

# 6 Predicted Changes to the Environment

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## 6.1 Atmospheric Environment

The Agency summarized the Proponent's assessment of changes to the atmospheric environment with input from federal authorities and Indigenous nations. This summary supports the analysis of effects on fish and fish habitat (Chapter 7.1), migratory birds (Chapter 7.2), species at risk (Chapter 7.3), Indigenous Peoples' current use of lands and resources for traditional purposes, physical and cultural heritage, and sites of significance (Chapter 7.4), Indigenous Peoples' health and socio-economic conditions (Chapter 7.5), and federal lands (Chapter 7.6), included in this EA Report.

The Agency is of the view that the Proponent adequately considered potential effects of the Project on the atmospheric environment and that the Proponent's proposed mitigation measures, monitoring, and follow-up programs (Appendix D) are appropriate to address potential project effects to the atmospheric environment. The Agency's conclusions are based on an analysis of the Proponent's assessment, including the Proponent's proposed mitigation, monitoring, and follow-up measures, and the views expressed by federal authorities and Indigenous nations.

### 6.1.1 Proponent's Assessment of Environmental Effects

#### Air Quality and Odour Emissions

During construction, operation, and decommissioning/closure at the Gordon and MacLellan sites, sources of atmospheric contaminant emissions that could affect air quality include: diesel combustion emissions; emissions from explosives detonation (i.e. nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), and sulphur dioxide (SO<sub>2</sub>)); fugitive dust emissions from mining equipment, haul trucks, light personnel vehicles, wind erosion of exposed soil, ore, and mine rock, and bulldozing and grading; and emissions from ore milling and processing. These activities could result in elevated concentrations of total suspended particulates, fine particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), NO<sub>2</sub>, CO, SO<sub>2</sub>, hydrogen cyanide (HCN), metals (i.e. arsenic, cadmium, copper, lead, nickel, and zinc), diesel particulate matter, and greenhouse gas (GHG) emissions, including carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O).

The Proponent predicted that project-related emissions of PM<sub>10</sub>, NO<sub>2</sub>, CO, and SO<sub>2</sub> during construction would result in exceedances of the Manitoba Ambient Air Quality Criteria (AAQC) and the Canadian Ambient Air Quality Standards (CAAQS) at the Gordon and MacLellan sites. These exceedances would occur for a maximum of two hours per year at the northeast PDA boundary at the Gordon site and the south PDA boundary at the MacLellan site. The maximum concentrations of all other air contaminants were not predicted to exceed the applicable Manitoba AAQC or CAAQS at either project site and concentrations of all atmospheric contaminants at receptor locations at the Black Sturgeon Reserve were predicted to be below the Manitoba AAQC and CAAQS.

During operation at the Gordon site, the Proponent predicted that the maximum 1-hour average NO<sub>2</sub>, CO, and SO<sub>2</sub> concentrations and 24-hour average total suspended particulate and PM<sub>10</sub> concentrations would

exceed the Manitoba AAQC and CAAQS limits (Table 3). At the MacLellan site, maximum 1-hour average NO<sub>2</sub> and 24-hour average total suspended particulate and PM<sub>10</sub> concentrations were predicted to exceed Manitoba AAQC and CAAQS limits along the PDA boundary (Table 3); exceedances would occur one day per year with increasing distance from the PDA boundary. Maximum predicted concentrations for all other air contaminants, including metals and HCN, were predicted to be less than the applicable Manitoba AAQC or CAAQS limits for both sites.

**Table 3 Air Contaminant Exceedances of Manitoba AAQC or CAAQs Limits During Operation**

Air Contaminant Standard Averaging Time	Length of Exceedance of Manitoba AAQC or CAAQS Limits	
	Gordon site <sup>1</sup>	MacLellan Site <sup>1</sup>
1 hour average NO <sub>2</sub>	99 days per year	79 days per year
1 hour average CO	One hour per year	No exceedance
1 hour average SO <sub>2</sub>	5 days per year	No exceedance
24 hour average total suspended particulate	73 days per year	64 days per year
24 hour average PM <sub>10</sub>	110 days per year	89 days per year

<sup>1</sup> At the PDA boundary.

The Proponent predicted that, during decommissioning/closure, the volume of atmospheric contaminants would be much lower than those during construction and operation, and would be managed with the implementation of mitigation measures. Therefore, potential effects to air quality due to emissions of air contaminants and fugitive dust during decommissioning/closure were predicted to be negligible.

