

LAKE MANITOBA AND LAKE ST. MARTIN OUTLET CHANNELS PROJECT RESPONSE TO IAAC TECHNICAL INFORMATION REQUESTS

Question IAAC-02

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Abbreviations and Acronyms

AQMS	Air Quality Management System
BLIERS	Base-level Industrial Emission Requirements
CAAQS	Canadian Ambient Air Quality Standards
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Agency
COPC	Chemical of Potential Concern
ECCC	Environment and Climate Change Canada
EIS	environmental impact statement
km	kilometre
LAA	local assessment area
LMOC	Lake Manitoba outlet channel
LSMOC	Lake St. Martin outlet channel
m	metre
MAAQC	Manitoba Ambient Air Quality Criteria
MI	Manitoba Infrastructure
MSD	Manitoba Sustainable Development
NO ₂	nitrogen dioxide
PDA	project development area
PDF	portable document format
PM _{2.5}	particulate matter (fine)
PR	public road
RAA	regional assessment area
SO ₂	sulfur dioxide
μ	micro

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EIS Guideline Reference: 7.1.1 Atmospheric Environment; 7.5. Significance of Residual Effects

EIS Reference: 6.2.2.2 Overview of Atmospheric Environment – Table 6.2-1; 6.2.4.2 Change in Ambient Air Quality; 6.2.1.4 Boundaries Project Development Area; 12.2 Atmospheric Environment

Context and Rationale

EIS guidelines require the EIS to assess significance of impacts against existing environmental standards, guidelines or objectives. The EIS identifies (CAAQS) and (MAAQC) standards (Table 6.2-1) but does not consistently apply these criteria/standards throughout the assessment, including to predicted ambient concentrations.

Short-term exposure to (NO₂) and (PM_{2.5}) has been associated with a range of adverse health effects. These pollutants are considered to be non-threshold. Acute (short-term) concentration estimates, including an analysis of the background, project-only, and project plus background levels, were not provided. This information is required to accurately characterize the risks these air pollutants pose on human health as a result of the project.

No rationale was provided for why predicted ambient air quality was not compared to CAAQS, which are more stringent than the MAAQC. The background concentrations for NO₂ and PM_{2.5} appear to be near or exceed the CAAQS and the degree to which predicted ambient air quality could further exceed standards is not described in the EIS. This information is required to understand project changes to air quality relative to applicable standards/criteria to be able to characterize impacts to human health and the environment throughout all phases of the project, and ultimately determine significance of residual effects.

Information Requests

- a) Provide an updated air quality assessment to include comparison to the short-term (1 Hr and 24 Hr) and long-term (annual) CAAQS, in addition to the MAAQC:
 - i. Update the air quality assessment to compare the CAAQS to predicted ambient concentrations (including background, project only and project plus background) for all relevant parameters ([SO₂], NO₂ and PM_{2.5}) in the (LAA) and (RAA). Assess the locations and frequency of any exceedances of the CAAQS standards that may occur as a result of the Project.
 - ii. If CAAQS are exceeded, describe what mitigation measures would be employed and how follow-up and monitoring plans would be updated to consider monitoring with comparison to the CAAQS. Describe the criteria which trigger the air quality follow-up and monitoring plan, and the timing for when mitigation measures to reduce (COPC) concentrations would be implemented.

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a) See response below.

- i. The Air Quality Management System (AQMS) is a comprehensive approach for reducing air pollution in Canada and is the product of collaboration by the federal, provincial and territorial governments and stakeholders (Canadian Council of Ministers of the Environment [CCME] 2018, CCME 2019). Federal, provincial and territorial governments all have roles and responsibilities in the implementation of the AQMS (CCME 2019, CCME 2012a). The AQMS includes the Canadian Ambient Air Quality Standards (CAAQS), base-level industrial emission requirements (BLIERS) for significant emission sources, air zones for management of local air quality, initiatives to reduce emissions from the transportation sector, and requirements for monitoring and public reporting (CCME 2019, CCME 2012a).

The CAAQS were developed as part of the AQMS considering both health and environmental impacts and were developed with the objective of driving continuous improvement of air quality in Canada. The CAAQS were developed collaboratively by Health Canada, Environment and Climate Change Canada (ECCC), provinces, territories, Indigenous peoples' representatives, and stakeholders from industry, health, and environmental organizations through the CCME (CCME 2012a). The CAAQS are established as objectives under the *Canadian Environmental Protection Act* 1999. Manitoba Conservation and Water Stewardship (now Manitoba Conservation and Climate) Manitoba Ambient Air Quality Criteria (MAAQC) and the CAAQS for nitrogen dioxide (NO₂), sulfur dioxide (SO₂) and particulate matter (fine) PM_{2.5} were presented in Volume 2, Table 6.2-1 of the environmental impact statement (EIS).

