



**INVESTIGATIONS AND PRELIMINARY ENGINEERING FOR
LMB OUTLET CHANNELS OPTIONS C AND D
DELIVERABLE D3
ANNUAL MONITORING REPORT TO JULY 1, 2018**

FINAL- REV 0

KGS Group 16-0300-006
August 2018

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August 23, 2018

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ATTENTION: Mr. Jared Baldwin, P.Eng.
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RE: Investigations & Preliminary Engineering for Lake Manitoba Outlet
Channels Options C & D Deliverable D3, Final – Rev 0

Dear Mr. Baldwin:

KGS Group is pleased to submit an electronic copy on the FTP site of our Final Report Investigations and Preliminary Engineering for Lake Manitoba Outlet Channels Options C and D Deliverable D3-Final Rev. 0. Three hard copies of the report will follow by courier.

We appreciate the opportunity to provide engineering services to Manitoba Infrastructure.

Sincerely, <original signed by>

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MFH/jr
Enclosure

cc: Mr. Mark Allard, P.Eng. Project Director (MI)
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1.0 INTRODUCTION AND SCOPE OF WORK

1.1 INTRODUCTION

Manitoba Infrastructure retained KGS Group to complete Investigations and Preliminary Engineering for Lake Manitoba Outlet Channels Options C and D. The “Summary Report” for the project was issued in May 2017¹. Annual monitoring of groundwater and surface water is included in the project as required under Work Breakdown Structure (WBS) 1010.04 and WBS 1010.05 monitoring plan described in the memo Deliverable D1 Groundwater Level Monitoring and Quarterly Water Quality Sampling. The first annual monitoring report was issued on July 1, 2017 (Deliverable D2 Annual Monitoring Report to July 1, 2017). This report is the second annual monitoring report.

This annual monitoring report summarizes groundwater and surface water monitoring activities from July 1, 2017 through July 1, 2018. The report documents seasonal data collection activities and provides comments regarding surface and groundwater conditions, building on Deliverable D6 Groundwater Study (included as Appendix C of the May 2017 Summary Report) and Deliverable D2 Annual Monitoring Report to July 1, 2017². Both of these reports contain background information on the project that should be used for reference. Manitoba Infrastructure directed that no further monitoring on Route C be conducted, with the exception of transducer downloads at Route C, beginning in May 2017. Downloads of transducers at Route C were not conducted in fall 2017 or May 2018 with Manitoba Infrastructure’s agreement. Download of these instruments was deferred to the next stage of the project. A general site plan showing the location of Route C can be found in Appendix D3-A Plate D4-1. Detailed plans of Route C can be found in the May 2017 Summary Report.

¹ Investigations and Preliminary Engineering for LMB Outlet Channels Options C and D Summary Report, May 2017, Prepared by KGS Group.

² Investigations and Preliminary Engineering for LMB Channels Options C and D Deliverable D2, Annual Monitoring Report to July 1, 2017. Final Rev 0, Prepared by KGS Group.

1.2 SCOPE OF WORK

The Scope of Work for Deliverable D3 includes the following:

1. Route D Field Programs:
 - Groundwater Elevation, Sampling and Transducer Download; Summer - August 2017; Fall October 2017; and Spring - May 2018
 - Surface Water Sampling and Transducer Download Summer - August 2017; Fall - October 2017; and Spring - May 2018
2. Summary comments and conclusions relating to seasonal changes in groundwater and surface water levels and quality.

In addition to the original scope of work, a summary of recommended instrumentation maintenance repairs is included in Appendix D3-D. Drilling logs for 15-RD-04A, 15-RD-04B and 15-RD-PW-1 (2016) are included in this report in Appendix D3-E for completeness as they were not included in the 2016 Geotechnical report submission.

An additional scope of work was approved to report metals analysis for groundwater and surface water samples. Deliverable D1 (Groundwater, Surface Water and Geotechnical Investigations Program) included a one-time analysis of metals for groundwater and a one-time analysis for surface water. Upon review of the deliverable, Manitoba Infrastructure (MI) decided that additional analysis of metals would be beneficial towards generating additional data useful for the future Environmental Impact Statement for the project. KGS Group determined that further analysis of metals could be retrieved from data already collected by the lab from 2017 and 2018 sample events. KGS Group requested the metals data from the laboratory and incorporated it into existing tables as shown in this report. The laboratory certificates of analysis are contained in Appendix D-3-F.

The retrieved metals analyses for the **surface water can be relied upon** since samples were acidified in the field using standard procedures.

The retrieved metals analyses for the **groundwater should be used for reference only**, and not relied upon as the samples were not required to be analysed for extended metals at the time of sampling, and therefore were not filtered and preserved in the field. The groundwater samples were filtered and preserved in the laboratory. This means that there was opportunity for potential precipitation of metals during sample transit and potential removal of this precipitate when the samples were filtered in the laboratory.

2.0 ROUTE D

2.1 WATER ELEVATION, TEMPERATURE AND TRANSDUCER DOWNLOADS

2.1.1 Field Program Activities

The locations of instruments are shown on the plan set in Appendix D3-A, and on Table D3-1. The transducer at 15-RD-PW1 was replaced in October 2017. Installation methodology was as described in the Deliverable D2 report for other instruments.

The elevations of the packers and transducers have been updated in Appendix Table D3-B-4. The transducer for TH-ED-01 was installed 24 m above the open bedrock zone. The transducer for 15-RD-PW1 was re-installed with a longer cable to the bottom of the casing, immediately above the top of the open bedrock monitoring zone.

Foam inserts were installed in all other flowing wells to prevent water from rising above ground surface in the casing and freezing in winter, which would cause the casing to break and result in uncontrolled groundwater flow. Foam inserts consisted of an aluminum rod surrounded by a foam packer. These inserts were installed after the October 2017 monitoring and were removed during the May 2018 monitoring. Because the May 2018 monitoring was the last under this contract, the foam packers were re-installed. Vibrating wire piezometers were read in August 2017, October 2017 and May 2018.

Transducers were re-installed at two surface water locations: Reed Lake (D3) and Clear Lake (D4), in May 2018 to replace damaged instruments.

Repairs and maintenance are required at several instruments as summarized in Appendix D3-D.

2.1.2 Results

Results of the groundwater monitoring program on Route D are shown on Table D3-1 showing all instrumentation monitored, instrument details and depth to groundwater level, pressure or vibrating wire readings and appropriate conversions to geodetic elevations. Transducer

hydrographs are shown in Appendix D3-B. A summary of mechanical packer and transducer installation is shown in Table D3-B-1.

Well TH-ED-01W

Well TH-ED-01W (Figure D3-B-1) is confined and flowing artesian and has a deep overburden till cover of 25 m. In 2016 to 2017, groundwater elevations decreased slightly through the winter from elevation (El.) 254 m on December 8, 2016 to El. 253.5 m on March 28, 2017 when they began to rise through April 27, 2017 to 254.2 m, decreasing slightly through the end of May 2017. Although groundwater elevations showed a slight seasonal increase in April 2017, they were only 0.2 m higher than elevations in December 2016. The water elevation rise is attributed to a piezometric response to the regional groundwater system and may include a response to Lake Manitoba water levels (Appendix D3-C), which began to rise on April 1, 2017, as well as transmission of the piezometric response from a regional recharge in upland areas. At Well TH-ED-01W, groundwater elevation declined between May 2017 and April 2018 to a low of El. 252.5 m on April 14, 2018. The groundwater elevation then increased to El. 253.40 m on May 26, 2018. Regional lake levels at Lake Manitoba and Lake St. Martin also declined between May 2017 and April 2018 (Appendix D3-C). Well TH-ED-01W is located in the deep bedrock valley that is beneath most of the channel alignment. Regional recharge occurs at a distance from the valley in upland bedrock areas, and not through the local 25 m till to the bedrock.

Declining temperature was recorded at well TH-ED-01W throughout the 2016 to 2017 winter, from 6 °C to 4°C. A steeper decrease occurred in early March 2017 to 1°C and remained low through late May 2017. The temperature increased to 10.7°C on September 15, 2017 then decreased gradually to 4° C on February 17, 2018 before dropping steeply to 1°C or less. The temperature began to rise on May 18, 2018 and was 3.2°C by May 29, 2018. The timing of the temperature decrease in both years was well before the groundwater elevation increase in early April. The transducer in well TH-ED-01W is 24 m above the bedrock open hole, so is not in contact with aquifer groundwater, therefore temperature results are not considered to be representative of true aquifer response and appear to be influenced by surrounding ground temperatures. A longer cable is required on the transducer to place it closer to the bedrock

monitoring zone. This will require opening and re-installing the packer assembly in the artesian well.

A comparison of water quality results from October 2016 and May 2017 and July 2017, October 2017, and May 2018, as discussed in Section 2.2 (Table D-3-3), does not show any changes in water quality with seasonal recharge events. This indicates that the bedrock beneath the buried valley is isolated from local recharge.

Well 15-RD-PW-1

Groundwater elevation at Well 15-RD-PW-1 (Figure D3-B-2) is confined and flowing and has a deep overburden till cover of 16.3 m. In 2016 and 2017, groundwater elevations decreased slightly throughout the winter from El. 254.4 m on December 8, 2016 to El. 253.6 m on March 11, 2017, and then began to rise through early April 2018. These temperature variations appear to be influenced by surrounding ground temperatures. There was a sharp drop in elevation of 0.29 m on April 20, 2018 with a corresponding increase on May 24, 2018. The transducer did not connect in the field for the May 2017 download. It was removed during the August 2017 sampling event and a new transducer was installed with a longer cable during the October 2017 sampling event. Groundwater elevations continued to drop to 254.1 m on April 21, 2018 and rose with the spring melt to 254.2 m.

Temperature readings in 2016 at 15-RD-PW-1 followed a pattern similar to well TH-ED-01W, with a slow decrease in the winter to 4°C; however, a further drop occurred in late April 2017 followed by a rise to 11.6°C on August 1, 2018. The new transducer was installed in October 2017 just above the bedrock and has registered a constant temperature of approximately 6.5°C since that time. The stable temperature data at well 15-RD-PW-1 following transducer lowering provides clear evidence of the separation of the groundwater system beneath the buried valley and the surface water system.

Reed Lake (D3)

At Reed Lake (Appendix D3-B-3), water elevation remained constant through the spring 2017 melt. A very slight elevation increase was seen beginning in late March 2017 from El. 248.60 m on March 29 to El. 248.80 m on April 6, 2017. The water elevation increase began at the same time air temperatures rose above zero and water temperature fluctuations began, coincident with the spring melt. Elevations declined slightly to El. 248.31 m on November 11, 2017, when the transducer stopped working due to freeze up. The initial reading on May 25, 2018 was El. 248.17 m; however, this reading may have been influenced by freeze up and should be re-confirmed with a re-survey of the transducer tip elevation. Water temperatures rose from 3°C in mid-April 2017 to 12°C by the end of May 2017, peaking at 20.65 °C on August 2, 2017, and then declining through the fall to 4.4°C on November 11, 2017.

Clear Lake (D4)

At Clear Lake (Appendix D3-B-4), the transducer was frozen in the ice in January 2017 as shown by the sub-zero temperatures. This affected the elevation readings, which are not considered representative until early April 2017. An increase in elevation was seen in late July 2017 during the two high precipitation events shown on the top of the graph. The transducer malfunctioned in November 2017 at freeze-up when the temperature decreased to 0°C. The new transducer installed in May 2018 recorded an elevation of El. 248.17 m at the time of installation; however, this should be confirmed with a re-survey of the transducer tip elevation. Temperature increased from 0°C in early April 2017, to 15°C in late May 2017. A maximum temperature of 21°C was measured in August 2017, dropping to 0°C at freeze-up in November 2017.

2.2 GROUNDWATER AND SURFACE WATER QUALITY

2.2.1 Field Program Methodology

Nine sites were sampled for surface water along Route D on May 25, 2017; August 3, 2017; October 5, 2017; and May 30, 2018. Locations and site descriptions are as follows:

Site	Name	Zone	Easting	Northing
D1	L. Manitoba	14U	530539.95 m E	5680326.47 m N
D2	Watchorn Cr.	14U	531563.42 m E	5683591.34 m N
D3	Reed L.	14U	531162.00 m E	5687747.00 m N
D4	Clear L.	14U	530962.69 m E	5690166.46 m N
D5	Clark's Drain	14U	533740.43 m E	5697563.34 m N
D6	Birch Cr.	14U	532476.89 m E	5698322.06 m N
D7	Woodale Drain	14U	531665.45 m E	5699876.73 m N
D8	Birch Cr.	14U	533225.95 m E	5702310.91 m N
D9	L. St. Martin	14U	532723.36 m E	5706356.42 m N

- **D1 (Lake Manitoba)** – end of the mile road near the entrance to Watchorn Provincial Park with sampling occurring approximately 200 m into lake to reduce the shoreline effect.
- **D2 (Watchorn Creek)** – along P.R. 237.
- **D3 (Reed Lake)** – accessed by walking approximately 700 m from a gravel road through a pasture and was sampled on the west side of the lake.
- **D4 (Clear Lake)** – accessed by walking approximately 500 m along an old road allowance. The sample was collected on the west side of the lake.
- **D5 (Clark's Drain)** – sampled where the drain crossed the road.
- **D6 (Birch Creek at PTH6)** – upstream of Highway 6.
- **D7 (Woodale Drain)** – sampled approximately 150 m west of Highway 6.
- **D8 (Birch Creek)** – sampled upstream side of the road.
- **D9 (Lake St. Martin)** – Sampled at location of hydrometric station (at the end of Hilbre Rd.). Location is between Route C and Route D outlets.

Sites were all sampled on upstream side of roads (where roads were present). A reacher pole with disposable surface water sampling cup was used to collect water from most sampling sites to minimize shore effects and any disturbance from sampling activities. At a few locations samples were collected directly into the sample bottle.

Groundwater

Groundwater samples along Route D were taken at six locations on May 23 to 24, 2017; August 1 to 2, 2017; October 3 to 4, 2017; and May 28 to 30, 2018:

- 15-RD-PW1
- TH-ED-01W
- TH-ED-01P
- TH-ED-03
- TH-GD-02
- TH-GD-07

Sampling tubing was opened and groundwater was allowed to purge from the well under artesian conditions until groundwater parameters (conductivity and temperature) stabilized. Stable groundwater parameters were achieved at all sample locations within 20 minutes.

Field measurements for pH, conductivity and dissolved oxygen were taken for each sample. A flow through cell was used for groundwater samples. Groundwater and surface water samples were stored in a cooler chest at 4°C for transport to the laboratory. Samples for metals analysis (calcium, magnesium, potassium, and sodium) were filtered and preserved in the laboratory since extended metals analysis were not required for the 2017 and 2018 samples at the time they were collected. The samples were analyzed at ALS Laboratory in Winnipeg, Manitoba. Samples for isotope analysis were collected in clean 40 ml glass vials and shipped to the Environmental Isotope Laboratory at the University of Waterloo in Waterloo, Ontario.

A quality control/quality assurance assessment of all groundwater data was performed, including review of laboratory QA/QC, replicate samples and any trip or field blanks.

Quality Assurance/Quality Control

Standardized sampling procedures and protocols were used during the sampling events to ensure representative samples were collected in a controlled manner so that scientifically defensible comparisons can be made.

Chain of Custody – KGS Group ensured all Chain-of-Custody procedures were properly undertaken and holding times were not exceeded.

Sample Collection – Samples were collected directly from the pump outlet. Disposable latex gloves were worn when handling each piece of equipment and groundwater sample, using a new pair for each sample collection. Samples were collected in clean containers (supplied by the lab) and stored at the appropriate temperature using the proper preservatives.

Laboratory Qualification – ALS Environmental of Winnipeg, Manitoba, is a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited analytical testing laboratory. Criteria and guidelines used for assessment of analytical data were clearly established with the laboratory to ensure the appropriate detection limits were used. The University of Waterloo Environmental Isotope Laboratory is a modern research facility with an international client base encompassing universities, government agencies, consulting firms and other mainstream institutions.

Duplicate Samples – Duplicate samples were submitted at a frequency of 10% for the total samples submitted to assess the quality of the laboratory analysis. The field duplicates were labelled such that the laboratory did not know the samples were duplicates. Laboratory standards and duplicates are run regularly by ALS and are on file. One duplicate sample was collected for QA/QC as shown on the data summary tables. Laboratory duplicate samples for stable isotope analysis by the University of Waterloo Environmental Isotope Laboratory are shown on Table D3-8.

Field Equipment – Field equipment such as field chemistry meters were calibrated prior to use or installation.

2.2.2 Results

Groundwater

All groundwater samples were taken from bedrock monitoring wells with sampling zones found on Table D3-1, except TH-ED-03, which was completed in the till. Field chemistry from the groundwater program is shown in Table D3-2. General groundwater quality is shown on Table D3-3, with metals shown on Table D3-4. Results were compared against Canadian Drinking Water Quality Guidelines, since the aquifer is potable and is the sole source of drinking water in the region. Results exceeding the applicable guidelines were highlighted. The Canadian Council of Ministers of the Environment (CCME) criteria for Freshwater Aquatic life was shown on the tables for reference.

Water type – Water type analysis was presented when sampled in November 2016 and May 2017 as discussed in Deliverable D6 and D4 submitted previously.

Water Quality Criteria November 2016 to May 2018 – The groundwater samples collected exceeded the drinking water criterion for turbidity; however, these samples are from monitoring wells and are not used for drinking water. All samples exceeded the criterion for hardness (359 to 420 mg/L; criterion 80 to 100 mg/L), typical of the carbonate aquifer and the till unit. All

sulphate samples were below the criterion of 500 mg/L. The sample at till well TH-ED-03 had much lower sulphate (22 – 58 mg/L) and lower conductivity (489 – 616 $\mu\text{S}/\text{cm}$) and hardness values (125 – 319 mg/L) than the bedrock samples. Nitrate values were below detection (generally <0.0051 mg/L), or at very low concentrations (TH-ED-01P) at all samples except the initial November 2016 sample of the till well TH-ED-03, which may not have been purged adequately due to low sample recovery. Boron, calcium, potassium and strontium values in November 2016 were also noticeably lower in the till well. Manganese, molybdenum, nickel, tungsten, uranium, and vanadium were found at low concentrations in the till well in November 2016, but were higher than in the bedrock samples.

Bacteria Sampling - Bacteria sampling was not conducted in groundwater in 2017 or 2018.

Metals - Metals analyses from October 2016 through May 2018 were all below the Health Canada Canadian Drinking Water Guidelines and the Canadian Council of Ministers of the Environment (CCME) Freshwater Aquatic Life Criteria, except manganese in August 2017 and October 2017 in TH-ED-3, a till well which typically had higher levels of turbidity.

Surface Water

Field chemistry from the surface water program November 2016 through May 2018 is shown in Table D3-5. Dissolved oxygen in samples ranged from 1.6 to 12.7 mg/L with lower values generally in August 2017, with a few in May 2018. Turbidity values were 4 to 11 NTU at the Inlet (D1 Lake Manitoba), 5 to 11 NTU at the Outlet (D9 Lake St. Martin), and were less than 5 NTU in the remainder of the samples except for: D5 Clarks Drain in October 2017 (11 NTU); D6 Birch Creek in October 2017 (5.6 NTU); D7 Woodale Drain in August 2017 (7.7 NTU); and D8 Birch Creek in May 2017 (5 NTU), October 2017 (10.5 NTU) and May 2018 (16.3 NTU). General surface water quality is shown on Table D3-6, with metals shown on Table D3-7. The Manitoba Water Quality Standards, Objectives and Guidelines MWQSOG November 28, 2011 were used where available for parameters analyzed. The CCME criteria for Freshwater Aquatic life are also shown and were used where MWQSOG were not listed. Results exceeding the applicable guidelines were highlighted.

Lake St. Martin sample D9 and Lake Manitoba sample D1 have a distinct geochemical composition that is different from the other surface water points due to their elevated sodium and chloride. Within the buried bedrock valley, groundwater quality was generally stable over the 2016 to 2018 monitoring period except for a slow increase in conductivity, hardness, and sulphate in bedrock well TH-ED-01P. Seasonal variations are not evident in the wells sampled, further supporting the relative isolation of the groundwater system below the buried bedrock valley from the surface water system.

Minor seasonal changes were noted in most surface water samples including an increase or decrease in sulphate, alkalinity, hardness, and conductivity. Watchorn Creek samples increased in conductivity, bicarbonate, hardness, and chloride over the 2016 to 2018 sampling period. The sample at Woodale Drain in October 2017 was taken during a dry period with very little flow and showed increased conductivity, alkalinity, hardness, chloride, sulphate, and total phosphorous.

Water Type – Water type analysis was presented in Deliverable D6 and D2 and can be referenced.

Water Quality Criteria – All of the samples from Lake St. Martin (D9) exceed the CCME criterion for chloride for long term exposure (value 130 mg/L, criterion 120 mg/L). The sodium concentrations in Lake Manitoba and Lake St. Martin reflect the contribution of saline groundwater on the west side of Lake Manitoba. The Birch Creek drainage is isolated from this system, and drains into Lake St. Martin. All samples except Reed Lake (D3) and Woodale Drain (D7) in November 2016 and May 2017 exceed the CCME long-term criterion for fluoride (values 0.13 to 0.37 mg/L, criterion 0.12 mg/L).

All samples exceeded the MWQSOG for phosphorous of 0.025 mg/L for streams entering lakes except: D1 Lake Manitoba in May 2017 and May 2018; D3 Reed Lake in August 2017, October 2017, and May 2018; D5 North Clark's Drain in November 2016; D6 South Birch Creek in November 2016 and May 2017; D7 Woodale Drain in November 2016; and D9 Lake St. Martin in November 2016, August 2017, and October 2017. Clear Lake and Reed Lake were evaluated with these aquatic life criteria because of the interconnected nature of the Birch Creek drainage system. Considering the sampling record through May 2018, the Birch Creek sample D8 has

similar values of phosphorous (0.02 mg/L) to Reed Lake (D3) and Clear Lake (D4). Surface water samples exceeded the various CCME trigger ranges for phosphorous as follows:

- Mesotrophic (0.010 to 0.020 mg/L)
 - o D1 Lake Manitoba: 1 of 5 dates
 - o D5 North Clark's Drain: 1 of 5 dates
 - o D6 South Birch Creek: 2 of 5 dates
- Meso-eutrophic (0.020 to 0.035 mg/L)
 - o D1 Lake Manitoba: 3 of 5 dates
 - o D2 Watchorn Creek: 1 of 5 dates
 - o D3 Reed Lake: 4 of 5 dates
 - o D4 Clear Lake: 3 of 5 dates
 - o D5 North Clark's Drain: 2 of 5 dates
 - o D6 South Birch Creek: 2 of 5 dates
 - o D7 Woodale Drain: 1 of 5 dates
 - o D8 Birch Creek: 2 of 5 dates
 - o D9 Lake St. Martin: 5 of 5 dates
- Eutrophic (0.035 to 0.1 mg/L)
 - o D1 Lake Manitoba: 1 of 5 dates
 - o D2 Watchorn Creek: 4 of 5 dates
 - o D3 Reed Lake: 1 of 5 dates
 - o D4 Clear Lake: 2 of 5 dates
 - o D5 North Clark's Drain: 2 of 5 dates
 - o D6 South Birch Creek: 1 of 5 dates
 - o D7 Woodale Drain: 3 of 5 dates
 - o D8 Birch Creek: 3 of 5 dates
- Hyper-eutrophic (> 0.1 mg/L)
 - o D7 Woodale Drain: 1 of 5 dates (this sample was taken during very low flow conditions)

Unionized ammonia values were calculated by KGS Group based on field pH and temperature as shown Table D3-6 with all samples below the CCME criterion of 0.019 mg/L.

Bacteria Sampling – Ranges of Total Coliform and *E. coli* at the various sampling locations were as follows:

Sampling Location	Total Coliform (MPN/100 mL)	E. coli (MPN/100 mL)
D1 Lake Manitoba	74 to 5,380	<1 to 114
D2 Watchorn Creek	860 to 2,420	20 to 70
D3 Reed Lake	300 to 3,270	19 to 33
D4 Clear Lake	38 to 2,420	1 to 281
D5 North Clarks Drain	750 to 4,480	18 to 64
D6 South Birch Creek	100 to 2,420	<2 to 3.8
D7 Woodale Drain	231 to 2,130	<1 to 122
D8 Birch Creek	230 to 2,420	39 to 249
D9 Lake St. Martin	100 to 1,990	1 to 613

Metals - Metals analyses from November 2016 through May 2018 were all below the MWQSOG (Tier III Freshwater Aquatic Life) and the CCME Freshwater Aquatic Life Criteria, except for the following samples:

- D-1 Lake Manitoba November 2016 - Aluminum
- D-8 Birch Creek May 2018 - Iron
- D-2 Watchorn Creek August 2017 and May 2018 Phosphorous
- D-7 Woodale Drain August 2017, October 2017 and May 2018 Phosphorous
- D-8 Birch Creek May 2018 Phosphorous
- D-7 Woodale Drain October 2017 – Uranium

Quality Assurance/Quality Control Evaluation

For groundwater from November 2016 through May 2018, relative percent difference (RPD) on Table D3-3 of duplicate samples were all below 5%. The RPD target (10% for all parameters where the analysis value was more than 5 times the detection limit) was met at all samples except for fluoride at GD-02 in November 2016, where the RPD was 17%.

For surface water, the RPDs on Table D3-6 were below the RPD target (10% for samples where the analysis values were more than 5 times the detection limit) except at D4 Clear Lake in May 2017 (total nitrogen and total Kjeldahl nitrogen were 19%) and at D4 Clear Lake in May 2018 (total dissolved phosphorous and total phosphorous were 25% and 18% respectively and total suspended solids were 62%).

A field blank was taken for each surface water sampling event. All parameters analyzed in the field blank were below detection except total dissolved phosphorous and total phosphorous (in November 2016 only), and antimony, calcium, magnesium and manganese in August 2016, all detected at very low concentrations that do not affect the interpretation of the analytical results. For metals analyses, the RPD target of 10% (for samples where the analysis values were more than 5 times the detection limit) was exceeded for the following samples:

- aluminum (16.5%) D9 Lake St. Martin November 2016, (102%) D-4 Clear Lake October 2017; and
- manganese (36%) D-4 Clear Lake October 2017

These variations can be present in surface water since they are not filtered and varying levels of sediment may be present even with standard sampling procedures.

Stable Isotopes

The stable isotopes Oxygen 18 (^{18}O) and deuterium (^2H) are used as surface water tracers in water quality studies. These isotopes are conservative tracers, reflecting the origin of the water. Surface water containing fresh snowmelt during a spring runoff or flood would typically have more negative ^{18}O values, in comparison to other times of the year. Less negative ^{18}O values would be expected later in the season, particularly in lakes where evaporation occurs. Groundwater in areas of recent recharge has less negative ^{18}O values, while more negative values can indicate older water.

Isotope samples were collected for the ^{18}O and ^2H for wells TH-ED-01W, 15-RD-PW1, as well as Lake Manitoba (D1), Clear Lake (D4), and at Lake St. Martin (D9). Sample results are shown on Table D3-8 and are plotted on Plate D3-1. The Global meteoric water line and the Gimli, Manitoba meteoric water line are plotted as reference. Surface water samples that plot to the right of these lines can indicate evaporation.

Groundwater samples for August 2017, October 2017, and May 2018 are in a similar position to the November 2016 samples (as shown in Deliverable D6 Plate D6-10), and May 2017 samples

(plotted in Deliverable D2 Plate D2-2). Sample TH GD-08 was sampled prior to sealing in 2016 and data is plotted in Deliverable 06 Plate D6-10.

The sample for Lake Saint Martin (D9) plots far to the right of the meteoric water lines and had an ^{18}O value of -8.1 to -8.6 VSMOW. The Lake Manitoba sample had a slightly less negative ^{18}O value of -8.1 to -8.3 VSMOW. The least negative values in both lakes in October 2017 and May 2018 are indicative of these surface waters having undergone a summer season (2017) of evaporation from the lakes, followed by a spring (2018) with low runoff and low lake levels.

The groundwater samples in August 2017 through May 2018 are very stable, with little seasonal variation, ranging from an ^{18}O of -15.3 at Well 15-RD-PW-1 to an ^{18}O of -14.9 at Well TH-ED-01W. These results suggest that this groundwater is reflective of relatively recent recharge from meteoric precipitation (rain and snow) with a relatively low residence time in the subsurface. This is expected since groundwater aquifer recharge in the region is known to be via rain and snowmelt within high elevation bedrock areas with thin overburden cover.

From August 2017 through May 2018 the surface water sample at Clear Lake (D-4) ranged from an ^{18}O of -10.3 in May 2018 to an ^{18}O of -7.19 in October 2017. These values are distinct from the groundwater samples. The Clear Lake samples exhibited a wider range of values from August 2017 to May 2018 than in the previous sampling. The May 2018 value was more similar to the May 2017 value (Table D-3-8) while the August and October values showed increasing depletion of ^{18}O . All surface water ^{18}O isotope values are consistently less negative than the groundwater values, indicating a distinct surface water source characterized by seasonal evaporative processes. The large variation in isotope concentrations is likely related to seasonal precipitation and evaporation rates.

3.0 CONCLUSIONS

The following conclusions regarding trends and seasonal effects can be made from the data collected over the 2016 to 2018 sampling period to July 1, 2018:

1. Minor water elevation changes at well TH-ED-01 and well 15-RD-PW-1 were observed and may be related to a combination of lake level rise and aquifer piezometric response, in combination with regional recharge from upland areas outside of the Route D buried bedrock valley area.
2. Temperature at well 15-RD-PW-1 was a constant 6.5 °C after a longer transducer cable was installed, enabling the transducer to measure groundwater temperature more closely to the bedrock surface. Previous temperature variations in the transducer readings at Routes D and C are not representative of bedrock aquifer conditions due to the shallow placement of the transducer in the well and groundwater temperature variability.
3. The constant groundwater temperature at well 15-RD-PW-1 (following transducer depth relocation) indicates the isolation of groundwater beneath the buried valley, from the surface water system or any other groundwater temperature effects,
4. Seasonal differences in groundwater quality on Route D were not observed between November 2016 and May 2018 in the wells sampled. Increasing parameters were observed at well TH-ED-01P.
5. Minor seasonal differences in surface water quality (e.g. sulphate, alkalinity, hardness, conductivity) between November 2016 and May 2018 were observed at most locations in the Birch Creek watershed. Increasing parameters were observed at D2 Watchorn Creek.
6. The water type and isotopic signatures for samples from Lake Manitoba and Lake St. Martin differ from the rest of the surface water (Clear Lake) and groundwater samples.
7. The stable isotope signature for bedrock groundwater (TH-ED-01W and 15-RD-PW1) and surface water (Clear Lake) samples is widely different and suggests negligible, if any, contribution of groundwater discharge to Clear Lake.
8. The water type signature for the groundwater samples differs from surface water samples along most locations sampled along the Birch Creek drainage, as shown in the Deliverable D6 and D2 reports; however, the sample from Watchorn Creek is more similar to the groundwater samples, due to a higher chloride contribution.

4.0 RECOMMENDATIONS

1. A longer cable should be installed for the transducer at well TH-ED-01W so that the instrument tip is placed closer to the bottom of the casing. This extension is required to obtain accurate temperature measurements of the active groundwater aquifer system.
2. The following repairs and actions are needed for the maintenance of the monitoring system and should be carried out during the next monitoring event:
 - Repair and re-survey staff gauges at D3 Reed Lake and D4 Clear Lake;
 - Re-survey transducer tips at Reed Lake and Clear Lake;
 - Protect cable at D3 Reed Lake with an animal-resistant protective sleeve;
 - Install a new Heron cable at D4 Clear Lake on the transducer with animal-resistant protective sleeve; and
 - Conduct repairs listed in Appendix D3-D at:
 - o TH-GD-05
 - o 15-RD-05
 - o 15-RD-02
 - o 15-RD-01
 - o BH-D109
3. Transducers on Route C should be downloaded during the next sampling event. The functionality of the equipment should be checked and longer cables should be installed so that the transducer tip is near the bottom of the casing. These instruments on Route C provide valuable baseline regional monitoring for future works on Route D.
4. Baseline monitoring data should be set up in a project database. A series of interpretive plots such as time concentration plots, geochemical plots, and statistical analysis should be created during the next stage of the project for data interpretation and as necessary for environmental licensing compliance.
5. Expanded isotope monitoring at more surface water locations is recommended for future phases, as results have proven useful to differentiate groundwater and surface water sources.

5.0 STATEMENT OF LIMITATIONS AND CONDITIONS

5.1 THIRD PARTY USE OF REPORT

This report has been prepared for Manitoba Infrastructure to whom this report has been addressed and any use a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

5.2 GEO-ENVIRONMENTAL STATEMENT OF LIMITATIONS

KGS Group prepared the geo-environmental conclusions and recommendations for this report in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. The information contained in this report is based on the information that was made available to KGS Group during the investigation and upon the services described, which were performed within the time and budgetary requirements of Manitoba Infrastructure. As the report is based on the available information, some of its conclusions could be different if the information upon which it is based is determined to be false, inaccurate or contradicted by additional information. KGS Group makes no representation concerning the legal significance of its findings or the value of the property investigated.

