

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

Question IAAC-41

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Abbreviations and Acronyms

AEMP	Aquatic Effects Monitoring Plan
EIS	environmental impact statement
EOC	emergency outlet channel
IAAC	Impact Assessment Agency of Canada
LMOC	Lake Manitoba outlet channel
LSM	Lake St. Martin
LSMOC	Lake St. Martin outlet channel

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EIS Guideline Reference: 7.3.1 Fish and fish habitat

EIS Reference: Appendix 6J Development Of Operating Rules For Lake Manitoba and Lake St. Martin Outlet Channels With Recommended Revisions (Manitoba Infrastructure 2019a)

Context and Rationale

Section 7.31 of the EIS requires the proponent to assess the effects of the project on fish and fish habitat, including effects from modifications of hydrological and hydrometric conditions on fish habitat and on the fish species' life cycle activities (e.g., reproduction, fry-rearing, movements).

Appendix 6J of the EIS describes how the operation of the outlet channels was based on lake levels. With the outlet channels there is an opportunity to reduce the flow in natural channels during higher flow events, which could alter the existing hydrograph for higher flow events in the natural channels. It is unclear how flows in the Fairford and Dauphin Rivers would be allocated and the potential loss of higher flows in the natural channels when the outlet channels are in operation and associated effects are not explained. Information is required to understand the potential effects to fish and fish habitat from changes to flows in the Fairford and Dauphin river.

Information Requests

- a) Provide information on proposed flow allocation plans for the outlet channels and the existing Fairford and Dauphin Rivers, and explain how flow allocation was determined.
- b) Identify potential changes to the hydrographs for the Fairford and Dauphin Rivers based on the flow allocation plan with a focus on the potential reduction in higher flow events in the natural rivers and the potential effects of these flow reductions. Describe the effects of these changes to fish and fish habitat, present mitigation measures and provide an updated significance determination.

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- a) Appendix 6E of the Environmental Impact Statement (EIS) presents information on the Regional Flow and Lake Level Data developed for the Project EIS. In general, the water levels and amount of flow present in the Project area lakes, rivers and the outlet channels will vary in response to changes in annual and seasonal lake levels on Lake Manitoba. Additional information on flow allocations can be found in response to IAAC-40.

Tables 6E-1 to 6E-7 in Appendix 6E provide information on the estimated water levels and amount of flow present in the Project area lakes, rivers and the outlet channels at average, median (50th percentile), low (95th percentile) and high (5th percentile) flow scenarios. The tables provide information on the amount of flow that will flow between the Fairford River and the Lake Manitoba

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Outlet Channel (LMOC), the lake levels on Lake St. Martin, and the amount of flow that will flow to the Dauphin River and the Lake St. Martin Outlet Channel (LSMOC), at different Lake Manitoba water levels.

The water level and flow information was examined using three flow scenarios – ‘Without the Project (No LSM EOC)’, ‘Without the Project (with LSM EOC)’ and ‘With the Project’ – to compare the changes to water levels and flows with and without the Project, and determine flows at different operating scenarios. The water level and flow data are presented by month in the EIS to allow examination of the seasonal changes in water levels and flows as required to understand potential implications for fish and fish habitat.

- b) The hydrographs and requested information on changes in flows in the Fairford River and Dauphin River are provided below. The hydrographs are presented by month to allow examination of the seasonal changes in flows as required to understand potential implications for fish and fish habitat.

Fairford River System

The change in flow in the Fairford River system was estimated by comparing the regional flows and lake levels without the Project to the regional flows and lake levels with the Project, at low, median and high levels of flow. The data used to calculate the changes are provided in Tables 6E-1 to 6E-7 in Appendix 6E of the EIS. Table 6.4-15 in the EIS is provided below and gives a summary of the estimated percent change in Fairford River flows with operation of the Project.

Table 6.4-15 Percent Changes in Fairford River Flows with and without the Project

Flows	Fairford River Flow without the Project (m ³ /s)	Fairford River Flow with the Project (m ³ /s)	Change in Fairford River Flow (m ³ /s and %)
Low Flow (95% of flows exceeded)	10.4	10.3	-0.1 (-1.2%)
Median Flow (50% of flows exceeded)	55.0	43.0	-12.0 (-21.8%)
High Flow (5% of flows exceeded)	271.0	184.7	-86.3 (-31.9%)
NOTE: The percent changes shown represent an overall reduction in flow, see Figure 6.4-12 and Figure 6.4-13 for an estimation of monthly changes in Fairford River flows			

