ATTACHMENT 6: ADDITIONAL INFORMATION

LAKE MANITOBA AND LAKE ST. MARTIN OUTLET CHANNELS PROJECT
SUPPLEMENTAL SUBMISSION

Attachment 6
June 30, 2022

MTI's response to IAAC's Attachment 1: Outstanding Information in Response to Information Request Round 1 (Amended) (dated June 6, 2022 and amended June 22, 2022)

Manitoba
Transportation and Infrastructure

Attachment 1: Outstanding Information in Response to Information Request Round 1 (Amended)

Amended as of June 22, 2022:

- In item 19, the reference to IAAC-83 is changed to IAAC-82.
- In item 21, the reference to IAAC-86 is changed to IAAC-13.
- In Item 5, it is the MS Excel file with location data referenced in the quoted text from the response to IAAC-13 that appears to be missing, rather than the maps as previously indicated.

#	Item	Comment	Request	Response (revisions shown in red)
1	Environmental Management Plans	Attachment 1: Updated Environmental Management Plans	Provide the Updated Environmental Management Plans as indicated in Attachment 1 of the round 1 Information Request (IR) response submission (the submission).	Attachment 1: Updated Environmental Management plans was issued to the Impact Assessment Agency of Canada (the Agency) on June 30, 2022.
2	Referencing/Concordance	A large volume of information has been provided during the EIS phase. Some referenced documents were provided as part of the EIS submission and the first submission of responses to Information Requests Round 1 Package 1. These reports are available on the Registry. Additional reports and information was provided as part of the submission as attachments 1-4. Attachment 2 is a collection of several reports. Unlike Attachments, 1,3, and 4, which are consistently referenced in the IR responses, reports referenced that are contained in Attachment 2 are often not identified as such. It is not always clear where the referenced report or document can be located.	To facilitate the identification of the documents submitted and their location in the IR responses, provide a table of concordance that identifies where referenced material can be found or accessed for each IR response.	A roadmap which facilitates the identification of documents submitted as part of Attachment 2 was issued to the Agency on June 30, 2022 (see enclosed)
3	IAAC-11: Errata	Appendix IAAC-11A appears to be mistakenly cited as 11C in some places. There is no Appendix 11C provided. There are 4 tables in the response, three of which are named Table IAAC-11-2.	Clarify the table names, the referenced Appendix, and any references to them as applicable.	Revised table numbering is provided below: • Table IAAC 11-1 Summary of Pre-2011 Data Sources • Table IAAC-11-2 Published Hydrometric Statistics 1966 - 2010 • Table IAAC-11-3 Provincial Water Quality Monitoring Locations in the Surface Water LAA and Lake Manitoba with Available Data between 1973 and 2010 • Table IAAC-11-4 Lake St. Martin Flood Affected Periods, 1973-2010 As for the reference to Appendix 11C, this is a typo. Duration curve Figures IAAC 11-1 through IAAC 11-12 are found in Appendix IAAC 11A.
4	IAAC-13: Errata	Two tables are labelled 13-2.	Clarify the table names	Revised table numbering is provided below: • Table IAAC-13-1 Summary of Water Quality Guidelines for the Protection of Aquatic Life Guidelines Applicable to Baseline Water Quality Data • Table IAAC-13-2 Sites and Data for Baseline Water Quality Graphs • Table IAAC-13-3 Nutrient, Turbidity and Suspended Sediment Parameter Trends in Lake Manitoba, Fairford River and Dauphin River, 1991 to 2021

#	Item	Comment	Request	Response (revisions shown in red)
5	IAAC-13: Reference, Missing data	The response states, "Baseline surface water quality data location maps are provided in Appendix IAAC- 13B3. In addition, locations are listed in an MS Excel file, which provides coordinates, data source, and data availability (first years and last year of data in record) for each site." The location data appears to have been provided in Appendix 13B3	Clarify the reference to MS Excel file and provide the file.	Appendix IAAC-13B3 is included in the filing package as pdf page 4563/4949 The table and figure titles are labelled "IAAC-13B3-1"; three figures/maps are provided in Appendix 13B3 Revision: Appendix IAAC-13B3 is a word table containing the Baseline SWQ Data Collection Locations, not an excel file. The coordinates, data source, and data availability are provided in the table.
6	IAAC-14: Missing Information	The IR references the following document that appears to be missing: KGS Group. 2021h. Lake St. Martin Outlet Channel - Design, Tender & Contract Administration: Design Discharge Criteria. Draft/Rev A. September 23, 2021. 20 pp.	Provide the missing information.	Current report: KGS Group. 2021h. Lake St. Martin Outlet Channel - Design, Tender & Contract Administration: Design Discharge Criteria. Draft/Rev A. September 23, 2021. 20 pp. Reference title was updated. Corrected reference title in filing package (Attachment 2): KGS Group 2021. Lake Manitoba and Lake St. Martin Outlet Channels Project – System Hydraulic Design Criteria. Final/Rev 0. Prepared for Manitoba Infrastructure. September 28, 2021. 37 pp.
7	IAAC-14, IAAC-30: Missing Information	The IR references the following document that appears to be missing: KGS Group. 2021d. Lake Manitoba and Lake St. Martin Outlet Channels Nutrient Mass Balance Analysis – DRAFT. June 17, 2021.	Provide the missing information.	Included in the June 30, 2022 reference package (Attachment 5)
8	IAAC-21: References	Figure IAAC-21-2 is referenced in the response to iii, but it appears that Figure IAAC-21-3 should be referenced instead. Figure IAAC-21-6 is referenced in response to iv, as displaying sentinel wells. No sentinel wells are on the figure. The reference could be Figure IAAC 21-7 but it is unclear.	Clarify the references.	Figure IAAC-21-2 is referenced in the response to iii, Figure IAAC-21-3 should be referenced. Figure IAAC-21-6 is referenced in response to iv, as displaying sentinel wells. No sentinel wells are on the figure. The reference should be Figure IAAC 21-7.
9	IAAC-24: Missing Information	Figure IAAC-24-4 is missing.	Provide the missing figure.	Current text: "This was illustrated in the existing regional groundwater description shown in Volume 2, Figure 6.4B-3 of the Project EIS (see Figure IAAC-24-4)." Revised text: "This was illustrated in the existing regional groundwater description shown in Volume 2, Figure 6.4B-3 of the Project EIS or in Figure IAAC-24-2.
10	IAAC-26: Missing Information	The response refers to Figure 16 of Appendix IAAC-21B in response to Technical Information Request IAAC-21. This figure is missing and there is no Appendix IAAC-21B	Provide the missing information.	Current text: Figure 16 (see Appendix IAAC-21B in response to Technical Information Request IAAC-21) in the GWMP (Attachment 1 – Updated Environmental Management Plans) shows the locations of the groundwater sampling locations. Revised text: Figure 21-7 (see Appendix IAAC-21A in response to Technical Information Request IAAC-21) shows the locations of the LSMOC groundwater sampling locations.
11	IAAC-27: Missing Information	The Response refers to Plates D6-5 and D6-6 in Appendix IAAC-27A. The Appendix is missing.	Provide Appendix IAAC-27A including the Plates that are referenced.	Appendix IAAC-27A was missing in the formal filing. This information is included; see the Appendix 27A figure/plates

