NPC-233 measurement procedure requirements, and NSAs were identified in consultation with the socio-economic specialists of the AtkinsRéalis Project Team and Webequie First Nation. Background sound levels for use in the assessment were established based on the sound level monitoring results from the three monitoring locations, a review of Health Canada's Noise Guidelines and applicable provincial noise guidelines including MTO Environmental Guide for Noise and MECP Publication NPC-300.</p>	<p>IAAC (Acoustic Environment Study Plan)</p>
<p>Provide a description of what activities may cause vibration and sound sources and when they may occur, including activities that are temporary. Provide details regarding activities that will fall under the 'Guidelines for the Use of Explosives in Canadian Fisheries Waters'. Provide details to demonstrate how the underwater soundscape and vibration levels will be described, as per the requirement in Section 8.1 of the TISG.</p>	<p>Consideration for DFO's guideline was used for identification of peak particle velocity (PPV) and Peak Overpressure, vibration limits for water, and similar. Please refer to Table 9-3, and Section 9.3.4 for further details.</p>	<p>IAAC (Acoustic Environment Study Plan)</p>
<p>Provide details to demonstrate how the expectation of peace and quiet at receptors and community-based policies concerning noise will be considered in the development of the "Construction Code of Practice" described in the revised study plan.</p>	<p>A Construction Blasting Management Plan and Noise and Vibration Management Plan will be developed and implemented to mitigate the effects of noise from construction activities. These plans will be adapted for continuation throughout the operations phase of the Project. Indigenous communities will have an active role in developing and implementing management plans. Section 9.4.3 and Appendix E of the EAR/IS outlined mitigation measures to eliminate or reduce potential adverse effects of noise from the project activities. These measures will be incorporated in the Construction Blasting Management Plan and Noise and Vibration Management Plan. These plans are parts of the Construction Environmental Management Plan and the Operation Environmental Management Plan that will be developed for the Project.</p> <p>Noise complaints, if arise during the project construction and operations, will be investigated and addressed.</p>	<p>IAAC (Acoustic Environment Study Plan)</p>

Comment Theme	How the Comments are Addressed in this EAR/IS	Indigenous Community or Stakeholder
Proponent is reminded that the EA needs to be very clear about the methodology for incorporating the discipline-specific information and selecting preferred alternatives. Alternatives assessment will include advantages and disadvantages using criteria and indicators for comparison – to be developed in EA.	Air quality and climate change impacts have been included as factors of the natural environment in the alternatives assessment and determining the preferred alternatives as described in Section 3 of this EAR/IS (Evaluation of Project Alternatives). The process of assigning scores for factors/screening criteria in the alternatives assessment reflected the values identified through engagement and consultation with Indigenous communities, professional opinions of the Project Team subject matter experts, and feedback from regulatory agencies and other stakeholders.	MECP (Revised Climate Change and Air Quality Work Plan)
Concerned about the need to adequately assess impacts of air quality on human health, wildlife and vegetation as a result of exhaust emissions and that a monitoring program needs to be in place to ensure air quality throughout the life span of the Project.	Section 9.3.1 identifies the changes in air quality caused by the Project activities in construction and operation phases. Section 5.18 – Dust Control Practices in Appendix E (Mitigation Measures) describes key mitigation measures to prevent or limit the potential effect dust generated by project activities on the air quality.	Attawapiskat First Nation – Long Lake #58 First Nation – Mushkegowuk Tribal Council Health Canada – Webequie First Nation
Concerned about the potential for the Project to cause health effects related to noise from road construction and operation.	Section 9.3.3 outlines the changes in noise level caused by activities in construction and operation phases of the Project. Section 9.4.3 includes the mitigative measures to limit the potential effect of noise and vibration generated by the Project in construction and operation phases.	Health Canada
Concerned about the impacts of ongoing climate change, which includes the breakup of ice and opening up of habitat, needs to be considered to understand the need for the Project and impacts to wildlife.	Section 9.3.2 has outlined the potential impacts of the Project on GHG emissions including GHG emissions sources and the expected GHG emissions levels (in construction and operation phases). Appendix H also elaborates the scope of assessment including the GHG emissions assessment boundary, the identification of activities generating GHG emissions, the considered GHGs, and the results presentation plan as well as discussion on the impact of the project on the Canadian GHG emissions and Canada's ability to meet its climate change commitment. The impact of the project on carbon reservoirs and sinks will also be assessed along with potential mitigation measures currently considered.	Attawapiskat First Nation – Fort Albany First Nation – LiUNA Indigenous Relations

9.1.3 Incorporation of Indigenous Knowledge and Land and Resource Use Information

To date, the following First Nations have provided Indigenous Knowledge and Land and Resource Use (IKLRU) information to the Project Team:

- Webequie First Nation;
- Marten Falls First Nation;
- Weenusk First Nation;
- Kashechewan First Nation; and
- Fort Albany First Nation.



Table 9-5 summarizes IKLRU information relating to Atmospheric Environment VC and indicates where the information is incorporated in the EAR/IS.

Table 9-5: Atmospheric Environment VC – Summary of Indigenous Knowledge and Land and Resource Use Information

Common Theme	Key Information and Concerns	Response and/or Relevant EAR/IS Section
Information on potential receptor locations for air emissions	<p><u>Information Shared</u></p> <ul style="list-style-type: none"> ▪ Potential locations of value that Webequie First Nation, or other Indigenous communities have identified such as community residences and institutions, spiritual or sacred spaces or hunting grounds (and which are allowed to be disclosed), that could be impacted by the Project. 	<p>Information on potential receptor locations provided through IKLRU program, desktop review and other means was used to characterize the existing conditions and to assess potential effects of the Project on air quality – refer to Appendix G (Air Quality Impact Assessment Report) and this EAR/IS Section 9. Air dispersion modelling results specific to these receptors, namely existing residences, institutional buildings, future residence plots per the Webequie First Nation On-Reserve Land Use Plan, and spiritual or sacred spaces for members of the Webequie First Nation and other Indigenous communities and/or stakeholders were obtained and analysed.</p> <p>Potential sensory disturbance of project activities on land and resource use activities is further discussed in the following EAR/IS sections:</p> <ul style="list-style-type: none"> ▪ Section 16 (Assessment of Effects on Land and Resource Use). ▪ Section 19 (Assessment of Effects on Aboriginal and Treaty Rights and Interests). <p>An Air Quality and Dust Control Management Plan will be developed and implemented to manage and reduce air contaminant emissions during construction and operation phases. The plan will integrate a monitoring procedure for dustfall effects.</p>
Air quality	<p><u>Information Shared</u></p> <ul style="list-style-type: none"> ▪ To minimize dust pollution, members recommended using tarps to prevent dust from spreading or spraying the roads with a water-based solution to suppress dust. ▪ Noise from aircraft presence at De Beers has been identified by as a source of wildlife disturbance, alongside effects on air quality. 	<ul style="list-style-type: none"> ▪ An Air Quality and Dust Control Management Plan will be developed and implemented to manage and reduce air contaminant emissions during construction and operation phases. Proposed mitigation measures to reduce dust effects include, but are not limited to, use of water sprays from trucks to increase moisture levels in active areas during dry days (e.g., haul/access roads, temporary soil and aggregate stockpiles) and the use of dust suppression systems at quarries. ▪ The Air Quality and Dust Control Management Plan will integrate a monitoring procedure for dustfall effects and measures to control or limit usage of vehicle or equipment that are the main emission source of particulates. ▪ Potential effects of project activities on air quality are assessed in this EAR/IS section (Section 9). Table 9-43 summarizes the potential effects, mitigation measures, and predicted net effects on air quality. ▪ Potential effects of changes to air quality on water, fish, plants, and wildlife and the use of



Common Theme	Key Information and Concerns	Response and/or Relevant EAR/IS Section
	<p>Concerns</p> <ul style="list-style-type: none"> ▪ It was noted that land, water, and air are needed to survive. Community members noted that their traditional territory is vast, the air is clean, and the land is untouched by development and that their identity is connected with their traditional lands and waters. ▪ Community members are concerned that the proposed roads will result in more pollution in and around their traditional territory. Specifically, they are concerned about water contamination, noise pollution, managing industrial dust, littering, polluting nearby waterways and the groundwater with chemicals, oil, and/or dust. ▪ Community members are concerned about keeping the water, fish, plants and wildlife safe from dust. ▪ Community members are concerned about the amount of smog that could affect wildlife (ducks, geese and moose were specifically outlined). ▪ Some members pointed out that dust may negatively impact sturgeon because they are sensitive to changes in their environment or habitat. ▪ Community members are concerned that increased dust from projects could make it harder to breathe. ▪ Potential negative effects of the removal of muskeg habitat and its role in air filtration. 	<p>recreational and traditional land and resources are discussed in the following EAR/IS sections: Section 7 (Assessment of Effects on Surface Water Resources), Section 10 (Assessment of Effects on Fish and Fish Habitat), Section 11 (Assessment of Effects on Vegetation and Wetlands), Section 12 (Assessment of Effects on Terrestrial Habitat and Wildlife), Section 13 (Assessment of Effects on Species at Risk), Section 16 (Non-Traditional Land and Resource Use), and Section 19 (Aboriginal and Treaty Rights and Interests). Proposed mitigation measures to eliminate or reduce potential effects of changes to air quality on water, fish, plants, and wildlife and the use of recreational and traditional land and resources are outlined in respective EAR/IS sections and in Appendix E – Mitigation Measures.</p>
<p>Climate change / Greenhouse gases</p>	<p>Information Shared</p> <ul style="list-style-type: none"> ▪ Community members noted that the peatlands clean out the air. ▪ Elders, Knowledge Holders, and community members noted that climate change has resulted in changes to landscapes, weather patterns, ecosystems, and extreme weather events impacting wellbeing of plants and animals, milder winter temperatures and less snowfall in recent years, changes in fish and wildlife populations, permafrost melt and a shortening winter road season 	<ul style="list-style-type: none"> ▪ A discussion on how the Project could impact global GHG emissions that are considered to contribute to climate change, is provided in Appendix H (Greenhouse Gas Emissions Report) and summarized in Section 9.5.2.2. ▪ As summarized in Section 9.3.2 and detailed in Sections 3 and 4 within Appendix H (Greenhouse Gas Emissions Report), GHG emissions, including disturbed carbon sinks associated with biomass clearing (during construction) and land-use change emissions (during operations), have been estimated for the construction phase and operation phase of the Project based on current preliminary



Common Theme	Key Information and Concerns	Response and/or Relevant EAR/IS Section
	<p>affecting transportation of supplies to their community, less ice build-up on the river making it unsafe for community members to use the river as a travel way for hunting, changes to harvesting patterns and traditional way of life, access to food and sustenance, and social conditions in their community.</p>	<p>engineering design and vehicle/equipment estimates.</p> <ul style="list-style-type: none"> Shared information on projected and historic climate change has been considered in the climate change resilience assessment conducted for the Project as part of the EA/IA (refer to Appendix I – Climate Change Resilience Review Report). The assessment analyzed risks to the Project due to climate change.
<p>Information on noise sensitive locations</p>	<p>Information Shared</p> <ul style="list-style-type: none"> Noise sensitive locations which Webequie First Nation, or other Indigenous communities have identified as requiring quiet or being sensitive to disruptions from noise, for example spiritual or sacred spaces or hunting grounds (and which are allowed to be disclosed). 	<p>Information on noise sensitive locations provided through IKLRU program, desktop review and other means was used to characterize the existing conditions and to assess potential effects of noise and vibration from the Project – refer to Appendix J (Noise and Vibration Impact Assessment Report) and this EAR/IS Section 9. Results of the Noise Impact Modelling indicate that the most affected noise sensitive locations are found within 150 m of the proposed roadway, or 300 m of a waterbody crossing (involving pile driving/bridge construction). Noise impacts from roadway construction are only expected to affect identified noise sensitive locations for approximately one week based on an approximate 100 m/day rate of construction. During operations phase, changes in sound levels resulting from the proposed Project are expected to be negligible for all identified noise sensitive locations and less than the 6.5% threshold established by Health Canada. Potential sensory disturbance of project activities on land and resource use activities is further discussed in the following EAR/IS sections:</p> <ul style="list-style-type: none"> Section 16 (Assessment of Effects on Land and Resource Use). Section 19 (Assessment of Effects on Aboriginal and Treaty Rights and Interests). <p>A Noise and Vibration Management Plan will be developed and implemented to mitigate the effects of noise and vibration from construction activities. The plan will be adapted for continuation throughout the operations phase of the Project.</p>
<p>Noise effects</p>	<p>Concerns</p> <ul style="list-style-type: none"> The project area is naturally quiet, dominated by sounds from wildlife, with minimal external land-use. The area includes remote regions like the Winisk River Provincial Park and other wildlife areas. Noise from development can cause distress to both humans and animals, leading to trauma and disrupting peace in the area. The noise might scare away animals, impacting the ability of 	<ul style="list-style-type: none"> Potential effects of noise from project activities are assessed in this EAR/IS section (Section 9). Results of the Noise Impact Modelling indicate that the most affected noise sensitive locations are found within 150 m of the proposed roadway, or 300 m of a waterbody crossing (involving pile driving/bridge construction). Noise impacts from roadway construction are only expected to affect identified noise sensitive locations for approximately one week based on an approximate 100 m/day rate of construction. During operations phase, changes in sound levels resulting from the proposed Project are



Common Theme	Key Information and Concerns	Response and/or Relevant EAR/IS Section
	<p>Indigenous community members to hunt and access them as a food source.</p> <ul style="list-style-type: none"> ▪ Concerns for noise pollution empowered Indigenous community members to recommend that there be more regulations around noise in the region. ▪ Acknowledgment that remote Indigenous communities already face health challenges due to isolation. Changes in water, air quality, and noise from the project could worsen those issues. ▪ Noise pollution is not just an environmental issue but also affects cultural practices like hunting by displacing wildlife. ▪ Consideration of the existing health challenges in remote Indigenous communities is crucial when assessing the project's impacts. ▪ Indigenous community members prefer to harvest in areas where it is quiet. Increased noise in harvesting areas may increase physical disturbance and impact harvesting activities. 	<p>expected to be negligible for all identified noise sensitive locations and less than the 6.5% threshold established by Health Canada.</p> <ul style="list-style-type: none"> ▪ Potential effects of noise (i.e., 'sensory disturbance') on wildlife and the use of recreational and traditional land and resource use are discussed in Section 12 (Assessment of Effects on Terrestrial Habitat and Wildlife), Section 13 (Assessment of Effects on Species at Risk), Section 16 (Non-Traditional Land and Resource Use), and Section 19 (Aboriginal and Treaty Rights and Interests). Sensory disturbance from changes in noise and vibration levels has the potential to affect human health which is assessed in Section 17 (Assessment of Effects on Human Health). ▪ Section 9.4.3 and Appendix E of the EAR/IS outlined mitigation measures to eliminate or reduce potential adverse effects of noise from the project activities. A Construction Blasting Management Plan and Noise and Vibration Management Plan will be developed and implemented to mitigate the effects of noise from construction activities. These plans will be adapted for continuation throughout the operations phase of the Project. ▪ Noise complaints, if arise during the project construction and operations, will be investigated and addressed.

Notes: Names of First Nations and associated location-specific description in some instances are not presented in this table due to potential sensitivity and confidentiality of IKLRU information.

9.1.4 Valued Component and Indicators

Valued components (VC), including the atmospheric environment (noise, air, greenhouse gases), have been identified in the TISG and by the Project Team and are, in part, based on what Indigenous communities and groups, the public and stakeholders have identified as valuable to them in the EA/IA process to date. Subcomponents (or criteria) of the Atmospheric Environment VC are further identified to help inform the report structure and better assess and present the data and assessment results. The assessment of these subcomponents is conducted using the methodology as outlined in Section 5 (Environmental Assessment / Impact Assessment Approach and Methods). The identified subcomponents for Atmospheric Environment VC are:

- Air quality;
- Greenhouse gases (GHGs) / climate change (the two terms are used interchangeably for this subcomponent of the Atmospheric Environment as GHGs contribute to climate change);
- Noise and vibration; and
- Lighting.



9.1.4.1 Air Quality Basics

9.1.4.1.1 Air Contaminants of Interest

Air quality refers to the concentration of pollutants or contaminants in the air. There are many different types of air contaminants including but not limited to particulate matter/dust, ground-level ozone (O₃), carbon monoxide (CO), sulphur dioxide (SO₂), nitrogen oxides (NO_x), lead, methane (CH₄), nitrous oxide (N₂O), soot, smoke, mold, pollen, and carbon dioxide (CO₂).

The air quality assessment considered air contaminants potentially associated with the Project that include the common air contaminants (CACs) and specific toxic contaminants from the volatile organic compound (VOC) category and polycyclic aromatic hydrocarbons (PAH). The CACs include nitrogen dioxide (NO₂), CO, SO₂, and particulate matter of different diameter classes (total suspended particulate (TSP), inferior to 10 (micrometres) µm (PM₁₀) and inferior to 2.5 µm (PM_{2.5})). The complete list of toxic contaminants included in this assessment is presented in **Table 9-6** and includes diesel particulate matter (DPM). The extent of dustfall during the construction and operation phases of the Project is also predicted in this assessment.



Indigenous community members are concerned about keeping the water, fish, plants and wildlife safe from dust and that dust from the Project could make it harder to breathe.

9.1.4.1.2 Relevant Air Quality Criteria and Standards

The Ontario Ambient Air Quality Criteria (AAQC) and the Canadian Ambient Air Quality Standards (CAAQS) for contaminants most relevant to the Project are presented in **Table 9-6**. The Nunavut Air Quality standards (NAAQS) are also shown for comparison purpose, as requested by the Mushkegowuk Council. As shown, the NAAQS are higher or at least equivalent to corresponding provincial and/or federal limits.

Table 9-6: Ambient Air Quality Criteria and Standards for Contaminants of Interest

Pollutant	Averaging Period	Ontario AAQC		CAAQS		Nunavut NAAQS	
		[ppb]	[µg/m ³]	[ppb]	[µg/m ³]	[ppb]	[µg/m ³]
Total suspended particulate (TSP)	24-hour	—	120	—	—	—	120
	Annual	—	60 ⁽¹⁾	—	—	—	60
Fine inhalable fraction of particulate matter (PM ₁₀)	24-hour	—	50	—	—	—	—
Fine particulate matter (PM _{2.5})	24-hour	—	27 ⁽²⁾	—	23 ⁽²⁾⁽⁴⁾	—	30
	Annual	—	8.8 ⁽³⁾	—	8.0 ⁽³⁾⁽⁴⁾	—	—
Sulphur dioxide (SO ₂)	10-minute	67	180	—	—	—	—
	1-hour	40	100	65 ⁽⁵⁾	173	172	450
	Annual	4	10	4 ⁽⁶⁾	10	11	30
Nitrogen dioxide (NO ₂)	1-hour	200	400	42 ⁽⁷⁾	79	200	400
	24-hour	100	200	—	—	100	200
	Annual	—	—	12 ⁽⁶⁾	22	32	60

Pollutant	Averaging Period	Ontario AAQC		CAAQS		Nunavut NAAQS	
		[ppb]	[µg/m ³]	[ppb]	[µg/m ³]	[ppb]	[µg/m ³]
Carbon monoxide (CO)	1-hour	30,000	36,200	—	—	—	—
	8-hour	13,000	15,700	—	—	—	—
Ozone (O ₃)	1-hour	80	165	—	—	—	—
	8-hour	—	—	60 ⁽⁸⁾	118	65	128
1,3-butadiene	24-hour	4.5	10	—	—	—	—
	Annual	0.91	2	—	—	—	—
Acetaldehyde	30-minute	278	500	—	—	—	—
	24-hour	278	500	—	—	—	—
Acrolein	1-hour	2.0	4.5	—	—	—	—
	24-hour	0.17	0.4	—	—	—	—
Benzene	24-hour	0.72	2.3	—	—	—	—
	Annual	0.14	0.45	—	—	—	—
Ethylbenzene	10-minute	438	1,900	—	—	—	—
	24-hour	231	1,000	—	—	—	—
Formaldehyde	24-hour	53	65	—	—	—	—
Hexanes	24-hour	711	2,500	—	—	—	—
Propionaldehyde	10-minute	4.2	10	—	—	—	—
Toluene	24-hour	532	2,000	—	—	—	—
Xylenes	10-minute	692	3,000	—	—	—	—
	24-hour	168	730	—	—	—	—
Benzo(a)pyrene (B[a]P) as a surrogate to PAHs	24-hour	—	0.00005	—	—	—	—
	Annual	—	0.00001	—	—	—	—
Diesel particulate matter (DPM)	2-hour	—	—	—	10 ⁽⁹⁾	—	—
	Annual	—	—	—	5 ⁽⁹⁾	—	—
Dustfall	30-day	—	7 g/m ²	—	—	—	—
	Annual	—	4.6 g/m ² ⁽¹⁰⁾	—	—	—	—

Notes:

- (1) As the geometric mean of daily measurements over a year.
- (2) The 3-year average of the annual 98th percentile of the daily 24-hr average concentrations.
- (3) The 3-year average of the annual average concentrations.
- (4) Applicable starting in 2030. The current CAAQS for PM_{2.5} is equivalent to the AAQC.
- (5) The 3-year average of the annual 99th percentile of the SO₂ daily maximum 1-hour average concentrations.
- (6) The average over a single calendar year of all 1-hour average concentrations.
- (7) The 3-year average of the annual 98th percentile of the daily maximum 1-hour average concentrations.
- (8) The 3-year average of the annual 4th highest of the daily maximum 8-hour average ozone concentrations.
- (9) No regulatory standards apply to DPM. Values represent Health Canada's guidance for acute and chronic exposure to DPM.
- (10) Arithmetic mean of 30-day periods over an annual averaging time.



9.1.4.2 Greenhouse Gas Emissions Basics

9.1.4.2.1 Greenhouse Gases of Interest

In the atmosphere, GHGs absorb and re-emit infrared radiation from the planetary surface, thereby introducing the potential effect of warming the lower levels of the atmosphere and acting as a thermal blanket for the planet. Globally, GHGs are emitted from numerous natural and anthropogenic sources and the increased atmospheric concentrations have been associated with climate change (Intergovernmental Panel on Climate Change [IPCC], 2014).

The greenhouse gases considered in this assessment are those associated with fuel combustion, namely CO₂, CH₄, and N₂O. The emissions for each gas are added as tonnes of « carbon dioxide equivalent » (t CO₂e) based on the global warming potentials as set up in the *Greenhouse Gas Pollution Pricing Act* (GGPPA): CO₂ = 1; CH₄ = 28, and N₂O = 265 t CO₂e per tonne which were developed in the 5th IPCC assessment report published in 2014 (IPCC, 2014).

The other GHGs from the GGPPA like sulphur hexafluoride (SF₆), nitrogen trifluoride (NF₃), the hydrofluorocarbons, and the perfluorocarbons are not considered in the assessment because they are not manipulated, produced, or converted on-site or at least in very small amounts, if any.

9.1.4.2.2 Emission Factors Considered in the GHG Emissions Assessment

Table 9-7 lists the GHG emission factors (weight of GHGs generated per fuel volume, presented as grams per litre [g/L]) considered in this assessment per source category presented in **Section 9.3.2**. They were extracted from the 2023 National Inventory Report (NIR) produced annually by ECCC (2023). For the assessment, diesel fuel and gasoline are set to contain 3% of biodiesel (B3) and 7% of ethanol (E7), respectively. These percentages represent the average found in Canadian fuel stocks in 2021 according to a study prepared annually by Navius Research (2022). Biogenic CO₂ from the combustion of biodiesel and ethanol is compiled separately using the following emission factors from the NIR: 2,472 g CO₂/L of biodiesel and 1,508 g CO₂/L of ethanol.

Table 9-7: Emission Factors Considered in the GHG Emissions Assessment

Source Category	Fuel	GHG Emissions Factor (g/L)				Reference (ECCC, 2023)
		CO ₂ ⁽¹⁾	CH ₄	N ₂ O	CO ₂ b ⁽²⁾	
Off-road mobile equipment	Diesel (B3)	2,601	0.073	0.12 ⁽³⁾	74	ECCC NIR 1990:2021 (Annex A6.1.6)
Stationary fuel combustion	Diesel (B3)	2,601	0.078	0.022	74	ECCC NIR 1990:2021 (Annex A6.1.2)
Crew vehicles including light-duty trucks	Gasoline (E7)	2,146	0.43	0.20	106	ECCC NIR 1990:2021 (Annex A6.1.6)
Heavy-duty transport trucks including mobilization / demobilization	Diesel (B3)	2,601	0.14	0.082	74	ECCC NIR 1990:2021 (Annex A6.1.6)
Air travel	Turbo Fuel	2,560	0.018	0.071	0	ECCC NIR 1990:2021 (Annex A6.1.6)

Notes:

- (1) Corresponds to the CO₂ emission factor multiplied by 0.97 for diesel and 0.93 for gasoline to consider the presence of biodiesel and ethanol, respectively in Canadian fuel stocks in average.
- (2) Corresponds to the CO₂ emission factor for biodiesel or ethanol multiplied by 0.03 and 0.07, respectively.
- (3) The N₂O emission factors for Tier 1-3 and Tier 4 engines were averaged, as the actual equipment fleet is unknown.



9.1.4.3 Noise and Vibration Basics

9.1.4.3.1 Noise

Sound is a dynamic and fluctuating pressure in a fluid medium such as air. Noise is defined as unwanted sound. The standard practice within the acoustical industry is to use these two terms interchangeably.

Sound levels are usually expressed in terms of A-Weighted decibels, also called dBA values, which account for the variation in human frequency response. People do not hear low frequency noise as well as noise in mid or high frequencies. The A-Weighting network was developed to correspond to how humans hear noises such as those typically generated by construction or road traffic.

Unweighted measurements are designated as dBZ values. These measurements are used in investigating impacts from overpressure (blasting) or low frequency noise. Based on the noise sources associated with the proposed Project, low frequency noise impacts are not expected.

People experience a wide range of sound levels in their daily activities. **Table 9-8** presents a graphical comparison of “typical” sound levels which might be encountered, and the general human perception of the level. Sound levels from 40 to 65 dBA are considered to be in the faint to moderate range.

Most of the outdoor noise environment, even within the busiest city cores, will lie within this area. Sound levels from 65 to 90 dBA are perceived as loud. This area includes very noisy commercial and industrial spaces. Sound levels greater than 85 dBA are very loud to deafening and may result in hearing damage.

Table 9-8: Range of Sound Levels

Sound Levels		Sources of Noise
Human Perception	Sound Level in dBA	
Deafening	125	Sonic booms
	120	Threshold of feeling / pain
	115	Maximum level, hard rock band concert
	110	Accelerating motorcycle at a few feet away
Very loud	105	Loud auto horn at 3 metres (m) away
	100	Dance club / maximum human vocal output at 1 m distance
	95	Jack hammer at 15 m distance
	90	Indoors in a noisy factory
Loud	85	Heavy truck pass-by at 15 m distance
	80	School cafeteria / noisy bar; Vacuum cleaner at 1.5 m
	75	Near edge of major highway
	70	Inside automobile at 60 kilometres per hour (km/h)
	65	Normal human speech (unraised voice) at 1 m distance
Moderate	60	Typical background sound levels in a large department store
	55	General objective for outdoor sound levels; typical urban sound level (24h)
	50	Typical suburban / semi-rural sound level (24h)
	45	Typical rural levels (24h); typical sound levels in an office due to HVAC



Sound Levels		Sources of Noise
Human Perception	Sound Level in dBA	
Faint	40	Typical background sound levels in a library
	35	--
	30	Broadcast studio
	25	Average whisper
Very faint	20	Deep woods on a very calm day
	15	--
	10	--
	5	Human breathing
	0	Quietest sound that can be heard

Source: Engineering Noise Control – Theory and Practice – Fourth Edition (Bies and Hansen, 1988)

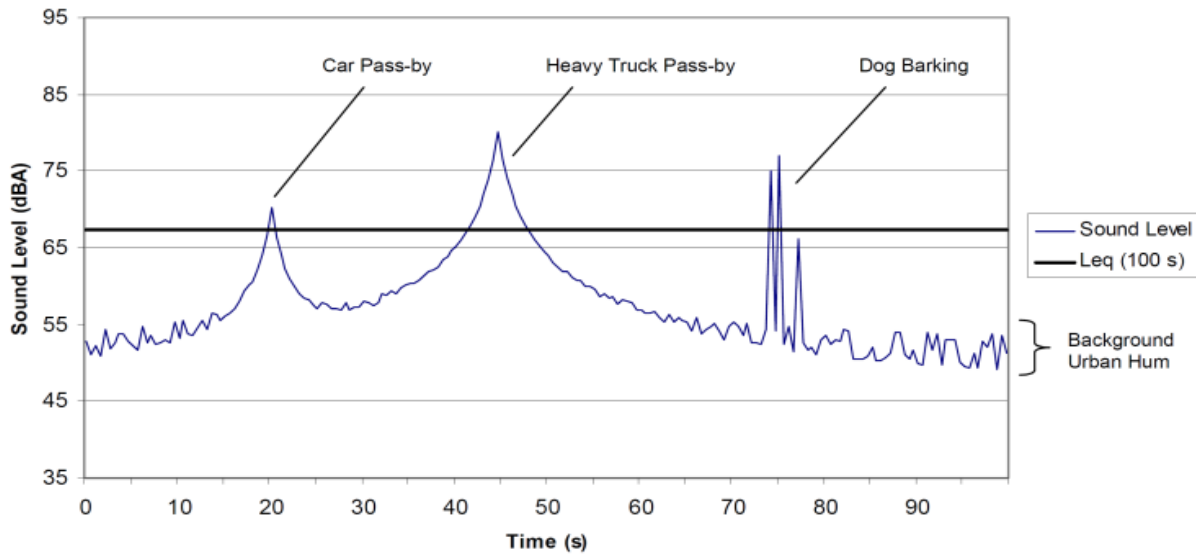
At this time, the best available research indicates that long-term human responses to noise are best evaluated using energy equivalent sound exposure levels (L_{eq} values), in A-Weighted decibels (L_{eq} values in dBA)¹ including adjustments to account for particularly annoying characteristics of the sounds being analyzed.

Sound levels in the ambient environment vary each instant. In rural environment, the background noise is formed by “the sounds of nature,” composed of noise from wind moving vegetation. As vehicle traffic passes near a noise receptor, the instantaneous sound level may increase as a vehicle approaches, and then decrease as it passes and travels farther away. The energy equivalent sound exposure level L_{eq} is the average sound level over the same period with same acoustical energy as the actual environment (i.e., it is the average of the sound energy measured over a time period T). As a time-average, all L_{eq} values must have a time period associated with them. This is typically placed in brackets beside the L_{eq} tag. For example, a thirty-minute L_{eq} measurement would be reported as an L_{eq} (30 min) value.

¹ ISO 1996:2003(E), Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures.



Figure 9.1: The L_{eq} Concept



The L_{eq} concept is illustrated in **Figure 9.1**, showing sound levels beside a small roadway, over a 100 second time period, with two vehicle pass-bys:

In this example, the background “sounds of nature” are between 47 and 53 dBA. A car passes by at 20 seconds. As it approaches, the sound level increases to a maximum, and then decreases as it speeds away. At 45 seconds, a heavy truck passes by. Near 75 seconds, a dog barks three times. The maximum sound level (L_{max}) over the period is 80 dBA and the minimum is 47 dBA. For almost 50% of the time, the sound level is lower than 55 dBA.

The L_{eq} (100s) for the example is 67 dBA, which is much higher than the statistical mean sound level of 55 dBA. This illustrates that the L_{eq} value is very sensitive to “loud” events, which contain much more sound energy (as sound is ranked on a logarithmic scale) than the normal background. It is also sensitive to the number of events during the time period, and the duration of those events. If only the truck had passed by during the measurement (no car and no dog barks), the L_{eq} (100s) would be 66 dBA. If only the car and dog barks had occurred, the L_{eq} (100s) would be 61 dBA. This shows that the truck pass-by is the dominant event in our example, due to its level and duration.

The ability of the L_{eq} metric to account for the three factors of level, duration and frequency of events makes it a robust predictor of human response to noise. It is for this reason that the vast majority of noise standards are based on L_{eq} values.

For transportation noise impact analyses, the following durations are typically used:

- L_{eq} (24h) The sound exposure level over then entire 24-hour day;
- L_{eq} Day L_{eq} (16h), from 7 am to 11 pm;
- L_D L_{eq} (15h), from 7 am to 10 pm;
- L_{eq} Night L_{eq} (8h), from 11 pm to 7 am;
- L_N L_{eq} (9h), from 10 pm to 7 am; and
- L_{DN} A special L_{eq} (24h) value with a 10 dB night-time penalty applied to overnight sound levels (10 pm to 7 am).

L_{eq} Day values, covering off the AM-peak and PM-peak travel periods, are generally appropriate for examining the impacts of non-freeway roadways such as the Project. Most of the noise associated with these sources is concentrated in the daytime hours. L_{eq} Day and L_{eq} Night values are used in Ontario transportation noise guidelines.

To account for increased annoyance with noise overnight in a single value, the U.S. Environmental Protection Agency (U.S. EPA) developed the L_{DN} metric (also known as DNL). It is a special form of an overall L_{eq} (24h) with a +10 dB night-time penalty. L_{DN} values are used in Health Canada’s Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (HC Guideline).

Other measures which are sometimes used to characterize sound levels include:

- L_{max} values: Maximum sound level measured over an event (pass-by);
- $L_{N\%}$ values: The sound level exceeded n% of the time. It is a statistical measure of sound level. For highly varying sounds, the L_{90} represents the background sound level, L_{50} represents the median or typical sound level, and L_{10} represents the short-term peak sound levels, such as those due to occasional traffic or a barking dog; and
- L_{LM} values: A special measurement of maximum sound level from impulsive sound sources such as hammer hits or metal dropping. These values are designated as “dBAI”.

The human ear does not interpret changes in sound level in a linear manner. The general subjective human perception of changes in sound level is shown in **Table 9-9** and is directly applicable to changes in sound level where the sound sources are of the same general character. For example, existing road traffic sound levels can be directly compared to future road traffic sound levels.

In comparing road traffic sound to rural background sound, the different frequency and temporal nature of the sound means that the sound from the road may be more noticeable. Adjustments for the nature of the new sound can be applied to better account for temporal and frequency differences.

Table 9-9: Subjective Human Perception of Changes in Sound Levels

Change in Sound Level (dB)	Human Perception of Change
< 3	Imperceptible change
3	Just-perceptible change
4 to 5	Clearly noticeable change
6 to 9	Substantial change
> 10 and more	Very substantial change (half or twice as loud)
> 20 and more	Very substantial change (much quieter or louder)

Notes:

Adapted from Bies and Hansen (1988) and MOE Noise Guidelines for Landfill Sites (MOE, 1998). Applies to changes in broadband noise sources only (i.e., increases or decreases in the same noise or same type of noise only). Changes in frequency content or the addition of tonal or temporal changes would affect the perception of the change.

For transportation sound sources, research conducted by the U.S. Environmental Protection Agency (EPA) indicates that a 5 dB change in sound levels is required to trigger a change in large-scale community response to noise. This correlates to a clearly noticeable increase in sound levels.

9.1.4.3.2 Vibration

Vibration is the repetitive motion of an object, surface, or fluid. Vibration may travel through the ground, through water, or through the air. Vibration is typically considered to be limited to frequencies below 100 Hertz (Hz); above 100 Hz the effects of vibration would be examined as noise.

Vibration may be measured using a number of different metrics. Relevant descriptors include:

- Root-mean-square vibration levels, in millimetres per second (mm/s). This is a measure of “average” vibration levels and is often used in determining human response to vibration; and
- Peak particle velocity (PPV) vibration levels, in mm/s. This is the peak vibration level from an event and is often used in determining the potential for construction damage or impacts on fish and aquatic life.

Many construction activities that generate noise will not generate vibration (e.g., chain saws used for clearing, construction vehicles).

9.1.4.4 Lighting Basics

Lighting or illumination is the deliberate use of light to achieve practical or aesthetic effects. Lighting includes the use of both artificial light sources like lamps and light fixtures, as well as natural illumination by capturing daylight. In general, three lighting attributes are considered to describe existing conditions and assess potential effects:

- Light trespass refers to the transmission of light from fixtures within a facility or community to the environment.
- Glare refers to intense or contrasting lighting conditions associated with incoming light that reduces the ability of humans, birds and other wildlife to see clearly (e.g., headlight from approaching vehicle).
- Sky glow refers to the illumination of the clouds by light sources on the surface of the Earth, such as street lighting, and haze in the atmosphere that replaces the natural night-time sky with a translucent to opaque lighted dome.

9.1.4.5 Indicators

"Indicators", are used to assess potential effects to a VC. In general, indicators represent a resource, feature or issue related to a VC that if changed from the existing conditions may demonstrate a positive or negative effect.

Table 9-10 shows the subcomponents and indicators identified for the Atmospheric Environment VC.