Changes to odour levels during all project phases at the Gordon and MacLellan sites were predicted to result from NO<sub>2</sub> and diesel combustion emissions from off-road mining equipment, haul trucks, and light-duty personnel vehicles, and would occur within the PDAs and LAAs. As maximum NO<sub>2</sub> concentrations during all phases were predicted to be less than odour recognition thresholds<sup>1</sup> at receptor locations within the LAAs and odour emissions would occur in short periods of less than one hour, the Proponent predicted that project-related odour emissions would be unlikely to affect the general population in the LAAs and RAA. However, the Proponent acknowledged that the perception of and sensitivity to odour is individually subjective.

The Proponent concluded that, with the implementation of mitigation measures, residual project effects to air quality and odour levels at the Gordon and MacLellan sites during construction would be adverse, low in magnitude, short-term, irregular in frequency, reversible, and would occur within the LAAs. During operation, effects were predicted to be adverse, low to high in magnitude, medium-term, irregular in frequency, reversible, and would occur within the LAAs. Residual effects during decommissioning/closure were predicted to be adverse, negligible in magnitude, long-term in duration, irregular, reversible, and would occur within the LAAs.

<sup>1</sup> As described in the United States Environmental Protection Agency's *Reference Guide to Odour Thresholds for Hazardous Air Pollutants Listed in the Clean Air Act Amendments of 1990* (1992).

## Greenhouse Gas Emissions

The estimated project-related GHG emissions during construction, operation, and decommissioning/closure at the Gordon and MacLellan sites are presented in Table 4. The Proponent conservatively assumed a continuous release of the maximum possible GHG emission volumes for construction and operation. While GHG emissions were not directly calculated or modelled for decommissioning/closure, GHG emissions were estimated to be approximately 30% of predicted construction phase emissions due to similarities in the types of activities and equipment used.

**Table 4 Estimated GHG emissions for the Gordon and MacLellan Sites**

	Total Project-related Emissions (kilotonnes of CO <sub>2</sub> e <sup>1</sup> )	Percent of Total Provincial GHG Emissions (2017) <sup>2</sup>	Percent of Total Federal GHG Emissions (2017) <sup>2</sup>
Construction			
Gordon Site	32	0.074	0.002
MacLellan Site	129	0.30	0.009
Operation			
Gordon Site	183	0.17	0.005
MacLellan Site	884	0.32	0.009
Decommissioning/Closure			
Gordon Site	0.46	Negligible	Negligible
MacLellan Site	3.78	Negligible	Negligible

<sup>1</sup> Carbon dioxide equivalent

<sup>2</sup> Based on data from *Canada's Official Greenhouse Gas Inventory*.

The Proponent predicted that, with the implementation of mitigation measures, residual effects from project-related GHG emissions during construction and operation would be adverse, low in magnitude, short-term for construction and medium-term for operation, continuous, and irreversible. Residual effects during decommissioning/closure were expected to be adverse, negligible in magnitude, long-term in duration, irregular, and irreversible.

## Light, Noise, and Vibration Levels

Project activities during all phases at the Gordon and MacLellan sites could result in an increase in ambient light levels from site lighting and equipment headlights, which could result in sensory disturbance and affect land users within the LAAs. The Proponent predicted that, with the implementation of mitigation measures, project-related increases in ambient light levels would be minor.

Project activities at the Gordon and MacLellan sites during all phases, including pile driving, land clearing and grading, ore milling and processing, mobile equipment and haul truck use, and blasting would result in elevated noise and vibration levels that could extend into the RAA. However, the noise and vibration levels at both sites during all project phases were predicted to comply with limits set out in Health Canada's *Guidance on Evaluating Human Health Impacts in Environmental Assessment: Noise*<sup>2</sup> and the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment Manual*<sup>3</sup>, respectively.

Residual project effects to noise levels at the Gordon and MacLellan sites for all project phases were predicted to be adverse, low to moderate in magnitude, short-term (i.e. construction and decommissioning/closure) and medium-term (i.e. operation), continuous, reversible, and would extend to the RAA, with the implementation of mitigation measures. Residual project effects on vibration levels for all project phases were predicted to be adverse, negligible to low in magnitude (i.e. construction and decommissioning/closure) and low to moderate in magnitude (i.e. operation), short-term (i.e. construction and decommissioning/closure) and medium-term (i.e. operation), reversible, regularly occurring, and would occur within the LAAs (i.e. construction and decommissioning/closure) and the RAA (i.e. operation). A residual effects analysis for project-related effects to ambient light levels was not provided.