TABLES

TABLE D3-1
TESTHOLE AND GROUNDWATER DATA SUMMARY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Test Hole	Description	UTM Location		Station	Soil Type	Instrumentation		Ground Elevation (m)	Tip Depth (m)	Tip Elevation (m)	Stick-up Height (m)	Top of Casing Elevation (m)	Date	Pressure Gauge Reading* (psi)	Ground-water Depth (m)	Ground-water Elevation (m)	VW Reading (Hz)	Ground-water Elevation (m)	Artesian Conditions	Comments
		Northing	Easting			Type	Diam. (mm)													
TH-GD-02	Left on road #237 (Township Line) just north of Moosehorn	5683632.07	531290.40		till	VW #1602935		248.625	6.91	241.715	-	-	9-Nov-16	-	-	-	2887.4	249.17	yes	
					till	VW #1602935		248.625	6.91	241.715	-	-	30-Mar-17	-	-	-	2874.3	250.16	yes	
					till	VW #1602935		248.625	6.91	241.715	-	-	24-May-17	-	-	-	2869.8	250.48	yes	
					till	VW #1602935		248.625	6.91	241.715	-	-	2-Aug-17	-	-	-	2870.6	250.42	yes	
					till	VW #1602935		248.625	6.91	241.715	-	-	4-Oct-17	-	-	-	2877.1	249.97	yes	
					till	VW #1602935		248.625	6.91	241.715	-	-	29-May-18	-	-	-	2883.5	249.27	yes	
					bedrock	STP	25	248.625	22.76	225.865	0.85	249.48	9-Nov-16	-	>-0.85	>250.33	-	-	yes	Flowing at TOC; used bailer as extension to measure GW elevation.
					bedrock	STP	25	248.625	22.76	225.865	0.85	249.48	30-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					bedrock	STP	25	248.625	22.76	225.865	0.85	249.48	24-May-17	4.6	-3.24	252.72	-	-	yes	Removed foam insert - ice on foam 2 m down from top of rod to end of rod; sampled; pressure reading is approx.- seal not tight. Flow rate approx. 6.7 L/min.
					bedrock	STP	25	248.625	22.76	225.865	0.85	249.48	2-Aug-17	3.6	-2.53	252.01	-	-	yes	Sampled; flow rate approx. 10.5 L/min.
TH-GD-05	Carne Ridge Road	5693350.95	530617.18		bedrock	STP	25	248.625	22.76	225.865	0.85	249.48	4-Oct-17	3.1	-2.18	251.66	-	-	yes	Sampled; foam insert placed in STP for winter.
					bedrock	STP	25	248.625	22.76	225.865	0.85	249.48	29-May-18	2.5	-1.76	251.24	-	-	yes	Foam insert removed and reinstalled after sampling.
					till	VW #1602924		248.66	6.71	241.95	-	-	9-Nov-16	-	-	-	2772.2	249.83	yes	
					till	VW #1602924		248.66	6.71	241.95	-	-	30-Mar-17	-	-	-	2749.6	251.29	yes	
					till	VW #1602924		248.66	6.71	241.95	-	-	24-May-17	-	-	-	2751.2	251.18	yes	
					till	VW #1602924		248.66	6.71	241.95	-	-	1-Aug-17	-	-	-	2771.4	249.87	yes	
					till	VW #1602924		248.66	6.71	241.95	-	-	3-Oct-17	-	-	-	2767.2	250.14	yes	
					till	VW #1602924		248.66	6.71	241.95	-	-	28-May-18	-	-	-	2745.8	251.53	yes	
					till	STP	20	248.66	16.92	231.74	0.80	249.461	9-Nov-16	-	>-0.8	>250.26	-	-	yes	Flowing at TOC; no extension available
					till	STP	20	248.66	16.92	231.74	0.80	249.461	30-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
TH-GD-06	On left side of road #239 to Steep Rock	5697400.98	531025.08		till	STP	20	248.66	16.92	231.74	0.80	249.461	24-May-17	-	>-1.05	>249.71	-	-	yes	Used bailer as extension for GW elevation measurement. Removed foam insert; STP loose - pulls up while removing foam.
					till	STP	20	248.66	16.92	231.74	0.80	249.461	1-Aug-17	-	-	>249.46	-	-	yes	Stabilized STP; water flowing out of TOC
					till	STP	20	248.66	16.92	231.74	0.80	249.461	3-Oct-17	2.5	-1.76	251.22	-	-	yes	Water flowing out of STP; foam insert placed in STP for winter; plug placed on top of foam insert and then slip cap taped on to prevent leakage.
					till	STP	20	248.66	16.92	231.74	0.80	249.461	28-May-18	3.1	-2.18	251.64	-	-	yes	STP tilted; had to raise casing to open lid. Crack in casing (0.3 m long); water flowing out of STP once foam removed; foam reinstalled. Stick up now 1.08 m.
					till	VW #1602923		251.918	10.67	241.248	-	-	10-Nov-16	-	-	-	2738.5	251.56	no	
					till	VW #1602923		251.918	10.67	241.248	-	-	30-Mar-17	-	-	-	2744.1	251.19	no	
					till	VW #1602923		251.918	10.67	241.248	-	-	24-May-17	-	-	-	2740.2	251.45	no	
					till	VW #1602923		251.918	10.67	241.248	-	-	1-Aug-17	-	-	-	2738.9	251.53	no	
					till	VW #1602923		251.918	10.67	241.248	-	-	3-Oct-17	-	-	-	2751.1	250.71	no	
					till	VW #1602923		251.918	10.67	241.248	-	-	28-May-18	-	-	-	2747.2	250.97	no	
TH-GD-06	On left side of road #239 to Steep Rock	5697400.98	531025.08		till	STP	25	251.918	21.34	230.578	0.89	252.809	10-Nov-16	-	0.02	252.79	-	-	yes	
					till	STP	25	251.918	21.34	230.578	0.89	252.809	30-Mar-17	-	0.02	252.79	-	-	yes	Foam insert frozen; could not remove.
					till	STP	25	251.918	21.34	230.578	0.89	252.809	24-May-17	-	1.495*	251.31*	-	-	no	Water was near TOC before removing foam insert; was still rising slowly after monitoring. Reading may still be depressed.
					till	STP	25	251.918	21.34	230.578	0.89	252.809	1-Aug-17	-	0.505	252.30	-	-	yes	
					till	STP	25	251.918	21.34	230.578	0.89	252.809	3-Oct-17	-	0.565	252.24	-	-	yes	Foam insert placed in STP for winter
					till	STP	25	251.918	21.34	230.578	0.89	252.809	28-May-18	-	1.596	251.21	-	-	no	Foam insert removed and then reinstalled.

TABLE D3-1
TESTHOLE AND GROUNDWATER DATA SUMMARY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Test Hole	Description	UTM Location		Station	Soil Type	Instrumentation		Ground Elevation (m)	Tip Depth (m)	Tip Elevation (m)	Stick-up Height (m)	Top of Casing Elevation (m)	Date	Pressure Gauge Reading* (psi)	Ground-water Depth (m)	Ground-water Elevation (m)	VW Reading (Hz)	Ground-water Elevation (m)	Artesian Conditions	Comments
		Northing	Easting			Type	Diam. (mm)													
TH-GD-07	Cluster of wells on west side of Hwy 6 (heading north)	5699453.66	531900.65		till	VW #1602937		252.045	12.19	239.855	-	-	9-Nov-16	-	-	-	2726.0	253.08	yes	
					till	VW #1602937		252.045	12.19	239.855	-	-	31-Mar-17	-	-	-	2720.0	253.48	yes	
					till	VW #1602937		252.045	12.19	239.855	-	-	24-May-17	-	-	-	2715.4	253.79	yes	
					till	VW #1602937		252.045	12.19	239.855	-	-	1-Aug-17	-	-	-	2723.6	253.24	yes	
					till	VW #1602937		252.045	12.19	239.855	-	-	3-Oct-17	-	-	-	2728.7	252.90	yes	
					till	VW #1602937		252.045	12.19	239.855	-	-	28-May-18	-	-	-	2726.6	253.04	yes	
					bedrock	STP	25	252.045	19.20	232.845	0.79	252.836	9-Nov-16	-	>-0.79	>253.63	-	-	yes	Flowing at TOC; no extension available >1.6m ags
					bedrock	STP	25	252.045	19.20	232.845	0.79	252.836	31-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					bedrock	STP	25	252.045	19.20	232.845	0.79	252.836	24-May-17	1.8	-1.27	254.10	-	-	yes	Removed foam insert; sampled. Flow rate approx. 0.8 L/min.
					bedrock	STP	25	252.045	19.20	232.845	0.79	252.836	1-Aug-17	1.8	-1.27	254.10	-	-	yes	sampled
					bedrock	STP	25	252.045	19.20	232.845	0.79	252.836	3-Oct-17	1.2	-0.84	253.68	-	-	yes	Sampled; foam insert placed in STP for winter
					bedrock	STP	25	252.045	19.20	232.845	0.79	252.836	28-May-17	1.25	-0.88	253.72	-	-	yes	Foam insert removed and reinstalled after sampling.
TH-GD-08	Intersection of Iverson Road and Birch Bay Loop	5701521.62	532917.21		till	VW #1602938		246.807	7.32	239.487	-	-	9-Nov-16	-	-	-	2721.1	250.41	yes	
					till	VW #1602938		246.807	7.32	239.487	-	-	30-Mar-17	-	-	-	2689.4	252.03	yes	
					till	VW #1602938		246.807	7.32	239.487	-	-	24-May-17	-	-	-	2681.6	252.54	yes	
					till	VW #1602938		246.807	7.32	239.487	-	-	1-Aug-17	-	-	-	2684.9	252.31	yes	
					till	VW #1602938		246.807	7.32	239.487	-	-	3-Oct-17	-	-	-	2697.5	251.49	yes	
					till	VW #1602938		246.807	7.32	239.487	-	-	28-May-18	-	-	-	2697.8	251.45	yes	
					sand	VW #1602940		246.807	11.58	235.227	-	-	9-Nov-16	-	-	-	2590.2	251.97	yes	
					sand	VW #1602940		246.807	11.58	235.227	-	-	30-Mar-17	-	-	-	2587.5	252.15	yes	
					sand	VW #1602940		246.807	11.58	235.227	-	-	24-May-17	-	-	-	2579.2	252.67	yes	
					sand	VW #1602940		246.807	11.58	235.227	-	-	1-Aug-17	-	-	-	2582.7	252.45	yes	
					sand	VW #1602940		246.807	11.58	235.227	-	-	3 Oct-17	-	-	-	2595.8	251.61	yes	
					sand	VW #1602940		246.807	11.58	235.227	-	-	28-May-18	-	-	-	2597.7	251.49	yes	
					till	STP	25	246.807	17.07	229.737	0.91	247.717	9-Nov-16	-	>-7.92	>254.75	-	-	yes	Flowing at TOC; only able to extend by 7.92 m safely >7.9m ags. Installed pressure gauge.
					till	STP	25	246.807	17.07	229.737	0.91	247.717	30-Mar-17	5.2	-3.66	251.38	-	-	yes	
					till	STP	25	246.807	17.07	229.737	0.91	247.717	24-May-17	4.2	-2.96	250.67	-	-	yes	
					till	STP	25	246.807	17.07	229.737	0.91	247.717	1-Aug-17	3	-2.11	249.83	-	-	yes	
					till	STP	25	246.807	17.07	229.737	0.91	247.717	3-Oct-17	4.5	-3.17	250.88	-	-	yes	
					till	STP	25	246.807	17.07	229.737	0.91	247.717	28-May-18	0.5*	#VALUE!	#VALUE!	-	-	#VALUE!	Gauge may not be working correctly - reading is much lower than previous, and needle is sitting at lowest value (0.5). Well is under extreme pressure and field repair of gauge was not possible.
TH-ED-01P	Farm off Werster Road (off Carne Ridge Road)	5692376.38	530502.82	11+625	till	VW #1602932		249.431	6.10	243.331	-	-	9-Nov-16	-	-	-	2830.4	249.47	yes	
					till	VW #1602932		249.431	6.10	243.331	-	-	30-Mar-17	-	-	-	2841.9	248.61	no	
					till	VW #1602932		249.431	6.10	243.331	-	-	23-May-17	-	-	-	2830.7	249.42	no	
					till	VW #1602932		249.431	6.10	243.331	-	-	2-Aug-17	-	-	-	2835.9	249.04	no	
					till	VW #1602932		249.431	6.10	243.331	-	-	4-Oct-17	-	-	-	2846.5	248.29	no	
					till	VW #1602932		249.431	6.10	243.331	-	-	29-May-18	-	-	-	2851.8	247.87	no	
					till	VW #1602939		249.431	10.67	238.761	-	-	9-Nov-16	-	-	-	2771.9	250.36	yes	
					till	VW #1602939		249.431	10.67	238.761	-	-	30-Mar-17	-	-	-	2788.6	249.18	no	
					till	VW #1602939		249.431	10.67	238.761	-	-	23-May-17	-	-	-	2778.9	249.86	yes	
					till	VW #1602939		249.431	10.67	238.761	-	-	2-Aug-17	-	-	-	2784.7	249.44	yes	
					till	VW #1602939		249.431	10.67	238.761	-	-	4-Oct-17	-	-	-	2796.2	248.62	no	
					till	VW #1602939		249.431	10.67	238.761	-	-	29-May-18	-	-	-	2803.4	248.11	no	
					bedrock	STP	25	249.431	27.74	221.691	0.92	250.348	9-Nov-16	-	-	>251.16	-	-	yes	Flowing at TOC; used bailer as extension to measure GW elevation.
					bedrock	STP	25	249.431	27.74	221.691	0.92	250.348	30-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					bedrock	STP	25	249.431	27.74	221.691	0.92	250.348	23-May-17	3.9	-2.74	253.09	-	-	yes	Removed foam insert; sampled. Flow rate approx. 4 L/min.
					bedrock	STP	25	249.431	27.74	221.691	0.92	250.348	2-Aug-17	4.3	-3.03	253.37	-	-	yes	Sampled; flow rate approx. 5.6 L/min.
					bedrock	STP	25	249.431	27.74	221.691	0.92	250.348	4-Oct-17	3.6	-2.53	252.88	-	-	yes	Sampled; flow rate approx. 5.3 L/min; foam insert placed in STP for winter.
					bedrock	STP	25	249.431	27.74	221.691	0.92	250.348	29-May-18	3.7	-2.60	252.95	-	-	yes	Foam insert removed and reinstalled after sampling.

TABLE D3-1
TESTHOLE AND GROUNDWATER DATA SUMMARY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Test Hole	Description	UTM Location		Station	Soil Type	Instrumentation		Ground Elevation (m)	Tip Depth (m)	Tip Elevation (m)	Stick-up Height (m)	Top of Casing Elevation (m)	Date	Pressure Gauge Reading* (psi)	Ground-water Depth (m)	Ground-water Elevation (m)	VW Reading (Hz)	Ground-water Elevation (m)	Artesian Conditions	Comments
		Northing	Easting			Type	Diam. (mm)													
TH-ED-01W	Farm off Werster Road (off Carne Ridge Road)	5692378.37	530495.27	11+625	bedrock	STP	125	249.492	31.70	217.792	1.04	250.53	9-Nov-16	-	-4.57	255.10	-	-	yes	Artesian at 5.6 m above ground surface.
					bedrock	STP	125	249.492	31.70	217.792	1.04	250.53	30-May-17	-	-	-	-	-	yes	Mechanical packer installed in December, 2016. Sampling port frozen. Downloaded transducer.
					bedrock	STP	125	249.492	31.70	217.792	1.04	250.53	23-May-17	-	-	-	-	-	yes	Downloaded transducer and sampled. Flow rate from well sampling tube approx. 2 L/min.
					bedrock	STP	125	249.492	31.70	217.792	1.04	250.53	2-Aug-17	-	-	-	-	-	yes	Downloaded transducer and sampled. Flow rate from well sampling tube approx. 2 L/min.
					bedrock	STP	125	249.492	31.70	217.792	1.04	250.53	4-Oct-17	-	-	-	-	-	yes	Downloaded transducer and sampled. Packer was leaking so removed and cleaned; reinstalled. Flow rate from well sampling tube approx. 2 L/min.
					bedrock	STP	125	249.492	31.70	217.792	1.04	250.53	29-May-18	-	-	-	-	-	yes	Downloaded transducer and sampled.
TH-ED-01PP1	Farm off Werster Road (off Carne Ridge Road)	5692378.65	530536.08		till	STP	25	248.717	1.22	247.497	0.97	249.688	9-Nov-16	-	1.130	248.56	-	-	no	
					till	STP	25	248.717	1.22	247.497	0.97	249.688	30-Mar-17	-	1.855	247.83	-	-	no	Foam insert removed and then reinstalled.
					till	STP	25	248.717	1.22	247.497	0.97	249.688	23-May-17	-	1.470	248.22	-	-	no	Foam insert removed.
					till	STP	25	248.717	1.22	247.497	0.97	249.688	2-Aug-17	-	1.910	247.78	-	-	no	Transducer for atmospheric pressure was installed in casing above water.
					till	STP	25	248.717	1.22	247.497	0.97	249.688	4-Oct-17	-	2.095	247.59	-	-	no	Foam insert placed in STP for winter
					till	STP	25	248.717	1.22	247.497	0.97	249.688	29-May-18	-	1.831	247.86	-	-	no	Foam insert removed; bar logger downloaded; foam insert reinstalled.
TH-ED-01PP2	Farm off Werster Road (off Carne Ridge Road)	5692380.13	530549.75		till	STP	25	248.456	1.22	247.236	1.06	249.519	9-Nov-16	-	1.03	248.49	-	-	yes	
					till	STP	25	248.456	1.22	247.236	1.06	249.519	30-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					till	STP	25	248.456	1.22	247.236	1.06	249.519	23-May-17	-	1.47	248.05	-	-	no	Foam insert removed.
					till	STP	25	248.456	1.22	247.236	1.06	249.519	2-Aug-17	-	1.81	247.71	-	-	no	
					till	STP	25	248.456	1.22	247.236	1.06	249.519	4-Oct-17	-	1.81	247.71	-	-	no	Foam insert placed in STP for winter
					till	STP	25	248.456	1.22	247.236	1.06	249.519	29-May-18	-	1.70	247.82	-	-	no	Foam insert removed and reinstalled.
TH-ED-03	Carne Ridge Road	5693404.42	529670.69		till	VW #1602931		252.218	6.10	246.118	-	-	9-Nov-16	-	-	-	2854.2	251.54	no	
					till	VW #1602931		252.218	6.10	246.118	-	-	30-Mar-17	-	-	-	-	-	-	VW reading error.
					till	VW #1602931		252.218	6.10	246.118	-	-	23-May-17	-	-	-	-	-	-	VW reading error.
					till	VW #1602931		252.218	6.10	246.118	-	-	1-Aug-17	-	-	-	-	-	-	VW reading error.
					till	VW #1602931		252.218	6.10	246.118	-	-	3-Oct-17	-	-	-	-	-	-	Cut VW wire down as far as possible and tried reading - still error
					till	STP	25	252.218	13.41	238.808	0.86	253.076	9-Nov-16	-	0.580	252.50	-	-	yes	
					till	STP	25	252.218	13.41	238.808	0.86	253.076	30-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					till	STP	25	252.218	13.41	238.808	0.86	253.076	23-May-17	-	1.915	251.16	-	-	no	Foam insert removed; sampled.
					till	STP	25	252.218	13.41	238.808	0.86	253.076	1-Aug-17	-	0.465	252.61	-	-	yes	sampled
					till	STP	25	252.218	13.41	238.808	0.86	253.076	3-Oct-17	-	-	-	-	-	-	Waterra left in STP in August, so no water depth taken; sampled; waterra left in STP, no foam insert. waterra left in STP in October, so no water depth taken; sampled; waterra left in STP, no foam insert.
					till	STP	25	252.218	13.41	238.808	0.86	253.076	28-May-18	-	-	-	-	-	-	Watera should be removed between sampling periods to enable getting a water level prior to sampling.

TABLE D3-1
TESTHOLE AND GROUNDWATER DATA SUMMARY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Test Hole	Description	UTM Location		Station	Soil Type	Instrumentation		Ground Elevation (m)	Tip Depth (m)	Tip Elevation (m)	Stick-up Height (m)	Top of Casing Elevation (m)	Date	Pressure Gauge Reading* (psi)	Ground-water Depth (m)	Ground-water Elevation (m)	VW Reading (Hz)	Ground-water Elevation (m)	Artesian Conditions	Comments
		Northing	Easting			Type	Diam. (mm)													
BH-D109	Walk south on farmer's field from Township Line	5682844.41	530474.731		till	STP	20	249.716	12.85	236.866	0.96	250.676	21-Jul-12	-	-	250.68	-	-	yes	Groundwater elevations from Summary Field Investigation Report, August, 2012 (KGS), Table 2.
					till	STP	20	249.716	12.85	236.866	0.96	250.676	29-Aug-12	-	-	250.68	-	-	yes	Groundwater elevations from Summary Field Investigation Report, August, 2012 (KGS), Table 2.
					till	STP	20	249.716	12.85	236.866	0.96	250.676	9-Nov-16	-	1.11	249.57	-	-	no	
					till	STP	20	249.716	12.85	236.866	0.96	250.676	30-Mar-17	3	-2.11	252.79	-	-	yes	Foam insert removed and then reinstalled.
					till	STP	20	249.716	12.85	236.866	0.96	250.676	23-May-17	-	-	>250.68	-	-	yes	Foam insert removed; water rose to TOC within a few minutes.
					till	STP	20	249.716	12.85	236.866	0.96	250.676	2-Aug-17	-	-	>250.68	-	-	yes	Flow very slow - too little to measure with gauge.
					till	STP	20	249.716	12.85	236.866	0.96	250.676	4-Oct-17	-	-	>250.68	-	-	yes	Flow very slow - too little to measure with gauge; foam insert placed in STP for winter.
					till	STP	20	249.716	12.85	236.866	0.96	250.676	29-May-18	-	-	-	-	-	-	Ice in borehole and on bottom of foam insert. Did not thaw after 9 hours; reinstalled foam insert. Lock would not close on well casing.
15-RD-01	Beside TH-GD-02	5683639	531292	2+672	Silty Clay	STP	25	248.3	10.4	237.9	1	249.3	16-Jul-15	1	-0.70	250.00	-	-	yes	Pressure gauge installed.
					Silty Clay	STP	25	248.3	10.4	237.9	1	249.3	4-Aug-15	1	-0.70	250.00	-	-	yes	Pressure gauge installed.
					Silty Clay	STP	25	248.3	10.4	237.9	1	249.3	9-Nov-15	1	-0.70	250.00	-	-	yes	Pressure gauge installed.
					Silty Clay	STP	25	248.3	10.4	237.9	1	249.3	9-Nov-16	1.1	-0.77	250.07	-	-	yes	Pressure gauge installed - not fitted tightly, so removed and replaced with j-plug.
					Silty Clay	STP	25	248.3	10.4	237.9	1	249.3	30-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					Silty Clay	STP	25	248.3	10.4	237.9	1	249.3	24-May-17	-	1.080	248.22	-	-	no	Removed foam insert; possibly artesian - water level may be low because foam was just removed.
					Silty Clay	STP	25	248.3	10.4	237.9	1	249.3	2-Aug-17	-	0.055	249.25	-	-	yes	
					Silty Clay	STP	25	248.3	10.4	237.9	1	249.3	4-Oct-17	-	0.050	249.25	-	-	yes	Foam insert placed in STP for winter
					Silty Clay	STP	25	248.3	10.4	237.9	0.9575	249.2575	28-May-18	-	0.450	248.81	-	-	yes	STP top broken off; obstruction at 1.5 m but got past it; reinstalled foam insert. New TOC is 0.0425 m lower than original.
					Clay Till	STP	25	248.3	20.4	227.9	0.97	249.27	16-Jul-15	3.5	-2.46	251.73	-	-	yes	Pressure gauge installed.
					Clay Till	STP	25	248.3	20.4	227.9	0.97	249.27	4-Aug-15	2.9	-2.04	251.31	-	-	yes	Pressure gauge installed.
					Clay Till	STP	25	248.3	20.4	227.9	0.97	249.27	9-Nov-15	3	-2.11	251.38	-	-	yes	Pressure gauge installed.
					Clay Till	STP	25	248.3	20.4	227.9	0.97	249.27	9-Nov-16	3.8	-2.67	251.94	-	-	yes	Pressure gauge installed.
					Clay Till	STP	25	248.3	20.4	227.9	0.97	249.27	30-Mar-17	1	-0.70	249.97	-	-	yes	Pressure gauge installed.
					Clay Till	STP	25	248.3	20.4	227.9	0.97	249.27	24-May-17	3.9	-2.74	252.01	-	-	yes	Pressure gauge installed.
					Clay Till	STP	25	248.3	20.4	227.9	0.97	249.27	2-Aug-17	3.4	-2.39	251.66	-	-	yes	Pressure gauge installed.
					Clay Till	STP	25	248.3	20.4	227.9	0.97	249.27	4-Oct-17	2.9	-2.04	251.31	-	-	yes	Pressure gauge installed.
					Clay Till	STP	25	248.3	20.4	227.9	0.97	249.27	29-May-18	3	-2.11	251.38	-	-	yes	Pressure gauge installed.
BH-D101	East side of Bayton Road	5684505.014	530628.736		till	STP	25	249.251	8.94	240.311	1.12	250.371	21-Jul-12	-	-	248.09	-	-	no	Groundwater elevations from Summary Field Investigation Report, August, 2012 (KGS), Table 2.
					till	STP	25	249.251	8.94	240.311	1.12	250.371	29-Aug-12	-	-	247.69	-	-	no	Groundwater elevations from Summary Field Investigation Report, August, 2012 (KGS), Table 2.
					till	STP	25	249.251	8.94	240.311	1.12	250.371	9-Nov-16	-	1.33	249.04	-	-	no	
					till	STP	25	249.251	8.94	240.311	1.12	250.371	23-May-17	-	-	-	-	-	-	Foam remained stuck in STP; could not remove; could not monitor.
					till	STP	25	249.251	8.94	240.311	1.12	250.371	1-Aug-17	-	2.02	248.36	-	-	no	Removed foam insert.
					till	STP	25	249.251	8.94	240.311	1.12	250.371	4-Oct-17	-	2.82	247.55	-	-	no	Foam insert placed in STP for winter
					till	STP	25	249.251	8.94	240.311	1.12	250.371	29-May-18	-	1.83	248.55	-	-	no	Removed foam insert and reinstalled.

TABLE D3-1
TESTHOLE AND GROUNDWATER DATA SUMMARY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Test Hole	Description	UTM Location		Station	Soil Type	Instrumentation		Ground Elevation (m)	Tip Depth (m)	Tip Elevation (m)	Stick-up Height (m)	Top of Casing Elevation (m)	Date	Pressure Gauge Reading* (psi)	Ground-water Depth (m)	Ground-water Elevation (m)	VW Reading (Hz)	Ground-water Elevation (m)	Artesian Conditions	Comments
		Northing	Eastings			Type	Diam. (mm)													
BH-D106	East side of Bayton Road	5682844.413	530474.731		till	STP	50	249.917	11.23	238.687	0.89	250.807	21-Jul-12	-	-	248.06	-	-	no	Groundwater elevations from Summary Field Investigation Report, August, 2012 (KGS), Table 2.
					till	STP	50	249.917	11.23	238.687	0.89	250.807	29-Aug-12	-	-	247.58	-	-	no	
					till	STP	50	249.917	11.23	238.687	0.89	250.807	9-Nov-16	-	0.86	249.95	-	-	yes	
					till	STP	50	249.917	11.23	238.687	0.89	250.807	30-Mar-17	-	2.56	248.25	-	-	no	
					till	STP	50	249.917	11.23	238.687	0.89	250.807	23-May-17	-	1.31	approx 249.50	-	-	yes	STP rose or casing fell approx. 5 cm while monitoring water level; needs to be resurveyed.
					till	STP	50	249.917	11.23	238.687	0.89	250.807	1-Aug-17	-	1.72	249.09	-	-	no	Lifted outer casing to appropriate height and poured bentonite inside casing and at base. Inside casing (STP) is stable.
					till	STP	50	249.917	11.23	238.687	0.89	250.807	4-Oct-17	-	2.15	248.66	-	-	no	Outer well casing remained in place - very stable. No foam insert - 50 mm STP.
BH-D107	Access by quad from TH-ED-01 farm	5691570.348	530533.122		till	STP	50	249.81	8.69	241.12	0.86	250.67	21-Jul-12	-	-	248.97	-	-	no	No foam insert - 50 mm STP. Groundwater elevations from Summary Field Investigation Report, August, 2012 (KGS), Table 2.
					till	STP	50	249.81	8.69	241.12	0.86	250.67	29-Aug-12	-	-	248.65	-	-	no	Groundwater elevations from Summary Field Investigation Report, August, 2012 (KGS), Table 2.
					till	STP	50	249.81	8.69	241.12	0.86	250.67	9-Nov-16	-	-	-	-	-	-	No permission for access
					till	STP	50	249.81	8.69	241.12	0.86	250.67	23-May-17	-	1.137	249.53	-	-	no	Pressure gauge installed.
					till	STP	50	249.81	8.69	241.12	0.86	250.67	2-Aug-17	-	1.490	249.18	-	-	no	Pressure gauge installed.
					till	STP	50	249.81	8.69	241.12	0.86	250.67	4-Oct-17	-	2.079	248.59	-	-	no	No foam insert - 50 mm STP.
					till	STP	50	249.81	8.69	241.12	0.86	250.67	28-May-18	-	-	-	-	-	-	No permission for access
15-RD-02	Corner of Burnett and Carne Ridge Road	5693417	530519	12+776	Silty Clay Till	STP	25	248.65	14.9	233.75	0.8	249.45	16-Jul-15	7.1	-5.00	254.45	-	-	yes	Pressure gauge installed.
					Silty Clay Till	STP	25	248.65	14.9	233.75	0.8	249.45	4-Aug-15	7.1	-5.00	254.45	-	-	yes	Pressure gauge installed.
					Silty Clay Till	STP	25	248.65	14.9	233.75	0.8	249.45	9-Nov-15	7.7	-5.42	254.87	-	-	yes	Pressure gauge installed.
					Silty Clay Till	STP	25	248.65	14.9	233.75	0.8	249.45	9-Nov-16	7.4	-5.21	254.66	-	-	yes	Pressure gauge installed.
					Silty Clay Till	STP	25	248.65	14.9	233.75	0.8	249.45	30-Mar-17	2.0	-1.41	250.86	-	-	yes	Pressure gauge installed.
					Silty Clay Till	STP	25	248.65	14.9	233.75	0.8	249.45	24-May-17	2.0	-1.41	250.86	-	-	yes	Pressure gauge installed; leaking a bit around pressure gauge.
					Silty Clay Till	STP	25	248.65	14.9	233.75	0.8	249.45	1-Aug-17	1.9	-1.34	250.79	-	-	yes	Leaking a bit around pressure gauge.
15-RD-02A	Corner of Burnett and Carne Ridge Road	5693419	530519	12+776	Silty Clay Till	STP	25	248.65	14.9	233.75	0.8	249.45	3-Oct-17	1.4	-0.99	250.44	-	-	yes	Leaking around pressure gauge; could not seal.
					Silty Clay Till	STP	25	248.65	14.9	233.75	0.8	249.45	28-May-18	1.0	-0.70	250.15	-	-	yes	Pressure gauge reading is at lowest reading (1 psi), so could be less than 1; lots of water leaking from casing.
					Silty Clay	STP	25	248.63	7.6	241.03	0.67	249.3	16-Jul-15	-	0.91	248.39	-	-	no	
					Silty Clay	STP	25	248.63	7.6	241.03	0.67	249.3	4-Aug-15	-	0.98	248.33	-	-	no	
					Silty Clay	STP	25	248.63	7.6	241.03	0.67	249.3	9-Nov-15	-	0.65	248.65	-	-	yes	
					Silty Clay	STP	25	248.63	7.6	241.03	0.67	249.3	9-Nov-16	-	>-0.67	>249.97	-	-	yes	Flowing at TOC; no extension available
					Silty Clay	STP	25	248.63	7.6	241.03	0.67	249.3	30-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
BH-D9	East side of Burnett, walk from road	5693949.149	530788.559		till	STP	25	249.495	12.376	237.119	0.90	250.395	21-Jul-12	-	-	248.96	-	-	no	Groundwater elevations from Summary Field Investigation Report, August, 2012 (KGS), Table 2.
					till	STP	25	249.495	12.376	237.119	0.90	250.395	29-Aug-12	-	-	248.77	-	-	no	Groundwater elevations from Summary Field Investigation Report, August, 2012 (KGS), Table 2.
					till	STP	25	249.495	12.376	237.119	0.90	250.395	9-Nov-16	-	1.23	249.16	-	-	no	
					till	STP	25	249.495	12.376	237.119	0.90	250.395	31-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					till	STP	25	249.495	12.376	237.119	0.90	250.395	24-May-17	-	2.12	248.28	-	-	no	
					till	STP	25	249.495	12.376	237.119	0.90	250.395	1-Aug-17	-	1.30	249.10	-	-	no	
					till	STP	25	249.495	12.376	237.119	0.90	250.395	3-Oct-17	-	2.10	248.30	-	-	no	Foam insert placed in STP for winter
BH-D106	East side of Bayton Road	5682844.413	530474.731		till	STP	25	249.495	12.376	237.119	0.90	250.395	28-May-18	-	2.32	248.08	-	-	no	Foam insert removed and then reinstalled.