Table 9-10: Atmospheric Environment VC – Subcomponents, Indicators, and Rationale

Subcomponent(s)	Indicators	Rationale
Air quality	<p>Qualitative and quantitative assessment of changes in ambient air quality for the following parameters:</p> <ul style="list-style-type: none"> ▪ Common air contaminants: <ul style="list-style-type: none"> ▫ SO₂, CO, and NO₂; and ▫ Particulate matter: Total suspended particulates (TSP), fine inhalable fraction of particulate matter (PM₁₀), and fine particulate matter (PM_{2.5}). 	<ul style="list-style-type: none"> ▪ Indigenous Knowledge and feedback from Indigenous communities regarding the importance of air quality. ▪ Commitment to avoid or minimize adverse effects to nearby receptors (residential homes) and culturally sensitive areas of value and interest to

Subcomponent(s)	Indicators	Rationale
	<ul style="list-style-type: none"> ▪ Toxic contaminants: <ul style="list-style-type: none"> ▫ Relevant VOCs: 1,3-butadiene, acetaldehyde, acrolein, benzene, ethylbenzene, formaldehyde, hexanes, propionaldehyde, toluene, xylenes; ▫ Benzo(a)pyrene as a surrogate to PAHs; ▫ Ground-level O₃; and ▫ Diesel particulate matter (DPM). 	<ul style="list-style-type: none"> ▪ Indigenous Peoples (e.g., spiritual sites, fish and hunting areas). ▪ Sensitivity of human health and the environment (soils, plants, animals) to air quality changes. ▪ Sensitivity of human health and the environment (soils, plants, animals) to global warming and climate change.
Greenhouse gas (GHG) emissions	<ul style="list-style-type: none"> ▪ CO₂, CH₄, N₂O expressed as carbon dioxide equivalent (CO₂e) which quantifies GHG emissions in terms of their total global warming potential relative to that of CO₂. 	<ul style="list-style-type: none"> ▪ Equipment use and vehicle traffic from the proposed Project will produce GHGs and air contaminants including dust from the road surface. ▪ Impact of the Project on the existing carbon sinks and reservoirs along the road footprint.
Noise and vibration	<ul style="list-style-type: none"> ▪ Absolute sound level and changes to sound levels (quantitative) for Noise Sensitive Areas (NSA): <ul style="list-style-type: none"> ▫ Overall sound levels during the daytime (L_d) (7 am to 11 pm) and night-time (L_n) (11 pm to 7 am) periods (dBA); ▫ Overall “day-night” sound levels over the entire day (L_{dn}) (dBA); ▫ Maximum sound levels from vehicle pass-by and the number of events during the night-time period (L_{max}) (10 pm to 7 am) (dBA); ▫ Change from existing “no-build” background sound levels, and the “future build” sound levels with the Project in place (background sound levels plus project sound levels): <ul style="list-style-type: none"> - number of NSA with 0-5 dBA increase; and - number of NSA with >5 dBA increase. ▫ Percent Highly Annoyed (%HA) at each NSA. ▪ Potential construction vibration levels (peak particle vibration velocity (PPV)) from blasting or pile driving at waterbody crossing locations that would exceed federal and provincial limits/criteria. 	<ul style="list-style-type: none"> ▪ Indigenous Knowledge and feedback from Indigenous communities regarding the importance of impacts of noise and vibration. ▪ Sensitivity of wildlife to changes above existing sound levels – sensory disturbance can impact habitat availability, use and connectivity (movement and behaviour), leading to changes in abundance and distribution of terrestrial animals. ▪ Sensitivity of humans to changes above existing noise and vibration levels – annoyance to individuals/households / communal uses in community based on noise and vibration proximity effects.



Subcomponent(s)	Indicators	Rationale
Light levels	<ul style="list-style-type: none"> ▪ Change in ambient light levels that would cause sensory disturbances. 	<ul style="list-style-type: none"> ▪ Indigenous Knowledge and feedback from Indigenous communities regarding the importance of impacts of changes in light levels. ▪ Sensitivity of wildlife to changes above existing light levels – sensory disturbance can impact habitat availability, use and connectivity (movement and behaviour), leading to changes in abundance and distribution of terrestrial animals. ▪ Potential visual aesthetic changes to land users.

9.1.5 Spatial and Temporal Boundaries

The following assessment boundaries have been defined for the Atmospheric Environment VC.

9.1.5.1 Spatial Boundaries

The spatial boundaries for the Atmospheric Environment VC are shown on **Figure 9.2** (Air Quality and Climate Change), **Figure 9.3** (Noise and Vibration) and **Figure 9.4** (Lighting) and include the following:

- **Project Footprint** – the area of direct disturbance (i.e., the physical area required for project construction and operations). The Project Footprint is defined as the 35 m wide right-of-way (ROW) of the WSR; and temporary and permanent areas needed to support the Project that include access roads, construction camps, laydown and storage yards, aggregate pits/quarries, and a Maintenance and Storage Facility (MSF).
- **Local Study Area (LSA)** – the area where potential largely direct, and indirect effects of the Project are likely to occur and can be predicted or measured for assessment.
 - For air quality – the LSA extends 1 km from each side of the centreline of the preliminary recommended preferred route, and 500 m from the boundaries of temporary or permanent supportive infrastructure.
 - For GHG emissions that contribute to climate change – the LSA includes the geographical area of northern Ontario due to the presence of peatlands.
 - For noise – the LSA extends 600 m from each side of the centreline of the preliminary recommended preferred route, and 500 m from temporary or permanent supportive infrastructure, and 1.5 km from known noise sensitive receptors (i.e., community of Webequie).
 - For vibration – the LSA extends 200 m from blasting and/or structural pile driving activities associated with construction or operations of the Project.
 - For lighting – the LSA extends 500 m from each side of the centreline of the preliminary recommended preferred route and supportive infrastructure.

- **Regional Study Area (RSA)** – the area where potential largely indirect and cumulative effects of the Project in the broader, regional context may occur.
 - For air quality – the RSA includes the LSA and further extends 5 km from each side of the LSA boundaries including all existing residences and institutions from the local community.
 - For GHG emissions that contribute to climate change – the RSA includes the provincial boundary of Ontario since regulations, and GHG emission reduction targets are set at the provincial and national levels.
 - For noise and vibration – there is no RSA proposed for noise and vibration as the effects are not anticipated beyond the boundaries of the LSA. Therefore, the RSA is considered the same as the LSA.
 - For lighting – There is no RSA proposed for lighting as the effects are not anticipated beyond the boundaries of the LSA. Therefore, the RSA is considered the same as the LSA.

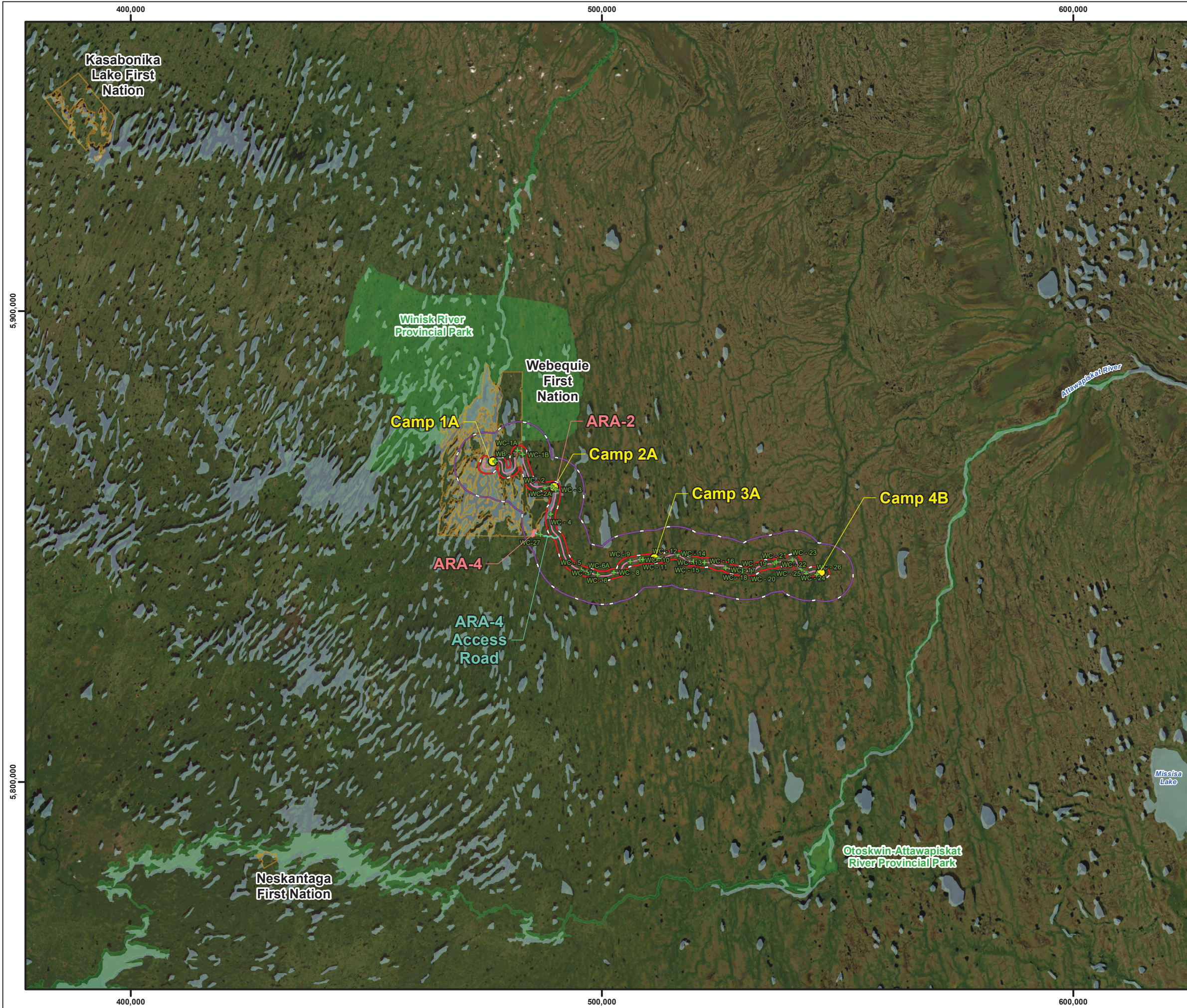
9.1.5.2 Temporal Boundaries

Temporal boundaries for the assessment address the potential effects of the Project over relevant timescales. The temporal boundaries for the Project consist of two main phases:

- **Construction Phase:** All activities associated with the initial development and construction of the road and supportive infrastructure from the start of the construction to the start of the operation and maintenance of the Project and is anticipated to be approximately 5 to 6 years in duration.
- **Operations Phase:** All activities associated with operation and maintenance of the road and permanent supportive infrastructure (e.g., operation and maintenance yard, aggregate extraction and processing areas) that will start after the construction activities are complete, including site restoration and decommissioning of temporary infrastructure (e.g., access roads, construction camps, etc.). The operations phase of the Project is anticipated to be 75 years based on the expected timeline when major refurbishment of road components (e.g., bridges) is deemed necessary.

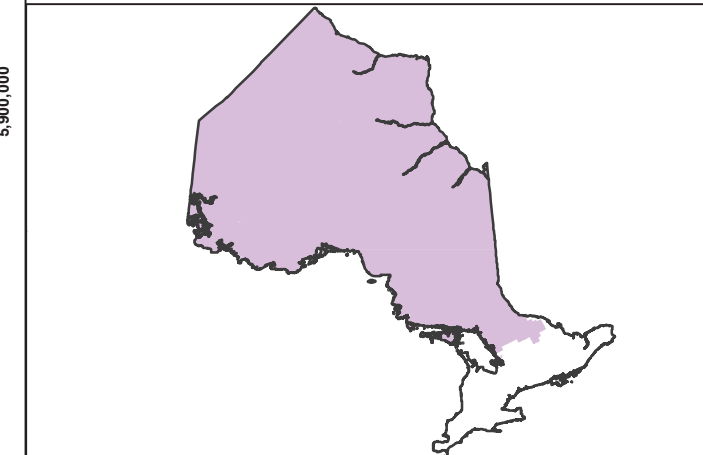
The Project is proposed to be operated for an indeterminate period; therefore, future suspension, decommissioning and eventual abandonment is not evaluated in the EA/IA (refer to Project Description, Section 4.4).





Legend

- Preliminary Recommended Preferred Route
- Air Quality Local Study Area (LSA 1km from Preferred Route)
- Air Quality Regional Study Area (RSA 5km from either side of LSA Boundary)
- Climate Change Local Study Area (LSA Includes the Geographical Area of Northern Ontario)
- Climate Change Regional Study Area (RSA is the Provincial Boundary of Ontario)
- First Nation Reserve
- Provincial Park
- Waterbody
- ARA-4 Access Road
- Recommended Aggregate/Rock Source
- Recommended Construction Camps
*Camp 2-A is proposed to include permanent Maintenance and Storage Facility (MSF) for operations of the WSR.
- + Waterbody Crossing



Webeque Supply Road (WSR)

Air Quality and Climate Change Study Areas

Figure Number:	9.2	REV	PA
Client:	Webeque First Nation	Project Number:	661910
		Date:	10/10/2024
DSC		DRN	CHK
		TE	AD
		APP	CW

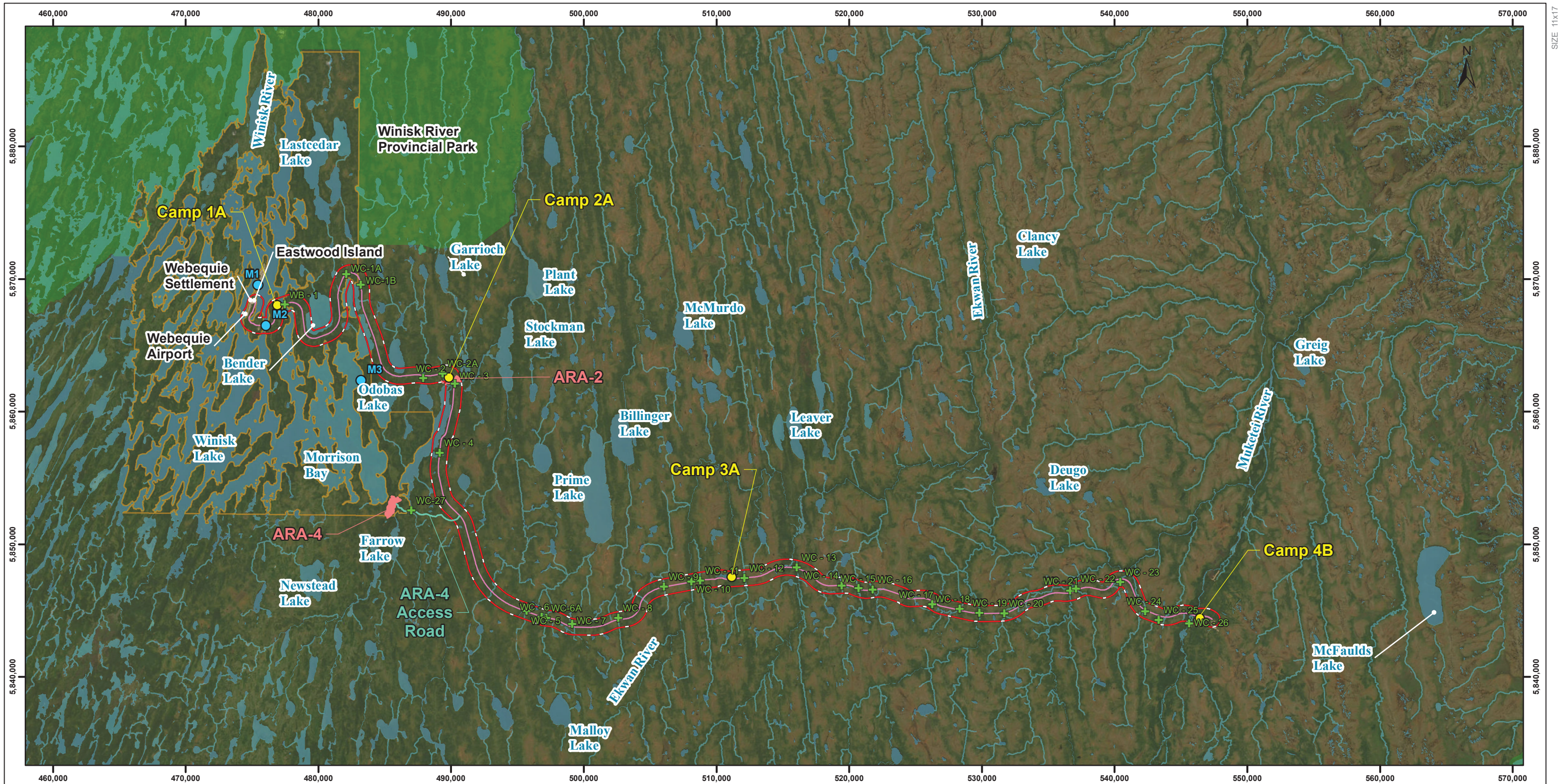
SCALE: 1:800,000

NOTES

1. Coordinate System: NAD 1983 UTM Zone 16N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information; and, Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.io.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF). Download Date : 2021-02-04

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Legend

- Preliminary Recommended Preferred Route
- Local Study Area (LSA Noise - 600m from Preferred Route and 1.5km from Noise Sensitive Areas; Vibration - LSA is 200m from Blasting Areas or Structural Pile Driving Location Once Known)
- Webeque First Nation Reserve
- Waterbody
- Watercourse
- ARA-4 Access
- Noise Monitoring Locations
- Recommended Aggregate/Rock Source
- Recommended Construction Camps
*Camp 2-A is proposed to include permanent Maintenance and Storage Facility (MSF) for operations of the WSR.
- + Waterbody Crossing

NOTES

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- Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information; and Land Information Ontario (LIO) Warehouse Open Data (<https://github.io.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF). Download Date: 2021-02-04

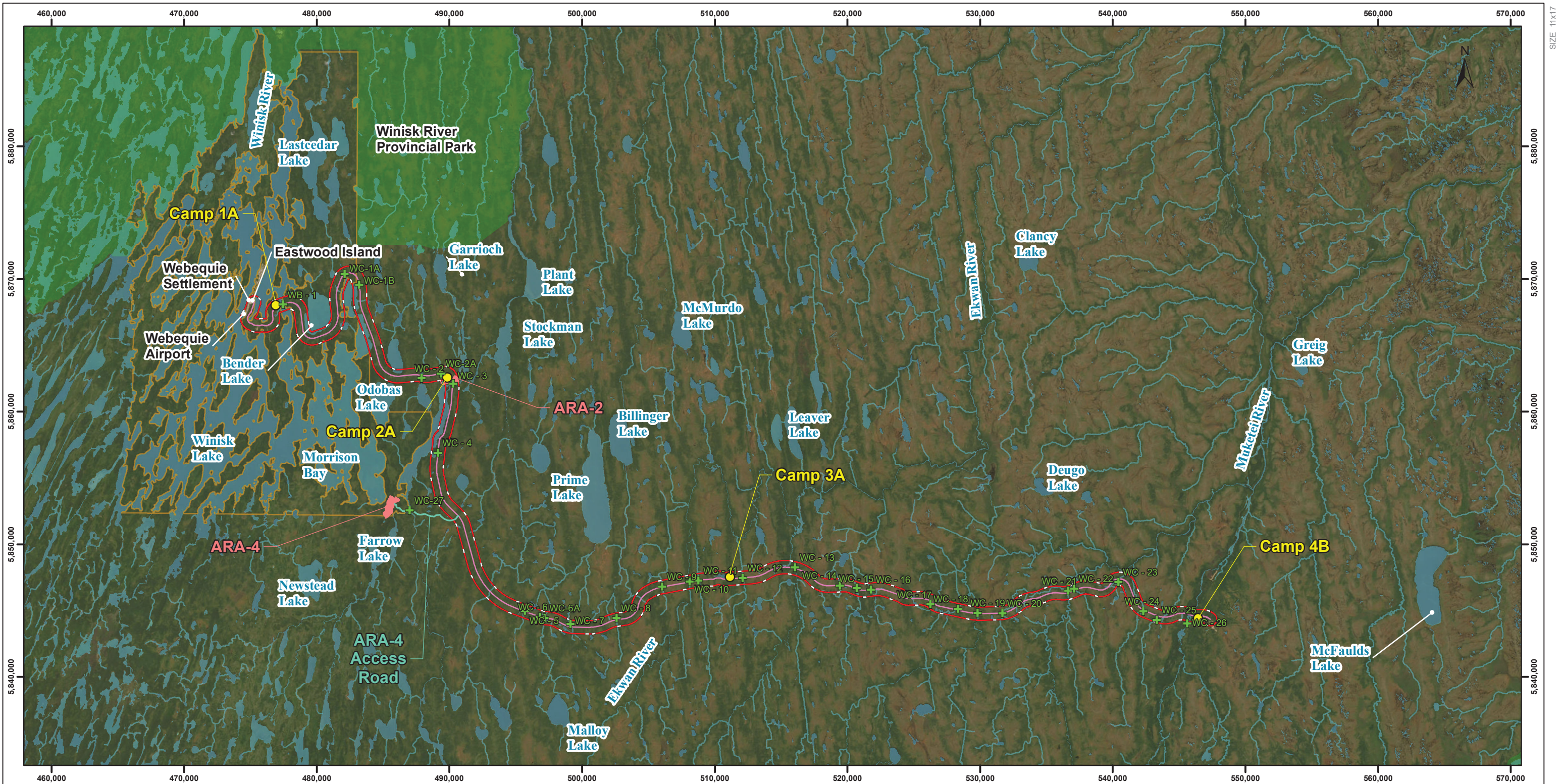
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Webeque Supply Road (WSR)

Noise and Vibration Study Areas

Figure Number: 9.3		REV: PA	
Client: Webeque First Nation	Project Number: 661910	Date: 8/20/2024	
DSC		DRN	CHK
		TE	AD
		APP	CW



Legend

	Preliminary Recommended Preferred Route		ARA-4 Access Road
	Local Study Area (LSA 500m from Centreline of Preferred Route)		Recommended Aggregate/Rock Source
	Webeque First Nation Reserve		Recommended Construction Camps *Camp 2-A is proposed to include permanent Maintenance and Storage Facility (MSF) for operations of the WSR.
	Winisk River Provincial Park		Waterbody Crossing
	Waterbody		
	Watercourse		

NOTES

- Coordinate System: NAD 1983 UTM Zone 16N.
- Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
- Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information; and Land Information Ontario (LIO) Warehouse Open Data (<https://github.io.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF). Download Date - 2021-02-04

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<h2 style="margin: 0;">Webeque Supply Road (WSR)</h2> <p style="margin: 0;">Light Level Study Area</p>			
Figure Number: 9.4		REV: PA	
Client: Webeque First Nation	Project Number: 661910	Date: 3/1/2024	
DSC		DRN	CHK
		TE	AD
		APP	CW

9.1.6 Identification of Project Interactions with Atmospheric Environment

Table 9-11 identifies the project activities that may interact with the Atmospheric Environment VC to result in a potential effect. The identification of project interactions with the atmospheric environment provides a basis for the subsequent assessment of the potential effects of the Project. The potential effects are described separately for subcomponents of Atmospheric Environment VC including air quality, GHGs, noise and vibration, and lighting. Air contaminants, GHGs, noise and light are generated by most project activities, and may result in a change in air quality, a change in atmospheric GHG content, a change in sound quality and/or a change in light levels. Rather than acknowledging this by placing a “checkmark” for each of these activities, a “checkmark” was included in the “Emissions, Discharges and Wastes” component which was added under each project phase for efficiency of discussion.

Table 9-11: Project Interactions with Atmospheric Environment VC and Potential Effects

Project Activities	Potential Effects				
	Change in Air Quality	Change in GHG Emissions	Change in Sound Levels	Change in Vibration Levels	Change in Light Levels
Construction					
Mobilization of Equipment and Supplies: Transport of equipment, materials and supplies to the Project site area using the winter road network and airport in Webequie First Nation Reserve.	–	–	–	–	–
Surveying: Ground surveys are conducted to stake (physically delineate) the road right-of-way (ROW) and supportive infrastructure components of the Project (i.e., construction camps, access roads, laydown/storage areas, and aggregate extraction and processing areas).	–	–	–	–	–
Vegetation Clearing and Grubbing: Clearing and grubbing of vegetation (forest & wetland), including removal, disposal and/or chipping.	–	–	–	–	–
Construction and Use of Supportive Infrastructure: This includes temporary construction camps, access roads and watercourse crossings, laydown/storage areas, and aggregate extraction (pits & quarries) and processing areas (screening, crushing), including blasting.	–	–	–	–	–
Construction of Road: removal and stockpiling of organics, subgrade excavation, placement of fill and gravel, grading and drainage work (e.g., road ditches, erosion protection, etc.).	–	–	–	–	–
Construction of Structures at Waterbody Crossings: Culverts and bridges – foundations (e.g., pile driving and concrete works), bridge girders, bridge decks, install of culverts.	–	–	–	–	–

Project Activities	Potential Effects				
	Change in Air Quality	Change in GHG Emissions	Change in Sound Levels	Change in Vibration Levels	Change in Light Levels
Decommissioning / Closure of Temporary Aggregate Extraction and Processing Areas (pits and quarries): Demobilization of extracting and processing equipment, grading and site reclamation/revegetation. This also includes formalizing / re-purposing select pits and quarries proposed as permanent Project components during operations.	–	–	–	–	–
Decommissioning of Temporary Construction Camps, Access Roads and Laydown / Storage Areas: Grading and site reclamation/revegetation. This also includes formalizing / re-purposing select access roads to permanent pits and quarries and a construction camp to an operations and maintenance facility as Project components for use during operations.	–	–	–	–	–
Emissions, Discharges and Wastes¹: Noise, air emissions / GHGs, water discharge, and hazardous and non-hazardous wastes.	✓	✓	✓	✓	✓
Completion of Project-Wide Clean-up, Site Restoration / Reclamation and Demobilization: Clean-up of excess materials, site revegetation and demobilization of equipment and materials.	–	–	–	–	–
Potential for Accidents and Malfunctions²: Spills, vehicle collisions, flooding, forest fire and vandalism.	–	–	–	–	–
Employment and Expenditures³	–	–	–	–	–
Operations					
Road Use: Light and heavy vehicles and maintenance equipment with average annual daily traffic volume of less than 500 vehicles.	–	–	–	–	–
Operation, Maintenance and Repair of Road: Includes vegetation management control within the road ROW; repairs/resurfacing of road granular surface and shoulders; dust control; winter/seasonal maintenance (i.e., snow clearing); road drainage system cleanout/repairs to culverts, ditches and drainage outfalls; rehabilitation and repairs to structural culverts and bridges; and road patrols for inspection.	–	–	–	–	–
Operation of Pits, Quarries and Maintenance Yard/Facility: Includes periodic extraction and blasting and processing operations (i.e., crushing, screening) and stockpiling of rock and aggregate materials. Also includes operation and repairs of Maintenance Yard/Facility and components within (office buildings, parking, storage of equipment and materials).	–	–	–	–	–



Project Activities	Potential Effects				
	Change in Air Quality	Change in GHG Emissions	Change in Sound Levels	Change in Vibration Levels	Change in Light Levels
Emissions, Discharges and Wastes ¹ : Noise, air emissions / GHGs, water discharge, and hazardous and non-hazardous wastes.	✓	✓	✓	–	✓
Potential for Accidents and Malfunctions ² : Spills, vehicle collisions, flooding, forest fire and vandalism.	–	–	–	–	–
Employment and Expenditures ³	–	–	–	–	–

Notes:

✓ = Potential interaction

– = No interaction

¹ Emissions, Discharges, and Wastes (e.g., air, noise, light, solid wastes, and liquid effluents) are generated by many project activities. Rather than acknowledging this by placing a checkmark against each of these activities, “Emissions, Discharges and Wastes” is included as an additional component under each project phase.

² Accidents and Malfunctions including spills, vehicle collisions, flooding, forest fire and vandalism may occur at any time during construction and operations of the Project. Rather than acknowledging this by placing a checkmark against each of these activities, “Potential for Accidents and Malfunctions” is an additional component under each project phase. The potential effects of accidental spills are assessed in Section 23 – Accidents and Malfunctions.

³ Project employment and expenditures are generated by most project activities and components and are the main drivers of many socio-economic effects. Rather than acknowledging this by placing a checkmark against each of these activities, “Employment and Expenditures” is an additional component under each project phase.

9.2 Existing Conditions

This section summarizes existing conditions of the atmospheric environment in the study areas. The purpose is to provide a baseline upon which the potential effects of the Project on the Atmospheric Environment VC are assessed. It also addresses the requirements in Sections 8.1 and 14.1 of the TISG and meeting the requirements of the MECP and other provincial ministries as identified in the ToR for the Project. Detailed descriptions of the methods for characterizing existing conditions and interpretations of the results are provided in Appendix F – Natural Environment Existing Conditions (NEEC) Report and in the following appendices:

- Air Quality Impact Assessment Report completed by AtkinsRéalis (Appendix G);
- Greenhouse Gas Emissions Report completed by AtkinsRéalis (Appendix H); and
- Noise and Vibration Impact Assessment Report completed by SLR Consulting Ltd. (Appendix J).

9.2.1 Methods

9.2.1.1 Air Quality

Local air quality data is not available with the exception of limited data collected from a station operated by the MECP (2019) as part of Ontario’s Ring of Fire Baseline Monitoring Program (2015-2018) providing data on fine particulate matter (PM_{2.5}). For the other contaminants, data from air quality monitoring stations located in regions similar to the Project were favoured to characterize and describe existing air quality conditions in the LSA and RSA. Where possible, the following characteristics were considered in



selecting representative stations amongst the National Air Pollution Surveillance Network (NAPS) and the Réseau de surveillance de la qualité de l'air du Québec (RSQAQ).

- Monitoring stations used for regional backgrounds (outside of urban areas);
- Monitoring stations located in non-urban remote areas; and
- Monitoring stations located in areas with non-commercial and non-industrial land uses.

Table 9-12 presents the monitoring stations considered for the purpose of characterizing existing air quality conditions and the rationale behind their selection. The location of monitoring stations is identified in **Figure 9.5**. In some cases, due to their proximity to some form of industrial activities, the resulting background concentration may slightly overstate the existing conditions for the LSA and RSA that do not hold industrial activities presently. In other cases, stations in small urban areas or southern locations needed to be considered where remote stations do not include monitoring for selected contaminants (e.g., VOCs, carbonyls and PAHs).

Background concentrations of DPM, which is a subset of total PM_{2.5} concentrations, could not be defined as there are no existing data about their concentration levels in ambient air (i.e., PM_{2.5} specific to diesel engine combustion can not be differentiated from total PM_{2.5}).

Table 9-12: Air Quality Monitoring Stations Used to Determine Background Concentrations

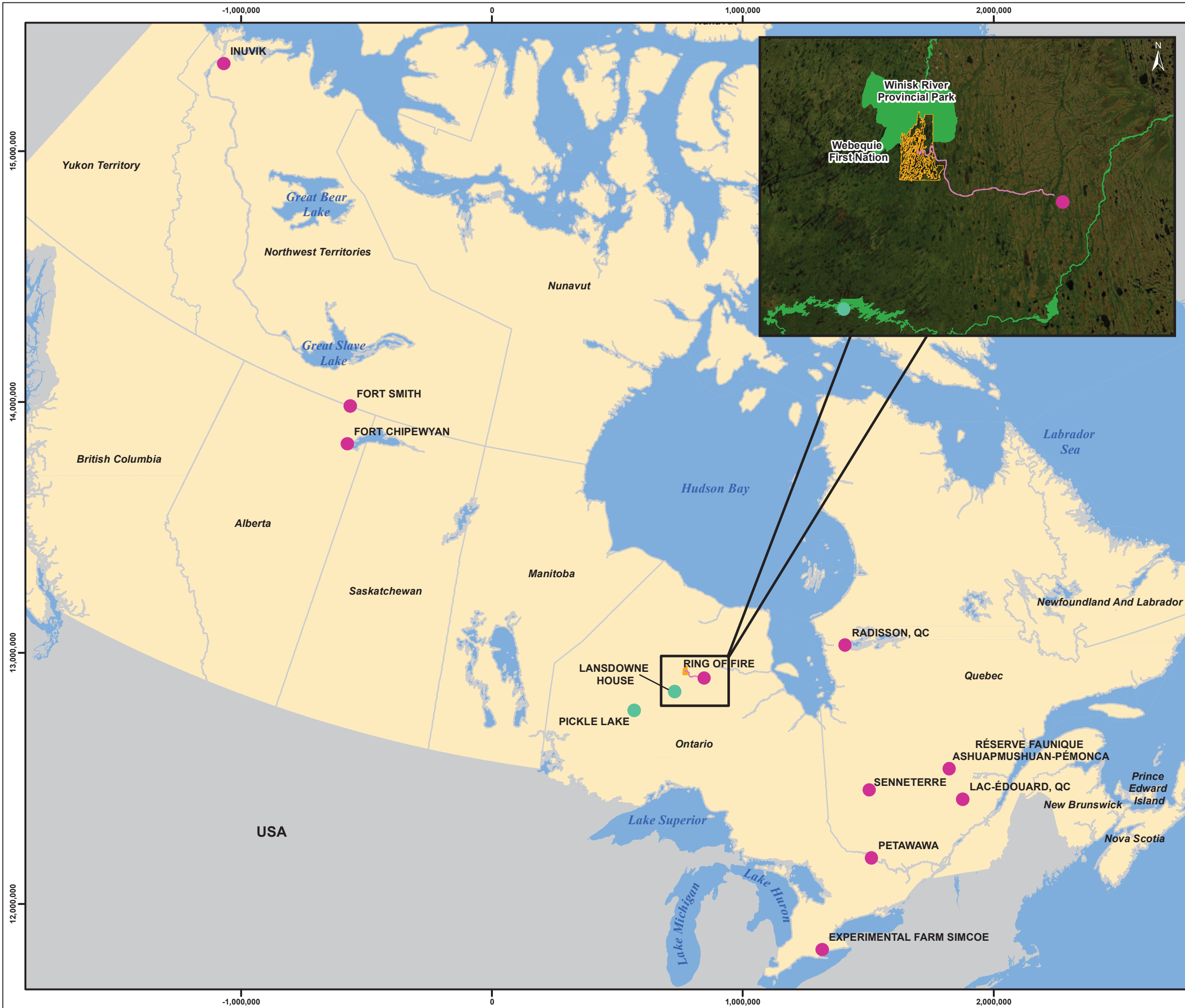
Contaminant	Station	Station Name	Rationale
TSP	10200	Radisson, QC	Station located in a remote region at about the same latitude than Webequie with limited activities nearby (presence of a small town and a hydroelectric plant). Between 2018 and 2020, it generated the highest 24-h average concentration of both stations.
	4750	Lac-Édouard, QC	Station located in the southern portion of Québec but still in a non-urban remote area with forest land around, a lake and a larger town. Between 2018 and 2020, it generated the highest annual average concentrations which are used along with the Radisson station measurement to obtain a compounded annual average.
PM _{2.5}	MECP	Ring of Fire, ON	Short-lived station measuring PM _{2.5} concentrations from 2015 to 2018 in the Ring of Fire area (relatively close to Webequie) part of a monitoring program carried out by the MECP in the last ten years.
PM ₁₀ , CO	129601	Fort Smith, NWT	Station located in northern Canada (border of NWT and Alberta) with Fort Smith acting as a logistics and transportation hub towards northern mines. Due to the presence of a larger town than Webequie, the PM ₁₀ and CO background concentrations are most likely slightly over-estimated. The resulting PM ₁₀ background concentration from this station was used to align with the selected TSP and PM _{2.5} background concentrations.

Contaminant	Station	Station Name	Station Location
SO ₂ , NO ₂	91801	Fort Chipewyan, AB	Station located in northern Alberta near the small town on Lake Athabasca with the overarching region known for bituminous oil extraction. Due to such activities, background concentration may be over-estimated compared to Webequie area.
B[a]P, VOCs ⁽¹⁾	62601	Simcoe, ON	No monitoring stations in remote areas. Although in a non-urban setting without any significant emission sources nearby, data comes from a station located in southern Ontario which most likely over-estimate the actual background concentration of VOCs in the study area.
Ground-level O ₃	55101	Senneterre, QC	Station located in a rural region of the province of Quebec east of Val-D'Or in a forested setting with some industrial activities in the region.

Sources: ECCC (2022); RSQAQ (2022).

(1) Including 1,3-butadiene, acetaldehyde, acrolein, benzene, ethylbenzene, formaldehyde, hexanes, propionaldehyde, toluene, and xylenes.





Legend

- WSR Preliminary Preferred Route
- Ambient Air Monitoring Station
- Meteorological Station
- Webeque First Nation Reserve
- Provincial Park

Webeque Supply Road (WSR)

Location of Climate and Air Quality Monitoring Stations

Figure Number:	9.5	REV	PA
Client:	Webeque First Nation	Project Number:	661910
		Date:	1/13/2025
DSC		DRN	CHK
		AD	JV

NOTES

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9.2.1.2 Greenhouse Gases (GHGs)

Excluding the community within Webequie First Nation reserve lands, the general project area consists of lakes, woodlands, and wetlands where anthropogenic/human emissions of GHGs are basically non-existent today.

As a small northern settlement, GHG emissions in the community of Webequie can generally be attributed to the energy usage from buildings (residential and commercial), local transportation, air travel, and solid waste disposal. Other direct or indirect emissions related to industrial, or manufacturing activities are not relevant to the project area. Therefore, a high-level description of current GHG emissions in the community of Webequie is provided in **Section 9.2.2.2** for context.

Provincial and national annual GHG emission levels published for the most recent year (2022), as shown in **Section 9.2.2.2**, were obtained from the National Inventory Report 1990:2022.

9.2.1.3 Noise and Vibration

9.2.1.3.1 Measurements of Background Ambient Sound Levels

The existing background ambient sound levels in the noise study area for the Project is dominated by the sounds of nature (wind, leaves rustling, etc.), with little to no man-made sounds.

Near the Webequie community, the existing ambient background sound environment includes:

- Natural background ambient noise, similar to more remote areas;
- Man-made sounds from community activities, such as vehicles and equipment; and
- Noise from the operation of the local airport.

The Webequie airport is located approximately 1.9 km to the southwest of the community and operates in uncontrolled airspace. Current and future flight data were requested from NAV Canada, but specific statistical data was not available. Anecdotally, there are currently a maximum of 1 to 2 flights per day using the facility. This number is not expected to increase due to the construction and operation of the Webequie Supply Road (WSR).

As a result, a specific assessment of the Project's effects on airport noise is not required. Predicted sound levels from the Webequie airport were not modelled. Existing (and effectively future) airport activities were captured in the background sound level measurements at Monitor M1, discussed above, which was used in assessing potential impacts at the community. Airport noise is not discussed further in this assessment.

The Project Team conducted studies to establish the existing conditions (i.e., the baseline setting) of the acoustic environment to determine the potential effects of the Project.