The Proponent's proposed mitigation, follow-up, and monitoring measures are described in Appendix D of this EA Report. The mitigation, monitoring, and follow-up measures the Agency views as key for preventing significant adverse effects to areas of federal jurisdiction, as described under section 5 of CEAA 2012, as a result of project-related changes to the atmospheric environment are described in Section 6.1.3 of this Chapter.

## 6.1.2 Views Expressed

### Indigenous Nations

Peter Ballantyne Cree Nation, Chemawawin Cree Nation, and Sayisi Dene First Nation expressed concerns regarding the use of chemical dust suppressants to mitigate fugitive dust emissions, and associated potential effects on surface water quality and vegetation harvested by community members.

Chemawawin Cree Nation and Peter Ballantyne Cree Nation raised concerns regarding project-related odour emissions, noting that odour emissions may result in impacts to rights and effects to current use by affecting the experience of land users on the landscape and causing avoidance of certain areas due to real or perceived effects.

Peter Ballantyne Cree Nation and Mathias Colomb Cree Nation expressed concerns regarding project-related increases in noise and vibration levels, and any associated sensory disturbance, which may affect the experience of land users on the landscape and current use by affecting the distribution of wildlife species of cultural and traditional importance.

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<sup>2</sup> Health Canada. 2016. *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise*. Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

<sup>3</sup> Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment Manual*. FTA Report No. 0123.

A summary of the comments provided by Indigenous nations, along with Proponent and Agency responses, is provided in Appendix C of this EA Report.

## Federal Authorities

Environment and Climate Change Canada expressed concerns regarding project-related air contaminant and GHG emissions and recommended that the Proponent abide by Tier 4 emissions standards<sup>4</sup> for all phases of the Project and use Tier 4 engines in all equipment. Environment and Climate Change Canada also recommended that the Proponent consider the Strategic Assessment of Climate Change<sup>5</sup> in developing its GHG Management and Monitoring Plan, particularly as it relates to the selection of technically and economically feasible mitigation measures to address GHG emissions and of the establishment of emissions intensity targets. Health Canada recommended that every economically and technologically feasible mitigation measure be implemented by the Proponent to limit diesel exhaust emissions to the greatest extent possible.

Health Canada and Environment and Climate Change Canada expressed concerns regarding predicted project-related exceedances of the CAAQS limits for NO<sub>2</sub> and PM<sub>2.5</sub> and the lack of monitoring proposed to verify the results of the environmental assessment and the effectiveness of mitigation measures to limit NO<sub>2</sub> emissions. Environment and Climate Change Canada also noted that there may be inaccuracies in the baseline data (i.e. air quality modelling), leading to an underestimation of project-related NO<sub>2</sub> emissions by the Proponent. Health Canada also noted that NO<sub>2</sub> and PM<sub>2.5</sub> are non-threshold contaminants, which can cause adverse health effects at low concentrations. As such, Health Canada, and Environment and Climate Change Canada recommended that the Proponent develop additional mitigation measures to further reduce NO<sub>2</sub> and PM<sub>2.5</sub> to the extent possible. Health Canada indicated that, as NO<sub>2</sub> and PM<sub>2.5</sub> are non-threshold contaminants which can cause adverse health effects at low concentrations, the Proponent must implement mitigation measures to reduce NO<sub>2</sub> and PM<sub>2.5</sub> concentrations to the extent possible. As such, Health Canada and Environment and Climate Change Canada recommended that the Proponent be required to develop additional mitigation measures to further reduce NO<sub>2</sub> and PM<sub>2.5</sub> to the extent possible. Environment and Climate Change Canada also suggested that monitoring of NO<sub>2</sub> concentrations for the life of the Project be required to inform adaptive management.

Health Canada shared concerns regarding uncertainties in the Proponent's assessment of project-related risks to human health from increases in noise levels and the lack of detail provided to determine the adequacy of the proposed noise management and monitoring measures. Health Canada recommended that mitigation and monitoring measures be developed and implemented by the Proponent to address potential increases in noise. Health Canada also recommended that the Proponent develop a protocol to collect and resolve noise complaints when noise generating activities associated with the Project are anticipated.