Reductions in peak flows will occur mainly during periods of high flows, with smaller changes in flow during periods of median and low flows. The flows in the Fairford River system are estimated to be reduced by up to 1.2% during low flow periods, by up to 21.8% during median flow periods, and by up to 31.9% during high flow periods. These percent changes are the estimated total changes in flows at the applicable percent flow exceedance. Changes occur at lower flows due to a carryover effect from a reduction in Lake Manitoba levels due to higher outflows from the Project. To maintain the lake level during low flows once it is lowered, the Fairford River flows are reduced. The median hydrograph for

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the Fairford River will be lower with the Project than without the Project but will retain typical seasonal variation, as shown in Figure 6.4-4 in the EIS, which is provided below.

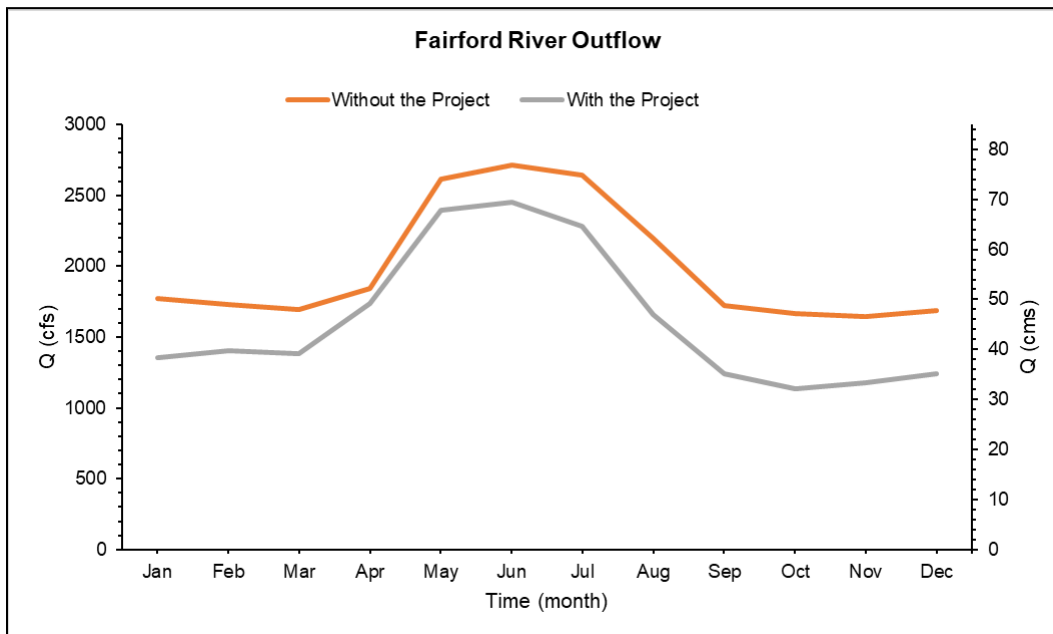


Figure 6.4-4 Fairford River Median Flows (50%) with and without the Project

During high flow events, flows on the Fairford River without the Project are four times the median flows and will remain at those high flow levels for most of the season, as shown in Figure 6.4-5 of the EIS, which is provided below. With the Project, higher spring and summer flows will still occur; however, in winter, flows will be reduced to more typical flow rates. The Project will still allow high flows that are required in river systems for flushing and natural fluvial geomorphologic processes to occur.



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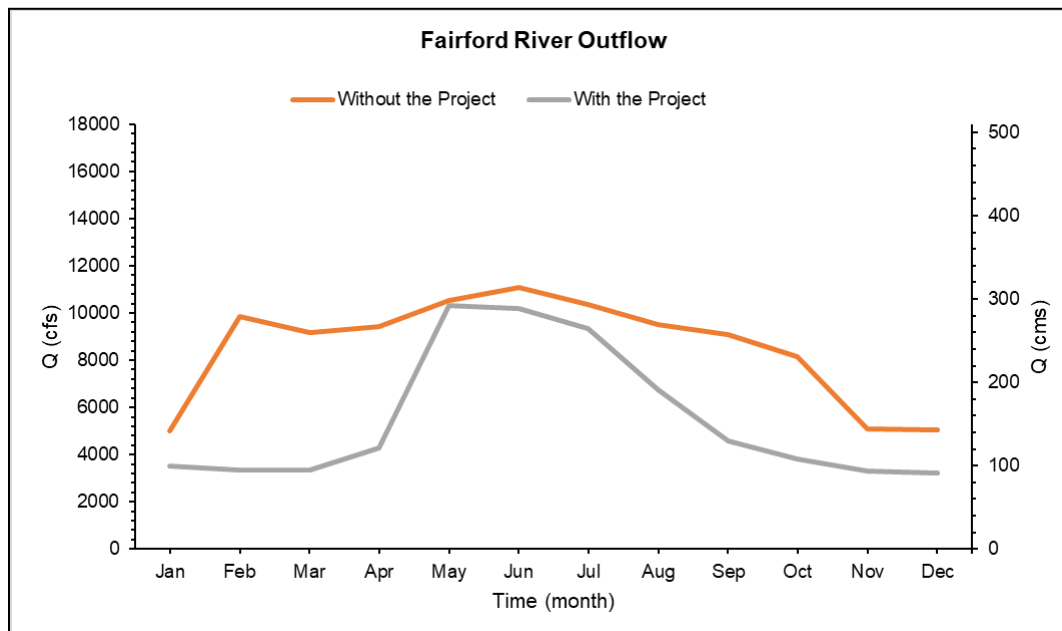