Existing background ambient sound levels at representative NSAs within the Webequie First Nation community and along the proposed WSR route have been determined through ambient sound level measurements.

Measurements were conducted for the period between October 29 and November 1, 2021. Monitoring was conducted at three locations:

- M1, within the Webequie First Nation community, at the western terminus of the proposed WSR route;
- M2, at a distance of 4.41 km along the proposed route (away from the Webequie First Nation community), which has been used as representative of conditions along the route; and



- M3, at a distance of 10.57 km south-east of the western terminus (away from the Webequie First Nation community); which has been used as representative of “remote” conditions, away from the community.

Monitoring locations are shown in **Figure 9.3**.

The community monitor at the western terminus (M1) includes noise from community activities (commercial noise, traffic noise, and airport noise). Monitors M2 and M3 are sufficiently removed from these sources and they capture ambient background sound levels in the rural area, dominated by the sounds of nature and removed from man-made noises. Monitor M2 received occasional man-made noises due to its proximity to a waste facility to the west. Monitor M3 did not have any human interference throughout the entirety of the measurement period.

The measurements at each location were conducted for a minimum period of 48 hours, in accordance with MECP Publication NPC-233 measurement procedure requirements. The ambient noise measurements were conducted in accordance with the requirements of the following guidelines:

- MECP Publication NPC-102 – *Instrumentation*;
- MECP Publication NPC-103 – *Procedures*;
- MECP Publication NPC-104 – *Sound Level Adjustments*;
- MECP Publication NPC-233 – Information To Be Submitted For Approval Of Stationary Sources Of Sound;
- Health Canada “Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise”; and
- ISO 1996-2:2007, Acoustics — Description, measurement, and assessment of environmental noise – Part 2: Determination of environmental noise levels.

Further details on how measurements were conducted at the monitoring locations are included in Appendix J – Noise and Vibration Impact Assessment Report.

For this assessment, sound level measurements were conducted in October, during the fall period. Given the rural environment, differences in ambient sound levels between the spring, summer and winter periods are not anticipated.

The fall measurements occurred after leaves were down and with insect activity being minimal; thus, the measurements are during naturally quiet periods, and representative of “predictable worst-case conditions” or a conservative approach for assessing potential effects of the Project.

The parameters that were captured include the following:

- L_{eq} (1-min) values, in dBA, dBC, and dBZ;
- L_{max} and L_{min} values;
- L_1 , L_{10} , L_{50} , L_{90} , and L_{99} values;
- Histograms; and
- Simultaneous audio recordings.



The refined measurement data were then be processed to determine typical sound levels that include the following levels:

- A characterization of the noise sources that contribute significantly to the baseline or background ambient sound environment, by type (e.g., traffic, aircraft, trains, industrial);
- A characterization of the background ambient sound environment, using descriptors such as “continuous, intermittent, regular impulsive, highly impulsive, high-energy impulsive, and continuous tonal and intermittent tonal”, per ISO 1996-2 and Health Canada Guidance;
- Existing L_{min} and L_{max} sound levels;
- An hourly distribution of background sound levels during the day and night (L_{eq} (1hr) values);
- L_{eq} Day, L_D , L_{eq} Night, and L_N sound levels; and
- Overall L_{DN} values.

The monitoring data were further supplemented with a review of typical background ambient sound level data for rural areas based on population density, contained in Health Canada’s Noise Guidelines.

9.2.1.3.2 Identification of Noise Sensitive Areas

SLR Consulting Ltd. worked with socio-economic specialists of the AtkinsRéalis Project Team and Webequie First Nation to identify noise sensitive areas (“NSAs”) applicable to the Project, which are points of reception where noise impacts have been predicted.

9.2.1.3.3 Background Sound Levels

Background sound levels for use in the assessment were established based on the sound level monitoring results from Monitors M1, M2, and M3, and a review of Health Canada’s Noise Guidelines and applicable provincial noise guidelines including MTO Environmental Guide for Noise and MECP Publication NPC-300.

The Health Canada Guideline provides estimations of background sound levels using qualitative descriptions and population densities of average types of communities. The estimations were adapted from research conducted in Alberta by the Alberta Energy Regulator (AER) and codified in AER Directive 038 – Noise Control. The estimations are reproduced as **Table 9-13** for reference below.

Table 9-13: Estimations of Background Sound Levels Using Qualitative Descriptions and Population Densities of Average Types of Communities (from Health Canada Guidelines)

Community Type and Qualitative Description	Average Census Tract Population Density, Number of People Per Square km	Estimated Background Sound Level, L_{DN} (dBA) ¹
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 ²
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



Community Type and Qualitative Description	Average Census Tract Population Density, Number of People Per Square km	Estimated Background Sound Level, L _{DN} (dBA) ¹
Urban Residential Not immediately adjacent to heavily travelled roads and industrial areas.	2,493	58 to 62
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:

¹ Note that a range of values is provided, and that selection of the appropriate estimated value would typically be based on the precautionary principle in the absence of adequate justification for a higher baseline. All day-night sound level (L_{DN}) values, except those of the quiet rural area community type, are based on the US EPA levels document (US EPA 1974).

² The quiet rural area (L_N = 35 dBA) estimated baseline sound level and population density were obtained from AER Directive 038 (revised Feb 16, 2007). The difference between L_D and L_N was obtained from AER and US EPA, and was approximated as 10 dBA. As such, quiet rural areas are considered to be less than or equal to 45 dBA L_{DN}.

The intent of the table is for situations where background measurement data are not available. The community type over the entire LSA would be qualitative described as “Quiet Rural”. The corresponding conservative estimates of background sound levels are:

- L_D – 45 dBA;
- L_N – 35 dBA; and
- L_{DN} – 45 dBA.

At Monitor M1, background L_D sound levels fall within the range of a “Quiet Rural” area, however L_N sound levels exceed 35 dBA on average therefore driving the area into a “Quiet Suburban Residential” category. L_{DN} sound levels exceed the 45 dBA Quiet Rural criteria, this is due to the greater sound levels during the night-time between 10 pm and 7 am.

Monitors M2 and M3 have background sound levels within the range of a “Quiet Rural” area, which is expected given their locations are far from frequent human activity and y travelled roadways.

9.2.1.4 Vibration

To characterize the existing vibration environment, existing vibration levels were established through a desktop study considering expert opinion of the Project Team with experience on previous projects.

9.2.1.5 Lighting

It is anticipated that the WSR will not be illuminated along its entire length; however, lighting may be required at certain locations for safety and security such as the east and west terminus points of the road and at supportive infrastructure sites, such as construction camps, rest and maintenance areas aggregate/rock sites and the MSF. To characterize the existing night sky environment and assess potential effects of illumination from the Project, where applicable, the Project Team reviewed background data sources that include the Model Lighting Ordinance prepared jointly by the Illumination Engineers Society and International Dark Sky Association (2011). In addition, existing light conditions were characterized using satellite observations of the global distribution of artificial light, and assumptions based on the remote nature of the general project area and nearby community of Webequie as a source of night light.

9.2.2 Results

The existing/baseline conditions of the Atmospheric Environment VC established through the desktop studies and field measurements are summarized in the following subsections.

9.2.2.1 Air Quality

The proposed WSR is located in a remote region of northern Ontario away from significant sources of human induced air emissions. For air quality in the LSA and RSA, air emission sources are limited to the community of Webequie and are summarized with assumptions as follows:

- Electric power station with diesel generator sets having a capacity of 2 MW producing an estimated 3,000 MWh of electricity per year (Government of Canada, 2024). According to the National Pollutant Report Inventory (NPRI), the power plant generates a total of 50 to 70 tonnes of NO₂ annually and 1 tonne or less of micro particulates (PM₁₀ and PM_{2.5}).
- The combustion of wood residues in stoves or equipment alike for heating purposes in Webequie, generating particulates, NO₂ and VOCs from combusted wood. Natural gas and propane are not available in the community.
- Mobile vehicles (trucks, snowmobile, all-terrain vehicles, dozers, etc.) are most likely used within the community but the related emissions should be relatively low.
- Solid wastes are disposed in a nearby community landfill which can release GHGs but also an array of VOCs. Given the population number (and organic waste generation rate), the resulting fugitive emissions from the landfill are most likely very small. No open burning of wastes commonly occurs in Webequie.
- The Webequie airport links the community to other regions in Ontario providing air transportation services for the local population, including delivery of goods and services. Aircrafts will generate an array of air contaminants, although mostly in the upper atmosphere.

There are no industrial or mining activities in the study area presently. The closest installations that have reported emissions to the NPRI (and therefore have exceeded the reporting threshold) are other thermal power plants operated by Hydro One (in Kasabonika and Landsdowne House at 100 km from Webequie). The closest active mine (Musselwhite Mine, Goldcorp Canada Ltd.) that have reported emissions to the NPRI are located at over 200 km from Webequie. There are no large-scale agricultural activities, and the commercial forestry industry is not active within the LSA or RSA.

Table 9-14 lists the background concentrations selected as part of this assessment relevant to the AAQC or CAAQS averaging period. They are based on data from existing air quality stations (refer to **Section 9.2.1.1**) that were presented in the NEEC Report (Appendix F). General remarks on the potential presence of contaminants in the RSA (within 6 km from each side of the centreline of the preliminary recommended preferred route) are as follows:

- **Gaseous common air contaminants:** The annual average SO₂, CO and NO₂ background concentrations in remote areas without industrial or manufacturing installations are expected to be low (< 1 ppb for SO₂; 200 ppb for CO; and < 3 ppb for NO₂) compared to applicable air quality criteria and standards, but can still reach higher values and peaks especially during wildfires (near or from further away due to high atmosphere dispersion), prescribed agricultural or biomass burns in the area, or in the case of Webequie, in the direct vicinity of the diesel power plant.



- **Ground-level O₃:** Concentrations measured at regional background monitoring stations are all similar in range, with no exceedances observed in comparison to the applicable criteria and standards. Annual mean concentrations in Webequie can be expected to be similar to those reported at stations in remote area, that is in the 25 to 30 ppb range.
- **Particulate matter:** Like for gaseous contaminants, particulate matter in remote areas will come mostly from the combustion of trees and vegetation, from diesel fuel combustion at the power plant and also, depending on location, from wind lifting of naturally or anthropogenically eroded surfaces that tends to generate concentration peaks in the summer months. The use of wood stoves or equivalents is another source of particulates and micro-particulates that is limited to the community.
- **Toxic contaminants:** Carbonyls, VOCs and PAHs are also attributed to fuel and wood combustion. Higher concentrations will be observed during the cooler months which may be attributed to wood burning in the area but also by the fact that cooler air and inversions trap contaminants near the ground.

The atmospheric dispersion model provides estimates about the Project's contribution to contaminant concentrations in ambient air. Background concentrations account for air contaminants already present in the environment or from other sources. The background concentrations presented in **Table 9-14** were therefore added to the model results to compare the resulting concentrations with applicable air quality standards and criteria.

Table 9-14: Summary of Background Concentrations for Studied Contaminants

Pollutant	Applicable Standard	Averaging Period	Background Concentration		Representative NAPS or RSQAQ
			[ppb]	[µg/m ³]	
Total suspended matter (TSP)	AAQC	24-hour	—	45	Maximum 24-hour concentration in Radisson (QC) from 2018 to 2020
	AAQC	Annual	—	4.0	Concentration representative of the study area based on measurements in Radisson (QC) and Lac Edouard (QC) from 2018 to 2020
Inhalable fraction of particulate matter (PM ₁₀)	AAQC	24-hour	—	28	3-year average of the 98 th percentile of daily 24-hour average concentrations at Fort Smith (NWT) from 2017 to 2019
Fine particulate matter (PM _{2.5})	AAQC & CAAQS	24-hour	—	13	3-year average of the annual 98 th percentile of daily 24-hour average concentration from 2015-2017 based on measurements at the Ring of Fire (ON) station
		Annual	—	4.7	3-year average of annual concentrations at the Ring of Fire (ON) station from 2015 to 2017
Sulphur dioxide (SO ₂)	AAQC	10-minute ⁽²⁾	59	149	Maximum 1-hour concentration measured at Fort Chipewyan (AB) from 2017 to 2019
	AAQC	1-hour	36	90	
	CAAQS		7.3	19	3-year average of the annual 99 th percentile of the daily maximum 1-hour average concentrations at Fort Chipewyan (AB) from 2017 to 2019
	AAQC & CAAQS	Annual	0.20	0.50	Concentration representative of the study area based on measurements at Fort Chipewyan (AB) from 2017 to 2019

Pollutant	Applicable Standard	Averaging Period	Background Concentration		Representative NAPS or RSQAQ
			[ppb]	[µg/m ³]	
Nitrogen dioxide (NO ₂)	AAQC	1-hour	27	51	Maximum 1-hour concentration measured at Fort Chipewyan (AB) from 2017 to 2019
	CAAQS		15	28	3-year average of the annual 98 th percentile of daily maximum 1-hour average concentration from 2017 to 2019 at Fort Chipewyan (AB)
	AAQC	24-hour	12	23	Maximum 24-hour concentration measured at Fort Chipewyan (AB) from 2017 to 2019
	CAAQS	Annual	1.4	2.6	Concentration representative of the study area based on measurements at Fort Chipewyan (AB) from 2017 to 2019
Carbon monoxide (CO)	AAQC	1-hour	4,200	5,061	Maximum 1-hour and 8-hour concentrations measured at Fort Smith (NWT) from 2017 to 2019
	AAQC	8-hour	2,700	3,253	
1,3-butadiene	AAQC	24-hour	0.054	0.12	Maximum concentration measured in Simcoe (ON) ⁽¹⁾ from integrated air samples between 2017 to 2019
	AAQC	Annual	0.005	0.010	Average concentration of measurements obtained at Simcoe (ON) ⁽¹⁾ between 2017 to 2019
Acetaldehyde	AAQC	30-minute ⁽²⁾	8.0	14	Maximum concentration measured in Simcoe (ON) ⁽¹⁾ from integrated air samples between 2017 to 2019
	AAQC	24-hour	6.6	12	
Acrolein	AAQC	1-hour	0.017	0.04	Maximum concentration measured in Simcoe (ON) ⁽¹⁾ from integrated air samples in 2019
	AAQC	24-hour	0.017	0.04	
Benzene	AAQC	24-hour	0.28	0.90	Maximum concentration measured in Simcoe (ON) ⁽¹⁾ from integrated air samples between 2017 to 2019
	AAQC	Annual	0.094	0.30	Average concentration of measurements obtained at Simcoe (ON) ⁽¹⁾ between 2017 to 2019
Ethylbenzene	AAQC	10-minute ⁽²⁾	0.065	0.28	Maximum concentration measured in Simcoe (ON) ⁽¹⁾ from integrated air samples between 2017 to 2019
	AAQC	24-hour	0.039	0.17	
Formaldehyde	AAQC	24-hour	2.3	2.9	
Hexanes	AAQC	24-hour	0.13	0.45	
Propionaldehyde	AAQC	10-minute ⁽²⁾	0.67	1.6	
Toluene	AAQC	24-hour	0.37	1.4	
Xylenes	AAQC	10-minute ⁽²⁾	0.20	0.86	
	AAQC	24-hour	0.12	0.52	
Benzo(a)pyrene	AAQC	24-hour	—	1.2 x 10 ⁻⁴	
	AAQC	Annual	—	2.0 x 10 ⁻⁵	



Pollutant	Applicable Standard	Averaging Period	Background Concentration		Representative NAPS or RSQAQ
			[ppb]	[µg/m ³]	
Diesel particulate matter (DPM)	—	2-hour Annual	—	0	Not applicable

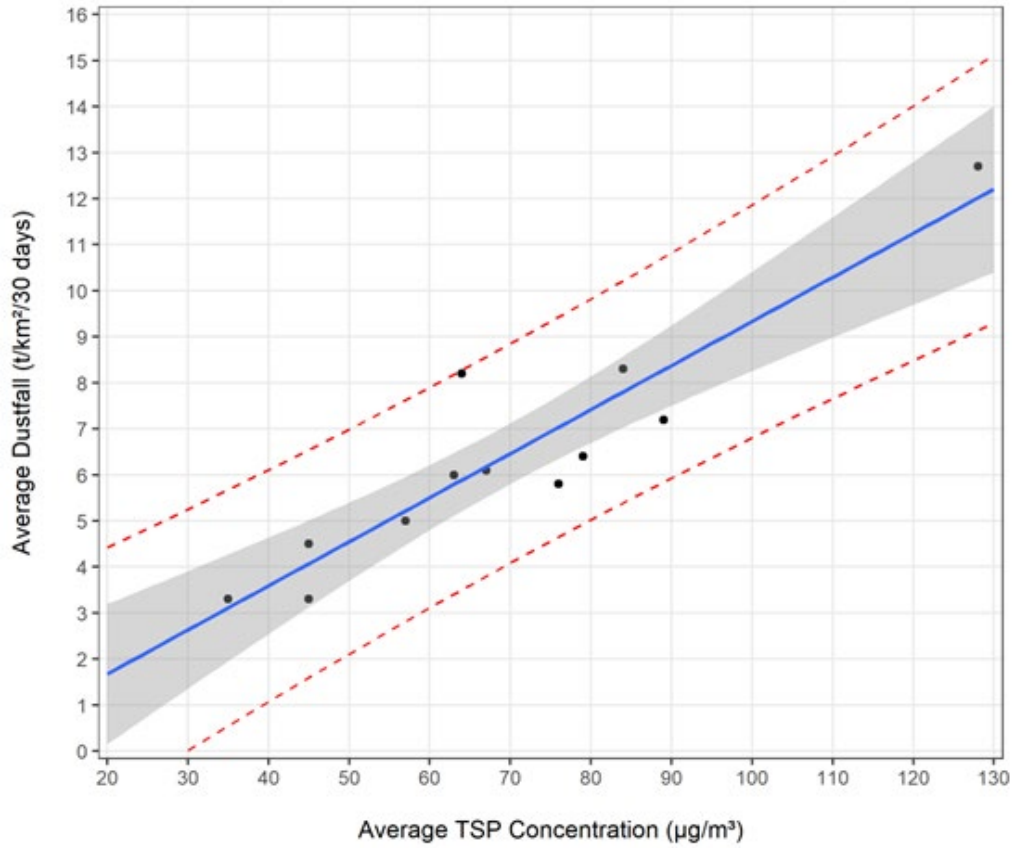
Notes: AAQC = Ontario Ambient Air Quality Criteria; CAAQS = Canadian Air Quality Standards

- (1) Although in a non-urban setting without any significant emission sources nearby, data comes from a station located in southern Ontario which most likely over-estimate the actual background concentration of VOCs in the study area.
- (2) Background 1-hour concentration multiplied by 1.65 for the 10-minute averaging period or 1.2 for 30-minute averaging period.

Dustfall

The TISG for the Project requires a description of background dust deposition conditions in the RSA, but like air contaminants, no local measurements are available. Background dustfall (in t/km²/30-days) can be broadly estimated by associating TSP concentrations in air with dust deposition on the ground at a same location. A study was carried out in the past (Roche, 1983) which presented average dustfall rates and TSP concentrations for several years at multiple stations within the City of Quebec. **Figure 9.6** illustrates the almost linear relationship between these two variables over several years. Assuming the average TSP concentration in the RSA is 4.0 µg/m³ (**Table 9-14**), then it would be expected according to this correlation that dustfall would approach 0.40 t/km²/30-day. This value is therefore considered as background dustfall in this assessment.

Figure 9.6: Relation between mean TSP concentrations measured in air and mean dust deposition measurements carried out at 12 stations in Quebec City from 1979 to 1982



(adapted from Roche, 1983)

Shaded: 95% confidence interval for average estimations

Red line: 95% confidence interval for single estimations

9.2.2.2 Greenhouse Gases (GHGs)

Table 9-15 provides a high-level assessment of current GHG emissions in the Webequie community for each GHG source category suggested by the IPCC which is normally used in developing national or regional inventories. Provincial and national annual GHG emission levels for the year 2022 were reported to be approximately 157 megatonnes (Mt) CO₂e and 708 Mt, respectively (ECCC, 2024).

Besides naturally-occurring GHG emissions, the natural environment (vegetation and soil) also represents a large carbon (CO₂) sink compensating part if not all the GHG emissions (CH₄ and CO₂) emanating from wet soils. Vegetation in the LSA and RSA include wetland and upland ecosystems (to a lesser degree). Section 9 in the NEEC report (Appendix F) details those present, which include undrained bog, fen, swamps, floodplains and conifer forests, as well a few other vegetation types. Wetlands are said to be able to hold more carbon than upland forests.

The quantity of carbon sequestered and stored in biomass, dead organic matter (DOM), and soil is substantial given that the LSA is comprised of approximately 80% wetlands, and more specifically of swamps and bogs for which the carbon sequestration potential is high in comparison to other wetland types (fen and marshes). The total amount of carbon currently stored in the LSA and RSA is unknown. However, the changes in currently sequestered carbon and carbon sequestration potential, brought upon changes in land-use due to the Project is assessed in Section 11 – Vegetation and Wetlands in this EAR/IS.

Table 9-15: Overview of Existing GHG Emission Sources in the Webequie Community

IPCC GHG Source Category (ECCC, 2020b)	High-Level Description
ENERGY / STATIONARY COMBUSTION SOURCES	
Public Electricity and Heat Production	An electric power station with diesel generator sets having a capacity of 2 MW is currently in operation in Webequie. An estimated 3,000 MWh of electricity is used annually (Government of Canada, 2018) which represents about 2,600 t CO ₂ eq in GHG emissions. ⁽¹⁾
Industries (Petroleum Refining, Oil and Gas Extraction, Mining, Manufacturing)	None.
Construction	Negligible if any.
Commercial and Institutional	Minimal. The community with a population of about 700 (residential and commercial buildings) is powered via an off-grid power station. It does not exclude the potential use of wood residues in stoves or equipment alike for heating purposes. Natural gas and propane are not available in the community.
Residential	
Agriculture and Forestry	None. The project zone is not suitable for large-scale agriculture activities and the commercial forestry industry is not active in Webequie.
ENERGY / TRANSPORT AND OTHERS	
Domestic Aviation	Low. The Webequie airport links the community to other regions in Ontario providing air transportation services for the local population and the merchandise. The resulting GHG emissions from these flights should not exceed 500 t CO ₂ eq per year. ⁽²⁾
Road Transportation	Negligible at best. The number of road vehicles and the annual distance to travel within the community is limited.
Railways	None.



IPCC GHG Source Category (ECCC, 2020b)	High-Level Description
Domestic Navigation	None. No related navigation between Canadian ports.
Off-Road Transportation	Negligible at best. Mobile equipment not designed to operate on roads (snowmobile, all-terrain vehicles, dozers, etc.) is most likely used within the community but the related emissions are minimal.
Pipeline Transport	None.
Fugitive Sources	None. No coal mines nor oil and gas exploration and transportation activities.
CO ₂ Transport Storage	None.
INDUSTRIAL PROCESSES AND PRODUCT USE	
Mineral Products, Chemical Industry and Metal Production	None.
Production and Consumption of Halocarbons, SF ₆ and NH ₃	Negligible. Halocarbons are used in air conditioning units and aerosol cans which are expected to be in limited quantity in the community.
Non-Energy Products from Fuels and Solvent Use	None.
Other Production Manufacture and Use	Negligible if any. The use of N ₂ O in propellants or use of urea in vehicle catalytic converters is unlikely.
AGRICULTURE	
Enteric Fermentation	None. No ruminant livestock (at least in large numbers).
Manure Management	None
Agriculture Soils	None. No large-scale agricultural activities.
Field Burning of Agriculture Residues	None
Liming, Urea Application and Other Carbon-Containing Fertilizers	None. No large-scale agricultural activities.
WASTE	
Solid Waste Disposal	Low. Most if not all solid wastes are disposed in a nearby landfill on Webequie First Nation reserve lands. Given the population number, the resulting fugitive GHG emissions from the landfill is most likely very small (< 400 t CO ₂ e _q per year) compared to the total in Ontario (6 000 000 t CO ₂ e _q according to the National Inventory Report 1990-2022). ⁽³⁾
Biological Treatment of Solid Waste	None. No composting facilities.
Wastewater Treatment and Discharge	Negligible.
Incineration and Open Burning of Waste	None. Open burning of waste should not be taken place.
Industrial Wood Waste Landfills	None
LAND-USE, LAND-USE CHANGE AND FORESTRY	
Forest Land	None. No recent conversion of managed forests and/or lands into forest in the community.
Cropland	None. There are no croplands in the community.



IPCC GHG Source Category (ECCC, 2020b)	High-Level Description
Grassland	None. There are no agricultural grasslands in the community.
Wetlands	No peat extraction activities and land flooded for development purpose in the general project area. However, wetlands are naturally generating large amounts of methane and nitrous oxides due to the slow decomposition of organic matter in soils in absence of oxygen. The extent of these emissions depends on many factors like soil moisture and temperature. Being undisturbed at this point, the GHG emissions flux is lower compared to drained wetlands.
Settlements	None in recent years. No (or very little) forest lands were cleared to build-up infrastructure in the community.
Harvested Wood Products	None. No forestry industry activities in the community.

Notes:

- (1) Order-of-magnitude annual GHG emissions from the electric power plant estimated as follows: 3,000 MWh / 30% [represents efficiency] / 38,3 MJ/L diesel x 0,002766 t CO₂e/L diesel x 3,600 = 2,600 tCO₂eq
- (2) Order-of-magnitude annual GHG emissions from aircrafts estimated as follows: 0,13 kg CO₂eq/passenger-km x 1,000 km (assuming round-trip between Webequie and Thunder Bay) x 700 passengers (equivalent to the population) / 1,000 = 84 t CO₂eq per year + 0,87 kg CO₂eq/tonne-km x 250,000 tonne-km (50 trips from Thunder Bay with 10 t payload of merchandise) / 1,000 = 220 t CO₂eq per year
- (3) Order-of-magnitude annual GHG emissions from the landfill estimated as follows: 0,3 tonne of solid waste per capita x 700 of population x 60 kg CH₄ generated per tonne of solid waste / 1,000 x 25 t CO₂e/t CH₄ = 315 t CO₂eq (from fugitive methane emissions). As a hypothesis, no biogas collection and flaring are considered.

9.2.2.3 Noise

9.2.2.3.1 Noise Monitoring Results

The following subsections and **Table 9-16** summarize the background ambient sound levels measured at the monitoring locations M1, M2, and M3. The raw and processed measurement data for these sound level monitoring locations are included in Appendix N3 and Appendix N4 respectively within Appendix J – Noise and Vibration Impact Assessment Report.

Results at Monitor Location M1

The sound environment at monitoring location M1 is dominated during the daytime by the sounds of people, including occasional traffic noise, dogs barking, and airport activity.

Human-made sounds are generally intermittent. During breaks in activity and during the majority of the night-time period, the sound environment is dominated by the continuous “sounds of nature”, including the noise of leaves rustling vegetation, etc. There is intermittent traffic noise, and airport activity throughout the night-time period.

No tonal noise sources were identified at Monitor M1. Similarly, no regular impulsive, highly impulsive, high-energy impulsive noise sources, as described in ISO 1996-2 and Health Canada Guidelines, were identified at Monitor M1.

Results at Monitor Location M2

The sound environment at monitoring location M2 is dominated at all times by the continuous “sounds of nature”, including the noise of leaves rustling vegetation, etc. There was chainsaw activity near the monitor during periods of the daytime, but sound levels were omitted from the summarized results. Vehicle activity along the road was intermittent and mostly during the daytime period between 7 am and 11 pm.

No tonal noise sources were identified at Monitor M2. Similarly, no regular impulsive, highly impulsive, high-energy impulsive noise sources, as described in ISO 1996-2 and Health Canada Guidelines, were identified at Monitor M2.

Results at Monitor Location M3

The sound environment at monitoring location M3 is dominated at all times by the continuous “sounds of nature”, including the noise of leaves rustling vegetation, bird calls, water movement etc. There are intermittent periods of airport activity including helicopter noise, but sound levels are not as high as at M1.

No tonal noise sources were identified at Monitor M3. Similarly, no regular impulsive, highly impulsive, high-energy impulsive noise sources, as described in ISO 1996-2 and Health Canada Guidelines, were identified at Monitor M3.

Table 9-16: Summary of Measured Background Ambient Sound Levels at Monitors M1, M2, and M3

Noise Metric	Measured Value (dBA)		
	Monitor M1	Monitor M2	Monitor M3
L _{eq} Day (7am to 11pm)	43.9	40.6	31.6
L _D (7 am to 10 pm)	44.0	40.7	31.7
L _{eq} Night (11 pm to 7 am)	42.8	38.1	31.0
L _N (10 pm to 7 am)	42.7	38.1	30.8
L _{DN} (24 hours)	49.5	44.6	37.3
Ranges of Measured Hourly L_{eq} (1 hr) Sound Levels			
Daytime (7 am to 7 pm)	41.0 to 47.0	19.5 to 48.9	29.0 to 35.6
Evening (7 pm to 11 pm)	37.3 to 42.7	19.5 to 40.9	27.6 to 35.7
Night-time (11 pm to 7 am)	38.4 to 46.0	20.1 to 41.8	27.9 to 35.6
Ranges of Measured Hourly L_{max} Sound Levels			
Daytime (7 am to 7 pm)	59.1 to 67.0	27.4 to 66.8	31.8 to 66.4
Evening (7 pm to 11 pm)	49.5 to 67.0	27.4 to 66.7	32.8 to 50.9
Night-time (11 pm to 7 am)	47.6 to 64.1	27.6 to 65.7	33.0 to 56.8

9.2.2.3.2 Identification of Noise Sensitive Areas



Information on potential receptor locations provided through IKLRU program, desktop review and other means was used to characterize the existing conditions and to assess potential effects of noise and vibration from the Project.

Noise sensitive areas (NSAs) which are representative of potential effects from noise and vibration at a group or cluster of receptors have been identified and are used in the assessment. The representative NSAs used in the assessment are shown in Figures N6 to N16 in Appendix J – Noise and Vibration Impact Assessment Report. If the applicable guidelines are met at these NSAs which are considered “worst-case locations”, they will be met elsewhere in the study areas.

The NSAs are also summarized in Table 4 in Appendix J – Noise and Vibration Impact Assessment Report and include the following:

- Permanent residences, including homes within the Webequie community;
- Schools, hospitals, community centres, retirement complexes, or assisted care homes;
- Seasonal residences, such as trapper cabins or hunting and fishing campsites, which are used by members of the Webequie First Nation, other Indigenous communities, and stakeholders;
- Spiritual or sacred spaces which members of the Webequie First Nation, other Indigenous communities, and stakeholders may identify as requiring quiet or being sensitive to disruptions from noise;
- Other locations which members of the Webequie First Nation, other Indigenous communities, and stakeholders and/or other Project disciplines may identify as requiring quiet or being sensitive to disruptions from noise (e.g., wildlife – Caribou), and include for instance locations important for harvesting of country foods; and
- The mine exploration camp at the McFaulds Lake area operated by Wylloo Pty Ltd. (formerly Noront Resources).

9.2.2.3.3 Summary of Background Sound Levels Adopted for the Assessment

Table 9-17 summarizes the background sound levels for use in the assessment based on the sound level monitoring results from Monitors M1, M2, and M3, and a review of Health Canada’s Noise Guidelines and applicable provincial noise guidelines including MTO Environmental Guide for Noise and MECP Publication NPC-300.

Table 9-17: Summary of Background Sound Levels for Use in the Assessment

Noise Sensitive Areas	Source	MTO Environmental Guide for Noise (dBA)		Health Canada Guidelines (dBA)			MECP Publication NPC-300 Stationary Noise (Leq (1hr) (dBA)		
		Leq Day	Leq Night	L _{DN}	L _D	L _N	Daytime	Evening	Night-time
CHL01 to CHL04	M1	44	43	50	44	43	45	40	40
CHL05	M2	41	38	45	41	38	45	40	40
CHL06 to 33	M3	32	31	37	32	31	45	40	40
I01 to I06	M1	44	43	50	44	43	45	40	40
RP01 to RP24	M1	44	43	50	44	43	45	40	40
RPF01 to RPF19	M1	44	43	50	44	43	45	40	40
RPF20 to RPF66	M2	41	38	45	41	38	45	40	40
O01	M3	32	31	37	32	31	45	40	40
C01 to C22	M1	44	43	50	44	43	45	40	40

Notes:

All values are in dBA, except Percent Highly Annoyed (%HA)
M# - background limits established from noise monitoring location
RP## Permanent residence, retirement complexes, assisted care homes
RPF## Future permanent residence, per Webequie First Nation On-Reserve Land-Use Plan May 31, 2019.
RS## Hotels, seasonal residence, trapper’s cabin, hunting and fishing campsites (and which are allowed to be disclosed)
CHL## Cultural Heritage Landscapes identified in draft Cultural Heritage Report–Webequie Supply Road March, 2022

I##	Noise sensitive institutional receptors such as schools, hospitals, clinics, etc.
O##	Other noise sensitive locations which Webequie First Nation, or other Stakeholders have identified as requiring quiet or being sensitive to disruptions from noise, for example spiritual or sacred spaces or hunting grounds (and which are allowed to be disclosed)
C##	Construction Camps (long-term)

9.2.2.4 Vibration

Based on a desktop review and previous project experiences, existing baseline vibration levels are expected to be negligible or minimal, similar to other areas across Canada for those potential receptors within the remote or rural land uses.

9.2.2.5 Lighting

Based on the review of background sources (Model Lighting Ordinance) to characterize ambient light levels (both sky glow and light trespass), the existing night sky conditions in the LSA for the Project are considered a dark, rural environmental that meets the criteria for Zone LZ-0 as specified in the Model Lighting Ordinance. In this zone, there are essentially limited to no existing sources of artificial light contributing to the existing ambient light environment. The sky glow levels in this range are representative of an unpolluted starry sky, where, on clear nights with no haze, many thousands of stars would be visible and the Milky Way would be clearly visible. Incidental light levels are not sensitive to seasonal variation, and sky glow would typically be dominated by celestial objects (e.g., the moon) and meteorological conditions (e.g., cloud cover).

9.3 Identification of Potential Effects, Pathways and Indicators

This section describes the nature of the potential effects, the pathways that link the project activities and the effects, and the indicators that can be used to assess and measure the effects. The descriptions of the potential effects in this section are structured based on the construction and operation phases since many project activities involve use of equipment and vehicles resulting in air and noise emissions as noted in **Section 9.1.6. Table 9-11** summarized the potential effect pathways and effect indicators for the Atmospheric Environment VC.

It is anticipated that the WSR will not be illuminated along its entire length. However, lighting may be required at certain locations for safety and security such as the east and west terminus points of the road and at supportive infrastructure sites, such as construction camps, rest and maintenance areas, aggregate/rock sites and MSF. Illumination is expected to be limited to low level light fixtures. In addition, as noted in Section 18 – Assessment of Effects on Visual Environment, visibility of the project components including supportive infrastructure for the Project’s operations would be partially or fully obstructed by surrounding vegetation with the existing height and density of the coniferous woodland. Therefore, potential lighting effects of the Project are predicted to be negligible and are not carried forward for further assessment.



The assessment of potential effects for the Atmospheric Environment VC was completed to fulfil the commitment to avoid or minimize adverse effects to nearby receptors (residential homes) and culturally sensitive areas of value and interest to Indigenous Peoples (e.g., spiritual sites, fish and hunting areas).

9.3.1 Change in Air Quality

The air emission sources associated with the Project come essentially from the combustion of diesel fuel or gasoline from land mobile equipment, heavy-duty trucks and light-duty vehicles during the construction and operation phases of the WSR. As noted in **Section 9.1.6**, emissions of air contaminants are generated by most project activities and may result in a change in air quality. The main pathways in which a change to air quality may occur are illustrated as follows:

- **Use of vehicles, machinery, and equipment for construction of the proposed road → Fuel combustion and dust uplifting → Increased air contaminant emissions during construction phase.**
- **Vehicle use of the proposed road once constructed and use of vehicles, machinery, and equipment for road maintenance → Fuel combustion and dust uplifting → Increased air contaminant emissions during operation phase.**

Potential effects of air quality on surface water resources, vegetation, wetlands, wildlife, and the use of recreational and traditional land and resource use, and human health are discussed in Section 7 (Assessment of Effects on Surface Water Resources), Section 11 (Assessment of Effects on Vegetation and Wetlands), Section 12 (Assessment of Effects on Terrestrial Habitat and Wildlife), Section 13 (Assessment of Effects on Species at Risk), Section 16 (Non-Traditional Land and Resource Use), Section 19 (Aboriginal and Treaty Rights and Interests), and Section 17 (Assessment of Effects on Human Health).

The following subsections include an assessment of potential effects from project construction and operation activities on air quality and whether there is risk of exceeding a CAAQS or AAQC applicable in the province of Ontario. The assessment included the use of the American Meteorological Society and Environmental Protection Agency Regulatory Air Dispersion Model (AERMOD version 22112, the most recent adopted by MECP) to predict concentrations of air contaminants resulting from the project activities. The MECP guide (MECP, 2017) designates AERMOD as the preferred model for dispersion studies at the close or local scale (< 50 km). Further description of the AERMOD model, modelling methodology, parameters and inputs, including meteorological parameters used to predict emissions of air contaminants is provided in Appendix G (Air Quality Impact Assessment Report).

9.3.1.1 Air Dispersion Modelling Approach

9.3.1.1.1 Air Contaminants

Assessed air contaminants include all CACs as well as toxic contaminants like aldehydes, specific VOCs, and PAHs with an AAQC that can be found in exhaust gases from vehicles and mobile equipment. The AAQC dustfall limits are considered as guidelines in this assessment to inform the reader of the extent of dust deposition associated with the Project on the surrounding environment. As required by the TISG, DPM was modelled representing all PM_{2.5} generated by engines. No criteria or standard is associated with DPM, but Health Canada has developed guidance values on recommended acute and chronic exposure limits for DPM which were used for comparison purpose.



9.3.1.1.2 Modelling Domain and Sensitive Receptors



Information on potential receptor locations provided through IKLRU program, desktop review and other means was used to characterize the existing conditions and to assess potential effects of the Project on air quality.

