
To:	Andrew Baryla Hatch Ltd.	From:	Stephen Biswanger 311 Portage Avenue, Winnipeg
File:	111475107 Hatch#: E358159-1000-220-030-0001, Rev. 0	Date:	June 16, 2021

Reference: Environmental Support Tasks – LMOC 2019-2020 Groundwater and Surface Water Quality Baseline Data Summary

This memo provides a summary of recently acquired groundwater and surface water quality monitoring data for the Lake Manitoba Outlet Channel (LMOC) project. The work was conducted by the Hatch Team as part of preliminary design for the LMOC. Information is provided to support responses to public interrogatory requests.

The Hatch Team collected data three times each year during open water conditions in 2019 (in conjunction with hydrogeological testing) and again in 2020 to develop an understanding of baseline groundwater and surface water quality in the LMOC area prior to construction.

SURFACE WATER QUALITY

Monitoring Sites

In 2019, surface water samples were collected in June, August, and October, while in 2020 they were collected in May, July, and October. Surface water quality was monitored at ten sites (D1, D2, D3, D4, D6, D8, D9; D10, D11, D12) each located in water bodies potentially affected by the LMOC project. Table 1 lists, from upstream to downstream, the surface water sample sites, locations, and sampling frequency for each year. Surface water sample collection was limited at some sites by site and weather conditions. Sampling locations are shown in Appendix A Map A-1 and Map A-2.

GROUNDWATER QUALITY

Monitoring Sites

In 2019, 13 groundwater wells (including pump test wells) were sampled for water quality. In 2020, the number of groundwater quality monitoring wells sampled was reduced to eight, including observation wells and test hole wells (within the channel right of way and at future bridge structure locations). The field campaigns occurred in June, August, and October 2019 and May, July, and October 2020. Table 2 lists the sample sites, frequency and locations from south to north. The groundwater sampling locations are shown in Appendix A on Map A-3 and Map A-4.

Reference: Environmental Support Tasks – LMOC 2019-2020 Groundwater and Surface Water Quality Baseline Data Summary

Table 1 Surface Water Quality Monitoring Sites and Frequency

Watershed	Site ID	Waterbody	Coordinates (UTM Zone 14 U)		2019 Samples Collected			2019 Total	2020 Samples Collected			2020 Total
			Easting (m)	Northing (m)	June	August	October		May	July	October	
Lake Manitoba	D1	Lake Manitoba	529999	5680739	1	1	1	3	1	1	1*	3
Watchorn Creek	D2	Watchorn Creek	531563	5683591	1	1	1	3	1	1	1	3
Birch Creek	D3	Reed Lake	532496	5686856	1	1		2	1	1	1	3
Birch Creek	D4	Clear Lake	531214	5689935	1	1	1	3	1	1	1	3
Birch Creek	D10	Water Lake	531272	5692230	1	1	1	3	1	1	1	3
Birch Creek	D11	Unnamed lake inlet	531317	5693397			1	1	1	1	1	3
Birch Creek	D12	Goodison Lake outlet	531741	5697313	1	1	1	3	1	1	1	3
Birch Creek	D6	Birch Creek	532477	5698322	1	1	1	3	1	1	1	3
Birch Creek	D8	Birch Creek	533226	5702311	1	1	1	3	1	1	1	3
Lake St. Martin	D9	Lake St. Martin	533392	5706318	1	1	1	3	1	1	1*	3
Total Number of Samples					9	9	9	27	10	10	10	30
Cells shaded grey indicate that no measurement recorded.												
* Sample collected from shoreline instead of by boat due to weather conditions												

Reference: Environmental Support Tasks – LMOC 2019-2020 Groundwater and Surface Water Quality Baseline Data Summary

Table 2 Groundwater Quality Monitoring Sites and Sample Frequency

Site ID	Coordinates (UTM Zone 14 U)		2019 Samples Collected			2019 Total	2020 Samples Collected			2020 Total
	Easting (m)	Northing (m)	June	August	October		May	July	October	
OW19-40	530823	5683152			1	1		1	1	2
CH19-37	530879	5686139			1	1	1	1	1	3
PW19-22	530695	5688126	1			1				
OW19-23	530694	5688133		1	1	2	1	1	1	2
BH19-29	530338	5693405	1	1	1	3	1	1	1	3
OW19-05	531018	5696655		1	1	2	1	1	1	3
PW19-06	531017	5696646	1			1				
BH19-12	532052	5699190		1	1	2	1	1	1	3
CH19-11	532340	5700333	1			1				
OW19-16	532343	5701488		1		1				
OW19-18	532303	5701488			1	1	1	1	1	3
PW19-17	532295	5701490	1			1				
CH19-08	533152	5703020	1	1	1	3	1	1	1	3
Total Number of Samples			6	6	7	19	7	8	8	23
OW: observation well drilled adjacent to pump wells PW: pump well CH: test hole well in channel right of way BH: test hole well at future bridge structure locations Cells shaded grey indicate that no measurement recorded.										

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Reference: Environmental Support Tasks – LMOc 2019-2020 Groundwater and Surface Water Quality Baseline Data Summary

RESULTS

Surface and groundwater quality data for 2019 and 2020 for each sampled location are compiled in the Tables in Appendix B. Tables B-1 through B-10 provide the analytical results and summary statistics for each surface water parameter and monitored surface water bodies indicated in Table 1. Basic comparisons to the most stringent referenced water quality guidelines are indicated for each parameter. Similarly, Tables B-11 and B-12 provide the analytical results and summary statistics for the analyzed groundwater samples indicated in Table 2 and include comparisons to the most stringent referenced guideline for each parameter.

Stantec Consulting Ltd.



Stephen Biswanger P.Eng.
Environmental Engineer

Phone: 204-924-7061

Fax: 204-453-9012

Stephen.biswanger@stantec.com

Attachment Appendix A – Maps
Appendix B – Tables

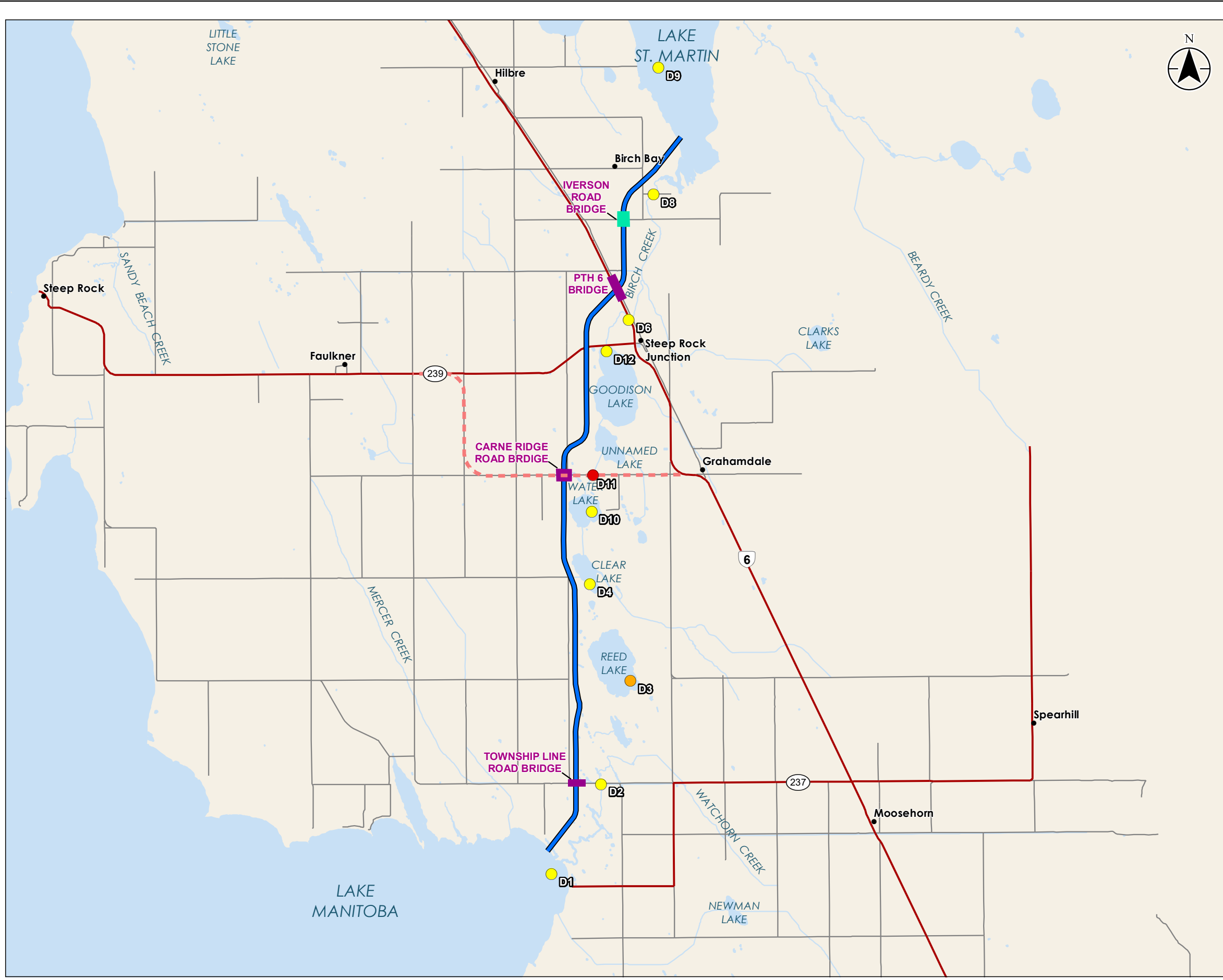
c. Dave Morgan, Stantec



APPENDIX A

Maps

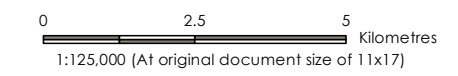
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- Project Infrastructure**
- Proposed Lake Manitoba Outlet Channel
 - Proposed PR 239 Realignment
 - Fairford Water Control Structure
 - Proposed Bridge
 - Proposed Water Control Structure

- Surface Water Quality Site (Stantec)**
- Frequency of Sampling
- October 2019
 - June and August 2019
 - June, August, and October 2019

- Landbase**
- Community
 - Highway
 - Major Road
 - Watercourse
 - Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 14N
 2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location: Lake Manitoba and Lake St. Martin Outlets 111475107
 Prepared by ACampigotto on 2021-01-26
 Technical Review by SBiswanger on 2021-01-26

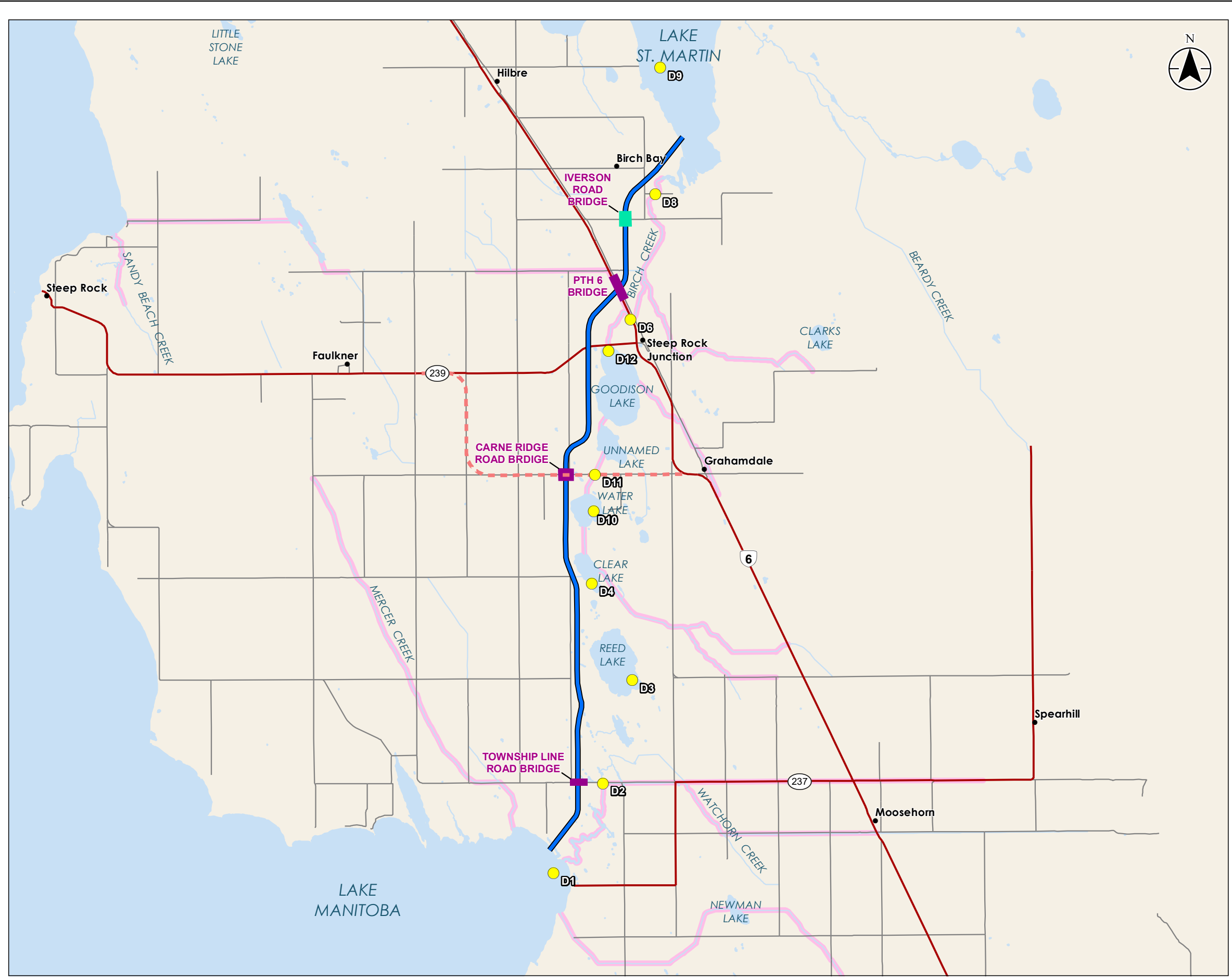
Client/Project: MANITOBA INFRASTRUCTURE
 Lake Manitoba Outlet Channel

Map No.

A-1

Title
2019 Surface Water Quality Sample Sites

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Project Infrastructure

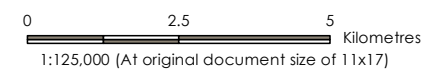
- Proposed Lake Manitoba Outlet Channel
- Proposed PR 239 Realignment
- Proposed Bridge
- Proposed Water Control Structure

Surface Water Quality Site (Stantec)

- Frequency of Sampling
- May, July and October 2020

Landbase

- Community
- Highway
- Major Road
- Watercourse
- Provincial Waterway/Drain
- Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 14N
 2. Base features provided by the Government of Manitoba and the Government of Canada.

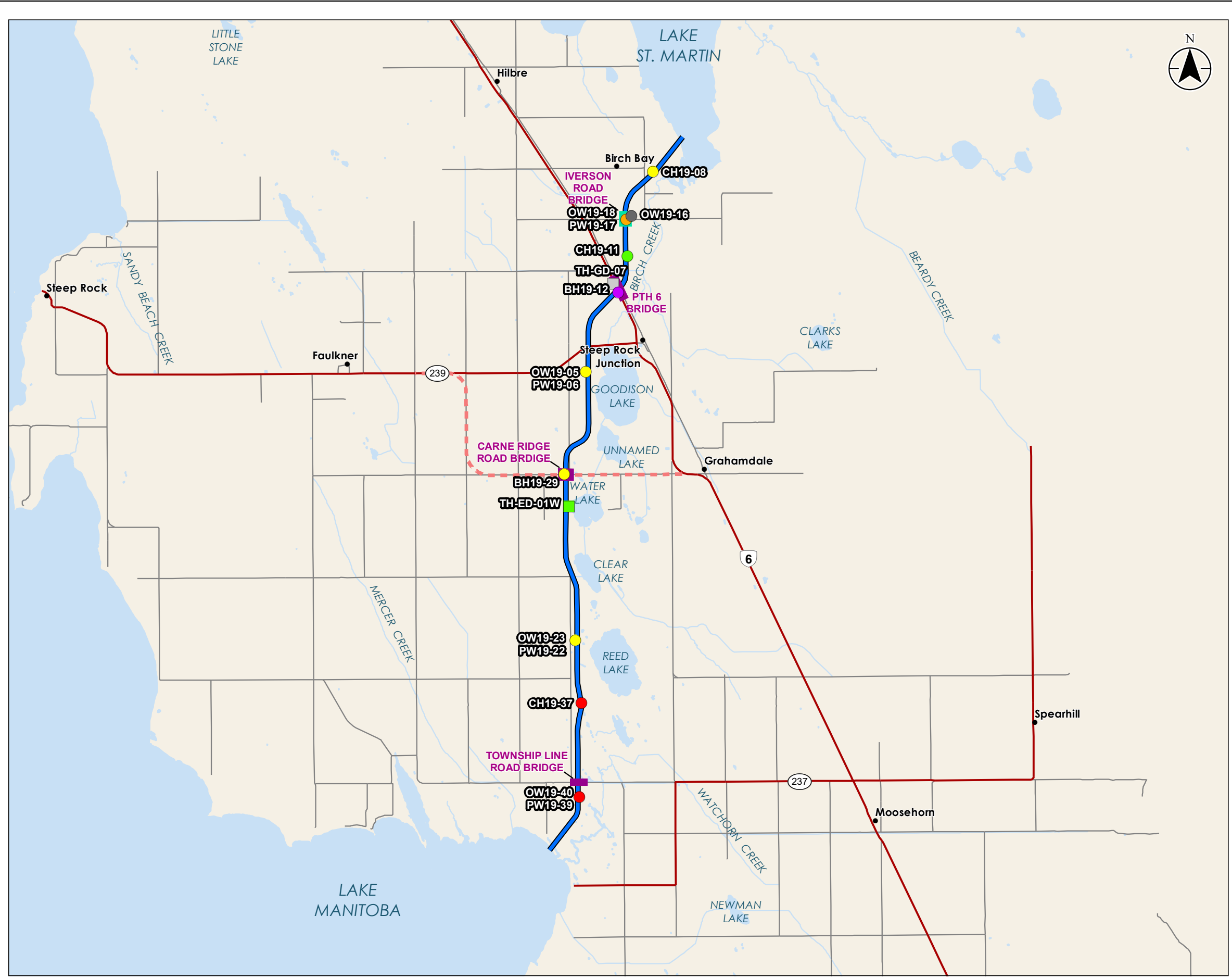
Project Location 111475107
 Lake Manitoba and
 Lake St. Martin Outlets
 Prepared by ACampigotto on 2021-01-26
 Technical Review by SBiswanger on 2021-01-26

Client/Project
MANITOBA INFRASTRUCTURE
 Lake Manitoba Outlet Channel

Map No.
A-2

Title
**2020 Surface Water Quality
 Sample Sites**

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Project Infrastructure

- Proposed Lake Manitoba Outlet Channel
- Proposed PR 239 Realignment
- Fairford Water Control Structure
- Proposed Bridge
- Proposed Water Control Structure

Groundwater Quality Site (Stantec)

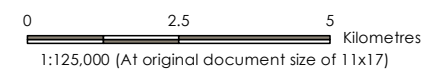
- Frequency of Sampling
- June 2019
 - August 2019
 - October 2019
 - June and October 2019
 - August and October 2019
 - June, August and October 2019

Groundwater Quality Site (KGS)

- Frequency of Sampling
- August 2019
 - June and August 2019

Landbase

- Community
- Highway
- Major Road
- Watercourse
- Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 14N
 2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location 111475107
 Lake Manitoba and Lake St. Martin Outlets
 Prepared by ACampigotto on 2021-01-26
 Technical Review by SBiswanger on 2021-01-26

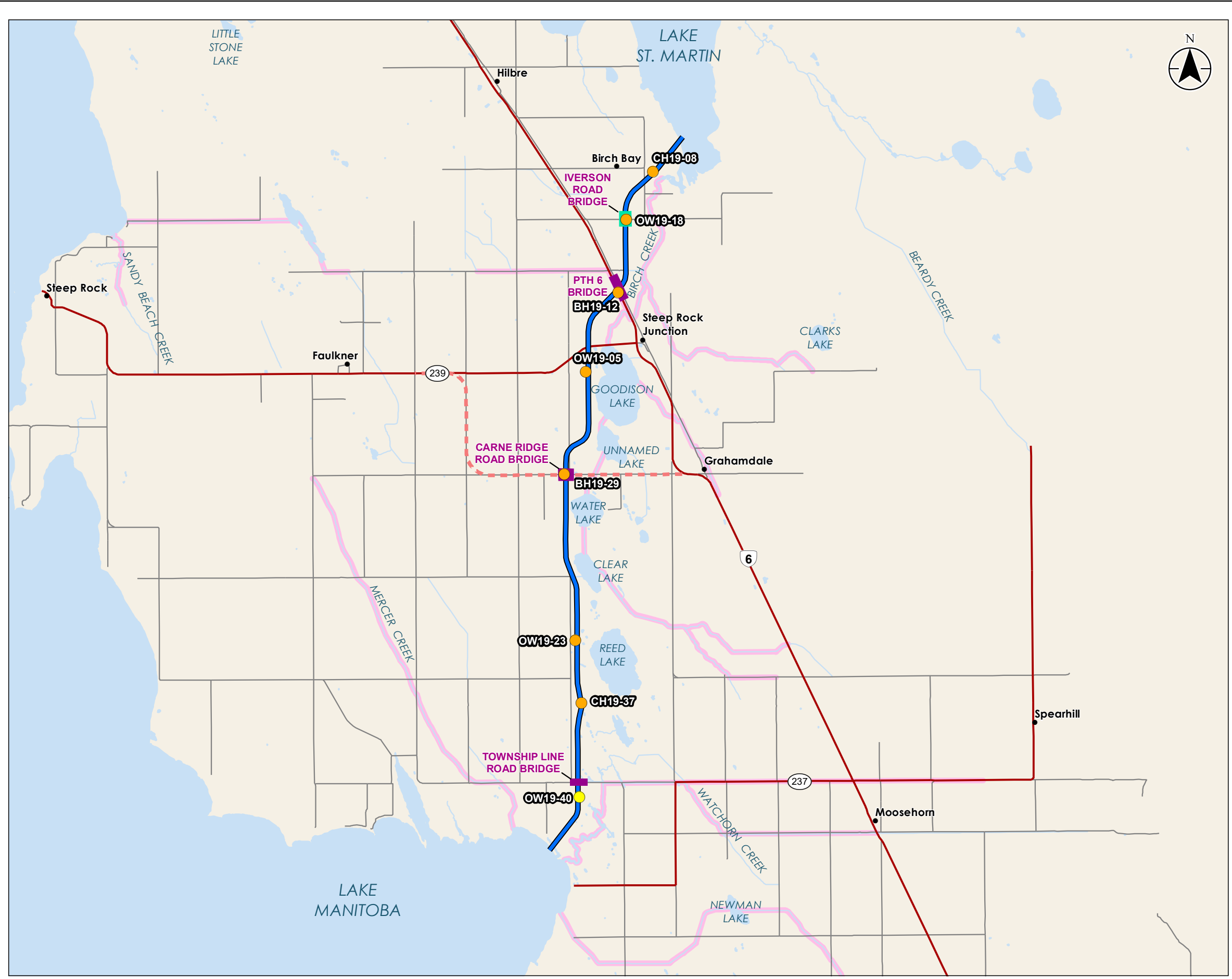
Client/Project
MANITOBA INFRASTRUCTURE
 Lake Manitoba Outlet Channel

Map No.

A-3

Title
2019 Groundwater Quality Sample Sites

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Project Infrastructure

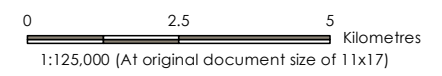
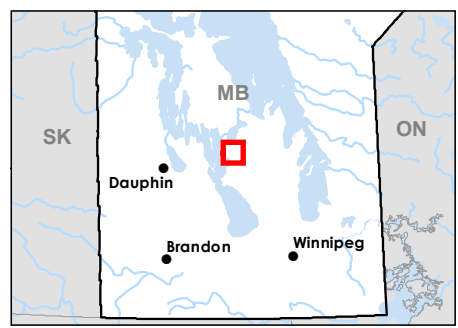
- Proposed Lake Manitoba Outlet Channel
- Proposed PR 239 Realignment
- Proposed Bridge
- Proposed Water Control Structure

Groundwater Quality Site (Stantec)

- Frequency of Sampling
- July and October 2020
 - May, July and October 2020

Landbase

- Community
- Highway
- Major Road
- Watercourse
- Provincial Waterway/Drain
- Waterbody



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 14N
 2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location: Lake Manitoba and Lake St. Martin Outlets 111475107
 Prepared by A.Campigotto on 2021-01-26
 Technical Review by S.Biswanger on 2021-01-26

Client/Project: MANITOBA INFRASTRUCTURE
 Lake Manitoba Outlet Channel

Map No.: **A-4**

Title: **2020 Groundwater Quality Sample Sites**

APPENDIX B

Tables

Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel

Sample Location				D1						D2						D3						
				20-Jun-19 D1	22-Aug-19 D1	8-Oct-19 D1	6-May-20 D1	8-Jul-20 D1	8-Oct-20 D1	19-Jun-19 D2	22-Aug-19 D2	8-Oct-19 D2	4-May-20 D2	5-May-20 QC-01	6-Jul-20 D2	6-Jul-20 QC-02	6-Oct-20 D2	20-Jun-19 D3	22-Aug-19 D3	6-May-20 D3	7-Jul-20 D3	7-Oct-20 D3
Sample Date	Sample ID	Sampling Company	Laboratory	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS		
Laboratory Work Order	Laboratory Sample ID	Units	CWQG-FAL	L2296166-6	L2334482-4	L2362912-10	L2444978-9	L2472215-1	L2514453-5	L2296166-5	L2334482-6	L2362912-11	L2443834-1	L2443834-10	L2470843-2	L2470843-11	L2512953-10	L2296166-7	L2334482-5	L2444978-1	L2470843-13	L2514453-3
Sample Type			MSOG-FAL											Field Duplicate	Field Duplicate							
Metals, Total																						
Aluminum	mg/L	0.005/0.1 ^{VAR1 B}	0.005/0.1 ^{VAR1 D}	0.0422	0.0243	0.037	0.0236	0.0325	0.0928	0.0322	0.0062	0.0284	0.0491	0.0495	0.0069	0.0046	0.0163	0.0097	0.0249	0.0157	0.0068	0.273 ^{BD}
Antimony	mg/L	n/v	n/v	0.00016	0.00014	0.00018	0.00012	0.00023	0.00019	0.00012	0.00014	0.00012	0.00018	0.00014	0.00019	0.00017	0.00014	<0.00010	0.00019	0.00010	0.00021	0.00015
Arsenic	mg/L	0.005 ^B	n/v	0.00202	0.00197	0.00192	0.00125	0.00220	0.00221	0.00180	0.00229	0.00125	0.00133	0.00121	0.00207	0.00222	0.00100	0.00139	0.00254	0.00109	0.00189	0.00218
Barium	mg/L	n/v	n/v	0.0382	0.0395	0.0387	0.0298	0.0417	0.0444	0.0357	0.0297	0.0397	0.0253	0.0244	0.0450	0.0478	0.0333	0.0140	0.0244	0.0190	0.0255	0.0355
Beryllium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	n/v	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	29 ^A 1.5 ^B	29/1.5 ^{SD}	0.095	0.085	0.108	0.069	0.102	0.105	0.160	0.137	0.110	0.072	0.079	0.138	0.154	0.121	0.089	0.050	0.053	0.106	0.093
Cadmium	mg/L	0.001 ^{STB} 9E-5 ^{LIG B}	n/v	0.000062	<0.000050	<0.000050	0.000056	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000056	<0.000050	<0.000050	<0.000050	<0.000050	0.000055	<0.000050	<0.000050	0.000099
Calcium	mg/L	n/v	n/v	40.4	37.6	37.2	31.9	39.2	37.1	60.4	36.8	57.8	46.4	45.8	56.4	56.8	78.1	20.9	29.4	31.4	27.2	43.9
Cesium	mg/L	n/v	n/v	<0.000010	<0.000010	0.000012	<0.000010	<0.000010	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000022
Chromium	mg/L	n/v	n/v	0.00051	0.00015	0.00019	<0.00010	0.00015	0.00019	0.00055	0.00020	0.00031	0.00036	0.00024	0.00025	0.00025	0.00011	0.00046	0.00027	<0.00010	0.00012	0.00049
Cobalt	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00023	0.00015	0.00014	0.00018	0.00019	0.00050	0.00054	0.00011	<0.00010	0.00021	<0.00010	0.00016	0.00023
Copper	mg/L	0.004 ^{AB}	n/v	0.00066	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00100	<0.00050	0.00185	0.00064	0.00059	0.00090	0.00053	0.00057	0.00083	<0.00050	<0.00050	<0.00050	0.00067
Iron	mg/L	0.3 ^B	0.3 ^D	0.041	0.026	0.038	0.026	0.038	0.070	0.067	0.025	0.062	0.108	0.110	0.269	0.258	0.054	0.018	0.033	0.027	0.022	0.293
Lead	mg/L	0.007 [#]	n/v	0.000121	0.000114	0.000152	0.000067	0.000089	0.000161	<0.000050	<0.000050	<0.000050	0.000054	0.000059	<0.000050	<0.000050	<0.000050	0.000074	0.000105	0.000063	0.000085	0.000200
Lithium	mg/L	n/v	n/v	0.0315	0.0300	0.0241	0.0305	0.0369	0.0241	0.0490	0.0648	0.0422	0.0354	0.0141	0.0140	0.0482	0.0270	0.0482	0.0242	0.0386	0.0162	0.0357
Magnesium	mg/L	n/v	n/v	32.3	34.4	33.7	27.4	39.1	40.0	97.3	129	60.8	45.4	44.5	55.1	60.6	78.5	78.4	120	58.6	86.3	111
Manganese	mg/L	n/v	n/v	0.00643	0.00498	0.00557	0.00417	0.00624	0.00590	0.0182	0.00775	0.00260	0.0283	0.0287	0.241	0.245	0.0230	0.0542	0.150	0.0169	0.0570	0.0305
Molybdenum	mg/L	0.073 ^B	0.073 ^D	0.00191	0.00379	0.00199	0.00161	0.00210	0.00231	0.000485	0.00458	0.00130	0.000778	0.000788	0.000638	0.000674	0.000728	0.000291	0.00101	0.000500	0.000276	0.00102
Nickel	mg/L	0.150 ^{AB}	n/v	0.00107	0.00070	0.00063	0.00056	0.00065	0.00066	0.00165	0.00115	0.00138	0.00111	0.00080	0.00135	0.00155	0.00092	0.00050	0.00078	<0.00050	<0.00050	0.00076
Phosphorus	mg/L	n/v	n/v	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.069	0.063	0.067	0.209	0.205	0.190	0.214	0.049	<0.030	0.052	0.052	0.062	0.132
Potassium	mg/L	n/v	n/v	8.00	8.77	8.48	7.05	9.97	10.6	7.64	9.48	9.67	15.9	16.2	6.65	7.12	4.36	13.2	18.2	10.7	14.8	16.9
Rubidium	mg/L	n/v	n/v	0.00361	0.00388	0.00388	0.00288	0.00369	0.00419	0.00311	0.00376	0.00369	0.00555	0.00555	0.00353	0.00368	0.00206	0.00551	0.00728	0.00387	0.00571	0.00656
Selenium	mg/L	0.001 ^B	0.001 ^D	0.000081	0.000067	0.000122	0.000062	0.000108	0.000086	0.000124	0.000116	0.000197	0.000139	0.000146	0.000358	0.000298	0.000083	0.000087	0.000206	0.000061	0.000164	0.000143
Silicon	mg/L	n/v	n/v	3.66	4.38	4.43	2.76	3.79	4.41	0.20	0.23	7.79	3.35	3.24	18.2	18.3	0.49	1.21	9.27	6.11	4.85	
Silver	mg/L	0.00025 ^B	0.0001 ^D	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	n/v	n/v	127	132	133	95.8	122	138	43.9	65.2	24.7	10.7	10.4	13.5	14.8	29.5	16.2	27.0	11.5	18.7	24.1
Strontium	mg/L	n/v	n/v	0.251	0.267	0.263	0.195	0.260	0.278	0.231	0.195	0.181	0.118	0.113	0.170	0.172	0.218	0.0448	0.0686	0.0725	0.0707	0.112
Sulfur	mg/L	n/v	n/v	26.9	27.0	25.8	21.1	34.3	34.6	52.1	81.8	28.2	31.4	33.4	9.01	9.56	54.2	30.7	51.0	22.7	38.6	52.3
Tellurium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	0.0008 ^B	0.0008 ^D	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	n/v	n/v	0.00019	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00079	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	n/v	n/v	0.00162	0.00110	0.00148	0.00085	0.00132	0.00327	0.00137	<0.00030	0.00150	0.00225	0.00198	0.00050	0.00069	0.00072	0.00034	0.00109	0.00065	0.00031	0.00925
Tungsten	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	0.033 ^A 0.015 ^B	0.033/0.015 ^{SD}	0.00155	0.00160	0.00159	0.00134	0.00162	0.00171	0.00324	0.00273	0.00589	0.00145	0.00108	0.00133	0.00136	0.00277	0.000563	0.00193	0.000707	0.000507	0.00223
Vanadium	mg/L	n/v	n/v	0.00158	0.00157	0.00158	0.00099	0.00142	0.00171	0.00168	0.00081	0.00157	0.00060	0.00063	0.00071	0.00063	<0.00050	0.00086	0.00150	0.00069	0.00087	0.00141
Zinc	mg/L	n/v	n/v	0.0067	<0.0030	<0.0030	0.0031	<0.0030	<0.0030	0.0102	<0.0030	0.0053	<0.0030	0.0037	0.0041	0.0056	<0.0030	0.0084	<0.0030	<0.0030	0.0068	0.0035
Zirconium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00033	<0.00020	0.00025	<0.00020	<0.00020	0.00029	0.00031	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00021