TABLE D3-1
TESTHOLE AND GROUNDWATER DATA SUMMARY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Test Hole	Description	UTM Location		Station	Soil Type	Instrumentation		Ground Elevation (m)	Tip Depth (m)	Tip Elevation (m)	Stick-up Height (m)	Top of Casing Elevation (m)	Date	Pressure Gauge Reading* (psi)	Ground-water Depth (m)	Ground-water Elevation (m)	VW Reading (Hz)	Ground-water Elevation (m)	Artesian Conditions	Comments
		Northing	Easting			Type	Diam. (mm)													
15-RD-03	On trail in woods across ditch on road #239, opposite side from TH-GD-06	5697485	530996	17+032	Silty Clay Till	STP	25	251.84	7.6	244.24	0.9	252.74	16-Jul-15	-	1.75	250.99	-	-	no	Water level 0.9 m below grade upon completion of drilling
					Silty Clay Till	STP	25	251.84	7.6	244.24	0.9	252.74	4-Aug-15	-	1.68	251.06	-	-	no	Water level 0.9 m below grade upon completion of drilling
					Silty Clay Till	STP	25	251.84	7.6	244.24	0.9	252.74	9-Nov-15	-	1.30	251.44	-	-	no	Water level 0.9 m below grade upon completion of drilling
					Silty Clay Til	STP	25	251.84	7.6	244.24	0.9	252.74	9-Nov-16	-	1.238	251.50	-	-	no	
					Silty Clay Til	STP	25	251.84	7.6	244.24	0.9	252.74	30-Mar-17	-	2.150	250.59	-	-	no	
					Silty Clay Til	STP	25	251.84	7.6	244.24	0.9	252.74	24-May-17	-	2.090	250.65	-	-	no	
					Silty Clay Til	STP	25	251.84	7.6	244.24	0.9	252.74	1-Aug-17	-	1.540	251.20	-	-	no	
					Silty Clay Till	STP	25	251.84	7.6	244.24	0.9	252.74	3-Oct-17	-	2.360	250.38	-	-	no	Foam insert placed in STP for winter
					Silty Clay Till	STP	25	251.84	7.6	244.24	0.9	252.74	28-May-18	-	2.219	250.52	-	-	no	Foam insert removed and then reinstalled.
					Clay till	STP	25	251.84	14.9	236.94	0.9	252.74	16-Jul-15	-	0.36	252.39	-	-	yes	Water level 0.9 m below grade upon completion of drilling
					Clay till	STP	25	251.84	14.9	236.94	0.9	252.74	4-Aug-15	-	0.32	252.42	-	-	yes	
					Clay till	STP	25	251.84	14.9	236.94	0.9	252.74	9-Nov-15	-	0.00	252.74	-	-	yes	Water level at Top Of Casing (TOC)
					Clay till	STP	25	251.84	14.9	236.94	0.9	252.74	9-Nov-16	-	>-0.9	>253.64	-	-	yes	Flowing at TOC; no extension available
					Clay till	STP	25	251.84	14.9	236.94	0.9	252.74	30-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					Clay till	STP	25	251.84	14.9	236.94	0.9	252.74	24-May-17	-	0.852	251.89	-	-	yes	Removed foam insert; water still rising after monitoring.
					Clay till	STP	25	251.84	14.9	236.94	0.9	252.74	1-Aug-17	-	0.020	252.72	-	-	yes	
15-RD-03A	On trail in woods across ditch on road #239, opposite side from TH-GD-06	5697489	530991	17+032	Sand	VW #1403291		251.86	10.4	241.46	-	-	16-Jul-15	-	-	250.52	-	-	no	Water level at bottom upon completion of drilling
					Sand	VW #1403291		251.86	10.4	241.46	-	-	4-Aug-15	-	-	251.18	-	-	no	
					Sand	VW #1403291		251.86	10.4	241.46	-	-	9-Nov-15	-	-	251.94	-	-	yes	
					Sand	VW #1403291		251.86	10.4	241.46	-	-	9-Nov-16	-	-	-	2816.1	251.93	yes	
					Sand	VW #1403291		251.86	10.4	241.46	-	-	30-Mar-17	-	-	-	2823.9	251.44	no	
					Sand	VW #1403291		251.86	10.4	241.46	-	-	24-May-17	-	-	-	2818.4	251.78	no	
					Sand	VW #1403291		251.86	10.4	241.46	-	-	1-Aug-17	-	-	-	2814.2	252.04	yes	
					Sand	VW #1403291		251.86	10.4	241.46	-	-	3-Oct-17	-	-	-	2828.1	251.16	no	No foam insert due to VW wire.
					Sand	VW #1403291		251.86	10.4	241.46	-	-	28-May-18	-	-	-	2825.2	251.35	no	No foam insert due to VW wire.
15-RD-04	Cluster of wells on west side of Hwy 6 (heading north)	5699450	531894	19+256	Silty Clay	STP	25	251.76	7.6	244.16	1	252.76	16-Jul-15	-	1.03	251.73	-	-	no	
					Silty Clay	STP	25	251.76	7.6	244.16	1	252.76	4-Aug-15	-	2.51	250.26	-	-	no	
					Silty Clay	STP	25	251.76	7.6	244.16	1	252.76	9-Nov-15	-	0.75	252.01	-	-	yes	
					Silty Clay	STP	25	251.76	7.6	244.16	1	252.76	9-Nov-16	-	0.54	252.22	-	-	yes	
					Silty Clay	STP	25	251.76	7.6	244.16	1	252.76	31-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					Silty Clay	STP	25	251.76	7.6	244.16	1	252.76	24-May-17	-	1.92	250.84	-	-	no	
					Silty Clay	STP	25	251.76	7.6	244.16	1	252.76	1-Aug-17	-	1.50	251.26	-	-	no	
					Silty Clay	STP	25	251.76	7.6	244.16	1	252.76	3-Oct-17	-	1.67	251.09			no	Foam insert placed in STP for winter
					Silty Clay	STP	25	251.76	7.6	244.16	1	252.76	28-May-18	-	1.15	251.61			no	Foam insert removed and then reinstalled.
					Silty Clay Til	STP	25	251.76	14.5	237.26	1	252.76	16-Jul-15	1.6	-1.13	253.89	-	-	yes	
					Silty Clay Til	STP	25	251.76	14.5	237.26	1	252.76	4-Aug-15	1.1	-0.77	253.53	-	-	yes	
					Silty Clay Til	STP	25	251.76	14.5	237.26	1	252.76	9-Nov-15	2.5	-1.76	254.52	-	-	yes	
					Silty Clay Till	STP	25	251.76	14.5	237.26	1	252.76	9-Nov-16	-	>-1	>253.76	-	-	yes	Flowing at TOC; no extension available
					Silty Clay Till	STP	25	251.76	14.5	237.26	1	252.76	31-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					Silty Clay Till	STP	25	251.76	14.5	237.26	1	252.76	24-May-17	1	-0.70	253.46	-	-	yes	Flowing at TOC; no extension available
					Silty Clay Till	STP	25	251.76	14.5	237.26	1	252.76	1-Aug-17	0.5	-0.35	253.11	-	-	yes	Flowing at TOC; 0.3 m head measured above TOC with bailer
					Silty Clay Till	STP	25	251.76	14.5	237.26	1	252.76	3-Oct-17	-	-	>252.76	-	-	yes	Flowing at TOC too slowly to measure P with gauge; foam insert placed in STP for winter
					Silty Clay Till	STP	25	251.76	14.5	237.26	1	252.76	28-May-18	-	-	>252.76	-	-	yes	Flowing at TOC; too tight against casing to measure P with gauge; foam insert removed and then reinstalled.

TABLE D3-1
TESTHOLE AND GROUNDWATER DATA SUMMARY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Test Hole	Description	UTM Location		Station	Soil Type	Instrumentation		Ground Elevation (m)	Tip Depth (m)	Tip Elevation (m)	Stick-up Height (m)	Top of Casing Elevation (m)	Date	Pressure Gauge Reading* (psi)	Ground-water Depth (m)	Ground-water Elevation (m)	VW Reading (Hz)	Ground-water Elevation (m)	Artesian Conditions	Comments
		Northing	Easting			Type	Diam. (mm)													
15-RD-PW1	Cluster of wells on west side of Hwy 6 (heading north)	5699447	531897	19+256	bedrock	STP	125	251.76	23.16	228.6	0.94	252.70	9-Nov-16	-	-	-	-	-	yes	Conducted pump test (flow rate approx. 9.5 L/min); sampled; installed packer with transducer.
					bedrock	STP	125	251.76	23.16	228.6	1.94	253.70	31-Mar-17	-	-	-	-	-	yes	Transducer would not connect.
					bedrock	STP	125	251.76	23.16	228.6	2.94	254.70	24-May-17	-	-	-	-	-	yes	Transducer would not connect; sampled. Flow rate from well sampling tube approx. 1.3 L/min.
					bedrock	STP	125	251.76	23.16	228.6	2.94	254.70	1-Aug-17	-	-	-	-	-	yes	Transducer would not connect; transducer and packer removed. Connection successful in office. Cable being replaced.
					bedrock	STP	125	251.76	23.16	228.6	2.94	254.70	3-Oct-17	-	-	-	-	-	yes	Reinstalled packer and transducer; sampled
					bedrock	STP	125	251.76	23.16	228.6	2.94	254.70	28-May-18	-	-	-	-	-	yes	Downloaded logger; sampled.
15-RD-10A	Use quad from old house on Burnett - watch for ditch in middle of field	5698130	531200	17+800	Silty Clay	VW #1404249		248.87	7.6	241.27	-	-	16-Jul-15	-	-	-	-	-	-	No Access
					Silty Clay	VW #1404249		248.87	7.6	241.27	-	-	4-Aug-15	-	-	-	-	-	-	No Access
					Silty Clay	VW #1404249		248.87	7.6	241.27	-	-	9-Nov-15	-	-	-	-	-	-	Was not read
					Silty Clay	VW #1404249		248.87	7.6	241.27	-	-	9-Nov-16	-	-	-	2727.5	249.60	yes	
					Silty Clay	VW #1404249		248.87	7.6	241.27	-	-	31-Mar-17	-	-	-	2732.3	249.29	yes	
					Silty Clay	VW #1404249		248.87	7.6	241.27	-	-	24-May-17	-	-	-	2728.0	249.54	yes	
					Silty Clay	VW #1404249		248.87	7.6	241.27	-	-	1-Aug-17	-	-	-	2725.9	249.67	yes	
					Silty Clay	VW #1404249		248.87	7.6	241.27	-	-	3-Oct-17	-	-	-	2731.0	249.36	yes	No foam insert due to VW wire.
					Silty Clay	VW #1404249		248.87	7.6	241.27	-	-	28-May-18	-	-	-	2733.2	249.22	yes	No foam insert due to VW wire.
					Silt Till	STP	25	248.87	18.3	230.57	1	249.87	16-Jul-15	-	-	-	-	-	-	Water level at bottom of hole upon completion of drilling
					Silt Till	STP	25	248.87	18.3	230.57	1	249.87	4-Aug-15	-	-	-	-	-	-	No Access
					Silt Till	STP	25	248.87	18.3	230.57	1	249.87	9-Nov-15	-	0.1	249.77	-	-	yes	
					Silt Till	STP	25	248.87	18.3	230.57	1	249.87	9-Nov-16	-	>-1	>250.87	-	-	yes	Flowing at TOC; no extension available
					Silt Till	STP	25	248.87	18.3	230.57	1	249.87	31-Mar-17	-	-	-	-	-	-	Foam insert frozen; could not remove.
					Silt Till	STP	25	248.87	18.3	230.57	1	249.87	24-May-17	-	1.613	248.26	-	-	no	Removed foam insert. Possibly artesian; water still rising after monitoring.
					Silt Till	STP	25	248.87	18.3	230.57	1	249.87	1-Aug-17	-	0.03	249.84	-	-	yes	
					Silt Till	STP	25	248.87	18.3	230.57	1	249.87	3-Oct-17	-	0.35	249.52	-	-	yes	Foam insert placed in STP for winter
					Silt Till	STP	25	248.87	18.3	230.57	1	249.87	28-May-18	-	0.407	249.46	-	-	yes	Foam insert removed and then reinstalled.
15-RD-05	Across road from TH-GD-08	5701483	532787	21+464	Silty Clay	STP	25	247.09	7.6	239.49	0.95	248.04	16-Jul-15	-	1.90	246.14			no	Water level 0.9 m below grade upon completion of drilling
					Silty Clay	STP	25	247.09	7.6	239.49	0.95	248.04	4-Aug-15	-	1.89	246.15			no	
					Silty Clay	STP	25	247.09	7.6	239.49	0.95	248.04	9-Nov-15	-	1.37	246.67			no	
					Silty Clay	STP	25	247.09	7.6	239.49	0.95	248.04	9-Nov-16	-	-	-	-	-	-	Blocked at 0.61 m. Could not install foam insert.
					Silty Clay	STP	25	247.09	7.6	239.49	0.95	248.04	30-Mar-17	-	-	-	-	-	-	Blocked at 0.46 m.
					Silty Clay	STP	25	247.09	7.6	239.49	0.95	248.04	24-May-17	-	-	-	-	-	-	Blocked at 0.46 m.
					Silty Clay	STP	25	247.09	7.6	239.49	0.95	248.04	1-Aug-17	-	-	-	-	-	-	Blocked at 0.46 m.
					Silty Clay	STP	25	247.09	11.9	235.19	0.93	248.02	16-Jul-15	-	>-0.93	>248.95			yes	Flowing at TOC; no extension available
					Silty Clay	STP	25	247.09	11.9	235.19	0.93	248.02	4-Aug-15	-	>-0.93	>248.95			yes	Flowing at TOC; no extension available
					Silty Clay	STP	25	247.09	11.9	235.19	0.93	248.02	9-Nov-15	-	>-0.93	>248.95			yes	Flowing at TOC; no extension available
					Silty Clay	STP	25	247.09	11.9	235.19	0.93	248.02	9-Nov-16	-	0.23	247.79			yes	
					Silty Clay	STP	25	247.09	11.9	235.19	0.93	248.02	30-Mar-17	-	-	-			-	Foam insert frozen; could not remove.
					Silty Clay	STP	25	247.09	11.9	235.19	0.93	248.02	24-May-17	-	0.15	247.87			yes	Removed foam insert; water still rising after monitoring (rose 1 m in 20 min).
					Silty Clay	STP	25	247.09	11.9	235.19	0.93	248.02	1-Aug-17	-	0.00	248.02			yes	flowing
					Silty Clay	STP	25	247.09	11.9	235.19	0.93	248.02	3-Oct-17	0.5	-0.35	248.37			yes	Flowing; foam insert placed in STP for winter
					Silty Clay	STP	25	247.09	11.9	235.19	0.93	248.02	3-Oct-17	-	-	-			yes	Flowing; could not remove foam insert as STP is bent at about 0.25 m below TOC.

VW = Vibrating Wire
STP = Standpipe
* Pressure gauges were installed on standpipes at: TH-GD-08; 15-RD-01 (10.4 m STP); and 15-RD-02. Pressure readings at other standpipes were taken with a handheld gauge.
Notes:
1. BH-BC series drilled and surveyed in 2011.
2. 15-RC series drilled in 2015. Ground elevations were estimated using LiDAR.
3. TH-GC and TH-EC series drilled and surveyed in 2016.
4. Transducers were installed December 8, 2016 in wells TH-ED-01W and 15-RD-PW1.

**TABLE D3-2
GROUNDWATER FIELD CHEMISTRY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS**

Sample No.	Date	Parameter								
		pH (units)	EC (µS/cm)	Temp. (°C)	ORP (mV)	DO (mg/L)	Turbidity	Odour	Colour	Comments
TH-ED-01W	26-Oct-16	6.5	793	6.4	174.9	NA	none to very low	none	none	start of pump test
	26-Oct-16	-	901	6.3	399.7	NA	none to very low	none	none	end of pump test - not sure if YSI was working properly
	23-May-17	7.4	813	4.7	133.2	3.07	none	none	none	purged 60 L; flow rate approx. 2 L/min.
	2-Aug-17	7.2	810	6.6	6.7	2.83	none	none	none	purged 95 L; flow rate approx. 2 L/min.
	4-Oct-17	7.7	844	6.7	-4.2	0.43	none	none	none	purged 140 L; flow rate approx. 1.7 L/min.
	29-May-18	9.0	811	5.5	-42.3	0.04	very low	none	none	purged 80 L; flow rate approx. 1.7 L/min.
TH-ED-01P	9-Nov-16	-	868	9.1	-185.1	1.21	none to very low	none	none	pH not calibrating
	23-May-17	7.3	818	7.0	122.2	1.92	none	none	none	purged 40 L; flow rate approx. 4 L/min.
	2-Aug-17	7.1	832	6.1	-36.7	0.41	low	none	none	purged 95 L; flow rate approx. 5.6 L/min.
	4-Oct-17	7.7	848	6.1	-14.0	0.78	low	swampy	none	purged 150 L; flow rate approx. 5.3 L/min.
	29-May-18	9.1	813	6.0	-	1.15	low	none	none	purged 300 L; flow rate approx. 4.8 L/min.
TH-ED-03	9-Nov-16	-	616	9.7	-172.9	9.02	none to very low	none	none	pH not calibrating
	24-May-17	8.1	548	8.7	77.1	6.52	none	none	none	purged dry after 8 L; recharge after 28 hours - 1 L
	1-Aug-17	7.2	518	10.2	-15.5	1.06	low	none	silty	purged dry after 4 L; sampled; sampled again after 30 hours - clearer water
	4-Oct-17	8.2	561	11.8	-5.4	3.58	moderate	none	silty	purged dry after 4 L; sampled after recharging for 28.5 hours
	28-May-18	6.8	562	12.4	-37.2	1.35	low	rotten eggs	silty	purged dry after 5 L; used this water for sample
TH-GD-02	9-Nov-16	-	796	5.7	-24.6	1.54	none to very low	none	none	pH not calibrating
	24-May-17	7.4	815	5.8	153.0	0.97	none	none	none	purged 150 L; flow rate approx. 6.7 L/min.
	2-Aug-17	7.2	797	6.0	-5.9	0.64	none	none	none	purged 210 L; flow rate approx. 10.5 L/min.
	4-Oct-17	7.3	814	5.9	-203.7	1.17	very low	none	silty	purged 270 L; flow rate approx. 9.4 L/min.
	29-May-18	8.2	782	5.9	-33.7	0.04	very low	none	none	purged 240 L; flow rate approx. 8.5 L/min.
TH-GD-07	9-Nov-16	-	782	7.4	-296.5	1.15	none to very low	none	none	pH not calibrating
	24-May-17	7.2	813	7.3	112.3	1.46	none	none	none	purged 30 L; flow rate approx. 0.8 L/min.
	1-Aug-17	7.1	796	8.9	-28.2	1.27	none	none	none	purged 15 L; flow rate approx. 0.7 L/min.
	3-Oct-17	7.5	807	8.3	-31.9	1.26	very low	sulfur	none	purged 18 L; flow rate approx. 0.3 L/min.
	28-May-18	8.9	767	6.7	-56.0	0.01	low	none	none	purged 12 L; flow rate approx. 0.3 L/min.
15-RD-PW1	24-May-17	7.3	817	6.3	97.0	1.24	none	none	none	purged 40 L; flow rate approx. 1.3 L/min.
	1-Aug-17	7.3	792	6.8	-6.0	0.78	yes	none	none	purged 70 L; flow rate approx. 3.4 L/min.
	3-Oct-17	7.7	808	9.4	-42.5	0.77	very low	none	none	purged 35 L; flow rate approx. 0.5 L/min.
	28-May-18	8.9	767	6.7	-56.0	0.01	none	none	none	purged 600 L; flow rate approx. 0.6 L/min.

Notes:

1. Mechanical packers installed in wells TH-ED-01W and 15-RD-PW1 in December, 2016.
2. Mechanical packer and transducer were removed from well 15-RD-PW1 in August, 2017, as the transducer was not functioning properly.
3. Mechanical packer and transducer were reinstalled in well 15-RD-PW1 in October, 2017.
4. pH readings for May 28, 2018 are generally higher than laboratory readings and may indicate pH probe malfunction.

"-" = No Data

NA = Not Applicable

EC = Electrical Conductivity

DO = Dissolved Oxygen

ORP = Oxidation-Reduction Potential

TABLE D3-3
GROUNDWATER GENERAL WATER QUALITY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Sample No.	Date	Field / Lab Dup. Info	Parameter ⁽¹⁾																							
			Turbidity (NTU)	pH (units)	E.C. (µS/cm)	Alkalinity as CaCO ₃	Bicarbonate as CaCO ₃	Carbonate as CaCO ₃	Hydroxide as CaCO ₃	Hardness as CaCO ₃	Chloride ⁽⁵⁾	Fluoride	Sulphate	Ammonia (as N)	Un-ionized Ammonia	Nitrate & Nitrite (as N)	Nitrate (as N)	Nitrite (as N)	Iron	Manganese	Free Cyanide	Total Phosphorus	T.D.S.	T.K.N.	E. Coli (MPN/100 mL)	Total Coliform (MPN/100mL)
EQL			0.2	0.01	1	1	1	1 / 0.60	1 / 0.34	1	0.5	0.02	0.5	0.01	0.03	0.01 / 0.0051	0.01 / 0.005	0.01/0.02/0.001	0.03	0.005	0.001	0.05	2 / 5	0.03	1	1
TH-ED-01W TEST START	26-Oct-16		17.6	7.7	741	321	392	<0.60	<0.34	374	6.09	0.757	149	0.247	-	<0.010	<0.010	<0.0100	-	-	-	0.025	513	0.26	<1	24
TH-ED-01W TEST STOP	26-Oct-16		-	7.7	744	339	413	<0.60	<0.34	375	6	-	148	0.246	-	<0.070	<0.040	<0.020	-	-	-	0.0129	521	0.28	<1	2
TH-ED-01W	23-May-17		-	7.71	768	328	400	<0.60	<0.34	398	5.76	-	142	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	514	-	-	-
TH-ED-01W	2-Aug-17		-	7.61	783	321	392	<0.60	<0.34	397	5.84	-	143	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	511	-	-	-
TH-ED-01W	4-Oct-17		-	7.53	754	316	386	<0.60	<0.34	402	5.8	-	143	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	508	-	-	-
TH-ED-01W	29-May-18		-	7.86	820	323	395	<0.60	<0.34	420	5.98	-	147	-	-	<0.010	<0.010	<0.0020	-	-	-	-	528	-	-	-
TH-ED-01P	9-Nov-16		1.41	7.72	776	301	368	<0.60	<0.34	398	6.18	0.821	149	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	508	-	-	-
TH-ED-01P	23-May-17		-	7.71	771	319	390	<0.60	<0.34	390	6.12	-	148	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	518	-	-	-
TH-ED-01P	2-Aug-17		-	7.62	786	315	384	<0.60	<0.34	392	6.18	-	149	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	515	-	-	-
TH-ED-01P	4-Oct-17		-	7.54	809	316	385	<0.60	<0.34	396	6.21	-	149	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	517	-	-	-
TH-ED-01P	29-May-18		-	7.59	827	315	384	<0.60	<0.34	414	6.33	-	153	-	-	<0.010	<0.010	<0.0020	-	-	-	-	532	-	-	-
TH-ED-03	9-Nov-16		694	8.11	616	377	460	<0.60	<0.34	319	14.6	0.466	21.6	-	-	0.23	0.211	0.0191	-	-	-	-	390	-	-	-
TH-ED-03	25-May-17		-	8.34	514	332	399	2.88	<0.34	162	17	-	43.2	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	372	-	-	-
TH-ED-03	2-Aug-17		-	8.23	520	221	270	<0.60	<0.34	134	17.6	-	53.6	-	-	0.0139	0.0139	<0.0010	-	-	-	-	320	-	-	-
TH-ED-03	4-Oct-17		-	8.07	508	247	301	<0.60	<0.34	138	17.8	-	57.4	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	338	-	-	-
TH-ED-03	28-May-18		-	8.46	489	218	253	6	<0.34	125	17.7	-	33.7	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	295	-	-	-
TH-GD-02	9-Nov-16		0.67	7.83	760	266	324	<0.60	<0.34	369	13.6	0.483	159	-	-	0.0063	0.0063	<0.0010	-	-	-	-	498	-	-	-
TH-GD-02	9-Nov-16	Dup	1.44	7.85	757	267	326	<0.60	<0.34	382	14	0.573	165	-	-	0.007	0.007	<0.0010	-	-	-	-	508	-	-	-
RPD			-	0.3%	0.4%	0.4%	0.6%	-	-	3.5%	2.9%	17.0%	3.7%	-	-	-	-	-	-	-	-	-	2.0%	-	-	-
TH-GD-02	23-May-17		-	7.84	744	276	336	<0.60	<0.34	359	12.9	-	156	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	496	-	-	-
TH-GD-02	2-Aug-17		-	7.78	758	271	330	<0.60	<0.34	362	13	-	156	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	494	-	-	-
TH-GD-02	4-Oct-17		-	7.72	749	272	331	<0.60	<0.34	362	13.1	-	156	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	494	-	-	-
TH-GD-02	29-May-18		-	7.7	799	274	334	<0.60	<0.34	369	13	-	157	-	-	<0.0051	<0.0050	0.001	-	-	-	-	502	-	-	-
TH-GD-07	9-Nov-16		2.96	7.7	751	320	391	<0.60	<0.34	391	5.62	0.765	120	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	482	-	-	-
TH-GD-07	23-May-17		-	7.74	739	334	407	<0.60	<0.34	384	5.3	-	117	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	487	-	-	-
TH-GD-07	1-Aug-17		-	7.63	747	332	404	<0.60	<0.34	379	5.3	-	116	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	482	-	-	-
TH-GD-07	2-Aug-17	Field Dup. (MW100)	-	7.68	746	330	402	<0.60	<0.34	379	5.28	-	116	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	480	-	-	-
RPD			-	0.7%	0.1%	0.6%	0.5%	-	-	0.0%	0.4%	-	0.0%	-	-	-	-	-	-	-	-	-	0.4%	-	-	-
TH-GD-07	3-Oct-17		-	7.59	719	329	401	<0.60	<0.34	387	5.35	-	115	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	481	-	-	-
TH-GD-07	3-Oct-17	Dup	-	7.63	733	332	405	<0.60	<0.34	390	5.31	-	115	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	485	-	-	-
RPD			-	0.5%	1.9%	0.9%	1.0%	-	-	0.8%	0.8%	-	0.0%	-	-	-	-	-	-	-	-	-	0.8%	-	-	-
TH-GD-07	28-May-18		-	7.93	782	335	408	<0.60	<0.34	397	5.34	-	117	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	493	-	-	-
TH-GD-07	28-May-18	Dup	-	7.69	788	332	405	<0.60	<0.34	403	5.33	-	116	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	494	-	-	-
RPD			-	3.1%	0.8%	0.9%	0.7%	-	-	1.5%	0.2%	-	0.9%	-	-	-	-	-	-	-	-	-	0.2%	-	-	-
TH-GD-08	29-Oct-16		-	7.79	732	324	395	<0.60	<0.34	384	6.26	-	115	0.17	-	<0.010	<0.010	<0.0020	-	-	-	0.081	-	0.26	-	-

TABLE D3-3
GROUNDWATER GENERAL WATER QUALITY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Sample No.	Date	Field / Lab Dup. Info	Parameter ⁽¹⁾																								
			Turbidity (NTU)	pH (units)	E.C. (µS/cm)	Alkalinity as CaCO ₃	Bicarbonate as CaCO ₃	Carbonate as CaCO ₃	Hydroxide as CaCO ₃	Hardness as CaCO ₃	Chloride ⁽⁵⁾	Fluoride	Sulphate	Ammonia (as N)	Un-ionized Ammonia	Nitrate & Nitrite (as N)	Nitrate (as N)	Nitrite (as N)	Iron	Manganese	Free Cyanide	Total Phosphorus	T.D.S.	T.K.N.	E. Coli (MPN/100 mL)	Total Coliform (MPN/100mL)	
EQL			0.2	0.01	1	1	1	1 / 0.60	1 / 0.34	1	0.5	0.02	0.5	0.01	0.03	0.01 / 0.0051	0.01 / 0.005	0.01/0.02/0.001	0.03	0.005	0.001	0.05	2 / 5	0.03	1	1	
15-RD-PW1	9-Nov-16		8.91	7.78	745	320	390	<0.60	<0.34	388	5.65	0.697	121	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	483	-	-	-	
15-RD-PW1	23-May-17		-	7.75	736	339	414	<0.60	<0.34	371	5.29	-	115	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	483	-	-	-	
15-RD-PW-1	1-Aug-17		-	7.65	773	338	413	<0.60	<0.34	383	5.39	-	118	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	489	-	-	-	
15-RD-PW-1	3-Oct-17		-	7.53	723	324	396	<0.60	<0.34	388	5.44	-	118	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	482	-	-	-	
15-RD-PW1	28-May-18		-	7.84	788	334	407	<0.60	<0.34	389	5.38	-	118	-	-	<0.0051	<0.0050	<0.0010	-	-	-	-	490	-	-	-	
HC-CDWQ ⁽²⁾																											
Drinking Water			0.3/1.0/0.1 (MAC) ⁽⁸⁾	6.5 - 8.5 (AO)	-	-	-	-	-	⁽⁹⁾	≤250 (AO)	1.5 (MAC)	500 (AO)	-	-	-	10 ⁽⁴⁾ (MAC)	1.0 ⁽⁴⁾ (MAC)	0.3 (AO)	0.05 (AO)	0.2 (MAC)	-	500 (AO)	-	None Detectable per 100 mL (MAC)	None Detectable per 100 mL (MAC)	
CCME ⁽³⁾ (Shown for Reference Only)																											
Freshwater Aquatic Life			Narrative ⁽⁷⁾	6.5 - 9.0	-	-	-	-	-	-	120 ^(5a) /640 ^(5b)	0.12	-	-	0.019 ⁽⁶⁾	-	3 ⁽¹²⁾ /124 ⁽¹¹⁾	0.06	0.3	-	0.005	⁽¹⁰⁾	-	-	-	-	

- Notes:**
EQL = Estimated Quantitation Limit = The lowest level of the parameter that can be quantified with confidence
"- " = No Data
E.C. = Electrical Conductivity
T.K.N. = Total Kjeldahl Nitrogen
T.D.S. = Total Dissolved Solids
RPD = Relative Percent Difference
- All values are expressed in milligrams per litre (mg/L) unless otherwise specified.
 - Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated October 2014.
MAC = Maximum Acceptable Concentration
AO = Aesthetic Objectives
 - CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated February 6, 2014.
Canadian Water Quality Guidelines for the Protection of Aquatic Life
 - Equivalent to 10 mg/L as nitrate-nitrogen. Where nitrate and nitrite are determined separately, levels of nitrite should not exceed 3.2 mg/L, which is equivalent to 1 mg/L nitrite-nitrogen.
 - Chloride toxicity to freshwater organisms was evaluated using tests with both CaCl₂ and NaCl salts.
 - Long-term exposure - May not be protective of certain species of endangered and special concern freshwater mussels. Refer to fact sheet for more explanation
 - Short-term exposure - derived with severe-effect data (such as lethality) and are not intended to protect all components of aquatic ecosystem structure and function. but rather to protect most species against lethality during severe but transient events. Refer to fact sheet for more information
 - Guideline is dependant on type of plant. See CCME summary table for details.
Foliar damage
= 100-178 mg/L for almond apricots and plums
= 178-355 mg/L for grapes, peppers, potatoes and tomatoes
= 355-710 mg/L for alfalfa, barley, corn, and cucumbers
>710 mg/L for cauliflower, cotton, safflower, sesame, sorghum, sugar beets, and sunflowers
Rootstocks
= 180-600 mg/L for stone fruit (peaches, plums, etc.)
= 710-900 mg/L for grapes
Cultivars
= 110-180 mg/L for strawberries
= 230-460 mg/L for grapes
= 250 mg/L for boysenberries, blackberries, and raspberries
 - Guideline for total ammonia is pH and Temperature dependent. See Factsheet for details.

- Turbidity Guidelines (see fact sheet for complete details):
Clear Flow:
Maximum increase of 8 NTUs from background levels for a short-term exposure (e.g. 24 hr period).
Maximum average increase of 2 NTUs from background levels for a longer term exposure (e.g. 30 day period).
High Flow or Turbid Waters:
Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs.
Should not increase more than 10% of background levels when background is >80 NTUs.
- Waterworks systems that use a surface water source or a groundwater source under the direct influence of surface water should filter the source water to meet the following health-based turbidity limits, as defined for specific treatment technologies. Where possible, filtration systems should be designed and operated to reduce turbidity levels as low as possible, with a treated water turbidity target of less than 0.1 NTU at all times. Where this is not achievable, the treated water turbidity levels from individual filters:
 - For chemically assisted filtration, shall be less than or equal to 0.3 NTU in at least 95% of the measurements made, or at least 95% of the time each calendar month, and shall not exceed 1.0 NTU at any time.
 - For slow sand or diatomaceous earth filtration, shall be less than or equal to 1.0 NTU in at least 95% of the measurements made, or at least 95% of the time each calendar month, and shall not exceed 3.0 NTU at any time.
 - For membrane filtration, shall be less than or equal to 0.1 NTU in at least 99% of the measurements made, or at least 99% of the time each calendar month, and shall not exceed 0.3 NTU at any time. If membrane filtration is the sole treatment technology employed, some form of virus inactivation* should follow the filtration process. Turbidity values greater than 1 NTU are shaded.
- Public acceptance of hardness varies considerably. Generally, hardness levels between 80 and 100 mg/L (as CaCO₃), provide acceptable balance between corrosion and incrustation; where a water softener is used, a separate unsoftened supply for cooking and drinking purposes is recommended.
- If trigger ranges for total phosphorous are exceeded, the potential exists for an environmental impact. If trigger range is not exceeded, but TP is more than 50% above baseline values, the potential exists for an environmental impact.
Trigger ranges (µg/L):

ultra-oligotrophii	<4	meso-eutrophic	20-35
oligotrophic	4-10	eutrophic	35-100
mesotrophic	10-20	hyper-eutrophic	>100
- Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events (spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances).
These are NOT protective guidelines.
- Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7d exposures for fish and invertebrates, 24h exposures for aquatic plants and algae).