Given the relatively long distance of the proposed WSR, the modelling domain was restricted within an area of about 20 km by 20 km that covers approximately 41 km of the 107 km road from the community of Webequie to the point on the road where it intersects with the ARA-4 aggregate pit access road (refer to **Figure 9.7**). This modelling domain was selected to focus on the impacts within a corridor along the road but also on sensitive receptors (i.e., residences, institutional buildings, and culturally sensitive areas) that are more sizeable in this area. In fact, the majority of sensitive receptors are located in the modelling domain and the impacts along the road are expected to be similar for the remaining length (i.e., ~66 km not included in the model).

For the construction and operation phases, the receptors, or points of impingement, for contaminant concentrations in ambient air, were arranged along the road with the resolution as follows (2,402 receptors):

- Every 100 m at 50 m distance from the road centreline on either side;
- Every 150 m at 150 m distance from the road centreline on either side;
- Every 150 m at 300 m distance from the road centerline on either side;
- Every 50 m at 100 m distance around the ARA-2 aggregate pit center; and
- Every 100 m at 200 m distance around the ARA-2 aggregate pit center.

This configuration allows for the generation of lateral concentration profile up to a distance of 300 m from the road centerline, capturing the zone where the majority of Project-related emissions are expected to occur. That said, the impact of the project emissions at specific points of impingement inside and outside the 300 m corridor was verified. Discrete receptors (147) were placed at the NSAs identified for the Project (refer to **Section 9.2.2.3.2**), which are also considered sensitive in terms of air quality and dustfall. These locations include the following:

- Twenty-four (24) existing residences or group of residences (RP) including mostly homes within the community of Webequie.
- Six (6) institutional buildings (I) including two schools, a nursing station, a church, a community building, and business center.
- Twenty-one (21) culturally sensitive areas (CHL) including spiritual or sacred spaces for members of the Webequie First Nation and other Indigenous communities and/or stakeholders. It includes locations important for harvesting country-food/plans or hunting. Since being areas, receptors were placed at intervals along the closest edge of these areas to the WSR to assess potential impacts. The modelling results discussion will focus on the impacts at these discrete receptor groups and along the road.
- Sixty-seven (67) locations for future residences (RPF) per the Webequie First Nation On-Reserve Land-Use Plan of 2019 distributed amongst four areas (Site A; Site West; Site C and Site D).

The receptors locations as part of the air quality assessment are illustrated in **Figure 9.7** and **Figure 9.8**.



9.3.1.2 Construction Phase

9.3.1.2.1 Considered Emission Sources for Air Dispersion Modelling

Based on the information provided in the Planning & Construction Input for Road & Supportive Infrastructure report completed by Sigfusson Northern Ltd. (2023) for the Project, an emission scenario was developed for the first year of construction which was selected amongst all years as a conservative approach for the following reasons:

- Year 1 will operate the greatest number of mobile equipment (bulldozers, excavators, loaders, cranes, etc.) in terms of month-equipment on-site.
- The majority of activities during Year 1 will be focused between the western terminus (Webequie) and the ARA-2 quarry which is close to the WC-3 water crossing, down to the access road/WSR intersection which represents the eastern point of the modelling domain. This area regroups the great majority of sensitive receptors (existing residences and institutional buildings, culturally sensitive areas, and future residences planned by the Webequie First Nation).
- Aggregates trucking from ARA-2 and ARA-4 quarries will be more intensive during Year 2 compared to Year 1. However, a great majority of Year 2 trucks will travel east of the access road/WSR intersection (outside the modelling domain). Trucking along the modelling domain would remain slightly higher during Year 2 but not to a great extent. For that reason, Year 2 trucking was combined in the emission scenario along with the other Year 1 emission sources, as a cautious approach.

The impact of Year 2 to 5 activities during the construction phase was not assessed as they involve the same emission sources as modelled for Year 1 only at different locations and different extents (i.e., varying number of trucks, different number of equipment to carry out the work based on Sigfusson's planning). Since the emissions are limited along the road 35-m wide ROW, the concentrations in air will be of similar profile whether being on the western or eastern portion of the road.

Details of the emission sources included in the model for the construction phase of the Project are provided in Table 3-13 and Table 3-14 within the Air Quality Impact Assessment Report (Appendix G).

9.3.1.2.2 Emission Parameters Summary

Table 3-13, Table 3-14, and Table 3-15 in the Air Quality Impact Assessment Report (Appendix G) list the emission sources and parameters included in the model for the construction phase of the Project. The tables also provide an overview of emission rates for NO_x and TSP applicable to 1-hour, 24-hour, 30-day, and annual exposure periods, where applicable. The emission rates for the other contaminants and other parameters that needs to be specified in the model are available in Appendix A within the Air Quality Impact Assessment Report (Appendix G).

Section 3.3 in the Air Quality Impact Assessment Report (Appendix G) describes in detail how emission rates are calculated for each contaminant included in the model. Emissions from the following types of vehicle/equipment and project activities were estimated using different calculation methods:

- Mobile and stationary equipment (engines);
- Surface dust emissions from the use of dozers and graders;
- Trucking (engines);
- Road dust emissions from trucking;
- Aggregate crushing plant (engines and dust);



- Aggregate loading at the quarry and unloading on construction site (dust); and
- Blasting at the ARA-2 quarry (dust uplift and combustion gases from explosives detonation).

9.3.1.2.3 Air Dispersion Modelling Results – Construction Phase



Results of the air dispersion modelling shows that construction activities could cause levels of airborne particles of various sizes, nitrogen dioxide (NO₂) and other contaminants from internal combustion engines to exceed Ontario and Canada standards at sensitive receptors located proximate to the proposed road centerline (refer to Section 9.5.2). These exceedances could only occur over a short period of 1-2 days given that project construction activities will be moving as road construction progresses.

Air dispersion modelling results for the construction phase are presented in **Table 9-18**, **Table 9-19** and **Table 9-20** for all studied contaminants identified as indicators of the air quality effects assessment in comparison to applicable Ontario AAQC and CAAQS. The tables present the maximum concentration calculated in air (or on the ground for dustfall) at any receptors in the modelling domain based on a 5-year meteorological dataset representative of the RSA. The tables include the results for the Project's contribution alone and with the background concentrations presented in **Section 9.2.2.1**. Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in **bold**. More specifically, the tables provide the following results:

- **Table 9-18** – contaminants from engines including mobile equipment with Tier 3 certification only (representing a “no mitigation” scenario).
- **Table 9-19** – contaminants from engines including the mobile equipment fleet of which 80% are certified Tier 4F (proposed mitigation measure as outlined in **Section 9.4.1**) for contaminants which maximum project contribution to the air concentrations according to the “no mitigation” scenario is greater than 50% of the applicable standard or criteria.
- **Table 9-20** – particulates and dustfall from fugitive dust emissions based on the scenario without water dust control (no mitigation) on the road and the scenario with water dust control (with mitigation).

The results presented in **Table 9-21** (for exhaust emissions) and **Table 9-22** (for fugitive dust emissions) based on the scenarios with mitigation focus on maximum concentrations calculated at sensitive receptors for contaminants which are meaningfully impacted by the Project. Given the large number of sensitive receptors, only the ones that are closest to the road centerline are presented in **Table 9-21** and **Table 9-22**. It includes existing residences, institutional buildings, and culturally sensitive areas. Note that future residence plots are not analyzed here since they will not exist during the construction phase. The results for the other receptors which are lower than the ones presented in **Table 9-21** and **Table 9-22** are available in Appendix B within the Air Quality Impact Assessment Report (**Appendix G**) for reference.

The following subsections discuss the results presented in these tables.

Particulates

Construction activities have the potential to create conditions that would exceed the standards for particulate matter (of all size), especially for short-term averaging periods (1-hour and 24-hour) outside the ROW. When integrating the mitigation measure (use of water trucks), the maximum calculated concentration does not change significantly (i.e., max of 16,423 µg/m³ for TSP vs. 16,468 µg/m³ without controls), meaning that road surface emissions during construction are not the predominant source.

Dust emissions at the construction site due to bulldozing, road grading and aggregates unloading are actually the main cause of these high concentrations. It is not possible to define the exact combination and space distribution of equipment and activities that will occur at individual sections of the road, and so all potential emissions were combined together in a single location as a simplified and conservative approach. All three dozers and graders available on site were considered in operation in the same close area which would probably not be the case in reality (or at least there would be some distance between each equipment).

In fact, emissions were intentionally constructed as conservative bounding cases. Within each 300 m segment along the road, equipment associated with the most intense activity at that location was assumed to operate concurrently for the full relevant averaging period, even though construction crews sequence activities and relocate equipment. For 24-hour and longer averaging periods, activity time weighting was applied, but the approach still treats emissions as continuous within the averaging window at the point of maximum impact. This results in predictions of protective upper bound concentrations (i.e., >10,000 $\mu\text{g}/\text{m}^3$ for 24-hour TSP) near the road centerline and at the ARA-2 quarry perimeter that exceed the actual short-term conditions to be expected at any single receptor because the same set of equipment does not remain at one location for entire days.

Gaseous Criteria Air Contaminants

AAQC / CAAQS with a very short-exposure period (1 hour or less) are exceeded to a great extent within the modeling domain for SO_2 , NO_2 and CO. For annual standards, no exceedances are calculated since construction activities at one specific location will be intermittent, largely diluting the emissions over a calendar year. The use of mobile equipment with Tier 4F engines in majority (quantifiable mitigation measure) improves the situation but the maximums within the modeling domain remain high due to the combustion of explosives used during blasts at the ARA-2 quarry. Otherwise, along the road (outside the area of influence of the quarry), the SO_2 and CO concentrations are much lower.

The maximum hourly NO_2 concentrations based on the CAAQS statistical representation, being more restrictive than the corresponding AAQC, would exceed the limit value up to several kilometers from the road centerline according to calculations. For example, for the closest existing residence (RP01) at over 1 km distance from the closest segment of the modeled WSR, the calculated maximum contribution of the Project with mitigation measure is 95 $\mu\text{g}/\text{m}^3$ (123 $\mu\text{g}/\text{m}^3$ with background concentration) surpassing the CAAQS of 79 $\mu\text{g}/\text{m}^3$.

These elevated concentrations must however be put into perspective. The NO_2 emission scenarios were developed to calculate the maximum hourly or daily concentrations relevant to AAQC by modeling each source at all hours of the 5-years meteorological dataset during specified periods. For the CAAQS, this emission scenario introduces substantial upward uncertainty because construction-related emissions along the road occur intermittently at any given location, while these standards rely on percentile statistics derived from hourly or daily concentrations. The 3-year averages of the annual 98th percentile of daily maximum 1-hour average concentrations (relevant to 1-hour NO_2 CAAQS) will be in reality much lower than values obtained with the emission scenario above considering that for a majority of days no emissions will be generated when looking at a specific location along the road. In absence of a highly specific construction schedule by day of year and sector of operation, it is impossible to properly verify the impact of construction activities with regard to the different CAAQS including the $\text{PM}_{2.5}$ AAQC.



Toxic Contaminants

Exceedances were calculated for acrolein (1-hour and 24-hour), benzene (24-hour) and propionaldehyde (10-minutes) at 50 m from the road centerline for the emission scenario without specific mitigation. When considering the scenario with mitigation (majority of Tier 4F engines), exceedances are still generated but to a lower extent. The exceedance setbacks for these contaminants reach more or less 200 m which include a culturally sensitive receptor. Otherwise, no exceedances were calculated for the other toxic contaminants at sensitive receptors, including existing residences, institutional buildings, and culturally sensitive areas.

This excludes B[a]P (24-hour and annual exposure periods) since the selected background concentrations are already exceeding the AAQC as part of the AQIA. When excluding the background concentration, the scenario with mitigation cuts the Project's contribution by two on the maximum annual BaP concentration below the applicable AAQC but is not sufficient to comply with the 24-hour AAQC.

DPM emissions dispersion from engines were simulated and resulted in elevated maximum 2-hour average concentrations in the modeling domain which is at least 25 times higher than the recommended concentration by Health Canada, even when considering the case with mitigation. For annual DPM concentrations, the calculated maximum ($< 2 \mu\text{g}/\text{m}^3$) is lower than the recommended Health Canada guidance value ($5 \mu\text{g}/\text{m}^3$) since construction activities at one specific location will be sporadic lasting likely a couple of days or weeks, largely diluting the DPM emissions over a year.

Dust Deposition

A maximum dust deposition value of $10 \text{ g}/\text{m}^2$ over 30-days (including background dust deposition) was calculated at 50 m from the road centerline (corresponding to about 143% of the AAQC) without the dust mitigation (water trucks on-road). Like for particulate matter concentrations, the impact of water control on the results remains low and cannot be discerned from the maximum calculated at 50 m distance, which remains at $10 \text{ g}/\text{m}^2$ over 30-days. That said, the maximums obtained at 150 m ($5.0 \text{ g}/\text{m}^2$) and 300 m ($2.5 \text{ g}/\text{m}^2$) are lower than their counterpart without dust control ($8.9 \text{ g}/\text{m}^2$ and $4.6 \text{ g}/\text{m}^2$, respectively). In fact, the maximum calculated dustfall does not exceed the AAQC of $7.0 \text{ g}/\text{m}^2$ per 30-days at sensitive receptors, except for a single culturally sensitive location nearby the WSR footprint.

A similar trend is observed with regard to the annualized dustfall which maximum only exceeds the applicable AAQC of $4.6 \text{ g}/\text{m}^2$ outside the ARA-2 quarry (maximum of $4.7 \text{ g}/\text{m}^2$ per 30-days in average during the year). Otherwise, no exceedances are noted at 50 m from the road centerline nor at sensitive receptors.

Summary

Exceedances of Ontario AAQC are a possibility at some culturally sensitive areas during the construction phase, even with the application of mitigation measures specified above. That said, there are other mitigating factors to consider when analyzing the impact of the construction phase on air quality. For example:

- The potential exceedances mainly concern short-term AAQC (24-hours and less) and could only occur over a short period (i.e., 1-2 days) at each receptor given that the emission sources will be moving as road construction progresses.
- AERMOD integrates local topography into calculations, but it does not consider the presence of vegetation and trees that can act as physical barriers, especially against particulates dispersion further down-wind.



- It is not possible to define the exact combination and space distribution of equipment and activities that will occur at individual sections of the road, and so all potential emissions (dozers, excavators, loaders, etc.) were combined together in a single source as a simplified but conservative approach.
- Ground and vegetation soiling over the government set threshold would also be limited to the road ROW and slightly beyond. Soiling would however be of limited time given the short period of dust emissions in an area which deposition would most likely be washed away with precipitations and other natural phenomenon after a while.
- The selected background concentration which represents elevated and uncommon conditions is added to the maximum modelled concentration, without knowing if both situations occur simultaneously.
- The integration of other mitigation measures as part of an Air Quality and Dust Control Management Plan (refer to **Section 9.4**), which benefits cannot be quantified as part of the AQIA, would further mitigate if not eliminate any potential exceedances of applicable air quality criteria.



Table 9-18: Maximum Concentrations for Non-Particulate Contaminants Calculated in the Modeling Domain for the Construction Phase (no mitigation; Tier 3 engines only)

Pollutant	Applicable Standard	Averaging Period	Maximum Project Contribution (A) ⁽¹⁾		Background Concentration (B)		Total (A+B)		Limit Value (µg/m ³)
			µg/m ³	% limit	µg/m ³	% limit	µg/m ³	% limit	
Sulphur dioxide (SO ₂)	AAQC	10-minute	14,023	7,791	149	83	14,172	7,873	180
	AAQC	1-hour	8,499	8,499	90	90	8,589	8,589	100
	CAAQS	1-hour ⁽²⁾	8,499	4,913	18	10	8,517	4,923	173
	AAQC	Annual	0.11	1.1	0.50	5.0	0.61	6.1	10
Nitrogen dioxide (NO ₂)	AAQC	1-hour	7,519	1,880	51	13	7,570	1,892	400
	CAAQS	1-hour ⁽¹⁾	2,902	3,673	28	35	2,930	3,709	79
	AAQC	24-hour	448	224	23	12	471	235	200
	AAQC	Annual	9.9	45	2.6	12	13	57	22
Carbon monoxide (CO)	AAQC	1-hour	62,703	173	5061	14	67,764	187	36,200
	AAQC	8-hour	7,924	50	3253	21	11,177	71	15,700
1,3-butadiene	AAQC	24-hour	0.52	5.2	0.12	1.2	0.64	6.4	10
	AAQC	Annual	0.0031	0.15	0.010	0.50	0.013	0.65	2.0
Acetaldehyde	AAQC	30-minute	146	29	14	2.8	160	32	500
	AAQC	24-hour	29	5.8	12	2.4	41	8.2	500
Acrolein	AAQC	1-hour	22	485	0.040	0.89	22	486	4.5
	AAQC	24-hour	5.3	1,314	0.040	10	5.3	1,324	0.40
Benzene	AAQC	24-hour	15	661	0.90	39	16	700	2.3
	AAQC	Annual	0.090	20	0.30	67	0.39	87	0.45
Ethylbenzene	AAQC	10-minute	20	1.0	0.28	0.015	20	1.0	1,900
	AAQC	24-hour	2.9	0.29	0.17	0.017	3.0	0.30	1,000
Formaldehyde	AAQC	24-hour	24	37	2.9	4.5	27	41	65
Hexanes	AAQC	24-hour	0.72	0.029	0.45	0.018	1.2	0.047	2,500
Propanal	AAQC	10-minute	42	424	1.6	16	44	440	10
Toluene	AAQC	24-hour	11	0.53	1.4	0.070	12	0.60	2,000
Xylenes	AAQC	10-minute	142	4.7	0.86	0.029	143	4.8	3,000
	AAQC	24-hour	21	2.8	0.52	0.071	21	2.9	730
Benzo(a)pyrene	AAQC	24-hour	2.3x10 ⁻³	4,574	1.2x10 ⁻⁴	240	2.4x10 ⁻³	4,814	5.0x10 ⁻⁵
	AAQC	Annual	1.2x10 ⁻⁵	117	2.0x10 ⁻⁵	200	3.2x10 ⁻⁵	317	1.0x10 ⁻⁵
Diesel particulate matter (DPM)	HC	2-hour	1,354	13,544	0	0	1,354	13,544	10
	HC	Annual	1.8	35	0	0	1.8	35	5

Notes: Concentrations that are greater than the corresponding AAQC, CAAQS or Health Canada (HC) guidance value for DPM are denoted in bold.

(1) Maximum concentration calculated in the modelling domain (at 50 m from the road centerline or at the perimeter of the ARA-2 quarry).

(2) The result represents the 1st highest 1-hour concentration and not the 88th highest 1-hour concentration as required from the CAAQS.



Table 9-19: Maximum Concentrations for Non-Particulate Contaminants Calculated in the Modelling Domain for the Construction Phase (with mitigation; 80% Tier 4F)

Pollutant	Applicable Standard	Averaging Period	Maximum Project Contribution (A) ⁽¹⁾		Background Concentration (B)		Total (A+B)		Limit Value ($\mu\text{g}/\text{m}^3$)
			$\mu\text{g}/\text{m}^3$	% limit	$\mu\text{g}/\text{m}^3$	% limit	$\mu\text{g}/\text{m}^3$	% limit	
Sulphur dioxide (SO ₂)	AAQC	10-minute	3,043	1,691	149	83	3,192	1,773	180
	AAQC	1-hour	1,844	1,844	90	90	1,934	1,934	100
	CAAQS	1-hour ⁽²⁾	1,844	1,066	18	10	1,862	1,076	173
Nitrogen dioxide (NO ₂)	AAQC	1-hour	4,664	1,166	51	13	4,715	1,179	400
	CAAQS	1-hour ⁽⁴⁾	2,897	3,667	28	35	2,925	3,703	79
	AAQC	24-hour	321	161	23	12	344	172	200
Carbon monoxide (CO)	AAQC	1-hour	62,681	173	5,061	14	67,742	187	36,200
	AAQC	8-hour	7,840	50	3,253	21	11,093	71	15,700
Acrolein	AAQC	1-hour	4.6	102	0.040	0.89	4.6	103	4.5
	AAQC	24-hour	1.5	384	0.040	10	1.6	394	0.40
Benzene	AAQC	24-hour	4.4	193	0.90	39	5.3	232	2.3
Formaldehyde	AAQC	24-hour	24	37	2.9	4.5	27	41	65
Propionaldehyde	AAQC	10-minute	8.9	89	1.6	16	10	105	10
Benzo(a)pyrene	AAQC	24-hour	6.3×10^{-4}	1,260	1.2×10^{-4}	240	7.5×10^{-4}	1,500	5.0×10^{-5}
	AAQC	Annual	5.6×10^{-6}	56	2.0×10^{-6}	200	2.6×10^{-5}	256	1.0×10^{-5}
Diesel particulate matter (DPM)	HC	2-hour	275	2,748	0	0	275	2,748	10

Notes: Concentrations that are greater than the corresponding AAQC, CAAQS or Health Canada (HC) guidance value for DPM are denoted in bold.

(1) Maximum concentration calculated in the modelling domain (at 50 m from the road centerline or at the perimeter of the ARA-2 quarry).

(2) The result represents the 1st highest 1-hour concentration and not the 88th highest 1-hour concentration as required from the CAAQS.

Table 9-20: Maximum Concentrations for Particulates and Dustfall Calculated in the Modeling Domain For the Construction Phase

Pollutant	Applicable Standard	Averaging Period	Maximum Project Contribution (A) ⁽¹⁾		Background Concentration (B)		Total (A+B)		Limit Value (µg/m ³)
			µg/m ³	% limit	µg/m ³	% limit	µg/m ³	% limit	
Scenario – unpaved surface (no control)									
Total suspended matter (TSP)	AAQC	24-hour	16,423	13,686	45	38	16,468	13,723	120
	AAQC	Annual	55	92	4.0	6.7	59	98	60
Fine inhalable fraction (PM ₁₀)	AAQC	24-hour	5,878	11,756	28	56	5,906	11,812	50
Fine particulate matter (PM _{2.5}) ⁽²⁾	CAAQS	24-hour	1,151	5,006	13	55	1,164	5,061	23
	AAQC	24-hour	1,151	4,264	13	47	1,164	4,311	27
	CAAQS	Annual	3.7	46	4.7	59	8.4	104	8.0
	AAQC	Annual	3.7	42	4.7	53	8.4	95	8.8
Dustfall	AAQC	30-days	10	143	0.40	5.7	10	148	7.0
	AAQC	Annual	5.2	114	0.40	8.7	5.6	123	4.6
Scenario – unpaved surface with road water control									
Total suspended matter (TSP)	AAQC	24-hour	16,211	13,510	45	38	16,256	13,547	120
	AAQC	Annual	53	89	4.0	6.7	57	96	60
Fine inhalable fraction (PM ₁₀)	AAQC	24-hour	5,752	11,505	28	56	5,780	11,561	50
Fine particulate matter (PM _{2.5}) ⁽²⁾	CAAQS	24-hour	1,141	4,961	13	55	1,154	5,016	23
	AAQC	24-hour	1,141	4,226	13	47	1,154	4,273	27
	CAAQS	Annual	3.4	43	4.7	59	8.1	102	8.0
	AAQC	Annual	3.4	39	4.7	53	8.1	93	8.8
Dustfall	AAQC	30-days	10	143	0.40	5.7	10	148	7.0
	AAQC	Annual	4.7	102	0.40	8.7	5.1	110	4.6

Notes:

Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in bold.

(1) Maximum concentration calculated in the modelling domain (at 50 m from the road centerline or at the perimeter of the ARA-2 quarry).

(2) The results are compared with the CAAQS applicable starting in 2030 while for the AAQC, it is compared with the 2020 targets.



Table 9-21: Maximum Concentrations in Areas of Interest For the Scenario with mitigation measure (80% Tier 4 Engines) During the Construction Phase

Sector or Receptor	NO ₂			SO ₂		CO
	AAQC	CAAQS	AAQC	AAQC	AAQC	AAQC
	1-h	1-h	24-h	10-min	1-h	1-h
Limit value (µg/m ³)	400	79	200	180	100	36,200
Project contribution (µg/m³)						
50 m from road centerline ⁽¹⁾	416	392	194	31	19	1,342
150 m from road centerline ⁽¹⁾	221	207	109	30	18	622
300 m from road centerline ⁽¹⁾	154	148	95	27	16	554
ARA-2 quarry perimeter	4,664	2,897	321	3,043	1,844	62,681
Existing residences (RP01) ⁽²⁾	98	95	36	2.8	1.7	83
Institutional buildings (I01) ⁽³⁾	93	92	34	2.1	1.3	66
Culturally sensitive areas ⁽⁴⁾						
CHL25 (60 m from RCL)	265	250	134	36	22	757
CHL05 (150 m from RCL)	179	171	89	10	5.8	410
CHL14 (200 m from RCL)	138	132	77	6.9	4.2	241
CHL28 (240 m from RCL)	135	132	86	20	12	409
CHL02 (350 m from RCL)	139	127	68	4.6	2.8	252
Project contribution + background (µg/m³)						
50 m from road centerline ⁽¹⁾	467	420	217	180	109	6,403
150 m from road centerline ⁽¹⁾	272	235	132	179	108	5,683
300 m from road centerline ⁽¹⁾	205	176	118	176	106	5,615
ARA-2 quarry perimeter	4,715	2,925	344	3,192	1,934	67,742
Existing residences (RP01) ⁽²⁾	149	123	59	152	92	5,144
Institutional buildings (I01) ⁽³⁾	144	120	57	151	91	5,127
Culturally sensitive area ⁽⁴⁾						
CHL25 (60 m from RCL)	316	278	157	185	112	5,818
CHL05 (150 m from RCL)	230	199	112	159	96	5,471
CHL14 (200 m from RCL)	189	160	100	156	94	5,302
CHL28 (240 m from RCL)	186	160	109	169	102	5,470
CHL02 (350 m from RCL)	190	155	91	154	93	5,313

Notes: Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in bold.

(1) In order to demonstrate the impact of emission sources other than blasts at different setbacks along the WSR, receptors located in the area of influence of the ARA-2 quarry was not considered in determining the maximums at 50, 150 and 300 m.

(2) Closest receptor of this category from the road centerline (RCL) at 1,350 m. Results for other receptors located further away are in Appendix B within the Air Quality Impact Assessment Report (**Appendix G**).

(3) Closest receptor of this category from the RCL at 1,800 m.

(4) Only the results for culturally sensitive receptors located within 400 m of the RCL are presented.



Table 9-21 (Cont'd): Maximum Concentrations in Areas of Interest For the Scenario with Mitigation Measure (80% Tier 4 Engines) During the Construction Phase

Sector or Receptor	Acrolein		Benzene	Propanal	BaP	DPM
	AAQC	AAQC	AAQC	AAQC	AAQC	HC
	1-h	24-h	24-h	10-min	24-h	2-h
Limit value ($\mu\text{g}/\text{m}^3$)	4.5	0.40	2.3	10	0.000050	10
Project contribution ($\mu\text{g}/\text{m}^3$)						
50 m from road centerline ⁽¹⁾	4.4	1.5	4.4	8.6	0.00063	271
150 m from road centerline ⁽¹⁾	1.9	0.49	1.4	3.6	0.00020	116
300 m from road centerline ⁽¹⁾	1.0	0.27	0.79	2.0	0.00011	60
ARA-2 quarry perimeter	1.7	0.58	1.7	3.3	0.00021	90
Existing residences (RP01) ⁽²⁾	0.27	0.063	0.18	0.52	0.000026	15
Institutional buildings (I01) ⁽³⁾	0.22	0.060	0.17	0.42	0.000025	12
Culturally sensitive areas ⁽⁴⁾						
CHL25 (60 m from RCL)	2.5	0.74	2.1	4.8	0.00030	147
CHL05 (150 m from RCL)	1.4	0.36	1.0	2.6	0.00015	83
CHL14 (200 m from RCL)	0.80	0.20	0.58	1.5	0.000082	44
CHL28 (240 m from RCL)	0.78	0.23	0.67	1.5	0.000095	45
CHL02 (350 m from RCL)	0.83	0.16	0.47	1.6	0.000067	50
Project contribution + background ($\mu\text{g}/\text{m}^3$)						
50 m from road centerline ⁽¹⁾	4.5	1.6	5.3	10.2	0.00075	271
150 m from road centerline ⁽¹⁾	1.9	0.53	2.31	5.2	0.00032	116
300 m from road centerline ⁽¹⁾	1.1	0.31	1.7	3.6	0.00023	60
ARA-2 quarry perimeter	1.8	0.62	2.6	4.9	0.00033	90
Existing residences (RP01) ⁽²⁾	0.31	0.10	1.1	2.1	0.00015	15
Institutional buildings (I01) ⁽³⁾	0.26	0.10	1.1	2.0	0.00015	12
Culturally sensitive area ⁽⁴⁾						
CHL25 (60 m from RCL)	2.5	0.78	3.0	6.4	0.00042	147
CHL05 (150 m from RCL)	1.4	0.399	1.9	4.2	0.00027	83
CHL14 (200 m from RCL)	0.84	0.24	1.5	3.1	0.00020	44
CHL28 (240 m from RCL)	0.82	0.27	1.6	3.1	0.00022	45
CHL02 (350 m from RCL)	0.87	0.20	1.4	3.2	0.00019	50

Notes: Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in bold.

- (1) In order to demonstrate the impact of emission sources other than blasts at different setbacks along the WSR, receptors located in the area of influence of the ARA-2 quarry was not considered in determining the maximums at 50, 150 and 300 m.
- (2) Closest receptor of this category from the road centerline (RCL) at 1,350 m. Results for other receptors located further away are in Appendix B within the Air Quality Impact Assessment Report (**Appendix G**).
- (3) Closest receptor of this category from the RCL at 1,800 m.
- (4) Only the results for culturally sensitive receptors located within 400 m of the RCL are presented.



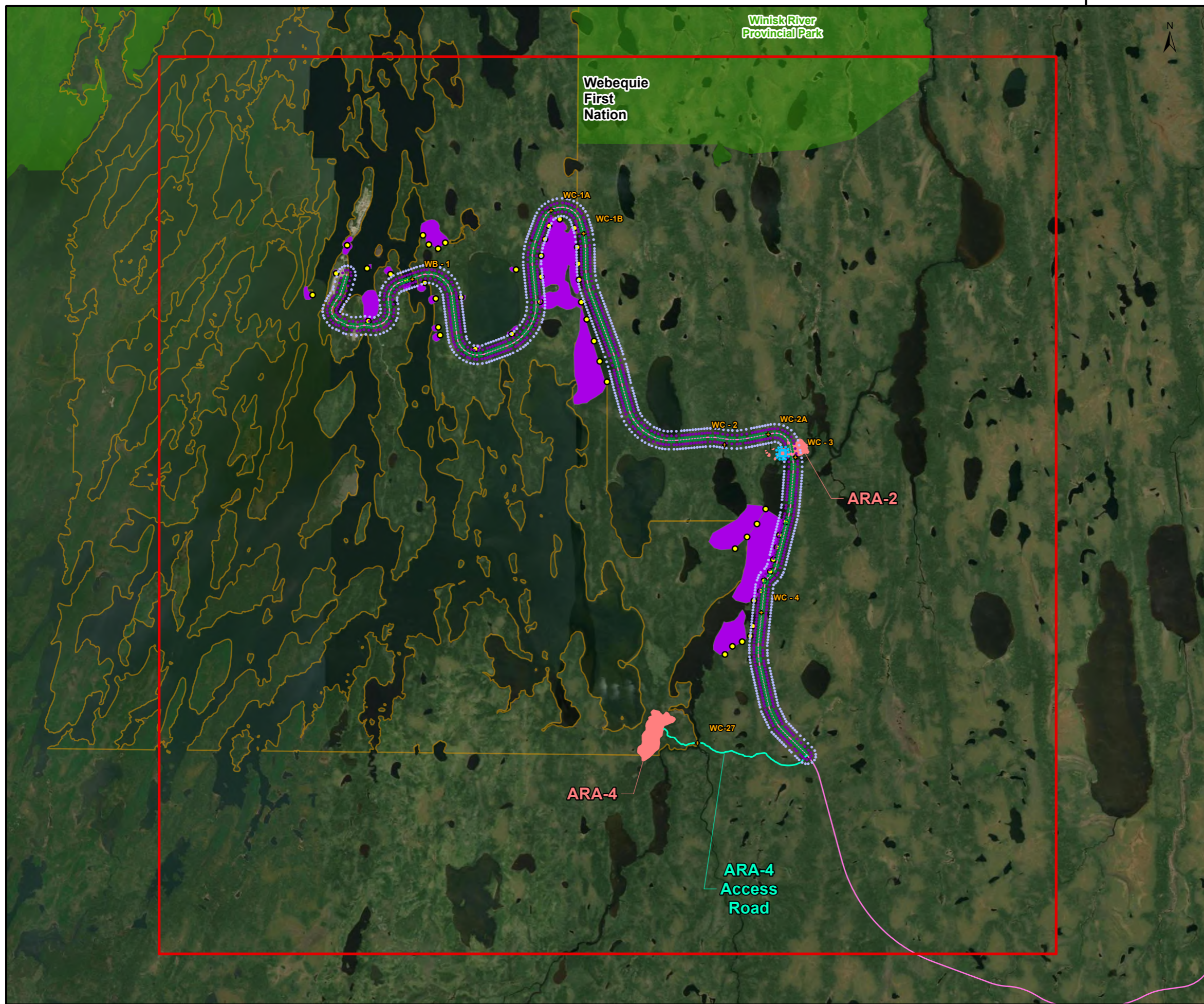
Table 9-22: Maximum Particulate Concentrations and Dust Depositions in Areas of Interest For the Scenario with Water Dust Control on Road Surfaces During the Construction Phase

Sector or Receptor	TSP	PM ₁₀	PM _{2.5}		Dustfall	
	AAQC	AAQC	CAAQS	CAAQS	AAQC	AAQC
	24-h	24-h	24-h	Annual	30-days	Annual
Limit value (µg/m ³)	120	50	23	8.0	7.0	4.6
Project contribution (µg/m³)						
50 m from road centerline ⁽¹⁾	16,211	5,752	1,141	1.5	10	3.8
150 m from road centerline ⁽¹⁾	2,610	1,283	189	0.49	5.0	1.1
300 m from road centerline ⁽¹⁾	1,102	672	96	0.35	2.5	0.64
ARA-2 quarry perimeter	1,595	815	105	3.4	9.7	4.7
Existing residences (RP01) ⁽²⁾	140	141	24	0.061	0.24	0.048
Institutional buildings (I01) ⁽³⁾	135	130	20	0.052	0.20	0.040
Culturally sensitive areas ⁽⁴⁾						
CHL25 (60 m from RCL)	5,701	2,448	381	0.59	7.8	1.3
CHL05 (150 m from RCL)	1,828	934	146	0.45	3.3	0.82
CHL14 (200 m from RCL)	1,179	549	103	0.38	2.8	0.71
CHL28 (240 m from RCL)	1,068	587	88	0.20	1.7	0.24
CHL02 (350 m from RCL)	629	383	68	0.15	1.2	0.20
CHL06 (400 m from RCL)	601	406	75	0.20	1.3	0.25
Project contribution + background (µg/m³)						
50 m from road centerline ⁽¹⁾	16,256	5,780	1,154	6.2	10	4.2
150 m from road centerline ⁽¹⁾	2,655	1,311	201	5.2	5.4	1.5
300 m from road centerline ⁽¹⁾	1,147	700	108	5.0	2.9	1.0
ARA-2 quarry perimeter	1,640	843	117	8.1	10	5.1
Existing residences (RP01) ⁽²⁾	185	169	37	4.8	0.64	0.45
Institutional buildings (I01) ⁽³⁾	180	158	33	4.8	0.60	0.44
Culturally sensitive area ⁽⁴⁾						
CHL25 (60 m from RCL)	5,746	2,476	394	5.3	8.2	1.7
CHL05 (150 m from RCL)	1,873	962	159	5.1	3.7	1.2
CHL14 (200 m from RCL)	1,224	577	116	5.1	3.2	1.1
CHL28 (240 m from RCL)	1,113	615	101	4.9	2.1	0.64
CHL02 (350 m from RCL)	674	411	80	4.8	1.6	0.60
CHL06 (400 m from RCL)	646	434	87	4.9	1.7	0.65

Notes: Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in bold.

- (1) In order to demonstrate the impact of emission sources other than blasts at different setbacks along the WSR, receptors located in the area of influence of the ARA-2 quarry was not considered in determining the maximums at 50, 150 and 300 m.
- (2) Closest receptor of this category from the road centerline (RCL) at 1,350 m. Results for other receptors located further away are in Appendix B within the Air Quality Impact Assessment Report (**Appendix G**).
- (3) Closest receptor of this category from the RCL at 1,800 m.
- (4) Only the results for culturally sensitive receptors located within 400 m of the RCL are presented.





