

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

Question IAAC-12

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Abbreviations and Acronyms

EIS	environmental impact statement
EMP	Environmental Management Program
EOC	emergency outlet channel
LMOC	Lake Manitoba outlet channel
LSMOC	Lake St. Martin outlet channel
MFRTF	Manitoba 2011 Flood Review Task Force
NSC	North/South Consultants
TLRU	traditional land and resource use
WCS	water control structure

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EIS Guideline Reference: 7.1.4 Groundwater and Surface Water

EIS Reference: EIS Section 6.4.5 – Existing Conditions for Surface Water

Context and Rationale

Section 7.1.4 of the EIS guidelines requires that the proponent present baseline information on sediment quality and quantity of the Project's local watersheds.

Section 6.4.5 of the EIS provides limited sediment quality data for Sturgeon Bay (i.e. the range of total organic carbon in Sturgeon Bay sediment). No mention is made of sediment quality in other water bodies that may be impacted by the Project (such as Lake St. Martin or Lake Manitoba).

Overall, the characterization of baseline sediment quality is insufficient, as it is not provided for all the waterbodies potentially impacted by the Project. Given the potential for sediment transport between water bodies as an effect of the Project that would have subsequent effects on fish and fish habitat as well as fishing, existing sediment quality and quantity should be adequately characterized in order to be able to predict, assess, and detect potential effects.

Information Requests

- a) Provide a comprehensive summary of sediment quality for all relevant water bodies. If relying on several sources, the information should be provided as a summary of relevant information used to establish sediment baseline data. Data should include a summary of statistics and sampling information, as well as raw data. Any gaps in existing sediment quality data should be identified and information should be provided on how data gaps will be filled.
- b) Complete an assessment of how sediment quality may interact with the environment and potential pathways of effects to fish and fish habitat and current use by Indigenous peoples.

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Response for a) and b)

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,

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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, 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 level of Lake St. Martin to approximately 244.72 m (802.87 ft), which represents a decrease of 27.5 km² 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 level of Lake St. Martin to about 243.91 m (800.22 ft), which represents a decrease of 21.4 km² 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. See IAAC 30 for further discussion related to sediment.

As noted below, 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

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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 below. In addition, MI has developed a series of monitoring plans that includes monitoring of water quality and sediment in the Project area. Please see IR IAAC-15 for a detailed description of the Project Environmental Management Program (EMP) and associated monitoring plans.

Sediment Data and Modelling

A number of studies were conducted in the Project area to determine the types, sources and dispersion of sediments, and assess potential changes to sediment transport that could potentially affect surface water. These studies are listed in the References below, and included:

- Bathymetric surveys conducted in the Fairford River, Watchorn Bay, Lake St. Martin, Dauphin River and Sturgeon Bay from 2011 to 2018 by Manitoba Infrastructure, North/South Consultants Inc. (NSC) and KGS Group, which provide information on the substrates and sediment types in the surveyed areas, i.e., existing conditions and the sources of potential sediment; maps generated from these surveys are provided in Volume 2, Appendix 6F of the EIS.
- Sediment transport studies conducted in the Fairford River, Watchorn Bay, Lake St. Martin, Dauphin River and Sturgeon Bay from 2011 to 2018 by Manitoba Infrastructure, KGS Group and NSC, which provided information on the particle sizes of sediment being transported, and existing areas of sediment erosion and deposition.
- Studies conducted by NSC and KGS Group in Fairford River, Lake St. Martin, Dauphin River and Sturgeon Bay from August 2011 to September 2015 as part of the Lake St. Martin Emergency Relief Channel Monitoring program, which provide information on sources and dispersion of sediment in the Project area under a range of flow conditions, the rate of sedimentation in Sturgeon Bay, and how wind is a factor in sediment resuspension and deposition in Sturgeon Bay.
- Modelling of flow scenarios by Manitoba Infrastructure with and without operation of the Project, which provide information on the expected flows and lake levels, with and without the Project, that may affect sediment transport processes.
- Modelling of flood routing, sediment transport, and ice processes by KGS Group, which provide information on sediment transport under different methods of erosion control.
- Modelling of channel flows for design and operation of the LMOC and LSMOC (see Volume 1, Chapter 3.0 Project Description in the EIS), which provides information on expected flows in the channels that are needed to understand the erosion control measures required to minimize erosion and sediment transport.