 - Exceedance of HC-CDWQ Guidelines

TABLE D3-4
GROUNDWATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No.	Date	Parameter ⁽¹⁾																	
		Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Cesium	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese
TH-ED-01W TEST START	26-Oct-16	<0.0020	<0.00020	0.00063	0.015	<0.00020	<0.00020	0.529	<0.000010	77.4	<0.00010	<0.0010	0.00025	0.00024	0.125	0.000108	0.0281	44	0.0144
TH-ED-01W TEST STOP	26-Oct-16	-	-	-	-	-	-	-	-	78.1	-	-	-	-	-	-	-	43.6	-
TH-ED-01W	4-Oct-17	<0.0010	<0.00010	0.00039	0.0138	<0.00010	<0.000050	0.623	<0.0000050	79.8	0.000043	<0.00010	0.00018	<0.00020	<0.010	<0.000050	0.0344	49.3	0.00873
TH-ED-01W	23-May-17	<0.0020	<0.00020	0.00043	0.0136	<0.00020	<0.00020	0.614	<0.000010	81.5	<0.00010	<0.0010	0.0002	<0.00020	<0.010	<0.000090	0.0367	47.2	0.00923
TH-ED-01W	2-Aug-17	<0.0010	<0.00010	0.00043	0.0139	<0.00010	<0.000050	0.547	<0.0000050	78.6	0.000047	<0.00010	0.00016	<0.00020	<0.010	<0.000050	0.0307	48.7	0.00908
TH-ED-01W	29-May-18	<0.0010	<0.00010	0.00033	0.0144	<0.00010	<0.000050	0.639	<0.0000050	86.3	0.000045	<0.00010	0.00019	<0.00020	<0.010	<0.000050	0.038	49.7	0.00927
TH-ED-01P	9-Nov-16	<0.0020	<0.00020	0.00071	0.0156	<0.00020	<0.00020	0.645	<0.000010	79.5	<0.00010	<0.0010	0.00026	<0.00020	0.154	<0.000090	0.0326	48.5	0.0153
TH-ED-01P	23-May-17	<0.0020	<0.00020	0.00046	0.0142	<0.00020	<0.00020	0.652	<0.000010	79.5	<0.00010	<0.0010	0.00023	<0.00020	<0.010	<0.000090	0.0355	46.5	0.0137
TH-ED-01P	2-Aug-17	<0.0010	<0.00010	0.0005	0.0145	<0.00010	<0.000050	0.559	<0.0000050	78	0.000042	<0.00010	0.00025	<0.00020	<0.010	<0.000050	0.0301	47.8	0.0141
TH-ED-01P	4-Oct-17	<0.0010	<0.00010	0.00044	0.0145	<0.00010	<0.000050	0.675	<0.0000050	78.5	0.000041	<0.00010	0.00023	<0.00020	<0.010	<0.000050	0.0348	48.6	0.0141
TH-ED-01P	29-May-18	<0.0010	<0.00010	0.00049	0.0154	<0.00010	<0.000050	0.668	<0.0000050	83.2	0.000035	<0.00010	0.00024	<0.00020	<0.010	<0.000050	0.0379	50.1	0.015
TH-ED-03	9-Nov-16	0.0035	0.00021	0.00034	0.0275	<0.00020	<0.00020	0.184	<0.000010	38.8	<0.00010	<0.0010	0.00048	0.00146	0.01	<0.000090	0.0193	53.8	0.0321
TH-ED-03	25-May-17	0.0072	0.00074	0.00061	0.0223	<0.00020	<0.00020	0.174	<0.000010	20.8	<0.00010	<0.0010	0.00035	0.00084	<0.010	<0.000090	0.0146	26.8	0.0482
TH-ED-03	2-Aug-17	0.0128	0.00046	0.00066	0.0192	<0.00010	<0.000050	0.187	0.0000123	18	0.000012	<0.00010	0.00049	0.00097	0.01	<0.000050	0.0104	21.7	0.103
TH-ED-03	4-Oct-17	0.0043	0.00024	0.00103	0.0179	<0.00010	<0.000050	0.199	0.0000058	17.9	<0.000010	<0.00010	0.0003	0.00039	<0.010	<0.000050	0.0103	22.5	0.0813
TH-ED-03	28-May-18	0.0189	0.00029	0.00072	0.023	<0.00010	<0.000050	0.168	0.0000056	16.5	<0.000010	<0.00010	0.00022	0.00046	0.012	<0.000050	0.0112	20.3	0.0421
TH-GD-02	9-Nov-16	<0.0020	<0.00020	<0.00020	0.0212	<0.00020	<0.00020	0.709	<0.000010	67.5	<0.00010	<0.0010	<0.00020	<0.00020	<0.010	<0.000090	0.0377	48.8	0.0121
TH-GD-02 Dup	9-Nov-16	<0.0020	<0.00020	<0.00020	0.0203	<0.00020	<0.00020	0.65	<0.000010	66.5	<0.00010	<0.0010	<0.00020	<0.00020	<0.010	<0.000090	0.0364	52.3	0.0123
RPD		-	-	-	4.34%	-	-	8.68%	-	1.49%	-	-	-	-	-	-	3.51%	6.92%	1.64%
TH-GD-02	23-May-17	<0.0020	<0.00020	<0.00020	0.0201	<0.00020	<0.00020	0.692	<0.000010	68	<0.00010	<0.0010	<0.00020	<0.00020	<0.010	<0.000090	0.0402	45.9	0.012
TH-GD-02	2-Aug-17	0.0011	<0.00010	<0.00010	0.0204	<0.00010	<0.000050	0.606	<0.0000050	66.9	0.000035	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0345	47.2	0.0122
TH-GD-02	4-Oct-17	<0.0010	<0.00010	<0.00010	0.0204	<0.00010	<0.000050	0.732	<0.0000050	67.3	0.000032	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0406	47	0.0123
TH-GD-02	29-May-18	0.0019	<0.00010	<0.00010	0.0202	<0.00010	<0.000050	0.7	<0.0000050	70.5	0.000034	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0435	46.9	0.0118
TH-GD-07	9-Nov-16	<0.0020	<0.00020	<0.00020	0.0211	<0.00020	<0.00020	0.579	<0.000010	74.4	<0.00010	<0.0010	<0.00020	0.00023	<0.010	<0.000090	0.0323	49.8	0.00827
TH-GD-07	23-May-17	<0.0020	<0.00020	<0.00020	0.0187	<0.00020	<0.00020	0.566	<0.000010	75.2	<0.00010	<0.0010	<0.00020	<0.00020	<0.010	<0.000090	0.035	47.8	0.00768
TH-GD-07	1-Aug-17	0.0015	<0.00010	0.00013	0.0195	<0.00010	<0.000050	0.481	<0.0000050	70.8	0.000036	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0296	49.2	0.01
TH-GD-07 Field Dup. (MW100)	2-Aug-17	0.0013	<0.00010	0.00013	0.0195	<0.00010	<0.000050	0.485	<0.0000050	71.4	0.000034	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0294	48.8	0.0101
RPD		-	-	0.00%	0.00%	-	-	0.83%	-	0.84%	5.71%	-	-	-	-	-	0.68%	0.82%	1.00%
TH-GD-07	3-Oct-17	0.0019	<0.00010	0.00013	0.0193	<0.00010	<0.000050	0.548	<0.0000050	73.1	0.00003	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0336	49.7	0.00963
TH-GD-07 Dup	3-Oct-17	0.0021	<0.00010	0.00013	0.0203	<0.00010	<0.000050	0.585	<0.0000050	74.2	0.00003	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0341	49.8	0.00939
RPD		10.00%	-	0.00%	5.05%	-	-	6.53%	-	1.49%	0.00%	-	-	-	-	-	1.48%	0.20%	2.52%
TH-GD-07	28-May-18	0.0018	<0.00010	0.0001	0.0199	<0.00010	<0.000050	0.548	<0.0000050	76.6	0.000032	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0371	50.1	0.00962
TH-GD-07 Dup	28-May-18	0.0013	<0.00010	<0.00010	0.0197	<0.00010	<0.000050	0.553	<0.0000050	78.2	0.000027	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0367	50.5	0.0093
RPD		32.26%	-	-	1.01%	-	-	0.91%	-	2.07%	-	-	-	-	-	-	1.08%	0.80%	3.38%
TH-GD-08	29-Oct-16	-	-	-	-	-	-	-	-	74.3	-	-	-	-	-	-	-	48.3	-

TABLE D3-4
GROUNDWATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No.	Date	Parameter ⁽¹⁾																		
		Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Cesium	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum
15-RD-PW1	9-Nov-16	<0.0020	<0.00020	0.00089	0.0201	<0.00020	<0.00020	0.594	<0.000010	72.4	<0.00010	<0.0010	<0.00020	<0.00020	0.028	<0.000090	0.0326	50.3	0.0056	0.00018
15-RD-PW1	23-May-17	<0.0020	<0.00020	<0.00020	0.0183	<0.00020	<0.00020	0.55	<0.000010	70.9	<0.00010	<0.0010	<0.00020	<0.00020	<0.010	<0.000090	0.0351	47.2	0.00871	0.00017
15-RD-PW1	1-Aug-17	<0.0010	<0.00010	0.0002	0.0207	<0.00010	<0.000050	0.486	0.0000066	69.5	0.000047	0.00069	<0.00010	<0.00020	<0.010	<0.000050	0.0299	51	0.00413	0.000203
15-RD-PW1	3-Oct-17	<0.0010	<0.00010	0.0001	0.0195	<0.00010	<0.000050	0.568	0.0000061	73.1	0.000036	<0.00010	<0.00010	<0.00020	<0.010	<0.000050	0.0345	50	0.00511	0.000232
15-RD-PW1	28-May-18	<0.0010	<0.00010	<0.00010	0.0178	<0.00010	<0.000050	0.573	<0.0000050	77.4	0.000034	<0.00010	<0.00010	0.00027	<0.010	0.000093	0.038	47.4	0.00873	0.000181
EQL		0.002	0.0002	0.0002	0.0002	0.0002	0.0002	0.01	0.00001	0.05	0.0001	0.001	0.0002	0.0002	0.01	0.00009	0.002	0.01	0.0001	0.001
HC-CDWQ ⁽²⁾																				
Drinking Water		0.1- 0.2 ⁽⁴⁾ (OG)	0.006 (MAC)	0.010 (MAC)	1.0 (MAC)	-	-	5.0 (MAC)	0.005 (MAC)	-	-	0.05 (MAC)	-	1.0 (AO)	0.3 (AO)	0.010 (MAC)	-	-	0.05 (AO)	-
CCME ⁽³⁾ (Shown for Reference Only)																				
Freshwater Aquatic Life		0.005 - 0.1 ⁽⁵⁾	-	0.005	-	-	-	(29 ⁽⁶⁾) 1.5 ⁽⁷⁾	0.09 µg/L ^(9a) 1.0 µg/L ^(9b)	-	-	0.0089 (III), 0.001 (VI)	-	^(9c)	0.3	^(9d)	-	-	-	0.073

TABLE D3-4
GROUNDWATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No.	Date	Parameter ⁽¹⁾																		
		Nickel	Phosphorus	Potassium	Rubidium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium
TH-ED-01W TEST START	26-Oct-16	<0.0010	<0.030	9.2	0.00629	<0.0010	5.31	<0.00010	34.9	0.574	<0.00020	<0.00010	<0.00010	0.00135	<0.00050	0.00015	0.0012	<0.00020	<0.0020	<0.00040
TH-ED-01W TEST STOP	26-Oct-16	-	-	9.18	-	-	-	-	32.9	-	-	-	-	-	-	-	-	-	-	-
TH-ED-01W	4-Oct-17	<0.00050	<0.050	9.57	0.00663	<0.000050	5.01	<0.000010	31.5	0.58	<0.00020	0.000021	<0.00010	<0.00010	<0.00030	<0.00010	0.00123	<0.00050	<0.0010	<0.000060
TH-ED-01W	23-May-17	<0.0010	<0.030	9.65	0.00643	<0.0010	5.28	<0.00010	31.5	0.542	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.00121	<0.00020	<0.0020	<0.00040
TH-ED-01W	2-Aug-17	0.0007	<0.050	9.77	0.00681	<0.000050	4.99	<0.000010	31.6	0.538	<0.00020	0.00002	<0.00010	<0.00010	<0.00030	<0.00010	0.00118	<0.00050	0.0017	<0.000060
TH-ED-01W	29-May-18	0.00063	<0.050	11	0.00705	<0.000050	5.29	<0.000010	33.9	0.587	<0.00020	0.000024	<0.00010	<0.00010	<0.00030	<0.00010	0.00135	<0.00050	<0.0010	<0.000060
TH-ED-01P	9-Nov-16	<0.0010	<0.030	10	0.00606	<0.0010	5.54	<0.00010	33.8	0.546	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.00114	<0.00020	<0.0020	<0.00040
TH-ED-01P	23-May-17	<0.0010	<0.030	9.82	0.00633	<0.0010	5.43	<0.00010	36	0.535	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.0012	<0.00020	<0.0020	<0.00040
TH-ED-01P	2-Aug-17	0.00075	<0.050	9.64	0.00636	<0.000050	5.27	<0.000010	35.8	0.528	<0.00020	0.00002	<0.00010	<0.00010	<0.00030	<0.00010	0.00118	<0.00050	<0.0010	<0.000060
TH-ED-01P	4-Oct-17	0.00066	<0.050	9.52	0.00638	<0.000050	5.3	<0.000010	35.7	0.566	<0.00020	0.000021	<0.00010	<0.00010	<0.00030	<0.00010	0.00118	<0.00050	<0.0010	<0.000060
TH-ED-01P	29-May-18	0.00074	<0.050	10.4	0.00674	<0.000050	5.48	<0.000010	39.8	0.577	<0.00020	0.00002	<0.00010	<0.00010	<0.00030	<0.00010	0.00127	<0.00050	0.0013	<0.000060
TH-ED-03	9-Nov-16	0.0019	<0.030	3.11	0.00164	<0.0010	4.56	<0.00010	30.9	0.131	<0.00020	<0.00010	<0.00010	0.00029	<0.00050	0.00133	0.00376	0.00048	<0.0020	<0.00040
TH-ED-03	25-May-17	0.0029	<0.030	2.43	0.00118	<0.0010	3.14	<0.00010	62.1	0.105	<0.00020	<0.00010	<0.00010	0.0004	<0.00050	0.00148	0.0049	0.0029	<0.0020	<0.00040
TH-ED-03	2-Aug-17	0.00454	<0.050	2.17	0.00086	0.000167	4.12	<0.000010	74.1	0.08	<0.00020	<0.000010	<0.00010	0.00089	0.00143	0.013	0.00474	0.00244	<0.0010	0.000129
TH-ED-03	4-Oct-17	0.00236	<0.050	1.83	0.00048	0.000124	4.66	<0.000010	72.7	0.0928	<0.00020	<0.000010	<0.00010	0.00126	<0.00030	0.00662	0.00238	0.0022	<0.0010	0.000109
TH-ED-03	28-May-18	0.00224	<0.050	2.64	0.00082	0.000061	3.35	<0.000010	73	0.103	<0.00020	<0.000010	<0.00010	0.00064	0.00118	0.00117	0.00322	0.00411	<0.0010	0.000158
TH-GD-02	9-Nov-16	<0.0010	<0.030	10.3	0.007	<0.0010	4.45	<0.00010	38.6	0.53	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.00173	<0.00020	<0.0020	<0.00040
TH-GD-02 Dup	9-Nov-16	<0.0010	<0.030	10.5	0.00727	<0.0010	4.65	<0.00010	39.9	0.521	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.00164	<0.00020	<0.0020	<0.00040
RPD		-	-	1.92%	3.78%	-	4.40%	-	3.31%	1.71%	-	-	-	-	-	-	5.34%	-	-	-
TH-GD-02	23-May-17	<0.0010	<0.030	9.88	0.00683	<0.0010	4.62	<0.00010	37.5	0.527	<0.00020	<0.00010	<0.00010	0.00022	<0.00050	<0.00010	0.00159	<0.00020	<0.0020	<0.00040
TH-GD-02	2-Aug-17	<0.00050	<0.050	9.85	0.00705	<0.000050	4.52	<0.000010	38	0.519	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00153	<0.00050	<0.0010	<0.000060
TH-GD-02	4-Oct-17	<0.00050	<0.050	9.92	0.00697	<0.000050	4.5	<0.000010	37.8	0.547	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00157	<0.00050	<0.0010	<0.000060
TH-GD-02	29-May-18	<0.00050	<0.050	9.86	0.00678	<0.000050	4.56	<0.000010	39.7	0.546	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00168	<0.00050	<0.0010	<0.000060
TH-GD-07	9-Nov-16	<0.0010	<0.030	10.7	0.0062	<0.0010	5.04	<0.00010	30.4	0.532	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.00064	<0.00020	0.0049	<0.00040
TH-GD-07	23-May-17	<0.0010	<0.030	10.2	0.0059	<0.0010	5.28	<0.00010	31.4	0.536	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.00066	<0.00020	<0.0020	<0.00040
TH-GD-07	1-Aug-17	<0.00050	<0.050	10.2	0.00594	<0.000050	5.03	<0.000010	31.7	0.51	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00061	<0.00050	<0.0010	<0.000060
TH-GD-07 Field Dup. (MW100)	2-Aug-17	<0.00050	<0.050	10	0.00606	<0.000050	5.06	<0.000010	31.1	0.512	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000631	<0.00050	<0.0010	
RPD		-	-	1.98%	2.00%	-	0.59%	-	1.91%	0.39%	-	-	-	-	-	-	3.38%	-	-	-
TH-GD-07	3-Oct-17	<0.00050	<0.050	10.1	0.00604	<0.000050	5.07	<0.000010	30.3	0.553	<0.00020	<0.000010	<0.00010	0.00013	<0.00030	<0.00010	0.000593	<0.00050	<0.0010	<0.000060
TH-GD-07 Dup	3-Oct-17	<0.00050	<0.050	10.2	0.00605	<0.000050	5.11	<0.000010	30.8	0.563	<0.00020	<0.000010	<0.00010	0.00021	<0.00030	<0.00010	0.000618	<0.00050	0.0018	<0.000060
RPD		-	-	0.99%	0.17%	-	0.79%	-	1.64%	1.79%	-	-	-	-	-	-	4.13%	-	-	-
TH-GD-07	28-May-18	<0.00050	<0.050	10.6	0.00625	<0.000050	5.27	<0.000010	33.3	0.561	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000656	<0.00050	<0.0010	<0.000060
TH-GD-07 Dup	28-May-18	<0.00050	<0.050	11.1	0.00619	<0.000050	5.33	<0.000010	33.1	0.566	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000654	<0.00050	<0.0010	<0.000060
RPD		-	-	4.61%	-	-	-	-	0.60%	-	-	-	-	-	-	-	-	-	-	-
TH-GD-08	29-Oct-16	-	-	10	-	-	-	-	35.4	-	-	-	-	-	-	-	-	-	-	-

TABLE D3-4
GROUNDWATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No.	Date	Parameter ⁽¹⁾																		
		Nickel	Phosphorus	Potassium	Rubidium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium
15-RD-PW1	9-Nov-16	<0.0010	<0.030	10.1	0.00586	<0.0010	5.55	<0.00010	31.1	0.54	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.00094	<0.00020	<0.0020	<0.00040
15-RD-PW1	23-May-17	<0.0010	<0.030	10	0.00544	<0.0010	5.51	<0.00010	30.3	0.521	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.00103	<0.00020	<0.0020	<0.00040
15-RD-PW1	1-Aug-17	<0.00050	<0.050	10.3	0.00579	<0.000050	5.12	<0.000010	32.1	0.508	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000819	<0.00050	0.0012	<0.000060
15-RD-PW1	3-Oct-17	0.0018	<0.050	10.1	0.00559	<0.000050	5.07	<0.000010	30.9	0.547	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000764	<0.00050	0.0054	<0.000060
15-RD-PW1	28-May-18	0.00082	<0.050	10.2	0.00574	<0.000050	5.15	<0.000010	31.9	0.562	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000904	<0.00050	0.0049	<0.000060
EQL		0.03	0.02	0.0002	0.001	0.1	0.0001	0.02	0.0001	0.0002	0.0001	0.0001	0.0001	0.0002	0.0005	0.0001	0.0001	0.0002	0.002	0.0004
HC-CDWQ ⁽²⁾																				
Drinking Water		-	-	-	-	0.05 (MAC)	-	-	200 (AO)	-	-	-		-	-	-	0.02 (MAC)	-	5 (AO)	-
CCME ⁽³⁾ (Shown for Reference Only)																				
Freshwater Aquatic Life		(8e)	(9,10)	-	-	0.001	-	0.00025	-	-	-	0.0008		-	-	-	(0.033 ⁽⁶⁾) 0.015 ⁽⁷⁾	-	0.03	-

TABLE D3-4
GROUNDWATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Notes:
EQL = Estimated Quantitation Limit = Lowest level of the parameter that can be quantified with confidence
"-" = No Data
RPD = Relative Percent Difference

1. All values are expressed in milligrams per litre (mg/L) unless otherwise specified.
2. Health Canada - Canadian Drinking Water Quality Guidelines (HC-CDWQ). Updated October 2014.

MAC = Maximum Acceptable Concentration

AO = Aesthetic Objectives

OG = Operational Guideline
3. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated February 6, 2014.

Guidelines for Canadian Drinking Water Quality.

Community Water Supplies (Health Canada - Canadian Drinking Water Quality Guidelines)

Canadian Water Quality Guidelines for the Protection of Aquatic Life

Canadian Water Quality Guidelines for the Protection of Agriculture Water Uses
4. This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants.
The operational guidance value of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.
5. Total aluminum should not exceed 0.005 mg/L in waters with a pH below 6.5.
The concentration of total aluminum should not exceed 0.1 mg/L in waters with a pH greater or equal to 6.5.
6. Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events
(spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances).
These are NOT protective guidelines.
7. Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7 day exposures for fish and invertebrates, 24 hour exposures for aquatic plants and algae).
8. For the following equations, hardness is expressed as CaCO₃ in mg/L and the guideline is in µg/L.

a. **Cadmium** Guideline: The long-term CWQG of 0.09 ug/L is for waters of 50 mg CaCO₃/L hardness. When water hardness is >0 to <17 mg/L, CWQG is 0.04 µg/L. At other hardness values, the CWQG can be calculated with the equation $CWQG = 10^{[0.83[\log(\text{hardness})] - 3.2]}$ µg/L valid for hardness between 17 and 280 mg CaCO₃/L.

b. **Cadmium** Guideline: The short-term benchmark concentration of 1.0 ug/L is for waters of 50 mg CaCO₃/L hardness. When water hardness is >0 to <5.3 mg/L, CWQG is 0.11 µg/L. At other hardness values, the benchmark can be calculated with the equation $\text{Benchmark} = 10^{[1.016(\log[\text{hardness}]) - 1.71]}$, valid for hardness between 5.3 and 360 mg CaCO₃/L.

c. **Copper** Guideline = $e^{(0.8545[\ln(\text{hardness})] - 1.465)}$ * 0.2 µg/L;

d. **Lead** Guideline = $e^{(1.273[\ln(\text{hardness})] - 4.705)}$ µg/L;

e. **Nickel** Guideline = $e^{(0.76[\ln(\text{hardness})] + 1.06)}$ µg/L

Well No. (November 2016)	Hardness	10a. Cadmium (long-term) mg/L	10b. Cadmium (short-term) (mg/L)	10c. Copper (mg/L)	10d. Lead (mg/L)	10e. Nickel (mg/L)
TH-ED-01W TEST START	374	0.000086	0.008017	0.007	0.017	0.260
TH-ED-01W TEST STOP	375	0.000086	0.008039	0.007	0.017	0.261
TH-GD-08	384	0.000088	0.008235	0.007	0.018	0.266
TH-ED-01P	398	0.000091	0.008540	0.008	0.018	0.273
TH-ED-03	319	0.000076	0.006821	0.006	0.014	0.231
TH-GD-02	369	0.000085	0.007909	0.007	0.017	0.258
TH-GD-02 Dup	382	0.000088	0.008192	0.007	0.018	0.265
TH-GD-07	391	0.000089	0.008388	0.008	0.018	0.269
15-RD-PW1	388	0.000089	0.008322	0.008	0.018	0.268

Well No. (May 2017)	Hardness	10a. Cadmium (long-term) mg/L	10b. Cadmium (short-term) (mg/L)	10c. Copper (mg/L)	10d. Lead (mg/L)	10e. Nickel (mg/L)
TH-ED-01W	398	0.000091	0.008540	0.008	0.018	0.273
TH-ED-01P	390	0.000089	0.008366	0.008	0.018	0.269
TH-ED-03	162	0.000043	0.003427	0.004	0.006	0.138
TH-GD-02	359	0.000083	0.007691	0.007	0.016	0.252
TH-GD-07	384	0.000088	0.008235	0.007	0.018	0.266
15-RD-PW1	371	0.000086	0.007952	0.007	0.017	0.259

TABLE D3-4
GROUNDWATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No. (August 2017)	Hardness	10a. Cadmium (long-term) mg/L	10b. Cadmium (short-term) (mg/L)	10c. Copper (mg/L)	10d. Lead (mg/L)	10e. Nickel (mg/L)
TH-ED-01W	397	0.000091	0.008519	0.008	0.018	0.273
TH-ED-01P	392	0.000090	0.008410	0.008	0.018	0.270
TH-ED-03	134	0.000037	0.002826	0.003	0.005	0.119
TH-GD-02	362	0.000084	0.007756	0.007	0.016	0.254
TH-GD-07	379	0.000087	0.008126	0.007	0.017	0.263
TH-GD-07 (DUP)	379	0.000087	0.008126	0.007	0.017	0.263
15-RD-PW-1	383	0.000088	0.008214	0.007	0.018	0.265

Well No. (October 2017)	Hardness	10a. Cadmium (long-term) mg/L	10b. Cadmium (short-term) (mg/L)	10c. Copper (mg/L)	10d. Lead (mg/L)	10e. Nickel (mg/L)
TH-ED-01W	402	0.000092	0.008628	0.008	0.019	0.275
TH-ED-01P	396	0.000090	0.008497	0.008	0.018	0.272
TH-ED-03	138	0.000038	0.002912	0.003	0.005	0.122
TH-GD-02	362	0.000084	0.007756	0.007	0.016	0.254
TH-GD-07	387	0.000089	0.008301	0.008	0.018	0.267
TH-GD-07 (DUP)	390	0.000089	0.008366	0.008	0.018	0.269
15-RD-PW-1	388	0.000089	0.008322	0.008	0.018	0.268

Well No. (May 2018)	Hardness	10a. Cadmium (long-term) mg/L	10b. Cadmium (short-term) (mg/L)	10c. Copper (mg/L)	10d. Lead (mg/L)	10e. Nickel (mg/L)
TH-ED-01W	420	0.000095	0.009020	0.008	0.020	0.284
TH-ED-01P	414	0.000094	0.008889	0.008	0.019	0.281
TH-ED-03	125	0.000035	0.002633	0.003	0.004	0.113
TH-GD-02	369	0.000085	0.007909	0.007	0.017	0.258
TH-GD-07	397	0.000091	0.008519	0.008	0.018	0.273
TH-GD-07 (DUP)	403	0.000092	0.008649	0.008	0.019	0.276
15-RD-PW1	389	0.000089	0.008344	0.008	0.018	0.268

9. If trigger ranges for total phosphorous are exceeded, the potential exists for an environmental impact. If trigger range is not exceeded, but TP is more than 50% above baseline values, the potential exists for an environmental impact.
- | | | | | |
|------------------------|--------------------|-------|-----------------|--------|
| Trigger ranges (µg/L): | ultra-oligotrophic | <4 | meso-eutrophic | 20-35 |
| | oligotrophic | 4-10 | eutrophic | 35-100 |
| | mesotrophic | 10-20 | hyper-eutrophic | >100 |
10. Low level phosphorous was not analyzed for groundwater samples. Phosphorous values in Table D3-4 analyzed by ICP are at detection limits higher than some trigger values shown in Note 9.

- Exceedance of HC-CDWQ Criteria

**TABLE D3-5
SURFACE WATER FIELD CHEMISTRY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS**

Sample No.	Date	Parameter								
		pH (units)	EC (µS/cm)	Temp. (°C)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Odour	Colour	Comments
D1 - Lake MB	7-Nov-16	8.1	492	4.6	35.9	12.68	9.17	none	slightly cloudy	sampled adjacent to Watchorn Prov. Park
	25-May-17	8.3	936	14.1	205.5	7.33	5.04	none	none	sampled adjacent to Watchorn Prov. Park approx. 75 m from shoreline at depth of 0.1 m; very windy; light rain
	3-Aug-17	8.0	932	25.2	-25.0	5.22	11.24	none	none	sampled adjacent to Watchorn Prov. Park approx. 40 m from shoreline at depth of 1 m; calm; small waves
	5-Oct-17	6.9	945	11.6	-69.0	8.28	24.7	none	grey/cloudy	sampled adjacent to Watchorn Prov. Park approx. 40 m from shoreline at depth of 1 m; calm; small waves
	30-May-18	7.2	849	21.0	-15.7	6.96	3.73	none	grey/cloudy	sampled adjacent to Watchorn Prov. Park approx. 100 m from shoreline at depth of 0.8 m; calm; water appears clear and is low compared to previous visits
D2 - Watchorn Creek	7-Nov-16	7.8	485	4.5	31.8	8.31	0.79	none	none	sampled from side road off gravel road
	25-May-17	7.4	603	13.8	175.6	3.59	1.59	none	none	sampled approx. 40 m south of PR 237 from side road using reacher pole; very windy; light rain
	3-Aug-17	6.9	629	21.5	-22.1	1.60	2.76	none	none	sampled approx. 40 m south of PR 237 from side road using reacher pole; lots of vegetation; calm; slow flow
	5-Oct-17	6.6	869	10.4	-68.5	4.85	1.06	none	none	sampled approx. 40 m south of PR 237 from side road using reacher pole; lots of vegetation; calm; slow flow
	30-May-18	7.5	853	21.1	-6.3	7.18	1.15	none	none	sampled approx. 40 m south of PR 237 from side road using reacher pole at approx. 0.5 m depth; visible flow;
D3 - Reed Lake	7-Nov-16	7.5	469	6.2	-24.4	7.77	1.32	none	none	sampled at 3.5' depth beyond logger
	25-May-17	7.7	540	14.1	152.0	6.16	2.70	none	none	sampled beyond staff gauge/edge of reeds using reacher pole; windy; light rain
	3-Aug-17	7.9	502	25.1	-22.1	4.66	1.85	none	none	sampled beyond staff gauge/edge of reeds using reacher pole; lots of vegetation; calm
	5-Oct-17	6.3	572	12.2	-70.5	6.32	1.01	none	none	sampled beyond staff gauge/edge of reeds using reacher pole; lots of vegetation; cows may have been here - lots of cattails knocked down; calm; water appears clear
	30-May-18	6.9	583	21.9	-38.0	3.39	1.43	none	none	sampled approx. 3 m beyond staff gauge/edge of reeds using reacher pole at approx. 0.5 m depth; water appears clear
D4 - Clear Lake	7-Nov-16	7.8	532	6.6	34.2	10.96	4.01	none	none	sampled approximately 5 m beyond reeds in open water
	25-May-17	8.3	696	12.8	131.4	5.63	1.09	none	none	sampled beyond staff gauge/edge of reeds using reacher pole; windy; light rain
	3-Aug-17	7.0	655	23.2	-20.4	4.52	0.89	none	none	sampled beyond staff gauge/edge of reeds using reacher pole; calm
	5-Oct-17	6.9	731	10.0	-72.7	6.82	6.51	none	none	sampled beyond staff gauge/edge of reeds using reacher pole; calm; water low; sediment disturbed while sampling; lots of geese and swans on lake
	30-May-18	7.2	789	19.9	-25.2	2.39	4.2	none	none	sampled beyond staff gauge/edge of reeds using reacher pole at approx. 0.5 m depth; calm; water low; recent muskrat pushup approx. 30 m north of staff gauge; tracks (snowmobile?) coming right up to gauge; lots of copepods in water
D5 - Clark's Drain	7-Nov-16	8.2	481.5	4.1	-32.8	10.63	0.96	none	none	sampled on E side of road
	25-May-17	8.1	622.5	14.4	118.0	7.07	3.21	none	none	sampled on E side of road in front of middle culvert; water approx. 0.2 m deep; windy
	4-Aug-17	7.2	675	18.1	-13.6	2.44	2.16	none	none	sampled on E side of road in front of middle culvert with reacher pole; water approx. 0.3 m deep; calm; water
	5-Oct-17	6.6	791	9.2	-74.3	5.51	10.99	none	none	sampled on E side of road standing in front of middle culvert; calm; water below bottom of culvert

TABLE D3-5
SURFACE WATER FIELD CHEMISTRY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Sample No.	Date	Parameter								
		pH (units)	EC (µS/cm)	Temp. (°C)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Odour	Colour	Comments
	30-May-18	7.2	742	17.8	-23.5	3.05	1.09	none	brownish	sampled on E side of road standing in front of southern most culvert; two culverts were blocked with mud and sticks; water flowing slowly through northern most culvert