#	Item	Comment	Request	Response (revisions shown in red)
12	IAAC-27: References	"KGS Group 2021" is referenced in the response to b)i. There are three entries in the references section: 2021a, 2021b, 2021c.	Clarify what is being referenced.	Current text: Part b) In 2019 and 2020, a geotechnical and hydrogeological field investigation program was conducted within the LSMOC Project development area (PDA; KGS Group 2021), as part of the ongoing design of the Project. Additional information collected since the Project EIS filing on groundwater conditions at the LSMOC have been developed (KGS Group 2021a and KGS Group 2021b and is summarized in response Public Information Request IAAC-72. Revised text: Part b) In 2019 and 2020, a geotechnical and hydrogeological field investigation program was conducted within the LSMOC Project development area (PDA; KGS Group 2020), as part of the ongoing design of the Project. Additional information collected since the Project EIS filing on groundwater conditions at the LSMOC have been developed (KGS Group 2021a and KGS Group 2021b and is summarized in response Public Information Request IAAC-72. This report is included in the June 30, 2022 reference package (Attachment 5)
13	IAAC-28: References	"Map 28-1" is referenced in response to d) but it is not clear what that map is. It could be Figure IAAC-28A-1.	Confirm what the reference to "Map 28-1" is.	Map 28-1 is Figure IAAC 28a-1; the figure number was adjusted to reflect the IR response
14	IAAC-30: References	The response references "Hatch 2022" however there is no long reference provided to indicate which Hatch report is being referenced.	Clarify the reference and provide the document if it was not included in the submission.	Included in Attachment 2 of the May 31, 2022 filing: Hatch Ltd. 2022. Lake Manitoba Outlet Channel / Lake St. Martin Outlet Channel - Updated Sediment Transport Assessment During Commissioning With Channel Armouring. Rev.0, May 2022.
15	IAAC-36: Missing information	Reports referenced in the response as NSC 2022d, NSC 2022e, NSC 2022g, NSC 2020 appear to be missing.	Provide the missing information.	The response to IAAC-36 describes currently known results of field studies and available reports. Refer to the text below regarding the 'missing information': 1. This report is included in the June 30, 2022 reference package (Attachment 5): NSC. 2022d. Lake Manitoba and Lake St. Martin Outlet Channels Project - Aquatic Environment Monitoring Spring 2021. Fish Use of Buffalo and Birch Creeks. A report prepared for Manitoba Transportation and Infrastructure. June 2022. 2. Included in Attachment 2 of the May 31, 2022 filing: NSC. 2022e. Lake Manitoba and Lake St. Martin Outlet Channels Project - Aquatic Environment Monitoring 2021. Lake St Martin Index Gillnetting Survey. A report prepared for Manitoba Transportation and Infrastructure. May 2022. 3. This report is included in the June 30, 2022 reference package (Attachment 5): NSC. 2022f. Lake Manitoba and Lake St. Martin Outlet Channels Project - Aquatic Environment Monitoring 2020 and 2021. Fish Use of the Fairford and Dauphin Rivers. A report prepared for Manitoba Transportation and Infrastructure. June 2022. 4. NSC. 2022g. Revision, remove reference as report does not exist 5. NSC. 2020. Revision, remove reference as report does not exist

#	Item	Comment	Request	Response (revisions shown in red)
16	IAAC-38 IAAC-43, and IAAC-68: Missing Information	A memo referenced as the following appears to be missing: Manitoba Infrastructure. 2020. Integration of Modified Lake St. Martin Permanent Outlet Channel Design Configuration and Lake St. Martin Narrows into Lake Manitoba and Lake St. Martin Hydrologic Water Balance Model. Memo from Peter Johnston (Senior Hydrologic Operations Engineer, Hydrologic Forecasting & Water Management) to Chris Propp (Hydrologic Services Engineer Hydrologic Forecasting & Water Management). November 3, 2020. 15 pp.	Provide the missing information.	Included in the June 30, 2022 reference package (Attachment 5)
17	IAAC-72: Missing Information/Reference	The response states, "Information on modelling used to develop the assessment provided in the Project EIS and Conceptual Engineering Design Reports (KGS Group 2017a, 2017b) in subsection "Assessment of Effects of Project on Bedrock Aquifer Near the LMOC."" The subsection appears to be missing in the referenced report.	Clarify or provide the subsection of the referenced report.	Current reference: Conceptual Engineering Design Reports (KGS Group 2017a, 2017b) in subsection "Assessment of Effects of Project on Bedrock Aquifer Near the LMOC. Revised reference: Conceptual Engineering Design Reports (KGS Group 2017a, 2017b) in subsection Appendix C Groundwater Study (Deliverable D6) Subsection 3.2 Assessment of Impact of the Channel Project on Groundwater Wells
18	IAAC-82: Missing Information	Two reports referenced in the response (NSC 2022b and NSC 2022f) appear to me missing.	Provide the missing information.	Included in the June 30, 2022 reference package (Attachment 5)
19	IAAC-82: Missing Information/Referencing	The response references a 2022 report for spawning movements in Fall 2021 (NSC. 2022d. Lake Manitoba and Lake St. Martin Outlet Channels Project - Aquatic Environment Monitoring Fall 2021. Lake Whitefish Spawning Movements. A report prepared for Manitoba Infrastructure by North/South Consultants Inc.). In Attachment 2, a 2021 report for spawn movements in fall 2020 is provided (NSC - LMOC & LSMOC Aquatic Environment Monitoring, Fall 2020 - Lake Whitefish Spawning Movements), which may be the proper reference.	Provide the referenced 2022 report for fish spawning movements in Fall 2021 or clarify the reference.	Revision, remove reference as report does not exist
20	IAAC-84: Missing Information	Appendix IAAC-84A appears to be missing.	Provide the missing information.	Appendix 84A: Velocity contour maps for Lake St. Martin illustrating passage of the 2011 peak flows for the pre- and post-Project environment are included in Appendix IAAC-84A This information is included; see the Appendix 84A velocity figures

Attachment 1: Outstanding Information in Response to Information Request Round 1 (Amended)

#	Item	Comment	Request	Response (revisions shown in red)
21	IAAC-13: Missing Information	The IR references “Stantec. 2022. Lake Manitoba Outlet Channel 2021 Surface Water and Groundwater Monitoring Report. Prepared by Stantec Consulting. Project 111475107”. Attachment 2 contains the 2019 and the 2020 Surface Water and Groundwater Monitoring Reports but the 2021 report appears to be missing.	Provide the missing monitoring report.	Revision, remove reference as report does not exist