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Assessment of Changes in Regional and/or Local Sediment and Debris Transport

Volume 2, Section 6.4.7.5 of the EIS presents the assessment of changes in regional and/or local sediment and debris transport. The assessment found that changes in regional and/or local sediment and debris transport may occur due to the construction and operation of the Project. Operation of the LMOC and LSMOC will reduce flows and lake levels in Lake Manitoba, the Fairford River, Lake St. Martin and Dauphin River, which is expected to alter sediment and debris transport at a local scale. The changes that will occur within each system are not expected to be of a magnitude that would result in a change in regional erosional or sedimentation processes. As such, the pathways of effects due to the construction and operation of the Project were found to be limited to local changes. These local changes may include a temporary increase in suspended sediments at inlet and outlet areas when the water control structure (WCS) gates are open and after gates-closed periods. During gates-closed periods, sediment entering the channels from Lake Manitoba or Lake St. Martin may be from prior operation; from providing baseflows; or from aquatic or other vegetation that enters or is established in the channels. Sediment and vegetation may be flushed out when the WCS gates are opened, which could temporarily increase local sediment and debris transport.

These temporary local changes will be monitored as part of the overall EMP for the Project, as described in IAAC-15.

Potential Pathways of Effects to Fish and Fish Habitat and Current Use by Indigenous Peoples

As noted in Volume 3, Section 7.2.1.2 of the EIS, multiple Indigenous groups expressed concern that the channels would lead to an increase in sediment and debris in surface waters downstream of the Project. These concerns were expressed by Dauphin River First Nation, Fisher River Cree First Nation, Lake St. Martin First Nation, Ebb and Flow First Nation, Norway House Cree Nation, Seymourville Northern Affairs Community, Interlake Reserves Tribal Council, Fisher River First Nation and Kinonjeoshtegon First Nation. Dauphin River First Nation expressed specific concern about the possibility of increased sediment and debris in the Dauphin River while the Lake St. Martin First Nation expressed similar concern for Bear Creek. These concerns were considered in the assessment of the potential effects of sediment and debris on fish habitat, which is provided in Volume 3, Section 7.2.4.2 of the EIS, and the potential direct effects of sediment and debris on fish health and mortality, which is provided in Volume 3, Section 7.2.4.4 of the EIS. The Project EMP will incorporate these considerations and be developed in discussion with Indigenous groups, as described below. The aquatic environment assessment concluded that residual effects of sediment deposition on fish and fish habitat are expected to be negligible (Volume 3, Section 7.2.4.4). As a result, there are no predicted effects to traditionally harvested fish species, and consequently no change in availability of traditional resources from current use through effect pathways identified in the Traditional Land and Resource Use (TLRU) assessment, "Loss or alteration of fish habitat resulting from disturbance to watercourses" or "Change to surface water quality or quantity" (Volume 4, Section 10.2.4.4).

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Ongoing Studies

As noted in Chapter 3 of the EIS, preliminary and detailed design of the Project components have been ongoing during development of the EIS. Additional studies, including monitoring of water quality and sediment to further refine the assessment of the residual effects of the Project on surface water are planned as part of detailed design. These studies will include the collection of data to supplement existing hydrologic and hydraulic modelling and enable further examination and quantification of the residual effects on surface water, including changes in suspended sediments. The information generated by these additional studies planned for the detailed design phase will inform the EMP plans being developed. The finalized EMP plans and the future monitoring reports that will be generated by the EMP will be made available to regulators as they become available as required.

Project Environmental Program

Please see IR IAAC-15 for a detailed description of the Project Environmental Management Program (EMP) and associated surface water monitoring plans.

References

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- KGS Group. 2016a. Assiniboine River and Lake Manitoba Basins - Flood Mitigation Study LMB & LSM Outlet Channels Conceptual Design - Stage 2. KGS Group Project 12-0300-011. Final Report. January 2016.
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- KGS Group. 2017a. Investigations and Preliminary Engineering for LMB Outlet Channels Options C and D Summary Report. KGS Group Project 16-0300-006. Final - Rev 0. May 2017.
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