**TABLE D3-5
SURFACE WATER FIELD CHEMISTRY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS**

Sample No.	Date	Parameter								
		pH (units)	EC (µS/cm)	Temp. (°C)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Odour	Colour	Comments
D6 - Birch Creek	7-Nov-16	8.1	584	5.4	-48.3	7.64	0.89	none	none	sampled on W side of Hwy 6 where Woodale Drain joins Birch Creek
	25-May-17	8.0	876	14.0	133.9	6.42	3.37	none	none	sampled on W side of Hwy 6 where Woodale Drain joins Birch Creek using reacher pole; water approx. 0.35 m
	3-Aug-17	7.2	848	18.9	-13.4	3.54	1.4	none	none	sampled on W side of Hwy 6 where Woodale Drain joins Birch Creek using reacher pole; water approx. 0.8 m
	5-Oct-17	6.7	943	8.2	-77.4	7.06	5.55	none	none	sampled on W side of Hwy 6 where Woodale Drain joins Birch Creek using reacher pole; water approx. 0.3 m deep; calm; water flowing slowly
	30-May-18	7.2	867	19.6	-26.7	3.11	4.29	none	slightly brown	sampled on W side of Hwy 6 where Woodale Drain joins Birch Creek using reacher pole; water approx. 0.3 m deep; calm; water low; good flow
D7 - Woodale Drain	7-Nov-16	8.2	477	5.6	-51.0	8.68	1.08	none	none	sampled on N side of #167N, 75 m from Hwy 6
	25-May-17	7.7	541	13.2	125.2	5.21	0.97	none	none	sampled on N side of Ira Pontius Rd., 100 m west of Hwy 6; water approx. 0.15 m deep; windy
	3-Aug-17	6.8	706	18.9	-10.6	7.30	7.74	none	none	sampled on N side of Ira Pontius Rd., 100 m west of Hwy 6; very little water, lots of vegetation; calm
	5-Oct-17	6.6	1746	5.9	-72.5	6.02	0.87	none	none	sampled on N side of Ira Pontius Rd., 100 m west of Hwy 6; very little water (deepest spot 0.05 m deep), lots of vegetation - some vegetation in sample; calm
	30-May-18	6.8	742	18.3	-16.6	3.29	1.15	none	none	sampled on N side of Ira Pontius Rd., 100 m west of Hwy 6; very little water (deepest spot 0.08 m deep); light drizzle
D8 - Birch Creek	7-Nov-16	8.3	567	5.5	-54.4	9.83	1.89	none	none	sampled upstream of bridge
	25-May-17	8.4	788	14.6	130.8	7.96	5.04	none	none	sampled upstream of bridge on Bittner Bay Rd. off end of culvert; water approx. 1 m deep; windy
	3-Aug-17	7.5	823	20.3	-14.9	3.70	2.97	none	none	sampled upstream of bridge on Bittner Bay Rd. off end of culvert; water >3 m deep (near top of culvert); calm
	5-Oct-17	6.4	952	9.9	-69.8	6.84	10.51	none	brownish	sampled upstream of bridge on Bittner Bay Rd. off end of culvert; very little flow; calm
	30-May-18	7.4	832	20.5	-20.5	3.57	16.3	none	brownish	sampled upstream of bridge on Bittner Bay Rd. off end of culvert; no visible flow; water level low
D9 - LSM	7-Nov-16	8.4	691	6.6	-26.1	10.58	5.15	none	none	sampled at prov. hydrometric station
	25-May-17	8.2	932	14.2	150.2	7.29	3.27	none	none	sampled south of prov. hydrometric station approx. 10 m from shoreline at depth of 1 m; windy; lake high - covering
	3-Aug-17	7.2	970	21.8	-21.6	5.37	9.42	none	none	sampled south of prov. hydrometric station at depth of 1 m; calm; lake high - covering approach road and most of
	5-Oct-17	6.4	959	10.5	-74.4	9.33	6.17	none	none	sampled south of prov. hydrometric station at depth of 0.6 m; calm, small waves; lake still high but lower than August - covering approach road approximately 0.1 m deep.
	30-May-18	6.5	960	19.2	-1.7	6.78	14.55	none	none	sampled south of prov. hydrometric station approx. 10 m off shore at depth of 0.35 m; calm, small waves; no standing water on approach road, although surface was too soft for driving

Notes:

"-" = No Data

NA = Not Applicable

EC = Electrical Conductivity

DO = Dissolved Oxygen

ORP = Oxidation-Reduction Potential

TABLE D3-6
SURFACE WATER GENERAL WATER QUALITY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Sample No.	Location	Date	Field / Lab Dup. Info	Parameter (mg/L unless otherwise specified)																								
				Turbidity (NTU)	pH (units)	E.C. (µS/cm)	Alkalinity as CaCO ₃	Bicarbonate as CaCO ₃	Carbonate as CaCO ₃	Hydroxide as CaCO ₃	Hardness as CaCO ₃	Chloride ⁽³⁾	Fluoride	Sulphate	Nitrate & Nitrite (as N)	Nitrate (as N)	Nitrite (as N)	Total Nitrogen	TKN	Phos-phorous, Total Dissolved	Total Phosphorous	Phosphor-ous, Total Particulate	Ammonia, total as N	Calculated Unionized Ammonia	T.D.S.	T.S.S.	E. Coli	Total Coliform (MPN/100m L)
EQL				0.1	0.1	1	1	1.2	0.6	0.34	0.25	0.1	0.02	0.3	0.0051	0.005	0.001	0.2	0.2	0.001	0.001	-	0.01	-	5	2	1	1
D-1	Lake Manitoba	8-Nov-16		5.91	8.35	604	260	310	3.72	<0.34	322	33.1	0.153	46.2	<0.0051	<0.0050	<0.0010	1.06	1.06	0.0111	0.032	-	0.042	0.0011036	373	8.8	<100	1350
D-1	Lake Manitoba	25-May-17		2.5	8.5	886	193	222	6.6	<0.34	250	141	0.148	82.7	<0.010	<0.010	<0.0020	0.87	0.87	0.0054	0.022	-	<0.010	0.0007	532	3.8	<1	74
D-1	Lake Manitoba	3-Aug-17		7.96	8.62	864	195	213	12.1	<0.34	249	134	0.153	80.6	<0.010	<0.010	<0.0020	1.13	1.13	0.0069	0.027	-	0.021	0.0040611	511	13.8	6	5380
D-1	Lake Manitoba	5-Oct-17		24.7	8.48	862	180	209	5.16	<0.34	245	149	0.143	77.6	<0.010	<0.010	<0.0020	1.23	1.23	0.0067	0.04	-	<0.010	0.000597	518	51	114	1050
D-1	Lake Manitoba	30-May-18		2.55	8.45	840	172	200	4.8	<0.34	229	134	0.149	85.1	<0.010	<0.010	<0.0020	1.01	1.01	0.0037	0.0123	-	<0.010	0.0010713	494	2.9	7	365
D-2	Watchorn Creek	8-Nov-16		0.63	7.94	582	229	279	<0.60	<0.34	321	10.1	0.138	95.6	0.0174	0.0162	0.0011	1.7	1.69	0.072	0.082	-	0.021	0.0002164	366	<2.0	<100	860
D-2	Watchorn Creek	25-May-17		1.2	7.82	561	272	332	<0.60	<0.34	329	13.3	0.221	129	<0.010	<0.010	<0.0020	1.51	1.51	0.037	0.046	-	<0.010	0.0002	426	<2.0	20	1990
D-2	Watchorn Creek	3-Aug-17		1.1	7.56	579	267	326	<0.60	<0.34	316	5.75	0.129	76.8	<0.0051	<0.0050	<0.0010	2.12	2.12	0.058	0.067	-	0.036	0.0005679	358	4	51	2410
D-2	Watchorn Creek	5-Oct-17		0.93	7.83	766	331	403	<0.60	<0.34	430	32.8	0.261	112	<0.0051	<0.0050	<0.0010	1.22	1.22	0.026	0.032	-	0.024	0.0003068	501	<2.0	37	2420
D-2	Watchorn Creek	30-May-18		1.03	8.22	841	421	514	<0.60	<0.34	476	23.5	0.286	62	<0.010	<0.010	0.002	1.75	1.75	0.0588	0.0717	-	0.023	0.0015281	511	2.4	70	1730
D-3	Reed Lake	7-Nov-16		1.15	7.88	564	240	293	<0.60	<0.34	335	4.78	0.113	85.6	0.0067	0.0051	0.0016	1.88	1.87	0.02	0.031	-	0.15	0.0015453	352	2.2	<100	300
D-3	Reed Lake	25-May-17		2	7.98	508	239	292	<0.60	<0.34	291	4.32	0.109	66.2	<0.0051	<0.0050	<0.0010	1.54	1.54	0.02	0.042	-	<0.010	0.0002	318	3.8	33	236
D-3	Reed Lake	3-Aug-17		1.5	8.84	435	213	221	19	<0.34	245	4.1	0.128	64.8	<0.0051	<0.0050	<0.0010	1.81	1.81	0.0113	0.024	-	0.027	0.0076464	284	6.8	19	3270
D-3	Reed Lake	5-Oct-17		1.01	8.14	448	231	282	<0.60	<0.34	275	4.52	0.142	66.8	<0.0051	<0.0050	<0.0010	1.54	1.54	0.0109	0.023	-	0.023	0.0006786	305	<2.0	23	613
D-3	Reed Lake	30-May-18		0.99	7.93	562	259	316	<0.60	<0.34	297	4.81	0.133	60.3	<0.0051	<0.0050	<0.0010	1.99	1.99	0.0055	0.0222	-	0.076	0.0028298	326	<2.0	31	866
D-4	Clear Lake	7-Nov-16		3.39	8.15	633	280	341	<0.60	<0.34	394	7.76	0.185	97	<0.0051	<0.0050	<0.0010	1.41	1.41	0.025	0.04	-	0.018	0.0003532	410	6	<100	<100
D-4	Clear Lake	25-May-17		0.9	8.45	645	337	393	8.88	<0.34	418	6.83	0.171	74	<0.0051	<0.0050	<0.0010	1.15	1.15	0.02	0.028	-	<0.010	0.0006	419	<2.0	2	42
D-4	Clear Lake	25-May-17	Dup	0.9	8.46	642	338	393	9.6	<0.34	405	6.81	0.178	73.9	<0.0051	<0.0050	<0.0010	1.39	1.39	0.02	0.027	-	<0.010	0.0006	416	<2.0	1	38
RPD				0.0%	0.1%	0.5%	0.3%	0.0%	7.8%	-	3.2%	0.3%	4.0%	0.1%	-	-	-	18.9%	18.9%	0.0%	3.6%	-	-	-	0.7%	-	66.7%	10.0%
D-4	Clear Lake	3-Aug-17		0.91	8.28	589	286	349	<0.60	<0.34	333	8.84	0.215	66.9	<0.0051	<0.0050	<0.0010	1.77	1.77	0.02	0.029	-	0.024	0.0020834	363	<2.0	1	472
D-4	Clear Lake	3-Aug-17	Dup	1.06	8.27	590	290	354	<0.60	<0.34	338	8.88	0.215	67	<0.0051	<0.0050	<0.0010	1.89	1.89	0.021	0.028	-	0.026	0.0003926	367	<2.0	4	1410
RPD				-	0.1%	0%	1%	1%	-	-	1%	0%	0%	0%	-	-	-	7%	7%	5%	4%	-	8%	-	1%	-	120%	100%
D-4	Clear Lake	5-Oct-17		60.4	7.88	653	332	406	<0.60	<0.34	353	11.6	0.24	73.5	<0.0051	<0.0050	<0.0010	2.17	2.17	0.021	0.052	-	0.092	0.0012773	407	120	260	2420
D-4	Clear Lake	5-Oct-17	Dup	32	7.91	647	335	409	<0.60	<0.34	339	11.5	0.24	73.4	<0.0051	<0.0050	<0.0010	2.19	2.19	0.0163	0.062	-	0.107	0.0015902	403	63	281	2420
RPD				-	0.4%	1%	1%	1%	-	-	4%	1%	0%	0%	-	-	-	1%	1%	25%	18%	-	-	-	1%	62%	8%	0%
D-4	Clear Lake	30-May-18		1.96	7.94	782	364	444	<0.60	<0.34	433	14.4	0.309	76.8	<0.0051	<0.0050	0.0013	2.56	2.56	0.023	0.0334	-	0.261	0.0086358	467	<2.0	172	411
D-4	Clear Lake	30-May-18	Dup	1.87	7.99	782	368	449	<0.60	<0.34	438	14.4	0.312	76.8	<0.0051	<0.0050	0.0011	2.62	2.62	0.0226	0.0321	-	0.262	0.0096876	473	<2.0	178	461
RPD				-	0.6%	0%	1%	1%	-	-	1%	0%	1%	0%	-	-	-	2%	2%	2%	4%	-	0%	-	1%	-	3%	11%
D-5	North Clarks Drain	8-Nov-16		0.77	8.27	574	322	393	<0.60	<0.34	362	1.68	0.234	32.9	<0.0051	<0.0050	<0.0010	1.06	1.06	0.0062	0.0109	-	0.012	0.0002531	346	<2.0	<100	750
D-5	North Clarks Drain	25-May-17		2.93	8.27	585	368	448	<0.60	<0.34	375	0.78	0.244	18.1	0.0346	0.0295	0.0051	0.92	0.89	0.021	0.03	-	0.05	0.0023	364	4	49	2420
D-5	North Clarks Drain	3-Aug-17		1.02	7.94	615	392	478	<0.60	<0.34	394	0.62	0.279	4.62	<0.0051	<0.0050	<0.0010	1.8	1.8	0.034	0.038	-	0.029	0.0008439	370	<2.0	64	4480
D-5	North Clarks Drain	5-Oct-17	no flow	9.02	8.06	691	386	471	<0.60	<0.34	386	2.66	0.357	72.9	<0.0051	<0.0050	<0.0010	1.62	1.62	0.034	0.076	-	0.049	0.016	439	10.4	18	2420
D-5	North Clarks Drain	30-May-18		1.05	8	740	426	520	<0.60	<0.34	462	1.39	0.374	30.2	<0.0051	<0.0050	<0.0010	2.11	2.11	0.0225	0.0331	-	0.019	0.016	445	<2.0	18	1020
D-6	South Birch Creek	8-Nov-16		0.76	8.05	683	295	359	<0.60	<0.34	424	8.45	0.235	112	0.0173	0.0173	<0.0010											

TABLE D3-6 SURFACE WATER GENERAL WATER QUALITY - ROUTE D LAKE MANITOBA OUTLET CHANNELS																												
Sample No.	Location	Date	Field / Lab Dup. Info	Parameter (mg/L unless otherwise specified)																								
				Turbidity (NTU)	pH (units)	E.C. (µS/cm)	Alkalinity as CaCO ₃	Bicarbonate as CaCO ₃	Carbonate as CaCO ₃	Hydroxide as CaCO ₃	Hardness as CaCO ₃	Chloride ⁽³⁾	Fluoride	Sulphate	Nitrate & Nitrite (as N)	Nitrate (as N)	Nitrite (as N)	Total Nitrogen	TKN	Phos-phorous, Total Dissolved	Total Phosphorous	Phosphorou s, Total Particulate	Ammonia, total as N	Calculated Unionized Ammonia	T.D.S.	T.S.S.	E. Coli	Total Coliform (MPN/100m L)
EQL				0.1	0.1	1	1	1.2	0.6	0.34	0.25	0.1	0.02	0.3	0.0051	0.005	0.001	0.2	0.2	0.001	0.001		0.01	-	5	2	1	1
D-8	Birch Creek	8-Nov-16		1.31	8.18	667	308	376	<0.60	<0.34	430	7.07	0.231	96.1	0.0185	0.0185	<0.0010	1.55	1.53	0.0173	0.029	-	0.018	0.0003465	436	<2.0	<100	310
D-8	Birch Creek	25-May-17		3.43	8.49	720	396	455	13.4	<0.34	480	6.82	0.243	78.1	<0.0051	<0.0050	<0.0010	1.3	1.3	0.0134	0.029	-	<0.010	0.0008	485	3.2	39	1990
D-8	Birch Creek	3-Aug-17		1.57	8.17	737	352	429	<0.60	<0.34	448	5.7	0.269	117	<0.0051	<0.0050	<0.0010	2.19	2.19	0.038	0.043	-	0.032	0.0018067	484	<2.0	41	2420
D-8	Birch Creek	5-Oct-17		7.5	8.2	814	382	466	<0.60	<0.34	429	10.3	0.244	162	<0.010	<0.010	<0.0020	2.14	2.14	0.029	0.039	-	0.025	0.0007089	548	6.4	249	2420
D-8	Birch Creek	30-May-18		10.8	8.29	802	390	476	<0.60	<0.34	481	8.12	0.315	90.2	<0.010	<0.010	<0.0020	2.26	2.26	0.0502	0.0725	-	0.037	0.002742	498	15.1	49	230
D-9	Lake St. Martin	8-Nov-16		3.53	8.47	813	182	211	5.4	<0.34	261	130	0.239	77.5	0.117	0.103	0.0139	1.36	1.24	0.0116	0.021	-	0.014	0.000562	503	7	<100	<100
D-9	Lake St. Martin	8-Nov-16	Dup	3.72	8.48	814	185	214	5.76	<0.34	248	128	0.238	76.7	0.027	0.022	0.0051	1.3	1.27	0.0141	0.02	-	0.016	0.0006566	491	6.6	100	100
RPD				5.2%	0.1%	0.1%	1.6%	1.4%	6.5%	-	5.1%	1.6%	-	1.0%	-	-	-	4.5%	2.4%	-	4.9%	-	-	-	2.4%	-	-	-
D-9	Lake St. Martin	25-May-17		2.41	8.24	864	208	253	<0.60	<0.34	270	142	0.125	64	0.011	0.011	<0.0020	0.82	0.81	0.0096	0.027	-	<0.010	0.0004	532	3.6	1	387
D-9	Lake St. Martin	3-Aug-17		3.6	8.61	874	189	207	11.3	<0.34	247	148	0.148	69.1	<0.010	<0.010	<0.0020	2.18	2.18	0.0057	0.02	-	0.03	0.0046573	519	6.6	29	1550
D-9	Lake St. Martin	5-Oct-17		4.4	8.5	845	189	215	7.44	<0.34	196	151	0.139	69.4	<0.010	<0.010	<0.0020	0.98	0.98	0.0052	0.024	-	0.017	0.0009779	488	8.2	20	74
D-9	Lake St. Martin	30-May-18		9.37	8.41	917	180	212	3.96	<0.34	244	147	0.146	77.6	<0.010	<0.010	<0.0020	0.82	0.82	0.0031	0.0136	-	0.01	0.0008754	516	10.4	613	1990
FB		8-Nov-16	Field Blank	<0.10	5.98	<1.0	<1.0	<1.2	<0.60	<0.34	0.25	<0.10	<0.020	<0.30	<0.0051	<0.0050	<0.0010	<0.20	<0.20	0.0011	0.0045	-	<0.010	-	<5.0	<2.0	<100	<100
FB		25-May-17	Field Blank	<0.10	6.27	1	1.1	1.3	<0.60	<0.34	<0.25	<0.10	<0.020	<0.30	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	<0.0010	<0.0028	<0.010	-	<5.0	<2.0	<1	<1
FB		3-Aug-17	Field Blank	<0.10	6.7	1	3.6	4.4	<0.60	<0.34	0.27	<0.10	<0.020	<0.30	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	<0.0010	-	<0.010	-	<5.0	<2.0	<1	<1
FB		5-Oct-17	Field Blank	<0.10	6.24	1.1	<1.0	<1.2	<0.60	<0.34	<0.20	<0.10	<0.020	<0.30	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	<0.0010	-	<0.010	-	<5.0	<2.0	<1	<1
FB		30-May-18	Field Blank	<0.10	6.08	<1.0	<1.0	<1.2	<0.60	<0.34	<0.20	<0.10	<0.020	<0.30	<0.0051	<0.0050	<0.0010	<0.20	<0.20	<0.0010	<0.0010	-	<0.010	-	<5.0	<2.0	<1	<1
MWQSOG ⁽¹⁾																												
Surface Water - Tier III																												
Freshwater Aquatic Life				⁽²⁾	6.5 - 9.0	-	-	-	-	-	-	-	-	-	-	13	0.06	-	-	-	0.025 (lakes and streams entering lakes)/ 0.05 (other streams) ⁽³⁾		⁽⁴⁾		-	⁽⁵⁾	-	-
CCME ⁽⁶⁾																												
Canadian Water Quality Guidelines for the Protection of Aquatic Life																												
Freshwater				Narrative ⁽⁷⁾	6.5 - 9.0	-	-	-	-	-	-	120 ^(8a) /640 ^(8b)	0.12	-	-	13 ⁽⁹⁾ /330 ⁽¹⁰⁾	0.06	-	-	-	⁽¹¹⁾		⁽¹²⁾	0.019	-	Narrative ⁽¹³⁾	-	-

TABLE D3-6
SURFACE WATER GENERAL WATER QUALITY - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Notes:

EQL = Estimated Quantitation Limit = The lowest level of the parameter that can be quantified with confidence
"-." = No Data
E.C. = Electrical Conductivity
T.D.S. = Total Dissolved Solids
T.S.S. = Total Suspended Solids
TKN = Total Kjeldahl Nitrogen
RPD = Relative Percent Difference

1. MWQSOG - Manitoba Water Quality Standards , Objectives, and Guidelines - Manitoba Water Stewardship Report 2011-01, November 28, 2011.
2. MWQSOG Tier II Objective - Equivalent induced levels of change as calculated from site-specific or regional correlation between total suspended sediment and turbidity.
3. MWQSOG Tier II Objective - Unless it can be demonstrated that total phosphorus is not a limiting factor, considering the morphological, physical, chemical, or other characteristics of the water body, total phosphorus should not exceed 0.025 mg/L in any reservoir, lake, or pond, or in a tributary at the point where it enters such bodies of water. In other streams, total phosphorus should not exceed 0.05 mg/L.
4. MWQSOG Tier II Objective - Cool Water, All Periods (Eq. 3). Manitoba Water Stewardship, November 2011.
5. Total Suspended Sediment Guidelines:
5 mg/L Induced Change over 30 days from background TSS <= 25 mg/L
25 mg/L Induced Change over 1 day from background TSS <= 250 mg/L
10% Induced Change over 1 day from background TSS > 250 mg/L
6. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated February 6, 2014.
Canadian Water Quality Guidelines for the Protection of Aquatic Life
7. Turbidity Guidelines (see fact sheet for complete details):
Clear Flow:
Maximum increase of 8 NTUs from background levels for a short-term exposure (e.g. 24 hr period).
Maximum average increase of 2 NTUs from background levels for a longer term exposure (e.g. 30 day period).
High Flow or Turbid Waters:
Maximum increase of 8 NTUs from background levels at any one time when background levels are between 8 and 80 NTUs.
Should not increase more than 10% of background levels when background is >80 NTUs.
8. Chloride toxicity to freshwater organisms was evaluated using tests with both CaCl₂ and NaCl salts.
a. Long-term exposure - May not be protective of certain species of endangered and special concern freshwater mussels. Refer to fact sheet for more explanation.
b. Short-term exposure - Derived with severe-effect data (such as lethality) and are not intended to protect all components of aquatic ecosystem structure and function but rather to protect most species against lethality during severe but transient events. Refer to fact sheet for more information.
9. Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7d exposures for fish and invertebrates, 24h exposures for aquatic plants and algae).
10. Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events (spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances).
These are NOT protective guidelines.
11. If trigger ranges for total phosphorous are exceeded, the potential exists for an environmental impact. If trigger range is not exceeded, but TP is more than 50% above baseline values, the potential exists for an environmental impact.
- Trigger ranges (µg/L):
- | | | | |
|--------------------|---------|-----------------|----------|
| ultra-oligotrophic | <4 | meso-eutrophic | 20 - 35 |
| oligotrophic | 4 - 10 | eutrophic | 35 - 100 |
| mesotrophic | 10 - 20 | hyper-eutrophic | >100 |
12. Guideline for total ammonia is pH and temperature dependent. See factsheet for details.
13. Total Suspended Solids:
Clear flow - Maximum increase of 25 mg/L from background levels for any short-term exposure (e.g., 24-h period). Maximum average increase of 5 mg/L from background levels for longer term exposures (e.g., inputs lasting between 24 h and 30 d).
High flow - Maximum increase of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. Should not increase more than 10% of background levels when background is ≥ 250 mg/L.

	- Exceedance of CCME Guidelines
BOLD	- Exceedance of MWQSOG Guidelines

TABLE D3-7
SURFACE WATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No.	Location	Date	Parameter (mg/L unless otherwise specified)																		
			Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Cesium	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum
D-1	Lake Manitoba	8-Nov-16	0.111	<0.00020	0.00087	0.0328	<0.00020	<0.00020	0.058	<0.000010	49	<0.00010	<0.0010	<0.00020	0.00059	0.126	0.000097	0.0172	48.6	0.00595	0.00069
D-1	Lake Manitoba	25-May-17	0.0299	0.00027	0.00159	0.0409	<0.00020	<0.00020	0.09	<0.000010	43.6	<0.00010	<0.0010	<0.00020	0.00053	0.025	<0.000090	0.0315	34.2	0.00461	0.00186
D-1	Lake Manitoba	3-Aug-17	0.0747	0.00033	0.00213	0.0437	<0.00010	<0.000050	0.1	0.0000053	43.4	0.000012	0.00019	0.00011	0.00064	0.083	0.000164	0.0328	34.2	0.011	0.00187
D-1	Lake Manitoba	5-Oct-17	0.0592	0.00014	0.00195	0.0423	<0.00010	<0.000050	0.101	<0.0000050	42.1	0.000012	0.00015	0.00012	0.00051	0.081	0.000242	0.0319	33.8	0.0103	0.00216
D-1	Lake Manitoba	30-May-18	0.0236	0.00015	0.00179	0.0451	<0.00010	<0.000050	0.09	<0.0000050	40.6	<0.000010	<0.00010	<0.00010	0.00056	0.025	0.000059	0.0315	30.9	0.00509	0.00183
D-2	Watchorn Creek	8-Nov-16	0.0098	<0.00020	0.00053	0.0235	<0.00020	<0.00020	0.05	<0.000010	41.6	<0.00010	<0.0010	<0.00020	0.00029	0.024	<0.000090	0.0154	52.9	0.00797	0.0003
D-2	Watchorn Creek	25-May-17	0.02	<0.00020	0.00065	0.0246	<0.00020	<0.00020	0.054	<0.000010	47.5	<0.00010	<0.0010	<0.00020	0.00027	0.037	<0.000090	0.0145	51	0.0446	0.00024
D-2	Watchorn Creek	3-Aug-17	0.0057	0.00025	0.00076	0.0325	<0.00010	<0.000050	0.079	<0.0000050	45.8	<0.000010	<0.00010	0.00012	<0.00050	0.07	<0.000050	0.0168	48.9	0.815	0.000079
D-2	Watchorn Creek	5-Oct-17	0.0158	<0.00010	0.00074	0.0406	<0.00010	<0.000050	0.102	<0.0000050	62.3	<0.000010	0.0001	<0.00010	<0.00050	0.023	<0.000050	0.0329	66.6	0.0288	0.000946
D-2	Watchorn Creek	30-May-18	0.0283	0.00012	0.00139	0.0394	<0.00010	<0.000050	0.114	<0.0000050	66.5	<0.000010	0.0002	0.00021	0.00069	0.111	<0.000050	0.0352	75.2	0.0323	0.000222
D-3	Reed Lake	7-Nov-16	0.0107	<0.00020	0.00057	0.0209	<0.00020	<0.00020	0.039	<0.000010	42.5	<0.00010	<0.0010	<0.00020	0.00038	0.021	<0.000090	0.0122	55.5	0.00874	0.00032
D-3	Reed Lake	25-May-17	0.0203	<0.00020	0.00054	0.0194	<0.00020	<0.00020	0.051	<0.000010	37	<0.00010	<0.0010	<0.00020	0.00023	0.025	<0.000090	0.0134	48.3	0.0146	0.00037
D-3	Reed Lake	3-Aug-17	<0.0030	0.00023	0.0007	0.013	<0.00010	<0.000050	0.072	<0.0000050	21.7	<0.000010	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	0.0154	46.5	0.0306	0.000194
D-3	Reed Lake	5-Oct-17	<0.0030	<0.00010	0.1%	1.2%	<0.00010	<0.000050	7.0%	<0.0000050	22.4	<0.000010	0.0%	<0.00010	<0.00050	0.01	<0.000050	1.7%	53.1	0.0185	0.0%
D-3	Reed Lake	30-May-18	1.0%	<0.00010	0.1%	2.1%	<0.00010	<0.000050	8.2%	<0.0000050	36.6	<0.000010	<0.00010	<0.00010	<0.00050	0.016	<0.000050	1.8%	49.9	0.0522	0.0%
D-4	Clear Lake	7-Nov-16	0.0617	<0.00020	0.00077	0.0342	<0.00020	<0.00020	0.051	<0.000010	58.3	<0.00010	<0.0010	<0.00020	0.00085	0.069	<0.000090	0.0165	60.3	0.0108	0.00052
D-4	Clear Lake	25-May-17	0.0269	<0.00020	0.00074	0.0263	<0.00020	<0.00020	0.036	<0.000010	45.2	<0.00010	<0.0010	<0.00020	0.00117	0.021	<0.000090	0.0189	74	0.00546	0.00052
D-4 Dup	Clear Lake	25-May-17	0.0148	<0.00020	0.00069	0.0263	<0.00020	<0.00020	0.036	<0.000010	44.8	<0.00010	<0.0010	<0.00020	0.00053	0.014	<0.000090	0.0185	71.2	0.00514	0.00049
RPD			-	-	7.0%	0.0%	-	-	0.0%	-	0.9%	-	-	-	-	-	-	2.1%	3.9%	6.0%	5.9%
D-4	Clear Lake	3-Aug-17	0.0035	0.00028	0.00094	0.0307	<0.00010	<0.000050	0.085	<0.0000050	44.3	<0.000010	0.00012	<0.00010	<0.00050	0.022	<0.000050	0.0193	53.9	0.0167	0.000378
D-4 Dup (SW100)	Clear Lake	3-Aug-17	0.0036	0.00027	0.00101	0.0311	<0.00010	<0.000050	0.089	<0.0000050	42.3	<0.000010	0.00011	<0.00010	<0.00050	0.019	<0.000050	0.0202	56.3	0.0171	0.000394
RPD			2.82%	3.64%	7.18%	1.29%	-	-	4.60%	-	4.6%	-	8.70%	-	-	-	-	4.56%	4.4%	2.4%	4.15%
D-4	Clear Lake	5-Oct-17	0.103	<0.00010	0.001	0.0323	<0.00010	<0.000050	0.086	<0.0000050	42.1	0.000018	0.00032	0.00013	<0.00050	0.097	0.000165	0.0234	60.3	0.0256	0.000581
D-4 Dup (SW100)	Clear Lake	5-Oct-17	0.0336	<0.00010	0.00102	0.0304	<0.00010	<0.000050	0.089	<0.0000050	38.6	<0.000010	0.00018	<0.00010	<0.00050	0.03	0.00006	0.0235	59	0.0178	0.000578
RPD			101.61%	-	1.98%	6.06%	-	-	3.43%	-	8.7%	-	-	-	-	-	-	0.43%	2.2%	35.9%	0.52%
D-4	Clear Lake	30-May-18	0.0461	0.00011	0.00133	0.0452	<0.00010	<0.000050	0.168	<0.0000050	62.4	<0.000010	0.00025	0.00013	<0.00050	0.049	0.000078	0.0269	67.2	0.0726	0.000481
D-4 Dup	Clear Lake	30-May-18	0.0433	0.00011	0.00125	0.0464	<0.00010	<0.000050	0.171	<0.0000050	66.8	<0.000010	0.0003	0.00013	<0.00050	0.051	0.00008	0.0271	65.9	0.0734	0.000486
RPD			6.26%	0.00%	6.20%	2.62%	-	-	1.77%	-	6.81%	-	-	0.00%	-	4.00%	2.53%	0.74%	1.95%	1.10%	1.03%
D-5	North Clarks Drain	8-Nov-16	0.0179	<0.00020	0.00056	0.0285	<0.00020	<0.00020	0.043	<0.000010	56.5	<0.00010	<0.0010	<0.00020	0.00043	0.036	<0.000090	0.0121	53.6	0.00746	0.00028
D-5	North Clarks Drain	25-May-17	0.085	<0.00020	0.00079	0.0335	<0.00020	<0.00020	0.065	<0.000010	63.2	<0.00010	<0.0010	<0.00020	0.00057	0.116	<0.000090	0.0125	52.7	0.0318	0.00027
D-5	North Clarks Drain	3-Aug-17	0.017	0.00027	0.00139	0.039	<0.00010	<0.000050	0.086	0.0000097	70.3	<0.000010	0.00016	0.00015	<0.00050	0.154	<0.000050	0.0139	53.1	0.0542	0.000196
D-5	North Clarks Drain	5-Oct-17	0.0669	<0.00010	0.00145	0.0502	<0.00010	<0.000050	0.137	<0.0000050	65.1	<0.000010	0.0002	0.00014	0.00066	0.117	0.000105	0.0169	54.2	0.0501	0.000881
D-5	North Clarks Drain	30-May-18	0.0146	0.00011	0.00236	0.0472	<0.00010	<0.000050	0.112	0.000007	89	<0.000010	0.00044	0.00035	0.00072	0.2	<0.000050	0.0177	58.3	0.137	0.000517