See notes on last page

Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel

Sample Location Sample Date Sample ID Sampling Company Laboratory Laboratory Work Order Laboratory Sample ID Sample Type	Units	CWQG-FAL	MSOG-FAL	D4						D6						D8					
				20-Jun-19 D4	22-Aug-19 D4	9-Oct-19 D4	4-May-20 D4	6-Jul-20 D4	7-Oct-20 D4	19-Jun-19 D6	22-Aug-19 D6	8-Oct-19 D6	7-May-20 D6	8-Jul-20 D6	5-Oct-20 D6	19-Jun-19 D8	21-Aug-19 D8	7-Oct-19 D8	5-May-20 D8	7-Jul-20 D8	5-Oct-20 D8
				STANTEC ALS L2296166 L2296166-8	STANTEC ALS L2334482 L2334482-7	STANTEC ALS L2362912 L2362912-18	STANTEC ALS L2443834 L2443834-4	STANTEC ALS L2470843 L2470843-5	STANTEC ALS L2514453 L2514453-1	STANTEC ALS L2296166 L2296166-3	STANTEC ALS L2334482 L2334482-10	STANTEC ALS L2362912 L2362912-7	STANTEC ALS L2444978 L2444978-6	STANTEC ALS L2472215 L2472215-4	STANTEC ALS L2512953 L2512953-5	STANTEC ALS L2296166 L2296166-2	STANTEC ALS L2334482 L2334482-2	STANTEC ALS L2362912 L2362912-3	STANTEC ALS L2443834 L2443834-7	STANTEC ALS L2470843 L2470843-16	STANTEC ALS L2512953 L2512953-2
Field Parameters																					
Dissolved oxygen, Field	mg/L	>5.5/6/6.5/9.5 ^{VAR} ^B	n/v	9.18	7.92	8.34	8.86	1.87 ^B	7.52	8	7.64	7.04	7.01	3.39 ^B	9.65	6.89	9.32	13.36	9.37	9.82	8
Electrical Conductivity, Field	µS/cm	n/v	n/v	679	598	664	192.9	482.2	555.6	984	1,142	815	430.9	731.0	836	809	856	639.9	359.9	569.0	922
Nitrite, Field	mg/L	n/v	n/v	0.03	NM	0.03	-	-	-	0.03	0.01	0.00	0.00	-	-	0.01	0.04	54.5	-	-	-
Oxidation Reduction Potential, field	mV	n/v	n/v	-27.2	8.9	-14.7	170.2	56.5	94	144.9	-101.3	42.3	157.7	33.4	-14.6	188.8	-69.6	54.5	100.8	14.8	-28.2
pH, Field	S.U.	6.5-9.0 ^B	6.5-9.0 ^D	8.62	9.09 ^{BD}	7.69	7.99	7.35	7.27	8.38	8.31	7.83	7.42	7.32	7.7	8.46	9.02 ^{BD}	8.24	7.76	7.81	7.87
Pressure	kPa	n/v	n/v	100.94	102.07	101.72	98.93	101.38	98.5	101.05	101.9	99.9	102.49	99.85	97.21	101.12	103.2	100.95	99.13	101.45	97.2
Temperature, Field	deg C	n/v	n/v	23.4	22.5	6.1	9.2	24.4	10	21.6	19.8	7.8	5.2	25.1	10.8	18.3	16.9	11.1	7.2	22.7	9.5
Total Dissolved Solids, Field	ppm	n/v	n/v	-	-	-	224	398	340	-	-	-	430	480	460	-	-	-	435	470	570
Turbidity, Field	NTU	n/v	n/v	3.36	68.00	13.93	9.45	0.49	2.79	0.13	0.00	1.48	0.45	0.24	5.51	2.82	1.65	73.93	8.44	0.26	4.59
General Chemistry																					
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	341	274	379	176	329	293	507	524	247	1,070	415	430	391	388	288	359	434	432
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	21.0	6.91	<0.60	<0.60	<0.60	10.6	13.7	30.8	<0.60	<0.60	<0.60	30.0	34.7	52.1	4.32	<0.60	9.36	28.1
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
Alkalinity, Total	mg/L	n/v	n/v	314	236	310	144	269	258	438	481	202	878	340	403	379	404	243	295	371	401
Ammonia (as N)	mg/L	TBC ² _B	TBC ¹ _D	0.023	0.180	0.330	0.023	0.025	0.012	0.029	0.076	0.022	0.015	0.046	0.030	0.027	0.092	0.021	0.023	0.020	0.089
Chloride	mg/L	640 ^A 120 ^B	n/v	13.7	19.5	20.7	4.67	8.59	11.2	16.6	35.2	25.8	8.62	10.4	15.7	10.9	25.0	28.8	8.05	6.68	18.1
Fluoride	mg/L	0.12 ^B	n/v	0.285 ^B	0.292 ^B	0.230 ^B	0.112	0.219 ^B	0.248 ^B	0.338 ^B	0.399 ^B	0.193 ^B	0.211 ^B	0.293 ^B	0.331 ^B	0.325 ^B	0.359 ^B	0.167 ^B	0.227 ^B	0.268 ^B	0.335 ^B
Hardness (as CaCO3)	mg/L	n/v	n/v	386	365	442	166	317	292	607	745	545	349	396	478	494	613	417	334	397	520
Nitrate (as N)	mg/L	124 ^A 3.0 ^B	13 ^D	<0.020	<0.020	0.053	<0.020	<0.020	<0.020	<0.040 DM	<0.040 DM	<0.040 DM	<0.020	<0.020	0.066	<0.040 DM	<0.040 DM	0.329	<0.020	<0.020	0.048
Nitrite (as N)	mg/L	0.06 ^B	0.06 ^D	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020 DM	<0.020 DM	<0.020 DM	<0.010	<0.010	<0.020 DM	<0.020 DM	<0.020 DM	<0.010	<0.010	<0.010	<0.020 DM
Nitrogen (Total)	mg/L	n/v	n/v	1.61	3.34	-	1.19	1.61	1.51	2.42	3.52	-	0.42	1.60	1.90	2.05	3.99	-	1.21	1.82	2.47
Phosphorus, Total	mg/L	n/v	0.025 ^C	0.0277 ^C	0.108 ^C	0.423 ^C	0.0704 ^C	0.0309 ^C	0.0154	0.0217	0.0257 ^C	0.0150	0.0118	0.0242	0.0297 ^C	0.0275 ^C	0.0736 ^C	0.0203	0.0571 ^C	0.0254 ^C	0.0602 ^C
Phosphorus, Total (Dissolved)	mg/L	n/v	0.025 ^C	0.0207	0.0163	0.0217	0.0217	0.0269 ^C	0.0099	0.0160	0.0168	0.0093	0.0268 RV ^C	0.0155	0.0168	0.0209	0.0513 ^C	0.0092	0.0459 ^C	0.0241	0.0348 ^C
Phosphorus, Total Particulate	mg/L	n/v	n/v	0.0070	0.0917	0.402	0.0488	<0.0042	0.0055	0.0056	0.0089	0.0057	<0.0042	0.0087	0.0129	0.0066	0.0223	0.0111	0.0112	<0.0042	0.0254
Total Dissolved Solids	mg/L	n/v	n/v	474	581	595	181	351	380	749	942	610	358	450	565	610	718	554	349	444	663
Sulfate	mg/L	n/v	n/v	92.7	141	148	18.2	46.3	58.8	196	295	324	50.0	44.5	93.1	136	191	170	39.1	23.7	141
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.61	3.34	9.93	1.19	1.61	1.51	2.42	3.52	1.18	0.42	1.60	1.90	2.05	3.99	1.12	1.21	1.82	2.47
Total Suspended Solids	mg/L	sn ^B	n/v	21.9	83.7	1,280	12.3	3.7	2.5	4.7	6.9	2.5	<2.0	<1.0	2.9	5.9	2.9	7.6	3.9	<1.0	12.6
Microbiological Parameters																					
Escherichia coli (E.Coli)	mpn/100mL	n/v	n/v	5	727	2,420	<1	7	1	-	54	186 ZH	3	36	72	-	3 ZH	313 ZH	13	88	727 SV
Total Coliforms	mpn/100mL	n/v	n/v	27	727	>2420	77	>2420	1,300	-	>2420	>2420 ZH	649	>2420	1,990	-	488 ZH	>2420 ZH	461	>2420	>2420 SV
BTEX and Petroleum Hydrocarbons																					
Benzene	mg/L	0.37 ^B	n/v	<0.00050	<0.00050	<0.00050 OWP	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	0.002 ^B	n/v	<0.0010	<0.0010	<0.00050 OWP	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010
Ethylbenzene	mg/L	0.09 ^B	0.09 ^D	<0.00050	<0.00050	<0.00050 OWP	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylene, m & p-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040 OWP	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, o-	mg/L	n/v	n/v	<0.00050	<0.00050	<0.00030 OWP	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050
Xylenes, Total	mg/L	n/v	n/v	<0.00064	<0.00064	<0.00050 OWP	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.025 OWP	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	n/v	n/v	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F3 (>C16-C34 range)	mg/L	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
PHC F4 (>C34-C50 range)	mg/L	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Total Hydrocarbons (C6-C50)	mg/L	n/v	n/v	<0.38	<0.38	<0.37	<0.38	<0.38	<0.38	<0.38	<0.38	<0.37	<0.38	<0.38	<0.38	<0.38	<0.38	<0.37	<0.38	<0.38	<0.38
Chromatogram to baseline at C50	none	n/v	n/v	-	-	YES	-	-	-	-	-	YES	-	-	-	-	-	YES	-	-	-

See notes on last page

Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel

Sample Location	Sample Date	Sample ID	Sampling Company	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	CWQG-FAL	MSOG-FAL	D4							D6					D8				
											20-Jun-19 D4	22-Aug-19 D4	9-Oct-19 D4	4-May-20 D4	6-Jul-20 D4	7-Oct-20 D4	19-Jun-19 D6	22-Aug-19 D6	8-Oct-19 D6	7-May-20 D6	8-Jul-20 D6	5-Oct-20 D6	19-Jun-19 D8	21-Aug-19 D8	7-Oct-19 D8	5-May-20 D8	7-Jul-20 D8
Aluminum	mg/L	n/v	0.005/0.1 _{VAR1} ^D	0.0041	0.0062^D	0.0092	0.0039	0.0012	0.0012	0.0025	0.0030	0.0021	0.0014	0.0013	<0.0010	0.0049	0.0352^D	0.0186	0.0022	0.0020	0.0042						
Antimony	mg/L	n/v	n/v	0.00013	0.00021	0.00015	<0.00010	<0.00010	<0.00010	0.00014	0.00015	0.00022	<0.00010	0.00012	0.00010	0.00014	0.00016	<0.00010	<0.00010	0.00012	0.00012						
Arsenic	mg/L	n/v	0.15/0.34 _{s2} ^D	0.00139	0.00321	0.00143	0.00057	0.00108	0.00098	0.00191	0.00237	0.00112	0.00073	0.00147	0.00134	0.00221	0.00346	0.00094	0.00077 RV	0.00171	0.00181						
Barium	mg/L	n/v	n/v	0.0360	0.0580	0.0394	0.0255	0.0389	0.0249	0.0556	0.0416	0.0380	0.0311	0.0527	0.0347	0.0346	0.0189	0.0383	0.0355	0.0483	0.0505						
Beryllium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010						
Bismuth	mg/L	n/v	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050						
Boron	mg/L	n/v	29/1.5 _{s3} ^D	0.123	0.044	0.076	0.046	0.115	0.029	0.130	0.163	0.104	0.076	0.136	0.136	0.116	0.077	0.097	0.075	0.109	0.134						
Cadmium	mg/L	n/v	0.00084/0.011 _{s6} ^D	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000063	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000062	<0.000050	<0.000050	<0.000050						
Calcium	mg/L	n/v	n/v	47.0	34.9	65.2	24.0	43.0	33.6	77.5	54.2	78.3	47.3	57.4	60.6	55.3	35.3	67.3	48.6	61.5	65.5						
Cesium	mg/L	n/v	n/v	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010						
Chromium	mg/L	n/v	0.317/2.43 _{s7} ^D	0.00015	0.00011	0.00026	<0.00010	0.00014	0.00012	0.00020	0.00013	<0.00010	<0.00010	0.00013	0.00014	0.00029	0.00022	0.00011	<0.00010	0.00019	0.00017						
Cobalt	mg/L	n/v	n/v	0.00012	0.00016	0.00014	<0.00010	<0.00010	<0.00010	0.00017	0.00016	0.00011	<0.00010	<0.00010	<0.00010	0.00022	0.00027	0.00010	<0.00010	0.00015	0.00014						
Copper	mg/L	n/v	0.040/0.07 _{s10} ^D	0.00072	0.00194	0.00055	0.00172	0.00045	0.00120	0.00062	0.00084	0.00092	0.00163 RV	0.00031	0.00122	0.00116	0.00052	0.00121	0.00182	0.00339 RV	0.00190						
Iron	mg/L	n/v	0.3 ^D	0.015	0.013	0.220	0.026	0.023	0.011	0.063	0.035	0.020	0.038	0.045	0.017	0.039	0.027	0.039	0.030	0.084	0.029						
Lead	mg/L	n/v	0.016/0.416 _{s9} ^D	<0.000050	0.000088	0.000069	0.000056	0.000102	<0.000050	<0.000050	<0.000050	0.000057	<0.000050	0.000096	<0.000050	0.000050	<0.000050	0.000055	<0.000050	0.00103	<0.000050						
Lithium	mg/L	n/v	n/v	0.0228	0.0201	0.0354	0.0068	0.0163	0.0193	0.0312	0.0346	0.0268	0.0153	0.0191	0.0248	0.0260	0.0268	0.0184	0.0121	0.0153	0.0266						
Magnesium	mg/L	n/v	n/v	65.2	67.5	67.8	25.9	50.9	50.5	100	148	84.9	56.1	61.3	79.3	86.4	128	60.4	51.7	59.1	86.6						
Manganese	mg/L	3.6 _{EQ3} ^A 0.43 _{EQ4} ^B	n/v	0.00255	0.0314	0.0165	0.00415	0.0144	0.00356	0.00977	0.00987	0.00448	0.0229	0.00776	0.0118	0.00555	0.00989	0.00353	0.0137	0.00966	0.0346						
Molybdenum	mg/L	n/v	0.073 ^D	0.00105	0.00139	0.00204	0.000640	0.000768	0.000705	0.000654	0.00378	0.00210	0.000789	0.000496	0.000578	0.000695	0.00115 RV	0.00169	0.000782	0.000527	0.00117						
Nickel	mg/L	n/v	0.23/2.1 _{s11} ^D	0.00076	0.00097	0.00068	<0.00050	0.00066	<0.00050	0.00086	0.00099	0.00059	0.00061	0.00080	0.00081	0.00115	0.00143	0.00090	0.00063	0.00090	0.00098						
Phosphorus	mg/L	n/v	n/v	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.049	<0.030	0.047	<0.030	<0.030	<0.030						
Potassium	mg/L	n/v	n/v	13.6	12.0	13.2	4.78	7.15	4.82	10.0	12.4	12.2	6.16	4.49	8.13	6.39	7.74	6.91	5.00	3.77	12.6						
Rubidium	mg/L	n/v	n/v	0.00529	0.00397	0.00536	0.00220	0.00375	0.00260	0.00394	0.00465	0.00382	0.00259	0.00249	0.00263	0.00279	0.00319	0.00239	0.00260	0.00287	0.00368						
Selenium	mg/L	n/v	0.001 ^D	0.000200	0.000203	0.000123	0.000073	0.000196	0.000180	0.000220	0.000258	0.000141	0.000135	0.000318	0.000147	0.000179	0.000265	0.000182	0.000145	0.000305	0.000235						
Silicon	mg/L	n/v	n/v	0.484	5.58	7.73	3.04	6.00	4.29	2.20	1.77	6.15	4.11	16.2	6.62	2.70	3.71	6.53	4.47	14.3	6.53						
Silver	mg/L	n/v	0.0001 ^D	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010 RV	<0.000010						
Sodium	mg/L	n/v	n/v	15.6	25.0	21.5	4.83	9.97	12.1	19.0	33.9	19.4	9.84	11.8	16.3	28.1	20.0	8.19	8.93	17.4							
Strontium	mg/L	n/v	n/v	0.158	0.120	0.196	0.0679	0.136	0.108	0.265	0.307	0.241	0.135	0.175	0.217	0.185	0.167	0.174	0.128	0.159	0.215						
Sulfur	mg/L	n/v	n/v	37.2	50.9	52.7	7.35	16.1	20.2	79.5	94.3	115	19.8	16.6	29.6	55.1	73.2	57.8	14.7	9.81	46.0						
Tellurium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020						
Thallium	mg/L	n/v	0.0008 ^D	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010						
Thorium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010						
Tin	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010						
Titanium	mg/L	n/v	n/v	<0.00030	0.00081	0.00055	0.00040	<0.00030	<0.00030	<0.00030	0.00033	<0.00030	<0.00030	<0.00030	<0.00030	0.00058	0.00054	0.00091	<0.00030	0.00032	0.00031						
Tungsten	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010						
Uranium	mg/L	n/v	0.033/0.015 _{s4} ^D	0.00262	0.00211	0.00413	0.00144	0.00129	0.00163	0.00319	0.00200	0.00532	0.00267	0.000829	0.00159	0.00272	0.00186	0.00588	0.00320	0.00113	0.00287						
Vanadium	mg/L	n/v	n/v	0.00081	0.00184	0.00071	0.00093	<0.00050	0.00055	0.00056	0.00055	<0.00050	<0.00050	<0.00050	<0.00050	0.00166	0.00162	0.00095	0.00065	<0.00050	0.00118						
Zinc	mg/L	0.037 _{EO1} ^A 0.007 _{EO2} ^B	0.530 _{s12} ^D	0.0041	0.0043	0.0567^{AB}	0.0031	0.0037	0.0022	0.0067	0.0066	0.0027	0.0036	0.0030	0.0030	0.0085^B	0.0037	0.0030	0.0035	0.0031	0.0028						
Zirconium	mg/L	n/v	n/v	<0.00020	0.00023	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00024	<0.00020	<0.00020	<0.00020	<0.00020	0.00037	0.00043	<0.00020	<0.00020	0.00022	0.00030						

See notes on last page

Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel

Sample Location	Sample Date	Sample ID	Sampling Company	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	CWQG-FAL	MSOG-FAL	D4						D6					D8						
											20-Jun-19 D4	22-Aug-19 D4	9-Oct-19 D4	4-May-20 D4	6-Jul-20 D4	7-Oct-20 D4	19-Jun-19 D6	22-Aug-19 D6	8-Oct-19 D6	7-May-20 D6	8-Jul-20 D6	5-Oct-20 D6	19-Jun-19 D8	21-Aug-19 D8	7-Oct-19 D8	5-May-20 D8	7-Jul-20 D8	5-Oct-20 D8
											STANTEC ALS L2296166-8	STANTEC ALS L2334482-7	STANTEC ALS L2362912-18	STANTEC ALS L2443834-4	STANTEC ALS L2470843-5	STANTEC ALS L2514453-1	STANTEC ALS L2296166-3	STANTEC ALS L2334482-10	STANTEC ALS L2362912-7	STANTEC ALS L2444978-6	STANTEC ALS L2472215-4	STANTEC ALS L2512953-5	STANTEC ALS L2296166-2	STANTEC ALS L2334482-2	STANTEC ALS L2362912-3	STANTEC ALS L2443834-7	STANTEC ALS L2470843-16	STANTEC ALS L2512953-2
Metals, Total																												
Aluminum	mg/L	0.005/0.1 ^B _{VAR1}	0.005/0.1 ^D _{VAR1}	0.0943	3.06 ^{BD}	1.24 DM ^{BD}	0.262	0.0091	0.0294	0.0227	0.0175	0.0505	0.0289	0.0041	0.0521	0.0916	0.0818 ^{BD}	0.109 ^{BD}	0.106 ^{BD}	0.0217	0.0465							
Antimony	mg/L	n/v	n/v	0.00012	0.00022	<0.0010 DM	<0.00010	0.00010	<0.00010	0.00012	0.00012	<0.00010	<0.00010	0.00013	0.00018	0.00011	0.00029	<0.00010	0.00011	0.00013	0.00013	0.00013						
Arsenic	mg/L	0.005 ^B	n/v	0.00147	0.00343	0.0020 DM	0.00064	0.00113	0.00099	0.00186	0.00245	0.00118	0.00080	0.00142	0.00139	0.00211	0.00376	0.00100	0.00088	0.00175	0.00177							
Barium	mg/L	n/v	n/v	0.0314	0.0754	0.0536 DM	0.0228	0.0362	0.0236	0.0506	0.0363	0.0370	0.0290	0.0489	0.0334	0.0316	0.0145	0.0381	0.0328	0.0460	0.0494							
Beryllium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.0010 DM	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010							
Bismuth	mg/L	n/v	n/v	<0.000050	<0.000050	<0.000050 DM	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050							
Boron	mg/L	29 ^A 1.5 ^B	29/1.5 ^D _{SS}	0.121	0.055	0.19 DM	0.050	0.106	0.035	0.125	0.190	0.108	0.064	0.126	0.148	0.106	0.078	0.090	0.070	0.122	0.142							
Cadmium	mg/L	0.001 ^A _{STB} 9E-5 ^B _{LTG}	n/v	0.000073	0.0000423	<0.000050 DM	0.000090	<0.000050	<0.000050	0.000054	<0.000050	<0.000050	0.0000644	0.0000224	0.000083	<0.000050	<0.000050	0.000054	<0.000050	<0.000050	0.000069							
Calcium	mg/L	n/v	n/v	49.8	45.4	70.1 DM	28.4	43.2	35.2	79.4	52.7	77.5	50.1	58.4	68.1	55.9	33.7	67.0	54.2	62.6	71.9							
Cesium	mg/L	n/v	n/v	0.000011	0.000355	0.00010 DM	0.000028	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010							
Chromium	mg/L	n/v	n/v	0.00051	0.00655	0.0026 DM	0.00050	0.00018	0.00014	0.00036	0.00027	0.00024	0.00014	0.00019	0.00025	0.00039	0.00068	0.00032	0.00030	0.00017	0.00025							
Cobalt	mg/L	n/v	n/v	0.00017	0.00189	<0.0010 DM	0.00016	0.00010	<0.00010	0.00018	0.00020	0.00012	<0.00010	<0.00010	0.00012	0.00026	0.00033	0.00012	0.00013	0.00016	0.00019							
Copper	mg/L	0.004 ^{AB}	n/v	0.00096	0.00450 ^B	<0.0050 DM	0.00090	0.00072	<0.00050	0.00074	0.00096	0.00083	0.00053	<0.00050	0.00182	0.00130	0.00081	0.00144	0.00082	<0.00050	0.00153							
Iron	mg/L	0.3 ^B	0.3 ^D	0.100	2.99 ^{BD}	1.36 DM ^{BD}	0.221	0.037	0.031	0.069	0.047	0.072	0.051	0.053	0.061	0.096	0.083	0.112	0.118	0.102	0.059							
Lead	mg/L	0.007 ^F	n/v	0.000088	0.00165	0.00085 DM	0.000179	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000142	0.000055	0.000074	0.000073	0.000072	<0.000050	<0.000050							
Lithium	mg/L	n/v	n/v	0.0243	0.0355	0.033 DM	0.0077	0.0165	0.0215	0.0328	0.0508	0.0257	0.0148	0.0178	0.0255	0.0269	0.0365	0.0201	0.0135	0.0162	0.0276							
Magnesium	mg/L	n/v	n/v	70.3	64.4	81.5 DM	24.5	50.5	61.3	110	152	81.9	53.6	55.9	77.6	92.5	121	60.3	53.5	61.5	83.9							
Manganese	mg/L	n/v	n/v	0.00877	0.102	0.0619 DM	0.0161	0.0168	0.00578	0.0154	0.0124	0.00705	0.0172	0.0137	0.0224	0.00830	0.0199	0.00570	0.0189	0.0138	0.0477							
Molybdenum	mg/L	0.073 ^B	0.073 ^D	0.00111	0.00149	0.00105 DM	0.000658	0.000792	0.000730	0.000759	0.00389	0.00213	0.000809	0.000500	0.000965	0.000678	0.000777	0.00186	0.000854	0.000542	0.00121							
Nickel	mg/L	0.150 ^{AB}	n/v	0.00106	0.00680	<0.0050 DM	0.00085	0.00069	0.00050	0.00146	0.00126	0.00066	0.00064	0.00075	0.00093	0.00137	0.00186	0.00093	0.00091	0.00102	0.00112							
Phosphorus	mg/L	n/v	n/v	0.041	0.128	<0.30 DM	0.124	0.059	<0.030	0.034	<0.030	0.036	<0.030	<0.030	0.139	<0.030	0.104	<0.030	0.068	<0.030	0.059							
Potassium	mg/L	n/v	n/v	11.9	12.0	13.0 DM	4.78	7.27	4.93	9.02	12.9	11.4	6.09	4.13	8.61	5.96	7.62	6.59	5.25	3.88	13.7							
Rubidium	mg/L	n/v	n/v	0.00531	0.0103	0.0071 DM	0.00253	0.00384	0.00269	0.00382	0.00465	0.00388	0.00270	0.00253	0.00281	0.00301	0.00330	0.00264	0.00285	0.00291	0.00422							
Selenium	mg/L	0.001 ^B	0.001 ^D	0.000173	0.000150	<0.000050 DM	0.000116	0.000196	0.000156	0.000211	0.000207	0.000112	0.000115	0.000244	0.000195	0.000259	0.000164	0.000143	0.000143	0.000240	0.000184							
Silicon	mg/L	n/v	n/v	0.67	11.0	9.8 DM	3.66	6.34	4.57	2.15	1.87	6.84	4.42	15.0	7.86	2.73	3.24	7.36	4.89	15.1	7.50							
Silver	mg/L	0.00025 ^B	0.0001 ^D	<0.000010	0.000020	<0.00010 DM	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000015	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010							
Sodium	mg/L	n/v	n/v	15.9	25.0	21.8 DM	4.29	9.95	13.2	19.7	38.1	18.9	9.10	10.4	16.5	15.1	28.8	20.1	8.26	9.36	17.2							
Strontium	mg/L	n/v	n/v	0.182	0.143	0.191 DM	0.0715	0.142	0.120	0.276	0.288	0.245	0.137	0.177	0.221	0.206	0.174	0.181	0.134	0.162	0.225							
Sulfur	mg/L	n/v	n/v	34.6	50.5	56.1 DM	7.51	18.1	21.8	73.5	109	123	21.4	15.2	34.2	50.4	66.8	64.3	15.5	10.5	51.5							
Tellurium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.0020 DM	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020							
Thallium	mg/L	0.0008 ^B	0.0008 ^D	<0.000010	0.000051	<0.00010 DM	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000017							
Thorium	mg/L	n/v	n/v	<0.00010	0.00070	<0.0010 DM	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010							
Tin	mg/L	n/v	n/v	<0.00010	<0.00010	<0.0010 DM	<0.00010	0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00022	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010							
Titanium	mg/L	n/v	n/v	0.00385	0.127	0.0393 DM	0.00888	0.00049	0.00111	0.00120	0.00093	0.00242	0.00138	0.00040	0.00198	0.00411	0.00260	0.00405	0.00448	0.00103	0.00182							
Tungsten	mg/L	n/v	n/v	<0.00010	<0.00010	<0.0010 DM	<0.00010	0.00021	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010							
Uranium	mg/L	0.033 ^A 0.015 ^B	0.033/0.015 ^D ₅₄	0.00272	0.00243	0.00390 DM	0.00142	0.00133	0.00170	0.00339	0.00198	0.00440	0.00252	0.000825	0.00211	0.00274	0.00195	0.00498	0.00344	0.00121	0.00337							
Vanadium	mg/L	n/v	n/v	0.00142	0.00764	<0.0050 DM	0.00139	0.00089	0.00075	0.00100	0.00073	0.00076	0.00060	<0.00050	0.00064	0.00213	0.00197	0.00131	0.00105	0.00069	0.00136							
Zinc	mg/L	n/v	n/v	0.0050	0.0145	<0.030 DM	0.0035	0.0051	<0.0030	0.0040	<0.0030	0.0056	<0.0030	<0.0030	0.0055	0.0043	<0.0030	<0.0030	<0.0030	0.0053	<0.0030							
Zirconium	mg/L	n/v	n/v	<0.00020	0.00243	<0.0020 DM	<0.00020	<0.00020	<0.00020	0.00020	0.00022	<0.00020	<0.00020	<0.00020	<0.00020	0.00037	0.00043	0.00027	0.00023	0.00024	0.00033							