500,000



500,000

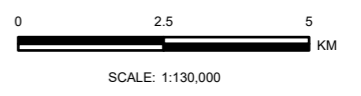
Legend

- Dispersion Modeling**
- Dispersion Domain
 - Receptor grid at 50 m from road centerline
 - Receptor grid at 150 m from road centerline
 - Receptor grid at 300 m from road centerline
 - Receptors surrounding the quarry sources
- WSR Components**
- Road Footprint
 - + Waterbody Crossing
 - Quarries
 - ARA-4 Access Road
- Sensitive Receptors**
- Culturally Sensitive Receptors
 - Culturally Sensitive Area
- Limits**
- First Nation Reserve
 - Provincial Park

Webeque Supply Road (WSR)

Air Dispersion Modelling Domain

Figure Number:	9.7	REV	PA
Client:	Webeque First Nation	Project Number:	661910
		Date:	1/19/2026
DSC		DRN	CHK
		AD	SP

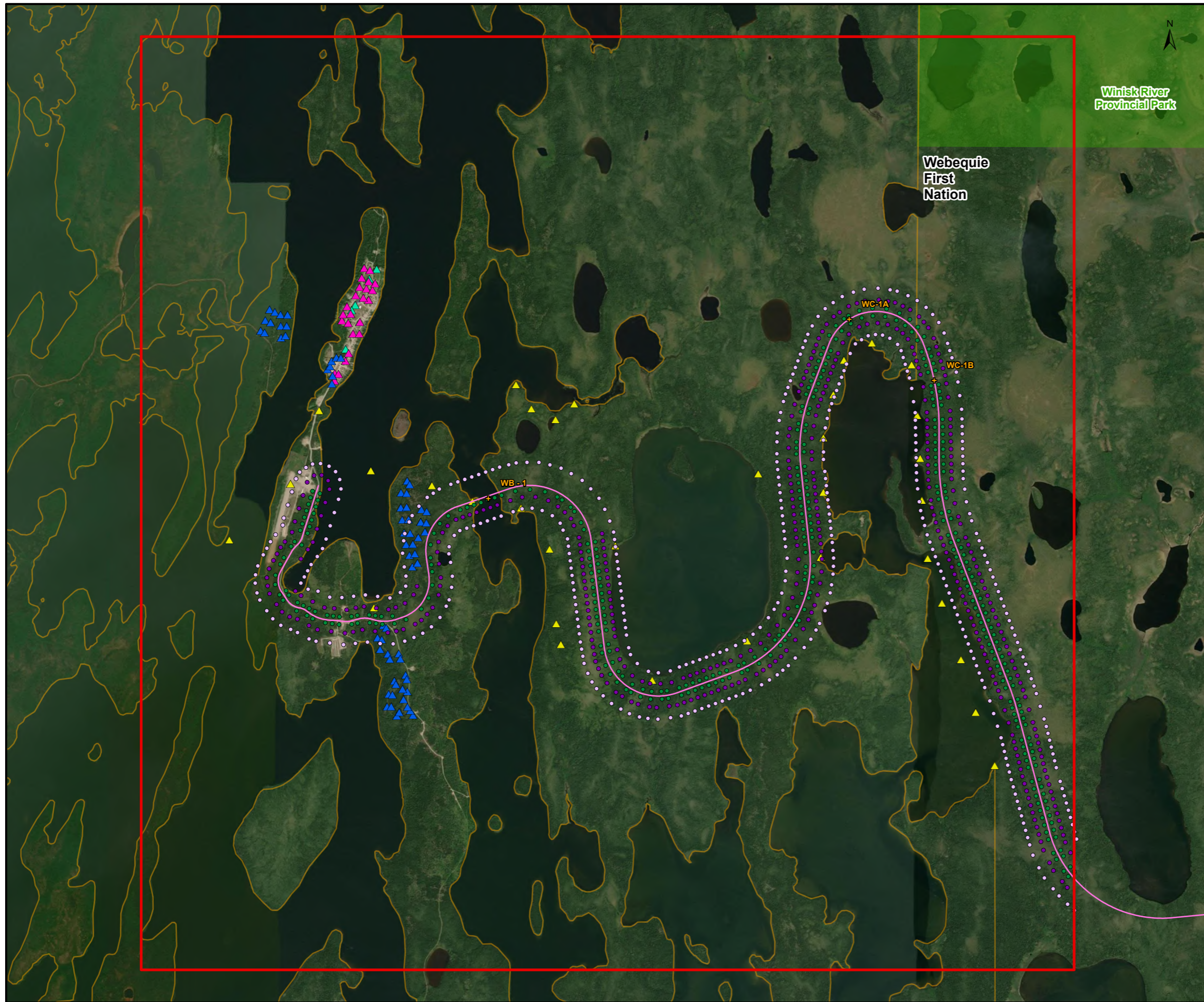


NOTES

1. Coordinate System: NAD 1983 UTM Zone 16N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information; and, Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF). Download Date : 2021-02-04

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Legend

Dispersion Modelling

- Zoomed Area
- Receptor grid at 50 m from road centerline
- Receptor grid at 150 m from road centerline
- Receptor grid at 300 m from road centerline

WSR Components

- Road Footprint
- + Waterbody Crossing

Sensitive Receptors

- ▲ Culturally Sensitive Areas
- ▲ Institutions
- ▲ Existing Residences
- ▲ Identified Future Residential Plots

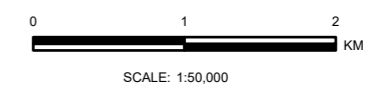
Limits

- First Nation Reserve
- Provincial Park

Webequie Supply Road (WSR)

**Air Dispersion Modelling Domain
(close-up near Webequie)**

Figure Number:	9.8	REV	PA
Client:	Webequie First Nation	Project Number:	661910
		Date:	1/22/2026
DSC			DRN
			CHK
			APP
			AD
			SP
			SP



NOTES

1. Coordinate System: NAD 1983 UTM Zone 16N.
2. Cadastral boundaries are for informational purposes only and should not be considered suitable for legal, engineering, or surveying purposes.
3. Topographic/landcover features obtained from CanVec v12.0 dataset, Natural Resources Canada Earth and Sciences Sector Centre for Topographic Information; and, Land Information Ontario (LIO) Warehouse Open Data (<https://geohub.lio.gov.on.ca/>), Ontario Ministry of Natural Resources and Forestry (OMNRF). Download Date : 2021-02-04

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9.3.1.3 Operation Phase

9.3.1.3.1 Considered Emission Sources for Air Dispersion Modelling

The operation phase of the WSR includes the vehicular traffic on the road as well as maintenance activities during this period, generating both exhaust gas emissions and fugitive dust emissions. A permanent MSF will be located near the WSR with the purpose of storing the equipment and materials used for inspection, maintenance, and repair activities. Activities occurring at the MSF will mainly include equipment maintenance and repair mostly inside garages. Inspections and maintenance work will be conducted to ensure the road meets the minimum operational standards for roadside safety.

The main air emission sources during operation phase include the regular daily passages of vehicles mainly from Webequie (less than 500 vehicles) to the eastern terminus of the road where proposed mineral exploration and developments are located and the proposed planned Northern Road Link to the south will connect with the WSR. In addition to vehicular traffic from and to Webequie, the types of vehicles using the road will also include heavy-duty trucks that will be used as part of maintenance activities like visual patrols, snow clearing, and aggregate hauling as part of road repairs. Although the road is expected to be surfaced with asphalt or chipseal, the initial emission scenario considers an aggregate/gravel-surface as it is expected that part of the road will not be fully surfaced from the start. As a result, a second source is modelled to capture road grading and maintenance activities, and associated air quality concerns. This represents a conservative approach with regard to dust emissions. The application of asphalt or chip seal would obviously result in lower TSP, PM₁₀ and PM_{2.5} concentrations in air and dustfall on the ground in the immediate area of the road.

Other air emission sources associated with isolated road maintenance activities such as brush and vegetation removal/control within the ROW, and specific road, culvert, and bridge repairs requiring an excavator, and a couple of graders for snow clearing are excluded considering that these activities are unspecific to a single location and will occur infrequently. Other emission sources that are excluded include the following:

- Diesel generator set(s) that will be installed at the MSF; however, the size and location are unknown at this time. The MSF is expected (although not confirmed) to be built near rehabilitated ARA-2 quarry adjacent to an area with no nearby sensitive receptors.
- Crushing and screening activities will occur at the ARA-4 quarry during a typical year but for short periods at a time only. The ARA-4 quarry is located at more than 2,500 m from the closest culturally sensitive area (refer to **Figure 9.7**).

9.3.1.3.2 Emission Parameters Summary

The emission scenario is composed of a linear volume source within the modelling domain (refer to **Section 9.3.1.1.2**) between Webequie and the intersection of the WSR with ARA-4 quarry access road. Although emissions will also occur on the eastern part of the WSR, the concentration profile from road center will be very similar. The exhaust gas from vehicles and fugitive dust emissions from the road and grading activities were modelled separately since they have different emission parameters. Also, for simplification, the fugitive dust emissions from both sources were combined in a single source.

Results were calculated based on a scenario without particular emission control measures and a similar scenario with control measures which, for the operation phase, concern fugitive dust control with a water truck for the gravel-based surface road followed by the paved surface case.



Tables 4-6 to 4-8 in the Air Quality Impact Assessment Report (Appendix G) summarize the emission sources and parameters included in the model for the operation phase of the Project. The tables provide an overview of emission parameters and emission rates for NO_x and TSP applicable to 1-hour, 24-hour, 30-day, and annual exposure periods, where applicable. The emission rates for the other contaminants and other parameters that needs to be specified in the model are available in Appendix A within the Air Quality Impact Assessment Report (Appendix G).

Section 4.2 in the Air Quality Impact Assessment Report (Appendix G) describes in detail how emission rates are calculated for each contaminant included in the model. Emissions from the following types of sources were estimated using different calculation methods in the model:

- Vehicular traffic (road engines);
- Vehicular traffic dust emissions; and
- Grading dust emissions.

9.3.1.3.3 Air Dispersion Modelling Results – Operation Phase



Results of the air dispersion modelling show that during operation phase, air contaminants are expected to meet Ontario and Canada standards for sensitive receptors located at 150 m of the road and beyond. Exceptions include total suspended particulates (TSP) and inhalable particulate matter (PM₁₀) concentrations which exceedance setback could go beyond 500 m with a gravel-based road during highly unfavorable meteorological conditions. With a paved surfaced, a potential exceedance of the AAQC only concerns PM₁₀ at short distance (up to 100 m from the road).

Table 9-23 and **Table 9-24** summarize air dispersion modelling results for the operation phase for contaminants identified as indicators of the air quality effects assessment in comparison to applicable AAQC and CAAQS. The tables present the maximum concentration calculated in air (or on ground for dustfall) anywhere along the WSR at 50 m on either side of the road centerline based on the 5-year meteorological dataset. **Table 9-24** provides the results specifically for particulate emissions based on the three scenarios defined previously: unpaved surface without control including grading activities; unpaved surface with water control; and paved surface. The tables also present the results for the Project's contribution alone and with the background concentrations presented in **Section 9.2.2.1**. Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in **bold**.

The results presented in Table 9-25 (for the scenario using unpaved surface with water control) and **Table 9-26** (for the scenario using paved surface) focus on maximum concentrations calculated at sensitive receptors for contaminants which are meaningfully impacted by the Project according to **Table 9-23** and **Table 9-24**. Given the large number of sensitive receptors, only those which are closest to the road are presented in these tables as an example of worst-case impacts. It includes existing residences, institutional buildings, culturally sensitive areas, and future residence plots. The results for the other receptors which are lower than the ones presented herein are available in Appendix B within the Air Quality Impact Assessment Report (**Appendix G**) for reference.

The following subsections discuss the results presented in these tables.

Particulates

Daily vehicular traffic and maintenance grading activities on the road will generate dust emissions mostly from the road surface. Maximum expected daily traffic on the road (less than 500 vehicles) would lead to 24-hour TSP and PM₁₀ concentrations that would largely exceed the applicable AAQC if no dust control measures are in place. The maintenance crew will have a water-spraying truck readily available to be used when needed, especially during dry summer months. This control measure would reduce the maximum expected concentrations by 25–30% but would not be enough to eliminate the calculated exceedances at 50 m distance. In fact, the AAQC would still be exceeded for most sensitive receptors that are located within 600 m (for TSP) and 2,000 m (for PM₁₀) from the road. For instance, the most impacted sensitive receptor (RPF42) could see TSP and PM₁₀ daily concentrations reach 675 µg/m³ and 243 µg/m³, respectively, due to the passage of vehicles on the road. The annual TSP AAQC is also exceeded although it would be limited to within 100 m from the road centerline without reaching any sensitive receptors.

With regard to PM_{2.5} AAQC/CAAQS, the impact of the unpaved road with water control on concentrations would be less substantial, at least when compared to the CAAQS 2030 target (maximum of 97% of the CAAQS for 24-hour PM_{2.5} concentrations and 46% of the CAAQS for annual concentrations at 50 m). When including the 24-hour background concentration, the exceedance setback reaches 150 m which includes the closest sensitive receptors (CHL25, RPF39, RPF42). For the annual concentrations, the exceedance is restricted within 100 m of the road centerline and would not reach nearby receptors according to modeling results.

These results were obtained assuming a low 30% control factor for dust emissions and there is still a margin for improvement by increasing the number of passages of water trucks during dry dust days. This would reduce the calculated maximum concentrations but most likely not enough to eliminate the exceedances noted at receptors located nearby the WSR. Meanwhile, the placement of asphalt or chip seal would greatly mitigate dust generation during vehicle passages. For this scenario, the maximum PM_{2.5} concentrations would remain below the AAQC/CAAQS threshold at 50 m distance. Exceedances of the TSP and PM₁₀ AAQC are still calculated up to about 100 m from the road centerline which includes a couple of sensitive receptors, namely future residential plots.

Gaseous Criteria Air Contaminants

The road traffic is not expected to increase gaseous CACs (NO₂, SO₂, and CO) concentrations higher than 5% of the corresponding AAQC at 50 m from the road centerline. For the 1-hour NO₂ CAAQS, the relative impact is expected to be more significant with a maximum concentration, according to the CAAQS statistical representation, tantamount to 28% of the 2025 target value at 50 m distance. This percentage decreases with increasing distance from the road, as sensitive receptors are setback at varying distances.

Toxic Contaminants

Based on maximum expected traffic, concentrations of VOCs at 50 m will remain very low (<5% of the applicable AAQC) and are therefore not a concern for sensitive receptors with regard to air quality. No exceedances were calculated with or without background concentrations at existing residences, institutional buildings, culturally sensitive areas, and future residence plots except for benzo(a)pyrene which 24-hour and annual background concentrations already exceed the corresponding AAQC. That said, these background concentrations were inferred from a monitoring station in Simcoe, Ontario, which is not located in a remote area such as Webequie but is considered the most representative from all available data located in a non-urban setting that are not impacted by any significant emission sources nearby.



Webequie has however a much smaller population than Simcoe, and there is little (e.g., temporary or short-term land use for traditional activities) or no human interaction along the WSR route, and potential emission sources are more limited. As such, the average B[a]P concentrations are expected to be significantly lower than those observed in Simcoe and thus, the background concentration may be overstated. It is also worth noting that the Project's contribution to B[a]P concentrations will represent less than 1% of the corresponding AAQC starting at 50 m distance.

DPM emissions from vehicles traveling on the road were also simulated and generated maximum concentrations of $0.8 \mu\text{g}/\text{m}^3$ for the 2-h averaging period and $0.0079 \mu\text{g}/\text{m}^3$ for the annual average at 50 m from RCL. Those results are well within the recommended concentrations from Health Canada for short-term ($10 \mu\text{g}/\text{m}^3$) and long-term ($5 \mu\text{g}/\text{m}^3$) exposures.

Dust Deposition



Indigenous community members would like to know if fugitive dust from vehicle traffic on the road will be quantified (estimate of tons of dust per year) and considered as a main contributor to contaminant emissions.

A maximum dust deposition value of $27 \text{ g}/\text{m}^2$ over 30-days (including background dust deposition) was calculated at 50 m of the road centerline (corresponding to 383% of the AAQC) without dust control. With water trucks in operation, this maximum decreases to $19 \text{ g}/\text{m}^2$. Given the depletion effect, dust surficial concentration decreases systematically outside 50 m reaching at maximum, $5.0 \text{ g}/\text{m}^2$ at 150 m distance and $2.6 \text{ g}/\text{m}^2$ at 300 m distance. Maximum calculated dustfall concentrations at existing residences, institutional buildings, culturally sensitive areas, and future residences plots are 0.23, 0.21, 7.8 and $11 \text{ g}/\text{m}^2$ over 30-days of deposition, respectively. Hence, for some sensitive receptors, the criteria of $7.0 \text{ g}/\text{m}^2$ representing the accepted threshold in Ontario for soil and vegetation is exceeded for the scenario showcasing an unpaved road surface with water control.

When analysing the scenario using a paved surface, the maximum dust depositions at 50 m from the RCL, including all sensitive receptors, comply with the applicable AAQC.

Summary

Maintenance crews will manage dust through routine water application on unpaved segments and speed control. In this case, short term TSP and PM_{10} exceedances are confined within approximately 50 to 150 m of the road centerline and drop quickly beyond 150 m as deposition occurs. $\text{PM}_{2.5}$ exceedances are limited to the receptors closest to the road and are less frequent due to lower fine fraction from road dust compared to construction handling sources. Meanwhile, the transition to a chip seal or paved surface, subject to performance monitoring of settlement and serviceability in the peatland segment, is expected to materially reduce particulate concentrations and dust deposition near the corridor. With paving in place, predicted particulate concentrations meet criteria beyond very short setbacks, and residual operational effects are de minimis at community receptors.

Otherwise, with daily traffics of a mixture of 500 light-duty and heavy-duty vehicles travelling on the WSR, no particular issues are noted for contaminants coming from internal combustion engines, at least outside the ROW.



Table 9-23: Maximum Concentrations for Non-Particulate Contaminants Calculated for the Operation Phase

Pollutant	Applicable Standard	Averaging Period	Maximum Project Contribution (A) ⁽¹⁾		Background Concentration (B)		Total (A+B)		Limit Value (µg/m ³)
			µg/m ³	% limit	µg/m ³	% limit	µg/m ³	% limit	
Sulphur dioxide (SO ₂)	AAQC	10-minute	0.31	0.17	149	83	149	83	180
	AAQC	1-hour	0.19	0.19	90	90	90	90	100
	CAAQS	1-hour ⁽²⁾	0.19	0.11	18	10	18	11	173
	AAQC & CAAQS	Annual	0.0020	0.020	0.50	5.0	0.50	5.0	10
Nitrogen dioxide (NO ₂)	AAQC	1-hour	18	4.5	51	13	69	17	400
	CAAQS	1-hour	18	23	28	35	46	59	79
	AAQC	24-hour	2.9	1.5	23	12	26	13	200
	AAQC & CAAQS	Annual	0.32	1.4	2.6	12	2.9	13	22
Carbon monoxide (CO)	AAQC	1-hour	55	0.15	5,061	14	5 116	14	36,200
	AAQC	8-hour	13	0.082	3,253	21	3 266	21	15,700
1,3-butadiene	AAQC	24-hour	0.00087	0.0087	0.12	1.2	0.12	1.2	10
	AAQC	Annual	<0.0001	0.0028	0.010	0.50	0.010	0.50	2.0
Acetaldehyde	AAQC	30-minute	0.55	0.11	14	2.8	15	2.9	500
	AAQC	24-hour	0.076	0.015	12	2.4	12	2.4	500
Acrolein	AAQC	1-hour	0.066	1.5	0.040	0.89	0.11	2.4	4.5
	AAQC	24-hour	0.011	2.7	0.040	10	0.051	13	0.40
Benzene	AAQC	24-hour	0.014	0.61	0.90	39	0.91	40	2.3
	AAQC	Annual	0.00089	0.20	0.30	67	0.30	67	0.45
Ethylbenzene	AAQC	10-minute	0.13	0.0066	0.28	0.015	0.41	0.021	1,900
	AAQC	24-hour	0.012	0.0012	0.17	0.017	0.18	0.018	1,000
Formaldehyde	AAQC	24-hour	0.24	0.36	2.9	4.5	3.1	4.8	65
Hexanes	AAQC	24-hour	0.0059	<0.001	0.45	0.018	0.46	0.018	2,500
Propanal	AAQC	10-minute	0.034	0.34	1.6	16	1.6	16	10
Toluene	AAQC	24-hour	0.033	0.0016	1.4	0.070	1.4	0.072	2,000
Xylenes	AAQC	10-minute	0.92	0.031	1.6	0.053	2.5	0.084	3,000
	AAQC	24-hour	0.092	0.013	0.52	0.071	0.61	0.084	730
Benzo(a)pyrene	AAQC	24-hour	4.6x10 ⁻⁷	0.93	1.2x10 ⁻⁴	240	1.2x10 ⁻⁴	241	5.0x10 ⁻⁴
	AAQC	Annual	2.6x10 ⁻⁸	0.26	2.0x10 ⁻⁵	200	2.0x10 ⁻⁵	200	1.0x10 ⁻⁴
Diesel particulate matter (DPM)	HC	2-hour	0.80	8.0	0	0	0.80	8.0	10
	HC	Annual	0.0079	0.16	0	0	0.0079	0.16	5

Notes: Concentrations that are greater than the corresponding AAQC, CAAQS or Health Canada (HC) guidance value for DPM are denoted in bold.

(1) Maximum concentration calculated at 50 m from the road centerline.

(2) For simplification, the result represents the 1st highest 1-hour concentration and not the 88th highest 1-hour concentration as required from the CAAQS.



Table 9-24: Maximum Concentrations for Particulates and Dustfall Calculated For the Operation Phase

Pollutant	Applicable Standard	Averaging Period	Maximum Project Contribution (A) ⁽¹⁾		Background Concentration (B)		Total (A+B)		Limit Value (µg/m ³)
			µg/m ³	% limit	µg/m ³	% limit	µg/m ³	% limit	
Scenario – unpaved surface (no control)									
Total suspended matter (TSP)	AAQC	24-hour	1,392	1,160	45	38	1,437	1,197	120
	AAQC	Annual	100	167	4.0	6.7	104	173	60
Fine inhalable fraction (PM ₁₀)	AAQC	24-hour	506	1,013	28	56	534	1,069	50
Fine particulate matter (PM _{2.5}) ⁽²⁾	CAAQS	24-hour	31	135	13	57	44	191	23
	AAQC	24-hour	31	115	13	48	44	163	27
	CAAQS	Annual	4.7	59	4.7	59	9.4	118	8.0
	AAQC	Annual	4.7	54	4.7	53	9.4	107	8.8
Dustfall	AAQC	30-days	26	377	0.40	5.7	27	383	7.0
	AAQC	Annual	14	308	0.40	8.7	15	317	4.6
Scenario – unpaved surface (water control)									
Total suspended matter (TSP)	AAQC	24-hour	1,031	859	45	38	1,076	897	120
	AAQC	Annual	97	161	4.0	6.7	101	168	60
Fine inhalable fraction (PM ₁₀)	AAQC	24-hour	355	709	28	56	383	765	50
Fine particulate matter (PM _{2.5}) ⁽²⁾	CAAQS	24-hour	22	97	13	57	35	153	23
	AAQC	24-hour	22	82	13	48	35	131	27
	CAAQS	Annual	3.7	46	4.7	59	8.4	105	8.0
	AAQC	Annual	3.7	42	4.7	53	8.4	95	8.8
Dustfall	AAQC	30-days	19	264	0.40	5.7	19	270	7.0
	AAQC	Annual	11	234	0.40	8.7	11	243	4.6
Scenario – paved surface									
Total suspended matter (TSP)	AAQC	24-hour	97	81	45	38	142	118	120
	AAQC	Annual	16	26	4.0	6.7	20	33	60
Fine inhalable fraction (PM ₁₀)	AAQC	24-hour	45	89	28	56	73	145	50
Fine particulate matter (PM _{2.5}) ⁽²⁾	CAAQS	24-hour	4.6	20	13	57	18	76	23
	AAQC	24-hour	4.6	17	13	48	18	65	27
	CAAQS	Annual	1.0	13	4.7	59	5.7	71	8.0
	AAQC	Annual	1.0	12	4.7	53	5.7	65	8.8
Dustfall	AAQC	30-days	2.5	36	0.40	5.7	2.9	42	7.0
	AAQC	Annual	1.8	39	0.40	8.7	2.2	48	4.6

Notes: Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in bold.

(1) Maximum concentration calculated at 50 m from the road centerline.

(2) The results are compared with the CAAQS applicable starting in 2030 while for the AAQC, it is compared with the 2020 target.



Table 9-25: Maximum Concentrations in Areas of Interest for the Scenario with Unpaved Surface and Water Control During the Operation Phase

Sector or Receptor	TSP		PM ₁₀	PM _{2.5}		Dustfall		NO ₂
	24-hour	An	24-hour	24-hour	An	30-day	An	1-hour
Limit value (µg/m ³)	120	60	50	23	8.0	7.0	4.6	79
Project contribution (µg/m³)								
50 m from road centerline	1,031	97	355	22	3.7	19	11	18
150 m from road centerline	463	26	167	9.4	1.2	5.0	2.7	11
300 m from road centerline	329	16	114	5.8	0.77	2.6	1.5	7.3
Existing residences (RP01) ⁽¹⁾	43	1.6	28	1.5	0.11	0.23	0.11	1.9
Institutional buildings (I01) ⁽²⁾	35	1.4	24	1.5	0.10	0.21	0.10	1.7
Culturally sensitive areas ⁽³⁾								
CHL25 (60 m from RCL)	673	40	225	14	1.6	7.8	3.8	11
CHL05 (150 m from RCL)	231	19	114	6.9	0.93	2.6	1.7	5.0
CHL14 (200 m from RCL)	192	17	98	6.4	0.86	2.8	1.6	4.0
CHL28 (240 m from RCL)	190	8.6	92	5.0	0.48	1.3	0.69	5.8
Future residences ⁽⁴⁾								
RPF01 (site A) (1 km RCL)	43	1.6	29	1.5	0.11	0.23	0.12	1.9
RPF10 (site West) (2 km RCL)	38	1.2	25	1.3	0.085	0.17	0.082	1.5
RPF39 (site C) (100 m from RCL)	537	24	200	11	1.1	4.2	2.0	11
RPF42 (site D) (55 m from RCL)	675	54	243	15	2.1	11	5.8	11
Project contribution + background (µg/m³)								
50 m from road centerline	1,076	101	383	35	8.4	19	11	46
150 m from road centerline	508	30	195	22	5.9	5.4	3.1	39
300 m from road centerline	374	20	142	19	5.5	3.0	1.9	35
Existing residences (RP01) ⁽¹⁾	88	5.6	56	15	4.8	0.63	0.51	30
Institutional buildings (I01) ⁽²⁾	80	5.4	52	14	4.8	0.61	0.50	30
Culturally sensitive area ⁽³⁾								
CHL25 (60 m from RCL)	718	44	253	27	6.3	8.2	4.2	39
CHL05 (150 m from RCL)	276	23	142	20	5.6	3.0	2.1	33
CHL14 (200 m from RCL)	237	21	126	19	5.6	3.2	2.0	32
CHL28 (240 m from RCL)	235	13	120	18	5.2	1.7	1.1	34
Future residences ⁽⁴⁾								
RPF01 (site A) (1 km RCL)	88	5.6	57	15	4.8	0.63	0.52	30
RPF10 (site West) (2 km RCL)	83	5.2	53	14	4.8	0.57	0.48	30
RPF39 (site C) (100 m from RCL)	582	28	228	24	5.8	4.6	2.4	39
RPF42 (site D) (55 m from RCL)	720	58	271	28	6.8	11	6.2	39

Notes: Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in bold.

- (1) Closest receptor of this category from the road centerline (RCL) at 1,350 m. Results for other receptors located further away are in Appendix B within the Air Quality Impact Assessment Report (**Appendix G**).
- (2) Closest receptor of this category from the RCL at 1,800 m.
- (3) Only the results for culturally sensitive receptors located within 250 m of the RCL are presented.
- (4) Only the results for the receptors closest to the RCL for each future residence areas are provided.



Table 9-26: Maximum Concentrations in Areas of Interest For the Scenario with Paved Surface During the Operation Phase

Sector or Receptor	TSP		PM ₁₀	PM _{2.5}		Dustfall	
	24-hour	Annual	24-hour	24-hour	Annual	30-day	Annual
Limit value (µg/m ³)	120	60	50	23	8.0	7.0	4.6
Project contribution (µg/m ³)							
50 m from road centerline	97	16	45	4.6	1.0	2.5	1.8
150 m from road centerline	36	4.2	23	2.0	0.34	0.73	0.45
300 m from road centerline	25	2.5	17	1.3	0.22	0.42	0.26
Existing residences (RP01) ⁽¹⁾	3.1	0.25	3.0	0.35	0.033	0.028	0.019
Institutional buildings (I01) ⁽²⁾	3.0	0.22	2.9	0.30	0.029	0.023	0.016
Culturally sensitive areas ⁽³⁾							
CHL25 (60 m from RCL)	56	6.3	25	2.7	0.45	0.98	0.65
CHL05 (150 m from RCL)	20	3.1	12	1.5	0.27	0.46	0.30
CHL14 (200 m from RCL)	13	1.8	10	1.0	0.17	0.22	0.16
CHL28 (240 m from RCL)	15	1.4	10	1.2	0.14	0.18	0.12
Future residences ⁽⁴⁾							
RPF01 (site A) (1 km RCL)	3.4	0.26	3.0	0.35	0.033	0.028	0.019
RPF10 (site West) (2 km RCL)	2.7	0.18	2.5	0.29	0.024	0.020	0.013
RPF39 (site C) (100 m from RCL)	44	3.7	22	2.3	0.30	0.56	0.35
RPF42 (site D) (55 m from RCL)	60	8.5	23	3.1	0.58	1.4	0.97
Project contribution + background (µg/m ³)							
50 m from road centerline	142	20	73	18	5.7	2.9	2.2
150 m from road centerline	81	8.2	51	15	5.0	1.1	0.85
300 m from road centerline	70	6.5	45	14	4.9	0.82	0.66
Existing residences (RP01) ⁽¹⁾	48	4.3	31	13	4.7	0.43	0.42
Institutional buildings (I01) ⁽²⁾	48	4.2	31	13	4.7	0.42	0.42
Culturally sensitive area ⁽³⁾							
CHL25 (60 m from RCL)	101	10	53	16	5.2	1.4	1.0
CHL05 (150 m from RCL)	65	7.1	40	14	5.0	0.86	0.70
CHL14 (200 m from RCL)	58	5.8	38	14	4.9	0.62	0.56
CHL28 (240 m from RCL)	60	5.4	38	14	4.8	0.58	0.52
Future residences ⁽⁴⁾							
RPF01 (site A) (1 km RCL)	48	4.3	31	13	4.7	0.43	0.42
RPF10 (site West) (2 km RCL)	48	4.2	31	13	4.7	0.42	0.41
RPF39 (site C) (100 m from RCL)	89	7.7	50	15	5.0	0.96	0.75
RPF42 (site D) (55 m from RCL)	105	13	51	16	5.3	1.8	1.4

Notes: Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in bold.

(1) Closest receptor of this category from the road centerline (RCL) at 1,350 m. Results for other receptors located further away are in Appendix B within the Air Quality Impact Assessment Report (**Appendix G**).

(2) Closest receptor of this category from the RCL at 1,800 m.

(3) Only the results for culturally sensitive receptors located within 250 m of the RCL are presented.

(4) Only the results for the receptors closest to the RCL for each future residence areas are provided.



9.3.2 Change in GHGs

The GHG emission sources associated with the Project come essentially from the combustion of diesel fuel or gasoline from land mobile equipment, heavy-duty trucks and light-duty vehicles during the construction and operation phases of the WSR. As noted in **Section 9.1.6**, emissions of GHGs are generated by most project activities, and may result in a change in atmospheric GHGs. The pathways in which GHG emissions may occur are illustrated as follows:

- **Use of vehicles, machinery, and equipment for construction of the proposed road → Fuel combustion → Release of GHGs during construction phase**
- **Vegetation clearing activities → Removal of biomass/carbon stock → Release of GHGs during construction phase**
- **Vehicle use of the proposed road once constructed and use of vehicles, machinery, and equipment for road maintenance → Fuel combustion → Release of GHGs during operation phase**
- **Peatland ecosystem alteration during construction → Net variation of sequestered CO₂ and naturally-occurring CO₂ and CH₄ → Variation of GHGs during operation phase**

Estimated GHG emissions from the Project were compared to provincial and national GHG emissions since global GHG emissions are aggregated from inventories that fall under these jurisdictions.



Representatives of Indigenous communities raised a concern about the lack of the instructions to assess a project's impact – positive and negative – on carbon sinks, especially given the value of the peatlands in the region for carbon storage. Following the technical guide related to the Strategic Assessment for Climate Change (ECCC, 2021a), GHG emissions, including disturbed carbon sinks associated with biomass clearing (during construction) and land-use change emissions (during operations), have been estimated for the Project based on current preliminary engineering design and carbon stock estimates relevant to the general project area (refer to Section 9.3.2.1, Section 9.3.2.2, and Sections 3 and 4 within Appendix H – Greenhouse Gas Emissions Report).

9.3.2.1 Construction Phase

9.3.2.1.1 GHG Emission Sources During Construction Phase

The assessment covered direct GHG emission sources occurring on-site during the construction phase for the WSR including the aggregate pits and the access road. The assessment includes emissions related to fuel combustion but also from the removal of carbon stock from vegetation clearing activities.

The estimation of GHG emissions during the construction phase will include a period of five years and will include the mobilization/demobilization of workers to Webequie and their daily commute from the construction camps to the work area. The mobilization of construction equipment and consumables and demobilization of equipment and disposable materials at the end of the construction phase is also accounted for in this estimation. For the purpose of this estimation, mobilization and demobilization include travelling from the last point of departure or first point of arrival.

For the construction phase, the GHG emissions from the following sources/activities were estimated for a period of five years:

- Mobile land equipment including excavators, bulldozers, graders, rubber tire loaders, cranes, compactors, forklifts, and off-road service trucks not used for transportation purpose;
- Stationary fuel combustion equipment namely all internal combustion engines used to operate the generator sets, the crushing and screening plant, the concrete batching plant, the tower lights, and the water pumps. Heating systems used during winter are included in this category;
- Crew vehicles used to transport workers, mainly from construction camps to their work area;
- Heavy-duty transport trucks used to haul materials on-site including filling materials and aggregates from quarries to site. Geotextile and geogrids transportation to location are included in this category;
- Land mobilization and demobilization including the shipment of equipment and consumables via a winter road linking Pickle Lake to Webequie;
- Air travel for mobilizing and demobilizing workers living outside the Webequie community. A helicopter will be used to transport camp supplies and personnel to and from Webequie during summer. It will also be used to support the movement of personnel and material to the area where the WC-26 bridge crossing of the Muketei River will be constructed; and
- Carbon stock removal from living biomass (trees, shrubs) and the management of DOM. It also includes related CH₄ and N₂O from the controlled burning of these biogenic materials.

9.3.2.1.2 GHG Emissions Calculations for the Construction Phase

Section 3.1 in the Greenhouse Gas Emissions Report (Appendix H) provides details about the methods, inputs, and assumptions considered for the calculation of annual emissions of GHGs for the construction phase. Based on their different emission factors as summarized in **Section 9.1.4.2.2**, GHG emissions from the construction equipment and activities listed in **Section 9.3.2.1.1** were estimated using different calculation methods (refer to Section 3.1 in Appendix H – Greenhouse Gas Emissions Report).

9.3.2.1.3 GHG Emissions Results for the Construction Phase

Table 9-27 summarizes the GHG emissions expected during the construction phase subdivided amongst the planned five years of activities according to the method detailed in Section 3 in the Greenhouse Gas Emissions Report (Appendix H). The total GHG emissions (CO₂, CH₄ and N₂O) presented in CO₂-equivalent (CO₂e) are provided, as well as the biogenic CO₂ emissions, presented separately, linked to either the combustion of biofuel (ethanol, biodiesel) in fuel stocks but most importantly from biomass (living and dead) clearing and burning. The total emissions per gas are also available in Appendix A within the Greenhouse Gas Emissions Report (Appendix H).

A total of 52,493 t CO₂e was calculated with the second year showing the highest emissions (15,605 t CO₂/a) with about 80% coming from on-site fossil-fuel combustion (mobile, stationary, and trucking) and most of the remaining 20% coming from the burning of biomass and DOM generating CH₄ and N₂O. Overall, the GHG emissions are expected to come from, in order of importance: land mobile equipment (38%), heavy-duty trucks (33%), DOM combustion (12%), and others (17%).

A total of 57,602 tonnes of biogenic CO₂ is also expected coming mostly from the carbon stock in biomass (living and dead) that will be removed from site mainly by combustion but also in part from salvaged timber (wood logs) that may be provided for use by Webequie community members. From this total, 33% would come from the removal of living vegetation during clearing activities, 13% from dead trees, but most importantly 51% from litter as natural boreal forests with conifers tend to accumulate a lot of such material (needles, decomposing wood, foliage, etc.). This assessment considers that all



litter/low-lying brush will be piled and burned although there will be some litter that will remain to decompose on-site, the extent of which is difficult to determine.

A discussion on the GHG emissions estimated for the construction phase of the Project with respect to the provincial and national emissions is provided in **Section 9.5.2.2**.



Table 9-27: GHG Emissions per Source and Year of Realization for the Construction Phase

Source	Total GHG Emissions (t CO ₂ e) ⁽¹⁾						Total Biogenic CO ₂ Emissions (t CO ₂)					
	Y1	Y2	Y3	Y4	Y5	Total	Y1	Y2	Y3	Y4	Y5	Total
Mobile land equipment	4,449	5,816	4,520	2,978	1,923	19,686	125	164	127	84	54	554
Stationary fuel combustion	1,124	1,504	1,172	501	373	4,674	32	43	33	14	11	133
Crew vehicles	66	155	162	67	54	504	3.1	7.4	7.8	3.2	2.6	24
Heavy-duty trucks	382	3,293	4,763	5,295	3,447	17,179	11	93	134	150	97	485
Land mobilization and demobilization	368	257	323	173	195	1,316	10	7.3	9.1	4.9	5.5	37
Air travel	50	55	119	25	28	278	0	0	0	0	0	0
Living biomass clearing	1,396	1,382	0	0	0	2,778	9,610	9,517	0	0	0	19,127
Dead organic matter clearing (DOM)	2,934	3,143	0	0	0	6,078	17,982	19,262	0	0	0	37,244
TOTAL	10,769	15,605	11,059	9,040	6,020	52,493	27,773	29,093	312	256	170	57,604

Notes:

(1) Includes the combined emissions of fossil-related CO₂, CH₄ and N₂O. Individual gas emissions are available in Appendix A within the Greenhouse Gas Emissions Report (Appendix H).