Health Canada shared concerns that the baseline dust deposition rate used in the Proponent's assessment was based on a single year of data that does not represent the maximum dustfall rate that

<sup>4</sup> United States Environmental Protection Agency. 2022. *Regulations for Emissions from Vehicles and Engines*. Available at: <https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-control-emissions-air-pollution-nonroad>

<sup>5</sup> Environment and Climate Change Canada. October 2020. *Strategic Assessment of Climate Change*. Available at: <https://www.canada.ca/en/services/environment/conservation/assessments/strategic-assessments/climate-change.html>

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could be experienced at nearby receptor locations, including Indigenous receptors. This introduces uncertainty regarding project effects to dustfall rates and metals accumulation in soil, and associated effects to human health. Health Canada recommended that additional data be collected to validate predicted dustfall rates and metals accumulation in soil to verify the results of the environmental assessment.

### 6.1.3 Agency Analysis and Conclusions

The Agency is of the view that the Proponent adequately characterized potential effects of the Project to the atmospheric environment, including effects to air quality, noise and vibration levels, GHG emissions, and odours. The Agency recognizes that the Project would result in exceedances of the Manitoba AAQC and CAAQS for NO<sub>2</sub>, CO, SO<sub>2</sub>, PM<sub>10</sub>, and total suspended particulates during construction and operation. The Agency is of the view that these exceedances would be unlikely to appreciably affect air quality at key receptor locations within the LAAs and RAA given the mitigation measures proposed. The Agency agrees with the importance of follow-up and monitoring to verify the results of the environmental assessment, verify the effectiveness of mitigation measures, and inform the need for contingency measures.

The Agency acknowledges the concerns expressed by Indigenous nations regarding the use of chemical dust suppressants and potential risks associated with the use of these substances to surface water quality and vegetation. The Agency understands that the Proponent committed to not using chemical dust suppressants to mitigate fugitive dust emissions.

With respect to project-related effects to noise, vibration, and odour levels, the Agency is of the view that the mitigation, monitoring, and follow-up measures proposed, including compliance with Health Canada's *Guidance on Evaluating Human Health Impacts in Environmental Assessment: Noise* and the Federal Transit Administration's *Transit Noise and Vibration Impact Assessment Manual*, would adequately mitigate increases in noise, vibration, and odour levels. The Agency also understands that a complaint response protocol would be developed by the Proponent as part of the Noise Monitoring Program to accept and resolve complaints regarding project-related noise.

The Agency agrees with the recommendations of Environment and Climate Change Canada and Health Canada with respect to the use of Tier 4 engines, requirements for NO<sub>2</sub> monitoring, implementation of additional mitigation measures to reduce NO<sub>2</sub> and PM<sub>2.5</sub> emissions to the extent possible to be protective of human health, and mitigation and monitoring for noise. The Agency also agrees with Health Canada that additional data be collected to verify predictions related to project effects to dustfall rates and metals accumulation in soil to verify the results of the environmental assessment and to determine whether additional mitigation measures are required.

The Agency is of the view that potential effects of the Project to the atmospheric environment would be adequately addressed, taking into account the implementation of the mitigation, follow-up, and monitoring measures proposed by the Proponent (Appendix D) and the key mitigation measures described below.

#### Key Mitigation Measures and Monitoring to Avoid Significant Effects and Follow-Up Program Requirements

The Agency considers the following mitigation measures, monitoring, and follow-up programs to be necessary to ensure that there are no significant adverse environmental effects to fish and fish habitat,

migratory birds, species at risk, and Indigenous Peoples, as a result of changes to the atmospheric environment. The following key mitigation measures are based on mitigation measures, monitoring, and follow-up programs proposed by the Proponent, expert advice from federal authorities, and comments received from Indigenous nations.