See notes on last page

Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel

Sample Location Sample Date Sample ID Sampling Company Laboratory Laboratory Work Order Laboratory Sample ID Sample Type	Units	CWQG-FAL	MSOG-FAL	D9									D10					
				19-Jun-19 D9	19-Jun-19 QC-01	21-Aug-19 D9	21-Aug-19 QC-02	7-Oct-19 D9	7-Oct-19 QC-01	7-May-20 D9	8-Jul-20 D9	8-Oct-20 D9	20-Jun-19 D10	22-Aug-19 D10	9-Oct-19 D10	6-May-20 D10	7-Jul-20 D10	7-Oct-20 D10
				STANTEC ALS L2296166 L2296166-1	STANTEC ALS L2296166 L2296166-12 Field Duplicate	STANTEC ALS L2334482 L2334482-1	STANTEC ALS L2334482 L2334482-3 Field Duplicate	STANTEC ALS L2362912 L2362912-1	STANTEC ALS L2362912 L2362912-6 Field Duplicate	STANTEC ALS L2444978 L2444978-7	STANTEC ALS L2472215 L2472215-2	STANTEC ALS L2514453 L2514453-11	STANTEC ALS L2296166 L2296166-9	STANTEC ALS L2334482 L2334482-8	STANTEC ALS L2362912 L2362912-21	STANTEC ALS L2444978 L2444978-2	STANTEC ALS L2470843 L2470843-12	STANTEC ALS L2514453 L2514453-4
Field Parameters																		
Dissolved oxygen, Field	mg/L	>5.5/6/6.5/9.5 ^B _{VAR}	n/v	9.32	-	9.25	-	12.02	-	8.54	7.12	11.97	9.73	2.57 ^B	11.29	6.16	4.79 ^B	9.74
Electrical Conductivity, Field	µS/cm	n/v	n/v	973	-	960	-	851	-	479.8	979.0	935	907	5.061	1,793	312.2	467.4	636.6
Nitrite, Field	mg/L	n/v	n/v	0.01	-	0.01	-	0.00	-	-	-	-	0.04	0.06	0.02	-	-	-
Oxidation Reduction Potential, field	mV	n/v	n/v	202.8	-	161.7	-	212.9	-	175	65.3	45	-124.2	0.3	69	107.3	-28.4	82.6
pH, Field	S.U.	6.5-9.0 ^B	6.5-9.0 ^D	8.4	-	8.64	-	8.26	-	7.69	8.30	8.16	9.75 ^{BD}	8.2	7.95	7.5	8.24	8.02
Pressure	kPa	n/v	n/v	101.18	-	103.23	-	101.18	-	102.54	99.90	98.65	100.91	101.99	101.68	102.22	101.47	98.66
Temperature, Field	deg C	n/v	n/v	19.6	-	18.1	-	7.9	-	1.6	24.5	7.9	26.1	25.6	3.7	10.3	23.1	11.9
Total Dissolved Solids, Field	ppm	n/v	n/v	-	-	-	-	-	-	485	677	620	-	-	-	314	372	410
Turbidity, Field	NTU	n/v	n/v	4.30	-	11.42	-	4.40	-	0.48	6.24	17.30	4.40	9.02	32.97	1.30	0.86	13.03
General Chemistry																		
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	206	206	214	214	203	202	423	203	209	86.9	750	308	186	227	336
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	4.08	3.84	6.59	6.48	6.00	2.40	<0.60	5.64	6.12	67.2	27.0	<0.60	<0.60	27.8	15.6
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34
Alkalinity, Total	mg/L	n/v	n/v	175	176	186	186	176	170	346	176	182	183	660	252	153	232	302
Ammonia (as N)	mg/L	0.011	0.010	0.024	0.010	0.011	0.013	0.031	0.012	0.012	<0.010	0.044	0.257	0.64	<0.010	0.018	0.016	
Chloride	mg/L	640 ^A 120 ^B	n/v	182 ^B	177 ^B	194 ^B	195 ^B	190 ^B	193 ^B	103	170 ^B	200 ^B	10.9	144 ^B	18.0	5.44	5.68	7.89
Fluoride	mg/L	0.12 ^B	n/v	0.144 ^B	0.144 ^B	0.164 ^B	0.151 ^B	0.176 ^B	0.140 ^B	0.091	0.141 ^B	0.144 ^B	0.318 ^B	0.43 ^B	0.31 ^B	0.135 ^B	0.215 ^B	0.274 ^B
Hardness (as CaCO3)	mg/L	n/v	n/v	223	224	253	243	241	228	160	242	241	533	4,050	1,280	225	329	381
Nitrate (as N)	mg/L	124 ^A 3.0 ^B	13 ^D	<0.040 DM	<0.040 DM	<0.040 DM	<0.040 DM	<0.040 DM	<0.040 DM	0.045	0.673	<0.040 DM	<0.040 DM	<0.40 DM	<0.10 DM	<0.020	<0.020	<0.020
Nitrite (as N)	mg/L	0.06 ^B	0.06 ^D	<0.020 DM	<0.020 DM	<0.020 DM	<0.020 DM	<0.020 DM	<0.020 DM	<0.010	<0.020 DM	<0.020 DM	<0.020 DM	<0.20 DM	<0.050 DM	<0.010	<0.010	<0.010
Nitrogen (Total)	mg/L	n/v	n/v	1.03	1.05	1.13	1.14	-	-	<0.20	1.01	1.41	2.78	20.5	-	1.09	1.66	1.95
Phosphorus, Total	mg/L	n/v	0.025 ^C	0.0135	0.0174	0.0278 ^C	0.0263 ^C	0.0228	0.0217	0.0089	0.0248	0.0389 ^C	0.0279 ^C	0.109 ^C	0.121 ^C	0.0505 ^C	0.0258 ^C	0.0357 ^C
Phosphorus, Total (Dissolved)	mg/L	n/v	0.025 ^C	0.0059	0.0054	0.0055	0.0064	0.0057	0.0036	0.0038	0.0096	0.0077	0.0216	0.0833 ^C	0.0216	0.0207	0.0208	0.0138
Phosphorus, Total Particulate	mg/L	n/v	n/v	0.0076	0.0120	0.0223	0.0199	0.0171	0.0181	0.0051	0.0153	0.0312	0.0062	0.0258	0.0989	0.0299	0.0050	0.0219
Total Dissolved Solids	mg/L	n/v	n/v	606	586	616	603	606	598	334	536	601	770	5,950 XB	1,870	257	378	456
Sulfate	mg/L	n/v	n/v	72.7	71.0	75.9	76.2	75.1	74.8	47.9	65.1	84.7	365	3,970	1,020	48.7	81.6	85.4
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.03	1.05	1.13	1.14	1.12	1.00	<0.20	1.01	1.41	2.78	20.5	4.30	1.09	1.66	1.95
Total Suspended Solids	mg/L	n/v	n/v	7.1	5.1	25.3	25.1	9.3	9.3	<2.0	6.8	45.0	5.6	13.3	83.9	<2.0	19.1	38.7
Microbiological Parameters																		
Escherichia coli (E.Coli)	mpn/100mL	n/v	n/v	-	-	11 ZH	24 ZH	1 ZH	<1 ZH	<1	3	86	<1	19	1,200	2 SV	11	27
Total Coliforms	mpn/100mL	n/v	n/v	-	-	1,200 ZH	1,730 ZH	20 ZH	12 ZH	4	517	272	1	365	>2420	866 SV	830	921
BTEX and Petroleum Hydrocarbons																		
Benzene	mg/L	0.37 ^B	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Toluene	mg/L	0.002 ^B	n/v	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010
Ethylbenzene	mg/L	0.09 ^B	0.09 ^D	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Xylene, m & p-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040
Xylene, o-	mg/L	n/v	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050
Xylenes, Total	mg/L	n/v	n/v	<0.00064	<0.00064	<0.00064	<0.00064	<0.00050	<0.00050	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00050	<0.00064	<0.00064	<0.00064
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10
PHC F1 (C6-C10 range) minus BTEX	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.025	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10
PHC F2 (>C10-C16 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
PHC F3 (>C16-C34 range)	mg/L	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
PHC F4 (>C34-C50 range)	mg/L	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Total Hydrocarbons (C6-C50)	mg/L	n/v	n/v	<0.38	<0.38	<0.38	<0.38	<0.37	<0.37	<0.38	<0.38	<0.38	<0.38	<0.38	<0.37	<0.38	<0.38	<0.38
Chromatogram to baseline at C50	none	n/v	n/v	-	-	-	-	YES	YES	-	-	-	-	-	YES	-	-	-

See notes on last page

Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel

Sample Location Sample Date Sample ID Sampling Company Laboratory Laboratory Work Order Laboratory Sample ID Sample Type	Units	CWQG-FAL	MSOG-FAL	D9									D10					
				19-Jun-19 D9	19-Jun-19 QC-01	21-Aug-19 D9	21-Aug-19 QC-02	7-Oct-19 D9	7-Oct-19 QC-01	7-May-20 D9	8-Jul-20 D9	8-Oct-20 D9	20-Jun-19 D10	22-Aug-19 D10	9-Oct-19 D10	6-May-20 D10	7-Jul-20 D10	7-Oct-20 D10
				STANTEC ALS L2296166 L2296166-1	STANTEC ALS L2296166 L2296166-12 Field Duplicate	STANTEC ALS L2334482 L2334482-1	STANTEC ALS L2334482 L2334482-3 Field Duplicate	STANTEC ALS L2362912 L2362912-1	STANTEC ALS L2362912 L2362912-6 Field Duplicate	STANTEC ALS L2444978 L2444978-7	STANTEC ALS L2472215 L2472215-2	STANTEC ALS L2514453 L2514453-11	STANTEC ALS L2296166 L2296166-9	STANTEC ALS L2334482 L2334482-8	STANTEC ALS L2362912 L2362912-21	STANTEC ALS L2444978 L2444978-2	STANTEC ALS L2470843 L2470843-12	STANTEC ALS L2514453 L2514453-4
Metals, Dissolved																		
Aluminum	mg/L	n/v	0.005/0.1 ^{VAR1} ^D	0.0023	0.0032	0.0052	0.0058	0.0016	0.0019	0.0013	0.0072	0.0045	0.0044	0.0030	0.0018	0.0016	<0.0010	0.0028
Antimony	mg/L	n/v	n/v	0.00016	0.00015	0.00017	0.00017	0.00019	0.00021	<0.00010	0.00017	0.00025	0.00015	0.00063	0.00039	<0.00010	<0.00010	0.00010
Arsenic	mg/L	n/v	0.15/0.34 ³² ^D	0.00182	0.00183	0.00192	0.00188	0.00190	0.00190	0.00082	0.00212	0.00206	0.00195	0.0118	0.00179	0.00071	0.00127	0.00104
Barium	mg/L	n/v	n/v	0.0387	0.0402	0.0441	0.0399	0.0401	0.0438	0.0261	0.0379	0.0432	0.0175	0.330	0.0927	0.0247	0.0269	0.0363
Beryllium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	n/v	29/1.5 ³³ ^D	0.094	0.090	0.114	0.085	0.102	0.114	0.057	0.102	0.103	0.189	0.405	0.269	0.062	0.125	0.077
Cadmium	mg/L	n/v	0.00084/0.011 ³⁶ ^D	<0.000050	0.000055	0.000055	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000151	<0.000050	<0.000050	<0.000050	<0.000050
Calcium	mg/L	n/v	n/v	39.4	39.1	41.3	38.2	47.0	39.7	27.5	40.9	36.5	37.3	192	33.2	33.4	50.9	
Cesium	mg/L	n/v	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000013	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Chromium	mg/L	n/v	0.317/2.43 ³⁷ ^D	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00019	0.00099	0.00013	<0.00010	0.00014	0.00010
Cobalt	mg/L	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00025	0.00099	0.00025	<0.00010	0.00015	<0.00010
Copper	mg/L	n/v	0.040/0.07 ¹⁰ ^D	0.00054	0.00062	0.00023	0.00070	0.00043	0.00140	0.00187 RV	0.00035	0.00103	0.00104	0.00174	0.00089	0.00177 RV	0.00316 RV	0.00107
Iron	mg/L	n/v	0.3 ^D	<0.010	<0.010	0.038	<0.010	<0.010	0.026	0.047	<0.010	<0.010	<0.010	0.048	0.017	0.030	0.025	0.026
Lead	mg/L	n/v	0.016/0.416 ³⁹ ^D	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000053	0.000179	0.000070	<0.000050	0.000100	<0.000050
Lithium	mg/L	n/v	n/v	0.0294	0.0295	0.0351	0.0229	0.0314	0.0305	0.0169	0.0298	0.0317	0.0355	0.154	0.0624	0.0108	0.0175	0.0215
Magnesium	mg/L	n/v	n/v	30.2	30.7	36.3	35.9	29.9	31.2	22.2	34.0	36.4	107	758	194	34.4	59.5	61.7
Manganese	mg/L	3.6 ^{EQ3} 0.43 ^{EQ4} ^B	n/v	0.00033	0.00048	0.00115	0.00057	0.00026	0.00043	0.00426	0.00016	0.00049	0.00826	0.154	0.121	0.00309	0.0194	0.00384
Molybdenum	mg/L	n/v	0.073 ^D	0.00178	0.00187	0.00214	0.00215	0.00267	0.00230	0.00127	0.00269	0.00258	0.000555	0.00128	0.00715	0.000793	0.000663	0.000624
Nickel	mg/L	n/v	0.23/2.1 ¹¹ ^D	0.00061	0.00064	0.00059	0.00050	0.00051	0.00056	<0.00050	0.00054	0.00060	0.00134	0.00537	0.00122	0.00052	0.00083	0.00055
Phosphorus	mg/L	n/v	n/v	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.116	<0.030	<0.030	<0.030	<0.030
Potassium	mg/L	n/v	n/v	8.73	9.01	9.18	9.11	9.08	8.95	5.27	8.66	9.38	18.8	78.1	19.7	7.22	8.15	6.36
Rubidium	mg/L	n/v	n/v	0.00350	0.00361	0.00386	0.00398	0.00389	0.00392	0.00188	0.00353	0.00378	0.00634	0.0189	0.00654	0.00290	0.00365	0.00269
Selenium	mg/L	n/v	0.001 ^D	0.000070	0.000100	0.000077	0.000067	0.000076	0.000070	0.000053	0.000106	0.000120	0.000263	0.000920	0.000248	0.000109	0.000231	0.000177
Silicon	mg/L	n/v	n/v	2.97	3.02	4.12	3.96	3.68	3.91	2.31	3.20	3.75	7.20	33.8	3.18	2.94	7.57	0.446
Silver	mg/L	n/v	0.0001 ^D	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000030	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	n/v	n/v	123	126	128	123	127	127	69.8	123	133	25.7	192	34.5	6.08	11.5	12.9
Strontium	mg/L	n/v	n/v	0.234	0.232	0.262	0.268	0.302	0.263	0.146	0.250	0.255	0.177	1.63	0.667	0.0980	0.126	0.169
Sulfur	mg/L	n/v	n/v	28.0	29.0	30.2	28.9	26.4	26.4	18.8	24.1	27.5	148	1,270	377	21.4	29.2	29.9
Tellurium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	n/v	0.0008 ^D	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	n/v	n/v	<0.00010	0.00066	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00012	<0.00010	<0.00010	<0.00010
Titanium	mg/L	n/v	n/v	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00047	0.00207	0.00042	<0.00030	0.00040
Tungsten	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	n/v	0.033/0.015 ³⁴ ^D	0.00157	0.00158	0.00161	0.00172	0.00175	0.00180	0.00133	0.00138	0.00173	0.00162	0.00836	0.0186^D	0.00129	0.00108	0.00160
Vanadium	mg/L	n/v	n/v	0.00116	0.00116	0.00137	0.00135	0.00132	0.00130	0.00051	0.00117	0.00170	0.00172	0.00432	0.00164	0.00055	<0.00050	0.00074
Zinc	mg/L	0.037 ^{EQ1} 0.007 ^{EQ2} ^B	0.530 ¹² ^D	0.0037	0.0074^B	0.0048	<0.0010	<0.0010	<0.0010	0.0036	0.0030	0.0022	0.0042	0.0049	0.0026	0.0141 RV^B	0.0027	0.0024
Zirconium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00025	0.00127	0.00022	<0.00020	<0.00020	<0.00020

See notes on last page

Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel

Sample Location	Sample Date	Sample ID	Sampling Company	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	CWQG-FAL	MSOG-FAL	D9										D10												
											19-Jun-19 D9	19-Jun-19 QC-01	21-Aug-19 D9	21-Aug-19 QC-02	7-Oct-19 D9	7-Oct-19 QC-01	7-May-20 D9	8-Jul-20 D9	8-Oct-20 D9	20-Jun-19 D10	22-Aug-19 D10	9-Oct-19 D10	6-May-20 D10	7-Jul-20 D10	7-Oct-20 D10								
											STANTEC ALS L2296166 L2296166-1	STANTEC ALS L2296166 L2296166-12 Field Duplicate	STANTEC ALS L2334482 L2334482-1	STANTEC ALS L2334482 L2334482-3 Field Duplicate	STANTEC ALS L2362912 L2362912-1	STANTEC ALS L2362912 L2362912-6 Field Duplicate	STANTEC ALS L2444978 L2444978-7	STANTEC ALS L2472215 L2472215-2	STANTEC ALS L2514453 L2514453-11	STANTEC ALS L2296166 L2296166-9	STANTEC ALS L2334482 L2334482-8	STANTEC ALS L2362912 L2362912-21	STANTEC ALS L2444978 L2444978-2	STANTEC ALS L2470843 L2470843-12	STANTEC ALS L2514453 L2514453-4								
Metals, Total																																	
Aluminum	mg/L	0.005/0.1 ^B _{VAR1}	0.005/0.1 ^D _{VAR1}	0.0441	0.0481	0.108^{BD}	0.102^{BD}	0.0618	0.0773	0.0427	0.0444	0.331	0.0352^{BD}	0.0827	1.36^{BD}	0.0165	0.0067	0.374															
Antimony	mg/L	n/v	n/v	0.00015	0.00018	0.00021	0.00023	0.00014	0.00013	<0.00010	0.00019	0.00020	0.00015	0.00062	0.00042	<0.00010	<0.00010	0.00013	0.00018														
Arsenic	mg/L	0.005 ^B	n/v	0.00195	0.00202	0.00228	0.00237	0.00209	0.00207	0.00091	0.00205	0.00236	0.00205	0.0113^B	0.00220	0.00084	0.00133	0.00118															
Barium	mg/L	n/v	n/v	0.0401	0.0418	0.0420	0.0423	0.0408	0.0401	0.0233	0.0395	0.0468	0.0180	0.285	0.111	0.0223	0.0231	0.0376															
Beryllium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010															
Bismuth	mg/L	n/v	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050															
Boron	mg/L	29 ^A 1.5 ^B	29/1.5 ^D ₅₅	0.094	0.096	0.092	0.093	0.100	0.106	0.053	0.082	0.115	0.206	-	0.236	0.130	0.088																
Cadmium	mg/L	0.001 ^{STB} 9E-5 ^{LTG} _B	n/v	<0.000050	0.0000118	0.0000053	0.0000054	<0.000050	<0.000050	<0.000050	0.0000208	0.0000062	0.0000065	0.0000181	0.0000325	<0.000050	<0.000050	0.000177															
Calcium	mg/L	n/v	n/v	41.2	41.5	38.8	37.8	40.5	38.5	27.9	40.0	40.5	38.8	374	176	34.8	50.8																
Cesium	mg/L	n/v	n/v	<0.000010	<0.000010	0.000017	0.000017	<0.000010	<0.000010	<0.000010	0.000011	0.000038	<0.000010	0.000015	0.000165	<0.000010	0.000053																
Chromium	mg/L	n/v	n/v	0.00035	0.00050	0.00034	0.00038	0.00015	0.00022	0.00012	0.00016	0.00076	0.00035	0.00131	0.00301	0.00011	0.00086																
Cobalt	mg/L	n/v	n/v	<0.00010	<0.00010	0.00013	0.00013	<0.00010	0.00010	<0.00010	<0.00010	0.00025	0.00028	0.00106	0.00103	<0.00010	0.00017	0.00030															
Copper	mg/L	0.004 ^{AB}	n/v	0.00060	0.00093	0.00051	0.00051	<0.00050	<0.00050	<0.00050	0.00053	0.00082	0.00106	0.00183	0.00283	0.00056	0.00089																
Iron	mg/L	0.3 ^B	0.3 ^D	0.038	0.042	0.119	0.114	0.058	0.063	0.054	0.040	0.370^{BD}	0.046	0.117	1.75^{BD}	0.055	0.030	0.440^{BD}															
Lead	mg/L	0.007 [#]	n/v	0.000113	0.000156	0.000232	0.000226	0.000174	0.000184	0.00067	0.000116	0.000440	0.000076	0.000212	0.00101	<0.000050	<0.000050	0.000263															
Lithium	mg/L	n/v	n/v	0.0310	0.0310	0.0312	0.0306	0.0312	0.0296	0.0181	0.0283	0.0352	0.0375	0.231	0.0665	0.0113	0.0185	0.0247															
Magnesium	mg/L	n/v	n/v	32.3	33.4	35.7	35.9	30.3	31.1	22.0	29.4	39.8	112	-	227	34.4	62.8	69.5															
Manganese	mg/L	n/v	n/v	0.00617	0.00663	0.0124	0.0123	0.00876	0.00859	0.00525	0.00957	0.0151	0.0116	0.158	0.198	0.0182	0.0318	0.0241															
Molybdenum	mg/L	0.073 ^B	0.073 ^D	0.00203	0.00213	0.00220	0.0111	0.00227	0.00225	0.00133	0.00183	0.00258	0.000592	0.00141	0.00677	0.000872	0.000670																
Nickel	mg/L	0.150 ^{AB}	n/v	0.00095	0.00126	0.00087	0.00093	0.00070	0.00069	0.00054	0.00058	0.00121	0.00145	0.00576	0.00335	0.00059	0.00087	0.00108															
Phosphorus	mg/L	n/v	n/v	<0.030	<0.030	<0.030	0.035	<0.030	<0.030	<0.030	<0.030	0.040	<0.030	0.140	0.108	0.083	0.035	0.044															
Potassium	mg/L	n/v	n/v	8.12	8.38	9.04	9.37	8.37	8.66	5.20	7.78	9.77	16.6	73.9	19.7	7.27	8.39	6.42															
Rubidium	mg/L	n/v	n/v	0.00353	0.00372	0.00408	0.00417	0.00433	0.00400	0.00199	0.00375	0.00469	0.00589	0.0180	0.0101	0.00293	0.00373	0.00356															
Selenium	mg/L	0.001 ^B	0.001 ^D	0.000103	0.000115	0.000073	0.000073	0.000058	0.000101	<0.000050	0.000191	0.000082	0.000288	0.000879	0.000393	0.000123	0.000176																
Silicon	mg/L	n/v	n/v	2.90	2.96	3.72	3.65	4.34	4.43	2.43	2.84	4.92	6.85	33.6	5.83	8.02	1.32																
Silver	mg/L	0.00025 ^B	0.0001 ^D	<0.000010	0.000011	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000011	<0.000010	<0.000010	0.000030	0.000012	<0.000010	<0.000010																
Sodium	mg/L	n/v	n/v	125	127	131	131	127	127	74.2	105	135	25.6	192	36.9	6.45	12.1	12.8															
Strontium	mg/L	n/v	n/v	0.262	0.265	0.267	0.266	0.255	0.265	0.155	0.245	0.268	0.195	-	0.669	0.104	0.196																
Sulfur	mg/L	n/v	n/v	26.7	27.4	28.2	27.6	31.0	29.2	18.7	21.5	31.7	140	-	404	20.1	30.9																
Tellurium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00030	<0.00020	<0.00020	<0.00020	<0.00020															
Thallium	mg/L	0.0008 ^B	0.0008 ^D	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000023	<0.000010	0.000012																
Thorium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011															
Tin	mg/L	n/v	n/v	0.00021	0.00121	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010															
Titanium	mg/L	n/v	n/v	0.00154	0.00172	0.00489	0.00483	0.00259	0.00283	0.00164	0.00165	0.0152	0.00180	0.00643	0.0615	0.00080	0.00055	0.0153															
Tungsten	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010															
Uranium	mg/L	0.033 ^A 0.015 ^B	0.033/0.015 ^D ₄	0.00167	0.00169	0.00176	0.00179	0.00153	0.00155	0.00132	0.00137	0.00197	0.00168	0.00869	0.0163^{BD}	0.00129	0.00169																
Vanadium	mg/L	n/v	n/v	0.00152	0.00160	0.00186	0.00185	0.00168	0.00177	0.00081	0.00120	0.00259	0.00221	0.00452	0.00452	0.00078																	

Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel

Sample Location	Sample Date	Sample ID	Sampling Company	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	CWQG-FAL	MSOG-FAL	D11				D12			
											9-Oct-19 D11 STANTEC ALS L2362912 L2362912-20	4-May-20 D11 STANTEC ALS L2443834 L2443834-5	6-Jul-20 D11 STANTEC ALS L2470843 L2470843-6	6-Oct-20 D11 STANTEC ALS L2512953 L2512953-8	19-Jun-19 D12 STANTEC ALS L2296166 L2296166-4	22-Aug-19 D12 STANTEC ALS L2334482 L2334482-9	8-Oct-19 D12 STANTEC ALS L2362912 L2362912-8	7-May-20 D12 STANTEC ALS L2444978 L2444978-5
Field Parameters																		
Dissolved oxygen, Field	mg/L	>5.5/6/6.5/9.5 ^B _{VAR}	n/v	NM	9.43	0.11 ^B	4.33 ^B	4.81 ^B	8.34	6.24	7.27	0.88 ^B	11.17					
Electrical Conductivity, Field	µS/cm	n/v	n/v	NM	272.3	1,017.0	688.3	1,005	1,028	749.3	427.7	551.0	821					
Nitrite, Field	mg/L	n/v	n/v	NM	-	-	-	0.03	0.03	0.03	-	-	-					
Oxidation Reduction Potential, field	mV	n/v	n/v	NM	157.0	-44.4	-27.8	148.1	-115	6.4	146.5	32.9	-34.5					
pH, Field	S.U.	6.5-9.0 ^B	6.5-9.0 ^D	NM	7.81	7.14	7.17	7.81	8.57	7.73	7.49	7.15	7.4					
Pressure	kPa	n/v	n/v	NM	98.95	101.35	97.18	101.03	101.9	99.93	102.47	101.31	97.34					
Temperature, Field	deg C	n/v	n/v	NM	9.3	20.1	10.5	19.2	19.2	7.5	19.2	24.2	12.8					
Total Dissolved Solids, Field	ppm	n/v	n/v	-	324	833	390	-	-	-	425	463	450					
Turbidity, Field	NTU	n/v	n/v	NM	1.53	1.45	3.98	0.59	1.69	2.66	0.03	0.00	1.65					
General Chemistry																		
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	249	202	471	336	550	529	279	321	400	406					
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	<0.60	2.16	<0.60	18.7	<0.60	39.5	<0.60	<0.60	<0.60	26.8					
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34					
Alkalinity, Total	mg/L	n/v	n/v	204	169	386	307	451	499	229	263	328	377					
Ammonia (as N)	mg/L	n/v	n/v	0.058	0.018	0.203	0.028	0.036	0.071	0.094	0.013	0.027	0.022					
Chloride	mg/L	640 ^A 120 ^B	n/v	8.2	5.79	5.9	8.39	15.7	20.1	19.7	9.54	9.31	19.3					
Fluoride	mg/L	0.12 ^B	n/v	0.24 ^B	0.140 ^B	0.254 ^B	0.265 ^B	0.353 ^B	0.348 ^B	0.208 ^B	0.206 ^B	0.294 ^B	0.300 ^B					
Hardness (as CaCO3)	mg/L	n/v	n/v	897	226	726	388	598	698	519	338	374	447					
Nitrate (as N)	mg/L	124 ^A 3.0 ^B	13 ^D	<0.10 DM	0.021	<0.040 DM	<0.020	<0.040 DM	<0.040 DM	<0.040 DM	<0.020	0.039	<0.020					
Nitrite (as N)	mg/L	0.06 ^B	0.06 ^D	<0.050 DM	<0.010	<0.020 DM	<0.010	<0.020 DM	<0.020 DM	<0.020 DM	<0.010	<0.010	<0.010					
Nitrogen (Total)	mg/L	n/v	n/v	-	1.13	6.53	1.57	2.28	3.26	-	0.47	2.04	1.56					
Phosphorus, Total	mg/L	n/v	0.025 ^C	0.0577 ^C	0.0436 ^C	0.158 ^C	0.0208	0.0243	0.0284 ^C	0.0115	0.0181	0.0650 ^C	0.0276 ^C					
Phosphorus, Total (Dissolved)	mg/L	n/v	0.025 ^C	0.0140	0.0205	0.125 ^C	0.0159	0.0141	0.0172	0.0077	0.0117	0.0217	0.0089					
Phosphorus, Total Particulate	mg/L	n/v	n/v	0.0438	0.0230	0.0336	0.0049	0.0101	0.0113	<0.0042	0.0064	0.0432	0.0187					
Total Dissolved Solids	mg/L	n/v	n/v	1,270	269	1,030	425	747	850	694	364	428	552					
Sulfate	mg/L	n/v	n/v	660	56.9	321	91.5	176	234	293	48.8	40.3	82.1					
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	1.48	1.13	6.53	1.57	2.28	3.26	1.26	0.47	2.04	1.56					
Total Suspended Solids	mg/L	n/v	n/v	2.8	<2.0	3.0	4.3	<2.0	4.7	<2.0	<2.0	10.7	2.3					
Microbiological Parameters																		
Escherichia coli (E.Coli)	mpn/100mL	n/v	n/v	9	<1	<10	58	-	9	276 ZH	5	435	4					
Total Coliforms	mpn/100mL	n/v	n/v	>2420	66	930	921	-	179	>2420 ZH	1,410	>2420	1,120					
BTEX and Petroleum Hydrocarbons																		
Benzene	mg/L	0.37 ^B	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050					
Toluene	mg/L	0.002 ^B	n/v	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010					
Ethylbenzene	mg/L	0.09 ^B	0.09 ^D	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050					
Xylene, m & p-	mg/L	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040					
Xylene, o-	mg/L	n/v	n/v	<0.00030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050					
Xylenes, Total	mg/L	n/v	n/v	<0.00050	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00050	<0.00064	<0.00064	<0.00064					
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10					
PHC F1 (C6-C10 range) minus BTEX	mg/L	n/v	n/v	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10					
PHC F2 (>C10-C16 range)	mg/L	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10					
PHC F3 (>C16-C34 range)	mg/L	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25					
PHC F4 (>C34-C50 range)	mg/L	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25					
Total Hydrocarbons (C6-C50)	mg/L	n/v	n/v	<0.37	<0.38	<0.38	<0.38	<0.38	<0.38	<0.37	<0.38	<0.38	<0.38					
Chromatogram to baseline at C50	none	n/v	n/v	YES	-	-	-	-	-	YES	-	-	-					

See notes on last page

Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel

Sample Location	Sample Date	Sample ID	Sampling Company	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	CWQG-FAL	MSOG-FAL	D11				D12							
											9-Oct-19 D11	4-May-20 D11	6-Jul-20 D11	6-Oct-20 D11	19-Jun-19 D12	22-Aug-19 D12	8-Oct-19 D12	7-May-20 D12	6-Jul-20 D12	5-Oct-20 D12		
											STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	STANTEC ALS	
											L2362912 L2362912-20	L2443834 L2443834-5	L2470843 L2470843-6	L2512953 L2512953-8	L2296166 L2296166-4	L2334482 L2334482-9	L2362912 L2362912-8	L2444978 L2444978-5	L2470843 L2470843-9	L2512953 L2512953-6		
Metals, Total																						
Aluminum	mg/L	0.005/0.1 ^B _{VAR1}	0.005/0.1 ^D _{VAR1}	0.155 ^{BD}	0.0059	0.0385	0.0519	0.0043	0.0111	0.0078	0.0045	0.0506	0.0171									
Antimony	mg/L	n/v	n/v	0.00025	0.00010	0.00048	<0.00010	0.00011	0.00015	<0.00010	<0.00010	0.00012	<0.00010									
Arsenic	mg/L	0.005 ^B	n/v	0.00101	0.00079	0.00385	0.00102	0.00161	0.00358	0.00122	0.00076	0.00133	0.00122									
Barium	mg/L	n/v	n/v	0.0741	0.0200	0.0648	0.0305	0.0529	0.0353	0.0328	0.0282	0.0505	0.0436									
Beryllium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010									
Bismuth	mg/L	n/v	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050									
Boron	mg/L	29 ^A 1.5 ^B	29/1.5 ^D	0.125	0.057	0.434	0.096	0.120	0.142	0.143	0.066	0.152	0.113									
Cadmium	mg/L	0.001 ^{STB} 9E-5 ^{LTG}	n/v	0.0000069	<0.0000050	0.0000070	<0.0000050	0.0000059	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050									
Calcium	mg/L	n/v	n/v	155	35.4	98.8	53.6	76.8	57.3	69.0	49.5	55.1	66.6									
Cesium	mg/L	n/v	n/v	0.000014	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010									
Chromium	mg/L	n/v	n/v	0.00050	0.00012	0.00041	0.00017	0.00022	0.00034	0.00016	<0.00010	0.00021	0.00012									
Cobalt	mg/L	n/v	n/v	0.00021	<0.00010	0.00083	0.00010	0.00014	0.00017	<0.00010	<0.00010	0.00013	<0.00010									
Copper	mg/L	0.004 ^{AB}	n/v	0.00258	<0.00050	0.00114	0.00177	<0.00050	0.00102	0.00057	<0.00050	0.00058	0.00112									
Iron	mg/L	0.3 ^B	0.3 ^D	0.175	0.045	0.543 ^{BD}	0.072	0.048	0.045	0.024	0.023	0.118	0.050									
Lead	mg/L	0.007 ^F	n/v	0.000079	<0.000050	0.000162	0.000103	<0.000050	<0.000050	<0.000050	<0.000050	0.000073	0.000109									
Lithium	mg/L	n/v	n/v	0.0415	0.0115	0.0460	0.0252	0.0319	0.0404	0.0250	0.0147	0.0178	0.0260									
Magnesium	mg/L	n/v	n/v	139	35.3	116	65.7	103	138	79.7	53.6	60.1	66.9									
Manganese	mg/L	n/v	n/v	0.0345	0.00630	1.53	0.0156	0.0445	0.0137	0.00655	0.00630	0.144	0.0176									
Molybdenum	mg/L	0.073 ^B	0.073 ^D	0.00599	0.000890	0.00511	0.000589	0.000542	0.000443	0.00170	0.000814	0.00158	0.000375									
Nickel	mg/L	0.150 ^{AB}	n/v	0.00152	0.00060	0.00206	0.00060	0.00070	0.00115	0.00057	0.00057	0.00086	<0.00050									
Phosphorus	mg/L	n/v	n/v	0.039	0.042	0.171	0.031	<0.030	0.038	<0.030	<0.030	0.059	<0.030									
Potassium	mg/L	n/v	n/v	15.6	7.13	21.8	6.91	8.35	9.90	10.7	6.20	4.35	10.7									
Rubidium	mg/L	n/v	n/v	0.00407	0.00288	0.00549	0.00296	0.00382	0.00406	0.00342	0.00259	0.00254	0.00419									
Selenium	mg/L	0.001 ^B	0.001 ^D	0.000184	0.000164	0.000457	0.000142	0.000199	0.000248	0.000088	0.000125	0.000255	0.000149									
Silicon	mg/L	n/v	n/v	6.22	2.97	30.3	1.85	6.30	1.59	6.75	4.38	15.6	14.0									
Silver	mg/L	0.00025 ^B	0.0001 ^D	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010									
Sodium	mg/L	n/v	n/v	20.4	6.24	25.3	13.1	19.4	27.1	16.4	9.22	10.6	14.6									
Strontium	mg/L	n/v	n/v	0.426	0.101	0.552	0.179	0.267	0.289	0.236	0.137	0.180	0.206									
Sulfur	mg/L	n/v	n/v	249	21.4	122	36.3	63.9	83.0	108	21.4	16.2	31.1									
Tellurium	mg/L	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020									
Thallium	mg/L	0.0008 ^B	0.0008 ^D	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010									
Thorium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010									
Tin	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010									
Titanium	mg/L	n/v	n/v	0.00553	0.00038	0.00303	0.00178	<0.00030	0.00058	0.00032	<0.00030	0.00223	0.00070									
Tungsten	mg/L	n/v	n/v	<0.00010	<0.00010	0.00026	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010									
Uranium	mg/L	0.033 ^A 0.015 ^B	0.033/0.015 ^D	0.0117	0.00148	0.00518	0.00154	0.00291	0.00164	0.00339	0.00252	0.000864	0.00116									
Vanadium	mg/L	n/v	n/v	0.00111	0.00066	0.00149	0.00069	0.00077	0.00075	0.00063	0.00051	<0.00050	<0.00050									
Zinc	mg/L	n/v	n/v	0.0050	<0.0030	0.0053	0.0036	0.0039	<0.0030	<0.0030	<0.0030	0.0040	0.0054									
Zirconium	mg/L	n/v	n/v	0.00027	<0.00020	0.00049	<0.00020	<0.00020	0.00022	<0.00020	<0.00020	<0.00020	<0.00020									