Under the AQMS, achievement of the CAAQS is determined in each air zone. Air zones are a place-based approach to manage local air quality. Provinces and territories have delineated their respective areas into individual air zones with the objective of driving continuous improvements in air quality and to prevent the CAAQS from being exceeded. Air management in each air zone is guided by the Air Zone Management Framework (CCME 2019, CCME 2012b), another element of the AQMS. The entire Province of Manitoba is designated as a single air zone under the AQMS.

The CCME describes the process for selecting monitoring stations, measuring pollutant concentrations and determining achievement of the CAAQS (CCME 2012b, CCME 2012c). Determining achievement of the CAAQS is based upon using measured air quality concentrations at community monitoring stations, comparing the measured levels to the CAAQS, and assigning air quality status to one of four management levels (CCME 2012b, GOC 2017, CCME 2019). The four air quality management levels require progressively more rigorous actions by jurisdictions as air quality approaches or exceeds the CAAQS; thereby, ensuring proactive management actions are undertaken to reduce emissions and prevent exceedances of the CAAQS (CCME 2012b).

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Air zones cover broad geographical areas consisting of communities, rural areas with few permanent dwellings and areas of industrial development. The CCME guidance on determining achievement of the CAAQS states that the monitoring stations that are used to determine achievement and guide air quality management efforts should be in areas that reflect air quality where people live (CCME 2012c). The CCME has developed guidance on determining achievement of the CAAQS (CCME 2019, CCME 2012c). The guidance states that the monitoring sites should not be sited near or unduly influenced by a nearby emission source (CCME 2012c); for example, Section 3.2 of the guidance states that monitoring stations should not be in close proximity to the fence line of an industrial facility or next to a major roadway (CCME 2012c).

Concentrations of NO₂, SO₂ and PM_{2.5} across the regional assessment area (RAA) and at sensitive receptors are discussed in this response; however, the pollutant concentrations are interpreted consistent with the Government of Canada's guidance and statements that the CAAQS are intended to be used to evaluate impacts of a project on downwind locations such as communities and other sensitive receptors and were not intended to be used as standards to be achieved at a project boundary (CCME 2019, GOC 2018). The CAAQS are not project-level regulatory standards. Rather, they are intended to be used by provinces and territories to guide air zone management actions to reduce ambient concentrations below the CAAQS and prevent CAAQS exceedances (CCME 2019).

The information request states that background concentrations for NO₂ and PM_{2.5} appear to be near or exceed the CAAQS; however, this is not an accurate assessment of background air quality. The Project is in a predominantly rural and remote area with few nearby industrial or nonindustrial emission sources. Because there were no current or historic ambient air quality monitoring data available in the immediate vicinity of the Project, the closest available monitoring data was used in the EIS to provide an indication of air quality in the region. In the case of NO₂ concentrations, the only available monitoring data is from the cities of Brandon and Winnipeg with much larger populations and emissions than the RAA. In the case of PM_{2.5}, monitoring data from Flin Flon and Thompson were used, which have much greater industrial activity than the RAA.

The maximum (100th percentile) measured 1-hour average NO₂ concentration in each year in Brandon, an urban centre that is expected to have higher ambient NO₂ concentrations than the Project local assessment area (LAA), ranged from 32.5 µg/m³ to 76.2 µg/m³ in years 2016 to 2018 (Volume 2, Table 6.2A-1, Appendix 6A of the EIS); however, this is not the correct statistic to compare to the CAAQS. The three-year average of 98th percentile daily maximum hourly NO₂ concentration (i.e., the correct statistic) at the Brandon station was 31 µg/m³ from 2016 to 2018. This is much less than the 2020 CAAQS of 113 µg/m³. Similarly, the maximum annual average NO₂ concentration from 2016 to 2018 at the Brandon monitoring station was 7.72 µg/m³ (Volume 2, Table 6.2A-3, Appendix 6A of the EIS) which is much less than the annual 2020 CAAQS of 32 µg/m³. Background NO₂ concentrations in the Project area are expected to be even less than measured in Brandon. For convenience, the above referenced

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NO₂ concentrations as compared to the MAAQC and CAAQS are summarized in Table IAAC-2-1.