TABLE D3-7
SURFACE WATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No.	Location	Date	Parameter (mg/L unless otherwise specified)																		
			Aluminum	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Calcium	Cesium	Chromium	Cobalt	Copper	Iron	Lead	Lithium	Magnesium	Manganese	Molybdenum
D-6	South Birch Creek	8-Nov-16	0.0132	<0.00020	0.00064	0.0328	<0.00020	<0.00020	0.07	<0.000010	61.2	<0.00010	<0.0010	<0.00020	0.00053	0.031	<0.000090	0.0198	65.8	0.00491	0.0006
D-6	South Birch Creek	25-May-17	0.0514	<0.00020	0.00083	0.037	<0.00020	<0.00020	0.078	<0.000010	74.2	<0.00010	<0.0010	<0.00020	0.00034	0.073	<0.000090	0.0232	82.7	0.0308	0.00043
D-6	South Birch Creek	3-Aug-17	0.0179	0.00026	0.00088	0.0368	<0.00010	<0.000050	0.119	<0.0000050	58.9	<0.000010	0.0001	<0.00010	<0.00050	0.036	<0.000050	0.0251	72.8	0.0166	0.000181
D-6	South Birch Creek	5-Oct-17	0.0259	<0.00010	0.00095	0.0275	<0.00010	<0.000050	0.093	<0.0000050	45.6	<0.000010	0.00037	<0.00010	<0.00050	0.047	<0.000050	0.029	74.1	0.00705	0.000295
D-6	South Birch Creek	30-May-18	0.0951	<0.00010	0.00125	0.0441	<0.00010	<0.000050	0.124	<0.0000050	74.1	0.000011	0.0003	0.00017	<0.00050	0.135	0.000075	0.028	76.6	0.114	0.000419
D-7	Woodale Drain	8-Nov-16	0.025	<0.00020	0.00064	0.03	<0.00020	<0.00020	0.02	<0.000010	56.4	<0.00010	<0.0010	<0.00020	0.00043	0.059	<0.000090	0.0111	51.5	0.0108	0.00033
D-7	Woodale Drain	25-May-17	0.0208	<0.00020	0.00085	0.0241	<0.00020	<0.00020	0.017	<0.000010	46.7	<0.00010	<0.0010	<0.00020	0.00036	0.084	<0.000090	0.0115	47.2	0.0407	<0.00020
D-7	Woodale Drain	3-Aug-17	0.0145	0.00024	0.00154	0.024	<0.00010	<0.000050	0.012	<0.0000050	52	<0.000010	0.00019	0.00018	<0.00050	0.053	<0.000050	0.0225	65.1	0.0297	0.00024
D-7	Woodale Drain	5-Oct-17	0.109	<0.00010	0.0014	0.0931	<0.00010	<0.000050	0.037	0.0000064	131	0.000019	0.00058	0.00034	0.00164	0.201	0.000182	0.0555	176	0.756	0.00429
D-7	Woodale Drain	30-May-18	0.0097	<0.00010	0.00194	0.033	<0.00010	<0.000050	0.024	<0.0000050	50.8	<0.000010	0.00015	0.00023	<0.00050	0.088	<0.000050	0.0307	71.2	0.167	0.00161
D-8	Birch Creek	8-Nov-16	0.0357	<0.00020	0.00064	0.0327	<0.00020	<0.00020	0.064	<0.000010	63.2	<0.00010	<0.0010	<0.00020	0.0006	0.059	<0.000090	0.0179	66.1	0.00712	0.00054
D-8	Birch Creek	25-May-17	0.112	<0.00020	0.00093	0.0355	<0.00020	<0.00020	0.074	<0.000010	70.8	<0.00010	<0.0010	<0.00020	0.00065	0.11	<0.000090	0.0199	73.7	0.0438	0.00043
D-8	Birch Creek	3-Aug-17	0.0342	0.00027	0.00111	0.0385	<0.00010	<0.000050	0.121	<0.0000050	61.5	<0.000010	0.00012	0.00013	<0.00050	0.069	<0.000050	0.024	71.6	0.0142	0.000247
D-8	Birch Creek	5-Oct-17	0.0522	<0.00010	0.00103	0.029	<0.00010	<0.000050	0.099	<0.0000050	48	<0.000010	0.00017	0.00011	0.00052	0.085	0.000058	0.029	75.1	0.00749	0.000381
D-8	Birch Creek	30-May-18	0.283	<0.00010	0.00162	0.0425	<0.00010	<0.000050	0.126	0.000005	77.8	0.00003	0.0007	0.00031	0.00084	0.305	0.000176	0.0251	69.7	0.0688	0.000455
D-9	Lake St. Martin	8-Nov-16	0.0421	<0.00020	0.00172	0.0398	<0.00020	<0.00020	0.086	<0.000010	43.3	<0.00010	<0.0010	<0.00020	0.00043	0.037	0.000118	0.0283	37.1	0.00489	0.00203
D-9 Dup	Lake St. Martin	8-Nov-16	0.0357	<0.00020	0.00166	0.0396	<0.00020	<0.00020	0.083	<0.000010	40.4	<0.00010	<0.0010	<0.00020	0.00038	0.036	0.000113	0.0262	35.8	0.00476	0.00185
D-9		RPD	16.5%	-	3.6%	0.5%	-	-	3.6%	-	6.9%	-	-	-	-	-	-	7.7%	3.6%	2.7%	9.3%
D-9	Lake St. Martin	25-May-17	0.036	<0.00020	0.00132	0.0391	<0.00020	<0.00020	0.083	<0.000010	48.6	<0.00010	<0.0010	<0.00020	0.00048	0.031	<0.000090	0.0262	36.2	0.00518	0.00156
D-9	Lake St. Martin	3-Aug-17	0.0356	0.00033	0.00187	0.0424	<0.00010	<0.000050	0.096	0.0000101	46.6	<0.000010	<0.00010	<0.00010	<0.00050	0.036	0.000091	0.0311	31.7	0.0106	0.00177
D-9	Lake St. Martin	5-Oct-17	0.0092	0.00013	0.00167	0.0335	<0.00010	<0.000050	0.099	<0.0000050	34.1	<0.000010	<0.00010	<0.00010	<0.00050	0.011	0.000068	0.0268	26.9	0.00378	0.00193
D-9	Lake St. Martin	30-May-18	0.167	0.00014	0.00169	0.0425	<0.00010	<0.000050	0.102	<0.0000050	47.4	0.00002	0.00041	0.00014	0.00072	0.169	0.000153	0.0333	30.5	0.00804	0.00187
FB	Field Blank	8-Nov-16	<0.0050	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.010	<0.000010	0.1	<0.00010	<0.0010	<0.00020	<0.00020	<0.010	<0.000090	<0.0020	<0.010	<0.00030	<0.00020
FB	Field Blank	25-May-17	<0.0050	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.010	<0.000010	<0.10	<0.00010	<0.0010	<0.00020	<0.00020	<0.010	<0.000090	<0.0020	<0.010	<0.00030	<0.00020
FB	Field Blank	3-Aug-17	<0.0030	0.00018	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	0.096	<0.000010	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	0.0068	0.00013	<0.000050
FB	Field Blank	5-Oct-17	<0.0030	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.000050
FB	Field Blank	30-May-18	<0.0030	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.010	<0.0000050	<0.050	<0.000010	<0.00010	<0.00010	<0.00050	<0.010	<0.000050	<0.0010	<0.0050	<0.00010	<0.000050
EQL			0.005	0.0002	0.0002	0.0002	0.0002	0.0002	0.01	0.00001	0.1 / 0.050	0.0001	0.001	0.0002	0.0002	0.01	0.00009	0.002	0.01	0.0003 / 0.0001	0.0002
MWQSOG ⁽¹⁾																					
Surface Water - Tier III																					
Freshwater Aquatic Life			0.005 - 0.1 ⁽³⁾	-	0.15 - 0.34 ⁽⁴⁾	-	-	-	-	⁽⁷⁾	-	-	⁽⁷⁾	-	⁽⁷⁾	0.3	⁽⁷⁾	-	-	-	0.073
CCME ⁽²⁾																					
Freshwater Aquatic Life			0.005 - 0.1 ⁽³⁾	-	0.005	-	-	-	(29 ⁽⁵⁾) 1.5 ⁽⁶⁾	0.09 µg/L ^(8a) 1.0 µg/L ^(8b)	-	-	0.0089 (III), 0.001 (VI)	-	^(8c)	0.3	^(8d)	-	-	-	0.073

TABLE D3-7
SURFACE WATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No.	Location	Date	Parameter (mg/L unless otherwise specified)																		
			Nickel	Phosphorus	Potassium	Rubidium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium
D-1	Lake Manitoba	8-Nov-16	<0.0020	<0.10	7.98	0.00403	<0.0010	8.01	<0.00010	32.5	0.15	<0.00020	<0.00010	<0.00010	<0.00020	0.00472	<0.00010	0.00188	0.00094	0.0021	<0.00040
D-1	Lake Manitoba	25-May-17	<0.0020	<0.10	9.26	0.0032	<0.0010	4.18	<0.00010	106	0.234	<0.00020	<0.00010	<0.00010	<0.00020	0.00108	<0.00010	0.00164	0.00119	<0.0020	<0.00040
D-1	Lake Manitoba	3-Aug-17	0.00082	<0.050	9.3	0.00371	0.0001	5.44	<0.000010	92.8	0.237	<0.00020	<0.000010	<0.00010	<0.00010	0.00358	<0.00010	0.00159	0.00154	0.0049	0.000113
D-1	Lake Manitoba	5-Oct-17	0.00077	<0.050	8.27	0.00346	0.000076	5.87	<0.000010	99.4	0.248	<0.00020	<0.000010	<0.00010	<0.00010	0.00248	<0.00010	0.00165	0.00174	<0.0030	0.00011
D-1	Lake Manitoba	30-May-18	0.00072	<0.050	8.02	0.00301	0.000077	4.03	<0.000010	92.1	0.239	<0.00020	<0.000010	<0.00010	<0.00010	0.00092	<0.00010	0.00146	0.00125	<0.0030	0.000061
D-2	Watchorn Creek	8-Nov-16	<0.0020	<0.10	15.6	0.00724	<0.0010	7.84	<0.00010	12.6	0.108	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	0.00104	<0.00020	<0.0020	<0.00040
D-2	Watchorn Creek	25-May-17	<0.0020	<0.10	10.2	0.00473	<0.0010	2.5	<0.00010	11.5	0.117	<0.00020	<0.00010	<0.00010	<0.00020	0.00067	<0.00010	0.00069	0.00027	<0.0020	<0.00040
D-2	Watchorn Creek	3-Aug-17	<0.00050	0.063	9.43	0.00517	0.000088	10.9	<0.000010	10.6	0.127	<0.00020	<0.000010	<0.00010	<0.00010	0.0003	<0.00010	0.000127	<0.00050	<0.0030	<0.000060
D-2	Watchorn Creek	5-Oct-17	0.00071	<0.050	7.17	0.00386	0.000087	6.99	<0.000010	21.1	0.196	<0.00020	<0.000010	<0.00010	<0.00010	0.00085	<0.00010	0.00367	0.00054	<0.0030	0.000107
D-2	Watchorn Creek	30-May-18	0.00131	0.089	6.46	0.00363	0.000171	3.27	<0.000010	25	0.222	<0.00020	<0.000010	<0.00010	<0.00010	0.00125	<0.00010	0.00176	0.00096	0.0049	0.000248
D-3	Reed Lake	7-Nov-16	<0.0020	<0.10	9.16	0.00467	<0.0010	9.2	<0.00010	10.9	0.0965	<0.00020	<0.00010	<0.00010	<0.00020	0.00053	<0.00010	0.00143	<0.00020	<0.0020	<0.00040
D-3	Reed Lake	25-May-17	<0.0020	<0.10	8.56	0.00399	<0.0010	2.78	<0.00010	9.88	0.0861	<0.00020	<0.00010	<0.00010	<0.00020	0.00073	<0.00010	0.00077	0.0003	<0.0020	<0.00040
D-3	Reed Lake	3-Aug-17	<0.00050	<0.050	9.45	0.00449	0.000068	2.15	<0.000010	9.33	0.0453	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000373	<0.00050	<0.0030	<0.000060
D-3	Reed Lake	5-Oct-17	<0.00050	<0.050	9.5	0.00437	0.00008	4.42	<0.000010	10.4	0.0506	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000405	<0.00050	<0.0030	<0.000060
D-3	Reed Lake	30-May-18	<0.00050	<0.050	8.92	0.0041	0.000064	3.01	<0.000010	9.96	0.0855	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.000316	<0.00050	<0.0030	<0.000060
D-4	Clear Lake	7-Nov-16	<0.0020	<0.10	8.33	0.00475	<0.0010	9.33	<0.00010	10.6	0.146	<0.00020	<0.00010	<0.00010	<0.00020	0.00231	<0.00010	0.0034	0.00076	<0.0020	<0.00040
D-4	Clear Lake	25-May-17	<0.0020	<0.10	3.27	0.00199	<0.0010	2.1	<0.00010	13.4	0.141	<0.00020	<0.00010	<0.00010	<0.00020	0.00086	<0.00010	0.00423	0.00115	<0.0020	<0.00040
D-4 Dup	Clear Lake	25-May-17	<0.0020	<0.10	3.23	0.0021	<0.0010	2.09	<0.00010	13	0.136	<0.00020	<0.00010	<0.00010	<0.00020	0.00056	<0.00010	0.00411	0.0011	<0.0020	<0.00040
RPD			-	-	1.2%	5.4%	-	0.5%	-	3.0%	3.6%	-	-	-	-	-	-	2.9%	4.4%	-	-
D-4	Clear Lake	3-Aug-17	0.00076	<0.050	6.46	0.00437	0.000183	4.41	<0.000010	11.1	0.128	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00131	<0.00050	<0.0030	0.000844
D-4 Field Dup. (SW100)	Clear Lake	3-Aug-17	0.00074	<0.050	6.64	0.00454	0.00014	4.54	<0.000010	11.4	0.13	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00129	<0.00050	<0.0030	0.000125
RPD			2.67%	-	2.7%	3.82%	-	2.91%	-	2.7%	1.55%	-	-	-	-	-	-	1.54%	-	-	-
D-4	Clear Lake	5-Oct-17	0.00073	<0.050	7.05	0.00394	0.000134	2.91	<0.000010	13	0.129	<0.00020	<0.000010	<0.00010	0.00011	0.005	<0.00010	0.00232	0.00069	0.0032	0.000152
D-4 Dup (SW100)	Clear Lake	5-Oct-17	0.0005	<0.050	6.98	0.00363	0.000113	2.77	<0.000010	12.7	0.131	<0.00020	<0.000010	<0.00010	<0.00010	0.0012	<0.00010	0.00231	0.00052	<0.0030	0.000113
RPD			-	-	1.0%	8.19%	-	4.93%	-	2.3%	1.54%	-	-	-	-	-	-	0.43%	-	-	-
D-4	Clear Lake	30-May-18	0.00082	<0.050	12.1	0.00586	0.000169	5.31	<0.000010	15.5	0.202	<0.00020	<0.000010	<0.00010	<0.00010	0.00166	<0.00010	0.00118	<0.00050	<0.0030	0.000144
D-4 Dup	Clear Lake	30-May-18	0.00081	<0.050	12.3	0.00581	0.00016	5.65	<0.000010	15.4	0.199	<0.00020	<0.000010	<0.00010	<0.00010	0.00179	<0.00010	0.0012	<0.00050	<0.0030	0.000131
RPD			-	-	1.64%	0.86%	5.47%	6.20%	-	0.65%	1.50%	-	-	-	-	7.54%	-	1.68%	-	-	9.45%
D-5	North Clarks Drain	8-Nov-16	<0.0020	<0.10	2.57	0.00253	<0.0010	7.23	<0.00010	5.75	0.114	<0.00020	<0.00010	<0.00010	<0.00020	0.00084	<0.00010	0.00201	0.00048	<0.0020	<0.00040
D-5	North Clarks Drain	25-May-17	<0.0020	<0.10	2.26	0.00219	<0.0010	4.1	<0.00010	5.77	0.127	<0.00020	<0.00010	<0.00010	<0.00020	0.00358	<0.00010	0.00146	0.00083	<0.0020	<0.00040
D-5	North Clarks Drain	3-Aug-17	0.00086	<0.050	1.67	0.00208	0.000186	11.2	<0.000010	4.67	0.147	<0.00020	<0.000010	<0.00010	<0.00010	0.00082	<0.00010	0.000702	<0.00050	<0.0030	0.000179
D-5	North Clarks Drain	5-Oct-17	0.00123	<0.050	5.02	0.00228	0.00016	3.79	<0.000010	7.16	0.186	<0.00020	<0.000010	<0.00010	<0.00010	0.00222	<0.00010	0.0025	0.00099	<0.0030	0.000249
D-5	North Clarks Drain	30-May-18	0.00182	<0.050	3.37	0.00353	0.00028	8.98	<0.000010	6.97	0.183	<0.00020	<0.000010	<0.00010	<0.00010	0.00099	<0.00010	0.00173	0.00068	0.0059	0.000426

TABLE D3-7
SURFACE WATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No.	Location	Date	Parameter (mg/L unless otherwise specified)																			
			Nickel	Phosphorus	Potassium	Rubidium	Selenium	Silicon	Silver	Sodium	Strontium	Tellurium	Thallium	Thorium	Tin	Titanium	Tungsten	Uranium	Vanadium	Zinc	Zirconium	
D-6	South Birch Creek	8-Nov-16	<0.0020	<0.10	8.57	0.00425	<0.0010	9.89	<0.00010	12.3	0.17	<0.00020	<0.00010	<0.00010	<0.00020	0.00061	<0.00010	0.0038	0.00036	<0.0020	<0.00040	
D-6	South Birch Creek	25-May-17	<0.0020	<0.10	6.66	0.00337	<0.0010	3.79	<0.00010	16.3	0.221	<0.00020	<0.00010	<0.00010	<0.00020	0.00247	<0.00010	0.00262	0.0005	<0.0020	<0.00040	
D-6	South Birch Creek	3-Aug-17	<0.00050	<0.050	4.67	0.00257	0.000116	17.4	<0.000010	12.8	0.204	<0.00020	<0.000010	<0.00010	<0.00010	0.00071	<0.00010	0.000457	<0.00050	<0.0030	0.000071	
D-6	South Birch Creek	5-Oct-17	<0.00050	<0.050	7.14	0.00294	0.000118	14.2	<0.000010	15.6	0.176	<0.00020	<0.000010	<0.00010	<0.00010	0.00143	<0.00010	0.00107	0.00058	<0.0030	0.000117	
D-6	South Birch Creek	30-May-18	0.00074	<0.050	7.94	0.00429	0.000165	9.87	<0.000010	14.8	0.229	<0.00020	<0.000010	<0.00010	<0.00010	0.00411	<0.00010	0.00136	0.0008	<0.0030	0.000193	
D-7	Woodale Drain	8-Nov-16	<0.0020	<0.10	6.78	0.00244	<0.0010	8.99	<0.00010	6.58	0.0966	<0.00020	<0.00010	<0.00010	<0.00020	0.00105	<0.00010	0.00352	0.00053	0.0029	<0.00040	
D-7	Woodale Drain	25-May-17	<0.0020	<0.10	4.7	0.00162	<0.0010	3.95	<0.00010	6.06	0.0821	<0.00020	<0.00010	<0.00010	<0.00020	0.00067	<0.00010	0.00068	0.00038	0.0023	<0.00040	
D-7	Woodale Drain	3-Aug-17	0.00104	0.062	2.49	0.0014	0.000174	6.27	<0.000010	8.89	0.131	<0.00020	<0.000010	<0.00010	<0.00010	0.00065	<0.00010	0.00127	0.00058	<0.0030	0.000194	
D-7	Woodale Drain	5-Oct-17	0.00156	0.155	9.76	0.00367	0.000143	10.1	<0.000010	23.9	0.346	<0.00020	<0.000010	<0.00010	<0.00010	0.00628	<0.00010	0.0444	0.00141	0.0082	0.000241	
D-7	Woodale Drain	30-May-18	0.00128	0.059	4.61	0.00184	0.000184	3.75	<0.000010	10.8	0.137	<0.00020	<0.000010	<0.00010	<0.00010	0.00058	<0.00010	0.00823	0.00062	<0.0030	0.000173	
D-8	Birch Creek	8-Nov-16	<0.0020	<0.10	7.31	0.00376	<0.0010	9.25	<0.00010	11.5	0.166	<0.00020	<0.00010	<0.00010	<0.00020	0.00155	<0.00010	0.0038	0.0005	<0.0020	<0.00040	
D-8	Birch Creek	25-May-17	<0.0020	<0.10	5.33	0.00306	<0.0010	2.9	<0.00010	13.2	0.185	<0.00020	<0.00010	<0.00010	<0.00020	0.00477	<0.00010	0.00255	0.00096	<0.0020	<0.00040	
D-8	Birch Creek	3-Aug-17	0.00058	<0.050	4.41	0.00258	0.000147	14.6	<0.000010	12.2	0.193	<0.00020	<0.000010	<0.00010	<0.00010	0.00142	<0.00010	0.000821	0.0005	<0.0030	0.000134	
D-8	Birch Creek	5-Oct-17	0.00052	<0.050	6.89	0.003	0.000131	13	<0.000010	15.9	0.183	<0.00020	<0.000010	<0.00010	<0.00010	0.00333	<0.00010	0.00157	0.00086	<0.0030	0.000216	
D-8	Birch Creek	30-May-18	0.00127	0.086	6.45	0.0041	0.000184	5.3	<0.000010	11.6	0.223	<0.00020	<0.000010	<0.00010	<0.00010	0.0113	<0.00010	0.00188	0.00181	<0.0030	0.00045	
D-9	Lake St. Martin	8-Nov-16	<0.0020	<0.10	8.74	0.00359	<0.0010	5.78	<0.00010	96.8	0.231	<0.00020	<0.00010	<0.00010	<0.00020	0.00138	<0.00010	0.00189	0.00152	<0.0020	<0.00040	
D-9 Dup	Lake St. Martin	8-Nov-16	<0.0020	<0.10	8.34	0.00351	<0.0010	5.58	<0.00010	91	0.213	<0.00020	<0.00010	<0.00010	<0.00020	0.00126	<0.00010	0.0018	0.00145	<0.0020	<0.00040	
RPD			-	-	4.7%	2.3%	-	3.5%	-	6.2%	8.1%	-	-	-	-	-	-	4.9%	4.7%	-	-	
D-9	Lake St. Martin	25-May-17	<0.0020	<0.10	8.57	0.00344	<0.0010	3.77	<0.00010	108	0.229	<0.00020	<0.00010	<0.00010	<0.00020	0.00105	<0.00010	0.00143	0.00099	<0.0020	<0.00040	
D-9	Lake St. Martin	3-Aug-17	0.00069	<0.050	8.63	0.00382	0.000084	5.18	<0.000010	101	0.243	<0.00020	<0.000010	<0.00010	<0.00010	0.00149	<0.00010	0.00141	0.00115	<0.0030	<0.000060	
D-9	Lake St. Martin	5-Oct-17	0.00051	<0.050	6.31	0.00273	0.000079	6.19	<0.000010	86.8	0.198	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	0.00131	0.00125	<0.0030	<0.000060	
D-9	Lake St. Martin	30-May-18	0.001	<0.050	7.97	0.00362	0.000077	4.54	<0.000010	97.5	0.255	<0.00020	<0.000010	<0.00010	<0.00010	0.00735	<0.00010	0.00151	0.00156	<0.0030	0.000152	
FB	Field Blank	8-Nov-16	<0.0020	<0.10	<0.020	<0.00020	<0.0010	<0.10	<0.00010	<0.030	0.00013	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	<0.00010	<0.00020	<0.0020	<0.00040	
FB	Field Blank	25-May-17	<0.0020	<0.10	<0.020	<0.00020	<0.0010	<0.10	<0.00010	<0.030	<0.00010	<0.00020	<0.00010	<0.00010	<0.00020	<0.00050	<0.00010	<0.00010	<0.00020	<0.0020	<0.00040	
FB	Field Blank	3-Aug-17	<0.00050	<0.050	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.000060	
FB	Field Blank	5-Oct-17	<0.00050	<0.050	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.000060	
FB	Field Blank	30-May-18	<0.00050	<0.050	<0.050	<0.00020	<0.000050	<0.10	<0.000010	<0.050	<0.00020	<0.00020	<0.000010	<0.00010	<0.00010	<0.00030	<0.00010	<0.000010	<0.00050	<0.0030	<0.000060	
EQL			0.002	0.1	0.02 / 0.05	0.0002	0.001	0.1	0.0001	0.03 / 0.05	0.0001	0.0002	0.0001	0.0001	0.0002	0.0005	0.0001	0.0001	0.0002	0.002	0.0004	
MWQSOG ⁽¹⁾																						
Surface Water - Tier III																						
Freshwater Aquatic Life			(7)	0.025 (lakes and streams entering lakes)/ 0.05 (other streams) ⁽⁹⁾	-	-	0.001	-	0.0001	-	-	-	-	0.0008	-	-	-	-	(0.033 ⁽⁵⁾) 0.015 ⁽⁶⁾	-	(7)	-
CCME ⁽²⁾																						
Freshwater Aquatic Life			(8e)	(10)	-	-	0.001	-	0.00025	-	-	-	-	0.0008	-	-	-	-	(0.033 ⁽⁵⁾) 0.015 ⁽⁶⁾	-	0.03	-

TABLE D3-7
SURFACE WATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Notes:

EQL = Estimated Quantitation Limit = Lowest level of the parameter that can be quantified with confidence
"-" = No Data
RPD = Relative Percent Difference

Notes:

EQL = Estimated Quantitation Limit = Lowest level of the parameter that can be quantified with confidence
"-" = No Data
RPD = Relative Percent Difference

- MWQSOG - Manitoba Water Quality Standards , Objectives, and Guidelines - Manitoba Water Stewardship Report 2011-01, November 28, 2011.
- CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines, 1999. Updated February 6, 2014.
Canadian Water Quality Guidelines for the Protection of Aquatic Life
- Total aluminum should not exceed 0.005 mg/L in waters with a pH below 6.5. The concentration of total aluminum should not exceed 0.1 mg/L in waters with a pH greater than or equal to 6.5.
- Short term duration (1 hour) should not exceed 0.34 mg/L long term duration (4 days) should not exceed 0.15 mg/L.
- Short-term exposure (24 to 96 hours) concentrations which indicate potential for severe effects during transient events
(spill events to aquatic receiving environments and infrequent releases of short-lived/non-persistent substances). These are NOT protective guidelines.
- Long-term exposure guideline that protects all forms of aquatic life for indefinite exposure periods (>7 day exposures for fish and invertebrates, 24 hour exposures for aquatic plants and algae).
- The following table provides guidelines for parameters based on the sample's hardness and the toxicity of the metal.

Hardness (mg/L)	Cadmium (mg/L)		Chromium (mg/L)		Copper (mg/L)		Lead (mg/L)		Nickel (mg/L)		Zinc (mg/L)	
	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute
245	0.00046	0.00481	0.15439	1.18692	0.01926	0.03126	0.00657	0.16872	0.11099	0.99931	0.25243	0.25038
270	0.00049	0.00528	0.16718	1.28523	0.02093	0.03426	0.00728	0.18684	0.1205	1.08492	0.27409	0.27186
295	0.00052	0.00576	0.17976	1.38191	0.02257	0.03724	0.00799	0.20496	0.12988	1.16932	0.29544	0.29305
320	0.00055	0.00623	0.19214	1.47711	0.0242	0.04021	0.00869	0.22307	0.13913	1.25263	0.31652	0.31396
345	0.00058	0.0067	0.20435	1.57097	0.0258	0.04316	0.0094	0.24116	0.14827	1.33493	0.33736	0.33462
370	0.00061	0.00717	0.2164	1.66361	0.02739	0.0461	0.0101	0.25922	0.15731	1.41633	0.35796	0.35505
400	0.00064	0.00774	0.02067	1.7733	0.02928	0.04962	0.01094	0.28025	0.16804	1.51289	0.3824	0.3793

8. For the following equations, hardness is expressed as CaCQ in mg/L and the guideline is in µg/L. exposure);
- a. **Cadmium** Guideline: The long-term CWQG of 0.09 ug/L is for waters of 50 mg CaCQ/L hardness. When water hardness is 0 to <17 mg/L, CWQG is 0.04µg/L.
At hardness ≥ 17 to ≤ 280, the CWQG can be calculated with the equation CWQG (ug/L) = 10^[0.83[log(hardness (mg/L)) - 2.46]. At hardness >280 mg/L, the CWQG is 0.37 ug/L.
- b. **Cadmium** Guideline: The short-term benchmark concentration of 1.0 ug/L is for waters of 50 mg CaCQ/L hardness.
When water hardness is 0 to <5.3 mg/L, the short-term CWQG is 0.11 µg/L. At hardness≥5.3 to ≤360 mg/L, the short term bench mark is calculated using this equation CWQG (ug/L) = 10^{1.016(log[hardness (mg/L)]-1.71)}. At hardness >360 mg/L, the short term benchmark is 7.7 ug/L
- c. **Copper** Guideline = When the water hardness is 0 to <82 mg/L, the CWQG is 2 ug/L.
At hardness ≥ 82 to ≤180 mg/L the CDWQ is calculated using this equation: CWQG (ug/L) = e^{(0.8545[ln(hardness (mg/L))-1.465]} * 0.2;
At hardness > 180 mg/L, the CWQG is 4 ug/L, if the hardness is not known, the CDQG is 2 ug/L.
- d. **Lead** Guideline =When the hardness is 0 to≤60 mg/L, the CWQG is 1 ug/L. At hardness >60 to≤180 mg/L the CWQG is calculated using: CWQG(ug/L) = e^{(1.273[ln(hardness (mg/L))]-4.705)} µg/L; At hardness >180 mg/L, the CWQG is 7 ug/L, If the hardness is unknown, the CWQG is 1 ug/L.
- e. **Nickel** Guideline = Whan water hardness is 0 to≤60 mg/L, the CWQG is 25 ug/L.
At hardness >60 to≤180 mg/L the CWQG is calculated using the following equation: CWQG (ug/L) = e^{(0.76[ln(hardness)]+1.06)}. At hardness >180 mg/L, the CWQG is 150 ug/L. If the hardness is unknown, the CWQG is 25 ug/L.