See notes on last page

**Table B-1
Surface Water Analytical Results Lake
Manitoba Outlet Channel**

Notes:

CWQG-FAL	Canadian Council of Ministers of the Environment
A	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Short Term
B	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Long Term
MSOG-FAL	Manitoba Provincial Water Quality Guidelines
C	Tier I - Water Quality Guidelines - Freshwater Aquatic Life
D	Tier III - Water Quality Guidelines - Freshwater Aquatic Life
6.5 ^A	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
EO1	The short-term benchmark is for dissolved zinc and is calculated using the following equation: Benchmark = $\exp(0.833[\ln(\text{hardness mg-L}^{-1})] + 0.240[\ln(\text{DOC mg-L}^{-1})] + 0.526)$. The value in the table is for surface water of 50 mg CaCO ₃ -L ⁻¹ hardness and 0.5 mg-L ⁻¹ dissolved organic carbon (DOC). The benchmark equation is valid between hardness 13.8 and 250.5 mg CaCO ₃ -L ⁻¹ and DOC 0.3 and 17.3 mg-L ⁻¹ .
EO2	The long-term CWQG is for dissolved zinc and is calculated using the following equation: CWQG = $\exp(0.947[\ln(\text{hardness mg-L}^{-1})] - 0.815[\text{pH}] + 0.398[\ln(\text{DOC mg-L}^{-1})] + 4.625)$. The value in the table is for surface water of 50 mg CaCO ₃ -L ⁻¹ hardness, pH of 7.5 and 0.5 mg-L ⁻¹ DOC. The CWQG equation is valid between hardness 23.4 and 399 mg CaCO ₃ -L ⁻¹ , pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg-L ⁻¹ .
EO3	The short-term benchmark is calculated using the benchmark calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese or the following equation: Benchmark = $\exp(0.878[\ln(\text{hardness})] + 4.76)$ where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO ₃ equivalents in mg/L. The value in the table is for surface water of 50 mg/L hardness and pH of 7.5. The CWQG table is valid between hardness 25 and 670 mg/L and pH 5.8 and 8.4.
EO4	The long-term CWQG is found using the look-up table (see Table 5) or the CWQG and benchmark calculator in Appendix B of CCME (2019). The value in the table is for surface water of 50 mg/L hardness and pH of 7.5. The CWQG table is valid between hardness 25 and 670 mg/L and pH 5.8 and 8.4.
LTG	The CWQG for cadmium (i.e. long-term guideline) of 0.09 µg-L ⁻¹ is for waters of 50 mg CaCO ₃ -L ⁻¹ hardness. The CWQG for cadmium is related to water hardness. At hardness ≤ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation (CWQG (µg/L) = $10\{0.83(\log[\text{hardness}]) - 2.46\}$); At hardness > 280 mg/L, the CWQG is 0.37 µg/L.
STB	The short-term benchmark concentration of 1.0 µg-L ⁻¹ is for waters of 50 mg CaCO ₃ -L ⁻¹ hardness. The short-term benchmark for cadmium is related to water hardness (as CaCO ₃): When the water hardness is 0 to < 5.3 mg/L, the short-term benchmark is 0.11 µg/L, At hardness ≥ 5.3 to ≤ 360 mg/L, the short-term benchmark is calculated using this equation: (Short-term benchmark (µg/L) = $10\{1.016(\log[\text{hardness}]) - 1.71\}$); At hardness > 360 mg/L, the short-term benchmark is 7.7 µg/L.
*	The CWQG for copper is related to water hardness. When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L. At hardness ≥ 82 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = $0.2 * e\{0.8545[\ln(\text{hardness})]-1.465\}$. At hardness >180 mg/L, the CWQG is 4 µg/L. If the hardness is unknown, the CWQG is 2 µg/L.
#	The CWQG for lead is related to water hardness. When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L. At hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (µg/L)= $e\{1.273[\ln(\text{hardness})]-4.705\}$. At hardness >180 mg/L, the CWQG is 7 µg/L. If the hardness is unknown, the CWQG is 1 µg/L.
**	The CWQG for nickel is related to water hardness. When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L. At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = $e\{0.76[\ln(\text{hardness})]+1.06\}$. At hardness >180 mg/L, the CWQG is 150 µg/L. If the hardness is unknown, the CWQG is 25 µg/L.
s3	29 mg/L short term exposure; 1.5 mg/L long term exposure.
s4	0.033 mg/L short term exposure; 0.15 mg/L long term exposure.
s7	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Chromium, 0.00084 mg/L is for 4 day averaging duration and 2.43 mg/L is for 1 hour averaging duration.
s8	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Cadmium, 0.00084 mg/L is for 4 day averaging duration and 0.011 mg/L is for 1 hour averaging duration.
s9	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Lead, 0.016 mg/L is for 4 day averaging duration and 0.416 mg/L is for 1 hour averaging duration.
s10	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Copper, 0.040 mg/L is for 4 day averaging duration and 0.07 mg/L is for 1 hour averaging duration.
s11	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Nickel, 0.23 mg/L is for 4 day averaging duration and 2.1 mg/L is for 1 hour averaging duration.
s12	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Zinc, 0.530 mg/L is for both the 4 day averaging duration and the 1 hour averaging duration.
SN	see Narrative
TBC1	Value is minimum value available. Sample-specific value to be calculated (equation).
TBC2	To be calculated (equation), then the present guideline values (mg/L NH3) can be converted to mg/L total ammonia-N by multiplying the corresponding guideline value by 0.8224.
VAR	Lowest acceptable dissolved oxygen concentration: for warm water biota: early life stages = 6000 µg/L; for warm water biota: other life stages = 5500 µg/L; for cold water biota: early life stages = 9500 µg/L; for cold water biota: other life stages = 6500 µg/L.
VAR1	Variable, 5 µg/L if pH < 6.5 and 100 µg/L if pH > 6.5
DM	Detection limit adjusted due to sample matrix effects.
NM	Result is non calculable due to matrix interference.
OWP	Organic water sample contained visible sediment (must be included as part of analysis). Measured concentrations of organic substances in water can be biased high due to presence of sediment.
RV	Reported result verified by repeat analysis.
SV	Sample was analyzed past the hold time.
XB	Re-analysis was completed past recommended hold time.
ZH	Sample analysed past recommended hold time.most probable number.

Table B-2: Surface Water Quality Statistic Data for Lake Manitoba from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Lake Manitoba (D1)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Physico-chemical Parameters Measured in the fields												
Electrical Conductivity, Field	µS/cm	0.01	n/v	n/v	n/v	582.7	1008	895.8	150.6	6	0	0
Nitrite, Field	mg/L	0.0001	n/v	n/v	n/v	0.0001	0.0300	0.0167	0.0125	3	1	33
pH, Field	S.U.	0.01	6.5-9.0 ^B	6.5-9.0 ^D	7.0-10.5 ^E	8.14	8.63	8.42	0.15	6	0	0
Temperature, Field	deg C	0.01	n/v	n/v	≤15 ^E	3.90	25.00	13.60	7.65	6	3	50
Total Dissolved Solids, Field	ppm	1	n/v	n/v	≤500 ^E	582	702	655	52	3	3	100
Turbidity, Field	NTU	0.01	n/v	n/v	≤0.3/1.0/0.1 ^H	2.2	225	43	81	6	6	100
Physico-chemical Parameters Measured in the laboratory												
Alkalinity, Bicarbonate (as CaCO ₃)	mg/L	1.2	n/v	n/v	n/v	161	210	196	16	6	0	0
Alkalinity, Carbonate (as CaCO ₃)	mg/L	0.60	n/v	n/v	n/v	2.2	7.2	4.5	1.9	6	0	0
Alkalinity, Hydroxide (as CaCO ₃)	mg/L	0.34	n/v	n/v	n/v	0.17	0.17	0.17	0	6	0	0
Alkalinity, Total	mg/L	1.0	n/v	n/v	n/v	135	182	168	15	6	0	0
Ammonia (as N)	mg/L	0.010	Equation*/ 0.020-0.641	Equation**/ 0.230- 5.60	n/v	0.005	0.067	0.020	0.02	6	2	33
Chloride	mg/L	0.50	640 ^A 120 ^B	n/v	≤250 ^E	134	206	181	24	6	6	100
Fluoride	mg/L	0.020	0.12 ^B	n/v	1.5 ^F	0.11	0.16	0.14	0.01	6	5	83
Hardness (as CaCO ₃)	mg/L	0.20	n/v	n/v	n/v	189	249	225	18	6	0	0
Nitrate (as N)	mg/L	0.020	124 ^A 3.0 ^B	13 ^D	10 ^F	0.010	0.020	0.018	0.004	6	0	0
Nitrite (as N)	mg/L	0.010	0.06 ^B	0.06 ^D	1 ^F	0.005	0.010	0.009	0.002	6	0	0
Nitrogen (Total)	mg/L	0.20	n/v	n/v	n/v	0.84	1.2	1.0	0.11	5	0	0
Phosphorus, Total	mg/L	0.0010	n/v	0.025 ^C	n/v	0.015	0.024	0.020	0.004	6	0	0
Phosphorus, Total (Dissolved)	mg/L	0.0010	n/v	0.025 ^C	n/v	0.0042	0.0091	0.0067	0.0016	6	0	0
Phosphorus, Total Particulate	mg/L	0.0028	n/v	n/v	n/v	0.0075	0.016	0.013	0.003	6	0	0
Sulfate	mg/L	0.30	n/v	n/v	≤500 ^E	53	97	76	14	6	0	0
Total Dissolved Solids	mg/L	20	n/v	n/v	≤500 ^E	435	631	572	66	6	5	83
Total Kjeldahl Nitrogen	mg/L	0.20	n/v	n/v	n/v	0.84	1.2	1.0	0.1	6	0	0
Total Suspended Solids	mg/L	1.0	SN ^B	n/v	n/v	1	11	7	3	6	0	0
Microbiological Parameters												
Escherichia coli (E.Coli)	mpn/100mL	1	n/v	n/v	0 ^G	0	55	19	25	6	3	50
Total Coliforms	mpn/100mL	1	n/v	n/v	0 ^G	0	2420	566	851	6	5	83
BTEX and Petroleum Hydrocarbons												
Benzene	mg/L	0.00050	0.37 ^B	n/v	0.005 ^F	0.00025	0.00025	0.00025	0	6	0	0
Toluene	mg/L	0.0005	0.002 ^B	n/v	0.024 ^E 0.06 ^F	0.00025	0.0016	0.00064	0.0004	6	0	0
Ethylbenzene	mg/L	0.00050	0.09 ^B	0.09 ^D	0.0016 ^E 0.14 ^F	0.00025	0.00025	0.00025	0	6	0	0
Xylene, m & p-	mg/L	0.00040	n/v	n/v	n/v	0.00020	0.00020	0.00020	0	6	0	0
Xylene, o-	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.00025	0.00023	0.00004	6	0	0
Xylenes, Total	mg/L	0.00050	n/v	n/v	0.02 ^E 0.09 ^F	0.00025	0.00032	0.00031	0.00003	6	0	0
PHC F1 (C6-C10 range)	mg/L	0.10	n/v	n/v	n/v	0.013	0.050	0.044	0.01	6	0	0
PHC F1 (C6-C10 range) minus BTEX	mg/L	0.10	n/v	n/v	n/v	0.013	0.050	0.044	0.01	6	0	0
PHC F2 (>C10-C16 range)	mg/L	0.10	n/v	n/v	n/v	0.050	0.050	0.050	7.E-18	6	0	0
PHC F3 (>C16-C34 range)	mg/L	0.25	n/v	n/v	n/v	0.13	0.13	0.13	0	6	0	0
PHC F4 (>C34-C50 range)	mg/L	0.25	n/v	n/v	n/v	0.13	0.13	0.13	0	6	0	0
Total Hydrocarbons (C6-C50)	mg/L	0.38	n/v	n/v	n/v	0.19	0.19	0.19	0.00186	6	0	0
Metals, Dissolved												
Aluminum	mg/L	0.0010	n/v	0.1 ^D	0.050	0.0010	0.012	0.0037	0.004	6	0	0
Antimony	mg/L	0.00010	n/v	n/v	0.006 ^F	0.00010	0.00018	0.00015	0.00003	6	0	0
Arsenic	mg/L	0.00010	n/v	0.15/0.34 ^D	0.010 ^F	0.0012	0.0022	0.0018	0.0003	6	0	0
Barium	mg/L	0.00010	n/v	n/v	2.0 ^F	0.031	0.044	0.040	0.005	6	0	0
Beryllium	mg/L	0.00010	n/v	n/v	n/v	0.000050	0.000050	0.000050	0	6	0	0
Bismuth	mg/L	0.000050	n/v	n/v	n/v	0.000025	0.000025	0.000025	0	6	0	0
Boron	mg/L	0.010	n/v	29/1.5 ^D	5 ^F	0.072	0.12	0.094	0.02	6	0	0
Cadmium	mg/L	0.000050	n/v	0.0000050 ^D	0.007 ^F	2.5E-06	0.000052	0.000030	0.000001	6	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	30	40	37	3	6	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000005	0.000005	0	6	0	0
Chromium	mg/L	0.00010	n/v	0.109/0.837 ^D	0.05 ^F	0.00005	0.00019	0.000073	0.00005	6	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Copper	mg/L	0.00020	n/v	0.0134/0.209 ^D	≤1.0 ^E 2 ^F	0.00024	0.0033	0.0015	0.001	6	0	0
Iron	mg/L	0.010	n/v	0.3 ^D	≤0.3 ^E	0.0050	0.012	0.0062	0.003	6	0	0
Lead	mg/L	0.000050	n/v	0.00418/0.107 ^D	0.005 ^F	0.000025	0.000085	0.000035	0.00002	6	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.020	0.036	0.028	0.006	6	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	28	38	32	3	6	0	0
Manganese	mg/L	0.00010	10 ^{EQ3} 0.75 ^B	n/v	≤0.02 ^E 0.12 ^F	0.00024	0.0014	0.00055	0.0004	6	0	0
Molybdenum	mg/L	0.000050	n/v	0.073 ^D	n/v	0.0015	0.0032	0.0021	0.0005	6	0	0
Nickel	mg/L	0.00050	n/v	0.0774/0.697 ^D	n/v	0.00025	0.00066	0.00047	0.0002	6	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.015	0.015	0	6	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	7.1	10	9.0	1	6	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0029	0.0039	0.0036	0.0004	6	0	0
Selenium	mg/L	0.000050	n/v	0.001 ^D	0.05 ^F	0.000060	0.00010	0.000074	0.00002	6	0	0
Silicon	mg/L	0.050	n/v	n/v	n/v	2.7	4.8	3.9	0.7	6	0	0
Silver	mg/L	0.000010	n/v	0.0001 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	91	135	123	15	6	0	0
Strontium	mg/L	0.00010	n/v	n/v	7.0 ^F	0.19	0.26	0.24	0.026	6	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	20	34	28	4	6	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	6	0	0
Thallium	mg/L	0.000010	n/v	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.00015	0.00015	0	6	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Uranium	mg/L	0.000010	n/v	0.033/0.015 ^D	0.02 ^F	0.0013	0.0017	0.0015	0.0001	6	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00069	0.0014	0.0012	0.0002	6	0	0
Zinc	mg/L	0.0010	0.087 ^{EQ1} 0.0022 ^{EQ2}	0.176/0.175 ^D	≤5.0 ^E	0.0011	0.0046	0.0033	0.001	6	5	83
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	6	0	0
Metals, Total												
Aluminum	mg/L	0.0030	0.1 ^D	0.1 ^D	0.050	0.024	0.093	0.042	0.02	6	1	17
Antimony	mg/L	0.00010	n/v	n/v	0.006 ^F	0.00012	0.00023	0.00017	0.00004	6	0	0
Arsenic	mg/L	0.00010	0.005 ^B	n/v	0.010 ^F	0.0013	0.0022	0.0019	0.0003	6	0	0
Barium	mg/L	0.00010	n/v	n/v	2.0 ^F	0.030	0.044	0.039	0.005	6	0	0
Beryllium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Bismuth	mg/L	0.000050	n/v	n/v	n/v	0.000025	0.000025	0.000025	0	6	0	0
Boron	mg/L	0.010	29 ^A 1.5 ^B	29/1.5 ^D	5 ^F	0.069	0.11	0.094	0.01	6	0	0

Table B-2: Surface Water Quality Statistic Data for Lake Manitoba from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Lake Manitoba (D1)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Cadmium	mg/L	0.000005	0.00023 ^{STB} ^A 0.0034 ^{TG} ^B	n/v	0.007 ^F	0.000003	0.000006	0.000004	0.000002	6	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	32	40	37	3	6	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000012	0.000007	0.000003	6	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00005	0.00051	0.00021	0.0001	6	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Copper	mg/L	0.00050	0.0035 ^{*B}	n/v	≤1.0 ^E 2 ^F	0.00025	0.00066	0.00032	0.0002	6	0	0
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.026	0.070	0.040	0.01	6	0	0
Lead	mg/L	0.000050	0.0058 ^{#B}	n/v	0.005 ^F	0.000067	0.00016	0.00012	0.00003	6	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.024	0.037	0.031	0.004	6	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	27	40	34	4	6	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.0042	0.0064	0.0055	0.0008	6	0	0
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.0016	0.0038	0.0023	0.0007	6	0	0
Nickel	mg/L	0.00050	0.137 ^{**B}	n/v	n/v	0.00056	0.0011	0.00071	0.0002	6	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.015	0.015	0	6	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	7.1	11	8.8	1	6	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0029	0.0042	0.0037	0.0004	6	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.000062	0.00012	0.000088	0.00002	6	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	2.8	4.4	3.9	0.6	6	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	96	138	125	14	6	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.20	0.28	0.25	0.03	6	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	21	35	28	5	6	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	6	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00019	0.00007	0.00005	6	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00085	0.0033	0.0016	0.0008	6	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 ^{s4} ^D	0.02 ^F	0.0013	0.0017	0.0016	0.0001	6	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00099	0.0017	0.0015	0.0002	6	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.0067	0.0026	0.002	6	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	6	0	0

Notes:

n	Total number of exceedances of a guideline for a parameter for the period from June 2019 to October 2020
	For statistical calculations, half detection limit values are used for the results of the laboratory analyses reported as less than the detection limits values, except for biological parameters.
CWQG-FAL	Canadian Council of Ministers of the Environment
B	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Long Term
MSOG-FAL	Manitoba Provincial Water Quality Guidelines
C	Tier I - Water Quality Guidelines - Freshwater Aquatic Life
D	Tier III - Water Quality Guidelines - Freshwater Aquatic Life
CDWQ	Health Canada (September 2020). Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
E	Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives/ Operational Guidelines
F	Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentration
G	Guidelines for Canadian Drinking Water Quality - Microbial Parameters

6.5^A Concentration exceeds the indicated standard

n/v no value

j High levels (above 500 mg/L) can cause physiological effects such as diarrhoea or dehydration.

EQ1 The short-term benchmark for dissolved zinc is calculated using the following equation: $Benchmark = \exp(0.833[\ln(\text{hardness mg/L})] + 0.240[\ln(\text{DOC mg/L})] + 0.526)$. The value in the table is for the minimum hardness of 160 mg/L as CaCO₃ and the minimum dissolved organic carbon (DOC), for which this equation is valid (0.3 mg/L) to generate the most stringent guideline. The benchmark equation is valid between hardness 13.8 and 250.5 mg/L as CaCO₃ and DOC 0.3 and 17.3 mg/L.

EQ2 The long-term CWQG for dissolved zinc is calculated using the following equation: $CWQG = \exp(0.947[\ln(\text{hardness mg/L})] - 0.815[\text{pH}] + 0.398[\ln(\text{DOC mg/L})] + 4.625)$. The value in the table is for the minimum hardness of 160 mg/L as CaCO₃, maximum pH, for which this equation is valid (8.13) since the maximum pH in surface water is 10, and the minimum DOC, for which this equation is valid (0.3 mg/L) to generate the most stringent guideline. The CWQG equation is valid between hardness 23.4 and 399 mg/L as CaCO₃, pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg/L.

EQ3 The short-term benchmark for manganese is calculated using the benchmark calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese or the following equation: $Benchmark = \exp(0.878[\ln(\text{hardness})] + 4.76)$, where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO₃ equivalents in mg/L. The value in the table is for the minimum hardness of 160 mg/L as CaCO₃ to generate the most stringent guideline. The benchmark equation is valid between hardness 25 and 250 mg/L.

EQ4 The long-term CWQG for manganese is found using the benchmark calculator in Appendix B of CCME (2021). The value in the table is for the minimum hardness of 160 mg/L and minimum pH of 7.00 to generate the most stringent guideline. The CWQG table is valid between hardness 25 and 670 mg/L and pH 5.8 and 8.4.

LTG The CWQG long-term guideline for cadmium of 0.00023 µg/L is for waters of 160 mg/L as CaCO₃ hardness to generate the most stringent guideline. This guideline is related to water hardness as follows: at hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation ($CWQG (\mu\text{g/L}) = 10\{0.83(\log[\text{hardness}]) - 2.46\}$); at hardness > 280 mg/L, the CWQG is 0.37 µg/L.

STB The CWQG short-term guideline for cadmium of 0.0034 µg/L is for waters of 160 mg/L as CaCO₃ hardness to generate the most stringent guideline. This guideline is related to water hardness as follows: when the water hardness is 0 to < 5.3 mg/L, the CWQG is 0.11 µg/L; at hardness ≥ 5.3 to ≤ 360 mg/L, the short-term benchmark is calculated using this equation: ($CWQG (\mu\text{g/L}) = 10\{1.016(\log[\text{hardness}]) - 1.71\}$); at hardness > 360 mg/L, the CWQG is 7.7 µg/L.

Equation* - The most stringent CWQG guideline for total ammonia-N, as mg/L, is calculated at maximum pH and temperature separately for each site for the period from June 2019 to October 2020. Table 1.2 of the Environmental Quality Guidelines for Alberta Surface Waters (Government of Alberta 2018) is used because the total ammonia as N is established for smaller increments compared to CWQG, i.e. 1 deg. C instead of 5 deg. C temperature and 0.1 instead of 0.5 pH; both guidelines use similar formulas for calculations.

Equation** - The most stringent MSOG-FAL for total ammonia is calculated at maximum pH and temperature separately for each site for the period from June 2019 to October 2020. This guideline is calculated using $[(0.0577/1+10^{(7.688-\text{pH})})+(2.487/1+10^{(\text{pH}-7.688)})]^a$, where $a=2.85$ or $a=1.45 \times 10^{(0.028 \times (25-\text{Temperature}))}$, whichever is less and pH ≥ 6.5 and ≤ 9.0 .

The most stringent CWQG for copper is calculated at minimum hardness of 160 mg/L as CaCO₃ using the following: when the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; at hardness ≥ 82 to ≤ 180 mg/L the CWQG is calculated using this equation: $CWQG (\mu\text{g/L}) = 0.2 \times e\{0.8545[\ln(\text{hardness})]-1.465\}$; at hardness > 180 mg/L, the CWQG is 4 µg/L; if the hardness is unknown, the CWQG is 2 µg/L.

The most stringent CWQG for lead is calculated at minimum hardness of 160 mg/L as CaCO₃ using the following: when the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; at hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation: $CWQG (\mu\text{g/L}) = e\{1.273[\ln(\text{hardness})]-4.705\}$; at hardness > 180 mg/L, the CWQG is 7 µg/L; if the hardness is unknown, the CWQG is 1 µg/L.

The most stringent CWQG for nickel is calculated at minimum hardness of 160 mg/L as CaCO₃ using the following: when the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; at hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation: $CWQG (\mu\text{g/L}) = e\{0.76[\ln(\text{hardness})]+1.06\}$; at hardness > 180 mg/L, the CWQG is 150 µg/L; if the hardness is unknown, the CWQG is 25 µg/L.

s2 15 mg/L for a 4 day averaging duration, 3.40 mg/L for a 1 hour averaging duration (from Tier II - Water Quality Objectives)

s3 29 mg/L short term exposure; 1.5 mg/L long term exposure.

s4 0.033 mg/L short term exposure; 0.15 mg/L long term exposure.

s7 The most stringent Tier II MSOG-FAL is calculated based on minimum hardness of 160 mg/L as CaCO₃ using Tier II equations for dissolved chromium III for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.109 mg/L is for 4 day averaging duration and 0.837 mg/L is for 1 hour averaging duration.

s8 The most stringent Tier II MSOG-FAL for dissolved cadmium is calculated based on minimum hardness of 160 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.00034 mg/L is for 4 day averaging duration and 0.0032 mg/L is for 1 hour averaging duration.

s9 The most stringent Tier II MSOG-FAL for dissolved lead is calculated based on minimum hardness of 160 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.0042 mg/L is for 4 day averaging duration and 0.107 mg/L is for 1 hour averaging duration.

s10 The most stringent Tier II MSOG-FAL for dissolved copper is calculated based on minimum hardness of 160 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.0134 mg/L is for 4 day averaging duration and 0.209 mg/L is for 1 hour averaging duration.

s11 The most stringent Tier II MSOG-FAL for dissolved nickel is calculated based on minimum hardness of 160 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.0774 mg/L is for 4 day averaging duration and 0.697 mg/L is for 1 hour averaging duration.

s12 The most stringent Tier II MSOG-FAL for dissolved zinc is calculated based on minimum hardness of 160 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.176 mg/L is for the 4 day averaging duration and 0.175 mg/L is the 1 hour averaging duration.

SN see Narrative

Table B-3: Surface Water Quality Statistic Data for Watchorn Creek from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Watchorn Creek (D2)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000005	0.000005	0	8	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00011	0.00055	0.00028	0.0001	8	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00011	0.00054	0.00026	0.0002	8	0	0
Copper	mg/L	0.00050	0.0035 ^{*B}	n/v	≤1.0 ^E 2 ^F	0.00025	0.0019	0.00079	0.0005	8	0	0
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.025	0.27	0.12	0.09	8	0	0
Lead	mg/L	0.000050	0.0058 ^{#B}	n/v	0.005 ^F	0.000025	0.000059	0.000033	0.00001	8	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.014	0.065	0.036	0.02	8	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	45	129	71	27	8	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.0026	0.25	0.074	0.098	8	5	63
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.0005	0.0046	0.0012	0.001	8	0	0
Nickel	mg/L	0.00050	0.137 ^{**B}	n/v	n/v	0.00080	0.0017	0.0012	0.0003	8	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.049	0.21	0.13	0	8	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	4.4	16	9.6	4	8	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0021	0.0056	0.0039	0.0011	8	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.000083	0.00036	0.00018	0.00009	8	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	0.2	18	6.5	7	8	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000005	0.000005	0	8	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	10	65	27	18	8	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.11	0.23	0.17	0.04	8	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	9.0	82	37	23	8	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	8	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	8	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	8	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00079	0.00015	0.0002	8	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.0023	0.0011	0.0007	8	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00031	0.00008	0.00009	8	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 ^{s4} ^D	0.02 ^F	0.0011	0.0059	0.0025	0.001	8	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00025	0.0017	0.00086	0.0005	8	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.010	0.0042	0.003	8	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00033	0.00020	0.0001	8	0	0

See Table B-2 notes for the details on the guideline selection and calculations.

Table B-4: Surface Water Quality Statistic Data for Reed Lake from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Reed Lake (D3)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Cadmium	mg/L	0.000005	0.00023 _{STB} ^A 0.0034 _{LTG} ^B	n/v	0.007 ^F	2.5E-06	0.000010	0.000005	0.000003	5	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	21	44	31	8	5	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000022	0.000008	0.000007	5	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00005	0.00049	0.00028	0.0002	5	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00023	0.00014	0.00008	5	0	0
Copper	mg/L	0.00050	0.0035 ^{*B}	n/v	≤1.0 ^E 2 ^F	0.00025	0.00083	0.00045	0.0003	5	0	0
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.018	0.29	0.079	0.1	5	0	0
Lead	mg/L	0.000050	0.0058 ^{#B}	n/v	0.005 ^F	0.000063	0.00020	0.00011	0.00005	5	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.016	0.039	0.028	0.008	5	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	59	120	91	22	5	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.017	0.15	0.062	0.05	5	4	80
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.00028	0.0010	0.00062	0.0003	5	0	0
Nickel	mg/L	0.00050	0.137 ^{**B}	n/v	n/v	0.00025	0.00078	0.00051	0.0002	5	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.13	0.063	0	5	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	11	18	15	3	5	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0039	0.0073	0.0058	0.001	5	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.000061	0.00021	0.00013	0.00005	5	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	1.2	9.3	4.8	3	5	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000005	0.000005	0	5	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	12	27	20	6	5	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.045	0.11	0.074	0.02	5	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	23	52	39	11	5	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	5	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	5	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	5	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00060	0.00016	0.0002	5	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00031	0.0093	0.0023	0.003	5	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	5	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 _{s4} ^D	0.02 ^F	0.00051	0.0022	0.0012	0.0007	5	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00069	0.0015	0.0011	0.0003	5	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.0084	0.0043	0.003	5	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00021	0.00012	0.00004	5	0	0

See Table B-2 notes for the details on the guideline selection and calculations.