Figure 6.4-5 Fairford River High Flows (5% of flows greater than) with and without the Project

Dauphin River System

The change in flow in the Dauphin River system was estimated by comparing the regional flows and lake levels without the Project to the regional flows and lake levels with the Project, at low, median and high levels of flow frequency. The data used to calculate the changes are provided in Tables 6E-1 to 6E-7 in Appendix 6E. Table 6.4-18 from the EIS is presented below and provides a summary of the estimated percent change in Dauphin River flows with operation of the Project.

Table 6.4-18 Changes in Dauphin River Flows

Flows	Dauphin River Flow without the Project (m ³ /s)	Dauphin River Flow with the Project (m ³ /s)	Change in Dauphin River Flow (m ³ /s)
Low Flow (95% of flows exceeded)	5.22	5.17	-0.05 (-0.96%)
Median Flows (50% of flows exceeded)	58.1	48.8	-9.3 (-16.0%)
High Flow (5% of flows exceeded)	240.2	139.2	-101.0 (-42.0%)
NOTE: The percent changes shown represent an overall reduction in flow, see Figure 6.4-7 and Figure 6.4-8 for an estimate of monthly changes in Dauphin River flows			

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The median hydrograph for Dauphin River will be slightly lower with the Project than without the Project; however, it will still retain typical seasonal variation as shown in Volume 2, Figure 6.4-7 of the EIS, which is provided below. Reductions in peak flows will occur mainly during periods of high flows, as well as during periods of median flows, with some minor reductions in flow at low flow levels, as presented in Volume 2, Table 6.4-18 of the EIS shown above. The flows in the Dauphin River system are estimated to be reduced by less than 1.0% at low flows, by up to 16.0% at median flows, and by up to 42.0% at high flows. These percent changes are the estimated change in flows at the applicable percent flow exceedance.