9.3.2.2 Operation Phase

9.3.2.2.1 GHG Emission Sources During Operation Phase

For the operation phase, the GHG emissions from following sources were estimated on an annual basis:

- Private / commercial and heavy-duty vehicles travelling on the road on a daily basis;
- Road maintenance equipment (mobile, truck);
- Generator sets used at the aggregate pit (ARA-4) and the MSF for power supply; and
- Net GHG emissions changes from mineral soil and peatland due to disturbances caused by the Project.

9.3.2.2.2 GHG Emissions Calculations for the Operation Phase

Section 3.2 in the Greenhouse Gas Emissions Report (Appendix H) provides details about the methods, inputs, and assumptions considered for the calculation of annual emissions of GHGs for the operation phase. Based on their different emission factors as summarized in **Section 9.1.4.2.2**, GHG emissions from the following types of operation activities were estimated using different calculation methods (refer to Section 3.2 in Appendix H – Greenhouse Gas Emissions Report):

- Vehicular traffic;
- Road maintenance equipment; and
- Land-use change emissions.

9.3.2.2.3 GHG Emissions Results for the Operation Phase

Table 9-28 summarizes the annual GHG emissions for the operation phase which amount to 8,927 t CO₂e/a with 51% coming from projected road traffic. The power diesel generator set at the new MSF is the second largest source representing 43% of the total according to the assessment. On the other hand, the net GHG emissions due to land-use changes reach 1,875 t CO₂e per year combining the net CH₄ and CO₂ emissions from disturbed soil, the loss of living biomass and peatlands backfilling. The oxidation of carbon from disturbed soil into CO₂ is the main source.

A discussion on the GHG emissions estimated for the operation phase of the Project with respect to the provincial and national emissions is provided in **Section 9.5.2.2**.

Table 9-28: Annual GHG Emissions per Source for the Operation Phase

Source	Annual GHG Emissions ⁽¹⁾ (t CO ₂ e/a)	Annual Biogenic CO ₂ Emissions (t CO ₂ /a)
Road Traffic	4,517	170
Road Maintenance (trucks)	301	8.5
Road Maintenance (mobile equipment)	410	12
Road Maintenance (stationary fuel combustion)	3,824	109
Land-Use Changes (mineral soil disturbance)	0	1,338
Land-Use Changes (biomass carbon accumulation loss)	0	458
Land-Use Changes (peatlands net emissions)	-125	203
TOTAL	8,927	2,297

Notes:

- (1) Includes the combined emissions of fossil-related CO₂, CH₄ and N₂O. Individual gas emissions are available in Appendix A within the Greenhouse Gas Emissions Report (Appendix H).



9.3.3 Change in Sound Levels

The project construction and operation activities that involve blasting and use of vehicle, machinery and equipment will increase noise. The pathways in which such changes may occur are illustrated as follows:

- **Blasting activities → Increased noise during the construction and operation phases**
- **Use of vehicles, machinery, and equipment at aggregate extraction sites → Increased noise during construction and operation phases**
- **Use of vehicles, machinery and, equipment for construction of the proposed roadway and waterbody crossings → Increased noise during the construction phase**
- **Traffic noise from vehicle use of the proposed road once constructed → Increased noise during the operation phase**

Potential effects of noise (i.e., 'sensory disturbance') on wildlife and the use of recreational and traditional land and resource use are discussed in Section 12 (Assessment of Effects on Terrestrial Habitat and Wildlife), Section 13 (Assessment of Effects on Species at Risk), Section 16 (Non-Traditional Land and Resource Use), and Section 19 (Aboriginal and Treaty Rights and Interests). Sensory disturbance from changes in noise and vibration levels has the potential to affect human health which is assessed in Section 17 (Assessment of Effects on Human Health).

The following subsections include assessments of noise effects due to blasting and use of vehicle, machinery and equipment during construction and operation phases on noise sensitive areas ("NSAs") applicable to the Project.



Indigenous community members prefer to harvest in areas where it is quiet. Increased noise in harvesting areas may increase physical disturbance and impact harvesting activities.

Information on potential receptor locations provided through IKLRU program, desktop review and other means was used to characterize the existing conditions and to assess potential effects of noise and vibration from the Project.

In establishing the potential operational and construction noise impacts of a project such as the WSR, comparisons are made of the following:

- Noise from construction and operations of the roadway, versus various applicable guidelines; and
- The change from existing conditions, which results from the construction and operations of the Project.

9.3.3.1 Increased Noise During Construction Phase

9.3.3.1.1 Construction Noise Effects – Blasting

Blasting of rocks with explosives is required to create desired road profiles and to extract rocks and granular for construction and maintenance/operations of the WSR. Blasting of rock is expected to be limited to ARA-2 for extraction and processing rock and aggregate and one small rock outcrop along the preliminary recommended preferred route for the WSR. Based on the relatively low volumes of rock needed for the Project, blasting of rock requiring the use of explosives during construction and operation activities is expected to occur on an infrequent basis when aggregate and/or rock materials are required for construction and maintenance activities. Exact locations and the blast designs for the Project's blasting activities are currently unknown. Noise generated by blasting is expected to be temporary and

the potential effects will be centered around blasting locations. To address the potential noise effects from blasting, it is proposed that a Construction Blasting Management Plan for the Project will be prepared by applicable contractor(s) prior to initiation of blasting activities. The plan will include a requirement for controlling peak overpressure sound levels to meet the blasting noise guidelines and criteria outlined in **Table 9-29** and **Table 9-30**.

Table 9-29: Construction Phase Blasting Noise Guidelines

Project Component	Applicable Guideline	Metrics Considered
All project components	MECP Publication NPC-119 – Blasting	Peak Overpressure

Table 9-30: Construction Phase Overpressure Sound Level Limits

Criteria	Medium	Limit
MECP Publication NPC-119 – Blasting	Air	<ul style="list-style-type: none"> ▪ Peak sound pressure limit of 120 dBL, in the absence of noise monitoring ▪ Peak sound pressure limit of 128 dBL, with noise monitoring

9.3.3.1.2 Construction Noise Effects – Aggregate Extraction Sites

Construction of the WSR will require aggregates, which will be obtained from two aggregate extraction sites, located along the WSR route (referred to as aggregate resource areas ARA-2 and ARA-4). Locations of ARA-2 and ARA-4 are shown in **Figure 9.3**. ARA-2 will be fully used for construction of the Project over a five-to-six-year period, and the site will be progressively rehabilitated (restored to its previous condition) during the construction phase. ARA-4 will be developed to provide material for construction of the road and will also serve as a source of aggregate to maintain and operate the road on an annual basis for the assumed 75-year operation and maintenance life cycle period for the Project.

Noise modelling was conducted by SLR Consulting Ltd. to predict sound levels from the aggregate extraction sites, in accordance with the requirements of MECP Publication NPC-300 Stationary Source Noise Guidelines. Predicted sound levels were modelled at the closest NSAs to ARA-2 and ARA-4. Where there were no noise sensitive receptors within 1.5 km of the boundary of the aggregate resource areas, the point of reception used in the assessment was a 1.5 km radius from ARA-2 or ARA-4 as per AER Directive 038/Health Canada Guidelines². The following subsections summarize the guideline requirements and modelling results. Details of the noise modelling are provided in Appendix J – Noise and Vibration Impact Assessment Report.

MECP Publication NPC-300 Stationary Source Noise Guidelines

Noise from the aggregate extraction sites were modelled as a “stationary” sources of sound, in accordance with the requirements of MECP Publication NPC-300. The guideline sets out sound level limits for two main types of noise sources:

- Non-impulsive, “continuous” noise sources such as ventilation fans, mechanical equipment, and vehicles while moving within the property boundary of an industry. Continuous noise is measured using 1-hour average sound exposures (L_{eq} (1-hr) values), in dBA; and

² From Alberta Energy Regulator (AER) Directive 038: Noise Control, which is referenced in the Health Canada Guidelines.

- Impulsive noise, which is a “banging” type noise characterized by rapid rise time and decay. Impulsive noise is measured using a logarithmic mean (average) level (L_{LM}) of the impulses in a one-hour period, in dBA.

Furthermore, the guideline requires an assessment, and provides separate guideline limits for:

- Outdoor points of reception (e.g., back yards, communal outdoor amenity areas); and
- Façade points of reception such as the plane of windows on the outdoor façade which connect onto noise sensitive spaces, such as living rooms, dens, eat-in kitchens, dining rooms and bedrooms.

The applicable sound level limits at a point of reception are the higher of:

- The existing background ambient sound levels, or
- The exclusion limits set out in the guideline.

The guidelines define four area classifications dependent on the proximity to roads/rail-lines, nature of land uses and activities in the area. The four classifications are as follows:

- **Class 1** means an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as “urban hum.”
- **Class 2** means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 areas:
 - sound levels characteristic of Class 1 during daytime (07:00 to 19:00 or to 23:00 hours); and;
 - low evening and night background sound level defined by natural environment and infrequent human activity starting as early as 19:00 hours (19:00 or 23:00 to 07:00 hours).
- **Class 3** means an area which can be described as “a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic.”
- **Class 4** means an area or specific site that would otherwise be defined as Class 1 or 2 and which:
 - is an area intended for development with new noise sensitive land-use(s) that are not yet built;
 - is in proximity to existing, lawfully established stationary source(s); and
 - has formal confirmation from the land-use planning authority (e.g., Webequie Community Based Land-Use Plan) with the Class 4 area classification which is determined during the land-use planning process.

Additionally, areas with existing noise sensitive land-use(s) cannot be classified as Class 4 areas.

The noise study area for the Project is considered a rural area and is defined as **Class 3**. **Table 9-31** outlines the exclusion limits set out in the guidelines for **Class 3**.



Table 9-31: MECP Publication NPC-300 Exclusion Limits for Class 3 Rural Areas

Time of Day	Non-Impulsive Noise (L_{eq} (1hr) Values, dBA)		Impulsive Noise (L_{LM} Values, dBA)		
	Plane of Windows of Noise Sensitive Spaces	Outdoor Points of Reception	No. of Impulses in a 1-hour Period	Plane of Windows of Noise Sensitive Spaces	Outdoor Points of Reception
7 am to 7 pm	45	45	9 or more	45	45
			7 to 8	50	50
			5 to 6	55	55
			4	60	60
			3	65	65
			2	70	70
			1	75	75
7 pm to 11 pm	40	40	9 or more	45	45
			7 to 8	50	50
			5 to 6	55	55
			4	60	60
			3	65	65
			2	70	70
			1	75	75
11 pm to 7 am	40	n/a	9 or more	40	n/a
			7 to 8	45	n/a
			5 to 6	50	n/a
			4	55	n/a
			3	60	n/a
			2	65	n/a
			1	70	n/a

Noise Impact Modelling Methods – Aggregate Extraction Site Operations

Operations at the aggregate extraction sites were modelled using Cadna/A, a computerized version of the internationally recognized ISO 9613-2 noise propagation algorithms. This is the preferred noise modelling methodology of the MECP. Detailed descriptions of the inputs and assumptions for the model parameters are included in Appendix 10 – Noise and Vibration Impact Assessment Report.

The aggregate extraction sites are assumed to be in operation during the daytime between 7 am and 7 pm. To represent a worst-case simulation of the noise emissions, the crusher/screener, stackers, and front-end loaders were assumed to be in operation continuously throughout the daytime. A total of ten (10) heavy shipping trucks were assumed to enter and exit the aggregate extraction sites during each hour.

Assumed Noise Sources







The detailed design of the aggregate extraction sites has not progressed to the point where actual equipment selections have been made. Based on the information provided in the Planning & Construction Input for Road & Supportive Infrastructure report completed by Sigfusson Northern Ltd. (2023) for the Project, assumptions have been made for equipment used at each site.

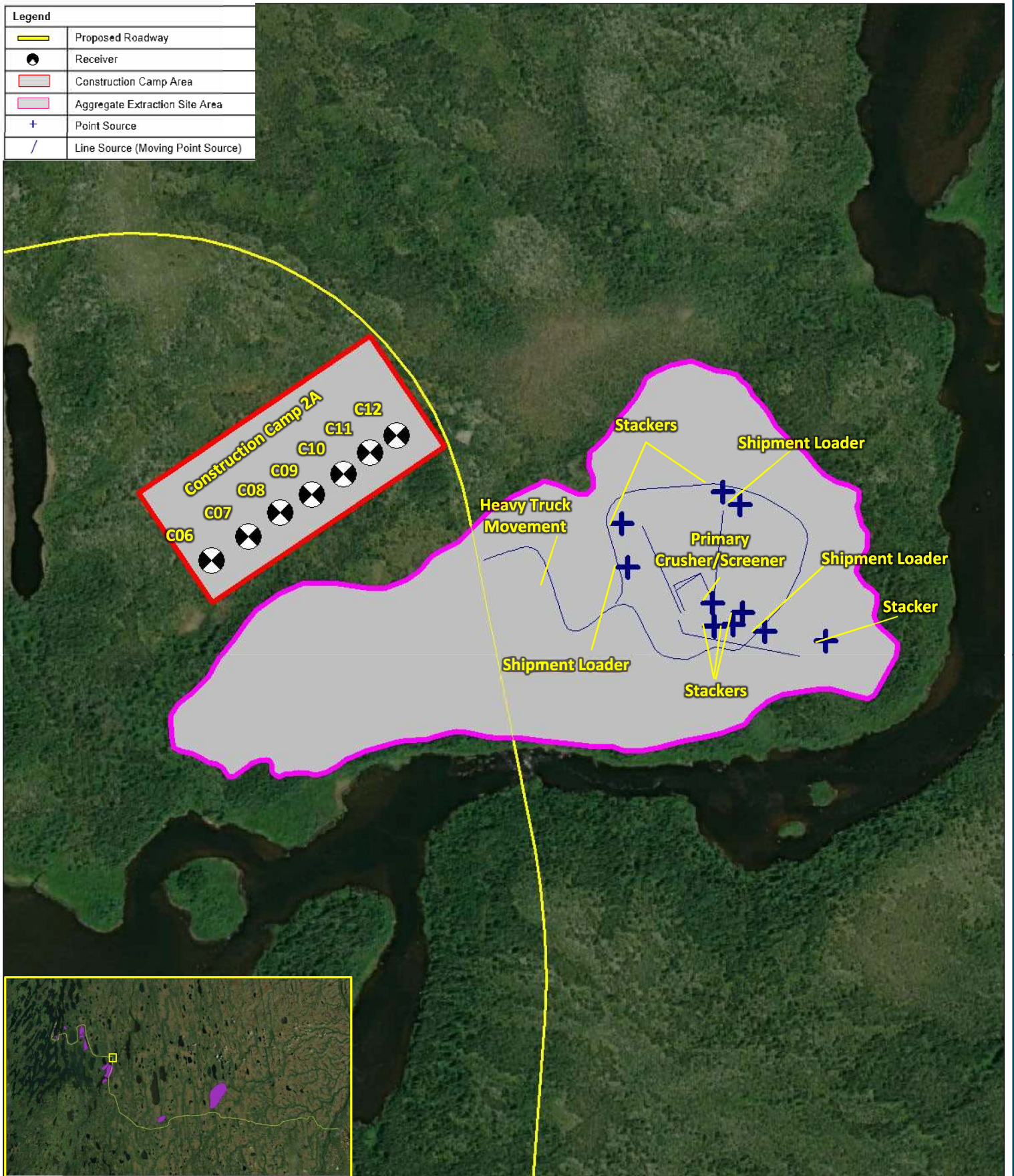
The following key noise sources are assumed:

- One (1) primary crusher with associated screener;
- Six (6) stackers;
- Three (3) front-end loaders;
- Movement of material through conveyors; and
- Movement of heavy trucks throughout the aggregate extraction sites carrying material.

The assumed locations of the key noise sources at the aggregate extraction sites ARA-2 and ARA-4 for the Noise Impact Modelling are shown in **Figure 9.9** and **Figure 9.10** (same as Figure N4 and Figure N5 in Appendix J – Noise and Vibration Impact Assessment Report), respectively. The sound levels for the noise sources listed above were assumed based on SLR Consulting Ltd.'s in-house database for similar types of equipment. The data used in the Noise Impact Modelling are provided in Appendix N5 of the Noise and Vibration Impact Assessment Report (Appendix J of this EAR/IS).



Legend	
	Proposed Roadway
	Receiver
	Construction Camp Area
	Aggregate Extraction Site Area
	Point Source
	Line Source (Moving Point Source)








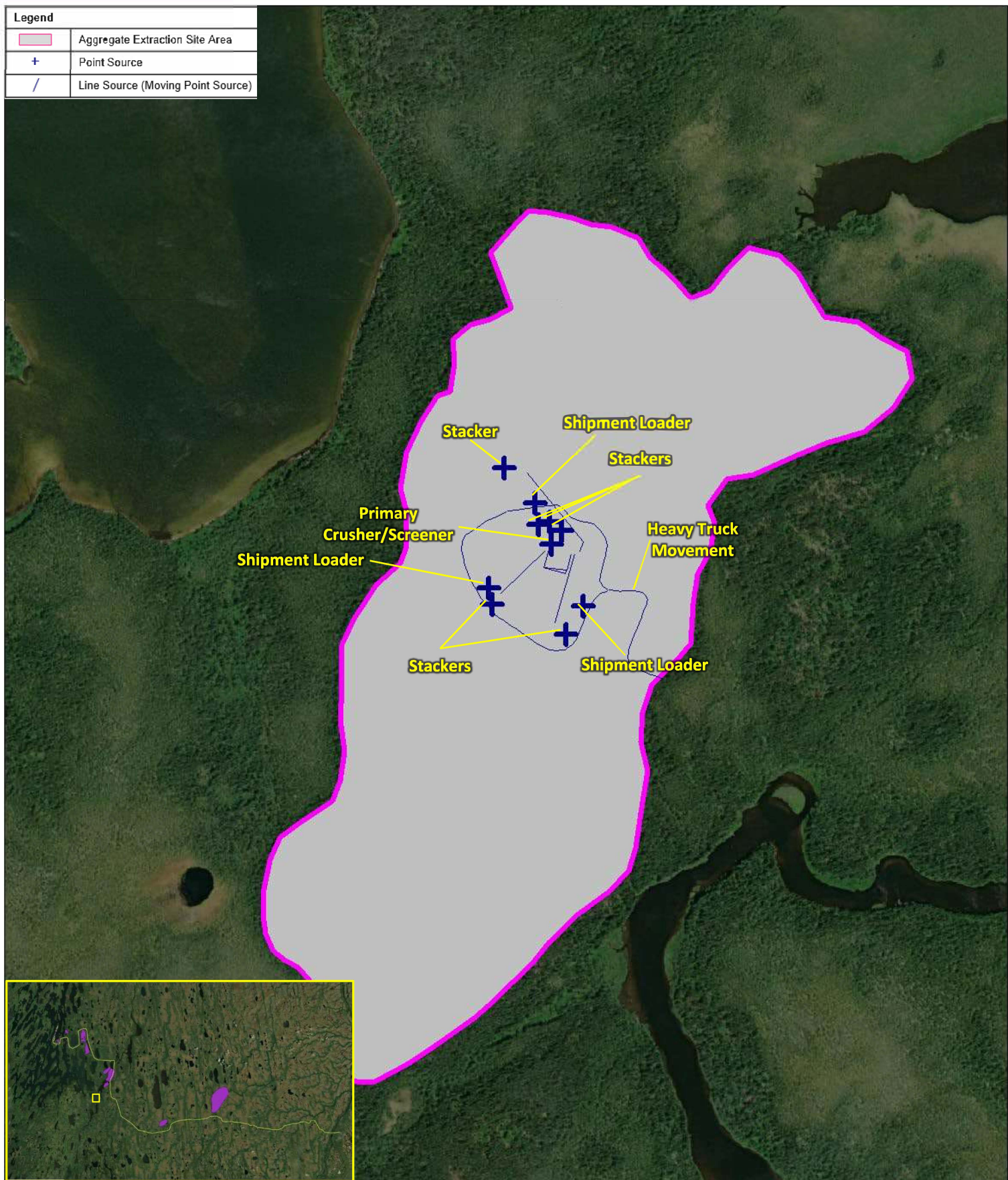




WEBEQUIE FIRST NATION Noise and Vibration Technical Report NOISE SOURCE LOCATIONS – AGGREGATE EXTRACTION SITE ARA-2		Scale: 1:7,500 METRES		
		Date: May 31, 2024		Rev 1.0
		Project No. 241.20141.00000		

Figure No.
9.9

Legend	
	Aggregate Extraction Site Area
	Point Source
	Line Source (Moving Point Source)



WEBEQUIE FIRST NATION Noise and Vibration Technical Report NOISE SOURCE LOCATIONS – AGGREGATE EXTRACTION SITE ARA-4	 True North	Scale: 1:10,000 METRES		
		Date: May 31, 2024 Rev 1.0		Figure No. 9.10
		Project No. 241.20141.00000		

Noise Impact Modelling Results – Aggregate Extraction Site Operations

The predicted sound levels at each receptor are summarized in **Table 9-32** for continuous noise from the aggregate extraction sites ARA-2 and ARA-4. The Noise and Vibration Impact Assessment Report (Appendix J) includes more details of the results from the Noise Impact Modelling such as predicted sound level contours and a sample modelling output file for the noise sensitive area C06 (Construction Camp 2A).

Table 9-32: Predicted Stationary Sound Levels – Aggregate Extraction Site Operations

NSA Location	Aggregate Extraction Site	Description	Predicted Sound Levels L _{eq} (1-hr) (dBA)	Performance Limits L _{eq} (1-hr) (dBA)	Investigation of Noise Mitigation Required? (Yes/No)
			Daytime	Daytime	
CHL-24	ARA-4	Culturally Sensitive Area – Gooseberries	31	45	No
CHL-25		Culturally Sensitive Area – Fishing	30	45	No
CHL-28		Culturally Sensitive Area – Gooseberries	24	45	No
C06	ARA-2	Construction Camp 2A – Receptor 6	45	45	No
C07		Construction Camp 2A – Receptor 7	46	45	Yes
C08		Construction Camp 2A – Receptor 8	47	45	Yes
C09		Construction Camp 2A – Receptor 9	48	45	Yes
C10		Construction Camp 2A – Receptor 10	48	45	Yes
C11		Construction Camp 2A – Receptor 11	49	45	Yes
C12		Construction Camp 2A – Receptor 12	49	45	Yes

As noted in **Table 9-32**, the predicted sound levels exceed NPC-300 guideline limits at Construction Camp 2A located near ARA-2, by a maximum of 4 dB. Given workers will be in the field during the daytime, the exceedances are minor and considered negligible. The overall sound levels are not excessive and would meet the NPC-300 guideline limits in a suburban or semi-rural area (50 dBA). Noise mitigation beyond best management practices for construction is not warranted.

9.3.3.1.3 Construction Noise Effects – General Construction Activities



Results of the Noise Impact Modelling indicate that the most affected noise sensitive locations are found within 150 m of the proposed roadway, or 300 m of a waterbody crossing (involving pile driving/bridge construction). Noise impacts from roadway construction are only expected to affect identified noise sensitive locations for approximately one week based on an approximate 100 m/day rate of construction.

As construction of the roadway proceeds along the route, there will be a number of different activities taking place, including clearing of vegetation, removal of overburden, compaction of subgrades, addition and compaction of base course and final courses of aggregate, and construction of bridges for waterbody crossings.

Noise modelling was conducted by SLR Consulting Ltd. to predict sound levels from roadway construction and bridge construction. The following subsections summarize the applicable guidelines and modelling results. Details of the noise modelling are provided in Appendix J – Noise and Vibration Impact Assessment Report.

Applicable Guidelines

Table 9-33 outlines noise guidelines that have been considered in the assessment of construction noise impacts. The following subsections provide an overview of the criteria and limits set out by these guidelines.

Table 9-33: Construction Phase Noise Guidelines

Project Component	Applicable Guideline	Metrics Considered
All project components	Health Canada Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise	L _D , L _N , L _{DN}
	MECP Publication NPC-115 – Construction Equipment	L _{max} at 15 m
	MECP Publication NPC-118 – Motorized Conveyances	L _{max} at 15 m

Health Canada Noise Guidelines

Health Canada considers two separate scenarios for evaluating construction noise, based on predicted L_D and L_N sound levels.

Short-term Construction Noise (Less than 1 Year)

Health Canada suggests that for construction activities lasting less than a year, the construction noise assessment should follow approaches recommended by the U.S. EPA document *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (1974). This technique is based on estimating a Mitigation Noise Level (MNL) based on community type and baseline sound level. Correction factors are then applied based on the type of construction, duration, etc.

For rural environments, Health Canada recommends using a base MNL of 47 dBA. **Table 9-34** describes correction factors considered for short-term construction noise.

Table 9-34: Construction Mitigation Noise Level (MNL) Corrections

Description	Correction to MNL
Construction duration less than two months	+ 10 dB
Winter (or windows always closed)	+ 5 dB
Negligible tonal or impulsive noise	+ 5 dB

Long-term Construction Noise (More than 1 Year)

Health Canada suggests that for construction activities longer than 1 year, mitigation be implemented when sound levels during long-term construction result in a greater than 6.5% increase in %HA. Community consultation is recommended if sound levels continue to exceed a 6.5% increase in %HA (Percent Highly Annoyed) even with mitigation installed.

MECP Publication NPC-115 and NPC-118 Construction Equipment Noise Emission Limits

MECP stipulates limits on noise emissions from individual items of equipment, rather than for overall construction noise. In the presence of persistent noise complaints, sound emission standards for the various types of construction equipment used on the project should be checked to ensure that they meet the specified limits contained in MECP Publication NPC-115 – Construction Equipment, and MECP Publication NPC-118 – Motorized Conveyances.

Table 9-35 summarizes maximum noise emission levels for typical construction equipment as specified in MECP Publication NPC-115 and NPC-118.

Table 9-35: Construction Equipment

Type of Unit	Maximum Sound Level ¹ (dBA)	Distance (m)	Power Rating (kW)
Excavation Equipment ²	83	15	< 75
	85	15	> 75
Pneumatic Equipment ³	85	7	-
Portable Compressors	76	7	-
Diesel Powered Trucks	95	15	-

Notes:

¹ Maximum permissible sound levels presented here are for equipment manufactured after Jan. 1981.

² Excavation equipment includes bulldozers, backhoes, front-end loaders, graders, excavators, steam rollers and other equipment capable of being used for similar applications.

³ Pneumatic equipment includes pavement breakers.

Noise Impact Modelling Methods – General Construction Activities (Roadway and Bridge Construction)

Noise generated by construction activities were modelled using Cadna/A, a computerized version of the internationally recognized ISO 9613-2 noise propagation algorithms. This is the preferred noise modelling methodology of the MECP. Detailed descriptions of the inputs and assumptions for the model parameters are included in Appendix J – Noise and Vibration Impact Assessment Report.

Assumed Noise Sources

Based on the information provided in the Planning & Construction Input for Road & Supportive Infrastructure report completed by Sigfusson Northern Ltd. (2023), assumptions have been made for equipment used for the construction of the WSR and associated waterbody crossings. Road construction equipment and activities are expected to consist of the following:

- Roadway Construction
 - Removal of Overburden
 - Excavator: one unit on a single day, assumed to operate 40% of the daytime;



- Haul Trucks: up to 3 units on a single day, assumed to operate 100% of the daytime;
- Dozer: one unit on a single day, assumed to operate 40% of the daytime; and
- Scraper: one unit on a single day, assumed to operate 40% of the daytime.
- Compaction of Subgrade
 - Compactor: up to 2 units on a single day, assumed to operate 20% of the daytime.
- Base Course
 - Front-end loaders: up to 2 units on a single day, assumed to operate 40% of the daytime;
 - Dozer: one unit on a single day, assumed to operate 40% of the daytime; and
 - Haul trucks: up to 4 units on a single day, assumed to operate 100% of the daytime.
- Compaction of Base Course
 - Compactor: one unit on a single day, assumed to operate 20% of the daytime; and
 - Grader: one unit on a single day, assumed to operate 40% of the daytime.
- Surface Course
 - Backhoe: up to 2 units on a single day, assumed to operate 40% of the daytime;
 - Haul Trucks: up to 3 units on a single day, assumed to operate 100% of the daytime; and
 - Roller: one unit on a single day, assumed to operate 20% of the daytime.
- **Bridge Construction**
 - Construction of Embankments
 - Backhoe: one unit on a single day, assumed to operate 40% of the daytime;
 - Haul Trucks: up to 3 units on a single day, assumed to operate 100% of the daytime;
 - Excavator: one unit on a single day, assumed to operate 40% of the daytime;
 - Dozer: one unit on a single day, assumed to operate 40% of the daytime;
 - Scraper: one unit on a single day, assumed to operate 40% of the daytime; and
 - Compactor: one unit on a single day, assumed to operate 20% of the daytime.
 - Construction of Bridge
 - Backhoe: one unit on a single day, assumed to operate 40% of the daytime;
 - Man Lift: one unit on a single day, assumed to operate 20% of the daytime;
 - Haul Trucks: up to 3 units on a single day, assumed to operate 100% of the daytime;
 - Impact Pile Driver: one unit on a single day, assumed to operate 20% of the daytime; and
 - Crane: one unit on a single day, assumed to operate 16% of the daytime.

The Noise Impact Modelling predicted sound levels at the surrounding NSAs for construction related noise from bridge construction activities at waterbody crossings: WB-1 at Winisk Lake (Six Span Composite Steel Bridge), WC-3 at Winiskisis Channel (Twin-Span Steel Bridge), and WC-13 at a tributary of the Ekwan River (Single Span Composite Steel Bridge) of the WSR. These two bridge locations were selected as the locations within 1.5 km of an NSA as per AER Directive 038/Health Canada Guidelines.

Noise Impact Modelling Results – Predicted Stationary Sound Levels for Roadway Construction

The assessment of short-term community annoyance is based on the MNL. An investigation into noise mitigation is warranted if the L_{DN} predicted is above 47 dBA. The highest predicted sound levels at the culturally sensitive areas CHLs 5, 7, 17, and 25 are between 49 and 57 dBA, exceeding the MNL threshold of 47 dBA (L_{DN}). The predicted sound levels at the surrounding NSAs from the construction of



the WSR are provided in Table 17 in the Noise and Vibration Impact Assessment Report (Appendix J). The most affected NSAs are found within 150 m of the roadway. There are no exceedances predicted for the existing permanent residences within the Webequie community.

Noise impacts from roadway construction are only expected to affect noise sensitive receptors for approximately one week based on an approximate 100 m/day rate of construction. As such, noise mitigation beyond best management practices for construction is not warranted.

Noise Impact Modelling Results – Predicted Stationary Sound Levels for Bridge Construction

The assessment of short-term community annoyance is based on MNL. An investigation into noise mitigation is warranted if the L_{DN} predicted is above 47 dBA. The predicted sound levels at the surrounding NSAs for construction related noise from bridge construction activities at representative waterbody crossings are provided in Table 18 in the Noise and Vibration Impact Assessment Report (Appendix J).

Noise impacts from the bridge construction are expected to exceed the 47 dBA threshold at the culturally sensitive area CHL-7 and Construction Camp 1A site C05. The sound levels are moderate (53 dBA and 48 dBA respectively). The most affected NSAs are found within 300 m of a waterbody crossing (involving pile driving/bridge construction). There are no exceedances predicted for the existing permanent residences within the Webequie community. As such, noise mitigation beyond best management practices for construction is not warranted.

9.3.3.2 Increased Noise During Operation Phase

For transportation projects, operational noise is of primary importance. This section provides an analysis of operational noise impacts from road traffic noise related to the Project. It is expected that infrequent blasting at aggregate extraction site ARA-4 may be required to maintain stockpiles of rock for road maintenance and repairs; however, this would not be considered a routine activity associated with the operations and maintenance phase. Regardless, blasting mitigation presented for application during the construction phase would also apply to the blasting activities during the operation and maintenance phase.

9.3.3.2.1 Applicable Noise Guidelines

There are a number of applicable noise guidelines addressing the potential for environmental noise and vibration impacts from the Project. The guidelines which have been considered for operational noise in this assessment are outlined in **Table 9-36** and described in the following subsections.

Table 9-36: Operations Phase Noise Guidelines

Project Component	Applicable Guideline	Metrics Considered
Road	MTO Environmental Guide for Noise	L_{eq} Day
	Health Canada Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (the Health Canada Guideline)	L_{DN} , L_D , L_N , L_{max} , Change in Percent Highly Annoyed (%HA)
Permanent Aggregate/Bedrock Extraction Site	MECP Publication NPC-300, Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (Publication NPC-300)	L_{eq} (1hr), during operating period



MTO Environmental Guide for Noise

Ontario’s most relevant and recent guideline/document related to assessing road traffic noise impacts is the MTO Environmental Guide for Noise.

The MTO Environmental Guide for Noise is used for provincially owned and operated facilities and is the most extensive and up-to-date. Under this guideline, the importance of changes from a noise impact perspective is based on the objective level and change from existing conditions. Cumulative sound levels are assessed. The MTO Environmental Guide for Noise is based on:

- The change from existing “no-build” background sound levels, and the “future build” sound levels with the project in place (background sound levels plus project sound levels³); as well the Provincial Objective for outdoor sound levels of 55 dBA. Changes greater than 5 dBA require an investigation of noise mitigation.
- The maximum “future build” sound levels. Sound levels in excess of 65 dBA require an investigation of noise mitigation.

Table 9-37 summarizes the requirements for investigation of noise mitigation measures.

Table 9-37: MTO Environmental Guide for Noise

Proposed Improvements/Project Future Build Noise Levels	Noise Mitigation Effort Required
< 5 dB change & < 65 dBA	None
> 5 dB change OR > 65 dBA	<ul style="list-style-type: none"> ▪ Investigate noise control measures within ROW. ▪ Noise control measures where used must provide a minimum of 5 dBA of attenuation, averaged over the first row of receivers. ▪ Mitigated to as close to ambient as possible, where technically, economically and administratively feasible.

Notes: Values are L_{eq} Day levels for municipal roads and provincial highways, and L_{eq} (24h) for freeways.

Health Canada Noise Guidelines

Health Canada’s Noise Guidelines for operational noise are based on three main parameters:

- The change in “Percent Highly Annoyed” (%HA) due to project operations. This is calculated based on the change from existing “no-build” background sound levels, and the “future build” sound levels with the project in place (background sound levels plus project sound levels).
- Indoor night-time average sound levels should not exceed 30 dBA (10 pm to 7 am); and
- Maximum indoor sound levels from individual events should not exceed 45 dBA and the number of events occurring during the overnight period should not exceed 10 to 15 events (10 pm to 7 am).

³ Project noise will include noise from roadway operations and noise from the aggregate extraction site.

Health Canada assesses annoyance based on the concept of Percent Highly Annoyed (%HA), which is an aggregate measure of community annoyance, based on sound levels received, the types of noise, and other aggregating factors. The calculated %HA provides information on how an average community responds to a sound level. It is important to emphasize that these annoyance responses are not applicable to a particular individual or group but represent an average community.

The Health Canada Guidelines use the dose-response relationship between sound levels and annoyance, as per ISO 1996-1:2003, based on measured and/or predicted L_{DN} values, in dBA.

The %HA value for the existing background ambient sound levels (i.e., the “no-build” situation) is calculated, as is the %HA for cumulative sound level with the Project in operation (the “build” scenario). Health Canada identifies a change in %HA of greater than 6.5% as being indicative of a noise impact. Noise mitigation measures should be investigated in this situation.

Health Canada required that mitigation be investigated for “build scenario” L_{DN} sound levels in excess of 75 dBA, regardless of the change in %HA.

The relationship between noise and %HA is non-linear in nature. At higher sound levels, there can be a substantial increase in the %HA, with relatively small changes in the noise environment; correspondingly, at lower sound levels far greater changes in sound levels may be required to substantially change the estimated %HA. At moderate sound levels, a 6.5% change in %HA corresponds to a 5 dB change, equivalent to the mitigation thresholds in the MTO Environmental Guide for Noise. In situations where greater expectation for, and value placed on, “peace and quiet”, such as in rural areas, Health Canada recommends that a +10 dB adjustment be placed in project sound levels to avoid underpredicting impacts.

In evaluating indoor night-time sound levels, a conservative adjustment of -15 dBA will be applied as appropriate to account for attenuation through open windows in accordance with the Health Canada Guidelines.

9.3.3.2.2 Road Traffic Data

The evaluation of noise impacts is determined by the change in cumulative sound levels from the 2041 “no-build” scenario to the future “build” scenario. Assessments are based on a mature state of development or at the start of construction. Accordingly, a design year of 2041 applies to this Project.

Traffic information for the 2041 “no-build” and “build” scenario for multiple roadways was provided by AtkinsRéalis. The data were further summarized in **Table 9-38**. Traffic data were provided as Average Annual Daily Traffic, with the percentage of commercial vehicles, day/night traffic split and posted speeds.

Table 9-38: 2041 "Build" Traffic Information at Anticipated Date of Construction

Roadway	Average Annual Daily Traffic	Day/Night Split (% / %) ¹	%Heavy Trucks	Speed (km/h)
Webequie Supply Road	500	90	25%	80

Notes: ¹ Daytime/Night-time traffic volume split of 90% daytime (7 am to 11 pm) and 10% night-time was assumed based on traditional day/night breakdown for low-volume Ontario roadways.



9.3.3.2.3 Noise Modelling Methods

Noise modelling was completed to predict noise generated from the operations of the WSR.

Roadway Noise Model

Sound levels from the proposed roadway was predicted using Cadna/A, a noise computer modelling package produced by Datakustik GmbH. Cadna/A includes a computerized implementation of the internationally recognized ISO 9613 noise propagation algorithms, and accounts for:

- Source and receiver geometries and distances;
- Source directivity;
- Screening from terrain and purpose-built noise barriers;
- Attenuation from woods and heavily forested areas;
- Ground attenuation due to soft terrain;
- Atmospheric absorption; and
- Worst-case meteorological conditions.

The WSR traffic near the identified NSAs was modelled as a “moving point source” of sound.⁴ “Future Build” sound levels (i.e., with the WSR in operation) will be predicted at the NSAs. The following levels will be determined:

- Overall sound levels during the daytime (7 am to 11 pm) and night-time (11 pm to 7 am) periods; and,
- Overall “day-night” sound levels over the entire day (L_{DN} values).