Table IAAC-2-1 Background NO₂ and PM_{2.5} Compared to MAAQC and CAAQS

Substance	Averaging Period	Maximum Measured Background Concentration (µg/m ³)	Station Location and Year	Most Stringent of Maximum Desirable, Acceptable and Tolerable Level MAAQC ^a (µg/m ³)	2020 CAAQS ^{b,c} (µg/m ³)
NO ₂	1-hour ^d	76.2	Brandon, 2016	400	–
	1-hour ^b	31.0	Brandon, 2016–2018	–	113 ^b
	24-hour ^d	33.9	Brandon, 2016	200	–
	Annual ^b	7.72	Brandon, 2016	60	32 ^b
PM _{2.5}	24-hour ^d	272	Flin Flon, 2017	30	–
	24-hour ^c	27.9	Flin Flon, 2016 - 2018	–	27 ^c
	Annual ^c	4.99	Flin Flon, 2016 - 2018	–	8.8 ^c
NOTES: a Manitoba Conservation and Water Stewardship Manitoba Ambient Air Quality Criteria (MCWS 2005) b The Canadian Ambient Air Quality Standard for NO₂ (GOC 2017a). For 1-hour NO₂, the CAAQS refer to the three-year average of the annual 98th percentile of the NO₂ daily-maximum 1-hour average concentrations. For annual NO₂, the CAAQS refer to the average over a single calendar year of all the 1-hour average NO₂ concentrations. c The CAAQS for PM_{2.5}. For 24-hour PM_{2.5}, the CAAQS refers to the 98th percentile 24-hour average from each year, averaged over three years. For annual PM_{2.5}, the CAAQS refers to the three-year average of the annual average concentrations. d The MAAQC apply to the maximum (100th percentile) measured concentration. – No applicable objective or standard in this jurisdiction. µg/m³ = micrograms per cubic metre					

Ambient PM_{2.5} concentrations measured in Flin Flon are considered the most representative publicly available monitoring data for the Lake Manitoba and Lake St. Martin Outlet Channels Project (the Project) area. The three-year average of the annual 98th percentile of the daily 24-hour average PM_{2.5} concentrations at Flin Flon was 27.9 µg/m³ (Volume 2, Table 6.2A-9, Appendix 6A of the EIS, and Table IAAC-2-1 above). The three-year average of the annual average PM_{2.5} concentrations at Flin Flon was 4.99 µg/m³. However, PM_{2.5} concentration measurements at Flin Flon are influenced by wildfire smoke. The CCME guidance on how to determine achievement of the CAAQS states that exceptional events such as wildfires are to be excluded from the comparison (CCME 2012c). The most recent publicly available assessment applying the correct achievement methodology (i.e., excluding wildfire influence) for PM_{2.5} relative to the CAAQS is the 2015 Manitoba Provincial Summary Report (MSD 2016) which classified the Flin Flon and Thompson monitoring stations at the yellow management level, which is the second lowest of the four levels. Typical background PM_{2.5} concentrations in the Project area are similarly expected to be much less than the CAAQS.

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The primary emission sources associated with construction of the Project are vehicle exhaust and fugitive dust emissions. As combustion equipment burn low-sulphur diesel fuel, concentrations of SO₂ attributable to the Project are expected to be much less than the CAAQS throughout both the LAA and RAA. Based upon Project emission estimates and considering dispersion modelling completed for the Springbank Project (Stantec 2018), a flood mitigation project in southern Alberta, there is potential for short-term (1-hour NO₂ and 24-hour PM_{2.5}) concentrations to exceed the CAAQS within the Project development area (PDA) and along areas within the immediate vicinity of the PDA. Project construction is scheduled to be completed prior to 2025. Therefore, the 2020 CAAQS are appropriate for assessing Project effects on air quality. The Springbank Project assessment found that the maximum three-year average of 98th percentile daily maximum hourly NO₂ concentrations were predicted to exceed the 2020 CAAQS of 113 µg/m³ along the PDA and extending to a maximum of 300 m from the Project. Similarly, the Springbank Project assessment found that the maximum 3-year average of the 98th percentile 24-hour PM_{2.5} concentrations were predicted to exceed the 2020 CAAQS of 27 µg/m³ along the PDA and extending to a maximum of approximately 1 km from the Project. The annual average CAAQS for the Project are not anticipated to be exceeded as construction activity will advance along the channel over the course of a year.

There are no communities, residential receptors or major roadways located within 5 km of the Lake St. Martin Outlet Channel (LSMOC) PDA. The Dauphin River First Nation is approximately 5 km away from the LSMOC PDA and the Lake St. Martin First Nation, Little Saskatchewan First Nation, and Pinaymootang First Nation are approximately 24 km, 18 km, and 13 km from the LSMOC PDA, respectively. Concentrations of NO₂, SO₂ and PM_{2.5} attributable to the Project are unlikely to exceed the CAAQS at residential receptors, communities and First Nations near the LSMOC.