## Mitigation Measures

- To limit contaminant and fugitive dust emissions, policies will be developed and implemented prior to construction to reduce the fuel consumption of project equipment and vehicles, limit cold starts, and control the speed of mobile equipment within the PDAs, including through no-idling and limited cold start policies.
- GHG and air contaminant emissions reduction technologies and practices will be incorporated into the final design of the Project and implemented during all project phases.
  - If monitoring results indicate that NO<sub>2</sub> and PM<sub>2.5</sub> concentrations exceed CAAQS limits, additional mitigation measures will be developed, in consultation with Health Canada, Environment and Climate Change Canada, other relevant federal and provincial authorities, and Indigenous nations, to reduce NO<sub>2</sub> and PM<sub>2.5</sub> emissions to the greatest extent possible.
  - The principles of the Strategic Assessment of Climate Change and Environment and Climate Change Canada's *Technical Guidance on Reporting Greenhouse Gas Emissions* will be considered in developing GHG and air emissions reduction measures.
- Dust suppressants with the least potential for adverse environmental effects, including water on haul and access roads, will be applied during dry periods when dust generation is expected or is occurring, such as periods of drought and high winds, to control fugitive dust emissions. Chemical dust suppressants will not be used during any project phase to avoid potential effects to the environment and Indigenous Peoples.
- Oversized stationary machinery and equipment used for processing ore will be located indoors, where technically feasible, including the Crushing Plant and conveyors feeding into the Ore Milling and Processing Plant, to limit fugitive dust and hydrogen cyanide emissions.
- All vehicles and equipment required for construction, operation, and decommissioning/closure of the Project will meet or exceed emission standards, including Tier 4 emission standards for off-road diesel equipment, applicable at the time of introduction, and will be operated, inspected, and maintained in accordance with any applicable engine instructions provided by the manufacturer to meet emissions standards pursuant to the *Off-Road Compression-Ignition (Mobile and Stationary) and Large Spark-Ignition Engine Emission Regulations*. Engines previously subject to the *Off-Road Compression-Ignition Engine Emission Regulations* will be required to comply with the emissions standards defined in that legislation.
- ~~Dustfall rates will be monitored within Marcel-Colemb First Nation's Black Sturgeon Reserve, and downwind and upwind from the PDAs during all project phases to verify model predictions of Project effects to baseline dustfall rates. If Project effects will be worse than predicted, additional mitigation measures will be developed in collaboration with Indigenous nations, Health Canada, and other relevant federal and provincial authorities to further limit Project-related increases in dustfall rates that could affect human health~~

## Follow-up and Monitoring

- A follow-up program will be developed, prior to construction and in consultation with relevant federal and provincial authorities and Indigenous nations, that outlines technically and economically feasible mitigation measures to manage and reduce GHG emissions throughout all phases of the Project. The Proponent will report annual project-related GHG emissions to Environment and Climate Change Canada, **regardless of whether** emissions are greater than the reporting threshold defined by Environment and Climate Change Canada as part of its GHG Reporting Program, including emissions associated with site electricity production, mine production, incineration (i.e. waste emissions), blasting emissions, and fuel consumption for transportation activities. The Proponent will take into account Environment and Climate Change Canada's **Technical Guidance on Reporting Greenhouse Gas Emissions**.
- A follow-up program will be developed, prior to construction, in consultation with relevant federal and provincial authorities and Indigenous nations, and implemented during all phases, which will provide a framework for:
  - **monitoring ambient air concentrations of total suspended particulate, PM<sub>10</sub>, NO<sub>2</sub> and PM<sub>2.5</sub> concentrations continuously, taking into account 24-hour and 1-hour CAAQS thresholds, during construction and operation on Marcel Colomb First Nation's Black Sturgeon Reserve, and upwind and downwind of the PDAs; and**
  - **monitoring meteorological conditions (e.g. wind speed, wind direction) upwind and downwind of the PDAs during project construction and operation.**
- **Dustfall rates will be monitored within Marcel Colomb First Nation's Black Sturgeon Reserve, and downwind and upwind from the PDAs during all project phases to verify model predictions of project effects to baseline dustfall rates. If project effects are more adverse than predicted, additional mitigation measures will be developed, in consultation with Indigenous nations, Health Canada, and other relevant federal and provincial authorities, to further limit project-related increases in dustfall rates that could affect human health.**
- Prior to construction, a follow-up program will be developed, in consultation with relevant federal and provincial authorities and Indigenous nations, to monitor project-related increases in noise and vibration levels at key receptor locations within the PDAs where effects to the health of Indigenous Peoples may occur, including the permanent work camp, to verify the accuracy of the environmental assessment, verify the effectiveness of mitigation measures, and to inform the need for contingency measures. Long-term continuous noise and vibration monitoring will occur during all project phases and monitoring reports will be submitted annually to regulatory authorities and shared with interested Indigenous nations and stakeholders.
  - A public complaints protocol will be developed to receive and address noise or vibration complaints in a timely manner. Information on this protocol and how to file a complaint will be made publically available online.
  - **Noise levels will be monitored at key receptor locations where human health may be affected,** such as permanent or seasonal residences, to verify the environmental assessment and associated modelling, verify the effectiveness of mitigation measures, and inform the need for contingency measures

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Additional mitigation measures, monitoring, and follow-up programs applicable to project-related effects to the atmospheric environment can be found in the following chapters of this EA Report: Indigenous Peoples – Health and Socio-economic Conditions (Chapter 7.5).