These will be compared to the “no-build” background ambient sound levels previously determined (see **Table 9-16**), as well as against the corresponding applicable and/or relevant noise guidelines.

The model uses the following vehicle classifications:

- Automobiles – Two axles and four wheels designed primarily for the transportation of nine or fewer passengers, or transportation of cargo (light trucks). This classification includes motorcycles. Generally, the gross vehicle weight is less than 4,500 kilograms.
- Heavy trucks – Three or more axles and designed for the transportation of cargo. Generally, the gross vehicle weight is greater than 12,000 kilograms.

As inputs into the noise model, the noise emission levels of automobiles and heavy trucks travelling over a gravel road were measured to develop a series of maximum pass-by sound levels at a number of different vehicle speeds. As a conservative assumption, the maximum posted speed of 80 km/h was assumed for all locations on the road. The maximum pass-by sound levels measured from the gravel road exceeded those predicted for a standard roadway consisting of stone mastic asphalt or similar pavement types typically used.

⁴ Roadway noise models require a minimum traffic volume of 40 vehicles per hour for the roadway to be considered a “line source” of noise, equating to a minimum traffic volume of 960 vehicles per day. That threshold is not met here, making the use of a “moving point source model” the most appropriate method for predicting noise from the new road.



9.3.3.2.4 Operational Noise Modelling Results



Results of the Noise Impact Modelling indicate that during operations phase, changes in sound levels resulting from the proposed Project are expected to be negligible for all identified noise sensitive locations.

MTO Environmental Guide for Noise

Table 30 in the Noise and Vibration Impact Assessment Report (Appendix J) presents a comparison of predicted “no-build” versus future “build” sound levels at NSAs in the noise study area, during the 16-hour daytime period, per the MTO Environmental Guide for Noise.

The maximum predicted sound level (L_{eq} – Daytime) is 44 dBA which is equal to the measured background ambient sound level within the Webequie community.

The changes in sound levels predicted at some of the culturally sensitive areas are expected to exceed the 5 dB threshold outlined in the MTO Environmental Guide for Noise. Overall “Build” sound levels are predicted to be less than or equal to 45 dBA which is considered appropriate for a quiet rural environment. Overall “Build” sound levels are less than the 55 dBA criteria outlined in the MTO Environmental Guide for Noise.

NSAs including CHL-7, CHL-8, CHL-13, CHL-14, CHL-15 CHL-17, and CHL-25 are predicted to exceed the 5 dB change outlined in the MTO Environmental Guide for Noise.

Health Canada Guidelines – Long-term Community Annoyance (%HA)

Table 31 in the Noise and Vibration Impact Assessment Report (Appendix J) presents a comparison of the background sound levels and the predicted “total operational” sound levels to Health Canada’s Guidelines.

The maximum predicted sound level (L_{DN}) is 54 dBA with a maximum predicted change in %HA (Percent Highly Annoyed) of 4.5%.

For the future residential area in the Webequie community, sound levels will be a maximum of 47 dBA with a maximum change in %HA of 2.3%, which is dependent on the final location of the residences. Locations at this time have been estimated based on information provided by Webequie First Nation.

The maximum change in %HA is 4.5% at CHL-25 (Fishing Area) which is below the 6.5% threshold. The results indicate that the operational noise impacts are not expected to cause long-term community annoyance based on Health Canada Guidelines.

9.3.4 Change in Vibration Levels

Some project construction activities that involve blasting and use of machinery and equipment will cause vibration. The pathways in which such changes may occur are illustrated as follows:

- **Blasting activities** → Increased vibration during the construction phase
- **Use of machinery and equipment for construction of the proposed roadway and waterbody crossings** → Increased vibration during the construction phase



There are no significant sources of vibration associated with the operation phase of the Project. As noted in **Section 9.3.3.2**, it is expected that infrequent blasting at aggregate extraction site ARA-4 may be required to maintain stockpiles of rock for road maintenance and repairs; however, this would not be considered a routine activity associated with the operations phase. Regardless, blasting mitigation presented for application during the construction phase would also apply to the blasting activities during the operation and maintenance phase. Vibration effects from the operations phase of the Project are considered negligible, and therefore an assessment of vibrations from operations is not required under the provincial EA ToR or the federal TISG for the IA.

Potential effects of vibration (i.e., ‘sensory disturbance’) on wildlife and the use of recreational and traditional land and resource use are discussed in Section 12 (Assessment of Effects on Terrestrial Habitat and Wildlife), Section 13 (Assessment of Effects on Species at Risk), Section 16 (Non-Traditional Land and Resource Use), and Section 19 (Aboriginal and Treaty Rights and Interests). The potential effects of the vibration from blasting on fish due to compressive shock waves generated from blasting are assessed in Section 10 (Assessment of Effects on Fish and Fish Habitat). Sensory disturbance from changes in noise and vibration levels has the potential to affect human health which is assessed in Section 17 (Assessment of Effects on Human Health).

The following subsections include assessments of vibration effects due to blasting and use of machinery and equipment during the construction phase on sensitive receptors which were also referred to as NSAs (see **Sections 9.2.1.3.2** and **9.2.2.3.2**).

9.3.4.1 Construction Vibration Effects – Blasting

Blasting of rocks with explosives is required to create desired road profiles and to extract rocks and granular for construction and maintenance/operations of the WSR. Blasting of rock is expected to be limited to ARA-2 for extraction and processing rock and aggregate and one small rock outcrop along the preliminary recommended preferred route for the WSR. Based on the relatively low volumes of rock needed for the Project, blasting of rock requiring the use of explosives during construction and operation activities is expected to occur on an infrequent basis when aggregate and/or rock materials are required for construction and maintenance activities. Exact locations and the blast designs for the Project’s blasting activities are currently unknown. Vibration generated by blasting is expected to be temporary and the potential effects will be centered around blasting locations. To address the potential effects of vibration from blasting, it is proposed that a Construction Blasting Management Plan for the Project will be prepared by applicable contractor(s) prior to initiation of blasting activities. The plan will include a requirement for controlling vibration levels to meet the blasting guidelines and criteria outlined in **Table 9-39** and **Table 9-40**. These guidelines are not based on background ambient vibration levels – rather they are from the activity itself, which will dominate over background levels. Vibration levels are controlled through blast design and confirmed through monitoring.

Table 9-39: Construction Phase Vibration Guidelines

Project Component	Applicable Guideline	Metrics Considered
All project components	MECP Publication NPC-119 – Blasting	Peak Particle Velocity (PPV)
	MTO Provincial Standard OPSS 120, General Specification of the Use of Explosives	PPV
	DFO Guidelines for the Use of Explosives in Canadian Fisheries Waters	PPV, Peak Overpressure



Table 9-40: Construction Phase Vibration Limits

Criteria	Medium	Limit		
MECP Publication NPC-119 – Blasting	Ground	<ul style="list-style-type: none"> Maximum PPV Velocity of 10 mm/s for unmonitored blasts; Maximum PPV Velocity of 12.5 mm/s for blasts where routine monitoring of peak pressure levels occurs. 		
MTO Provincial Standard OPSS 120	Ground	Structures and Pipelines	Maximum PPV Velocity of 20 mm/s < 40 Hz	Maximum PPV Velocity of 50 mm/s > 40 Hz
		Concrete and Grout < 72 hours from placement	Maximum PPV Velocity of 10 mm/s	
	Water	100 kPa, (mandatory monitoring required)		
DFO Guidelines for the Use of Explosives in Canadian Fisheries Waters	Water	<ul style="list-style-type: none"> Instantaneous pressure < 100 kPa, 10 m from the point of detonation; Maximum PPV Velocity of 13 mm/s in spawning beds during incubation. 		

9.3.4.2 Construction Vibration Effects – General Construction Activities

As construction proceeds along the WSR route, vibration from construction activity will occur. An assessment has been completed to examine the extent of vibration away from the construction area.

Construction Vibration Guidelines – City of Toronto By-Law 514-2008

While not directly applicable, the City of Toronto By-Law 514-2008 provides useful criteria and assessment methods for examining the potential for vibration effects from construction activity. The by-law specifies “Do-Not-Exceed” threshold limits as listed in **Table 9-41** to address structural concerns for nearby/adjacent structures.

Table 9-41: City of Toronto By-Law Vibration Guidelines

Frequency of Vibration (Hz)	Peak Particle Velocity (mm/s)
Less than 4	8 ¹
Between 4 and 10	15
Greater than 10	25

Note: ¹ While the threshold limit is 8 mm/s for frequencies below 4 Hz, 62.5% of the threshold limit, i.e., 5 mm/s, is given as an appropriate cautionary threshold for most structures and typically serves as the industry best practice for defining the Zone of Influence.

Zone of Influence of Construction Vibration

The City of Toronto By-Law requires determination of a “zone of influence” or ZOI associated with construction activities. Chapter 363 of The City of Toronto Municipal Code defines this as follows:

“The area of land within or adjacent to a construction site, including any buildings or structures, that potentially may be impacted by vibrations emanating from a construction activity where the peak particle velocity measured at the point of reception is equal to or greater than five (5) mm/sec at any frequency or such greater area where specific site conditions are identified by the professional engineer in a preliminary vibration study.”



For this assessment, the model recommended by the Federal Transit Administration in the United States has been applied for prediction of vibration impacts during construction and to establish the extent of the ZOI. The source vibration levels associated with the equipment planned for excavation were specified based on data in the Federal Transit Administration document, as well as SLR Consulting Ltd.'s own measurement data collected on construction projects.

The ZOI was determined based on a numerical model described in detail in Section 9.2 of the Noise and Vibration Impact Assessment Report (Appendix J). Estimation of the ZOI was completed for each anticipated equipment type to establish the maximum (worst-case) offset of the ZOI from the extent of the construction activities. A summary of associated ZOI setback distances for each equipment type is provided in **Table 9-42**.

Table 9-42: Summary of Zone of Influence (ZOI) Setback Distances Associated with Construction Activities

Equipment/Activity	Peak Particle Velocity – PPV@1m Setback (mm/s)	ZOI Setback Distance (m)
Vibratory Roller	107	11
Compactor	166	15
Large Bulldozer	48	4
Loaded Trucks	41	6
Excavator	9	3
Impact Pile Driver	344	24
Sonic Pile Driver	91	10

Predicted Construction Vibration Levels

The predicted peak particle velocity vibration levels for the receptors during the roadway and bridge construction activities range from 0.002 to 0.7 mm/s and are less than the 3 mm/s PPV target level criteria as presented in Table 23 (Roadway Construction) and Table 24 (Bridge Construction) in the Noise and Vibration Impact Assessment Report (Appendix J). Therefore, vibration effects from general construction activities are not anticipated.



Table 9-43: Potential Effects, Pathways and Indicators for Atmospheric Environment VC

Potential Effect	Project Phase	Effect Pathway	Effect Indicators	Nature of Interaction and Effect (Direct or Indirect)	Linked VCs
Change in air quality	Construction and Operations	<ul style="list-style-type: none"> Use of vehicles, machinery, and equipment for construction of the proposed road will lead to fuel combustion and dust uplifting resulting in increased air contaminant emissions during construction phase. Vehicle use of the proposed road once constructed and use of vehicles, machinery, and equipment for road maintenance will lead to fuel combustion and dust uplifting resulting in increased air contaminant emissions during operation phase. 	<p>Changes in ambient air concentrations for the following contaminants:</p> <ul style="list-style-type: none"> Common air contaminants: <ul style="list-style-type: none"> SO₂, CO, and NO₂; and Particulate matter: TSP, PM₁₀, and PM_{2.5}; Toxic contaminants: <ul style="list-style-type: none"> VOCs relevant to liquid fuel combustion: 1,3-butadiene, acetaldehyde, acrolein, benzene, ethylbenzene, formaldehyde, hexanes, propionaldehyde, toluene, xylenes; Benzo(a)pyrene as a surrogate to PAHs; Ground-level O₃; and Diesel particulate matter (DPM). 	Direct	<p>The assessment of this VC informs the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Surface Water (Section 7); Vegetation and Wetlands (Section 11); Wildlife and Wildlife Habitat (Section 12); Species at Risk (Section 13); Non-Traditional Land and Resource Use (Section 16); Human Health (Section 17); and Aboriginal and Treaty Rights and Interests (Section 19).
Change in GHGs	Construction and Operations	<ul style="list-style-type: none"> Use of vehicles, machinery, and equipment for construction of the proposed road will lead to fuel combustion releasing GHGs during construction phase. Vegetation clearing activities will lead to removal of biomass/carbon stock resulting in GHG releases during construction phase. Vehicle use of the proposed road once constructed and use of vehicles, machinery, and equipment for road maintenance will lead to fuel combustion releasing GHGs during operation phase. Net change in GHG releases from the peatland ecosystem due to the presence of the road. 	CO ₂ , CH ₄ , N ₂ O expressed as carbon dioxide equivalent (CO _{2e}) which quantifies GHG emissions in terms of their total global warming potential relative to that of CO ₂ .	Direct	
Change in sound levels	Construction and Operations	<ul style="list-style-type: none"> Blasting activities will cause increased noise during the construction and operation phases. Use of vehicles, machinery, and equipment at aggregate extraction sites will cause increased noise during construction and operation phases. Use of vehicle, machinery and, equipment for construction of the proposed roadway and waterbody crossings will cause increased noise during the construction phase. Traffic noise from vehicle use of the proposed road once constructed will cause increased noise during the operation phase. 	<p>Absolute sound level and changes to sound levels (quantitative) for Noise Sensitive Areas (NSA):</p> <ul style="list-style-type: none"> Overall sound levels (dBA) during the daytime (L_D) and night-time (L_N) periods; Overall "day-night" sound levels (dBA) over the entire day (L_{DN}); Maximum sound levels (dBA) from vehicle pass-by and the number of events during the night-time period (L_{max}): <ul style="list-style-type: none"> Change from existing "no-build" background sound levels, and the "future build" sound levels with the Project in place number of NSA with 0-5 dBA increase; Number of NSA with >5 dBA increase; and Percent Highly Annoyed (%HA) at each NSA. 	Direct	<p>The assessment of this VC informs the effects assessment for other VCs:</p> <ul style="list-style-type: none"> Wildlife and Wildlife Habitat (Section 12); Species at Risk (Section 13); Non-Traditional Land and Resource Use (Section 16); Human Health (Section 17); and Aboriginal and Treaty Rights and Interests (Section 19).
Change in vibration levels	Construction	<ul style="list-style-type: none"> Blasting activities will cause increased vibration during the construction phase. Use of machinery and equipment for construction of the proposed roadway and waterbody crossings will cause increased vibration during the construction phase. 	Potential construction vibration levels (peak particle vibration velocity (PPV)) from blasting or pile driving at waterbody crossing locations that would exceed federal and provincial limits/criteria.	Direct	

9.4 Mitigation Measures

This section describes proposed mitigation measures to eliminate or reduce the potential effects of the Project on the atmospheric environment. A summary of the potential effects, mitigation measures and predicted net effects for Atmospheric Environment VC is provided in **Table 9-44**. Further measures will be provided in the Construction Environmental Management Plan and the Operation Environmental Management Plan that will be developed for the Project. Refer to Section 4.6 for details of the proposed framework for the development of the Construction Environmental Management Plan and the Operation Environmental Management Plan.



Indigenous community members will have an active role in developing and implementing environmental management plans.



An Environment Committee will be established to facilitate communication and engagement during construction and operations of the Project. Committee members will include Webequie First Nation Elders and Knowledge Holders, other First Nations with interest in participating, and appropriate project representatives, to: facilitate communication and engagement during construction and operations of the Project; facilitate use of Indigenous Knowledge in project activities; facilitate evaluation of land use information; and facilitate development of appropriate monitoring programs, protocols and management plans as it relates to Atmospheric Environment VC.

9.4.1 Air Quality

An Air Quality and Dust Control Management Plan will be developed and implemented during construction that will include typical mitigation measures such as the use of water sprays from trucks to increase moisture levels in active areas during dry days (e.g., haul/access roads, temporary soil and aggregate stockpiles), the use of environmentally certified equipment (e.g. Tier 4 engines), the use of dust suppression systems at quarries, truck speed limitations, vehicle and heavy equipment movement limitations to designated areas, minimizing idling and so forth. As part of the air quality impact assessment, the following quantifiable control measures were integrated into the emission scenario:

- Water-spraying on-road surface mitigating dust uplifting from heavy-duty trucks.
- The use of at least 80% of mobile and stationary equipment having a Tier 4F engine, when the base scenario only considered Tier 3 engines.



To minimize dust pollution, Indigenous community members recommended using tarps to prevent dust from spreading or spraying the roads with a water-based solution to suppress dust.

During operation, while it is not feasible to have a direct control on emissions from vehicle engines, it is possible to work on dust emissions from the road surface. Considering that part of the road will not be fully surfaced with asphalt or chip seal from the start, the maintenance crew will operate a truck that will spray water over the gravel-surface road from May to November, or when needed.



Mushkegowuk Council recommends the proponent prepare an Air Quality and Dustfall Monitoring Plan with dustfall sampling methods and reporting for review by all impacted Indigenous communities through the suggested terrestrial advisory group. Also, provide sampling methodology of air pollutants and compare with existing Nunavut Air Quality standards along with ECCC recommended federal targets.

Section 5.18 – Dust Control Practices in Appendix E (Mitigation Measures) describes key mitigation measures to prevent or limit the potential effect dust generated by project activities on the air quality. The Air Quality and Dust Control Management Plan will integrate a monitoring procedure for dustfall effects and measures to control or limit particulate emissions that would mostly come from the passage of vehicles on the road or the handling of soil or aggregates by mobile equipment during construction.

The Air Quality and Dust Control Management Plan will also include a procedure for documenting compliance with applicable standards and required conditions as stipulated in permits, approvals, licenses and/or authorizations.

9.4.2 GHGs

The GHG emissions were estimated without consideration of mitigation measures that would reduce the overall carbon footprint of the Project. For the construction phase, electrification of mobile equipment, vehicles or trucks will not be possible nor recommended given that electricity would be produced from diesel powered generator sets. Therefore, while assuming that the construction planning from the Planning & Construction Input for Road & Supportive Infrastructure report completed by Sigfusson Northern Ltd. (2023) remain valid (excluding optimization measures in logistics and planning reducing fuel usage), available mitigation measures are the ones typical for road construction projects, such as the following:

- Eco-driving that could lead to fuel savings within the 2-5% bracket depending on drivers. Contractors would need to demonstrate that their operators have followed a training session or have been sensitized to eco-driving.
- Optimized equipment maintenance program to make sure that the alignment, tires, and other mechanized features that could impact fuel economy is optimal, so to mitigate the fuel usage by a couple of percent compared to poorly maintained equipment.
- Where practical and applicable, use multi-passenger vehicles for the transport of crews to and from job sites.
- Minimize equipment and vehicles idling or unnecessary operation (i.e., tower light, gen set) that could potentially help save up to a couple of percent of fuel over the course of the Project.

The proponent for the construction phase of the Project, which is unknown at this time, is recommended to select contractors that consider the above practices, if not already implemented by them, to minimize fuel consumption and costs.

The main GHG reduction potential comes from the combustion of living biomass (i.e., wood logs and branches) that will generate important quantities of CH₄ and N₂O along with biogenic CO₂. A commitment to mitigate these emissions by using the biomass for other purposes like the production of roundwood and timber that would be used in Webequie for construction projects or woodchips used as mulch for landscaping, erosion control or other application will be analyzed further by the proponent. At this time, there is an objective to burn no greater than 10% of all cleared living biomass. In such a case, the GHG



emissions from burning would be reduced by at least 19,000 t CO₂e (2,500 t CO₂e of CH₄ and N₂O prevented from combustion and 16,500 t emitted as biogenic CO₂). Although timber and mulch can eventually be released as CO₂, not all of the carbon in wood would be released as such. These avoided emissions represent 17% of total emissions during construction and 6% of total emissions when including the operation phase for the first 20 years.

For the operation phase, the main mitigation measure that the proponent can control is the design and operation of the MSF that will be powered by a dedicated generator set. At this point, the MSF design is unknown, but the proponent is committed to discuss and consider designs that would help minimize electric power requirements. It will include energy efficiency measures during operation that could be implemented by the maintenance team. An Energy Management Plan will be developed and will include guidance to reduce operational GHG emissions associated with the MSF.

9.4.3 Noise and Vibration



Indigenous community members prefer to harvest in areas where it is quiet. Increased noise in harvesting areas may increase physical disturbance and impact harvesting activities.

To limit the potential effect of noise and vibration generated by the project construction and operation activities, it is recommended that provisions be written into the construction and operational contract documentation for applicable contractor(s), including but not be limited to the following:

- Construction will be limited to the daytime period, where possible, especially near residences.
- All equipment will be properly maintained to limit noise emissions. As such, all construction equipment will be operated with effective muffling devices that are in good working order.
- In the presence of persistent noise complaints, all construction equipment will be verified to comply with MOE NPC-115 guidelines.
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration will be given to the technical, administrative, and economic feasibility of the various alternate measures.
- A Construction Blasting Management Plan for the Project will be prepared and submitted by applicable contractor(s) after contract award and prior to initiation of blasting activities. The plan will outline best practices and regulatory requirements for the safe transportation, handling, storage and use of explosives. Storage facilities for explosives at quarry sites will meet the federal standards and licensing requirements as specified in the *Explosives Act* as well as provincial standards and licensing requirements as specified in the Ontario Regulation 213/91 – Construction Projects, under the *Occupational Health and Safety Act*. Blasting restriction “windows” for the protection of aquatic and terrestrial species described in the EAR/IS will also be addressed in the plan. Blast operations, where applicable, will be carried out in accordance with Department of Fisheries and Oceans (DFO) guidelines and Ontario Provincial Standard Specification 120 General Specification for the Use of Explosives.
- Use of appropriate personal protective equipment (including hearing protection) and coordinating the timing of blasting with the period of fewest on-site workers, when possible.
- A Noise and Vibration Management Plan will be developed and implemented to mitigate the effects of noise and vibration from construction activities. The plan will be adapted for continuation throughout the operations phase of the Project.



The following sections in Appendix E (Mitigation Measures) describe key mitigation measures to prevent or limit the effect of noise and vibration generated from the Project's construction and operation activities:

- Section 5.4 – Noise Control; and
- Section 5.12 – Blasting Near a Watercourse.



Table 9-44: Summary of Potential Effects, Mitigation Measures and Predicted Net Effects for Atmospheric Environment VC

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Mitigation Measures	Predicted Net Effect
Air quality	<p>Changes in ambient air quality for the following parameters:</p> <ul style="list-style-type: none"> ▪ Common air contaminants: <ul style="list-style-type: none"> ▫ SO₂, CO, and NO₂; and ▫ Particulate matter: TSP, PM₁₀, and PM_{2.5}; ▪ Toxic contaminants: <ul style="list-style-type: none"> ▫ VOCs relevant to liquid fuel combustion: 1,3-butadiene, acetaldehyde, acrolein, benzene, ethylbenzene, formaldehyde, hexanes, propionaldehyde, toluene, xylenes; benzo(a)pyrene as a surrogate to PAHs; ▫ Ground-level O₃; and ▫ Diesel particulate matter (DPM). 	Construction and Operations	<p>As noted in Section 9.1.6 and Table 9-11, emissions of air contaminants are generated by most project activities which involve:</p> <ul style="list-style-type: none"> ▪ Use of vehicles, machinery, and equipment for construction of the proposed road; ▪ Vehicle use of the proposed road once constructed; and ▪ Use of vehicles, machinery, and equipment for road maintenance during operation phase. 	Change in air quality	<ul style="list-style-type: none"> ▪ Use of water sprays from trucks to increase moisture levels in active areas during dry days (e.g., haul/access roads, temporary soil and aggregate stockpiles). ▪ Restrict or halt construction and operations during high wind or dry conditions to prevent excessive dust generation near sensitive receptors. ▪ Use of environmentally certified equipment, with a commitment that 80% of mobile and stationary engines will meet Tier 4F standards. ▪ Use of dust suppression systems at quarries. ▪ Limit vehicle speed. ▪ Limit vehicle and heavy equipment movement to designated areas. ▪ Use of efficient, lower-emission vehicles and equipment, where practical. ▪ Where practical and applicable, use multi-passenger vehicles for the transport of crews to and from job sites. ▪ Minimize idling of vehicles and equipment when possible. ▪ Provide work crews with a training session on eco-driving to reduce fuel usage. ▪ No use of sand or salt is currently proposed for de-icing during winter operations. However, sand may be applied in select locations based on road safety concerns. ▪ An Air Quality and Dust Control Management Plan will be developed and implemented to mitigate the effects of construction activities on air quality. The plan will be adapted for continuation throughout the operations phase of the Project. ▪ Refer to Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.18 – Dust Control Practices. 	Yes
GHG emissions	<p>CO₂, CH₄, N₂O expressed as carbon dioxide equivalent (CO₂e) which quantifies GHG emissions in terms of their total global warming potential relative to that of CO₂.</p>	Construction and Operations	<p>As noted in Section 9.1.6 and Table 9-11, emissions of GHGs are generated by most project activities which involve:</p> <ul style="list-style-type: none"> ▪ Use of vehicles, machinery, and equipment for construction of the proposed road; ▪ Vegetation clearing resulting in removal of biomass during construction phase; ▪ Vehicle use of the proposed road once constructed; ▪ Use of vehicles, machinery, and equipment for road maintenance during operation phase; and ▪ Net change in GHG releases from the peatland ecosystem due to the presence of the road. 	Change in GHGs	<ul style="list-style-type: none"> ▪ Implement proposed mitigation measures for air quality. ▪ Use biomass (removed due to vegetation clearing) for other purposes like the production of woodchips and erosion control. ▪ An Energy Management Plan will be developed and will include guidance to reduce operational GHG emissions associated with the MSF. 	Yes
Noise	<p>Absolute sound level and changes to sound levels (quantitative) for Noise Sensitive Areas (NSA):</p> <ul style="list-style-type: none"> ▪ Overall sound levels (dBA) during the daytime (L_D) and night-time (L_N) periods; ▪ Overall “day-night” sound levels (dBA) over the entire day (L_{DN}); ▪ Maximum sound levels (dBA) from vehicle pass-by and the number of events during the night-time period (L_{max}): 	Construction and Operations	<ul style="list-style-type: none"> ▪ Blasting activities; ▪ Aggregate extraction operations; ▪ Construction of the proposed roadway and waterbody crossings; and ▪ Vehicle use of the proposed road once constructed. 	Change in sound levels	<ul style="list-style-type: none"> ▪ Construction will be limited to the daytime period, where possible, especially near residences. ▪ All equipment will be properly maintained to limit noise emissions. As such, all construction equipment will be operated with effective muffling devices that are in good working order. ▪ In the presence of persistent noise complaints, all construction equipment will be verified to comply with MOE NPC-115 guidelines. ▪ In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration will be given to the technical, administrative, and economic feasibility of the various alternatives. 	Yes

VC Subcomponent	Indicators	Project Phase	Project Component or Activity	Potential Effect	Mitigation Measures	Predicted Net Effect
	<ul style="list-style-type: none"> ▫ Change from existing “no-build” background sound levels, and the “future build” sound levels with the Project in place number of NSA with 0-5 dBA increase; and ▫ Number of NSA with >5 dBA increase. ▪ Percent Highly Annoyed (%HA) at each NSA. 				<ul style="list-style-type: none"> ▪ A Construction Blasting Management Plan for the Project will be prepared and submitted by applicable contractor(s) after contract award and prior to initiation of blasting activities. ▪ Use of appropriate personal protective equipment (including hearing protection) and coordinating the timing of blasting with the period of fewest on-site workers, when possible. ▪ A Noise and Vibration Management Plan will be developed and implemented to mitigate the effects of noise and vibration from construction activities. The plan will be adapted for continuation throughout the operations phase of the Project. ▪ Refer to Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.4 – Noise Control; and ▫ Section 5.12 – Blasting Near a Watercourse. 	
Vibration	Potential construction vibration levels (peak particle vibration velocity (PPV)) from blasting or pile driving at waterbody crossing locations that would exceed federal and provincial limits/criteria.	Construction	<ul style="list-style-type: none"> ▪ Blasting activities; and ▪ Construction of the proposed roadway and waterbody crossings. 	Change in vibration levels	<ul style="list-style-type: none"> ▪ A Construction Blasting Management Plan for the Project will be prepared and submitted by applicable contractor(s) after contract award and prior to initiation of blasting activities. ▪ Use of appropriate personal protective equipment (including hearing protection) and coordinating the timing of blasting with the period of fewest on-site workers, when possible. ▪ A Noise and Vibration Management Plan will be developed and implemented to mitigate the effects of noise and vibration from construction activities. ▪ Refer to Appendix E – Mitigation Measures: <ul style="list-style-type: none"> ▫ Section 5.4 – Noise Control; and ▫ Section 5.12 – Blasting Near a Watercourse. 	No

9.5 Characterization of Net Effects

Net effects are defined as the effects of the Project that remain after application of proposed mitigation measures. The effects assessment follows the general process described in Section 5 – Environmental Assessment / Impact Assessment Approach. The focus of the effects assessment is on predicted net effects, which are the effects that remain after application of proposed mitigation measures. Potential effects with no predicted net effect after implementation of mitigation measures are not carried forward to the net effects characterization or the cumulative effects assessment. **Table 9-45** presents definitions for net effects criteria, developed with specific reference to the Atmospheric Environment VC. These criteria are considered together in the assessment, along with context derived from existing conditions and proposed mitigation measures, to characterize predicted net effects from the Project on the Atmospheric Environment VC.

Table 9-45: Criteria for Characterization of Predicted Net Effects on Atmospheric Environment VC

Characterization Criteria	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	Direction relates to the value of the effect in relation to the existing conditions.	<p>Positive – Net gain or benefit; effect is desirable.</p> <p>Neutral – No change compared with existing conditions and trends.</p> <p>Negative – Net loss or adverse effect; effect is undesirable.</p>
Magnitude	Magnitude is the amount of change in measurable parameters or the VC relative to existing conditions.	<p>For Air Quality:</p> <p>Negligible – Model predicted air contaminant concentrations outside the road footprint due to Project-related emissions are less than 10% of existing conditions and do not result in exceedances of the ambient air quality criteria.</p> <p>Low – Model predicted air contaminant concentrations outside the road footprint due to Project-related emissions are greater than 10% of existing conditions, but less than 50% of the ambient air quality criteria.</p> <p>Moderate – Model predicted air contaminant concentrations outside the road footprint due to Project-related emissions are greater than 50% of the ambient air quality criteria, but the maximum air contaminant concentrations are less than the ambient air quality criteria.</p> <p>High – The predicted air contaminant concentrations outside the road footprint due to Project-related emissions combined with background frequently exceed the ambient air quality criteria.</p> <p>For GHGs:</p> <p>Negligible – No measurable change in GHG emissions.</p> <p>Low – Although a change is measurable, based on guidance by ECCC (2020a) and <i>Canadian Environmental Assessment Act</i> (CEA) Agency (2003), and professional judgment, relatively small changes are expected in provincial and national GHG emissions (<0.1% of the provincial emission levels, or <0.01% of the national emission level).</p>

Characterization Criteria	Description	Quantitative Measure or Definition of Qualitative Categories
		<p>Moderate – Based on guidance by ECCC (2020a) and CEA Agency (2003), and professional judgment, notable changes are expected in provincial and national GHG emissions (>0.1% but <1% of the provincial emission levels, or <0.1% of the national emission level).</p> <p>High – Based on guidance by ECCC (2020a) and CEA Agency (2003), and professional judgment, material changes are expected in provincial and national GHG emissions (>1% of the provincial emission levels, or >0.1% of the national emission level).</p> <p>For Noise:</p> <p>Negligible – No measurable change.</p> <p>Low – Sound level change of less than 5 dBA for NSAs from existing “no-build” background sound levels, and the “future build” sound levels with the Project in place. – Change in %HA of ≤6.5%.</p> <p>Moderate – Sound level change of greater than 5 dBA for NSAs from existing “no-build” background sound levels, and the “future build” sound levels with the Project in place but not requiring noise mitigation – Change in %HA of greater than 6.5% but less than 10%.</p> <p>High – Sound level change of greater than 5 dBA for NSAs from existing “no-build” background sound levels, and the “future build” sound levels with the Project in place and requiring noise mitigation. – Change in %HA of greater than 10%.</p> <p>For Vibration:</p> <p>Negligible – No measurable change.</p> <p>Low – Change below the applicable guidelines’ limits.</p> <p>Moderate – Change slightly above the applicable guidelines’ limits.</p> <p>High – Change well above the applicable guidelines’ limits.</p>
Geographic Extent	Geographic extent refers to the spatial area over which a net effect is expected to occur or can be detected within the Project Footprint, Local Study Area and Regional Study Area.	<p>Project Footprint – The effect is confined to the Project Footprint.</p> <p>Local Study Area – The effect is confined to the Local Study Area.</p> <p>Regional Study Area – The effect extends beyond the Local Study Area boundary but is confined within the Regional Study Area.</p>
Timing	Timing criteria indicate the timing (e.g., dates or seasons) importance of the net effect.	Not applicable.
Duration	Duration is the period of time required until the measurable indicators or the VC returns to its existing (baseline) condition, or the net effect can no longer be measured or otherwise perceived.	<p>Short-term – Net effect restricted to no more than the duration of the construction phase (approximately 5 years).</p> <p>Medium-term – Net effect extends through the Operations Phase of the Project (75-year life cycle).</p> <p>Long-term – Net effect extends beyond the Operations Phase (greater than 75 years).</p> <p>Permanent – Recovery to baseline conditions unlikely.</p>



Characterization Criteria	Description	Quantitative Measure or Definition of Qualitative Categories
Frequency	Frequency refers to the rate of occurrence of an effect over the duration of the Project or in a specific phase.	Infrequent – The effect is expected to occur rarely. Frequent – The effect is expected to occur intermittently. Continuous – The effect is expected to occur continually.
Context	Context considers sensitivity and resilience of the VC to Project-related change.	Low resilience – Effect takes place within an area that is relatively not affected by human activity. Moderate resilience – Effect takes place within an area that is somewhat affected by human activity. High resilience – Effect takes place within an area with human activity.
Input from Indigenous Peoples	Views of the Indigenous communities and groups in assigning the criteria to be used and in characterizing the effects.	Not applicable – No inputs on net effects criteria were received during the engagement and consultation.
Reversibility	Reversibility describes whether a measurable indicator or the VC can return to its existing condition after the project activity ceases.	Reversible – The net effect is likely to be reversed after activity completion and rehabilitation. Irreversible – The net effect is unlikely to be reversed.
Likelihood of Occurrence	Likelihood of occurrence is a measure of the likelihood that an activity will result in an effect.	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.

9.5.1 Potential Effect Pathways Not Carried Through for Further Assessment

The following potential effects are expected to be eliminated through the implementation of mitigation measures:

- Increased noise and vibration levels due to blasting activities during construction and operation phases. Noise generated by blasting is expected to be temporary and infrequent. Vibration effects will be centered around blasting locations. Exact locations and the blast designs for the Project's blasting activities are currently unknown. Based on the relatively low volumes of rock needed for the Project, blasting of rock requiring the use of explosives during construction and operation activities is expected to occur on an infrequent basis when aggregate and/or rock materials are required for construction and maintenance activities. The Construction Blasting Management Plan that will be prepared for the Project prior to initiation of blasting activities will include a requirement for controlling noise and vibration levels to meet the blasting guidelines and criteria guidelines set out by MECP, MTO, Health Canada, and DFO.
- Increased vibration during the construction phase due to the use of machinery and equipment for construction of the proposed roadway and waterbody crossings. The predicted peak particle velocity vibration levels for the NSAs during the roadway and bridge construction activities range from 0.002 to 0.7 mm/s and are less than the 3 mm/s PPV target level criteria.





Indigenous community members will have an active role in developing and implementing environmental management plans.

Potential effects that remain following the implementation of mitigation measures are considered net effects and carried forward for further assessment (**Section 9.5.2**).

9.5.2 Predicted Net Effects

An effect on the Atmospheric Environment VC may remain after the implementation of mitigation measures. The predicted net effects include:

- Change in air quality during construction and operation phases;
- Change in GHGs during construction and operation phases; and
- Change in sound levels due to aggregate extraction operations and general construction activities (construction of the proposed road, including waterbody crossings) during the construction phase and due to vehicle use of the proposed road during the operation phase.

9.5.2.1 Change in Air Quality

9.5.2.1.1 Change in Air Quality During Construction Phase

An Air Quality and Dust Control Management Plan will be developed and implemented during construction that will include typical mitigation measures such as the use of water sprays from trucks to increase moisture levels in active areas during dry days (e.g., haul/access roads, temporary soil and aggregate stockpiles), the use of environmentally certified equipment (e.g. Tier 4 engines), the use of dust suppression systems at quarries, truck speed limitations, vehicle and heavy equipment movement limitations to designated areas, minimizing idling and so forth. As part of the air quality impact assessment, the following quantifiable control measures were integrated into the emission scenario:

- Water-spraying on-road surface mitigating dust uplifting from heavy-duty trucks.
- The use of at least 80% of mobile and stationary equipment having a Tier 4F engine, when the base scenario only considered Tier 3 engines.

The impact of these measures on the maximum concentrations calculated at 50, 150 and 300 m from the road centerline (RCL), at 100 m distance from ARA-2 quarry center point (QCP), and for three (3) culturally sensitive areas located within 200 m from the RCL is illustrated in **Table 9-46**. It covers the main contaminants and averaging periods with the highest potential for an exceedance an AAQC within the modeling domain. Observations are as follows:

- Dust control over road surfaces would have a limited impact on the maximum TSP and PM₁₀ concentrations, meaning that road emissions are not the predominant source. Dust emissions at the construction site due to bulldozing and road grading are actually the main causes of these high concentrations.
- The maximum dust deposition at 50 m from RCL is equivalent for both scenarios without or with dust control. Improvements are obtained at further setbacks. Other than the 50 m mark, exceedances are also noted at the periphery of ARA-2 quarry and for one culturally sensitive location at 60 m from the RCL.