There are four small communities (Grahamdale, Steep Rock Junction, Faulkner and Birch Bay), numerous residential receptors (Volume 2, Table 6.2-26 and Figure 6.2B-4 of the EIS), and Provincial Trunk Highway 6 and Provincial Road (PR) 237 and PR 239 located within 5 km of the Lake Manitoba Outlet Channel (LMOC) PDA (within the LAA). In addition, the communities of Hilbre, Moosehorn, and Gypsumville are located within the RAA. Concentrations of SO₂ are unlikely to exceed the CAAQS at any of the residential receptors, communities or First Nations. The maximum 1-hour NO₂ concentrations may exceed the 2020 CAAQS at receptors located up to 300 m from the PDA and the maximum 24-hour PM_{2.5} concentrations may exceed the 2020 CAAQS at receptors located within a 1 km radius of the PDA. However, 1-hour NO₂ and 24-hour PM_{2.5} concentrations are not expected to exceed the CAAQS in the nearest communities or First Nations.

The CAAQS are not project-level regulatory standards to be achieved within or adjacent to the PDA. However, the CAAQS are considered in evaluating the potential human health risks associated with inhalation exposures to air contaminants. The CAAQS for NO₂ and PM_{2.5} reflect the findings of the human health risk assessments for NO₂ and coarse particulate matter completed by Health Canada (Health Canada 2016a, 2016b) but incorporate a

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recognition of the roles that the magnitude and frequency play in determining the potential human health risks associated with inhalation exposures to NO₂ and PM_{2.5}. The Project is a linear project which means that emissions from the Project will generally advance along the channel as construction progresses. As a result, at a given location, exceedances of the 1-hour NO₂ and/or 24-hour PM_{2.5} CAAQS are expected to be temporary. As noted for the Springbank Project, the annual average NO₂ and PM_{2.5} concentrations are not anticipated to exceed their respective annual average CAAQS. Therefore, it is reasonable to conclude that temporary exceedances of the 1-hour NO₂ and 24-hour PM_{2.5} CAAQS attributable to the Project that may occur at residential receptor locations in the vicinity of the PDA would represent a negligible human health risk.

- ii. Concentrations of SO₂ attributable to the Project are expected to be less than the CAAQS throughout the Project LAA and RAA. The potential for concentrations of NO₂ or PM_{2.5} that exceed the short-term (1-hour and 24-hour, respectively) CAAQS is anticipated to be limited to the PDA and areas within the immediate vicinity of the PDA, which does include a number of the nearby residential receptors; however, the CAAQS are not project-level regulatory standards to be achieved within or adjacent to the PDA and temporary exceedances of the 1-hour NO₂ or 24-hour PM_{2.5} CAAQS during construction is deemed to represent a negligible human health risk. Concentrations of NO₂ and PM_{2.5} at the nearest communities and First Nations will be lower than those that occur in or near the PDA and exceedances of CAAQS, attributable to the Project, are unlikely at these receptors.

A comprehensive list of mitigation is detailed in Volume 2, Section 6.2.4.2 of the EIS, the implementation of which will reduce emissions of fugitive dust and combustion emissions such that effects on air quality are acceptable relative to the CAAQS. An adaptive management program will also be implemented to apply and vary appropriate mitigation to reduce ambient concentrations of fugitive dust based upon observed levels of dust, stakeholder complaints and the presence of meteorological conditions associated with higher potential for dust such as hot, dry and windy conditions. Manitoba Infrastructure (MI) will develop a process to manage air quality (e.g., dust) impacts during construction including, as appropriate, stakeholder/ resident communication, proactive notifications of nearby intensive construction activities, complaint logging and initial response, complaint investigation, and complaint resolution and adaptive mitigation. Manitoba Infrastructure believes the proposed mitigation and adaptive management plans will effectively reduce emissions and potential for effects on air quality and human health and that an ambient air quality monitoring program is not necessary.

With respect to communicating follow-up and monitoring plans and programs to potentially affected Indigenous groups, detailed mitigation and monitoring program review discussions have been incorporated into the community-specific work plan that supports consultation. Information shared throughout these discussions will be included in the subsequent development of mitigation strategies and environmental management and/or monitoring

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plans, to assess and accommodate potential impacts from the Project (Volume 4, Section 10.2.7; Volume 1, Appendix 5C; Volume 1, Section 2.2).

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