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Abbreviations and Acronyms

AEMP	Aquatic Effects Monitoring Plan
EIS	environmental impact statement
EOC	emergency outlet channel
EMP	Environmental Management Program
LMOC	Lake Manitoba outlet channel
LSMOC	Lake St. Martin outlet channel
MFRTF	Manitoba 2011 Flood Review Task Force
MI	Manitoba Infrastructure

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EIS Guideline Reference: 7.2.2 Changes to Groundwater, Surface Water, and Fluvial Morphology

EIS Reference: 6.4.7 Assessment of Residual Environmental Effects on Surface Water

Context and Rationale

Section 7.2.2 of the EIS guidelines requires the proponent to assess the changes to groundwater, surface water and fluvial morphology as a result of the project. The EIS Guidelines direct the proponent to apply the Agency's Operational Policy Statement, Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under CEAA 2012 when assessing the significance of the potential effects of the Project (https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/determining-project-cause-significant-environmental-effects-ceaa2012.html).

EIS Section 6.4.7.7 provides conclusions on potential residual environmental effects of the project on surface water quality. For example, it states that "it is not expected that the operation of the LMOC and LSMOC will alter the surface water quality in the LAA beyond the range of variability already observed in these waterways" and that "the diversion of water is not expected to substantially change the water temperature in the lakes and rivers in the region." The methodology used to assess residual environmental effects on surface water quality is not provided in sufficient detail, and the EIS does not present information to justify the conclusions drawn.

The EIS does not appear to address all water quality parameters of the EIS Guidelines; for example, the EIS does not present a quantification of potential temperature changes in surface water as a result of groundwater-surface water interactions.

This information is required to understand whether potential changes from the Project to surface water quality were adequately characterized and whether predicted residual effects are accurate.

Information Requests

a) Present an updated assessment of effects of the Project on surface water quality that applies the Agency's guidance. To support this analysis:

   i. Present a detailed description of methodology used to assess residual effects of the Project on surface water quality. Include data analyses to support/demonstrate conclusions drawn regarding residual environmental effects on surface water quality.

   ii. Address all the surface water quality and associated sediment quality/quantity parameters including:

      - temperature changes in surface water as a result of groundwater-surface water interactions;

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- changes to surface water quality, including seasonal changes in runoff entering watercourses;
- changes to total suspended solids (TSS), total dissolved solids, turbidity, oxygen level, water temperature, pH, dissolved oxygen, water quality including metals, methyl mercury, nutrients, algae blooms, dissolved/total organic carbon, biochemical oxygen demand (BOD)/carbonaceous biochemical oxygen demand (CBOD), pesticides, aquatic indicators, sediment quality;
- temperature changes in surface water as a result of water diversion and retention;
- changes to water quality and quantity and sediment quality and quantity during all phases of the Project associated with Project-related: drainage areas, flow paths, and seepage of groundwater into surface water; erosion and sedimentation; excavation, blasting, and stock-piling of materials and waste rock; wastes, wastewater, fuels, chemicals, hazardous materials, contaminated soils, including run off from agricultural lands; spills and releases; mercury methylation; metal leaching and acid rock drainage;
- water quality and sediment quality changes as a result of storing water in, and releasing water from one lake to another and from the channels

b) Drawing upon the updated assessment in a), present an assessment of how residual effects to water quality may interact with the environment and potential pathways of effects to all relevant VCs.

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A response to a) and b) is provided below.

Surface Water Assessment Overview

The Project is proposed to alleviate an ongoing problem that, for decades, has caused adverse effects on people, the economy and the environment in Manitoba. The Project will allow for floodwaters to be moved more quickly through Lake Manitoba and Lake St. Martin by dividing the flows that would be forced to move only through the relatively narrow inlets and channels of the Fairford River and the Dauphin River. Dividing and redirecting floodwaters through the Lake Manitoba outlet channel (LMOC) and Lake St. Martin outlet channel (LSMOC) will result in less flooding and reduced lake levels on Lake St Martin, which is a desired positive outcome and positive effect of the Project. The Project will not function like the emergency outlet channel (EOC) as there will be no floodwaters directed through the Buffalo Creek watershed. As such, during a flood, the Project does not alter flow volumes, the overall direction of existing flow pathways, or the overall quality of the water flowing, and therefore, would not result in adverse effects on surface water or surface water quality.