- The use of Tier 4F equipment would greatly limit the impact of exhaust emissions on 1-hour and 24-hour NO₂ concentrations confining a potential exceedance of the AAQC at 50 m from RCL and possibly a little beyond. The large concentrations noted outside the ARA-2 quarry are the result of the large instantaneous NO₂ emissions modeled to represent explosives combustion during blasts.
- Exceedances are calculated at the periphery of the ARA-2 quarry for short-term SO₂ and CO concentrations due to explosives detonation. Elsewhere, the impact of Tier 4F machinery would be relatively limited along the road for these contaminants. Exceedances of the SO₂ 1-hour AAQC are noted (100 µg/m³), caused to a large extent by the background concentration selected for this study (90 µg/m³). The maximum impact of the Project at 50 m from RCL represents in fact less than 20% of the AAQC.
- In a similar way, the use of Tier 4F equipment would significantly reduce the maximum concentrations of toxic contaminants, as shown for 24-hour acrolein and 24-hour benzene. That said, based on modeled results for these two contaminants, exceedances are still obtained at 150 m from RCL and possibly a little beyond which comprise some of the closest culturally sensitive areas.

Exceedances of several Ontario AAQC are therefore a possibility at some culturally sensitive areas, even with the application of mitigation measures specified above. That said, there are elements to consider when analyzing the impact of the construction phase on air quality. For example:

- The potential exceedances only concern short-term AAQC (24-hours and less) and could only occur over a short period (i.e., 1-2 days) at each receptor given that the emission sources will be moving as road construction progresses.
- There will be no long-term health impact based on AAQCs. Ground and vegetation soiling from dust deposition over the government set threshold would also be limited to the road ROW and slightly beyond. Exceedance of the AAQC for dustfall was calculated at only one culturally sensitive location even though high particulate matter concentrations were obtained. The dust build-up would also be of limited time given the short period of dust emissions in an area which deposition would most likely be washed away with precipitations and other natural phenomenon after a while.
- The AERMOD modelling tool integrates local topography into calculations, but it does not consider the presence of vegetation and trees that can act as physical barriers, especially against particulates dispersion further down-wind.
- It is not possible to define the exact combination and space distribution of equipment and activities that will occur at individual sections of the road, and so all potential emissions (dozers, excavators, loaders, etc.) were combined in a single source as a simplified but conservative approach. For example, all three dozers and graders available on-site were considered in operation at the same time and same close area which results in higher localized concentrations but would probably not be the case in reality (or at least there would be some distance between each equipment).



Table 9-46: Air Dispersion Modelling Results for Selected Contaminants at Different Locations During the Construction Phase

Contaminant	Averaging Period	Maximum Total Concentration Including Background					Limit Value	Selected Background
		Location	Without Mitigation		With Mitigation			
			$\mu\text{g}/\text{m}^3$	% limit	$\mu\text{g}/\text{m}^3$	% limit	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$
Total suspended matter (TSP)	Max 24-hour	50 m from RCL	16,468	13,723	16,256	13,547	120 (AAQC)	45
		150 m from RCL	2,761	2,301	2,655	2,212		
		300 m from RCL	1,208	1,007	1,147	956		
		100 m from QCP	1,733	1,445	1,640	1,367		
		CHL25 (60 m)	5,901	4,917	5,746	4,788		
		CHL05 (150 m)	1,873	1,561	1,873	1,561		
		CHL14 (200 m)	1,270	1,059	1,224	1,020		
Fine inhalable particulate fraction (PM ₁₀)	Max 24-hour	50 m from RCL	5,906	11,812	5,780	11,561	50 (AAQC)	28
		150 m from RCL	1,478	2,955	1,311	2,622		
		300 m from RCL	829	1,657	700	1,400		
		100 m from QCP	943	1,887	843	1,685		
		CHL25 (60 m)	2,566	5,131	2,476	4,952		
		CHL05 (150 m)	962	1,925	962	1,925		
		CHL14 (200 m)	614	1,229	577	1,154		
Dustfall	Max 30-days	50 m from RCL	10	148	10	148	7.0 (AAQC)	0.4
		150 m from RCL	9.3	132	5.4	78		
		300 m from RCL	5.0	72	2.9	42		
		100 m from QCP	10	147	10	144		
		CHL25 (60 m)	9.2	132	8.2	117		
		CHL05 (150 m)	6.1	87	3.7	52		
		CHL14 (200 m)	5.5	78	3.2	45		
Nitrogen dioxide (NO ₂)	Max 1-hour	50 m from RCL	1,797	449	467	117	400 (AAQC)	51
		150 m from RCL	859	215	272	68		
		300 m from RCL	502	125	205	51		
		100 m from QCP	7,570	1,892	4,715	1,179		
		CHL25 (60 m)	1,022	256	316	79		
		CHL05 (150 m)	650	163	230	58		
		CHL14 (200 m)	401	100	189	47		
Nitrogen dioxide (NO ₂)	Max 24-hour	50 m from RCL	458	229	217	109	200 (AAQC)	23
		150 m from RCL	179	90	132	66		
		300 m from RCL	146	73	118	59		
		100 m from QCP	380	190	344	172		
		CHL25 (60 m)	228	114	157	78		
		CHL05 (150 m)	154	77	112	56		
		CHL14 (200 m)	128	64	100	50		

Notes: RCL – road centerline; QCP – ARA-2 quarry center point
 Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in bold.

Table 9-46 (cont'd): Air Dispersion Modelling Results for Selected Contaminants at Different Locations During the Construction Phase

Contaminant	Averaging Period	Maximum Total Concentration Including Background					Limit Value	Selected Background
		Location	Without Mitigation		With Mitigation			
			$\mu\text{g}/\text{m}^3$	% limit	$\mu\text{g}/\text{m}^3$	% limit	$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$
Sulfur dioxide (SO ₂)	Max 1-hour	50 m from RCL	174	174	109	109	100 (AAQC)	90
		150 m from RCL	173	173	108	108		
		300 m from RCL	164	164	106	106		
		100 m from QCP	8,589	8,589	1,934	1,934		
		CHL25 (60 m)	190	190	112	112		
		CHL05 (150 m)	104	104	96	96		
		CHL14 (200 m)	109	109	94	94		
Carbon monoxide (CO)	Max 1-hour	50 m from RCL	12,611	35	6,403	18	36,200 (AAQC)	5,061
		150 m from RCL	8,369	23	5,683	16		
		300 m from RCL	6,751	19	5,615	16		
		100 m from QCP	67,764	187	67,742	187		
		CHL25 (60 m)	9,107	25	5,818	16		
		CHL05 (150 m)	7,424	21	5,471	15		
		CHL14 (200 m)	6,297	17	5,302	15		
Acrolein	Max 24-hour	50 m from RCL	5.1	1,284	1.6	394	0.40 (AAQC)	0.04
		150 m from RCL	1.3	335	0.53	132		
		300 m from RCL	0.68	169	0.31	78		
		100 m from QCP	1.1	275	0.62	156		
		CHL25 (60 m)	1.7	419	0.78	195		
		CHL05 (150 m)	0.83	208	0.40	100		
		CHL14 (200 m)	0.48	120	0.24	60		
Benzene	Max 24-hour	50 m from RCL	16	680	5.3	232	2.3 (AAQC)	0.9
		150 m from RCL	4.7	203	2.3	100		
		300 m from RCL	2.7	119	1.7	73		
		100 m from QCP	4.0	173	2.6	113		
		CHL25 (60 m)	5.6	245	3.0	132		
		CHL05 (150 m)	3.2	139	1.9	84		
		CHL14 (200 m)	2.2	94	1.5	64		
Benzo(a)pyrene (B[a]P) (as surrogate for PAHs)	Max annual	50 m from RCL	2.1×10^{-5}	213	2.1×10^{-5}	207	1.0×10^{-5} (AAQC)	2.0×10^{-5}
		150 m from RCL	2.0×10^{-5}	204	2.0×10^{-5}	202		
		300 m from RCL	2.0×10^{-5}	202	2.0×10^{-5}	201		
		100 m from QCP	3.2×10^{-5}	317	2.6×10^{-5}	256		
		CHL25 (60 m)	2.0×10^{-5}	204	2.0×10^{-5}	201		
		CHL05 (150 m)	2.0×10^{-5}	203	2.0×10^{-5}	201		
		CHL14 (200 m)	2.0×10^{-5}	202	2.0×10^{-5}	201		

Notes: RCL – road centerline; QCP – ARA-2 quarry center point
Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in bold.



The Air Quality and Dust Control Management Plan will not limit itself to the measures considered in this assessment as there are many other options to mitigate dust uplifting and exhaust emissions. Most of these options like idling minimization, limitation of unnecessary vehicle and heavy equipment movement, and the wetting of soil and aggregate during dry days cannot however be properly translated into the dispersion model and so their potential impact was not calculated here. Moreover, mitigation measures for dozers and graders, which are the main source of particulates near culturally sensitive areas, could include watering but it would not be practical. The management plan could therefore integrate a monitoring procedure with the intent of mitigating the impact of these emissions by controlling (limiting) their usage during unfavorable weather conditions.

The net effects on air quality during the construction phase are adverse, as the project construction results in a predicted increase of ambient concentrations compared to existing conditions. The magnitude of net effects is conservatively predicted to be moderate to high (with a cautious approach taken in identifying emission sources for the air dispersion model). The geographic extent for change in air quality is limited to the LSA, and the net effects will be short-term (i.e., limited to the approximated five-year construction period) and is predicted to be infrequent as it is expected that construction activities will progress along the proposed road ROW.

For ecological and social context, the net effects are categorized as moderate resilience as the air quality LSA is considered an area that is somewhat affected by human activity. The net effects are predicted to be reversible as the predicted increase in ambient concentrations would return to existing conditions after the end of the construction phase. The likelihood of project construction activities resulting in change to air quality is certain.

9.5.2.1.2 Change in Air Quality During Operation Phase

While it is impossible to have a direct control on emissions from vehicle engines during the operations phase, it is possible to work on dust emissions from the road surface. Considering that part of the road will not be fully surfaced with asphalt or chip seal from the start, the maintenance crew will operate a truck that will spray water over the gravel-surface part of the road from May to November, or when needed. Note that particulate matter in air comes almost exclusively from road dust emissions and less from exhaust gases (representing <1% of total particulates).

The impact of this measure on the maximum concentrations of TSP, PM₁₀, and PM_{2.5} along with dustfall calculated at 50, 150, and 300 m distance from the road centerline, as well as at the closest existing residence, culturally sensitive area and future residence plot is provided in **Table 9-47**. Results for the scenario where the vehicles are travelling on a paved surface instead of a gravel-based surface are also presented. For other contaminants like gaseous CACs and toxic contaminants, this mitigation measure has no impact but as mentioned their maximum concentrations are already low, below any applicable AAQC and CAAQS. The outcomes are as follows:

- Road watering during non-winter months slightly helps reduce the maximum projected TSP concentrations in air, although it would be far from enough to comply with the AAQC at 50 m distance from the road centerline. The difference between both scenarios (unpaved no control vs. unpaved with control) is comparable to the dust control factor of 30% applied in the emissions scenario. This control factor could eventually be higher if the passage of water trucks is more frequent, especially during days with high dust uplift and dispersion potential. It would however be not enough to prevent exceedances up to at least 500 m distance from the road, according to the model that was developed as part of this study. The application of asphalt or chip seal would eventually remove these exceedances, at least beyond the 50 m mark from the road centerline.



- PM₁₀ concentrations follow a similar trend although in this case the exceedance setback could reach 150 m with a paved surface, comprising some culturally sensitive areas and future residential plots located close-by. That said, calculated exceedances at these sensitive locations remain close to the AAQC (**100–110%**).
- For PM_{2.5} based on CAAQS 2030 target of 23 µg/m³, exceedances are noted for the scenarios with unpaved surface but to a much lower extent than TSP and PM₁₀. In fact, based on modeling results, the exceedance setback only reaches 150 m and so. For the paved surface scenario, no exceedances are obtained even at 50 m distance from the road.
- With a gravel-based surface and water control, the maximum dust deposition at 50 m distance would decrease to 19 g/m² from 27 g/m² over 30-days without dust control corresponding to **270%** of the AAQC (7 g/m²). This value decreases rapidly with distance dropping to 5.4 g/m² (**76%**) and 2.8 g/m² (**43%**) at 150 and 300 m, respectively for the scenario with water control. With a paved surface, no issues are noted on that respect.
- With regard to annual air quality criteria (TSP, PM_{2.5}, and dust deposition), exceedances were calculated at 50 m distance only for the gravel-based surface scenario with water control with the exception of dustfall which AAQC is exceeded (**134%**) at one future residence location (RPF42).



Table 9-47: Air Dispersion Modelling Results for the Operation Phase

Contaminant	Averaging Period	Maximum Total Concentration Including Background							Limit Value µg/m³	Selected Background µg/m³
		Location from RCL ⁽¹⁾	Unpaved – No control		Unpaved – With control		Paved			
			µg/m³	% limit	µg/m³	% limit	µg/m³	% limit		
Total Suspended Matter (TSP)	Max 24-hour	Max at 50 m	1,437	1,198	1,076	897	142	118	120 (AAQC)	45
		Max at 150 m	650	542	508	423	81	68		
		Max at 300 m	473	394	374	312	70	59		
		CHL25 at 60 m	957	798	718	598	101	84		
		RP01 at 1,350 m	98	82	80	67	48	40		
		RFP42 at 55 m	970	808	720	600	105	87		
Fine Inhalable Fraction (PM ₁₀)	Max 24-hour	Max at 50 m	534	1,069	383	765	73	145	50 (AAQC)	28
		Max at 150 m	266	533	195	390	51	102		
		Max at 300 m	190	381	142	283	45	90		
		CHL25 at 60 m	350	700	253	506	53	106		
		RP01 at 1,350 m	68	136	56	112	31	62		
		RFP42 at 55 m	376	752	271	542	51	103		
Fine Particulate Matter (PM _{2.5})	3-year average of annual 98 th percentile of daily 24-hour averages	Max at 50 m	44	191	35	152	18	76	23 (2030 CAAQS) 27 (AAQC)	13
		Max at 150 m	26	113	22	96	15	65		
		Max at 300 m	21	91	19	83	16	62		
		CHL25 at 60 m	32	139	27	117	16	68		
		RP01 at 1,350 m	15	65	15	65	13	58		
		RFP42 at 55 m	33	143	28	122	16	70		
Dustfall	Max 30-days	Max at 50 m	27	383	19	270	2.9	42	7.0 (AAQC)	0.4
		Max at 150 m	7.5	107	5.4	76	1.1	16		
		Max at 300 m	4.1	58	2.8	43	0.82	12		
		CHL25 at 60 m	12	165	8.2	117	1.4	20		
		RP01 at 1,350 m	0.73	10	0.63	9.0	0.43	6.1		
		RFP42 at 55 m	16	224	11	158	1.8	25		

Notes: Concentrations that are greater than the corresponding AAQC or CAAQS are denoted in **bold**.

(1) Closest receptors from the road centerline (RCL25) for culturally sensitive areas (CHL), existing residences and institutions (RP01), and future residential plots (RFP42).



The net effects on air quality during the operation phase are adverse, as vehicular traffic and maintenance activities result in a predicted increase of ambient concentrations compared to existing conditions. The magnitude of net effects is conservatively predicted to be moderate to high (with a cautious approach taken in identifying emission sources for the air dispersion model). The geographic extent for change in air quality is limited to the LSA, and the net effects will be medium-term with the predicted operation-related air emissions continuing through the operation phase. Net effects will be frequent as it is expected that there will be intermittent presence of vehicles and maintenance activities on the road during the operation phase. However, ambient concentrations will change with meteorological conditions.

For ecological and social context, the net effects are categorized as moderate resilience as the air quality LSA is considered an area that is somewhat affected by human activity. The net effects are predicted to be reversible as the predicted increase in ambient concentrations would return to existing conditions after the end of the operation phase. The likelihood of vehicular traffic and maintenance activities during the operation phase resulting in change to air quality is certain.

9.5.2.2 Change in GHGs

The following subsections describe the predicted net effects for GHG emissions during construction and operation phases of the Project as well as provide a summary of the analysis on the effects of the Project on Canada's carbon footprint and carbon sinks (refer to Section 5 in Appendix H – Greenhouse Gas Emissions Report for the detailed analysis).

9.5.2.2.1 Change in GHGs During Construction Phase

Over a period of 25 years starting with the first year of construction, the Project is expected to generate over 330,000 t CO₂e from which 33% is linked to the construction phase. On an annual basis, the maximum GHG emissions are expected to occur during the second year of construction generating a total of 44,699 t CO₂e, with 75% coming from the combustion of cleared living and dead organic biomass.

The net effects of GHG emissions during construction are adverse, as project construction will result in a predicted increase of GHG emissions compared to existing conditions. The magnitude of the net effects is predicted to be low, with project construction resulting in a relatively small change of GHG emissions compared to provincial and national emissions. The geographic extent for change in GHGs during construction is beyond the RSA because the effects is global. The net effects will be short-term (i.e., limited to the approximated five-year construction period) and is predicted to be continuous as it is expected that construction activities will occur throughout the construction phase and due to the long-live nature of GHGs. The net effect is considered irreversible as effects related to the release of GHG emissions from project construction would not be reversible for many decades based on current knowledge on climate change. For ecological and social context, the net effects of change in GHG emissions during construction are categorized as moderate resilience, as the geographic extent is beyond the RSA, where there have been anthropogenic sources of GHG emissions prior to the Project.

9.5.2.2.2 Change in GHGs During Operation Phase

For the operation phase, the annual emissions are estimated at 11,178 t CO₂e with about half linked to the projected vehicular traffic on the WSR, and 35% from the generator set required to provide power to the MSF. Emissions related to land-use change, mainly from the natural oxidation of carbon in mineral soil that will be disturbed during construction, represent 17% of the total annual emissions that will greatly decrease after twenty (20) years (i.e., soil carbon oxidation is projected to stop or greatly diminish after that time period).



The net effects of GHG emissions during the operation phase are adverse, as the project operation results in a predicted increase of GHG emissions compared to existing conditions. The magnitude is predicted to be low, with the project operation resulting in a relatively small change of GHG emissions compared to provincial and national emissions (<0.1% and <0.01% of provincial and national emissions in 2022, respectively). The geographic extent for change in GHGs during operation is beyond the RSA because the effect is global. Net effects on change in GHGs during operation is medium-term (i.e., will occur over the operation phase of the Project) and continuous. As with construction, the net effect is considered irreversible as effects related to the release of GHG emissions from vehicular traffic and maintenance activities during the operation phase would not be reversible for many decades based on current knowledge on climate change. For ecological and social context, the net effects of change in GHG emissions from Project-related activities during operation are categorized as moderate resilience, as the geographic extent is beyond the RSA, where there have been anthropogenic sources of GHG emissions prior to the Project.

9.5.2.2.3 Effects of the Project on Canada’s Carbon Footprint and Carbon Sinks

The GHG emissions expected during the first years of construction from vegetation and DOM clearing are estimated to represent about 60% of all emissions calculated for the first 25-years considering that biomass is projected to be burned on-site in great majority. The remaining 40% is attributed either to the loss of a carbon sink, the net emissions from the land (emissions added – those avoided due to the project), or the net carbon ecosystem exchange for CO₂ in the peatlands affected by the Project. Over +105,000 t CO₂e can be attributed to land disturbance for the first 25 years. However, the uncertainty on this number remains high, being estimated at ±45% based on the method presented in Section 4.1 within the Greenhouse Gas Emissions Report (Appendix H), uncertainty ratings and justifications on inputs provided for the carbon sinks and reservoirs.

When compared to the Canadian total in 2022 (708 Mt CO₂e according to the NIR) of which approximately 23% (157 Mt CO₂e) comes from Ontario (ECCC, 2024), the added emissions from the WSR Project appears negligible (+0.0067% maximum). However, when compared per NIR GHG emissions category (Table 5-1 in Appendix H), WSR’s emission sources, while remaining small for fossil-fuel combustion activities (0.06% and less vs. the Canadian total depending on category), cannot be seen as negligible when compared to the Canadian total regarding land converted into settlements like it is the case for the proposed WSR.⁵ In fact, the results from this assessment show that the maximum annual emissions caused by construction activities on carbon reservoir would generate an equivalent of 0.5% of the corresponding Canadian total for land-use changes into settlements (based on 2021 data from the NIR) while the annual emissions for the operation phase were estimated to be 0.03% of the Canadian total.

Other than adding to the Canadian GHG emissions, the presence of the road could also accelerate the development of mines in the region in which ore could be used in smelters (or an equivalent) in Ontario or Canada in replacement of ore coming from abroad. This particular situation would improve Canada’s GHG inventory by limiting transportation emissions from abroad. It could also have the reverse effect if the ore is shipped abroad. As such, the additional impact of the WSR on the carbon footprint of the region will depend more on future mining operators than the WSR.

⁵ The “Land converted into settlements” category covers all built-up land: urban, rural residential, and industrial and recreational land; roads, ROW and other transportation infrastructure; and land used for resource exploration, extraction and distribution (mining, oil and gas).



Furthermore, the WSR Project will not have an impact on global GHG emissions, at least it will not displace emissions internationally, since it remains an infrastructure project intended to provide access to the Webequie community and future nearby mineral exploration and proposed future mining sites.

9.5.2.3 Change in Sound Levels

9.5.2.3.1 Change in Sound Levels due to Aggregate Extraction Operations During Construction Phase

The Noise Impact Modelling conducted for aggregate extraction activities indicated that predicted sound levels are expected to minorly exceed NPC-300 guideline limits at Construction Camp 2A located near ARA-2. Given workers will be in the field during the daytime, the exceedances are minor (by a maximum of 4 dBA). Therefore, the magnitude of the effect is considered to be low.

The effect's geographic extent will be limited to the noise LSA. The effect is short-term in duration and predicted to be infrequent in the aggregate resource areas. For ecological and social context, the effect is categorized as moderate resilience as the noise LSA is considered a rural area. The effect is likely to occur but is reversible as the acoustic environment is expected to return to the background sound levels when noise generating activities cease.

9.5.2.3.2 Change in Sound Levels due to General Construction Activities During Construction Phase

The noise modelling conducted for the construction of the proposed roadway and bridges indicated that the highest predicted sound levels at the culturally sensitive areas CHL-5, CHL-7, CHL-17, CHL-25, and Construction Camp 1A site C05 are between 48 and 57 dBA, exceeding the MNL threshold of 47 dBA (L_{DN}). Therefore, the magnitude of the effect is considered to be low to moderate.

The effect's geographic extent will be limited to the noise LSA. The most affected NSAs are found within 150 m of the roadway, or 300 m of a waterbody crossing (involving pile driving/bridge construction). There are no exceedances predicted for the existing permanent residences within the Webequie community. The effect is short-term in duration and predicted to be infrequent. Noise impacts from roadway construction are only expected to affect NSAs for approximately one week based on an approximate 100 m/day rate of construction.

For ecological and social context, the effect is categorized as moderate resilience as the noise LSA is considered a rural area. The effect is likely to occur but is reversible as the acoustic environment is expected to return to the background sound levels when noise generating activities cease.

9.5.2.3.3 Change in Sound Levels due to Vehicle Use of the Proposed Road During Operation Phase

The noise modelling conducted to predict noise generated from the operations of the WSR indicated that changes in sound levels resulting from the proposed Project are expected to be negligible for the existing residences within the Webequie community and less than the 5 dB change threshold outlined in the MTO Noise Guide. Overall "Build" sound levels are predicted to be less than or equal to 45 dBA which is considered appropriate for a quiet rural environment. For the culturally sensitive areas, the maximum sound level is predicted to be 46 dBA. The maximum change is predicted to be 14 dB which is above the MTO Noise Guide threshold. Overall "Build" sound levels are highly dependent on the exact location of the NSAs. Sound levels are predicted to be less than 46 dBA which is considered appropriate for a quiet rural area. With respect to Health Canada Guidelines, changes in sound levels resulting from the



proposed Project are expected to be negligible for all NSAs and less than the 6.5% threshold. Therefore, the magnitude of the effect is considered to be low.

The effect's geographic extent will be limited to the noise LSA. The effect is medium-term in duration and predicted to be frequent as it is expected that there will be intermittent presence of vehicles on the road during the operation phase.

For ecological and social context, the effect is categorized as moderate resilience as the noise LSA is considered a rural area. The effect is likely to occur but is reversible as the acoustic environment is expected to return to the background sound levels as noise from vehicle use of the road will attenuate following a vehicle pass-by.

9.5.3 Summary

A summary of the characterization of net effects is provided in **Table 9-48**.



Table 9-48: Summary of Predicted Net Effects on Atmospheric Environment VC

Predicted Net Effect	Project Phase	Net Effects Characterization							
		Direction	Magnitude	Geographic Extent	Duration	Frequency	Context	Reversibility	Likelihood of Occurrence
Change in Air Quality									
Change in air quality during construction phase	Construction	Negative	Moderate to High	LSA	Short-term	Infrequent	Moderate resilience	Reversible	Certain
Change in air quality during operation phase	Operations	Negative	Moderate to High	LSA	Medium-term	Frequent	Moderate resilience	Reversible	Certain
Change in GHGs									
GHG emissions during construction phase	Construction	Negative	Low	Beyond RSA	Short-term	Continuous	Moderate resilience	Irreversible	Certain
GHG emissions during operation phase	Operations	Negative	Low	Beyond RSA	Medium-term	Continuous	Moderate resilience	Irreversible	Certain
Change in Sound Levels									
Aggregate extraction operations	Construction	Negative	Low	LSA	Short-term	Infrequent	Moderate resilience	Reversible	Probable
Construction of the proposed roadway and waterbody crossings	Construction	Negative	Low to Moderate	LSA	Short-term	Infrequent	Moderate resilience	Reversible	Probable
Vehicle use of the proposed road once constructed	Operations	Negative	Low	LSA	Medium-term	Frequent	Moderate resilience	Reversible	Probable

Note: Refer to **Table 9-45** for definitions of categories for net effects characterization.



9.6 Determination of Significance

Several methodologies can be used to determine whether an adverse environmental effect is significant or not significant, as outlined in the Interim Technical Guidance Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the *Canadian Environmental Assessment Act* (CEA Agency, 2018). A qualitative aggregation method is used for determination of significance based on the sequential interaction among the magnitude, geographic extent, and duration criteria for effects. The following sequential interactions form the basis for determination of significance of adverse net effects on the Atmospheric Environment VC:

A predict net effects is considered not significant if the effect is:

- Low to moderate in magnitude, local to regional in extent, and short-term to permanent in duration.

A predict net effects is considered significant if the effect is:

- High in magnitude, local to regional in extent, and long-term to permanent in duration.

9.6.1 Air Quality

The construction and operation phases of the Project will result in air contaminant emissions; however, the emissions are localized and short-term to medium-term in duration. The magnitudes of the releases will be managed with the implementation of best management practices and proposed mitigation measures outlined in **Section 9.4.1**. Based on the characterization of net effects in **Section 9.5.2.1.1** and **Section 9.5.2.1.2**, the net effects of the Project on air quality are predicted to be not significant.

9.6.2 Greenhouse Gases (GHGs)

For GHGs, provincial and federal policies and regulations do not identify specific thresholds or standards that could be used to determine significance when assessing the net effects of a single project's GHG emissions. The primary criterion used to assess significant effects of Project-related changes in GHG emissions is magnitude. The GHG emissions from the Project are compared to provincial and national GHG inventories to establish a context for the magnitude of emissions following the Strategic Assessment of Climate Change (ECCC 2020a) guidance. The magnitude definition is presented in **Table 9-45** based on the Impact Assessment Agency of Canada (formerly the Canadian Environmental Assessment [CEA] Agency) guidance (CEA Agency, 2003).

The Project's GHG emissions estimated for construction and operation phases represent a small contribution to provincial and national GHG emissions as noted in **Section 9.5.2.2**. The GHG emissions are ranked as low in magnitude during the construction and operation phases. Based on these results and the characterization of net effects in **Section 9.5.2.2.1** and **Section 9.5.2.2.2**, the net effects due to GHG emissions by the Project are predicted to be not significant.



9.6.3 Noise

A net adverse effect of noise is predicted to be significant where Project-related noise levels at the NSAs are likely to exceed the NPC-300 guideline limits for sound levels in a suburban or semi-rural area (50 dBA) and the annoyance threshold (%HA of 6.5%) recommended by Health Canada. If the predicted sound levels do not frequently exceed these thresholds, they are deemed to be not significant.

The construction and operations of the Project will result in noise emissions; however, the magnitude of the releases will be limited and well managed with the implementation of best management practices.

The predicted overall sound levels during construction are not excessive and meet the NPC-300 guideline limits in a suburban or semi-rural area (50 dBA). The predicted sound pressure levels during operations (background sound levels plus project sound levels) at the NSAs are expected to be well below Health Canada threshold for annoyance (change in %HA less than 6.5%).

With the implementation of mitigation measures as described in this assessment, and based on the results of the Noise Impact Modelling and characterization of net effects in **Section 9.5.2.3**, net adverse effects of noise during the construction and operation phases of the Project are predicted to be not significant.

9.7 Cumulative Effects

In addition to assessing the net environmental effects of the Project, the assessment for Atmospheric Environment VC also evaluates and assesses the significance of net effects from the Project that overlap temporally and spatially with effects from other past, present and reasonably foreseeable developments (RFDs) and activities (i.e., cumulative effects).

For a valued component that has identified net effects where the magnitude was determined to be higher than negligible, it is necessary to determine if the effects from the Project interact both temporally and spatially with the effects from one or more past, present RFDs or activities, since the combined effects may differ in nature or extent from the effects of individual Project activities. Where information is available, the cumulative effects assessment estimates or predicts the contribution of effects from the Project and other human activities on the criteria, in the context of changes to the natural, health, social or economic environments.

For this Atmospheric Environment VC assessment, the net effects in **Section 9.5.2** that are characterized as having a likelihood of occurrence of “probable” or “certain” and a “moderate” to “high” magnitude have been carried forward to the cumulative effects assessment. Net effects with this characterization are most likely to interact with other RFD and activities.

The cumulative effects assessment for the Project is completed at the regional scale (i.e., VC specific RSA). The cumulative effects assessment for each VC is primarily qualitative and describes how the interacting effects of human activities and natural factors are predicted to affect indicators for each VC. The assessment is presented as a reasoned narrative describing the outcomes of cumulative effects for each VC.



The predicted net effects of the Project on the Atmospheric Environment VC that are carried forward for the assessment of cumulative effects within the Atmospheric Environment RSA include:

- Change in air quality during construction and operation phases;
- Change in sound levels during construction of the proposed road way and waterbody crossings.

Results of the cumulative effects assessment for the Atmospheric Environment VC with consideration of RFDs and activities are presented in Section 21.

9.8 Prediction Confidence in the Assessment

9.8.1 Air Quality

The level of confidence is moderate for the estimation of air emissions. There are some uncertainties associated with meteorological datasets, assumptions on emission factors for types of vehicles and equipment, day-to-day activities during the construction phase and traffic volume and types of vehicles on the WSR during the operations phase, as detailed in the Air Quality Impact Assessment Report (**Appendix G**). However, the overall assessment of air quality is still considered to be conservative because the emission factors used the air dispersion model represent maximum standards to achieve, meaning the modelling results are likely to be higher than those that would be measured when the project construction and operation activities take place. When the road will be fully surfaced with asphalt or chipseal, it will result in much lower TSP, PM₁₀ and PM_{2.5} concentrations in air and dustfall on the ground in the immediate area of the road.

The confidence in the effectiveness of the proposed mitigation measures to reduce air emissions is high because most of the mitigation measures are known to effectively reduce the source of air emissions (e.g., lower fuel consumption is directly proportional to lower air emissions).

9.8.2 Greenhouse Gases (GHGs)

The estimation of GHG emissions associated with construction and operation phases depends on the engineering design and on the estimated fuel consumption. The prediction confidence for the estimation of GHG emissions is rated as moderate to low because the construction phase work plan is not definite and can be subjected to changes compared to the hypotheses used in this assessment. Similarly, for the operation change, the actual impact of the road in term of traffic volumes, maintenance work and impact on net GHG emissions from the land are based on best estimates at this point that can however vary significantly in reality depending on factors like the presence of mining operations (road traffic), the size and design of the maintenance facility (operation of generator set), and meteorological conditions (maintenance). In summary, this assessment can be seen as providing an indication on the extent of GHG emissions to be expected for by the Project.

The confidence in the effectiveness of the GHG mitigation measures is high because most of the mitigation measures are known to effectively reduce the source of GHG emissions (e.g., lower fuel consumption is directly proportional to lower GHG emissions).



9.8.3 Noise and Vibration

The prediction confidence in the effects assessment for noise and vibration is rated as moderate to high, because the equipment noise emissions and vibration levels are well-understood and are based on equipment totals and established database for measured sound power levels for similar equipment. Existing conditions of background sound levels are based on sound level monitoring data collected at representative locations within the noise study areas. The predicted sound levels at identified NSAs were completed using industry-standard software that is routinely used for predicting environmental noise from industrial activities.

9.9 Predicted Future Condition of the Environment if the Project Does Not Proceed

There are no large industrial emissions sources within the LSA; therefore, the air contaminant concentrations in the LSA are not likely to change substantially from those background concentrations presented in **Section 9.2.2.1**. If the Project were not to proceed, air quality in the LSA would remain at the existing low background levels unless other developments with substantive emissions were brought into the area.

The federal and provincial governments have set targets to reduce emissions of GHGs. The federal target aims to reduce GHG emissions by 30% below 2005 levels by 2030 and to achieve a low carbon economy by 2050 (ECCC 2021b). If the Project were not to proceed, provincial and federal GHG emissions would continue the current trend of decreasing GHG emissions due to efforts by the provincial and federal governments to meet specified targets and reduce the effects of climate change. This trend would continue regardless of whether the Project will proceed because the Project's contributions to overall GHG emissions are predicted to be not substantial.

There are no large industrial emissions sources within the LSA and existing sound levels in the LSA are likely to be low and influenced predominantly by wildlife (e.g., bird and insects). If the Project were not to proceed, sound levels in the LSA would remain at the existing low background levels unless some other developments are planned for the area.

The predicted future condition of lighting if the Project does not proceed is anticipated to be consistent with the current existing condition within the LSA.

9.10 Climate Change Resilience

A climate change resilience analysis was completed to assess risks to the Project due to climate change based on the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol from Engineers Canada and Natural Resources Canada. The PIEVC Protocol respects the requirements from the Strategic Assessment for Climate Change (SACC) and Ontario's guidelines within the framework of environmental impact assessments. The climate change resilience assessment was carried out with respect to the expected impact of climate change over time and not according to the climate strictly speaking. Details of the climate change resilience analysis are provided in the Climate Change Resilience Review Report (Appendix I).



The climate change resilience analysis assessed climate hazards that may have the potential to affect one or more of the components. The assessed climate hazards include thick fog conditions, high-intensity short-duration rainfalls, blizzards, freezing rain, freeze-thaw cycles, rain on snow events, extreme winds, permafrost degradation, freshets, riverbank erosion, and wildfires.

The assessment results indicate that there are no « moderate » and « high » risks associated with the proposed WSR. The interactions for which the risk level is « very low » or « low » represent general situations where the potential effects of the identified climate hazards are considered marginal or sufficiently low considering all available information (final design criteria, construction standards, hydrological/geotechnical attributes, etc.) to not have tangible repercussion on the road integrity. Extra control measures are not considered necessary. This conclusion is based on the Project adopting, and in some cases exceeding provincial standards, guidelines and codes for the design and operation and maintenance of provincial highways. Proposed project design and measures to further reduce climate risks are detailed in the Climate Change Resilience Review Report (Appendix I). The potential effects of climate change and extreme weather events on the Project are assessed in Section 24 – Effects of the Environment on the Project.

9.11 Follow-Up and Monitoring



The Project invites community members to participate in developing and implementing monitoring programs to assess the effectiveness of proposed mitigation measures and potential adverse effects to the environment. Where effects are considered unacceptable and/or based on concerns raised by Indigenous community members or other stakeholders, further mitigation options will be considered by the road operator in consultation with Indigenous communities and stakeholders.

9.11.1 Air Quality

An Air Quality and Dust Control Management Plan will be developed and implemented to manage and reduce air contaminant emissions during construction and operation phases. As described in Section 22 (Follow-up and Compliance Monitoring Programs), follow-up and monitoring activities will be conducted to confirm mitigation measures are being implemented appropriately. The Air Quality and Dust Control Management Plan will integrate a monitoring procedure for dustfall effects and measures to control or limit particulate emissions that would mostly come from the passage of vehicles on the road or the handling of soil or aggregates by mobile equipment during construction.

Ongoing engagement and consultation with potentially affected Indigenous communities and groups will help identify opportunities to address concerns regarding air quality throughout construction and operations of the Project.

9.11.2 Greenhouse Gases (GHGs)

Based on the results of the assessment, a GHG monitoring program is not recommended for the Project. As noted in **Section 9.4.2**, mitigation measures will be implemented to reduce GHG emissions. As described in Section 22 (Follow-up and Compliance Monitoring Programs), follow-up and monitoring activities will be conducted to confirm mitigation measures are being implemented appropriately.



Ongoing engagement and consultation with potentially affected Indigenous communities and groups is proposed to help identify opportunities to address concerns regarding GHG emissions throughout construction and operations of the Project.

9.11.3 Noise and Vibration

With the implementation of mitigation measures, the Project will result in construction and operation noise effects that are not expected to exceed guidance levels that require noise mitigation beyond best management practices outlined in **Section 9.4.3**. A noise monitoring program for the construction and operation phases of the Project is not recommended. However, response to noise complaints, if they arise, will be investigated, documented and addressed.

Vibration monitoring is expected to be required for aggregate extraction sites and general construction blasting activities to align with guidelines set out by MECP, MTO, Health Canada, DFO and general industry practices, respectively. Monitoring requirements for construction blasting will be considered and assessed once detailed information regarding the blast designs are available.

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