Table B-5: Surface Water Quality Statistic Data for Clear Lake from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Clear Lake (D4)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Cadmium	mg/L	0.0000050	0.00023 _{STB} ^A 0.0034 _{LTG} ^B	n/v	0.007 ^F	2.5E-06	0.000042	0.000015	0.00001	6	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	28	70	45	13	6	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.00036	0.00008	0.0001	6	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00014	0.0066	0.0017	0.002	6	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.0019	0.00048	0.0006	6	0	0
Copper	mg/L	0.00050	0.0035 ^B	n/v	≤1.0 ^E 2 ^F	0.00025	0.0045	0.0016	0.001	6	1	17
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.031	3.0	0.79	1	6	2	33
Lead	mg/L	0.000050	0.0058 ^{#B}	n/v	0.005 ^F	0.000025	0.0017	0.00047	0.0006	6	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.0077	0.036	0.023	0.009	6	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	25	82	59	18	6	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.0058	0.10	0.035	0.04	6	2	33
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.00066	0.0015	0.0010	0.0003	6	0	0
Nickel	mg/L	0.00050	0.137 ^{**B}	n/v	n/v	0.00050	0.0068	0.0021	0.002	6	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.15	0.086	0	6	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	4.8	13	9.0	3	6	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0025	0.010	0.0053	0.003	6	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.00012	0.00025	0.00017	0.00004	6	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	0.67	11	6.0	4	6	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000050	0.000015	0.00002	6	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	4.3	25	15	7	6	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.072	0.19	0.14	0.04	6	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	7.5	56	31	17	6	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.0010	0.00025	0	6	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000051	0.000020	0.00002	6	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00070	0.00023	0.0003	6	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00050	0.00015	0.0002	6	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00049	0.13	0.030	0.05	6	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00050	0.00015	0.0002	6	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 _{s4} ^D	0.02 ^F	0.0013	0.0039	0.0023	0.0009	6	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00075	0.0076	0.0024	0.002	6	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.015	0.0074	0.005	6	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.0024	0.00064	0.0009	6	0	0

See Table B-2 notes for the details on the guideline selection and calculations.

Table B-6: Surface Water Quality Statistic Data for Birch Creek from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Birch Creek - Upstream (D6)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Cadmium	mg/L	0.000050	0.00023 ^{STB} ^A 0.0034 ^{LTG} ^B	n/v	0.007 ^F	2.5E-06	0.000064	0.000018	0.00002	6	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	50	79	64	11	6	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000005	0.000005	0	6	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00014	0.00036	0.00024	0.00007	6	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00020	0.00012	0.00006	6	0	0
Copper	mg/L	0.00050	0.0035 ^B	n/v	≤1.0 ^E 2 ^F	0.00025	0.0018	0.00086	0.0005	6	0	0
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.047	0.072	0.059	0.009	6	0	0
Lead	mg/L	0.000050	0.0058 ^{#B}	n/v	0.005 ^F	0.000025	0.00014	0.000045	0.00004	6	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.015	0.051	0.028	0.01	6	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	54	152	89	34	6	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.0071	0.022	0.015	0.005	6	1	17
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.00050	0.0039	0.0015	0.001	6	0	0
Nickel	mg/L	0.00050	0.137 ^{**B}	n/v	n/v	0.00064	0.0015	0.00095	0.0003	6	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.14	0.042	0	6	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	4.1	13	8.7	3	6	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0025	0.0047	0.0034	0.0008	6	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.00011	0.00024	0.00018	0.00005	6	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	1.9	15	6.4	4	6	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000015	0.0000067	0.000004	6	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	9.1	38	19	10	6	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.14	0.29	0.22	0.05	6	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	15	123	63	42	6	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	6	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00041	0.00011	0.0001	6	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00040	0.0024	0.0014	0.0007	6	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00010	0.000058	0.00002	6	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 ³⁴ ^D	0.02 ^F	0.00083	0.0044	0.0025	0.001	6	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00025	0.0010	0.00066	0.0002	6	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.0056	0.0033	0.002	6	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00022	0.00014	0.00005	6	0	0

See Table B-2 notes for the details on the guideline selection and calculations.

Table B-6: Surface Water Quality Statistic Data for Birch Creek from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Birch Creek - Downstream (D8)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Cadmium	mg/L	0.000050	0.00023 ^{STB} ^A 0.0034 ^{LTG} ^B	n/v	0.007 ^F	2.5E-06	0.0000069	0.0000037	0.000002	6	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	34	72	58	12	6	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000005	0.000005	0	6	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00017	0.00068	0.00035	0.0002	6	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00012	0.00033	0.00020	0.00007	6	0	0
Copper	mg/L	0.00050	0.0035 ^B	n/v	≤1.0 ^E 2 ^F	0.00025	0.0015	0.0010	0.0004	6	0	0
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.059	0.12	0.095	0.02	6	0	0
Lead	mg/L	0.000050	0.0058 ^{#B}	n/v	0.005 ^F	0.000025	0.000074	0.000054	0.00002	6	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.014	0.037	0.023	0.008	6	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	54	121	79	23	6	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.0057	0.048	0.019	0.01	6	1	17
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.00054	0.0019	0.0010	0.0004	6	0	0
Nickel	mg/L	0.00050	0.137 ^{**B}	n/v	n/v	0.00091	0.0019	0.0012	0.0003	6	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.10	0.046	0	6	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	3.9	14	7.2	3	6	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0026	0.0042	0.0032	0.0005	6	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.00014	0.00026	0.00020	0.00004	6	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	2.7	15	6.8	4	6	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	8.3	29	16	7	6	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.13	0.23	0.18	0.03	6	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	11	67	43	22	6	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	6	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000017	0.000007	0.000004	6	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00022	0.00008	0.00006	6	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.0010	0.0045	0.0030	0.001	6	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 ³⁴ ^D	0.02 ^F	0.0012	0.0050	0.0029	0.001	6	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00069	0.0021	0.0014	0.0005	6	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.0053	0.0026	0.002	6	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00023	0.00043	0.00031	0.00007	6	0	0

See Table B-2 notes for the details on the guideline selection and calculations.

Table B-7: Surface Water Quality Statistic Data for Lake St. Martin from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Lake St. Martin (D9)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Cadmium	mg/L	0.000050	0.00023 _{STB} ^A 0.0034 _{LTG} ^B	n/v	0.007 ^F	2.5E-06	0.000021	0.0000066	0.000006	9	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	28	42	39	4	9	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000038	0.000012	0.00001	9	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00012	0.00076	0.00033	0.0002	9	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00025	0.00010	0.00006	9	0	0
Copper	mg/L	0.00050	0.0035 ^B	n/v	≤1.0 ^E 2 ^F	0.00025	0.00093	0.00052	0.0002	9	0	0
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.038	0.37	0.10	0.1	9	1	11
Lead	mg/L	0.000050	0.0058 ^B	n/v	0.005 ^F	0.000067	0.00044	0.00019	0.0001	9	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.018	0.035	0.030	0.004	9	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	22	40	32	5	9	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.0053	0.015	0.0094	0.003	9	0	0
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.0013	0.011	0.0031	0.003	9	0	0
Nickel	mg/L	0.00050	0.137 ^B	n/v	n/v	0.00054	0.0013	0.00086	0.0002	9	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.040	0.020	0	9	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	5.2	10	8.3	1	9	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0020	0.0047	0.0038	0.0007	9	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.000025	0.00019	0.000091	0.00004	9	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	2.4	4.9	3.6	0.8	9	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000011	0.0000063	0.000002	9	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	74	135	120	18	9	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.16	0.27	0.25	0.03	9	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	19	32	27	4	9	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	9	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	9	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	9	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.0012	0.00020	0.0004	9	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.0015	0.015	0.0041	0.004	9	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	9	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 ₃₄ ^D	0.02 ^F	0.0013	0.0020	0.0016	0.0002	9	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00081	0.0026	0.0017	0.0005	9	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.013	0.0031	0.004	9	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00023	0.00011	0.00004	9	0	0

See Table B-2 notes for the details on the guideline selection and calculations.

Table B-8: Surface Water Quality Statistic Data for Water Lake from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Water Lake (D10)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Cadmium	mg/L	0.000050	0.00023 ^{STB} ^A 0.0034 ^{LTG} ^B	n/v	0.007 ^F	2.5E-06	0.000033	0.000013	0.00001	6	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	34	374	118	125	6	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.00017	0.000041	0.00006	6	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00011	0.0030	0.00097	0.001	6	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.0011	0.00048	0.0004	6	0	0
Copper	mg/L	0.00050	0.0035 ^B	n/v	≤1.0 ^E 2 ^F	0.00025	0.0028	0.0012	0.0009	6	0	0
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.030	1.8	0.41	0.6	6	2	33
Lead	mg/L	0.000050	0.0058 ^{#B}	n/v	0.005 ^F	0.000025	0.0010	0.00027	0.0003	6	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.011	0.23	0.065	0.08	6	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	34	227	101	68	5	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.012	0.20	0.074	0.07	6	4	67
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.00059	0.0068	0.0018	0.002	6	0	0
Nickel	mg/L	0.00050	0.137 ^{**B}	n/v	n/v	0.00059	0.0058	0.0022	0.002	6	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.14	0.071	0	6	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	6.4	74	22	24	6	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0029	0.018	0.0074	0.005	6	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.00012	0.00088	0.00035	0.0003	6	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	1.3	34	9.7	11	6	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000030	0.000010	0.000009	6	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	6.5	192	48	65	6	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.10	0.67	0.26	0.2	5	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	20	404	125	146	5	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00030	0.00013	0.00007	6	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000023	0.000009	0.000007	6	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00030	0.00010	0.00009	6	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00055	0.062	0.014	0.02	6	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 ³⁴ ^D	0.02 ^F	0.0011	0.016	0.0051	0.006	6	1	17
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00071	0.0045	0.0024	0.002	6	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.0081	0.0026	0.002	6	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.0014	0.00049	0.0004	6	0	0

See Table B-2 notes for the details on the guideline selection and calculations.

Table B-9: Surface Water Quality Statistic Data for Unnamed Lake Inlet from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Unnamed Lake Inlet (D11)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Physico-chemical Parameters Measured in the fields												
Electrical Conductivity, Field	µS/cm	0.01	n/v	n/v	n/v	272.3	1017	659.2	304.7	3	0	0
Nitrite, Field	mg/L	0.0001	n/v	n/v	n/v	-	-	-	-	0	-	-
pH, Field	S.U.	0.01	6.5-9.0 ^B	6.5-9.0 ^D	7.0-10.5 ^E	7.14	7.81	7.37	0.31	3	0	0
Temperature, Field	deg C	0.01	n/v	n/v	≤15 ^E	9.30	20.10	13.30	4.83	3	1	33
Total Dissolved Solids, Field	ppm	1	n/v	n/v	≤500 ^E	324	833	516	226	3	1	33
Turbidity, Field	NTU	0.01	n/v	n/v	≤0.3/1.0/0.1 ^H	1.5	4.0	2.3	1	3	3	100
Physico-chemical Parameters Measured in the laboratory												
Alkalinity, Bicarbonate (as CaCO3)	mg/L	1.2	n/v	n/v	n/v	202	471	315	102	4	0	0
Alkalinity, Carbonate (as CaCO3)	mg/L	0.60	n/v	n/v	n/v	0.30	19	5.4	7.7	4	0	0
Alkalinity, Hydroxide (as CaCO3)	mg/L	0.34	n/v	n/v	n/v	0.17	0.17	0.17	0	4	0	0
Alkalinity, Total	mg/L	1.0	n/v	n/v	n/v	169	386	267	86	4	0	0
Ammonia (as N)	mg/L	0.010	Equation*/ 0.020-0.641	Equation**/ 0.230- 5.60	n/v	0.018	0.20	0.077	0.07	4	3	75
Chloride	mg/L	0.50	640 ^A 120 ^B	n/v	≤250 ^E	5.8	8.4	7.1	1	4	0	0
Fluoride	mg/L	0.020	0.12 ^B	n/v	1.5 ^F	0.14	0.27	0.22	0.05	4	4	100
Hardness (as CaCO3)	mg/L	0.20	n/v	n/v	n/v	226	897	559	266	4	0	0
Nitrate (as N)	mg/L	0.020	124 ^A 3.0 ^B	13 ^D	10 ^F	0.010	0.050	0.025	0.015	4	0	0
Nitrite (as N)	mg/L	0.010	0.06 ^B	0.06 ^D	1 ^F	0.005	0.025	0.011	0.008	4	0	0
Nitrogen (Total)	mg/L	0.20	n/v	n/v	n/v	1.1	6.5	3.1	2	3	0	0
Phosphorus, Total	mg/L	0.0010	n/v	0.025 ^C	n/v	0.021	0.16	0.070	0.05	4	3	75
Phosphorus, Total (Dissolved)	mg/L	0.0010	n/v	0.025 ^C	n/v	0.014	0.13	0.044	0.05	4	1	25
Phosphorus, Total Particulate	mg/L	0.0028	n/v	n/v	n/v	0.0049	0.044	0.026	0.014	4	0	0
Sulfate	mg/L	0.30	n/v	n/v	≤500 ^E	57	660	282	241	4	1	25
Total Dissolved Solids	mg/L	20	n/v	n/v	≤500 ^E	269	1270	749	414	4	2	50
Total Kjeldahl Nitrogen	mg/L	0.20	n/v	n/v	n/v	1.1	6.5	2.7	2	4	0	0
Total Suspended Solids	mg/L	1.0	_{SN} ^B	n/v	n/v	1	4	3	1	4	0	0
Microbiological Parameters												
Escherichia coli (E.Coli)	mpn/100mL	1	n/v	n/v	0 ^G	0	58	18	23	4	3	75
Total Coliforms	mpn/100mL	1	n/v	n/v	0 ^G	66	642420	161084	277900	4	4	100
BTEX and Petroleum Hydrocarbons												
Benzene	mg/L	0.00050	0.37 ^B	n/v	0.005 ^F	0.00025	0.00025	0.00025	0	4	0	0
Toluene	mg/L	0.0005	0.002 ^B	n/v	0.024 ^E 0.06 ^F	0.00025	0.00050	0.00044	0.0001	4	0	0
Ethylbenzene	mg/L	0.00050	0.09 ^B	0.09 ^D	0.0016 ^E	0.00025	0.00025	0.00025	0	4	0	0
Xylene, m & p-	mg/L	0.00040	n/v	n/v	n/v	0.00020	0.00020	0.00020	0	4	0	0
Xylene, o-	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.00025	0.00023	0.00004	4	0	0
Xylenes, Total	mg/L	0.00050	n/v	n/v	0.02 ^E 0.09 ^F	0.00025	0.00032	0.00030	0.00003	4	0	0
PHC F1 (C6-C10 range)	mg/L	0.10	n/v	n/v	n/v	0.013	0.050	0.041	0.02	4	0	0
PHC F1 (C6-C10 range) minus BTE	mg/L	0.10	n/v	n/v	n/v	0.013	0.050	0.041	0.02	4	0	0
PHC F2 (>C10-C16 range)	mg/L	0.10	n/v	n/v	n/v	0.050	0.050	0.050	0	4	0	0
PHC F3 (>C16-C34 range)	mg/L	0.25	n/v	n/v	n/v	0.13	0.13	0.13	0	4	0	0
PHC F4 (>C34-C50 range)	mg/L	0.25	n/v	n/v	n/v	0.13	0.13	0.13	0	4	0	0
Total Hydrocarbons (C6-C50)	mg/L	0.38	n/v	n/v	n/v	0.19	0.19	0.19	0.002	4	0	0
Metals, Dissolved												
Aluminum	mg/L	0.0010	n/v	0.1 ^D	0.050	0.00050	0.013	0.0052	0.005	4	0	0
Antimony	mg/L	0.00010	n/v	n/v	0.006 ^F	0.000050	0.00047	0.00019	0.0002	4	0	0
Arsenic	mg/L	0.00010	n/v	0.15/0.34 _{s2} ^D	0.010 ^F	0.00073	0.0039	0.0016	0.001	4	0	0
Barium	mg/L	0.00010	n/v	n/v	2.0 ^F	0.020	0.072	0.047	0.02	4	0	0
Beryllium	mg/L	0.00010	n/v	n/v	n/v	0.000050	0.000050	0.000050	0	4	0	0
Bismuth	mg/L	0.000050	n/v	n/v	n/v	0.000025	0.000025	0.000025	0	4	0	0
Boron	mg/L	0.010	n/v	29/1.5 _{s3} ^D	5 ^F	0.060	0.46	0.19	0.2	4	0	0
Cadmium	mg/L	0.0000050	n/v	0.000000025 _{s8} ^D	0.007 ^F	0.0000025	0.0000071	0.0000044	0	4	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	33	159	85	49	4	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000005	0.000005	0	4	0	0
Chromium	mg/L	0.00010	n/v	0.109/0.837 _{s7} ^D	0.05 ^F	0.00005	0.00038	0.00019	0.0001	4	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00080	0.00027	0.0003	4	0	0
Copper	mg/L	0.00020	n/v	0.0134/0.209 _{s10} ^D	≤1.0 ^E 2 ^F	0.00062	0.0023	0.0014	0.0006	4	0	0
Iron	mg/L	0.010	n/v	0.3 ^D	≤0.3 ^E	0.031	0.46	0.14	0.2	4	1	25
Lead	mg/L	0.000050	n/v	0.00418/0.107 _{s9} ^D	0.005 ^F	0.000025	0.00013	0.000052	0.00005	4	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.011	0.045	0.029	0.01	4	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	35	121	84	36	4	0	0
Manganese	mg/L	0.00010	10 _{EQ3} ^A	n/v	≤0.02 ^E 0.12 ^F	0.0024	1.5	0.39	0.6	4	2	50
Molybdenum	mg/L	0.000050	n/v	0.073 ^D	n/v	0.00054	0.0056	0.0030	0.002	4	0	0
Nickel	mg/L	0.00050	n/v	0.0774/0.697 _{s11} ^D	n/v	0.00025	0.0021	0.00098	0.0008	4	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.12	0.042	0.05	4	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	6.3	21	13	6	4	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0026	0.0055	0.0037	0.001	4	0	0
Selenium	mg/L	0.000050	n/v	0.001 ^D	0.05 ^F	0.000080	0.00053	0.00022	0.0002	4	0	0
Silicon	mg/L	0.050	n/v	n/v	n/v	1.5	29	9.8	11	4	0	0
Silver	mg/L	0.000010	n/v	0.0001 ^D	n/v	0.000005	0.000005	0.000005	0	4	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	6	25	16	7	4	0	0
Strontium	mg/L	0.00010	n/v	n/v	7.0 ^F	0.10	0.52	0.30	0.2	4	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	21	238	102	87	4	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	4	0	0
Thallium	mg/L	0.000010	n/v	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	4	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	4	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00021	0.00009	0.00007	4	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.0016	0.00076	0.0006	4	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	4	0	0
Uranium	mg/L	0.000010	n/v	0.033/0.015 _{s4} ^D	0.02 ^F	0.0014	0.011	0.0048	0.004	4	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00025	0.00090	0.00058	0.0002	4	0	0
Zinc	mg/L	0.0010	0.087 _{EQ1} ^A 0.0022 _{EQ2} ^B	0.176/0.175 _{s12} ^D	≤5.0 ^E	0.0005	0.0071	0.0039	0.002	4	3	75
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00052	0.00021	0.0002	4	0	0
Metals, Total												
Aluminum	mg/L	0.0030	0.1 ^D	0.1 ^D	0.050	0.0059	0.16	0.063	0.06	4	2	50
Antimony	mg/L	0.00010	n/v	n/v	0.006 ^F	0.00005	0.00048	0.00022	0.0002	4	0	0
Arsenic	mg/L	0.00010	0.005 ^B	n/v	0.010 ^F	0.00079	0.0039	0.0017	0.001	4	0	0
Barium	mg/L	0.00010	n/v	n/v	2.0 ^F	0.020	0.074	0.047	0.02	4	0	0
Beryllium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	4	0	0
Bismuth	mg/L	0.000050	n/v	n/v	n/v	0.000025	0.000025	0.000025	0	4	0	0
Boron	mg/L	0.010	29 ^A 1.5 ^B	29/1.5 _{s3} ^D	5 ^F	0.057	0.43	0.18	0.1	4	0	0

Table B-9: Surface Water Quality Statistic Data for Unnamed Lake Inlet from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Unnamed Lake Inlet (D11)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Cadmium	mg/L	0.0000050	0.00023 ^{STB A} 0.0034 ^{ITG B}	n/v	0.007 ^F	0.0000025	0.0000070	0.0000047	0.000002	4	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	35	155	86	46	4	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000014	0.000007	0.000004	4	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00012	0.00050	0.00030	0.0002	4	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00083	0.00030	0.0003	4	0	0
Copper	mg/L	0.00050	0.0035 ^{*B}	n/v	≤1.0 ^E 2 ^F	0.00025	0.0026	0.0014	0.0009	4	0	0
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.045	0.54	0.21	0.2	4	1	25
Lead	mg/L	0.000050	0.0058 ^{#B}	n/v	0.005 ^F	0.000025	0.00016	0.000092	0.00005	4	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.012	0.046	0.031	0.01	4	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	35	139	89	41	4	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.0063	1.5	0.40	0.7	4	2	50
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.00059	0.0060	0.0031	0.002	4	0	0
Nickel	mg/L	0.00050	0.137 ^{**B}	n/v	n/v	0.00060	0.0021	0.0012	0.0006	4	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.031	0.17	0.071	0	4	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	6.9	22	13	6	4	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0029	0.0055	0.0039	0.001	4	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.00014	0.00046	0.00024	0.0001	4	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	1.9	30	10	12	4	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000005	0.000005	0	4	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	6.2	25	16	7	4	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.10	0.55	0.31	0.2	4	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	21	249	107	90	4	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	4	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	4	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	4	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	4	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00038	0.0055	0.0027	0.002	4	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00026	0.00010	0.00009	4	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 ^{sd D}	0.02 ^F	0.0015	0.012	0.0050	0.004	4	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00066	0.0015	0.0010	0.0003	4	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.0053	0.0039	0.002	4	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00049	0.00024	0.0002	4	0	0

See Table B-2 notes for the details on the guideline selection and calculations.

Table B-10: Surface Water Quality Statistic Data for Goodison Lake Outlet from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Goodison Lake Outlet (D12)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Physico-chemical Parameters Measured in the fields												
Electrical Conductivity, Field	µS/cm	0.01	n/v	n/v	n/v	427.7	1028	763.7	219.7	6	0	0
Nitrite, Field	mg/L	0.0001	n/v	n/v	n/v	0.0300	0.0300	0.0300	0	3	0	0
pH, Field	S.U.	0.01	6.5-9.0 ^B	6.5-9.0 ^D	7.0-10.5 ^E	7.15	8.57	7.69	0.45	6	0	0
Temperature, Field	deg C	0.01	n/v	n/v	≤15 ^E	7.50	24.20	16.62	5.30	6	4	67
Total Dissolved Solids, Field	ppm	1	n/v	n/v	≤500 ^E	425	463	446	16	3	0	0
Turbidity, Field	NTU	0.01	n/v	n/v	≤0.3/1.0/0.1 ^H	0.01	2.7	1.1	1	6	4	67
Physico-chemical Parameters Measured in the laboratory												
Alkalinity, Bicarbonate (as CaCO3)	mg/L	1.2	n/v	n/v	n/v	279	550	414	99	6	0	0
Alkalinity, Carbonate (as CaCO3)	mg/L	0.60	n/v	n/v	n/v	0.30	40	11	16	6	0	0
Alkalinity, Hydroxide (as CaCO3)	mg/L	0.34	n/v	n/v	n/v	0.17	0.17	0.17	0	6	0	0
Alkalinity, Total	mg/L	1.0	n/v	n/v	n/v	229	499	358	96	6	0	0
Ammonia (as N)	mg/L	0.010	Equation*/ 0.020-0.641	Equation**/ 0.230- 5.60	n/v	0.013	0.094	0.044	0.03	6	5	83
Chloride	mg/L	0.50	640 ^A 120 ^B	n/v	≤250 ^E	9.3	20	16	5	6	0	0
Fluoride	mg/L	0.020	0.12 ^B	n/v	1.5 ^F	0.21	0.35	0.28	0.06	6	6	100
Hardness (as CaCO3)	mg/L	0.20	n/v	n/v	n/v	338	698	496	125	6	0	0
Nitrate (as N)	mg/L	0.020	124 ^A 3.0 ^B	13 ^D	10 ^F	0.010	0.039	0.020	0.01	6	0	0
Nitrite (as N)	mg/L	0.010	0.06 ^B	0.06 ^D	1 ^F	0.005	0.010	0.008	0.003	6	0	0
Nitrogen (Total)	mg/L	0.20	n/v	n/v	n/v	0.47	3.3	1.9	0.9	5	0	0
Phosphorus, Total	mg/L	0.0010	n/v	0.025 ^C	n/v	0.012	0.065	0.029	0.02	6	3	50
Phosphorus, Total (Dissolved)	mg/L	0.0010	n/v	0.025 ^C	n/v	0.0077	0.022	0.014	0.005	6	0	0
Phosphorus, Total Particulate	mg/L	0.0028	n/v	n/v	n/v	0.0021	0.043	0.015	0.013	6	0	0
Sulfate	mg/L	0.30	n/v	n/v	≤500 ^E	40	293	146	96	6	0	0
Total Dissolved Solids	mg/L	20	n/v	n/v	≤500 ^E	364	850	606	173	6	4	67
Total Kjeldahl Nitrogen	mg/L	0.20	n/v	n/v	n/v	0.47	3.3	1.8	0.9	6	0	0
Total Suspended Solids	mg/L	1.0	SN ^B	n/v	n/v	1	11	3	3	6	0	0
Microbiological Parameters												
Escherichia coli (E.Coli)	mpn/100mL	1	n/v	n/v	0 ^G	4	435	146	178	5	5	100
Total Coliforms	mpn/100mL	1	n/v	n/v	0 ^G	179	642420	257510	314278	5	5	100
BTEX and Petroleum Hydrocarbons												
Benzene	mg/L	0.00050	0.37 ^B	n/v	0.005 ^F	0.00025	0.00025	0.00025	0	6	0	0
Toluene	mg/L	0.0005	0.002 ^B	n/v	0.024 ^E 0.06 ^F	0.00025	0.00050	0.00046	0.00009	6	0	0
Ethylbenzene	mg/L	0.00050	0.09 ^B	0.09 ^D	0.0016 ^E 0.14 ^F	0.00025	0.00025	0.00025	0	6	0	0
Xylene, m & p-	mg/L	0.00040	n/v	n/v	n/v	0.00020	0.00020	0.00020	0	6	0	0
Xylene, o-	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.00025	0.00023	0.00004	6	0	0
Xylenes, Total	mg/L	0.00050	n/v	n/v	0.02 ^E 0.09 ^F	0.00025	0.00032	0.00031	0.00003	6	0	0
PHC F1 (C6-C10 range)	mg/L	0.10	n/v	n/v	n/v	0.013	0.050	0.044	0.01	6	0	0
PHC F1 (C6-C10 range) minus BTE	mg/L	0.10	n/v	n/v	n/v	0.013	0.050	0.044	0.01	6	0	0
PHC F2 (>C10-C16 range)	mg/L	0.10	n/v	n/v	n/v	0.050	0.050	0.050	7.E-18	6	0	0
PHC F3 (>C16-C34 range)	mg/L	0.25	n/v	n/v	n/v	0.13	0.13	0.13	0	6	0	0
PHC F4 (>C34-C50 range)	mg/L	0.25	n/v	n/v	n/v	0.13	0.13	0.13	0	6	0	0
Total Hydrocarbons (C6-C50)	mg/L	0.38	n/v	n/v	n/v	0.19	0.19	0.19	0.002	6	0	0
Metals, Dissolved												
Aluminum	mg/L	0.0010	n/v	0.1 ^D	0.050	0.00050	0.0025	0.0015	0.0007	6	0	0
Antimony	mg/L	0.00010	n/v	n/v	0.006 ^F	0.000050	0.00015	0.000093	0.00004	6	0	0
Arsenic	mg/L	0.00010	n/v	0.15/0.34 ^{s2} ^D	0.010 ^F	0.00069	0.0035	0.0016	0.0009	6	0	0
Barium	mg/L	0.00010	n/v	n/v	2.0 ^F	0.031	0.054	0.043	0.009	6	0	0
Beryllium	mg/L	0.00010	n/v	n/v	n/v	0.000050	0.000050	0.000050	0	6	0	0
Bismuth	mg/L	0.000050	n/v	n/v	n/v	0.000025	0.000025	0.000025	0	6	0	0
Boron	mg/L	0.010	n/v	29/1.5 ^{s3} ^D	5 ^F	0.082	0.15	0.11	0.02	6	0	0
Cadmium	mg/L	#####	n/v	0.00034/0.0032 ^{s8} ^D	0.007 ^F	0.0000025	0.0000025	0.0000025	0	6	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	48	76	61	10	6	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000005	0.000005	0	6	0	0
Chromium	mg/L	0.00010	n/v	0.109/0.837 ^{s7} ^D	0.05 ^F	0.00005	0.00024	0.00012	0.00007	6	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00014	0.000080	0.00004	6	0	0
Copper	mg/L	0.00020	n/v	0.0134/0.209 ^{s10} ^D	≤1.0 ^E 2 ^F	0.00050	0.0027	0.0013	0.0007	6	0	0
Iron	mg/L	0.010	n/v	0.3 ^D	≤0.3 ^E	0.018	0.058	0.033	0.01	6	0	0
Lead	mg/L	0.000050	n/v	0.00418/0.107 ^{s9} ^D	0.005 ^F	0.000025	0.00011	0.000044	0.00003	6	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.014	0.030	0.023	0.006	6	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	53	135	83	28	6	0	0
Manganese	mg/L	0.00010	10 ^{EQ3} ^A 0.75 ^{EQ4} ^B	n/v	≤0.02 ^E 0.12 ^F	0.0052	0.087	0.026	0.03	6	2	33
Molybdenum	mg/L	0.000050	n/v	0.073 ^D	n/v	0.00034	0.0026	0.0010	0.0008	6	0	0
Nickel	mg/L	0.00050	n/v	0.0774/0.697 ^{s11} ^D	n/v	0.00025	0.00094	0.00062	0.0002	6	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.015	0.015	0	6	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	4.3	12	8.5	2	6	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0024	0.0040	0.0034	0.0007	6	0	0
Selenium	mg/L	0.000050	n/v	0.001 ^D	0.05 ^F	0.000077	0.00031	0.00019	0.00009	6	0	0
Silicon	mg/L	0.050	n/v	n/v	n/v	1.6	14	7.5	4	6	0	0
Silver	mg/L	0.000010	n/v	0.0001 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	9	25	16	5	6	0	0
Strontium	mg/L	0.00010	n/v	n/v	7.0 ^F	0.13	0.28	0.21	0.05	6	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	15	105	53	34	6	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	6	0	0
Thallium	mg/L	0.000010	n/v	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00014	0.000078	0.00004	6	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.00040	0.00019	0.00009	6	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Uranium	mg/L	0.000010	n/v	0.033/0.015 ^{s4} ^D	0.02 ^F	0.00082	0.0038	0.0021	0.001	6	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00025	0.00051	0.00029	0.0001	6	0	0
Zinc	mg/L	0.0010	0.087 ^{EQ1} ^A 0.0022 ^{EQ2} ^B	0.176/0.175 ^{s12} ^D	≤5.0 ^E	0.0013	0.0055	0.0033	0.001	6	4	67
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00023	0.00012	0.00005	6	0	0
Metals, Total												

Table B-10: Surface Water Quality Statistic Data for Goodison Lake Outlet from June 2019 to October 2020

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Goodison Lake Outlet (D12)						
						Min	Max	Mean	Standard Deviation	N	Exceedances	
											n	%
Aluminum	mg/L	0.0030	0.1 ^D	0.1 ^D	0.050	0.0043	0.051	0.016	0.02	6	1	17
Antimony	mg/L	0.00010	n/v	n/v	0.006 ^F	0.00005	0.00015	0.000088	0.00004	6	0	0
Arsenic	mg/L	0.00010	0.005 ^B	n/v	0.010 ^F	0.00076	0.0036	0.0016	0.0009	6	0	0
Barium	mg/L	0.00010	n/v	n/v	2.0 ^F	0.028	0.053	0.041	0.009	6	0	0
Beryllium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Bismuth	mg/L	0.000050	n/v	n/v	n/v	0.000025	0.000025	0.000025	0	6	0	0
Boron	mg/L	0.010	29 ^A 1.5 ^B	29/1.5 _{s3} ^D	5 ^F	0.066	0.15	0.12	0.03	6	0	0
Cadmium	mg/L	#####	0.00023 ^{STB} ^A 0.0034 ^{LTG} ^B	n/v	0.007 ^F	2.5E-06	0.0000059	0.0000031	0.000001	6	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	50	77	62	9	6	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000005	0.000005	0	6	0	0
Chromium	mg/L	0.00010	n/v	n/v	0.05 ^F	0.00005	0.00034	0.00018	0.00009	6	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00017	0.00010	0.00005	6	0	0
Copper	mg/L	0.00050	0.0035 ^{*B}	n/v	≤1.0 ^E 2 ^F	0.00025	0.0011	0.00063	0.0003	6	0	0
Iron	mg/L	0.010	0.3 ^B	0.3 ^D	≤0.3 ^E	0.023	0.12	0.051	0.03	6	0	0
Lead	mg/L	0.000050	0.0058 ^{#B}	n/v	0.005 ^F	0.000025	0.00011	0.000047	0.00003	6	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.015	0.040	0.026	0.009	6	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	54	138	84	29	6	0	0
Manganese	mg/L	0.00010	n/v	n/v	≤0.02 ^E 0.12 ^F	0.0063	0.14	0.039	0.049	6	2	33
Molybdenum	mg/L	0.000050	0.073 ^B	0.073 ^D	n/v	0.00038	0.0017	0.00091	0.0005	6	0	0
Nickel	mg/L	0.00050	0.137 ^{**B}	n/v	n/v	0.00025	0.0012	0.00068	0.0003	6	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.059	0.026	0	6	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	4.4	11	8.4	2	6	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0025	0.0042	0.0034	0.0007	6	0	0
Selenium	mg/L	0.000050	0.001 ^B	0.001 ^D	0.05 ^F	0.000088	0.00026	0.00018	0.00006	6	0	0
Silicon	mg/L	0.10	n/v	n/v	n/v	1.6	16	8.1	5	6	0	0
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	9.2	27	16	6	6	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.14	0.29	0.22	0.05	6	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	16	108	54	34	6	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	0	6	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.000005	0.000005	0	6	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00011	0.00006	0.00002	6	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.0022	0.00069	0.0007	6	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	0	6	0	0
Uranium	mg/L	0.000010	0.033 ^A 0.015 ^B	0.033/0.015 _{s4} ^D	0.02 ^F	0.00086	0.0034	0.0021	0.0009	6	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00025	0.00077	0.00053	0.0002	6	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.0054	0.0030	0.002	6	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00022	0.00012	0.00004	6	0	0

See Table B-2 notes for the details on the guideline selection and calculations.