Surface Water During Flood Conditions

Flood events occur in Manitoba due to a combination of factors such as soil moisture conditions, groundwater levels, precipitation amounts, wind and wave effects, and the physical characteristics of the waterway, e.g., gradient, elevation, geology and morphology (size, shape, capacity). During a flood event,

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flows in streams and rivers are high and fast, lake levels rise, backwatering occurs, and land areas that are typically dry are inundated and saturated with overland flooding. The high volumes of floodwater in 2011 that flowed through Lake Manitoba, Lake St. Martin and the Dauphin River caused catastrophic consequences to people, infrastructure and the environment. Natural watercourses were overwhelmed by high flows and entire communities, including Lake St. Martin First Nation, Little Saskatchewan First Nation, Dauphin River First Nation and Dauphin River, were displaced by flooding and suffered significant losses to homes, schools, infrastructure, livelihoods and lifestyles. Over 7,100 people were displaced and economic effects of the 2011 flood event exceeded $1.2 billion for the province of Manitoba, including infrastructure repair and disaster payments as well as flood response costs (MFRTF 2013).Volume 2, Figure 6G-2 in Appendix 6G of the environmental impact statement (EIS) shows the difference between the area of inundation that occurred around Lake St. Martin during the 2011 flood when the lake level reached 245.48 m (805.38 ft) and the predicted area of inundation around Lake St. Martin that would have occurred during the 2011 flood with the LMOC and LSMOC in operation. It is estimated that the operation of the outlet channels would have decreased the lake level to approximately 244.72 m (802.87 ft), which represents a decrease of 27.5 km^2 in the amount of area that would have been inundated by flood waters. Volume 2, Figure 6G-3 in Appendix 6G of the EIS shows the difference between the area of inundation around Lake St. Martin for a low flood event under the current operating regime, which would result in a lake level of 244.43 m (801.93 ft); and the predicted area of inundation around Lake St. Martin for a low flood event with the LMOC and LSMOC in operation. It is estimated that the operation of the outlet channels would have decreased the lake level to about 243.91 m (800.22 ft), which represents a decrease of 21.4 km^2 in the amount of area that would have been inundated by flood waters around Lake St. Martin. These reductions in lake levels and decreased areas of inundation are the desired positive outcomes of the Project.

During a flood event, the high, fast flows entrain, resuspend and redistribute river or lake substrates, and floodwaters often contain high loads of sediment. Runoff from land areas may also contribute sediment to waterways during flood events. As such, water chemistry and sediment conditions during a flood event are turbulent and dynamic, and controlled by natural conditions that are beyond the control or influence of the Project.

As noted in IAAC-12, the Project planning and design includes studies on the potential changes to sediment due to construction, operation and maintenance of the Project, and measures to reduce the release and transport of sediment are incorporated in the Project design and mitigation measures. The studies have shown that the release and transport of sediment, and subsequent effects on water quality, are not altered by the Project, as these effects and conditions are part of a flood event and are not controlled by the Project. Information on the sediment studies is provided in IAAC-12. In addition, Manitoba Infrastructure (MI) is developing a series of monitoring plans including an Aquatic Effects Monitoring Plan (AEMP) to verify whether predictions made in the EIS are accurate and that measures implemented for Project construction and operation are functioning at a broader scale. Please see IAAC-15 for information on the Project Environmental Management Program (EMP) and associated monitoring plans.

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No Adverse Changes to Overall Surface Water Quality

There were no adverse changes expected to overall surface water quality in the regional or local area waterways, as the composition and volume of floodwater being transported from Lake Manitoba to Sturgeon Bay is not altered by the Project construction or operation. All floodwater flows from the Lake Manitoba basin will enter Sturgeon Bay, with or without the Project. As noted above, water chemistry and sediment conditions during a flood event are turbulent and dynamic, and controlled by natural conditions that are beyond the control or influence of the Project.

Temporary increases in suspended sediments may occur in local waterways due to construction activities (that would be mitigated using standard construction techniques and best practices), or at the channel inlet and outlet areas during periods of initial outlet channel operation. These areas will be monitored as part of the overall EMP for the Project, as described in Volume 1, Section 3.7 of the EIS and IAAC-15.

Project Environmental Management Program

Please see IAAC-15 for more information on the Project EMP.

References

Manitoba 2011 Flood Review Task Force (MFRTF). 2013. Manitoba 2011 Flood Review Task Force Report.