Well No. (November 2016)	Hardness	8a. Cadmium (long-term) mg/L	8b. Cadmium (short-term) (mg/L)	8c. Copper (mg/L)	8d. Lead (mg/L)	8e. Nickel (mg/L)
D-1	322	0.00042	0.00689	0.00642	0.01410	0.23245
D-2	321	0.00042	0.00686	0.00641	0.01404	0.23190
D-3	335	0.00043	0.00717	0.00664	0.01483	0.23954
D-4	394	0.00049	0.00845	0.00763	0.01823	0.27098
D-5	362	0.00046	0.00776	0.00710	0.01636	0.25408
D-6	424	0.00053	0.00911	0.00813	0.02001	0.28652
D-7	353	0.00045	0.00756	0.00695	0.01585	0.24926
D-8	430	0.00053	0.00924	0.00822	0.02037	0.28959
D-9	261	0.00035	0.00556	0.00537	0.01079	0.19815

TABLE D3-7
SURFACE WATER METALS - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Well No. (May 2017)	Hardness	8a. Cadmium (long-term) mg/L	8b. Cadmium (short-term) (mg/L)	8c. Copper (mg/L)	8d. Lead (mg/L)	8e. Nickel (mg/L)
D-1	250	0.00034	0.00532	0.00517	0.01021	0.19177
D-2	329	0.00043	0.00704	0.00654	0.01449	0.23628
D-3	291	0.00038	0.00621	0.00589	0.01239	0.21523
D-4	418	0.00052	0.00898	0.00803	0.01965	0.28343
D-5	375	0.00047	0.00804	0.00732	0.01712	0.26099
D-6	526	0.00063	0.01134	0.00977	0.02633	0.33752
D-7	311	0.00041	0.00665	0.00624	0.01349	0.22639
D-8	480	0.00058	0.01033	0.00903	0.02343	0.31484
D-9	270	0.00036	0.00576	0.00553	0.01127	0.20332

Well No. (August 2017)	Hardness	8a. Cadmium (long-term) mg/L	8b. Cadmium (short-term) (mg/L)	8c. Copper (mg/L)	8d. Lead (mg/L)	8e. Nickel (mg/L)
D-1	249	0.00034	0.00530	0.00516	0.01016	0.19119
D-2	316	0.00041	0.00676	0.00632	0.01376	0.22915
D-3	245	0.00033	0.00522	0.00509	0.00996	0.18885
D-4	338	0.00044	0.00723	0.00669	0.01500	0.24117
D-5	394	0.00049	0.00845	0.00763	0.01823	0.27098
D-6	447	0.00055	0.00961	0.00850	0.02140	0.29825
D-7	398	0.00050	0.00854	0.00770	0.01846	0.27306
D-8	448	0.00055	0.00963	0.00852	0.02146	0.29876
D-9	247	0.00034	0.00526	0.00512	0.01006	0.19002

Well No. (October 2017)	Hardness	8a. Cadmium (long-term) mg/L	8b. Cadmium (short-term) (mg/L)	8c. Copper (mg/L)	8d. Lead (mg/L)	8e. Nickel (mg/L)
D-1	245	0.00033	0.00522	0.00509	0.00996	0.18885
D-2	430	0.00053	0.00924	0.00822	0.02037	0.28959
D-3	275	0.00037	0.00587	0.00561	0.01153	0.20618
D-4	353	0.00045	0.00756	0.00695	0.01585	0.24926
D-5	386	0.00049	0.00828	0.00750	0.01776	0.26678
D-6	419	0.00052	0.00900	0.00804	0.01971	0.28395
D-7	1050	0.00112	0.02288	0.01764	0.06348	0.57076
D-8	429	0.00053	0.00922	0.00821	0.02031	0.28908
D-9	196	0.00028	0.00416	0.00420	0.00749	0.15939

Well No. (May 2018)	Hardness	8a. Cadmium (long-term) mg/L	8b. Cadmium (short-term) (mg/L)	8c. Copper (mg/L)	8d. Lead (mg/L)	8e. Nickel (mg/L)
D-1	229	0.00032	0.00487	0.00480	0.00914	0.17940
D-2	476	0.00058	0.01024	0.00897	0.02319	0.31285
D-3	297	0.00039	0.00634	0.00599	0.01272	0.21860
D-4	438	0.00054	0.00941	0.00835	0.02086	0.29368
D-5	462	0.00056	0.00994	0.00874	0.02232	0.30583
D-6	500	0.00060	0.01077	0.00936	0.02469	0.32477
D-7	420	0.00052	0.00902	0.00806	0.01977	0.28446
D-8	481	0.00058	0.01035	0.00905	0.02350	0.31534
D-9	244	0.00033	0.00520	0.00507	0.00990	0.18826

9. MWQSOG Tier II Objective - Unless it can be demonstrated that total phosphorus is not a limiting factor, considering the morphological, physical, chemical, or other characteristics of the water body, total phosphorus should not exceed 0.025 mg/L in any reservoir, lake, or pond, or in a tributary at the point where it enters such bodies of water. In other streams, total phosphorus should not exceed 0.05 mg/L.
10. If trigger ranges for total phosphorous are exceeded, the potential exists for an environmental impact. If trigger range is not exceeded, but TP is more than 50% above baseline values, the potential exists for an environmental impact.
- | | | | | |
|------------------------|--------------------|-------|-----------------|--------|
| Trigger ranges (µg/L): | ultra-oligotrophic | <4 | meso-eutrophic | 20-35 |
| | oligotrophic | 4-10 | eutrophic | 35-100 |
| | mesotrophic | 10-20 | hyper-eutrophic | >100 |

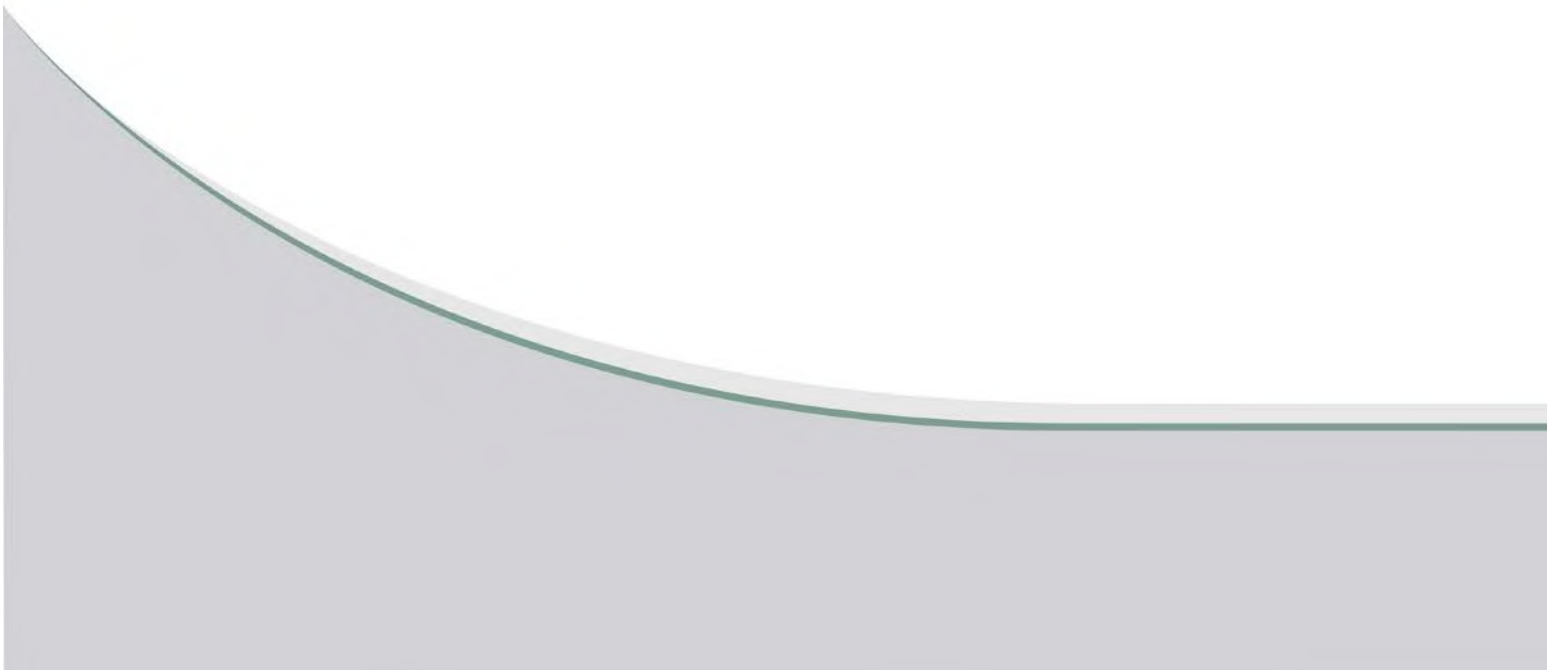
	- Exceedance of CCME Guidelines
BOLD	- Exceedance of MWQSOG Guidelines

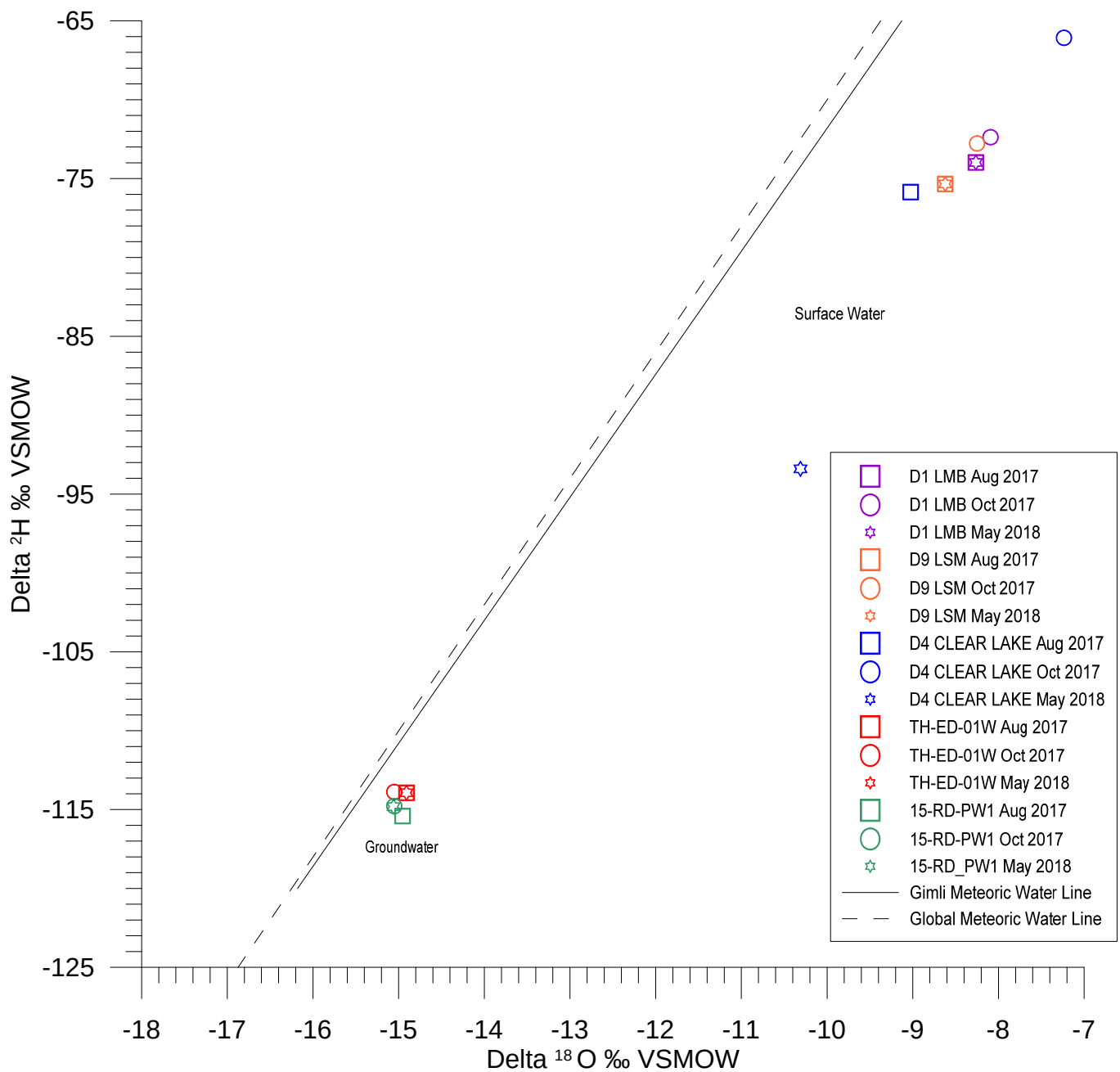
TABLE D3-8
STABLE ISOTOPES IN GROUNDWATER AND SURFACE WATER - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

Sample	Date	Lab#	$\delta^{18}\text{O}$ H ₂ O	Result VSMOW	Repeat	$\delta^2\text{H}$ H ₂ O	Result VSMOW	Repeat	pH	Conductivity μS/cm
Ground Water										
TH-ED-01W	26-Oct-16	373023	X	-14.72	-14.89	X	-113.02	-112.97	6.51	511
TH-ED-01W	23-May-17	381957	X	-15.14	-15.11	X	-114.18	-113.99	7.38	813
TH-ED-01W	2-Aug-17	384686	X	-14.91	-15.06	X	-113.94	-114.01	7.17	810
TH-ED-01W	4-Oct-17	386776	X	-15.05	-15.10	X	-113.88	-113.78	7.73	844
TH-ED-01W	29-May-18	403342	X	-14.88	-14.91	X	-113.74	-113.46	9.01	811
TH-GD-08	29-Oct-16	373025	X	-14.86	0.16	X	-113.64	-	-	*
15-RD-PW1	24-May-17	381958	X	-15.30	-	X	-115.05	-	7.33	817
15-RD-PW1	1-Aug-17	384687	X	-14.95	-	X	-115.42	-	7.32	792
15-RD-PW1	3-Oct-17	386777	X	-15.05	-	X	-114.78	-	7.71	808
15-RD-PW1	28-May-18	403343	X	-15.06	-	X	-114.82	-	8.94	767
Surface Water										
D-1 LMB	8-Nov-16	374371	X	-9.72	-	X	-75.68	-	8.05	492
D-1 LMB	25-May-17	381959	X	-8.83	-8.81	X	-75.80	-75.55	8.32	936
D-1 LMB	3-Aug-17	384688	X	-8.26	-8.42	X	-73.98	-73.79	8.01	932
D-1 LMB	5-Oct-17	386778	X	-8.09	-8.00	X	-72.38	-72.11	6.87	945
D-1 LMB	30-May-18	403344	X	-8.06	-8.01	X	-73.16	-72.56	7.15	849
D-4 Clear Lake	8-Nov-16	374374	X	-11.31	-11.29	X	-80.81	-80.67	8.84	532
D-4 Clear Lake	25-May-17	381960	X	-10.67	-	X	-90.14	-	8.33	696
D-4 Clear Lake DUP	25-May-17	381962	X	-10.68	-10.75	X	-89.83	-89.67	8.33	696
D-4 Clear Lake	3-Aug-17	384689	X	-9.02	-	X	-75.86	-	7.02	659
D-4 Clear Lake DUP	3-Aug-17	384691	X	-8.84	-9.06	X	-75.05	-75.18	7.02	659
D-4 Clear Lake	5-Oct-17	386779	X	-7.23	-	X	-66.07	-	6.93	731
D-4 Clear Lake DUP	5-Oct-17	386781	X	-7.19	-7.16	X	-65.85	-65.98	6.93	731
D-4 Clear Lake	30-May-18	403345	X	-10.31	-	X	-93.41	-	7.15	789
D-4 Clear Lake DUP	30-May-18	403347	X	-10.16	-10.20	X	-92.64	-92.86	7.15	789
D-9 LSM	8-Nov-16	374372	X	-8.46	-8	X	-72.86	-73.00	8.41	691
D-9 LSM-DUP	8-Nov-16	374373	X	-8.51	-	X	-72.83	-	8.41	691
D-9 LSM	25-May-17	381961	X	-9.00	-	X	-77.15	-	8.18	932
D-9 LSM	3-Aug-17	384690	X	-8.62	-	X	-75.34	-	7.2	970
D-9 LSM	5-Oct-17	386780	X	-8.25	-	X	-72.78	-	6.43	959
D-9 LSM	30-May-18	403346	X	-8.14	-	X	-73.23	-	6.48	960

TABLE D3-8
STABLE ISOTOPES IN GROUNDWATER AND SURFACE WATER - ROUTE D
LAKE MANITOBA OUTLET CHANNELS
PAGE 1 OF 1

PLATES





Gimli Meteoric Water Line
 $\Delta^2\text{H} = (7.8) \Delta^{18}\text{O} + 6.2$

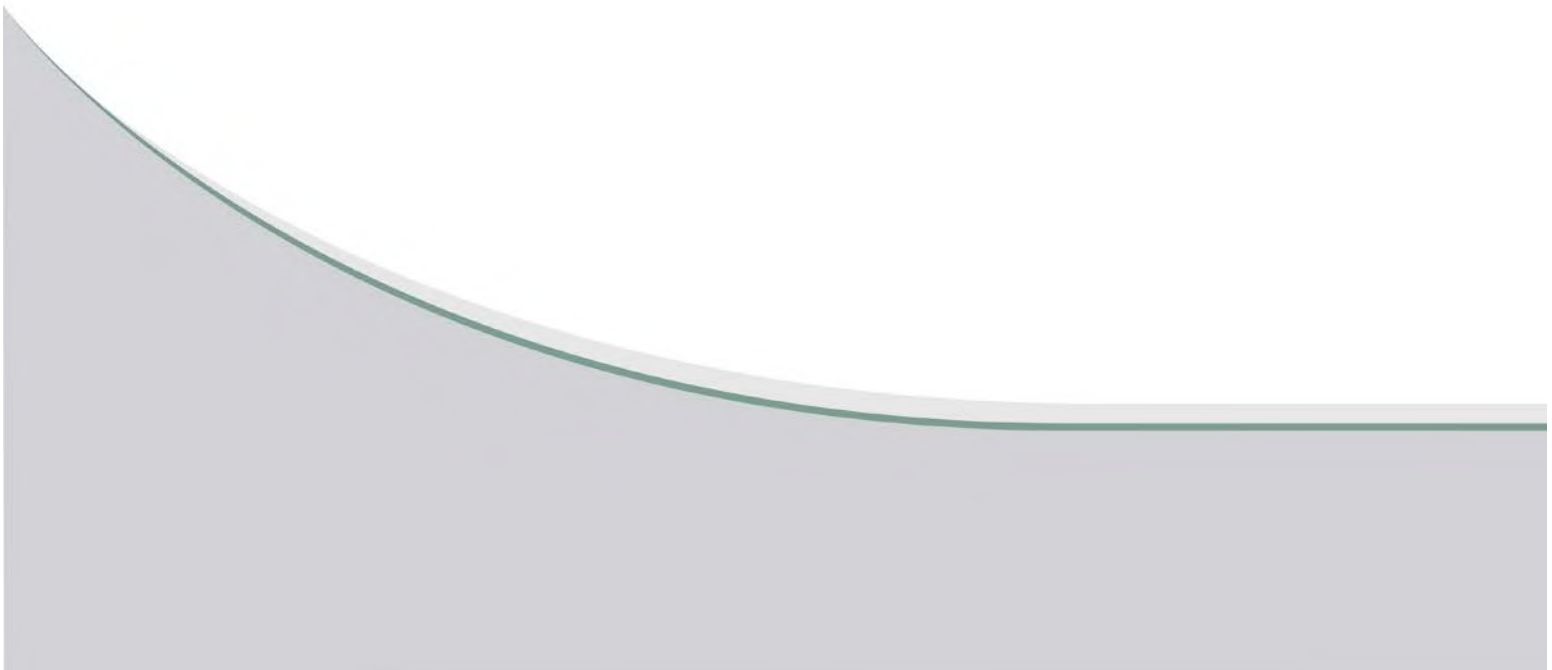
Global Meteoric Water Line
 $\Delta^2\text{H} = (8) \Delta^{18}\text{O} + 10$

➡

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NO.	YYMMDD	DESCRIPTION	DESIGN BY	DESIGN CHECK
REVISIONS / ISSUE				
				
INVESTIGATIONS & PRELIMINARY ENGINEERING FOR LMB OUTLET CHANNELS OPTIONS C & D				
ISOTOPES IN GROUNDWATER AND SURFACE WATER - ROUTE D				
AUGUST 2018		PLATE D3-1	REV:	0

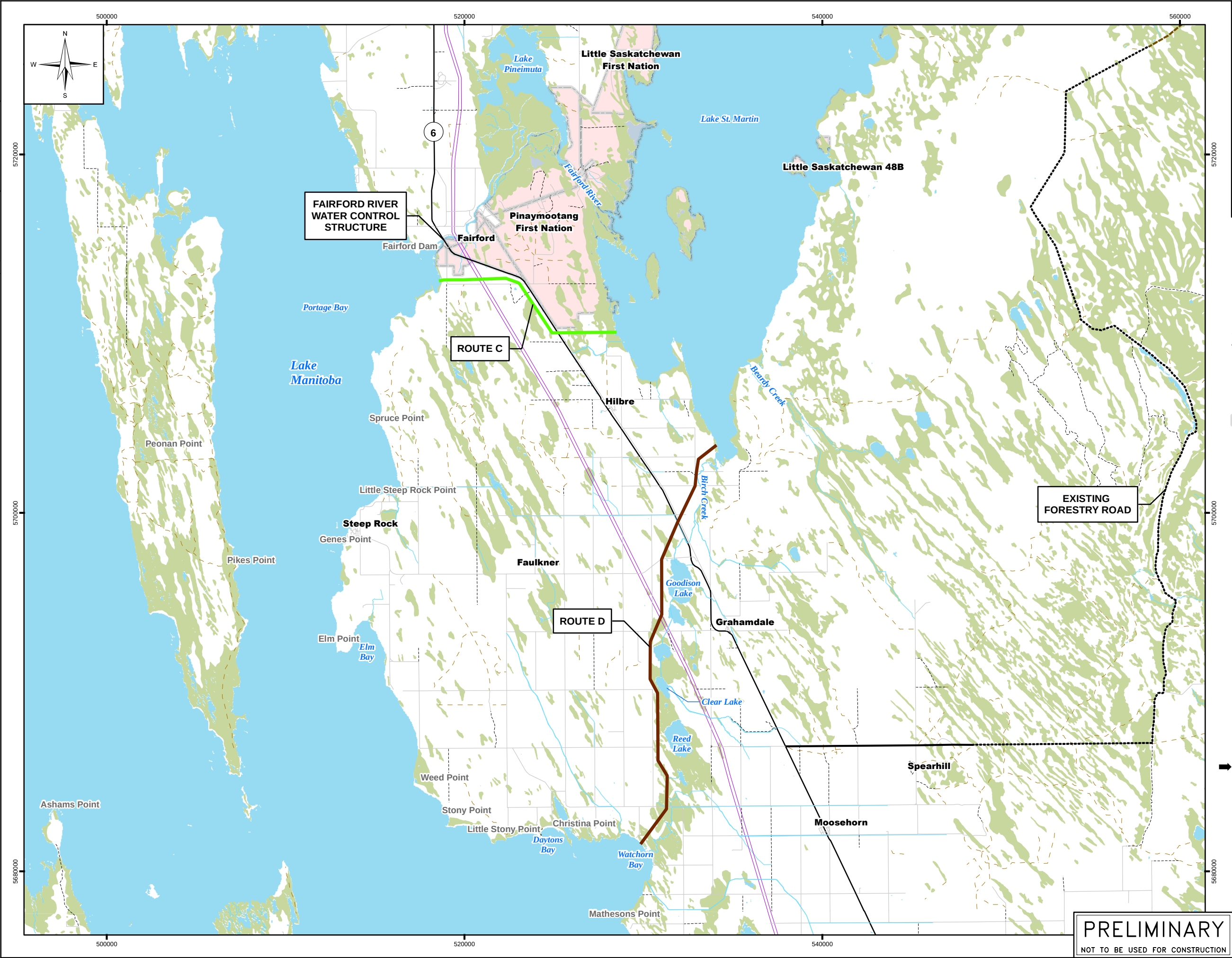
APPENDIX D3-A

**LOCATION PLANS FROM: INVESTIGATIONS AND PRELIMINARY ENGINEERING
FOR LAKE MANITOBA OUTLET CHANNELS OPTIONS C AND D SUMMARY
REPORT, MAY 2017. APPENDIX A, DELIVERABLE 4 ASSESSMENT OF EXISTING
WELL USE AND SUITABILITY AS DRINKING WATER – ROUTE D**



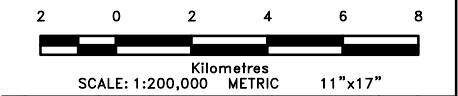
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11"x17" PLOT SCALE 1:1

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- LEGEND:**
- LMB Channel Option C
 - LMB Channel Option D
 - Existing Transmission Line
 - Forestry Road
 - Access Road
 - Municipal Road
 - Highway
 - Limited Use Road
 - Trail
 - Watercourse
 - Wetlands
 - Waterbody
 - First Nation

NOTES:
1. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 14. Elevations are in metres above sea level (MSL).



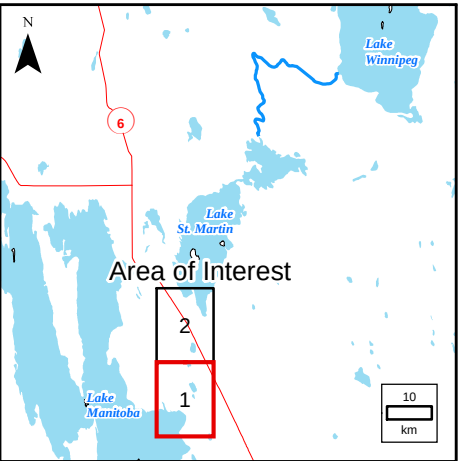
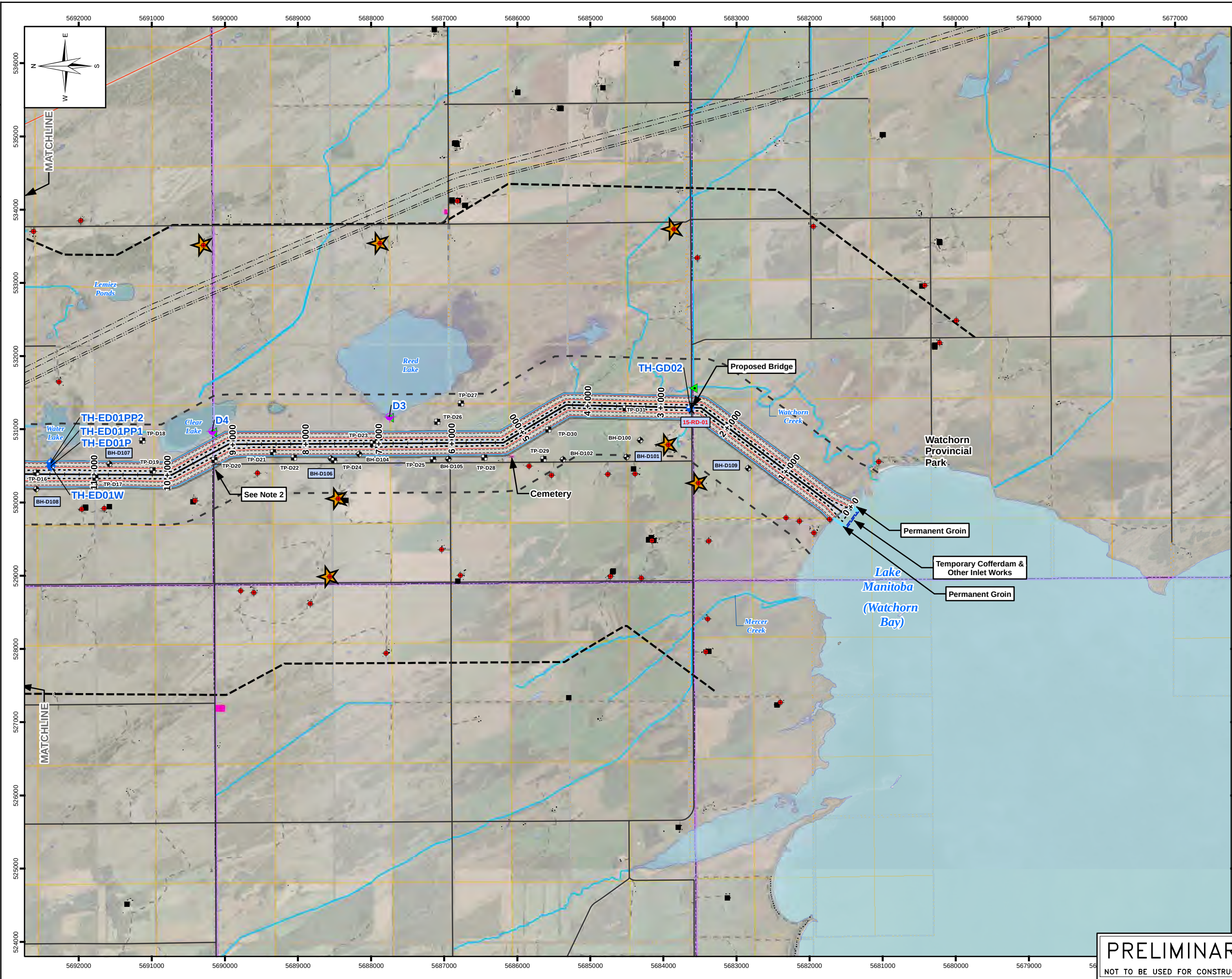
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NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY

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

GENERAL SITE PLAN ROUTE C AND D		REV: 0
MAY 2017	PLATE D4-1	

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

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11"x17" PLOT SCALE 1:1



- LEGEND:**
- Potential Domestic Well Location (MI ID)
 - Domestic Well Location (MI ID) in Well Inventory
 - Surface Water Locations
 - Logger (November, 2016)
 - Testhole (November, 2016)
 - (G:Geotechnical, E:Environmental)
 - Test Hole (June, 2015)
 - Borehole (2011)
 - Test Pit (2011)
 - Utility Lines
 - Transmission Line (Existing)
 - Roads
 - Paved Road/Street (1 or more lanes)
 - Gravel Road
 - Dry Season Road
 - Proposed Road Re-alignment
 - Water Features
 - River/Stream/Ditch
 - Lake
 - Boundaries
 - Section
 - Quarter Section
 - Township
 - First Nation
 - 3 km channel buffer
 - 500m distance from Channel ROW

NOTES:

- Imagery is dated 2007 – 2011 and supplied by the Province of Manitoba, Manitoba Land Initiative.
- Final channel and spoil pile alignment to accommodate bipole transmission line towers, road realignments, privately owned structures, etc.
- All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 14. Elevations are in metres above sea level (MSL).



NO.		YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
0	17/05/10	ISSUED WITH DELIVERABLE D4	MFH	JDM	

REVISIONS / ISSUE

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**INVESTIGATIONS & PRELIMINARY
ENGINEERING FOR LMB OUTLET
CHANNELS OPTIONS C&D
POTENTIAL THIRD-PARTY WELL AND
INVENTORY LOCATIONS
ROUTE D**

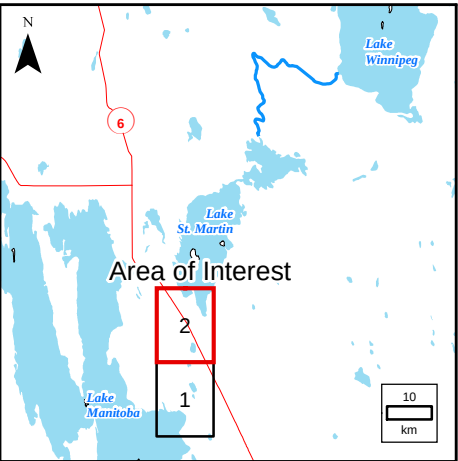
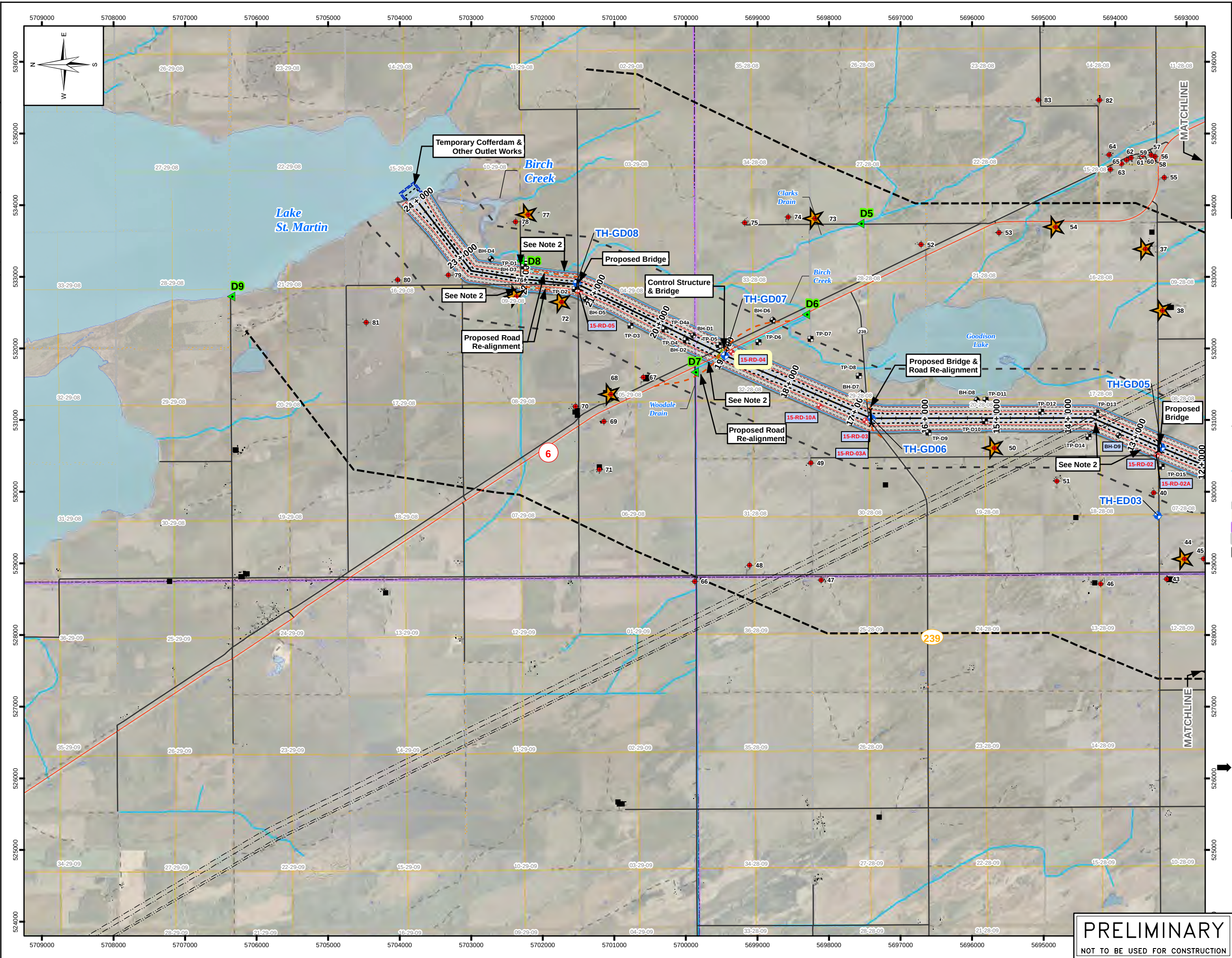
PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

MAY 2017

PLATE D4-6.1

REV: 0



- LEGEND:**
- Potential Domestic Well Location (MI ID)
 - Domestic Well Location (MI ID) In Well Inventory
 - Surface Water Locations
 - Testhole (November, 2016) (G:Geotechnical, E:Environmental)
 - Test Hole (June, 2015)
 - Borehole (2011)
 - Test Pit (2011)
 - Utility Lines
 - Transmission Line (Existing)
 - Roads
 - Paved Road/Street (1 or more lanes)
 - Gravel Road
 - Dry Season Road
 - Proposed Road Re-alignment
 - Water Features
 - River/Stream/Ditch
 - Lake
 - Boundaries
 - Section
 - Quarter Section
 - Township
 - First Nation
 - 3 km channel buffer
 - 500m distance from Channel ROW

NOTES:

1. Imagery is dated 2007 – 2011 and supplied by the Province of Manitoba, Manitoba Land Initiative.
2. Final channel and spoil pile alignment to accommodate bipole transmission line towers, road realignments, privately owned structures, etc.
3. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 14. Elevations are in metres above sea level (MSL).