LAKE MANITOBA AND LAKE ST. MARTIN OUTLET CHANNELS PROJECT
SUPPLEMENTAL SUBMISSION

Attachment 6
June 30, 2022

Attachment 2 Referencing Roadmap

Manitoba
Transportation and Infrastructure

Attachment 2 Referencing Roadmap

Author	Technical Report	IR Submission Package	Technical IRs	Public IRs
WSP	Heritage Resource Impact Assessment	Attachment_2_Tech_Supp_Information-Part 1 of 3	N/A	IAAC 114; IAAC 115; IAAC 116; IAAC 117; IAAC 119
WSP	Preconstruction Environmental Field Work - Vegetation	Attachment_2_Tech_Supp_Information-Part 1 of 3	IAAC 22	IAAC 98
WSP	Preconstruction Environmental Field Work - Wetlands	Attachment_2_Tech_Supp_Information-Part 1 of 3	IAAC 47: IAAC 53	IAAC 98; IAAC 99; IAAC 100; IAAC 101
WSP	Preconstruction Environmental Field Work - Wildlife	Attachment_2_Tech_Supp_Information-Part 1 of 3	IAAC 46; IAAC 51; IAAC 54	N/A
Hatch	Sediment Transport Modeling to Manage Excess Sediment Concentrations During Commissioning	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 30	N/A
Hatch	Winter Dissolved Oxygen Analysis	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 31	IAAC 78
Hatch	Lake Manitoba Outlet Channel Morphology Review	Attachment_2_Tech_Supp_Information-Part 2 of 3	N/A	IAAC 83; IAAC 111
Hatch	Birch Creek Flow Augmentation Structure - Conceptual Design (Drawing/Figure)	Attachment_2_Tech_Supp_Information-Part 2 of 3	N/A	N/A
Hatch	Updated Sediment Transport Assessment During Commissioning With Channel Armouring	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 30; IAAC 44	N/A
Stantec	Groundwater Balance in Region of Lake Manitoba/Lake St. Martin Outlet Channels	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 07; IAAC 09	IAAC 66; IAAC 70
Stantec	Surface Water and Groundwater Interactions in the Region of the Lake Manitoba Outlet Channel	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 07; IAAC 20; IAAC 24; IAAC 25; IAAC 53	IAAC 67; IAAC 70; IAAC 72; IAAC 97; IAAC 99; IAAC 106
Stantec	2019 Surface Water and Groundwater Monitoring Report	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 16	N/A
Stantec	2020 Surface Water and Groundwater Monitoring Report	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 16	N/A
Stantec	Domestic Well Monitoring Report	Attachment_2_Tech_Supp_Information-Part 2 of 3	N/A	N/A
Stantec	Environmental Support Tasks - LMOC 2019-2020 Groundwater and Surface Water Quality Baseline Data Summary	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 13	N/A
Stantec	Updated Preliminary Engineering Design of the Lake Manitoba Outlet Channel Outside Drain	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 53	N/A
KGS	LSMOC: Head Loss Analysis Report	Attachment_2_Tech_Supp_Information-Part 2 of 3	N/A	N/A
KGS	LMOC & LSMOC: Analysis of Physical Impacts to Lakes Within the Hydraulic System	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 32	IAAC 68; IAAC 94
KGS	LMOC & LSMOC: Analysis of Physical Impacts to Rivers Within the Hydraulic System	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 32; IAAC 41; IAAC 43	N/A
KGS	LSMOC: Baseline Shoreline Assessment	Attachment_2_Tech_Supp_Information-Part 2 of 3	IAAC 12; IAAC 32; IAAC 43	N/A
KGS	LSMOC: System Hydraulic Design Criteria	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 59	IAAC 121
KGS	LSMOC: Dissolved Oxygen Analysis Report	Attachment_2_Tech_Supp_Information-Part 3 of 3	N/A	IAAC 78
KGS	LSMOC: Groundwater Quality Assessment	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 07; IAAC 20; IAAC 25; IAAC 2l; IAAC 53	IAAC 67; IAAC 70; IAAC 72; IAAC 97; IAAC 98; IAAC 106; IAAC 130
KGS	LSMOC: Groundwater Water Levels Assessment	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 20; IAAC 21; IAAC 22; IAAC 23; IAAC 24; IAAC 25; IAAC 27	IAAC 72
KGS	LSMOC: Post-Project Shoreline Morphology Assessment	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 32; IAAC 43	N/A
KGS	LSMOC: Sediment Transport Modelling to Manage Excess Sediment Concentrations During Commissioning	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 30	N/A
KGS	LSMOC: Bedrock Aquifer Depressurization Estimates Memo	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 07; IAAC 19; IAAC 20; IAAC 21; IAAC 23; IAAC 24; IAAC 25; IAAC 27	IAAC 72
KGS	LSMOC: Groundwater and Surface Water Baseline Data Summary	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 13	N/A
KGS	LSMOC: Preliminary Hydraulic Design of the Lake St. Martin Outlet Channel Outside Drain	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 07	IAAC 97
Dillon	Assessment of Passive Treatment Options for Cattle Operations Runoff in Vicinity of the LMOC	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 14	N/A
NSC	LMOC & LSMOC Aquatic Environment Monitoring, Fall 2020 - Water Quality	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 31; IAAC 36	N/A
NSC	LMOC & LSMOC Aquatic Environment Monitoring, Fall 2020 - Sediment Quality	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 12; IAAC 36	N/A
NSC	LMOC & LSMOC Aquatic Environment Monitoring, Fall 2020 - Lake Whitefish Spawning Movements	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 36; IAAC 41	IAAC 82
NSC	LMOC & LSMOC Aquatic Environment Monitoring, Fall 2020 to Spring 2021 - Water Quality	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 13	N/A
NSC	LMOC & LSMOC Aquatic Environment Monitoring, Fall 2021 - Water Quality	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 13	N/A
NSC	LMOC & LSMOC Aquatic Environment Monitoring, Fall 2021 - Sediment Quality	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 36	N/A
NSC	LMOC & LSMOC Aquatic Environment Monitoring, Spring 2021 - Larval Fish Studies	Attachment_2_Tech_Supp_Information-Part 3 of 3	IAAC 36	N/A
NSC	LMOC & LSMOC Aquatic Environment Monitoring, Spring 2021 - LSM Index Gillnetting Survey	Attachment_2_Tech_Supp_Information-Part 3 of 3	N/A	IAAC 82
NSC	LMOC & LSMOC Aquatic Environment Monitoring, 2021 - Aquatic Habitat	Attachment_2_Tech_Supp_Information-Part 3 of 3	N/A	IAAC 82