Table B-11
Groundwater Analytical Results Lake
Manitoba Outlet Channel

Sample Location	Sample Date	Sample ID	Sampling Company	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	CWQG-FAL	MSOG-FAL	CDWQ	BH19-12					BH19-29					CH19-08										
												19-Aug-19	7-Oct-19	5-May-20	8-Jul-20	5-Oct-20	26-Jun-19	20-Aug-19	9-Oct-19	7-May-20	6-Jul-20	6-Oct-20	24-Jun-19	19-Aug-19	7-Oct-19	5-May-20	7-May-20	7-Jul-20	5-Oct-20			
												BH19-12	BH19-12	BH19-12	BH19-12	BH19-12	TH18-27	BH19-29	BH19-29	BH19-29	BH19-29	BH19-29	TH18-03	CH19-08	CH19-08	CH19-08	CH19-08	CH19-08	CH19-08	CH19-08	CH19-08	
												STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
												ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS
												L2332554-3	L2362912-5	L2443834-9	L2472215-3	L2512953-4	L2301696-2	L2332554-5	L2362912-19	L2444978-3	L2470843-7	L2512953-9	L2297783-1	L2332554-1	L2362912-2	L2443834-6	L2444978-8	L2470843-14	L2512953-1			
Field Parameters																																
Dissolved oxygen, Field	mg/L	>5.5/6.5/9.5 ^{VAR}	n/v	n/v	4.67 ^B	1.13 ^B	3.09 ^B	4.19 ^B	0.82 ^B	2.98 ^B	1.96 ^B	1.59 ^B	1.84 ^B	5.82	1.32 ^B	3.96 ^B	3.8 ^B	7.9	1.17 ^B	-	4.22 ^B	6.6										
Electrical Conductivity, Field	µS/cm	n/v	n/v	n/v	656	636.2	492.7	785.0	759.9	686.7	590	619	531	560.5	690	722.3	784	623	459.0	-	641.2	778.7										
Nitrite, Field	mg/L	n/v	n/v	n/v	0.00	NM	-	-	-	0.01	0.01	NM	-	-	-	0.01	NM	NM	-	-	-	-										
Oxidation Reduction Potential, field	mV	n/v	n/v	n/v	-27	-120.8	-40.5	-71.4	-143.7	127.1	-24.5	-74.2	-8.7	-58.4	-103.8	53.4	69.7	-157.2	-6.3	-	-38.6	-79.8										
pH, Field	S.U.	6.5-9.0 ^B	6.5-9.0 ^D	7.0-10.5 ^E	7.77	7.4	7.11	7.04	6.78 ^E	7.2	7.75	7.7	7.26	7.39	7.13	7.42	7.67	7.88	7.4	-	7.37	7.8										
Pressure	kPa	n/v	n/v	n/v	NM	NM	-	-	97.41	NM	NM	NM	-	-	97.28	NM	NM	NM	-	-	-	97.21										
Temperature, Field	deg C	n/v	n/v	≤15 ^E	7.2	8.7	6.1	6.9	6.8	6.4	7.5	6.3	5.7	6.3	7.2	6.8	8.2	7.9	5.7	-	7.3	6.5										
Total Dissolved Solids, Field	ppm	n/v	n/v	≤500 ^E	-	-	441	582 ^E	440	-	-	-	184	528 ^E	400	-	-	-	611 ^E	-	590 ^E	450										
Turbidity, Field	NTU	n/v	n/v	≤0.3/1.0/0.1 ^G	0.61 ^G	3.51 ^G	14.07 ^G	3.99 ^G	3.58 ^G	1.31 ^G	1.57 ^G	0.59 ^G	0.07	22.33 ^G	11.83 ^G	28.30 ^G	51.73 ^G	166.67 ^G	14.73 ^G	-	23.63 ^G	4.98 ^G										
General Chemistry																																
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	n/v	404	397	399	395	322	282	288	287	103	279	248	398	394	375	-	366	342	303										
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	n/v	<0.60	<0.60	<0.60	<0.60	3.72	<0.60	<0.60	<0.60	<0.60	<0.60	5.40	<0.60	<0.60	<0.60	-	<0.60	<0.60	4.08										
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	n/v	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	-	<0.34	<0.34	<0.34										
Alkalinity, Total	mg/L	n/v	n/v	n/v	331	325	327	324	270	231	236	235	84.1	229	212	326	323	307	-	300	280	255										
Ammonia (as N)	mg/L	n/v	n/v	n/v	0.110	0.119	0.127	0.114	0.114	0.188	0.198	0.196	0.160	0.201	0.191	0.121	0.141	0.132	0.157	-	0.133	0.119										
Chloride	mg/L	640 ^A 120 ^B	n/v	≤250 ^E	6.08	5.84	3.75	5.74	5.73	11.9	11.6	11.2	11.2	11.2	11.2	10.5	10.4	9.95	-	9.82	10.4	10.2										
Fluoride	mg/L	0.12 ^B	n/v	1.5 ^F	0.596 ^B	0.535 ^B	0.374 ^B	0.570 ^B	0.608 ^B	0.756 ^B	0.855 ^B	0.818 ^B	0.803 ^B	0.806 ^B	0.829 ^B	0.199 ^B	0.236 ^B	0.237 ^B	-	0.236 ^B	0.321 ^B	0.272 ^B										
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	369	359	389	389	359	300	284	311	315	286	278	362	354	381	369	-	349	345										
Nitrate (as N)	mg/L	124 ^A 3.0 ^B	13 ^D	10 ^F	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	-	<0.020	<0.020	<0.020										
Nitrite (as N)	mg/L	0.06 ^B	0.06 ^D	1 ^F	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	-	<0.010	<0.010	<0.010										
Nitrogen (Total)	mg/L	n/v	n/v	n/v	<0.20	-	0.21	<0.20	<0.20	<0.20	0.21	-	<0.20	0.21	0.21	<0.20	0.21	-	-	-	<0.20	0.25										
Phosphorus, Total	mg/L	n/v	0.025 ^C	n/v	<0.0030	0.0036	0.0376 ^C	0.0065	0.0050	0.0043	0.0033	0.0033	0.0024	0.0071	0.0058	0.0321 ^C	0.108 ^C	0.191 ^C	0.578 ^C	0.0027	0.144 ^C	0.322 ^C										
Phosphorus, Total (Dissolved)	mg/L	n/v	0.025 ^C	n/v	<0.0030	<0.0030	0.0012	0.0020	<0.0010	<0.0030	<0.0030	<0.0030	0.0023	0.0045	0.0012	<0.0030	0.0033	0.0074	0.0024	<0.0010	<0.0010	<0.0010										
Phosphorus, Total Particulate	mg/L	n/v	n/v	n/v	<0.0042	<0.0042	0.0364	0.0050	0.0043	<0.0042	<0.0042	<0.0042	<0.0028	<0.0032	0.0046	0.0311	0.104	0.184	0.576	<0.0028	0.143	0.321										
Sulfate	mg/L	n/v	n/v	≤500 ^E	123	121	76.1	117	116	132	145	142	129	134	138	149	147	147	-	131	133	141										
Total Dissolved Solids	mg/L	n/v	n/v	≤500 ^E	492	487	451	453	447	428	456	458	428	395	396	532 ^E	534 ^E	561 ^E	-	475	491	529 ^E										
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	n/v	<0.20	<0.20	0.21	<0.20	<0.20	<0.20	0.21	<0.20	<0.20	0.21	0.21	<0.20	0.21	<0.20	<2.0	-	<0.20	0.25										
Total Suspended Solids	mg/L	n/v	n/v	n/v	3.9	<2.0	13.3	10.3	1.8	8.0	5.7	<2.0	<2.0	24.7	9.8	238 XB	465	843	-	<2.0	8,890	5,260 XB										
Microbiological Parameters																																
Escherichia coli (E.Coli)	mpn/100mL	n/v	n/v	0 ^G	<1 ZH	<1 ZH	<1	<1	<1	-	<1	<1	<1 SV	<1	<1	<1	<1 ZH	<1 ZH	<1	-	<1	<1 SV										
Total Coliforms	mpn/100mL	n/v	n/v	0 ^G	1 ZH ^G	<1 ZH	<1	<1	<1	-	9 ^G	<1	<1 SV	<1	<1	46 ^G	75 ZH ^G	1 ZH ^G	<1	-	<1	<1 SV										
BTEX and Petroleum Hydrocarbons																																
Benzene	mg/L	0.37 ^B	n/v	0.005 ^F	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050										
Toluene	mg/L	0.002 ^B	n/v	0.024 ^E 0.06 ^F	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	0.0017	0.00111	<0.0010	<0.0010	<0.0010	<0.0010	0.0013	0.00197	<0.0010	-	<0.0010	<0.0010										
Ethylbenzene	mg/L	0.09 ^B	0.09 ^D	0.0016 ^E 0.14 ^F	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050										
Xylene, m & p-	mg/L	n/v	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	-	<0.00040	<0.00040										
Xylene, o-	mg/L	n/v	n/v	n/v	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00050	-	<0.00050	<0.00050										
Xylenes, Total	mg/L	n/v	n/v	0.02 ^E 0.09 ^F	<0.00064	<0.00050	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00050	<0.00064	-	<0.00064	<0.00064										
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	n/v	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	-	<0.10	<0.10										
PHC F1 (C6-C10 range) minus BTEX	mg/L	n/v	n/v	n/v	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	-	<0.10	<0.10										
PHC F2 (>C10-C16 range)	mg/L	n/v	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	-	<0.10	<0.10										
PHC F3 (>C16-C34 range)	mg/L	n/v	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	-	<0.25	<0.25										
PHC F4 (>C34-C50 range)	mg/L	n/v	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	-	<0.25	<0.25										
Total Hydrocarbons (C6-C50)	mg/L	n/v	n/v	n/v	<0.38	<0.37	<0.38	<0.38	<0.38	<0.38	<0.38	<0.37	<0.38	<0.38	<0.38	<0.38	<0.38	<0.37	<0.38	-	<0.38	<0.38										
Chromatogram to baseline at C50	none	n/v	n/v	n/v	-	YES	-	-	-	-	-	YES	-	-	-	-	-	YES	-	-	-	-										

Table B-11
Groundwater Analytical Results Lake
Manitoba Outlet Channel

Sample Location Sample Date Sample ID Sampling Company Laboratory Laboratory Work Order Laboratory Sample ID Sample Type	Units	CWQG-FAL	MSOG-FAL	CDWQ	BH19-12					BH19-29					CH19-08							
					19-Aug-19 BH19-12 STANTEC ALS L2332554 L2332554-3	7-Oct-19 BH19-12 STANTEC ALS L2362912 L2362912-5	5-May-20 BH19-12 STANTEC ALS L2443834 L2443834-9	8-Jul-20 BH19-12 STANTEC ALS L2472215 L2472215-3	5-Oct-20 BH19-12 STANTEC ALS L2512953 L2512953-4	26-Jun-19 TH18-27 STANTEC ALS L2301696 L2301696-2	20-Aug-19 BH19-29 STANTEC ALS L2332554 L2332554-5	9-Oct-19 BH19-29 STANTEC ALS L2362912 L2362912-19	7-May-20 BH19-29 STANTEC ALS L2444978 L2444978-3	6-Jul-20 BH19-29 STANTEC ALS L2470843 L2470843-7	6-Oct-20 BH19-29 STANTEC ALS L2512953 L2512953-9	24-Jun-19 TH18-03 STANTEC ALS L2297783 L2297783-1	19-Aug-19 CH19-08 STANTEC ALS L2332554 L2332554-1	7-Oct-19 CH19-08 STANTEC ALS L2362912 L2362912-2	5-May-20 CH19-08 STANTEC ALS L2443834 L2443834-6	7-May-20 CH19-08 STANTEC ALS L2444978 L2444978-8	7-Jul-20 CH19-08 STANTEC ALS L2470843 L2470843-14	5-Oct-20 CH19-08 STANTEC ALS L2512953 L2512953-1
Metals, Dissolved																						
Aluminum	mg/L	n/v	0.005/0.1 _{VAR1} ^D	<0.1/0.2 _a ^E	0.0062	0.0020	<0.0010	<0.0010	<0.0010	0.0019	0.0038	<0.0010	<0.0010	0.0016	0.0022	0.0032	0.0036	0.0737	0.0018	-	<0.0010	0.0028
Antimony	mg/L	n/v	n/v	0.006 ^F	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	n/v	0.15/0.34 _{s2} ^D	0.010 ^F	0.00011	0.00010	0.00015	0.00012	0.00013	0.00204	0.00216	0.00194	0.00199	0.00185	0.00195	0.00035	0.00050	0.00043	0.00044	-	0.00039	0.00039
Barium	mg/L	n/v	n/v	2.0 ^F	0.0245	0.0205	0.0233	0.0222	0.0202	0.0266	0.0260	0.0232	0.0224	0.0211	0.0235	0.0197	0.0295	0.0270	0.0303	-	0.0251	0.0277
Beryllium	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010
Bismuth	mg/L	n/v	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050	<0.000050
Boron	mg/L	n/v	29/1.5 _{s3} ^D	5 ^F	0.472	0.502	0.501	0.537	0.473	0.560	0.528	0.61	0.585	0.561	0.550	0.412	0.366	0.423	0.408	-	0.417	0.377
Cadmium	mg/L	n/v	0.00056/0.006 _{s8} ^D	0.007 ^F	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050	<0.000050
Calcium	mg/L	n/v	n/v	n/v	69.4	70.3	71.3	73.7	69.1	54.4	50.4	63.4	56.1	51.4	54.9	63.3	59.6	75.1	61.8	-	57.6	59.9
Cesium	mg/L	n/v	n/v	n/v	0.000022	0.000021	0.000023	0.000021	0.000018	<0.000010	0.000013	<0.000010	0.000012	<0.000010	<0.000010	0.000029	0.000018	0.000037	0.000017	-	0.000011	0.000013
Chromium	mg/L	n/v	0.195/1.5 _{s7} ^D	0.05 ^F	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00018	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010
Cobalt	mg/L	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00024	0.00021	0.00024	0.00022	0.00023	0.00023	0.00033	0.00029	0.00025	0.00018	-	0.00023	0.00015
Copper	mg/L	n/v	0.024/0.04 _{s10} ^D	≤1.0 ^E 2 ^F	0.00044	0.00028	0.00023	<0.00020	0.00052	0.00135	0.00108	<0.00020	<0.00020	<0.00020	0.00554 ^D	0.00047	0.00109	0.00028	0.00106	-	<0.00020	0.00038
Iron	mg/L	n/v	0.3 ^D	≤0.3 ^E	0.087	0.049	0.063	0.053	0.050	0.111	0.135	0.125	0.113	0.111	0.131	0.066	0.143	0.247	0.262	-	0.470 ^{DE}	0.287
Lead	mg/L	n/v	0.008/0.227 _{s9} ^D	0.005 ^F	<0.000050	<0.000050	<0.000050	0.000117	<0.000050	<0.000050	<0.000050	0.000326	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000055	<0.000050	-	<0.000050	<0.000050
Lithium	mg/L	n/v	n/v	n/v	0.0320	0.0282	0.0311	0.0345	0.0312	0.0270	0.0258	0.0278	0.0279	0.0259	0.0261	0.0327	0.0309	0.0309	0.0302	-	0.0306	0.0302
Magnesium	mg/L	n/v	n/v	n/v	47.7	44.5	51.2	49.7	45.3	39.8	38.5	37.0	42.4	38.2	34.3	49.6	49.9	46.9	52.1	-	49.9	47.4
Manganese	mg/L	3.6 _{EO3} ^A 0.43 _{EO4} ^B	n/v	≤0.02 ^E 0.12 ^F	0.0218 ^E	0.00799	0.00856	0.00542	0.00468	0.00985	0.0106	0.0134	0.0128	0.0150	0.0155	0.0185	0.0340 ^E	0.0306 ^E	0.0328 ^E	-	0.0518 ^E	0.0284 ^E
Molybdenum	mg/L	n/v	0.073 ^D	n/v	0.000677	0.00139	0.000398	0.000354	0.000459	0.00104	0.00110	0.00103	0.00109	0.00114	0.00117	0.000709	0.00204	0.00180	0.00134 RV	-	0.00161	0.00110
Nickel	mg/L	n/v	0.14/1.27 _{s11} ^D	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00280	0.00327	0.00293	0.00096	-	0.00258	0.00097
Phosphorus	mg/L	n/v	n/v	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	-	<0.030	<0.030
Potassium	mg/L	n/v	n/v	n/v	9.69	9.98	9.91	10.1	9.03	7.89	7.61	8.51	7.65	7.26	7.24	6.19	6.01	6.62	6.16	-	5.99	5.72
Rubidium	mg/L	n/v	n/v	n/v	0.00588	0.00628	0.00622	0.00573	0.00561	0.00373	0.00323	0.00373	0.00354	0.00326	0.00330	0.00397	0.00340	0.00332	0.00286	-	0.00242	0.00263
Selenium	mg/L	n/v	0.001 ^D	0.05 ^F	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	-	<0.000050	<0.000050
Silicon	mg/L	n/v	n/v	n/v	5.16	4.75	5.22	5.16	4.59	5.04	5.15	5.06	5.37	4.83	5.15	5.64	5.51	5.35	5.73	-	5.21	5.06
Silver	mg/L	n/v	0.0001 ^D	n/v	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	-	<0.000010	<0.000010
Sodium	mg/L	n/v	n/v	≤200 ^E	31.6	34.2	33.1	32.3	30.7	42.9	42.0	44.0	44.0	43.7	42.7	42.4	45.2	49.2	48.4	-	46.3	44.2
Strontium	mg/L	n/v	n/v	7.0 ^F	0.482	0.521	0.537	0.510	0.485	0.450	0.438	0.465	0.444	0.425	0.406	0.421	0.453	0.591	0.610	-	0.599	0.625
Sulfur	mg/L	n/v	n/v	n/v	45.0	42.0	44.8	44.8	38.8	50.0	51.8	44.8	50.2	45.1	50.3	49.2	52.3	48.4	50.2	-	46.3	46.3
Tellurium	mg/L	n/v	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020
Thallium	mg/L	n/v	0.0008 ^D	n/v	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000013	0.000010	0.000013	<0.000010	<0.000010	<0.000010	0.000034	0.000014	<0.000010	<0.000010	-	<0.000010	<0.000010
Thorium	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010
Tin	mg/L	n/v	n/v	n/v	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	0.00017	<0.00010	<0.00010	0.00015	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	<0.00010	<0.00010
Titanium	mg/L	n/v	n/v	n/v	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	0.00283	<0.00030	-	<0.00030	<0.00030
Tungsten	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00036	0.00088	0.00013	0.00087 RV	-	<0.00072	0.00050
Uranium	mg/L	n/v	0.033/0.015 _{s4} ^D	0.02 ^F	0.000458	0.000560	0.000549	0.000473	0.000482	0.00104	0.000880	0.00120	0.00110	0.000942	0.00100	0.00167	0.00138	0.00188	0.00163	-	0.00148	0.00124
Vanadium	mg/L	n/v	n/v	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	-	<0.00050	<0.00050
Zinc	mg/L	0.037 _{EO1} ^A 0.007 _{EO2} ^B	0.32 _{s12} ^D	≤5.0 ^E	0.0043	0.0023	0.0019	0.0026	0.0028	0.0064	0.0036	0.0056	<0.0010	0.0012	0.0025	<0.0010	0.0051	0.0015	0.0026	-	0.0012	0.0042
Zirconium	mg/L	n/v	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020

See notes on last page

Table B-11
Groundwater Analytical Results Lake
Manitoba Outlet Channel

Sample Location Sample Date Sample ID Sampling Company Laboratory Laboratory Work Order Laboratory Sample ID Sample Type	Units	CWQG-FAL	MSOG-FAL	CDWQ	BH19-12					BH19-29					CH19-08							
					19-Aug-19 BH19-12 STANTEC ALS L2332554-3	7-Oct-19 BH19-12 STANTEC ALS L2362912-5	5-May-20 BH19-12 STANTEC ALS L2443834-9	8-Jul-20 BH19-12 STANTEC ALS L2472215-3	5-Oct-20 BH19-12 STANTEC ALS L2512953-4	26-Jun-19 TH18-27 STANTEC ALS L2301696-2	20-Aug-19 BH19-29 STANTEC ALS L2332554-5	9-Oct-19 BH19-29 STANTEC ALS L2362912-19	7-May-20 BH19-29 STANTEC ALS L2444978-3	6-Jul-20 BH19-29 STANTEC ALS L2470843-7	6-Oct-20 BH19-29 STANTEC ALS L2512953-9	24-Jun-19 TH18-03 STANTEC ALS L2297783-1	19-Aug-19 CH19-08 STANTEC ALS L2332554-1	7-Oct-19 CH19-08 STANTEC ALS L2362912-2	5-May-20 CH19-08 STANTEC ALS L2443834-6	7-May-20 CH19-08 STANTEC ALS L2444978-8	7-Jul-20 CH19-08 STANTEC ALS L2470843-14	5-Oct-20 CH19-08 STANTEC ALS L2512953-1
Metals, Total																						
Aluminum	mg/L	0.005/0.1 ^{VAR1} ^B	0.005/0.1 ^{VAR1} ^D	<0.1/0.2 ^E	0.0062	0.0259	0.141 ^{BDE}	0.0344	0.0198 ^{BD}	0.0119	0.0307	0.0052	<0.0030	0.0913	0.0891	0.532	2.15 ^{BDE}	2.13 ^{BDE}	2.17 ^{BDE}	-	6.34 ^{BDE}	3.98 ^{BDE}
Antimony	mg/L	n/v	n/v	0.006 ^F	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	0.005 ^B	n/v	0.010 ^F	0.00015	0.00011	0.00017	0.00024	0.00013	0.00212	0.00247	0.00209	0.00212	0.00200	0.00197	0.00041	0.00134	0.00119	0.00172	-	0.00236	0.00151
Barium	mg/L	n/v	n/v	2.0 ^F	0.0200	0.0199	0.0203	0.0182	0.0186	0.0219	0.0248	0.0231	0.0225	0.0219	0.0214	0.0215	0.0527	0.0406	0.0498	-	0.0737	0.0493
Beryllium	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00021	0.00018	0.00032	-	0.00059	0.00034
Bismuth	mg/L	n/v	n/v	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000057	<0.000050	-	0.000142	0.000121
Boron	mg/L	29 ^A 1.5 ^B	29/1.5 ³³ ^D	5 ^F	0.536	0.545	0.568	0.470	0.517	0.60	0.59	0.63	0.603	0.563	0.589	0.452	0.412	0.443	0.480	-	0.467	0.444
Cadmium	mg/L	0.0077 ^{STB} 0.00037 ^{LTG} ^B	n/v	0.007 ^F	<0.000050	<0.000050	<0.000050	0.000172	0.000079	<0.000050	<0.000050	0.000052	<0.000050	<0.000050	0.000081	0.000065	0.0000251	0.0000266	0.0000916	-	0.0000793	0.0000438
Calcium	mg/L	n/v	n/v	n/v	76.4	73.8	79.6	74.6	74.3	57.7	56.1	59.1	57.3	54.5	58.0	78.7	176	184	500	-	240	232
Cesium	mg/L	n/v	n/v	n/v	0.000022	0.000023	0.000088	0.000037	0.000024	<0.000010	0.000013	<0.000010	<0.000010	0.000019	0.000017	0.000128	0.000504	0.000807	0.000596	-	0.00202	0.00156
Chromium	mg/L	n/v	n/v	0.05 ^F	<0.00010	0.00018	0.00027	0.00016	<0.00010	<0.00010	<0.00010	<0.00010	0.00034	0.00017	0.00141	0.00485	0.00545	0.00825	-	0.0149	0.0102	
Cobalt	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00024	0.00028	0.00023	0.00024	0.00028	0.00028	0.00052	0.00146	0.00164	0.00231	-	0.00406	0.00254
Copper	mg/L	0.004 ^{AB}	n/v	≤1.0 ^E 2 ^F	<0.00050	0.00078	<0.00050	<0.00050	0.00400 ^B	<0.00050	<0.00050	0.00646 ^B	<0.00050	0.00075	0.00487 ^B	0.00190	0.00973 ^B	0.00829 ^B	0.0116 ^B	-	0.0271 ^B	0.0229 ^B
Iron	mg/L	0.3 ^B	0.3 ^D	≤0.3 ^E	0.075	0.069	0.140	0.081	0.055	0.118	0.150	0.130	0.130	0.207	0.210	0.412 ^{BDE}	3.11 ^{BDE}	2.94 ^{BDE}	4.13 ^{BDE}	-	6.69 ^{BDE}	4.71 ^{BDE}
Lead	mg/L	0.007 ^{AB}	n/v	0.005 ^F	<0.00050	0.000275	0.000113	0.000076	0.00167	<0.00050	<0.00050	0.000991	<0.00050	0.000351	0.00118	0.000407	0.00224	0.0021	0.00406	-	0.00661 ^F	0.00568 ^F
Lithium	mg/L	n/v	n/v	n/v	0.0338	0.0303	0.0348	0.0334	0.0328	0.0254	0.0260	0.0296	0.0294	0.0273	0.0274	0.0343	0.0351	0.0326	0.0379	-	0.0429	0.0394
Magnesium	mg/L	n/v	n/v	n/v	52.6	43.6	53.9	44.4	44.3	41.9	45.8	40.6	41.3	38.9	35.7	61.7	120	102	320	-	153	129
Manganese	mg/L	3.6 ^{EQ3} 0.43 ^{EQ4} ^B	n/v	≤0.02 ^E 0.12 ^F	0.0214 ^E	0.00829	0.00903	0.00631	0.00650	0.0105	0.0134	0.0136	0.0130	0.0167	0.0168	0.0288 ^E	0.121 ^{EF}	0.125 ^{EF}	0.438 ^{BEF}	-	0.402 ^{EF}	0.177 ^{EF}
Molybdenum	mg/L	0.073 ^B	0.073 ^D	n/v	0.000724	0.00131	0.000496	0.000329	0.000838	0.00108	0.00109	0.00108	0.00114	0.00105	0.00110	0.000557	0.00167	0.00165	0.000968	-	0.00187	0.000965
Nickel	mg/L	0.150 ^{AB}	n/v	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00069	0.00352	0.00764	0.00830	0.0208	-	0.0239	0.0135
Phosphorus	mg/L	n/v	n/v	n/v	<0.030	<0.030	0.047	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.040	0.166	0.184	0.646	-	0.667	0.369
Potassium	mg/L	n/v	n/v	n/v	9.65	9.66	9.83	9.27	9.57	7.92	8.23	7.84	7.81	7.57	7.46	6.72	7.12	6.69	7.09	-	8.20	7.87
Rubidium	mg/L	n/v	n/v	n/v	0.00580	0.00621	0.00679	0.00590	0.00606	0.00369	0.00381	0.00359	0.00352	0.00351	0.00343	0.00483	0.00768	0.0108	0.00808	-	0.0182	0.0149
Selenium	mg/L	0.001 ^B	0.001 ^D	0.05 ^F	<0.000050	<0.000050	<0.000050	0.000060	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000061	-	0.000085	<0.000050
Silicon	mg/L	n/v	n/v	n/v	4.93	5.22	5.65	4.52	5.34	5.06	5.09	5.27	5.57	5.25	5.39	6.92	9.56	9.93	9.93	-	16.2	13.5
Silver	mg/L	0.00025 ^B	0.0001 ^D	n/v	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000035	0.000023	0.000043	-	0.000084	0.000053
Sodium	mg/L	n/v	n/v	≤200 ^E	33.4	33.1	33.0	28.0	32.9	42.6	47.3	43.9	46.1	43.1	42.3	44.2	49.2	45.1	48.2	-	50.7	45.1
Strontium	mg/L	n/v	n/v	7.0 ^F	0.540	0.550	0.569	0.525	0.511	0.462	0.425	0.486	0.462	0.440	0.428	0.415	0.521	0.640	0.730	-	1.12	0.705
Sulfur	mg/L	n/v	n/v	n/v	40.7	46.6	44.5	37.6	43.2	51.6	48.6	50.7	53.0	46.9	48.1	53.1	51.7	53.5	53.1	-	50.4	51.8
Tellurium	mg/L	n/v	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	-	<0.00020	<0.00020
Thallium	mg/L	0.0008 ^B	0.0008 ^D	n/v	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000013	0.000011	0.000011	<0.000010	<0.000010	0.000012	0.000041	0.000063	0.000079	0.000078	-	0.000208	0.000158
Thorium	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	0.00017	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00031	0.00174	0.00195	0.00342	-	0.00626	0.00442
Tin	mg/L	n/v	n/v	n/v	0.00015	<0.00010	<0.00010	<0.00010	<0.00010	0.00071	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00030	0.00014	0.00012	0.00015	-	0.00028	0.00024
Titanium	mg/L	n/v	n/v	n/v	<0.00030	0.00098	0.00451	0.00152	0.00065	0.00062	0.00174	0.00034	<0.00030	0.00473	0.00483	0.0222	0.0845	0.0758	0.0612	-	0.165	0.142
Tungsten	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00023	<0.00010	0.00021	0.00086	0.00041	0.00035	-	0.00078	0.00037
Uranium	mg/L	0.033 ^A 0.015 ^B	0.033/0.015 ³⁴ ^D	0.02 ^F	0.000553	0.000501	0.000622	0.000483	0.000551	0.000984	0.000961	0.00111	0.00111	0.000964	0.00101	0.00162	0.00201	0.00177	0.00247	-	0.00318	0.00214
Vanadium	mg/L	n/v	n/v	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00057	<0.00050	0.00167	0.00634	0.00728	0.00838	-	0.0159	0.0117
Zinc	mg/L	n/v	n/v	≤5.0 ^E	<0.0030	0.0031	<0.0030	0.0082	0.0278	0.0050	0.0082	<0.0030	0.0034	0.0169	0.0169	0.0072	0.0158	0.018	0.0525	-	0.0621	0.0435
Zirconium	mg/L	n/v	n/v	n/v	<0.00020	<0.00020	0.00028	0.00077	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.00075	0.00139	0.00089	0.00197	-	0.00230	0.00193