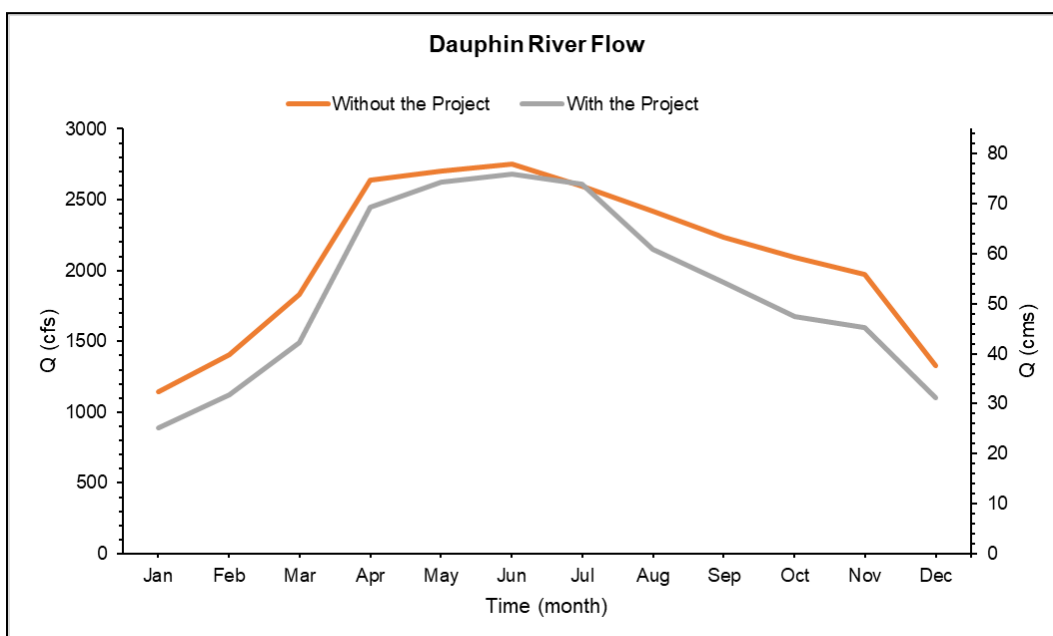


Figure 6.4-7 Dauphin River Median Flows (50%) with and without the Project

During floods, flows on Dauphin River without the Project are four to five times the median flows, as shown on Volume 2, Figure 6.4-8 in the EIS, which is provided below. With the Project, the flows will be reduced to two times median flows and retain the same seasonal flow patterns. The Project will still allow high flows for flushing and natural fluvial geomorphologic processes to occur, while protecting the communities along Dauphin River from floods.



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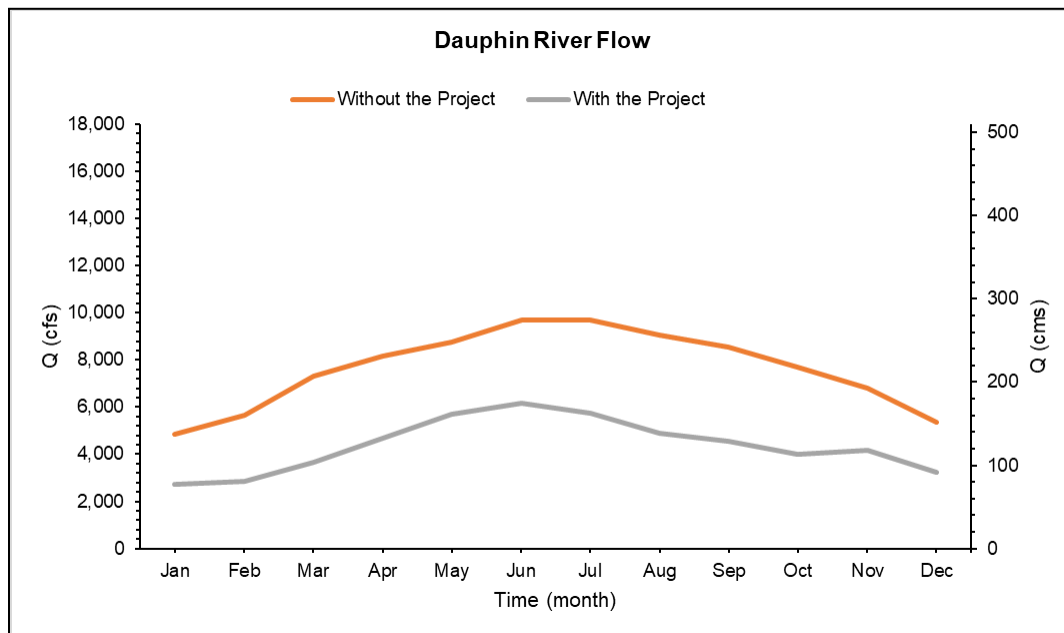


Figure 6.4-8 Dauphin River High Flows (5% of flows greater than) With and Without the Project

Effects of Flow Changes to Fish and Fish Habitat

The assessment of changes to fish and fish habitat as a result of flow changes was based on the information presented above. Flows will continue to exhibit typical seasonal variation and will remain within historical ranges. Based on the predicted changes, it is expected the river will continue to provide the water velocities and water depths suitable for the fish life history functions that currently occur in the Dauphin and Fairford rivers. This is because the LMOC and LSMOC will only be used during extreme floods and will be designed and operated to convey only the excess runoff that would otherwise exceed both rivers conveyance capacity within their respective channels. Forthcoming 2D modeling will provide additional detail on changes to water velocities and river widths. These data will be taken into consideration in the Application for *Fisheries Act* Authorization. Given the magnitude of the flow changes, it is not expected that these data will change the determination of significance. However, the data may influence offsetting plans.

Hydraulic monitoring conducted as part of the Water Management Plan and monitoring of fish abundance and reproduction conducted as part of the AEMP will provide the basis for confirming EIS predictions. Should it be determined that fish habitat suitability has been negatively affected post Project, flows could be adaptively managed within the operating guidelines to improve conditions taking into consideration all stakeholder interests.

References

None