LAKE MANITOBA AND LAKE ST. MARTIN OUTLET CHANNELS PROJECT
SUPPLEMENTAL SUBMISSION

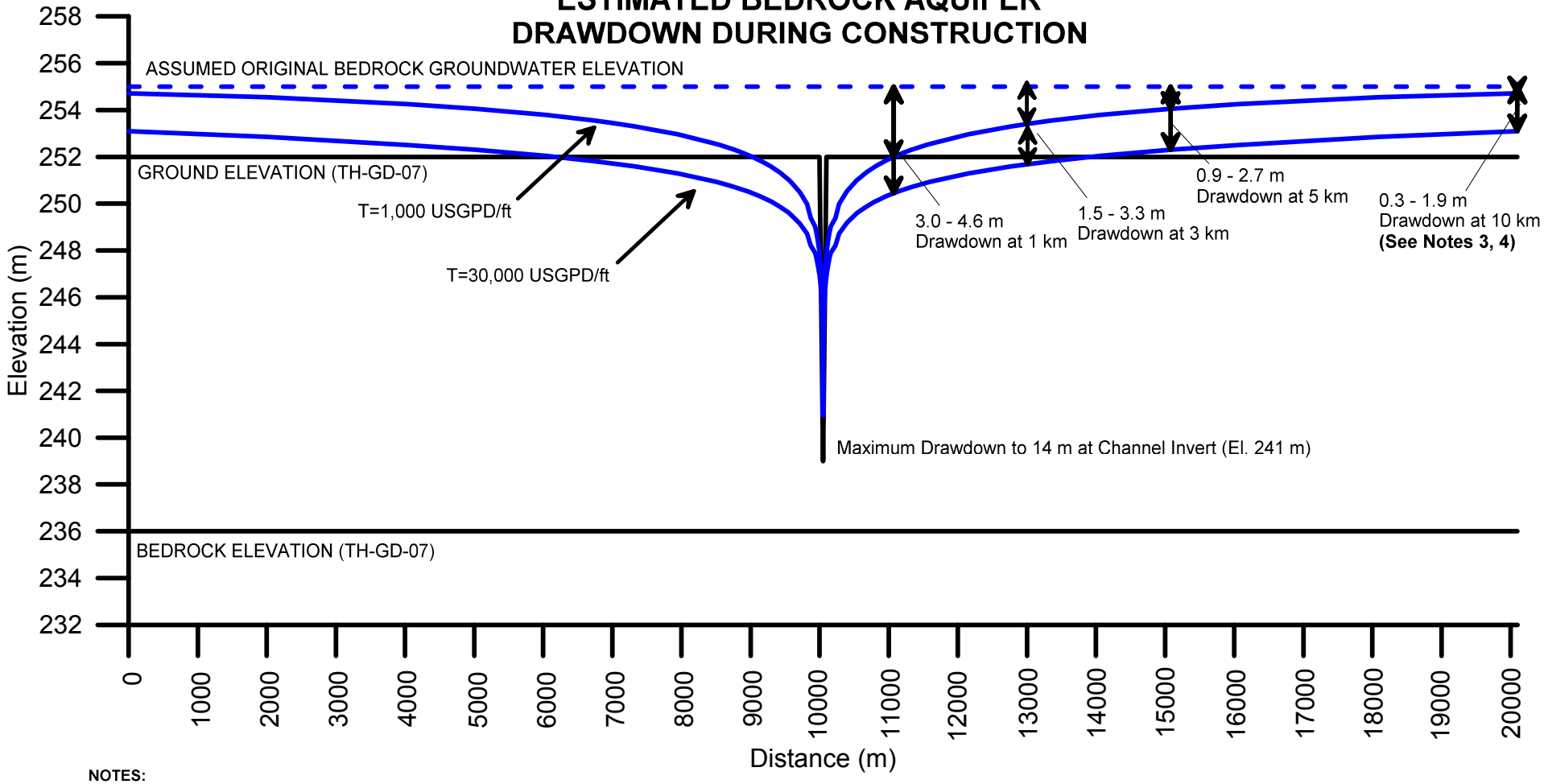
Attachment 6
June 30, 2022

Missing Information from Information Request Responses as identified by IAAC

Manitoba
Transportation and Infrastructure

APPENDIX 27A: FIGURE/PLATES

ESTIMATED BEDROCK AQUIFER DRAWDOWN DURING CONSTRUCTION



NOTES:

1. Drawdown calculated based on:
   T = 1000 to 30,000 USgpd/ft
   S = 0.0001
   t = 10 months
   Calculations based on radial well flow equations.
2. Example shown for Route D TH-GD-07. Basic bedrock Parameters and estimated relative drawdowns are similar on Route C.
3. On Route C, potential lake boundary conditions exist within 5 km of the channel. Estimated drawdowns beyond this distance are not defined herein.
4. On Route D, potential Lake Manitoba boundary condition occurs within 15 km of much of the route, and potential Lake St. Martin boundary condition occurs within 5 km of the area of greatest drawdown (northern 1/3 of the channel), which may reduce estimated drawdown in the west, north, and south directions. Estimated drawdowns beyond these distances are not defined herein.