See notes on last page

Table B-11
Groundwater Analytical Results Lake
Manitoba Outlet Channel

Sample Location	Sample Date	Sample ID	Sampling Company	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	CWQG-FAL	MSOG-FAL	CDWQ	CH19-11	CH19-37					OW19-05					OW19-16		OW19-18					
												28-Jun-19	8-Oct-19	4-May-20	6-Jul-20	7-Oct-20	19-Aug-19	8-Oct-19	8-Oct-19	7-May-20	6-Jul-20	5-Oct-20	5-Oct-20	19-Aug-19	19-Aug-19	7-Oct-19	5-May-20	7-Jul-20	5-Oct-20	
												TH18-13	CH19-37	CH19-37	CH19-37	CH19-37	OW19-05	OW19-05	QC-02	OW19-05	OW19-05	OW19-05	QC-1 (NOT ON COC)	OW19-16	QC-01	OW19-18	OW19-18	OW19-18	OW19-18	
												STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
												ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS
												L2301696	L2362912	L2443834	L2470843	L2514453	L2332554	L2362912	L2362912-15	L2444978	L2470843	L2512953	L2512953-11	L2332554	L2332554	L2362912-4	L2443834	L2470843	L2512953	
												L2301696-4	L2362912-13	L2443834-2	L2470843-3	L2514453-2	L2332554-4	L2362912-9	Field Duplicate	L2444978-4	L2470843-8	L2512953-7	Field Duplicate	L2332554-2	L2332554-7	Field Duplicate	L2362912-4	L2443834-8	L2470843-15	L2512953-3
Field Parameters																														
Dissolved oxygen, Field	mg/L	>5.5/6.5/9.5 ^{VAR}	n/v	n/v	NM	1.28 ^B	1.20 ^B	4.06 ^B	1.8 ^B	4.1 ^B	1.25 ^B	-	2.30 ^B	4.28 ^B	0.64 ^B	-	4.82 ^B	-	0.98 ^B	1.23 ^B	6.07	3.61 ^B								
Electrical Conductivity, Field	µS/cm	n/v	n/v	n/v	781	646.2	495.6	624.0	689.7	527.7	518.7	-	481.9	505.6	612.5	-	677.5	-	664.5	512.1	662.0	788.7								
Nitrite, Field	mg/L	n/v	n/v	n/v	0.02	NM	-	-	-	0.01	-	-	-	-	-	-	0.00	-	NM	-	-	-								
Oxidation Reduction Potential, field	mV	n/v	n/v	n/v	4.6	18.4	143.6	46.1	9.4	81.4	-88.5	-	98.6	30.1	-142	-	88.9	-	-3.3	103.8	18.3	-81.4								
pH, Field	S.U.	6.5-9.0 ^B	6.5-9.0 ^D	7.0-10.5 ^E	7.48	7.82	7.25	7.26	7.12	8.04	7.79	-	7.36	7.46	7.22	-	7.8	-	7.36	7.02	7.12	6.9 ^E								
Pressure	kPa	n/v	n/v	n/v	NM	NM	-	-	98.63	NM	NM	-	-	-	97.46	-	NM	-	NM	-	-	97.29								
Temperature, Field	deg C	n/v	n/v	≤15 ^E	6.2	8	5.8	6.7	8.9	8.5	8.7	-	5.4	6.9	8	-	7.7	-	8.2	5.8	6.3	6.7								
Total Dissolved Solids, Field	ppm	n/v	n/v	≤500 ^E	-	-	649 ^E	575 ^E	440	-	-	-	488	475	330	-	-	-	-	612 ^E	600 ^E	460								
Turbidity, Field	NTU	n/v	n/v	≤0.3/1.0/0.1 ^G	2.57 ^G	2.50 ^G	0.76 ^G	2.32 ^G	4.00 ^G	24.23 ^G	54.00 ^G	-	1.17 ^G	0.57 ^G	54.00 ^G	-	1.22 ^G	-	10.46 ^G	3.58 ^G	10.27 ^G	2.25 ^G								
General Chemistry																														
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	n/v	415	311	324	309	272	279	268	260	1,200	268	245	246	432	422	423	431	423	344								
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	n/v	<0.60	<0.60	<0.60	<0.60	9.72	<0.60	<0.60	<0.60	<0.60	<0.60	8.28	8.04	<0.60	<0.60	<0.60	<0.60	<0.60	2.28								
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	n/v	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34									
Alkalinity, Total	mg/L	n/v	n/v	n/v	340	255	266	253	239	229	220	214	983	220	215	215	354	346	347	353	347	286								
Ammonia (as N)	mg/L	n/v	n/v	n/v	0.121	0.215	0.137	0.138	0.131	0.103	0.096	0.133	<0.010	0.053	0.100	0.098	0.193	0.180	0.136	0.150	0.128	0.133								
Chloride	mg/L	640 ^A 120 ^B	n/v	≤250 ^E	5.62	14.8	9.91	14.9	15.3	11.0	10.8	10.9	11.1	10.7	10.9	10.9	6.06	6.08	6.12	6.05	6.46	6.38								
Fluoride	mg/L	0.12 ^B	n/v	1.5 ^F	0.554 ^B	0.399 ^B	0.273 ^B	0.388 ^B	0.428 ^B	0.532 ^B	0.477 ^B	0.498 ^B	0.580 ^B	0.587 ^B	0.574 ^B	0.577 ^B	0.740 ^B	0.728 ^B	0.744 ^B	0.812 ^B	0.796 ^B	0.801 ^B								
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	391	326	363	349	315	257	259	262	267	243	238	245	389	387	383	404	387	382								
Nitrate (as N)	mg/L	124 ^A 3.0 ^B	13 ^D	10 ^F	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020								
Nitrite (as N)	mg/L	0.06 ^B	0.06 ^D	1 ^F	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010								
Nitrogen (Total)	mg/L	n/v	n/v	n/v	<0.20	-	<0.20	<0.20	<0.20	<0.20	-	-	<0.20	<0.20	<0.20	0.25	0.23	-	<0.20	<0.20	<0.20	<0.20								
Phosphorus, Total	mg/L	n/v	0.025 ^C	n/v	0.0034	<0.0030	0.0011	0.0039	<0.0010	0.0168	0.0218	0.0148	0.0077	0.0310 ^C	0.0307 ^C	0.0034	0.0033	<0.0030	0.0018	0.0073	0.0027	0.0027								
Phosphorus, Total (Dissolved)	mg/L	n/v	0.025 ^C	n/v	<0.0030	<0.0030	<0.0010	<0.0010	<0.0010	0.0031	0.0061	0.0072	0.0013	0.0029	0.0027	0.0032	<0.0030	<0.0030	<0.0030	0.0011	0.0041	0.0012								
Phosphorus, Total Particulate	mg/L	n/v	n/v	n/v	<0.0042	<0.0042	<0.0028	0.0040	<0.0028	0.0138	0.0199	0.0146	0.0136	0.0048	0.0283	0.0276	<0.0042	<0.0042	<0.0042	<0.0028	0.0032	<0.0028								
Sulfate	mg/L	n/v	n/v	≤500 ^E	117	160	103	153	154	108	114	112	104	100	114	115	112	111	110	111	110	111								
Total Dissolved Solids	mg/L	n/v	n/v	≤500 ^E	471	485	467	405	453	405	390	401	385	356	342	365	492	485	499	454	429	483								
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	n/v	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.25	0.23	<0.20	<0.20	<0.20	<0.20								
Total Suspended Solids	mg/L	n/v	n/v	n/v	5.3	<2.0	<2.0	4.6	<1.0	32.0	245	251	32.1	16.9	181	86.0	9.7	<2.0	3.1	6.4	10.9	3.7								
Microbiological Parameters																														
Escherichia coli (E.Coli)	mpn/100mL	n/v	n/v	0 ^G	-	<1	<1	<1	<1	<1 ZH	<1 ZH	<1	<1	<1	<1	<1	<1 ZH	<1 ZH	<1 ZH	<1	<1	<1 SV								
Total Coliforms	mpn/100mL	n/v	n/v	0 ^G	-	14 ^G	<1	<1	<1	24 ZH ^G	<1 ZH	<1	<1	<1	<1	<1	2 ZH ^G	196 ZH ^G	9 ZH ^G	<1	<1	<1 SV								
BTEX and Petroleum Hydrocarbons																														
Benzene	mg/L	0.37 ^B	n/v	0.005 ^F	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050								
Toluene	mg/L	0.002 ^B	n/v	0.024 ^E 0.06 ^F	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	0.0098 ^B	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010								
Ethylbenzene	mg/L	0.09 ^B	0.09 ^D	0.0016 ^E 0.14 ^F	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050								
Xylene, m & p-	mg/L	n/v	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040								
Xylene, o-	mg/L	n/v	n/v	n/v	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050								
Xylenes, Total	mg/L	n/v	n/v	0.02 ^E 0.09 ^F	<0.00064	<0.00050	<0.00064	<0.00064	<0.00064	<0.00064	<0.00050	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064								
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	n/v	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.025	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10								
PHC F1 (C6-C10 range) minus BTEX	mg/L	n/v	n/v	n/v	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.025	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10								
PHC F2 (>C10-C16 range)	mg/L	n/v	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10								
PHC F3 (>C16-C34 range)	mg/L	n/v	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25								
PHC F4 (>C34-C50 range)	mg/L	n/v	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25								
Total Hydrocarbons (C6-C50)	mg/L	n/v	n/v	n/v	<0.38	<0.37	<0.38	<0.38	<0.38	<0.38	<0.37	<																		

Table B-11
Groundwater Analytical Results Lake
Manitoba Outlet Channel

Sample Location Sample Date Sample ID Sampling Company Laboratory Laboratory Work Order Laboratory Sample ID Sample Type	Units	CWQG-FAL	MSOG-FAL	CDWQ	CH19-11	CH19-37					OW19-05					OW19-16		OW19-18						
					28-Jun-19	8-Oct-19	4-May-20	6-Jul-20	7-Oct-20	19-Aug-19	8-Oct-19	8-Oct-19	7-May-20	6-Jul-20	5-Oct-20	5-Oct-20 QC-1 (NOT ON COC)	19-Aug-19	19-Aug-19	7-Oct-19	5-May-20	7-Jul-20	5-Oct-20		
					TH18-13	CH19-37	CH19-37	CH19-37	CH19-37	CH19-37	OW19-05	OW19-05	QC-02	OW19-05	OW19-05	OW19-05	STANTEC ALS L2512953-11 Field Duplicate	STANTEC ALS L2332554-2	STANTEC ALS L2332554-7 Field Duplicate	STANTEC ALS L2362912-4	STANTEC ALS L2443834-8	STANTEC ALS L2470843-15	STANTEC ALS L2512953-3	
Metals, Dissolved																								
Aluminum	mg/L	n/v	0.005/0.1 _{VAR1} ^D	<0.1/0.2 _a ^E	0.0033	0.0020	<0.0010	<0.0010	0.0018	0.0023	0.0025	0.0021	<0.0010	<0.0010	<0.0010	0.0069	0.0020	<0.0010	0.0010	0.0012	<0.0010	<0.0010	<0.0010	<0.0010
Antimony	mg/L	n/v	n/v	0.006 ^F	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00052	0.00024	0.00025	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic	mg/L	n/v	0.15/0.34 _{s2} ^D	0.010 ^F	0.00048	0.00012	0.00014	0.00015	0.00030	0.00250	0.00203	0.00207	0.00100	0.00092	0.00172	0.00164	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Barium	mg/L	n/v	n/v	2.0 ^F	0.0237	0.0236	0.0236	0.0215	0.0232	0.0400	0.0406	0.0408	0.0449	0.0413	0.0402	0.0370	0.0231	0.0183	0.0207	0.0240	0.0184	0.0206	0.0206	0.0206
Beryllium	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Bismuth	mg/L	n/v	n/v	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Boron	mg/L	n/v	29/1.5 _{s3} ^D	5 ^F	0.543	0.602	0.613	0.644	0.575	0.420	0.480	0.467	0.459	0.456	0.384	0.447	0.504	0.486	0.528	0.531	0.525	0.491	0.491	0.491
Cadmium	mg/L	n/v	0.00056/0.006 _{s8} ^D	0.007 ^F	<0.000050	<0.000050	0.000097	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Calcium	mg/L	n/v	n/v	n/v	68.1	58.2	60.6	60.0	60.2	43.9	50.5	50.2	44.5	41.2	43.5	47.0	69.8	67.3	75.2	72.9	70.4	72.8	72.8	72.8
Cesium	mg/L	n/v	n/v	n/v	0.000018	<0.000010	<0.000010	<0.000010	<0.000010	0.000025	0.000029	0.000033	0.000022	0.000020	0.000021	0.000027	0.000013	0.000013	0.000025	0.000026	0.000022	0.000021	0.000021	0.000021
Chromium	mg/L	n/v	0.195/1.5 _{s7} ^D	0.05 ^F	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Cobalt	mg/L	n/v	n/v	n/v	0.00020	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper	mg/L	n/v	0.024/0.04 _{s10} ^D	≤1.0 ^E 2 ^F	<0.00020	<0.00020	0.00074	0.00026	0.00121	0.00032	0.00069	0.00025	0.00036	<0.00020	0.00031	<0.00020	<0.00020	<0.00020	0.00050	0.00127	<0.00020	0.00068	0.00068	0.00068
Iron	mg/L	n/v	0.3 ^D	≤0.3 ^E	0.090	0.048	0.042	0.046	0.050	<0.010	0.216	0.042	0.230	0.187	0.220	0.182	0.160	0.015	<0.010	0.013	0.0137	0.040	0.037	0.037
Lead	mg/L	n/v	0.008/0.227 _{s9} ^D	0.005 ^F	<0.000050	0.000499	0.00204	<0.000050	<0.000050	<0.000050	0.000050	0.000055	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000161	0.000087	<0.000050	<0.000050	<0.000050	<0.000050
Lithium	mg/L	n/v	n/v	n/v	0.0338	0.0303	0.0353	0.0366	0.0330	0.0192	0.0187	0.0192	0.0199	0.0189	0.0183	0.0188	0.0332	0.0349	0.0310	0.0347	0.0337	0.0344	0.0344	0.0344
Magnesium	mg/L	n/v	n/v	n/v	53.5	43.8	51.4	48.4	40.0	35.8	32.1	33.2	37.8	34.0	31.4	31.0	52.0	53.1	47.4	53.9	51.2	48.5	48.5	48.5
Manganese	mg/L	3.6 _{EQ3} ^A 0.43 _{EQ4} ^B	n/v	≤0.02 ^E 0.12 ^F	0.0190	0.00683	0.00734	0.00717	0.00622	0.0546 ^E	0.0309 ^E	0.0319 ^E	0.0330 ^E	0.0506 ^E	0.0309 ^E	0.0328 ^E	0.0138	0.0128	0.0266 ^E	0.0168	0.0193	0.0139	0.0139	0.0139
Molybdenum	mg/L	n/v	0.073 ^D	n/v	0.000248	0.000500	0.000539	0.000623	0.000547	0.00651	0.00573	0.00572	0.00464	0.00359	0.00177	0.00189	0.000836	0.000280	0.000480 RV	0.000222	0.000221	0.000235	0.000235	0.000235
Nickel	mg/L	n/v	0.14/1.27 _{s11} ^D	n/v	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus	mg/L	n/v	n/v	n/v	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Potassium	mg/L	n/v	n/v	n/v	10.3	8.20	8.11	7.93	7.80	6.82	6.62	7.03	6.71	6.50	6.10	6.22	10.3	10.0	11.2	10.9	10.9	10.2	10.2	10.2
Rubidium	mg/L	n/v	n/v	n/v	0.00515	0.00343	0.00326	0.00321	0.00316	0.00399	0.00419	0.00436	0.00372	0.00345	0.00379	0.00394	0.00602	0.00617	0.00677	0.00679	0.00641	0.00622	0.00622	0.00622
Selenium	mg/L	n/v	0.001 ^D	0.05 ^F	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000124	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Silicon	mg/L	n/v	n/v	n/v	5.58	4.68	4.71	4.43	4.63	3.90	3.77	3.78	4.17	3.54	3.40	3.87	5.67	5.77	5.47	5.90	5.15	5.16	5.16	5.16
Silver	mg/L	n/v	0.0001 ^D	n/v	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium	mg/L	n/v	n/v	≤200 ^E	33.9	41.3	43.2	41.3	40.0	36.6	40.5	41.5	43.8	44.0	36.8	37.7	32.0	32.5	34.3	34.9	33.3	32.8	32.8	32.8
Strontium	mg/L	n/v	n/v	7.0 ^F	0.539	0.419	0.498	0.454	0.426	0.368	0.342	0.348	0.345	0.331	0.312	0.308	0.509	0.506	0.569	0.577	0.556	0.549	0.549	0.549
Sulfur	mg/L	n/v	n/v	n/v	41.9	55.8	54.3	52.1	51.5	38.7	39.1	38.5	41.4	34.1	31.1	36.7	40.1	40.0	38.1	39.4	35.3	35.8	35.8	35.8
Tellurium	mg/L	n/v	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Thallium	mg/L	n/v	0.0008 ^D	n/v	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Thorium	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium	mg/L	n/v	n/v	n/v	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Tungsten	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00322	0.00201	0.00200	0.00323	0.00324	0.00143	0.00155	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Uranium	mg/L	n/v	0.033/0.015 _{s4} ^D	0.02 ^F	0.000946	0.00205	0.00213	0.00194	0.00181	0.000202	0.000143	0.000140	0.0001											

Table B-11
Groundwater Analytical Results Lake
Manitoba Outlet Channel

Sample Location	Sample Date	Sample ID	Sampling Company	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	CWQG-FAL	MSOG-FAL	CDWQ	CH19-11	CH19-37					OW19-05					OW19-16		OW19-18					
												28-Jun-19	8-Oct-19	4-May-20	6-Jul-20	7-Oct-20	19-Aug-19	8-Oct-19	8-Oct-19	7-May-20	6-Jul-20	5-Oct-20	5-Oct-20	19-Aug-19	19-Aug-19	7-Oct-19	5-May-20	7-Jul-20	5-Oct-20	
												TH18-13	CH19-37	CH19-37	CH19-37	CH19-37	OW19-05	OW19-05	QC-02	OW19-05	OW19-05	OW19-05	QC-1	OW19-16	QC-01	OW19-18	OW19-18	OW19-18	OW19-18	
												STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
												ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS
												L2301696	L2362912	L2443834	L2470843	L2514453	L2332554	L2362912	L2362912-15	L2444978	L2470843	L2512953	L2512953-11	L2332554	L2332554-7	L2362912-4	L2443834-8	L2470843-15	L2512953	
												L2301696-4	L2362912-13	L2443834-2	L2470843-3	L2514453-2	L2332554-4	L2362912-9	Field Duplicate	L2444978-4	L2470843-8	L2512953-7	Field Duplicate	L2332554-2	Field Duplicate	L2362912-4	L2443834-8	L2470843-15	L2512953-3	
Metals, Total																														
Aluminum	mg/L	0.005/0.1 ^{VAR1} ^B	0.005/0.1 ^{VAR1} ^D	<0.1/0.2 ^E	0.0244	0.0097	0.0041	0.0404	0.644^{BDE}	0.483^{BDE}	0.383^{BDE}	0.382^{BDE}	0.0907	0.0482	0.695^{BDE}	0.485^{BDE}	0.0056	0.0068	0.0072	0.007	0.0305	0.0113^{BD}								
Antimony	mg/L	n/v	n/v	0.006 ^F	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00067	0.00027	0.00026	0.00017	0.00013	0.00014	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00013								
Arsenic	mg/L	0.005 ^B	n/v	0.010 ^F	0.00050	0.00022	0.00019	0.00023	0.00051	0.00346	0.00266	0.00257	0.00146	0.00114	0.00253	0.00226	0.00011	0.00012	0.00011	0.00012	0.00017	<0.00010								
Barium	mg/L	n/v	n/v	2.0 ^F	0.0184	0.0228	0.0233	0.0220	0.0247	0.0441	0.0419	0.0420	0.0436	0.0432	0.0409	0.0400	0.0196	0.0198	0.0191	0.0199	0.0193	0.0190								
Beryllium	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	<0.00010	<0.00010	0.00014	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010								
Bismuth	mg/L	n/v	n/v	n/v	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050								
Boron	mg/L	29 ^A 1.5 ^B	29/1.5 ³³ ^D	5 ^F	0.59	0.68	0.713	0.619	0.675	0.469	0.450	0.502	0.455	0.485	0.447	0.447	0.544	0.533	0.551	0.600	0.580	0.544								
Cadmium	mg/L	0.0077 ^{STB} ^A 0.00037 ^{LIG} ^B	n/v	0.007 ^F	<0.000050	0.0000183	0.0000086	<0.000050	0.0000092	0.0000143	0.0000105	0.0000074	<0.000050	<0.000050	0.0000170	0.0000075	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050								
Calcium	mg/L	n/v	n/v	n/v	73.0	63.7	67.2	59.8	62.8	53.3	95.7	73.9	48.4	45.4	77.4	54.0	74.9	74.5	72.9	78.5	74.3	77.1								
Cesium	mg/L	n/v	n/v	n/v	0.000020	<0.000010	<0.000010	0.000011	0.000012	0.000130	0.000101	0.000085	0.000034	0.000036	0.000187	0.000149	0.000018	0.000016	0.000022	0.000028	0.000028	0.000027								
Chromium	mg/L	n/v	n/v	0.05 ^F	0.00025	0.00013	<0.00010	<0.00010	0.00038	0.00087	0.00093	0.00077	0.00026	0.00014	0.00142	0.00091	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010								
Cobalt	mg/L	n/v	n/v	n/v	0.00021	0.00011	<0.00010	<0.00010	0.00029	0.00109	0.00109	0.00080	0.00014	<0.00010	0.00162	0.00099	<0.00010	<0.00010	0.00013	<0.00010	<0.00010	<0.00010								
Copper	mg/L	0.004 ^{AB}	n/v	≤1.0 ^E 2 ^F	<0.00050	0.0310^B	0.00729^B	<0.00050	0.00296	0.00396	0.00132	0.00145	0.00067	<0.00050	0.00489^B	0.00131	<0.00050	<0.00050	0.00081	<0.00050	0.00154	0.00096								
Iron	mg/L	0.3 ^B	0.3 ^D	≤0.3 ^E	0.097	0.050	0.047	0.066	0.957^{BDE}	1.07^{BDE}	1.15^{BDE}	0.952^{BDE}	0.471^{BDE}	0.460^{BDE}	1.73^{BDE}	1.16^{BDE}	0.024	0.023	0.020	0.026	0.065	0.049								
Lead	mg/L	0.007 ^{AB}	n/v	0.005 ^F	<0.000050	0.00226	0.0021	0.000073	0.000682	0.000935	0.000666	0.000598	0.000252	0.000106	0.00219	0.000923	<0.000050	<0.000050	0.000261	0.000121	0.000366	0.00144								
Lithium	mg/L	n/v	n/v	n/v	0.0319	0.0386	0.0388	0.0365	0.0352	0.0205	0.0209	0.0218	0.0206	0.0204	0.0204	0.0204	0.0358	0.0339	0.0344	0.0374	0.0357	0.0355								
Magnesium	mg/L	n/v	n/v	n/v	56.1	51.4	52.0	47.6	47.2	43.0	68.0	51.7	40.0	37.2	48.3	34.7	59.8	45.6	44.3	55.1	54.5	46.8								
Manganese	mg/L	3.6 ^{EQ3} ^A 0.43 ^{EQ4} ^B	n/v	≤0.02 ^E 0.12 ^F	0.0187	0.00721	0.00765	0.00773	0.0211^E	0.0656^E	0.0455^E	0.0394^E	0.0397^E	0.0554^E	0.0452^E	0.0378^E	0.0153	0.0148	0.0290^E	0.0163	0.0195	0.0155								
Molybdenum	mg/L	0.073 ^B	0.073 ^D	n/v	0.000219	0.000579	0.000565	0.000484	0.000505	0.00664	0.00614	0.00621	0.00496	0.00388	0.00199	0.00191	0.000958	0.000703	0.000238	0.000226	0.000226	0.000244								
Nickel	mg/L	0.150 ^{AB}	n/v	n/v	<0.00050	0.00051	0.00056	<0.00050	0.00083	0.00225	0.00161	0.00128	<0.00050	<0.00050	0.00265	0.00165	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050								
Phosphorus	mg/L	n/v	n/v	n/v	<0.030	<0.030	<0.030	<0.030	<0.030	0.049	<0.030	<0.030	<0.030	<0.030	0.038	0.042	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030								
Potassium	mg/L	n/v	n/v	n/v	10.3	7.99	8.17	8.13	7.83	7.22	6.93	6.98	6.89	6.75	6.68	6.51	10.7	9.88	10.2	11.0	11.0	11.0								
Rubidium	mg/L	n/v	n/v	n/v	0.00512	0.00339	0.00332	0.00330	0.00324	0.00495	0.00509	0.00510	0.00399	0.00373	0.00565	0.00499	0.00649	0.00638	0.00728	0.00670	0.00665	0.00671								
Selenium	mg/L	0.001 ^B	0.001 ^D	0.05 ^F	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000228	0.000111	0.000090	<0.000050	<0.000050	0.000143	0.000094	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050								
Silicon	mg/L	n/v	n/v	n/v	5.68	4.79	5.14	4.78	6.61	4.60	4.59	4.58	4.32	4.20	5.13	4.78	6.01	5.56	5.83	6.13	5.72	5.91								
Silver	mg/L	0.00025 ^B	0.0001 ^D	n/v	<0.000010	0.000017	<0.000010	<0.000010	<0.000010	0.000014	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000046	<0.000010	<0.000010	<0.000010	<0.000010								
Sodium	mg/L	n/v	n/v	≤200 ^E	33.5	42.7	41.9	41.0	41.7	38.9	41.8	42.3	46.9	45.3	37.3	34.3	35.4	31.0	32.3	33.9	34.3	32.4								
Strontium	mg/L	n/v	n/v	7.0 ^F	0.554	0.485	0.518	0.472	0.474	0.378	0.378	0.383	0.360	0.352	0.328	0.332	0.533	0.482	0.597	0.605	0.566	0.554								
Sulfur	mg/L	n/v	n/v	n/v	44.1	56.4	60.1	54.4	55.3	37.0	44.3	42.8	43.5	39.8	37.1	37.0	41.0	40.2	42.4	42.4	39.0	41.2								
Tellurium	mg/L	n/v	n/v	n/v	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020								
Thallium	mg/L	0.0008 ^B	0.0008 ^D	n/v	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	0.000016	0.000011	<0.000010	<0.000010	<0.000010	0.000024	0.000013	0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010								
Thorium	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	<0.00010	0.00021	0.00060	0.00045	0.00034	0.00015	<0.00010	0.00113	0.00082	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010								
Tin	mg/L	n/v	n/v	n/v	0.00012	0.00036	0.00010	<0.00010	0.00041	0.00039	0.00011	<0.00010	0.00113	0.00069	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010								
Titanium	mg/L	n/v	n/v	n/v	0.00090	0.00038	<0.00030	0.00092	0.0295	0.0126	0.0113	0.0106	0.00407	0.00176	0.0202	0.0146	<0.00030	0.00035	0.00036	<0.00030	0.00097	0.00057								
Tungsten	mg/L	n/v	n/v	n/v	<0.00010	<0.00010	<0.00010	0.00025	<0.00010	0.00337	0.00184	0.00185	0.00343	0.00351	0.00114	0.00125	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010								
Uranium	mg/L	0.033 ^A 0.015 ^B	0.033/0.015 ³⁴ ^D	0.02 ^F	0.000896	0.00222	0.00225	0.00197	0.00194	0.000630	0.000449	0.000421	0.000223	0.000140	0.000779	0.000594	0.000613	0.000546	0.000637	0.000767	0.000677	0.000700								

Table B-11
Groundwater Analytical Results Lake
Manitoba Outlet Channel

Sample Location	Sample Date	Sample ID	Sampling Company	Laboratory	Laboratory Work Order	Laboratory Sample ID	Sample Type	Units	CWQG-FAL	MSOG-FAL	CDWQ	OW19-23						OW19-40				PW19-06	PW19-17	PW19-22		
												19-Aug-19	8-Oct-19	4-May-20	5-May-20	6-Jul-20	8-Oct-20	8-Oct-19	6-Jul-20	6-Jul-20	8-Oct-20	27-Jun-19	25-Jun-19	28-Jun-19	28-Jun-19	
												OW19-23	OW19-23	OW19-23	QC-02	OW19-23	OW19-23	OW19-40	OW19-40	QC-01	OW19-40	TH18-21	TH18-09	TH18-36	QC-02	
												STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
												ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS	ALS
												L2332554	L2362912	L2443834	L2443834	L2470843	L2514453	L2362912	L2470843	L2470843	L2514453	L2301696	L2301696	L2301696	L2301696	
												L2332554-6	L2362912-14	L2443834-3	L2443834-11	L2470843-4	L2514453-10	L2362912-12	L2470843-1	L2470843-10	L2514453-9	L2301696-3	L2301696-1	L2301696-5	L2301696-6	
															Field Duplicate					Field Duplicate					Field Duplicate	
Field Parameters																										
Dissolved oxygen, Field	mg/L	>5.5/6.5/9.5 ^{VAR} ^B	n/v	n/v	3.08 ^B	10.8	1.85 ^B	-	5.78	1.6 ^B	1.21 ^B	5.64	-	4.15 ^B	4.7 ^B	3.3 ^B	5.45 ^B	-								
Electrical Conductivity, Field	µS/cm	n/v	n/v	n/v	607	579.6	459.2	-	583.4	654.6	608.9	650.6	-	705.8	654.6	727	676.7	-								
Nitrite, Field	mg/L	n/v	n/v	n/v	0.01	NM	-	-	-	NM	-	-	-	-	0.01	0.01	0.00	-								
Oxidation Reduction Potential, field	mV	n/v	n/v	n/v	56.2	30.8	134.9	-	59.1	-28.7	29	36.4	-	-49.9	-26.5	61.4	-23	-								
pH, Field	S.U.	6.5-9.0 ^B	6.5-9.0 ^D	7.0-10.5 ^E	8.02	7.74	7.38	-	7.45	7.22	8.12	7.43	-	7.36	7.87	7.63	7.55	-								
Pressure	kPa	n/v	n/v	n/v	NM	NM	-	-	-	98.73	NM	-	-	98.81	101.6	100.44	101.86	-								
Temperature, Field	deg C	n/v	n/v	≤15 ^E	7.9	8.3	6.5	-	6.9	7	7.4	6.5	-	5.9	6.9	7.2	7.8	-								
Total Dissolved Solids, Field	ppm	n/v	n/v	≤500 ^E	-	-	542 ^E	-	523 ^E	440	-	608 ^E	-	480	-	-	-	-								
Turbidity, Field	NTU	n/v	n/v	≤0.3/1.0/0.1 ^G	6.47 ^G	1.85 ^G	15.37 ^G	-	31.63 ^G	17.53 ^G	7.65 ^G	31.90 ^G	-	47.63 ^G	7.15 ^G	1.19 ^G	11.24 ^G	-								
General Chemistry																										
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	n/v	n/v	287	278	293	291	287	260	309	317	322	300	315	369	278	273								
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	n/v	n/v	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60								
Alkalinity, Hydroxide (as CaCO3)	mg/L	n/v	n/v	n/v	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34								
Alkalinity, Total	mg/L	n/v	n/v	n/v	235	228	240	239	235	213	253	260	264	246	258	302	228	224								
Ammonia (as N)	mg/L	n/v	n/v	n/v	0.180	0.173	0.138	0.153	0.139	0.141	0.086	0.063	0.073	0.065	0.118	0.137	0.161	0.146								
Chloride	mg/L	640 ^A 120 ^B	n/v	≤250 ^E	20.9	20.1	19.4	20.2	21.0	21.1	16.5	17.9	17.0	17.7	8.47	6.53	20.6	20.4								
Fluoride	mg/L	0.12 ^B	n/v	1.5 ^F	0.840 ^B	0.776 ^B	0.798 ^B	0.794 ^B	0.819 ^B	0.827 ^B	0.372 ^B	0.367 ^B	0.353 ^B	0.364 ^B	0.419 ^B	0.637 ^B	0.757 ^B	0.750 ^B								
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	276	285	288	294	283	269	333	346	349	345	304	396	270	270								
Nitrate (as N)	mg/L	124 ^A 3.0 ^B	13 ^D	10 ^F	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020								
Nitrite (as N)	mg/L	0.06 ^B	0.06 ^D	1 ^F	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010								
Nitrogen (Total)	mg/L	n/v	n/v	n/v	0.22	-	<0.20	0.21	<0.20	<0.20	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20								
Phosphorus, Total	mg/L	n/v	0.025 ^C	n/v	0.0096	0.0048	0.0135	0.0080	0.0138	0.0304 ^C	0.0059	0.0070	0.0053	0.0303 ^C	0.0346 ^C	<0.0030	0.0131	0.0112								
Phosphorus, Total (Dissolved)	mg/L	n/v	0.025 ^C	n/v	<0.0030	<0.0030	0.0017	0.0013	0.0039	0.0023	<0.0030	0.0034	0.0012	0.0015	<0.0030	<0.0030	0.0034	<0.0030								
Phosphorus, Total Particulate	mg/L	n/v	n/v	n/v	0.0071	<0.0042	0.0118	0.0067	0.0099	0.0281	<0.0042	0.0036	0.0041	0.0287	0.0325	<0.0042	0.0097	0.0096								
Sulfate	mg/L	n/v	n/v	≤500 ^E	135	131	128	132	130	134	157	162	158	163	106	108	124	123								
Total Dissolved Solids	mg/L	n/v	n/v	≤500 ^E	447	442	425	421	418	430	494	454	460	487	392	486	411	408								
Total Kjeldahl Nitrogen	mg/L	n/v	n/v	n/v	0.22	<0.20	<0.20	0.21	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20								
Total Suspended Solids	mg/L	n/v	n/v	n/v	7.7	4.3	47.6	27.3	57.3	101	6.3	32.3	9.3	136	51.2	2.8	56.5	45.7								
Microbiological Parameters																										
Escherichia coli (E.Coli)	mpn/100mL	n/v	n/v	0 ^G	<1 ZH	2 ^G	<1	<1	<1	<1	<1	<1	<1	<1	-	-	-	-								
Total Coliforms	mpn/100mL	n/v	n/v	0 ^G	99 ZH ^G	3 ^G	<1	<1	<1	<1	4 ^G	<1	<1	<1	-	-	-	-								
BTEX and Petroleum Hydrocarbons																										
Benzene	mg/L	0.37 ^B	n/v	0.005 ^F	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050								
Toluene	mg/L	0.002 ^B	n/v	0.024 ^E 0.06 ^F	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010								
Ethylbenzene	mg/L	0.09 ^B	0.09 ^D	0.0016 ^E 0.14 ^F	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050								
Xylene, m & p-	mg/L	n/v	n/v	n/v	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040	<0.00040								
Xylene, o-	mg/L	n/v	n/v	n/v	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050								
Xylenes, Total	mg/L	n/v	n/v	0.02 ^E 0.09 ^F	<0.00064	<0.00050	<0.00064	<0.00064	<0.00064	<0.00064	<0.00050	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064	<0.00064								
PHC F1 (C6-C10 range)	mg/L	n/v	n/v	n/v	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10								
PHC F1 (C6-C10 range) minus BTEX	mg/L	n/v	n/v	n/v	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.025	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10								
PHC F2 (>C10-C16 range)	mg/L	n/v	n/v	n/v	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10								
PHC F3 (>C16-C34 range)	mg/L	n/v	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25								
PHC F4 (>C34-C50 range)	mg/L	n/v	n/v	n/v	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25								
Total Hydrocarbons (C6-C50)	mg/L	n/v	n/v	n/v	<0.38	<0.37	<0.38	<0.38	<0.38	<0.38	<0.37	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38								
Chromatogram to baseline at C50	none	n/v	n/v	n/v	-	YES	-	-	-	-	YES	-	-	-	-	-	-	-								