NO.	YY/MM/DD	DESCRIPTION	DESIGN BY	DESIGN CHECK
0	17/05/10	ISSUED WITH DELIVERABLE D6	MFH	JDM

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

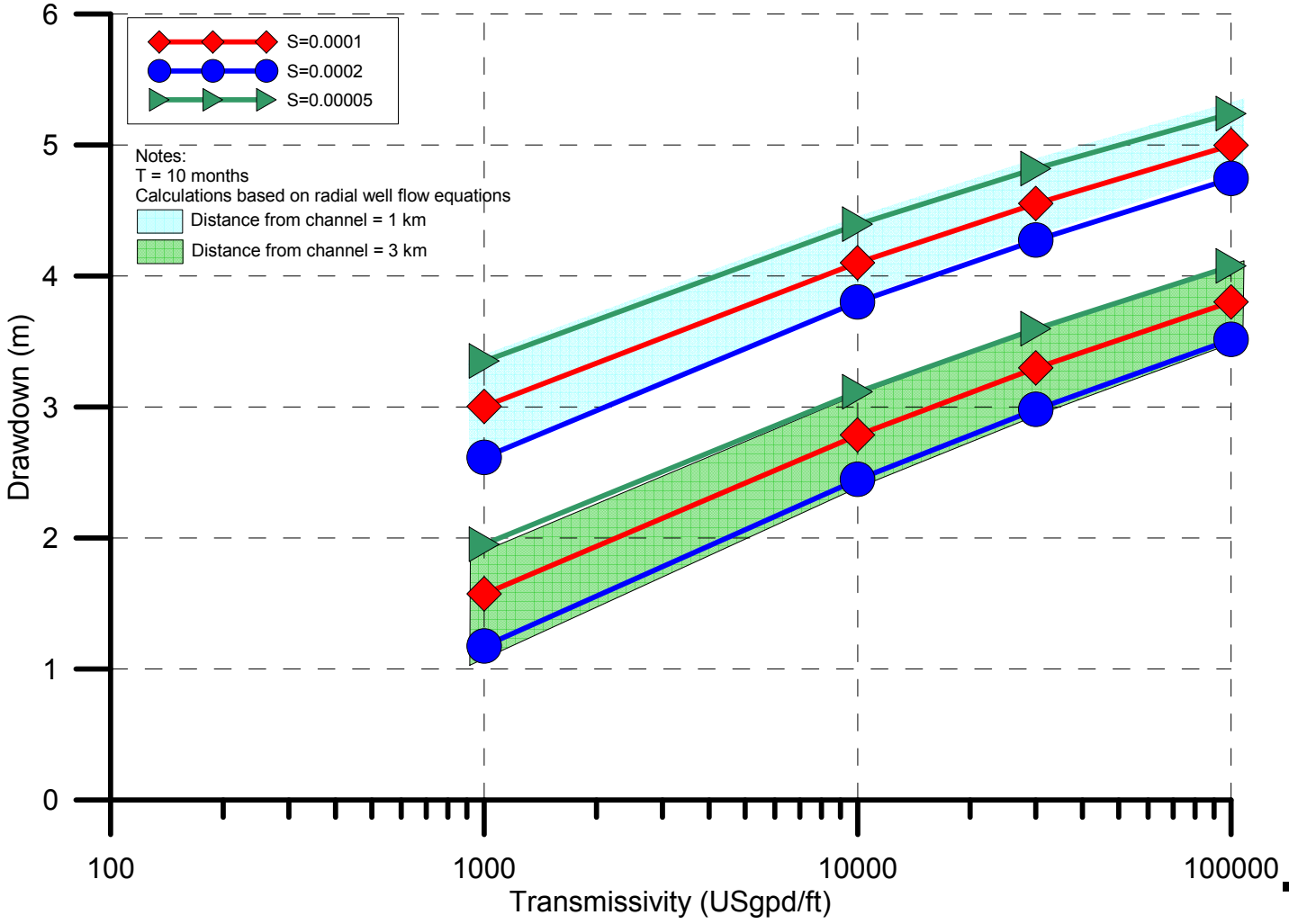
Manitoba Infrastructure

INVESTIGATIONS & PRELIMINARY ENGINEERING FOR LMB OUTLET CHANNELS OPTIONS C & D

DRAWDOWN ESTIMATES WITH DISTANCE - ROUTE C AND D

MAY 2017	PLATE D6-5	REV: 0

TRANSMISSIVITY AND DRAWDOWN AT 1 KM AND 3 KM



NO.	YY/MM/DD	DESCRIPTION	DESIGN BY	DESIGN CHECK
0	17/05/10	ISSUED WITH DELIVERABLE D6	MFH	JDM

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

Manitoba Infrastructure

INVESTIGATIONS & PRELIMINARY ENGINEERING FOR LMB OUTLET CHANNELS OPTIONS C & D

DRAWDOWN ESTIMATES SENSITIVITY ANALYSIS - ROUTE C AND D

MAY 2017	PLATE D6-6	REV: 0

APPENDIX 84A: VELOCITY CONTOUR MAPS FOR LAKE ST. MARTIN ILLUSTRATING PASSAGE OF THE 2011 PEAK FLOWS FOR THE PRE- AND POST-PROJECT ENVIRONMENT

N

Lake St. Martin Flow Patterns - 2011 Flood Peak (Post-Project)

Fairford River Flow: 508 cms
LMOC Flow: 250 cms
Dauphin River Flow: 266 cms
LSMOC Flow: 480 cms
Lake St. Martin South Basin Level: 244.87 m
Lake St. Martin North Basin Level: 244.35 m

Water Velocity [m/s]

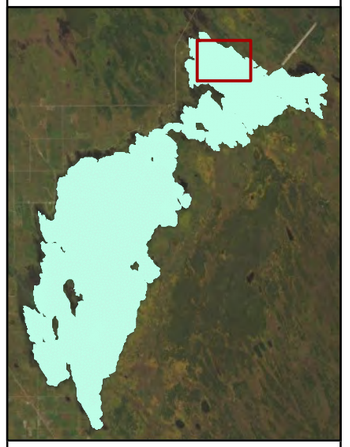
- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

0 1.25 2.5 5 7.5 km

N

Lake St. Martin: Post-Project 2011 Flood Peak

Fairford River Flow: 508 cms
LMOC Flow: 250 cms
Dauphin River Flow: 266 cms
LSMOC Flow: 480 cms
South Basin Level: 244.87 m
North Basin Level: 244.35 m



Water Velocity [m/s]

- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

0 0.175 0.35 0.7

Kilometers

N

Lake St. Martin: Post-Project 2011 Flood Peak

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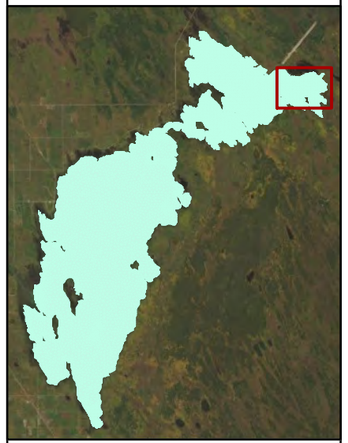

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- 1.0 - 1.5
- >1.5

0 0.175 0.35 0.7

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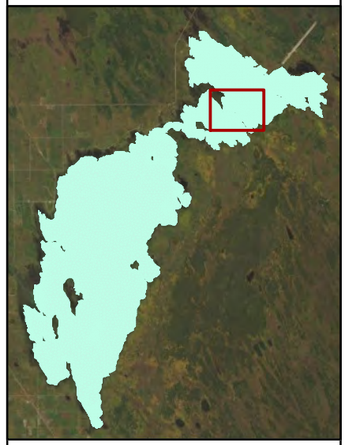

Water Velocity [m/s]

- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

0 0.175 0.35 0.7

Kilometers

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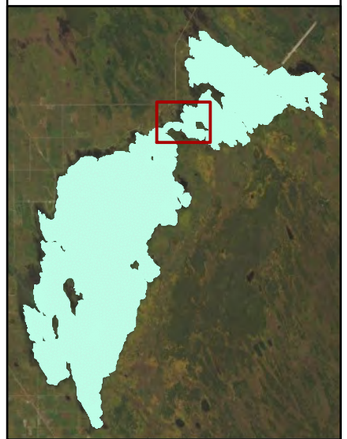

Water Velocity [m/s]

- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

0 0.175 0.35 0.7

Kilometers

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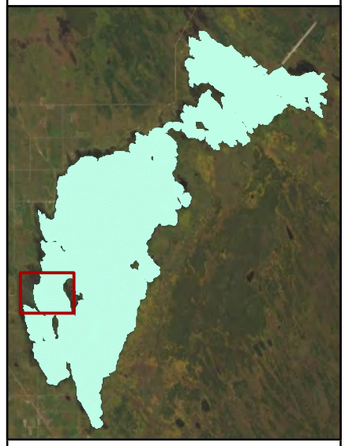

Water Velocity [m/s]

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- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

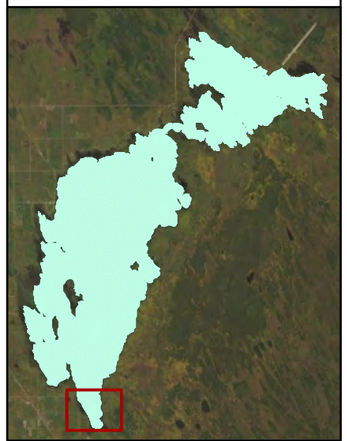
0 0.175 0.35 0.7

Kilometers

N

Lake St. Martin: Post-Project 2011 Flood Peak

Fairford River Flow: 508 cms
LMOC Flow: 250 cms
Dauphin River Flow: 266 cms
LSMOC Flow: 480 cms
South Basin Level: 244.87 m
North Basin Level: 244.35 m



Water Velocity [m/s]

- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

0 0.175 0.35 0.7

Kilometers

N

Lake St. Martin Flow Patterns - 2011 Flood Peak (Pre-Project)

Fairford River Flow: 607 cms
LMOC Flow: 0 cms
Dauphin River Flow: 595 cms
LSMOC Flow: 0 cms
Lake St. Martin South Basin Level: 245.50 m
Lake St. Martin North Basin Level: 245.39 m

Water Velocity [m/s]

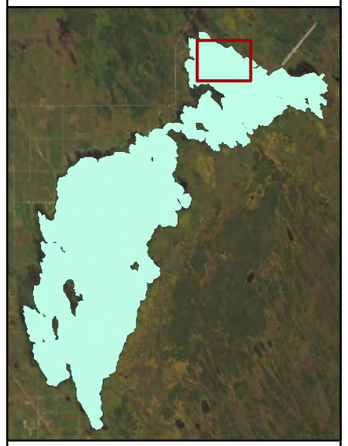
< 0.025	0.20 - 0.30	0.75 - 1.0
0.025 - 0.10	0.30 - 0.40	1.0 - 1.5
0.10 - 0.15	0.40 - 0.50	>1.5
0.15 - 0.20	0.50 - 0.75	

0 1.25 2.5 5 7.5 km

N

Lake St. Martin: Pre-Project 2011 Flood Peak

Fairford River Flow: 607 cms
LMOC Flow: 0 cms
Dauphin River Flow: 595 cms
LSMOC Flow: 0 cms
South Basin Level: 245.50 m
North Basin Level: 245.39 m



Water Velocity [m/s]

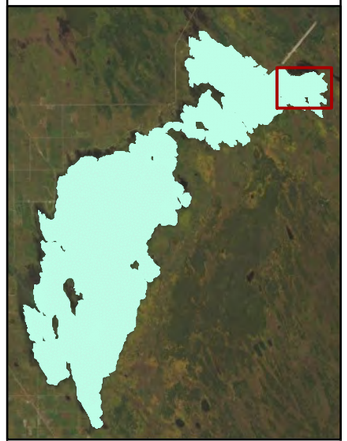
- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

0 0.175 0.35 0.7

Kilometers

Lake St. Martin: Pre-Project 2011 Flood Peak

Fairford River Flow: 607 cms
LMOC Flow: 0 cms
Dauphin River Flow: 595 cms
LSMOC Flow: 0 cms
South Basin Level: 245.50 m
North Basin Level: 245.39 m



N

Water Velocity [m/s]

- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

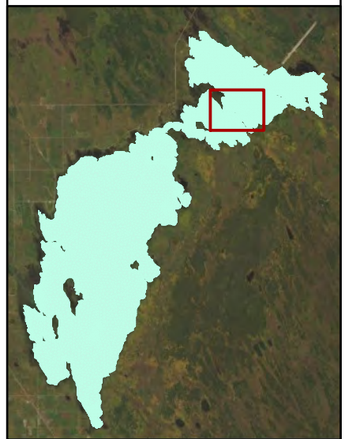
0 0.175 0.35 0.7

Kilometers

N

Lake St. Martin: Pre-Project 2011 Flood Peak

Fairford River Flow: 607 cms
LMOC Flow: 0 cms
Dauphin River Flow: 595 cms
LSMOC Flow: 0 cms
South Basin Level: 245.50 m
North Basin Level: 245.39 m



Water Velocity [m/s]

- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

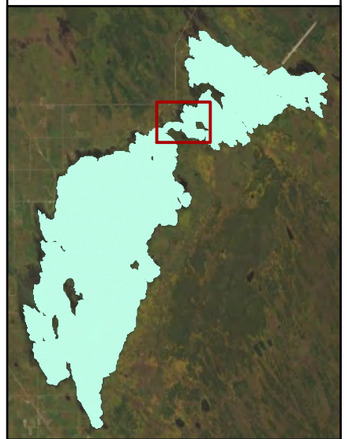
0 0.175 0.35 0.7

Kilometers

N

Lake St. Martin: Pre-Project 2011 Flood Peak

Fairford River Flow: 607 cms
LMOC Flow: 0 cms
Dauphin River Flow: 595 cms
LSMOC Flow: 0 cms
South Basin Level: 245.50 m
North Basin Level: 245.39 m

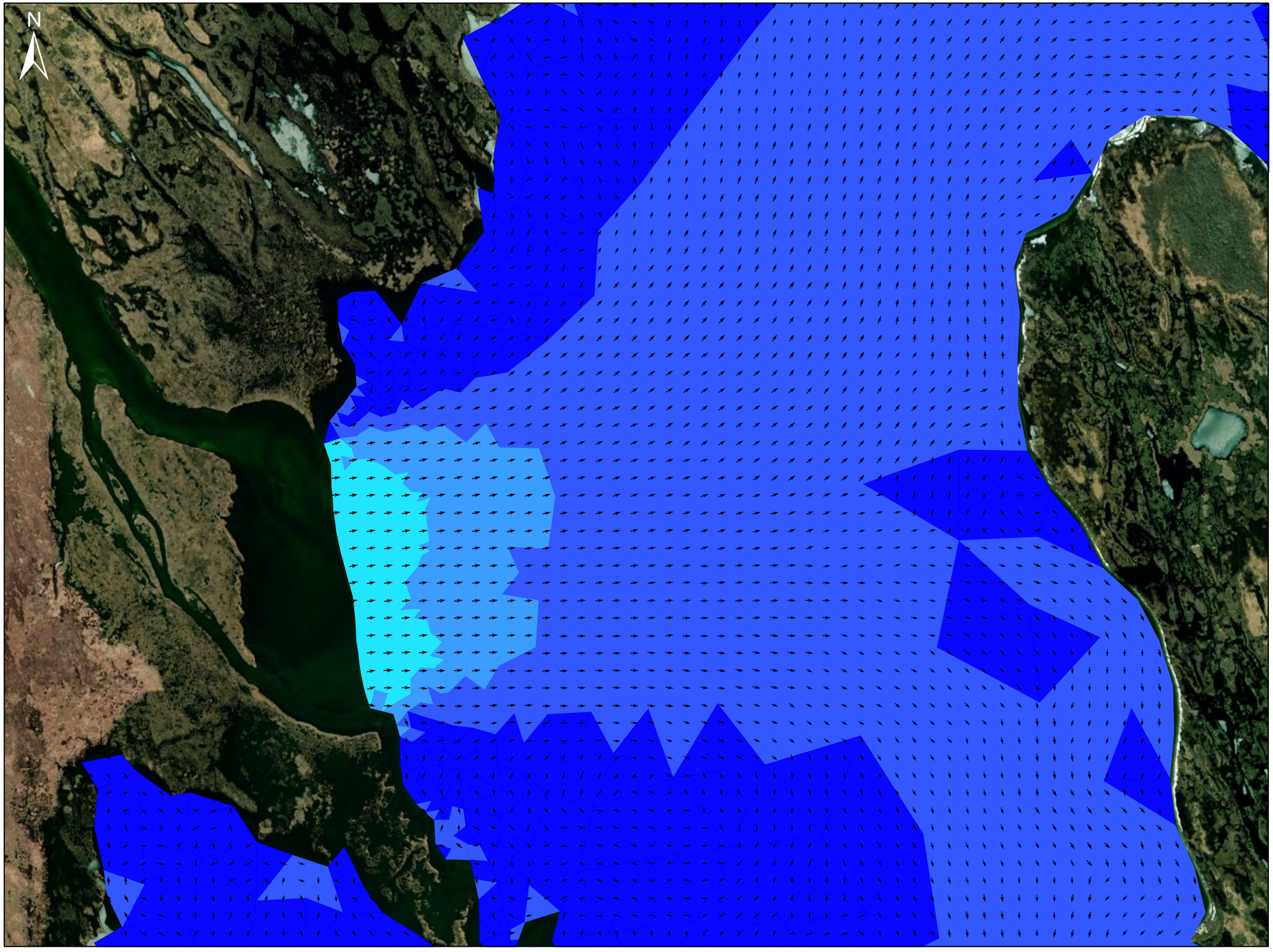


Water Velocity [m/s]

- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

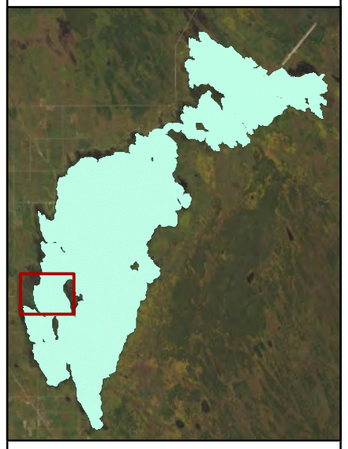
0 0.175 0.35 0.7

Kilometers



Lake St. Martin: Pre-Project 2011 Flood Peak

Fairford River Flow: 607 cms
LMOC Flow: 0 cms
Dauphin River Flow: 595 cms
LSMOC Flow: 0 cms
South Basin Level: 245.50 m
North Basin Level: 245.39 m



Water Velocity [m/s]

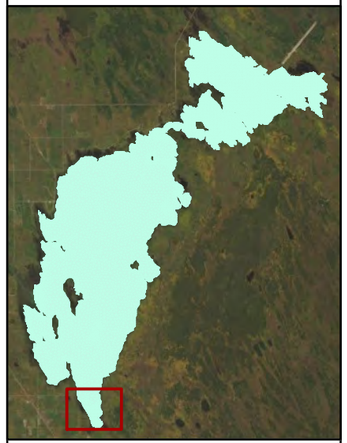
- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

0 0.175 0.35 0.7
Kilometers

N

Lake St. Martin: Pre-Project 2011 Flood Peak

Fairford River Flow: 607 cms
LMOC Flow: 0 cms
Dauphin River Flow: 595 cms
LSMOC Flow: 0 cms
South Basin Level: 245.50 m
North Basin Level: 245.39 m



Water Velocity [m/s]

- < 0.025
- 0.025 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.0
- 1.0 - 1.5
- >1.5

0 0.175 0.35 0.7

Kilometers

Attachment 6
June 30, 2022

Lake Manitoba and Lake St. Martin Water Control Structures Operating Guidelines (Draft as of June 16, 2022)

Manitoba
Transportation and Infrastructure

LAKE MANITOBA
LAKE ST. MARTIN

OUTLET CHANNELS PROJECT

Lake Manitoba and Lake St. Martin Water Control Structures Operating Guidelines

Draft as of June 16, 2022

Fairford River Water Control Structure Operating Guidelines

The Lake Manitoba and Lake St. Martin regulation guidelines for the Fairford River Water Control Structure (FRWCS) that were recommended by the 2003 Lake Manitoba Regulation Review Advisory Committee[1] and later amended by the 2013 Lake Manitoba, Lake St. Martin Regulation Review Committee[2] are as follows:

1. The desired regulation range on Lake Manitoba is 247.04 metres (m) to 247.65 m (810.5 feet [ft] to 812.5 ft). The desired regulation range on Lake St. Martin is 242.93 m to 243.84 m (797.0 ft to 800.0 ft). It is expected that Lake Manitoba Levels may rise to 247.80 m (813.0 ft) or higher in some years, and drop to 246.89 m (810.0 ft) or lower in other years.
2. The FRWCS is operated under the Minimal Log Change Model as follows:
   a) **Normal Operating Conditions** - When the water level on Lake Manitoba is between 247.04 m to 247.65 m (810.5 ft and 812.5 ft), the water level on Lake St. Martin is between 242.93 m to 243.84 m (797.0 ft and 800.0 ft), and neither lake is in a flood recovery or drought recovery condition, no changes to the stop-log configuration are made provided discharge remains within 50 – 60% of full capacity.
   b) **High Water Operation** - The FRWCS will increase discharge above 60% of capacity while balancing impacts between Lake Manitoba and Lake St. Martin.
   c) **Flood Operation** - The FRWCS will discharge at its maximum capacity when the Lake Manitoba water level exceeds 248.1m (814.0 ft).

      During recovery from flood conditions on Lake Manitoba, the FRWCS operates at its maximum capacity until the Lake Manitoba water level recedes to 247.35 m (811.5 ft), after which discharge is reduced to 50% of full capacity.
   d) **Low Water Operation** - The FRWCS will discharge at its minimum discharge rate when the Lake Manitoba water level falls below 247.04 m (810.5 ft).