See notes on last page

Table B-11
Groundwater Analytical Results Lake
Manitoba Outlet Channel

Notes:

CWQG-FAL	Canadian Council of Ministers of the Environment
A	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Short Term
B	Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Long Term
MSOG-FAL	Manitoba Provincial Water Quality Guidelines
C	Tier I - Water Quality Guidelines - Freshwater Aquatic Life
D	Tier III - Water Quality Guidelines - Freshwater Aquatic Life
CDWQ	Health Canada (September 2020). Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
E	Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives/ Operational Guidelines
F	Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentration
G	Guidelines for Canadian Drinking Water Quality - Microbial Parameters
6.5^A	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
a	This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants; it does not apply to naturally occurring aluminum found in groundwater. The operational guidance values of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.
j	High levels (above 500 mg/L) can cause physiological effects such as diarrhoea or dehydration.
EQ1	The short-term benchmark is for dissolved zinc and is calculated using the following equation: Benchmark = $\exp(0.833[\ln(\text{hardness mg-L}^{-1})] + 0.240[\ln(\text{DOC mg-L}^{-1})] + 0.526)$. The value in the table is for surface water of 50 mg CaCO ₃ -L ⁻¹ hardness and 0.5 mg-L ⁻¹ dissolved organic carbon (DOC). The benchmark equation is valid between hardness 13.8 and 250.5 mg CaCO ₃ -L ⁻¹ and DOC 0.3 and 17.3 mg-L ⁻¹ .
EQ2	The long-term CWQG is for dissolved zinc and is calculated using the following equation: CWQG = $\exp(0.947[\ln(\text{hardness mg-L}^{-1})] - 0.815[\text{pH}] + 0.398[\ln(\text{DOC mg-L}^{-1})] + 4.625)$. The value in the table is for surface water of 50 mg CaCO ₃ -L ⁻¹ hardness, pH of 7.5 and 0.5 mg-L ⁻¹ DOC. The CWQG equation is valid between hardness 23.4 and 399 mg CaCO ₃ -L ⁻¹ , pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg-L ⁻¹ .
EQ3	The short-term benchmark is calculated using the benchmark calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese or the following equation: Benchmark = $\exp(0.878[\ln(\text{hardness})] + 4.76)$ where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO ₃ equivalents in mg/L. The value in the table is for surface water of 50 mg/L hardness. The benchmark equation is valid between hardness 25 and 250 mg/L.
EQ4	The long-term CWQG is found using the look-up table (see Table 5) or the CWQG and benchmark calculator in Appendix B of CCME (2019). The value in the table is for surface water of 50 mg/L hardness and pH of 7.5. The CWQG table is valid between hardness 25 and 670 mg/L and pH 5.8 and 8.4.
LTG	The CWQG for cadmium (i.e. long-term guideline) of 0.09 µg-L ⁻¹ is for waters of 50 mg CaCO ₃ -L ⁻¹ hardness. The CWQG for cadmium is related to water hardness. At hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation (CWQG (µg/L) = $10(0.83[\log(\text{hardness})] - 2.46)$); At hardness > 280 mg/L, the CWQG is 0.37 µg/L.
STB	The short-term benchmark concentration of 1.0 µg-L ⁻¹ is for waters of 50 mg CaCO ₃ -L ⁻¹ hardness. The short-term benchmark for cadmium is related to water hardness (as CaCO ₃): When the water hardness is 0 to < 5.3 mg/L, the short-term benchmark is 0.11 µg/L, At hardness ≥ 5.3 to ≤ 360 mg/L, the short-term benchmark is calculated using this equation: (Short-term benchmark (µg/L) = $10(1.016[\log(\text{hardness})] - 1.71)$); At hardness > 360 mg/L, the short-term benchmark is 7.7 µg/L.
*	The CWQG for copper is related to water hardness. When the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L. At hardness ≥ 82 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = $0.2 * e^{(0.8545[\ln(\text{hardness})] - 1.465)}$. At hardness > 180 mg/L, the CWQG is 4 µg/L. If the hardness is unknown, the CWQG is 2 µg/L.
#	The CWQG for lead is related to water hardness. When the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L. At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = $e^{(1.273[\ln(\text{hardness})] - 4.705)}$. At hardness > 180 mg/L, the CWQG is 7 µg/L. If the hardness is unknown, the CWQG is 1 µg/L.
**	The CWQG for nickel is related to water hardness. When the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L. At hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = $e^{(0.76[\ln(\text{hardness})] + 1.06)}$. At hardness > 180 mg/L, the CWQG is 150 µg/L. If the hardness is unknown, the CWQG is 25 µg/L.
s2	15 mg/L for a 4 day averaging duration, 3.40 mg/L for a 1 hour averaging duration (from Tier II - Water Quality Objectives)
s3	29 mg/L short term exposure; 1.5 mg/L long term exposure.
s4	0.033 mg/L short term exposure; 0.15 mg/L long term exposure.
s7	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Chromium, 0.195 mg/L is for 4 day averaging duration and 1.5 mg/L is for 1 hour averaging duration.
s8	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Cadmium, 0.00056 mg/L is for 4 day averaging duration and 0.006 mg/L is for 1 hour averaging duration.
s9	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Lead, 0.008 mg/L is for 4 day averaging duration and 0.227 mg/L is for 1 hour averaging duration.
s10	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Copper, 0.024 mg/L is for 4 day averaging duration and 0.04 mg/L is for 1 hour averaging duration.
s11	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Nickel, 0.14 mg/L is for 4 day averaging duration and 1.27 mg/L is for 1 hour averaging duration.
s12	Site-specific guidelines calculated based on average site-hardness. See Tier II - Water Quality Objectives for equation. For Dissolved Zinc, 0.32 mg/L is for both the 4 day averaging duration and the 1 hour averaging duration.
SN	see Narrative
TBC1	Value is minimum value available. Sample-specific value to be calculated (equation).
TBC2	To be calculated (equation), then the present guideline values (mg/L NH ₃) can be converted to mg/L total ammonia-N by multiplying the corresponding guideline value by 0.8224.
VAR	Lowest acceptable dissolved oxygen concentration: for warm water biota: early life stages = 6000 µg/L; for warm water biota: other life stages = 5500 µg/L; for cold water biota: early life stages = 9500 µg/L; for cold water biota: other life stages = 6500 µg/L.
VAR1	Variable, 5 µg/L if pH < 6.5 and 100 µg/L if pH > 6.5
NM	Result is non calculable due to matrix interference.
RV	Reported result verified by repeat analysis.
SV	Sample was analyzed past the hold time.
XB	Re-analysis was completed past recommended hold time.
ZH	Sample analysed past recommended hold time. most probable number.

Table B-12: Summary LMOC Groundwater Quality Statistics (2019 to 2020)

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Min	Max	Mean	Standard Deviation	5 th Percentile	95 th Percentile	N	Exceedances	
													n	%
Physico-chemical Parameters Measured in the fields														
Electrical Conductivity, Field	µS/cm	0.01	n/v	n/v	n/v	459.0	788.7	630.5	92.77	483.0	783.7	43	0	0
Nitrite, Field	mg/L	0.0001	n/v	n/v	n/v	0.00005	0.020	0.0082	0.0057	0.00005	0.015	11	3	27
pH, Field	S.U.	0.01	6.5-9.0 ^B	6.5-9.0 ^D	7.0-10.5 ^E	6.78	8.12	7.46	0.32	7.02	8.01	43	0	0
Temperature, Field	deg C	0.01	n/v	n/v	≤15 ^E	5.40	8.90	7.06	0.91	5.71	8.68	43	0	0
Total Dissolved Solids, Field	ppm	1	n/v	n/v	≤500 ^E	184	649	498	104	337	612	23	11	48
Turbidity, Field	NTU	0.01	n/v	n/v	≤0.3/1.0/0.1 ^H	0.070	167	16.4	28	0.59	53.8	43	42	98
Physico-chemical Parameters Measured in the laboratory														
Alkalinity, Bicarbonate (as CaCO ₃)	mg/L	1.2	n/v	n/v	n/v	103	1200	339	140	247	428	49	0	0
Alkalinity, Carbonate (as CaCO ₃)	mg/L	0.60	n/v	n/v	n/v	0.30	10	1.1	2.2	0.30	7.0	49	0	0
Alkalinity, Hydroxide (as CaCO ₃)	mg/L	0.34	n/v	n/v	n/v	0.17	0.17	0.17	6E-17	0.17	0.17	49	0	0
Alkalinity, Total	mg/L	1.0	n/v	n/v	n/v	84	983	280	114	213	351	49	0	0
Ammonia (as N)	mg/L	0.010	0.739	1.67	n/v	0.005	0.215	0.134	0.041	0.064	0.197	49	0	0
Chloride	mg/L	0.50	640 ^A 120 ^B	n/v	≤250 ^E	3.75	21.1	11.8	5.06	5.73	20.8	49	0	0
Fluoride	mg/L	0.020	0.12 ^B	n/v	1.5 ^F	0.199	0.855	0.580	0.205	0.236	0.828	49	49	100
Hardness (as CaCO ₃)	mg/L	0.20	n/v	n/v	n/v	238	404	326	49	250	390	49	0	0
Nitrate (as N)	mg/L	0.020	124 ^A 3.0 ^B	13 ^D	10 ^F	0.010	0.010	0.010	5E-18	0.010	0.010	49	0	0
Nitrite (as N)	mg/L	0.010	0.06 ^B	0.06 ^D	1 ^F	0.005	0.005	0.005	3E-18	0.005	0.005	49	0	0
Nitrogen (Total)	mg/L	0.20	n/v	n/v	n/v	0.10	0.25	0.13	0.05	0.10	0.23	39	0	0
Phosphorus, Total	mg/L	0.0010	n/v	0.025 ^C	n/v	0.0005	0.58	0.037	0.095	0.0015	0.17	50	13	26
Phosphorus, Total (Dissolved)	mg/L	0.0010	n/v	0.025 ^C	n/v	0.0005	0.0074	0.0021	0.0016	0.00050	0.0054	50	0	0
Phosphorus, Total Particulate	mg/L	0.0028	n/v	n/v	n/v	0.0014	0.58	0.035	0.095	0.0014	0.17	50	0	0
Sulfate	mg/L	0.30	n/v	n/v	≤500 ^E	76.1	163	127	19	102	159	49	0	0
Total Dissolved Solids	mg/L	20	n/v	n/v	≤500 ^E	342	561	448	47	373	531	49	4	8
Total Kjeldahl Nitrogen	mg/L	0.20	n/v	n/v	n/v	0.10	1.0	0.14	0.13	0.10	0.24	49	0	0
Total Suspended Solids	mg/L	1.0	SN ^B	n/v	n/v	0.5	8890	352	1442	1.0	692	49	0	0
Microbiological Parameters														
Escherichia coli (E.Coli)	mpn/100mL	1	n/v	n/v	0 ^G	0	2	0.05	0.3	0	0	44	1	2
Total Coliforms	mpn/100mL	1	n/v	n/v	0 ^G	0	196	11	35	0	72	43	13	30
BTEX and Petroleum Hydrocarbons														
Benzene	mg/L	0.00050	0.37 ^B	n/v	0.005 ^F	0.00025	0.00025	0.00025	2E-19	0.00025	0.00025	49	0	0
Toluene	mg/L	0.0005	0.002 ^B	n/v	0.024 ^E 0.06 ^F	0.00025	0.0098	0.00074	0.0013	0.00025	0.0015	49	1	2
Ethylbenzene	mg/L	0.00050	0.09 ^B	0.09 ^D	0.0016 ^E 0.14 ^F	0.00025	0.00025	0.00025	2E-19	0.00025	0.00025	49	0	0
Xylene, m & p-	mg/L	0.00040	n/v	n/v	n/v	0.00020	0.00020	0.00020	3E-20	0.00020	0.00020	49	0	0
Xylene, o-	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.00025	0.00023	4E-05	0.00015	0.00025	49	0	0
Xylenes, Total	mg/L	0.00050	n/v	n/v	0.02 ^E 0.09 ^F	0.00025	0.00032	0.00031	3E-05	0.00025	0.00032	49	0	0
PHC F1 (C6-C10 range)	mg/L	0.10	n/v	n/v	n/v	0.013	0.05	0.043	0.015	0.013	0.05	49	0	0
PHC F1 (C6-C10 range) minus BTE	mg/L	0.10	n/v	n/v	n/v	0.013	0.05	0.043	0.015	0.013	0.05	49	0	0
PHC F2 (>C10-C16 range)	mg/L	0.10	n/v	n/v	n/v	0.05	0.25	0.054	0.028	0.05	0.05	49	0	0
PHC F3 (>C16-C34 range)	mg/L	0.25	n/v	n/v	n/v	0.13	0.13	0.13	0	0.13	0.13	49	0	0
PHC F4 (>C34-C50 range)	mg/L	0.25	n/v	n/v	n/v	0.13	0.13	0.13	0	0.13	0.13	49	0	0
Total Hydrocarbons (C6-C50)	mg/L	0.38	n/v	n/v	n/v	0.19	0.19	0.19	0.0019	0.19	0.19	49	0	0
Metals, Dissolved														
Aluminum	mg/L	0.0010	n/v	0.1 ^D	0.050	0.0005	0.074	0.0044	0.013	0.00050	0.0066	49	2	4
Antimony	mg/L	0.00010	n/v	n/v	0.006 ^F	0.000050	0.00052	0.000068	8E-05	0.000050	0.00016	49	0	0
Arsenic	mg/L	0.00010	n/v	0.15/0.34 ^{s2} ^D	0.010 ^F	0.000050	0.0025	0.00073	0.00076	0.000050	0.0021	49	0	0
Barium	mg/L	0.00010	n/v	n/v	2.0 ^F	0.018	0.045	0.027	0.0068	0.020	0.041	49	0	0
Beryllium	mg/L	0.00010	n/v	n/v	n/v	0.000050	0.000050	0.000050	7E-21	0.000050	0.000050	49	0	0
Bismuth	mg/L	0.000050	n/v	n/v	n/v	0.000025	0.000025	0.000025	3E-21	0.000025	0.000025	49	0	0
Boron	mg/L	0.010	n/v	29/1.5 ^{s3} ^D	5 ^F	0.37	0.73	0.53	0.083	0.39	0.64	49	0	0
Cadmium	mg/L	0.0000050	n/v	0.00045/0.0047 ^{s8} ^D	0.007 ^F	0.0000025	0.000067	0.0000041	0.0000092	0.0000025	0.0000061	49	0	0
Calcium	mg/L	0.050	n/v	n/v	n/v	41.2	75.2	59.3	9.3	44.1	73.4	49	0	0
Cesium	mg/L	0.000010	n/v	n/v	n/v	0.000005	0.000037	0.000016	0.000008	0.000005	0.000030	49	0	0
Chromium	mg/L	0.00010	n/v	0.151/1.16 ^{s7} ^D	0.05 ^F	0.000050	0.00040	0.000076	0.00007	0.000050	0.00022	49	0	0
Cobalt	mg/L	0.00010	n/v	n/v	n/v	0.000050	0.00033	0.00010	0.000082	0.000050	0.00025	49	0	0
Copper	mg/L	0.00020	n/v	0.019/0.03 ^{s10} ^D	≤1.0 ^E 2 ^F	0.00010	0.0055	0.00054	0.00082	0.00010	0.0013	49	0	0
Iron	mg/L	0.010	n/v	0.3 ^D	≤0.3 ^E	0.0050	0.47	0.096	0.091	0.014	0.26	49	1	2
Lead	mg/L	0.000050	n/v	0.006/0.163 ^{s9} ^D	0.005 ^F	0.000025	0.0020	0.00011	0.00029	0.000025	0.00036	49	0	0
Lithium	mg/L	0.0010	n/v	n/v	n/v	0.018	0.040	0.030	0.0057	0.019	0.038	49	0	0
Magnesium	mg/L	0.0050	n/v	n/v	n/v	31	54	43	7.0	33	53	49	0	0
Manganese	mg/L	0.00010	14 ^{EQ3} ^A 0.27 ^{EQ4} ^B	n/v	≤0.02 ^E 0.12 ^F	0.0047	0.055	0.018	0.012	0.0059	0.044	49	14	29
Molybdenum	mg/L	0.000050	n/v	0.073 ^D	n/v	0.00022	0.0065	0.0013	0.0014	0.00023	0.0053	49	0	0
Nickel	mg/L	0.00050	n/v	0.108/0.975 ^{s11} ^D	n/v	0.00025	0.0033	0.00050	0.00073	0.00025	0.0027	49	0	0
Phosphorus	mg/L	0.030	n/v	n/v	n/v	0.015	0.015	0.015	1E-17	0.015	0.015	49	0	0
Potassium	mg/L	0.050	n/v	n/v	n/v	5.7	11	8.4	1.6	6.0	11	49	0	0
Rubidium	mg/L	0.00020	n/v	n/v	n/v	0.0024	0.0068	0.0045	0.0013	0.0030	0.0066	49	0	0
Selenium	mg/L	0.000050	n/v	0.001 ^D	0.05 ^F	0.000025	0.00012	0.000027	0.000014	0.000025	0.000025	49	0	0
Silicon	mg/L	0.050	n/v	n/v	n/v	3.4	5.9	4.8	0.66	3.7	5.8	49	0	0
Silver	mg/L	0.000010	n/v	0.0001 ^D	n/v	0.000005	0.000019	0.000006	0.000003	0.000005	0.000005	49	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	31	53	41	6.3	32	52	49	0	0
Strontium	mg/L	0.00010	n/v	n/v	7.0 ^F	0.31	0.63	0.46	0.079	0.34	0.60	49	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	31.1	56.3	45.0	6.30	35.5	55.2	49	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	1E-20	0.00010	0.00010	49	0	0
Thallium	mg/L	0.000010	n/v	0.0008 ^D	n/v	0.000005	0.000034	0.000007	0.000005	0.000005	0.000014	49	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00005	0.00005	7E-21	0.00005	0.00005	49	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.00054	0.000081	0.00009	0.00005	0.00022	49	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.0028	0.00026	0.00051	0.00015	0.00015	49	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.0032	0.00045	0.00086	0.00005	0.0027	49	0	0
Uranium	mg/L	0.000010	n/v	0.033/0.015 ^{s4} ^D	0.02 ^F	0.00011	0.0021	0.00095	0.00053	0.00013	0.0019	49	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00025	0.00025	0.00025	2E-19	0.00025	0.00025	49	0	0
Zinc	mg/L	0.0010	0.120 ^{EQ1} ^A 0.015 ^{EQ2} ^B	0.25/0.24 ^{s12} ^D	≤5.0 ^E	0.0005	0.13	0.0062	0.018	0.0005</				

Sample Type	Units	RDL	CWQG-FAL	MSOG-FAL	CDWQ	Min	Max	Mean	Standard	5 th	95 th	N	Exceedances	
Silver	mg/L	0.000010	0.00025 ^B	0.0001 ^D	n/v	0.000005	0.000084	0.000011	0.00002	0.000005	0.000045	49	0	0
Sodium	mg/L	0.050	n/v	n/v	≤200 ^E	28	53	42	6.9	32	53	49	0	0
Strontium	mg/L	0.00020	n/v	n/v	7.0 ^F	0.33	1.1	0.49	0.13	0.36	0.68	49	0	0
Sulfur	mg/L	0.50	n/v	n/v	n/v	37	60	47	6.3	37	58	49	0	0
Tellurium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.00010	0.00010	1E-20	0.00010	0.00010	49	0	0
Thallium	mg/L	0.000010	0.0008 ^B	0.0008 ^D	n/v	0.000005	0.00021	0.000020	0.000038	0.000005	0.000079	49	0	0
Thorium	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.0063	0.00049	0.0012	0.00005	0.0028	49	0	0
Tin	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.0013	0.00017	0.00027	0.00005	0.00070	49	0	0
Titanium	mg/L	0.00030	n/v	n/v	n/v	0.00015	0.17	0.016	0.034	0.00015	0.081	49	0	0
Tungsten	mg/L	0.00010	n/v	n/v	n/v	0.00005	0.0035	0.00045	0.00087	0.00005	0.0028	49	0	0
Uranium	mg/L	0.000010	0.033 ^A	0.033/0.015 ^G	0.02 ^F	0.00014	0.0032	0.0011	0.00063	0.00043	0.0022	49	0	0
Vanadium	mg/L	0.00050	n/v	n/v	n/v	0.00025	0.016	0.0016	0.0031	0.00025	0.0079	49	0	0
Zinc	mg/L	0.0030	n/v	n/v	≤5.0 ^E	0.0015	0.16	0.013	0.025	0.0015	0.049	49	0	0
Zirconium	mg/L	0.00020	n/v	n/v	n/v	0.00010	0.0023	0.00042	0.00054	0.00010	0.0017	49	0	0

Notes:

N Total number of analytical results for a parameter, which includes 6 field duplicate samples collected for the period from June 2019 to October 2020

n Total number of exceedances of a guideline for a parameter for the period from June 2019 to October 2020

For statistical calculations, half detection limit values are used for the results of the laboratory analyses reported as less than the detection limits values.

RDL Reportable Laboratory Detection Limit

CWQG-FAL Canadian Council of Ministers of the Environment

A Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Short Term

B Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life - Freshwater Aquatics Long Term

MSOG-FAL Manitoba Provincial Water Quality Guidelines

C Tier I - Water Quality Guidelines - Freshwater Aquatic Life

D Tier III - Water Quality Guidelines - Freshwater Aquatic Life

CDWQ Health Canada (September 2020). Guidelines for Canadian Drinking Water Quality—Summary Table. Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

E Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives/ Operational Guidelines

F Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentration

G Guidelines for Canadian Drinking Water Quality - Microbial Parameters

H Guidelines for Canadian Drinking Water Quality - Treatment limits for individual filters or units: conventional and direct filtration: ≤ 0.3 NTU; slow sand and diatomaceous earth filtration: ≤ 1.0 NTU; membrane filtration: ≤ 0.1 NTU

6.5^A Concentration exceeds the indicated standard

n/v no value

j High levels (above 500 mg/L) can cause physiological effects such as diarrhoea or dehydration.

EQ1 The short-term benchmark for dissolved zinc is calculated using the following equation: Benchmark = exp(0.833[ln(hardness mg/L)] + 0.240[ln(DOC mg/L)] + 0.526). The value in the table is for the minimum hardness of 238 mg/L CaCO₃ and the minimum dissolved organic carbon (DOC), for which this equation is valid (0.3 mg/L). The benchmark equation is valid between hardness 13.8 and 250.5 mg CaCO₃ and DOC 0.3 and 17.3 mg/L.

EQ2 The long-term CWQG for dissolved zinc is calculated using the following equation: CWQG = exp(0.947[ln(hardness mg/L)] - 0.815[pH] + 0.398[ln(DOC mg/L)] + 4.625). The value in the table is for the minimum hardness of 238 mg/L CaCO₃, maximum pH of 8.12, and the minimum DOC, for which this equation is valid (0.3 mg/L). The CWQG equation is valid between hardness 23.4 and 399 mg CaCO₃, pH 6.5 and 8.13 and DOC 0.3 to 22.9 mg/L.

EQ3 The short-term benchmark for manganese is calculated using the benchmark calculator in Appendix B of the Scientific Criteria Document for the Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life: Manganese or the following equation: Benchmark = exp(0.878[ln(hardness)] + 4.76) where the benchmark is expressed in dissolved manganese concentration (µg/L), and hardness is measured as CaCO₃ equivalents in mg/L. The value in the table is for minimum hardness of 238 mg/L hardness. The benchmark equation is valid between hardness 25 and 250 mg/L.

EQ4 The long-term CWQG for manganese is found using benchmark calculator in Appendix B of CCME (2021). The value in the table is for minimum hardness of 238 mg/L and maximum pH of 8.12 to generate the most stringent guideline. The CWQG table is valid between hardness 25 and 670 mg/L and pH 5.8 and 8.4.

LTG The CWQG long-term guideline for cadmium of 0.33 µg/L is for waters of 238 mg/L CaCO₃ hardness to generate the most stringent guideline. This guideline is related to water hardness as follows: at hardness ≥ 17 to ≤ 280 mg/L, the CWQG is calculated using this equation (CWQG (µg/L) = 10{0.83(log[hardness]) - 2.46}); at hardness > 280 mg/L, the CWQG is 0.37 µg/L.

STB The CWQG short-term guideline for cadmium of 5.1 µg/L is for waters of 238 mg/L CaCO₃-hardness to generate the most stringent guideline. This guideline is related to water hardness as follows: when the water hardness is 0 to < 5.3 mg/L, the CWQG is 0.11 µg/L; at hardness ≥ 5.3 to ≤ 360 mg/L, the short-term benchmark is calculated using this equation: (CWQG (µg/L) = 10{1.016(log[hardness]) - 1.71}); at hardness > 360 mg/L, the CWQG is 7.7 µg/L.

The most stringent CWQG guideline for total ammonia-N, as mg/L, is calculated at maximum pH (8.12) and maximum T (8.90 deg.C). Table 1.2 of the Environmental Quality Guidelines for Alberta Surface Waters (Government of Alberta 2018) is used because the total ammonia as N is established for smaller increments, i.e. 1 deg. C instead of 5 deg. C) and for wider pH range compared to CWQG; both guidelines use similar formulas for calculations.

The most stringent MSOG-FAL for total ammonia is calculated at maximum pH (8.12), and maximum temperature (8.90 deg.C). This guideline is calculated using [(0.0577/1+10^A(7.688-pH)+(2.487/1+10^A(pH-7.688))^a, where a=2.85 or a=1.45*10^A(0.028*(25-Temperature)), whichever is less and pH ≥6.5 and ≤9.0.

The most stringent CWQG for copper is calculated at minimum hardness of 238 mg/L CaCO₃ using the following: when the water hardness is 0 to < 82 mg/L, the CWQG is 2 µg/L; at hardness ≥82 to ≤180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = 0.2 * e{0.8545[ln(hardness)]-1.465}; at hardness >180 mg/L, the CWQG is 4 µg/L; if the hardness is unknown, the CWQG is 2 µg/L.

The most stringent CWQG for lead is calculated at minimum hardness of 238 mg/L CaCO₃ using the following: when the hardness is 0 to ≤ 60 mg/L, the CWQG is 1 µg/L; at hardness >60 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (µg/L)= e{1.273[ln(hardness)]-4.705}; at hardness >180 mg/L, the CWQG is 7 µg/L; if the hardness is unknown, the CWQG is 1 µg/L.

The most stringent CWQG for nickel is calculated at minimum hardness of 238 mg/L CaCO₃ using the following: when the water hardness is 0 to ≤ 60 mg/L, the CWQG is 25 µg/L; at hardness > 60 to ≤ 180 mg/L the CWQG is calculated using this equation: CWQG (µg/L) = e{0.76[ln(hardness)]+1.06}; at hardness >180 mg/L, the CWQG is 150 µg/L; if the hardness is unknown, the CWQG is 25 µg/L.

s2 15 mg/L for a 4 day averaging duration, 3.40 mg/L for a 1 hour averaging duration (from Tier II - Water Quality Objectives).

s3 29 mg/L short term exposure; 1.5 mg/L long term exposure.

s4 0.033 mg/L short term exposure; 0.15 mg/L long term exposure.

s7 The most stringent Tier II MSOG-FAL is calculated based on minimum hardness of 238 mg/L as CaCO₃ using Tier II equations for dissolved chromium III for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.151 mg/L is for 4 day averaging duration and 1.16 mg/L is for 1 hour averaging duration.

s8 The most stringent Tier II MSOG-FAL for dissolved cadmium is calculated based on minimum hardness of 238 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.00045 mg/L is for 4 day averaging duration and 0.0047 mg/L is for 1 hour averaging duration.

s9 The most stringent Tier II MSOG-FAL for dissolved lead is calculated based on minimum hardness of 238 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.006 mg/L is for 4 day averaging duration and 0.163 mg/L is for 1 hour averaging duration.

s10 The most stringent Tier II MSOG-FAL for dissolved copper is calculated based on minimum hardness of 238 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.019 mg/L is for 4 day averaging duration and 0.03 mg/L is for 1 hour averaging duration.

s11 The most stringent Tier II MSOG-FAL for dissolved nickel is calculated based on minimum hardness of 238 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.108 mg/L is for 4 day averaging duration and 0.975 mg/L is for 1 hour averaging duration.

s12 The most stringent Tier II MSOG-FAL for dissolved zinc is calculated based on minimum hardness of 238 mg/L as CaCO₃ using Tier II equations for 4-day and 1-hour duration (see Tier II - Water Quality Objectives for equations, MWS (2011)): 0.25 mg/L is for the 4 day averaging duration and 0.24 mg/L is the 1 hour averaging duration.

SN see Narrative