      During recovery from drought, the FRWCS is kept at 800 cubic feet per second (cfs) until the Lake Manitoba water level reaches 247.35 m (811.5 ft) after which discharge is increased to 50 – 60% of full capacity.
3. Any variances in the lake levels outside of the desired regulation range shall be shared between Lake Manitoba and Lake St. Martin insofar as this may be reasonably possible. This is achieved by adjusting the discharge at the FRWCS.
4. The minimum discharge at the FRWCS is 800 cfs when this can reasonably be achieved. It is desirable to maintain a minimum discharge of 1,000 cfs as often as possible.
5. Notwithstanding the guidelines above, discharge may be adjusted to accommodate maintenance, inspection, or survey work as required.

Lake Manitoba and Lake St. Martin Outlet Channels Operating Guidelines

It is assumed that Lake Manitoba and Lake St. Martin water control structure (WCS) gate settings will be adjusted when required on a weekly or biweekly basis rather than on a daily basis. All references to Lake St. Martin water levels are for the south basin of Lake St. Martin. Notwithstanding the guidelines outlined below, temporary adjustments to channel flows are permitted to facilitate maintenance and inspection activities.

Lake Manitoba Outlet Channel

1. The desirable regulation range on Lake Manitoba is 247.04 m to 247.65 m (810.5 ft to 812.5 ft).
2. Except as outlined in the following conditions, opening of the Lake Manitoba Outlet Channel (LMOC) may begin when Lake Manitoba is above the top of the regulation range 247.65 m (812.5 ft). Discretion may be used to keep the LMOC gates closed or only partially open if Lake Manitoba is forecast to exceed its desired range by less than 0.5 ft and less than 4 weeks, but the outlet shall otherwise be used to its full capacity when Lake Manitoba is above 247.80 m (813ft).
3. The LMOC may be opened pro-actively when the lake level is below 247.65 m (812.5 ft), if the water level on Lake Manitoba is forecasted to be above 247.80 m (813 ft) in the same season.

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Lake Manitoba Outlet Channel *(continued)*

4. Initial operation of the LMOC will increase flow incrementally over multiple days to minimize the mobilization of sediment.
5. During recovery from flood, the outflow from the LMOC will be reduced when the water level on Lake Manitoba recedes to the middle of the regulation range (247.35 m (811.5 ft)). The outflows from the channel will be gradually reduced so that Lake Manitoba water levels stay within the middle of the regulation range and will be reduced to zero once the outflow through Fairford River matches or exceeds the total inflow to the lake.
6. If the LMOC must be operated continuously from the open water season into winter freeze-up, the control structure will be operated in a manner to minimize water level fluctuations over the winter and to maintain stable ice conditions, insofar as practicable.
7. Operation of the outlet control structure should not be initiated during the period in which there is solid ice cover in the channel (typically from Dec 1 – April 30th). However, operation may be considered if Lake Manitoba is forecast to exceed 248.1 m (814.0 ft) for the following spring.
8. A riparian flow shall be maintained when required to support dissolved oxygen levels through the channel when the outlet channel gates are closed. Consideration will be given to eliminating riparian flows should Fairford River flows decline below 14.1 m3/s (500 cfs).
9. Flow through the channels will not be restricted through operation of the outlet channel WCS gates when Lake Manitoba is above 247.80 m (813.0 ft

Lake St. Martin Outlet Channel

1. The desirable regulation range for Lake St. Martin is 242.93 m to 243.84 m (797 ft to 800 ft).
2. Opening of the Lake St. Martin Outlet Channel may begin when the Lake St. Martin water level rises above 243.84 m (800 ft). Discretion may be used to keep the Outlet Channel gates closed or only partially open if Lake St. Martin is forecast to exceed its desired range by less than 0.15 m (0.5 ft) and less than 4 weeks, but the outlet shall otherwise be used to its full capacity when Lake St. Martin is above 244 m (800.5 ft).
3. Notwithstanding Guideline 2, the Lake St. Martin Outlet shall be operated to full capacity when:
   a) the Lake Manitoba Outlet is operated to full capacity,

      and

   b) Lake St. Martin is above 242.93 m (797 ft),

      and

   c) Lake St. Martin is forecasted to go above 243.84 m (800 ft) without operation of the Lake St. Martin Outlet Channel.
4. The LMOC may be opened pro-actively when the lake level is below 243.84 m (800 ft), if the water level on Lake St. Martin is forecasted to be above 244 m (800.5 ft) in the same season.
5. Initial operation of the Lake St. Martin Outlet Channel will increase flow incrementally over multiple days to minimize the mobilization of sediment and to reduce the level differential across the Lake St. Martin Narrows.
6. The outflow from the Lake St. Martin Outlet Channel will be reduced when the lake level decreases below 243.84 m (800 ft) and the lake level will gradually be drawn down to 243.23 m (798 ft). Outflows from the channel will then be further reduced to ensure that the Lake St. Martin water level stays within the middle of the regulation range and will be reduced to zero once the outflow through Dauphin River matches or exceeds the total inflow to Lake St. Martin.
7. If the LMOC must be operated continuously from the open water season into winter freeze-up, the Lake St. Martin Outlet Chanel will be operated in a manner to minimize water level fluctuations over the winter and to maintain stable ice conditions, insofar as practicable.
8. Operation of the outlet control structure should not be initiated during the period in which there is solid ice cover in the channel (typically from Dec 1 – April 30th). However, operation may be considered if the LMOC is operated under clause 7 of its guidelines, or if Lake St. Martin is forecast to exceed 244.75 m (803.0 ft) for the following spring.
9. A riparian flow shall be maintained when required to support dissolved oxygen levels through the channel when the outlet channel gates are closed. Consideration will be given to eliminating riparian flows should conditions on the Dauphin River warrant.
10. Flow through the channels will not be restricted through operation of the outlet channel WCS gates when Lake St. Martin exceeds 244 m (800.5 ft).

LAKE MANITOBA
LAKE ST. MARTIN

OUTLET CHANNELS PROJECT

References:

1. Farlinger, D., et al. (2003). Regulation of Water Levels on Lake Mantioba and along the Fairford River, Pineimuta Lake, Lake St. Martin, and Dauphin River and Related Issues: A Report to the Manitoba Minister of Conservation (Volume 2: Main Report). Manitoba Conservation.

   http://content.gov.mb.ca/mit/wm/water_levels_main2003_07.pdf.

2. Westdal, H., et al. (2013). Lake Manitoba/Lake St. Martin Regulation Review Finding the Right Balance: A Report to the Minister of Infrastructure and Transportation (Volume 1: Main Report). Manitoba Infrastructure and Transportation.

   https://www.gov.mb.ca/asset_library/en/2011flood/regulation_review_report.pdf.

Manitoba