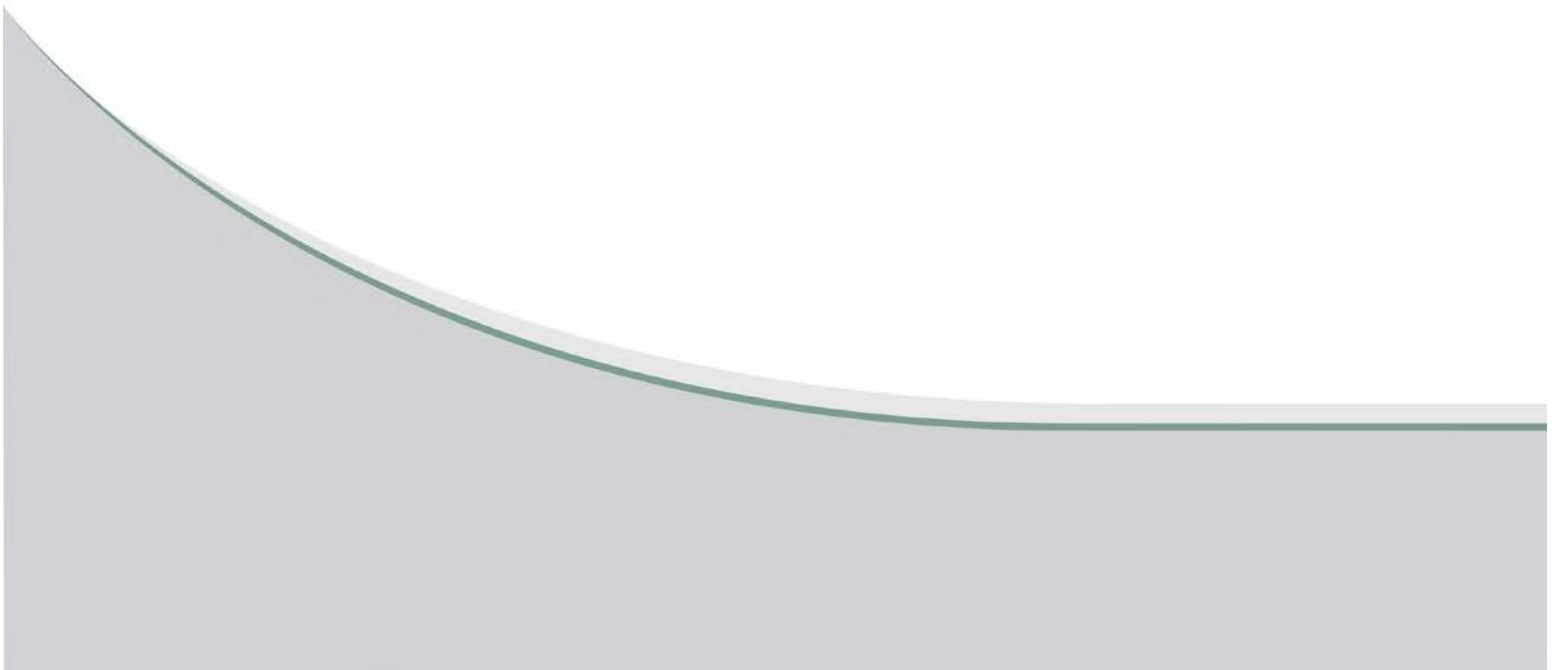
0.5 0 0.5 1 1.5 2

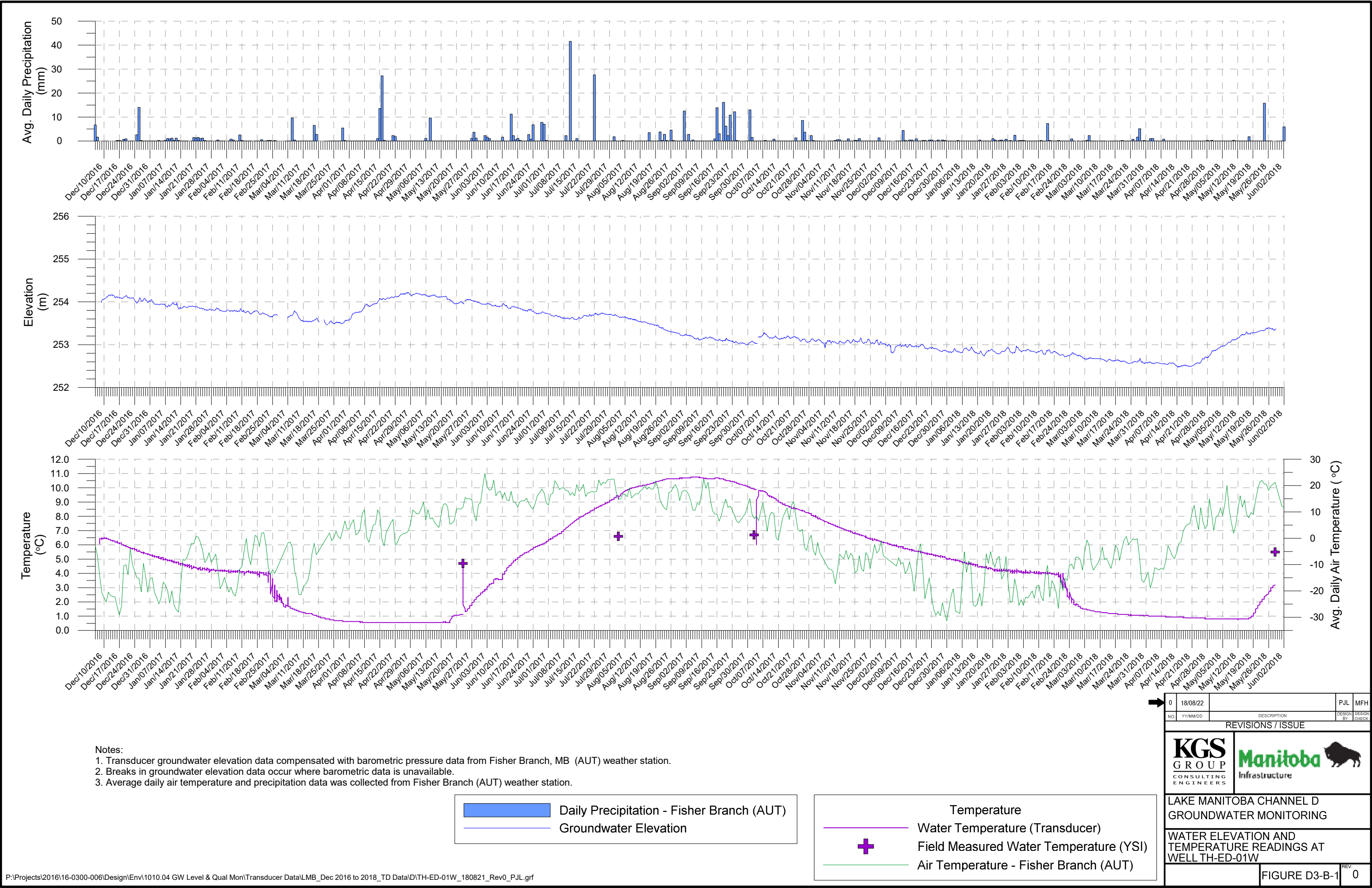
SCALE: 1:50,000 METRIC 11"x17"

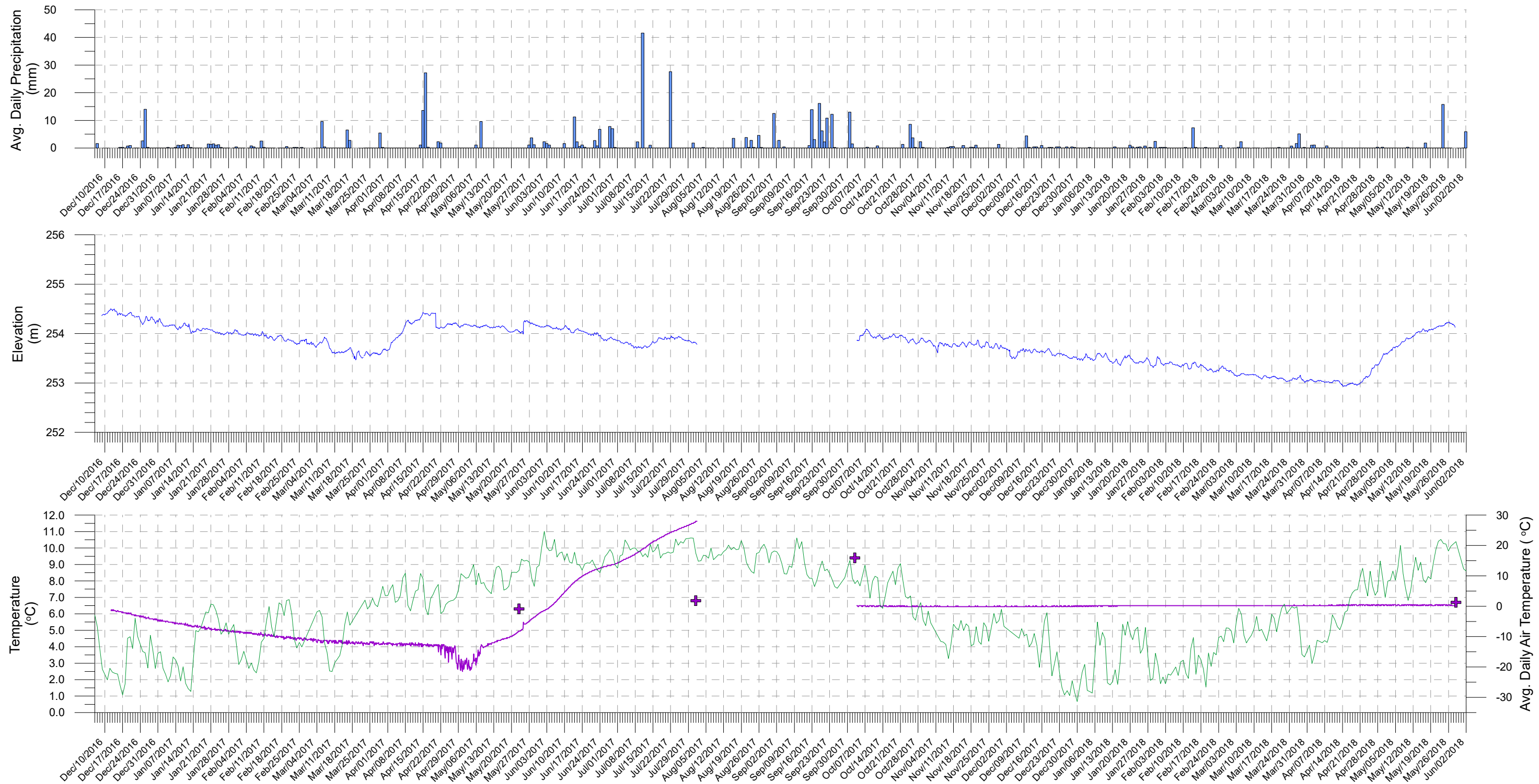
0	17/05/10	ISSUED WITH DELIVERABLE D4	MFH	JDM
NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
KGS GROUP CONSULTING ENGINEERS		Manitoba  Infrastructure		
INVESTIGATIONS & PRELIMINARY ENGINEERING FOR LMB OUTLET CHANNELS OPTIONS C&D				
POTENTIAL THIRD-PARTY WELL AND INVENTORY LOCATIONS ROUTE D				
MAY 2017		PLATE D4-6.2	REV:	0

APPENDIX D3-B

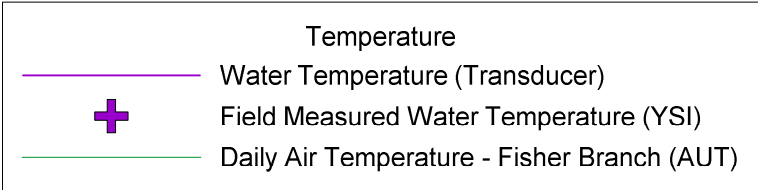
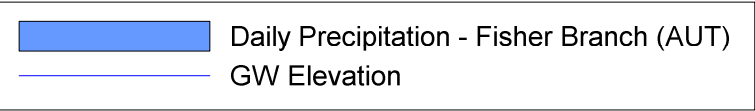
CONTINUOUS WATER ELEVATION AND TEMPERATURE DATA



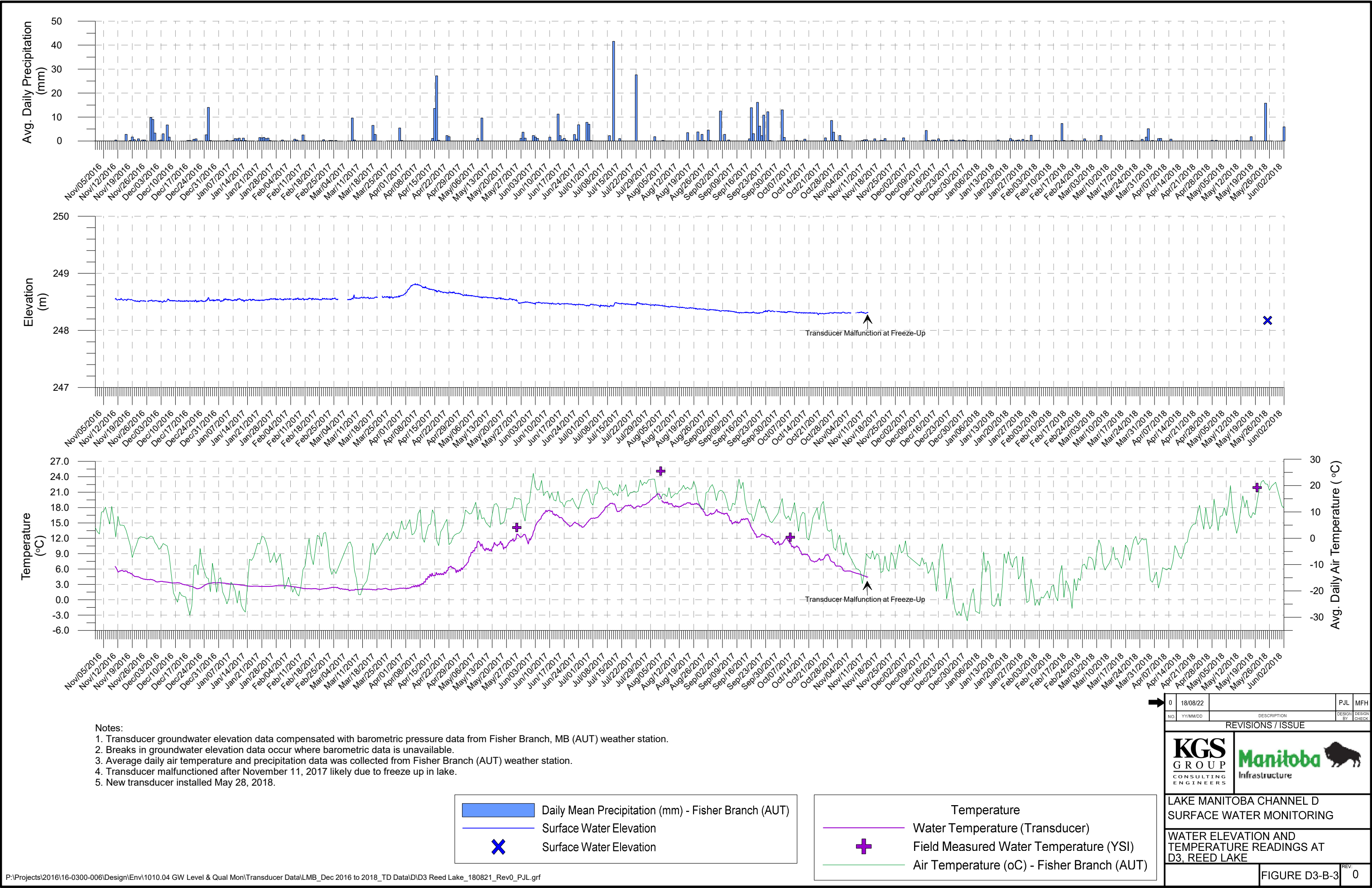




- Notes:
- 1. Transducer groundwater elevation data compensated with barometric pressure data from Fisher Branch, MB (AUT) weather station.
 - 2. Breaks in groundwater elevation data occur where barometric data is unavailable.
 - 3. Average daily air temperature and precipitation data was collected from Fisher Branch (AUT) weather station.
 - 4. Transducer malfunctioned August 2017.
 - 6. New transducer installed in October 2017.



0	18/08/22	PJL	MFH
NO.	YYMMDD	DESIGN BY	DESIGN CHECK
REVISIONS / ISSUE			
KGS GROUP CONSULTING ENGINEERS Manitoba Infrastructure			
LAKE MANITOBA CHANNEL D GROUNDWATER MONITORING			
WATER ELEVATION AND TEMPERATURE READINGS AT WELL 15-RD-PW1			
FIGURE D3-B-2			REV: 0



0	18/08/22		PJL	MFH
NO.	YY/MM/DD	DESCRIPTION	DESIGN BY	DESIGN CHECK
REVISIONS / ISSUE				
				
LAKE MANITOBA CHANNEL D SURFACE WATER MONITORING				
WATER ELEVATION AND TEMPERATURE READINGS AT D3, REED LAKE				
FIGURE D3-B-3			REV:	0

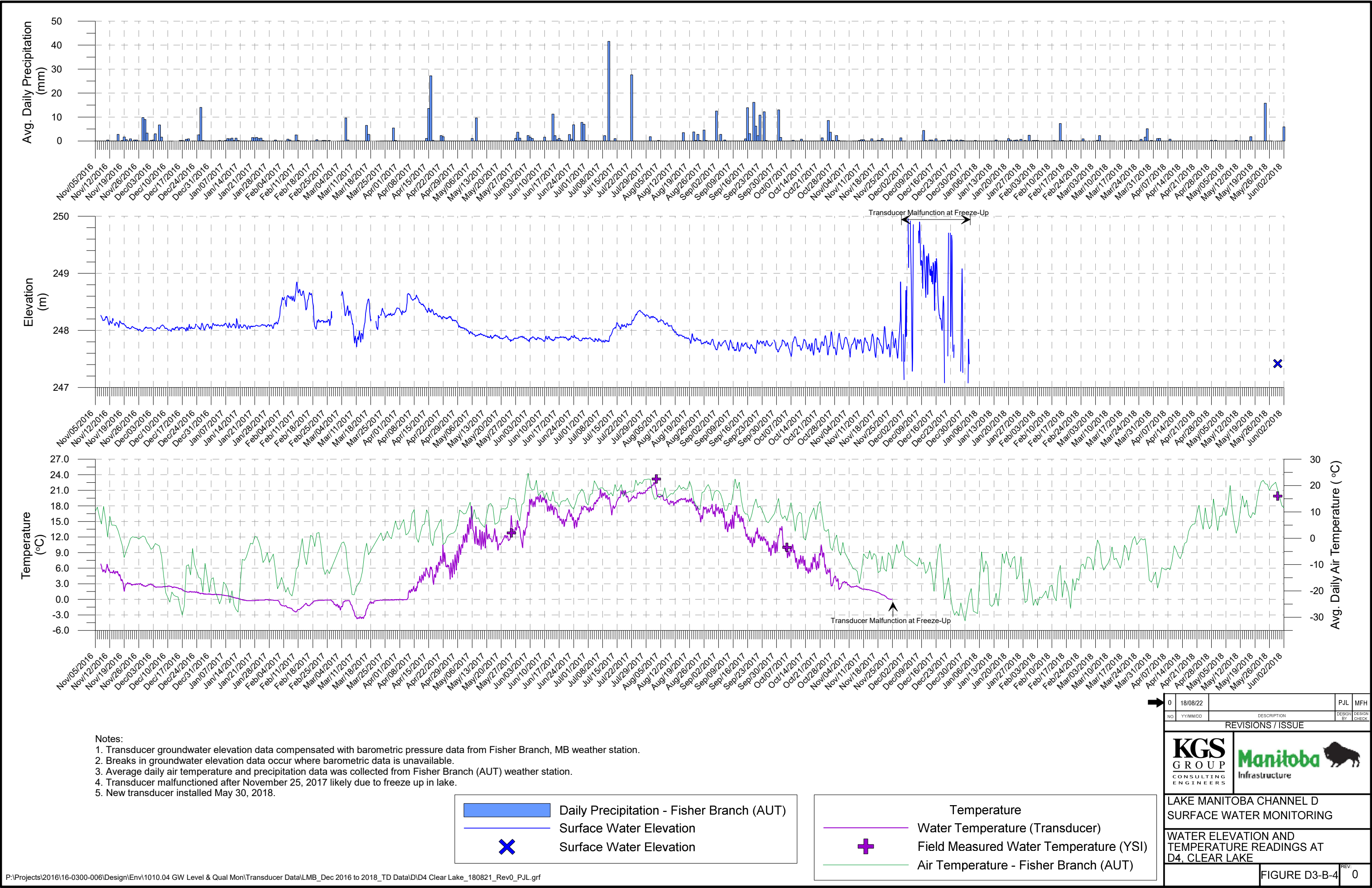


TABLE D3-B-1
MECHANICAL PACKER AND TRANSDUCER INSTALLATION - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

ID	TOC El. (m)	Ground El. (m)	Packer El. (m)	Date	Transducer Tip El. (m)	Bedrock Open Zone Elevation
TH-ED-01W	250.53	249.49	248.65	Dec 8, 2016	247.89	223.89 m to 217.8 m
15-RD-PW1	252.67	251.76	250.79	Dec 8, 2016	250.06	234.96 m to 228.6 m
				Oct 3, 2017	235.02	
Reed Lake	-	-	-	Nov 7, 2016	247.619 ⁽¹⁾	-
				May 25, 2018	247.57	
Clear Lake	-	-	-	Nov 7, 2016	247.678 ⁽¹⁾	-
	-	-	-	May 25, 2018	247.68	-

Note:

1. Tip Elevation for transducer at Reed Lake and Clear Lake surveyed.

TABLE D3-B-5
MECHANICAL PACKER AND TRANSDUCER INSTALLATION - ROUTE D
LAKE MANITOBA OUTLET CHANNELS

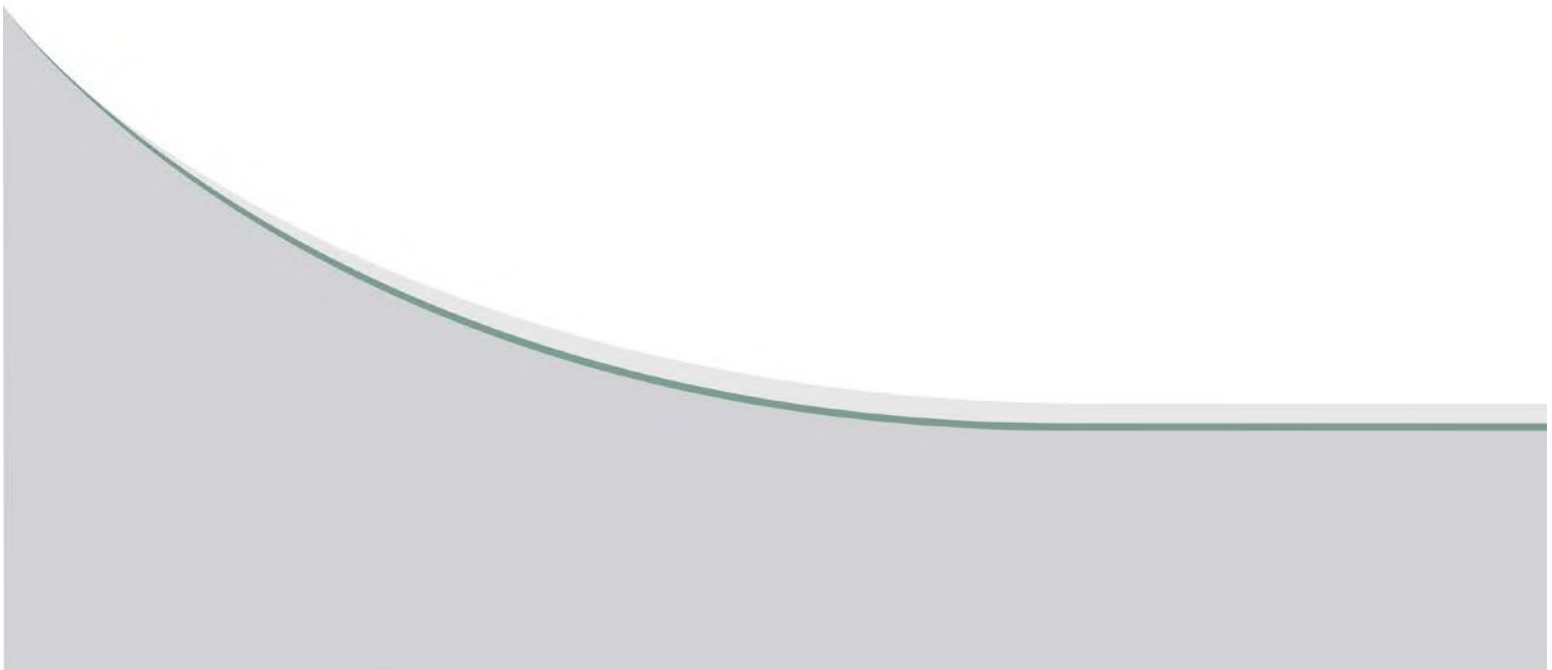
ID	TOC El. (m)	Ground El. (m)	Packer El. (m)	Date	Transducer Tip El. (m)	Bedrock Open Zone Elevation
TH-ED-01W	250.53	249.49	248.65	Dec 8, 2016	247.89	223.89 m to 217.8 m
15-RD-PW1	252.67	251.76	250.79	Dec 8, 2016	250.06	234.96 m to 228.6 m
				Oct 3, 2017	235.02	
Reed Lake	-	-	-	Nov 7, 2016	247.619 ⁽¹⁾	-
				May 25, 2018	247.57	
Clear Lake	-	-	-	Nov 7, 2016	247.678 ⁽¹⁾	-
	-	-	-	May 25, 2018	247.68	-

Note:

1. Tip Elevation for transducer at Reed Lake and Clear Lake surveyed.

APPENDIX D3-C

LAKE LEVEL HYDROGRAPHS – ENVIRONMENT CANADA LAKE MANITOBA (STEEPROCK 05LK002) LAKE ST. MARTIN (HILBRE05LM005)



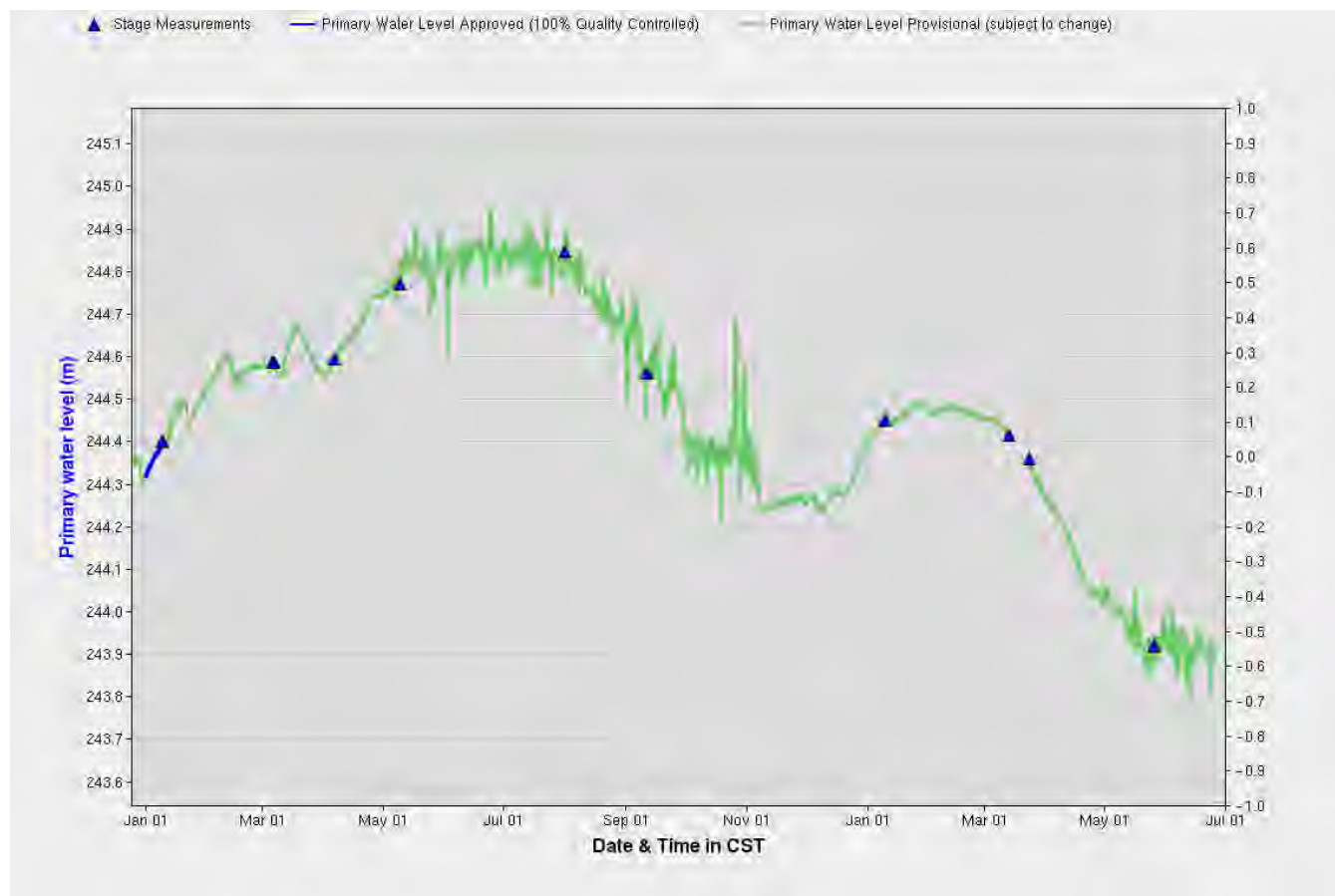


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Real-Time Hydrometric Data Graph for LAKE ST. MARTIN NEAR HILBRE (05LM005) [MB]



[Timeliness of the real-time data](#)

Station Information

Active or discontinued:

Active

Province / Territory:

Manitoba

Latitude:

51° 30' 31" N

Longitude:

98° 31' 44" W

Gross drainage area:

82200 km²

Effective drainage area:

N/A

Record length:

53 Years

Period of record:

1966 - 2018

Regulation type:

Regulated

Regulation length:

N/A

Real-time data available:	Yes
Sediment data available:	No
Type of water body:	Lake
RHBN:	No
EC Regional Office:	WINNIPEG
Data contributed by:	N/A
Datum of published data:	GEODETIC SURVEY OF CANADA DATUM (LOCAL 1964 ADJ.)

Data Collection History

This table contains information pertaining to the historical changes of defined elements in the operation of a station.

Period of operation	Type	Operation schedule	Gauge type
1966 - 1970	Level	Continuous	Manual
1971 - 2018	Level	Continuous	Recorder

Date modified:

2018-03-14

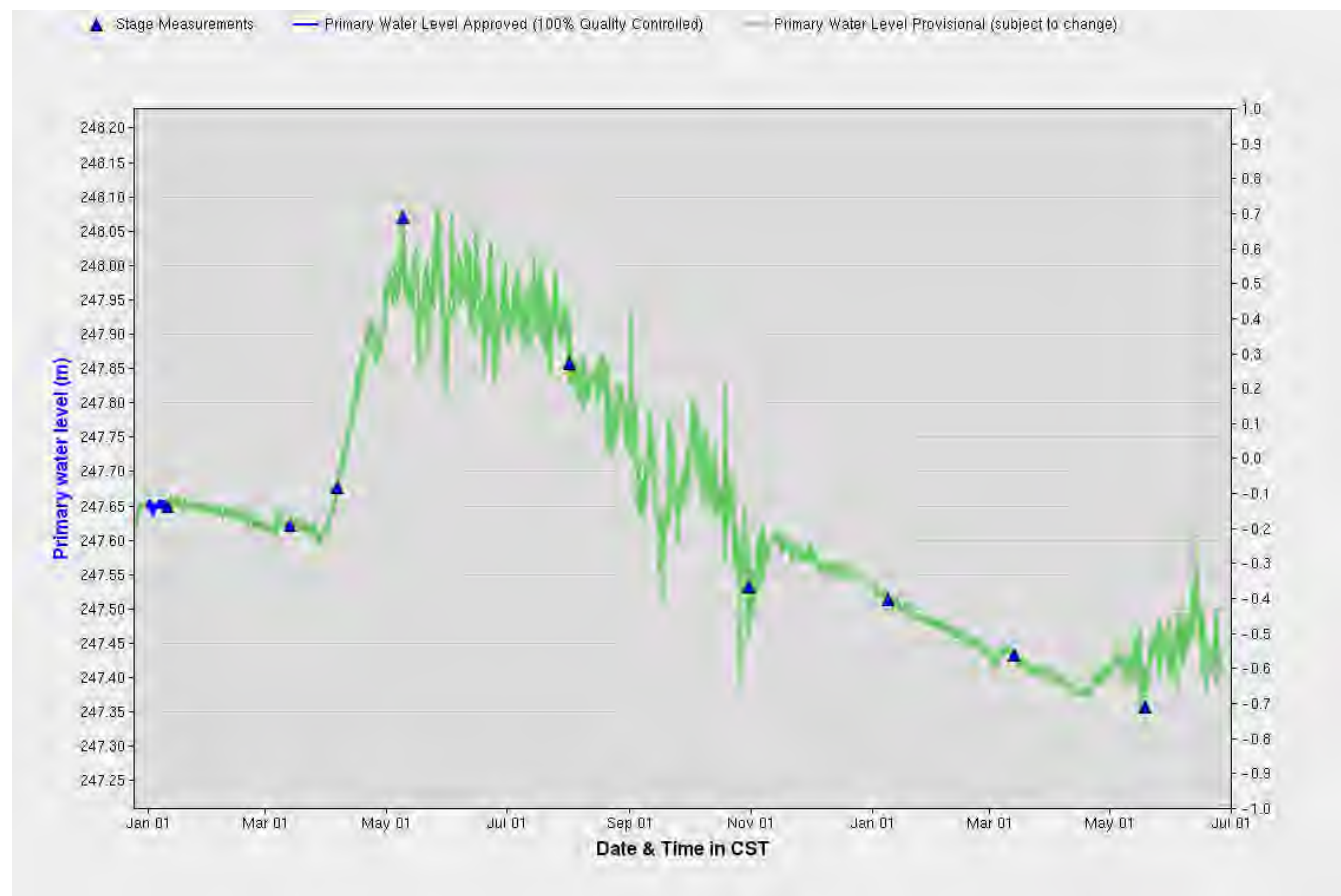


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Real-Time Hydrometric Data Graph for LAKE MANITOBA AT STEEP ROCK (05LK002) [MB]



[Timeliness of the real-time data](#)

Station Information

Active or discontinued:

Active

Province / Territory:

Manitoba

Latitude:

51° 26' 38" N

Longitude:

98° 48' 11" W

Gross drainage area:

79800 km²

Effective drainage area:

N/A

Record length:

96 Years

Period of record:

1923 - 2018

Regulation type:

Regulated

Regulation length:

N/A

Real-time data available:	Yes
Sediment data available:	No
Type of water body:	Lake
RHBN:	No
EC Regional Office:	WINNIPEG
Data contributed by:	N/A
Datum of published data:	GEODETIC SURVEY OF CANADA DATUM (LOCAL 1964 ADJ.)

Data Collection History

This table contains information pertaining to the historical changes of defined elements in the operation of a station.

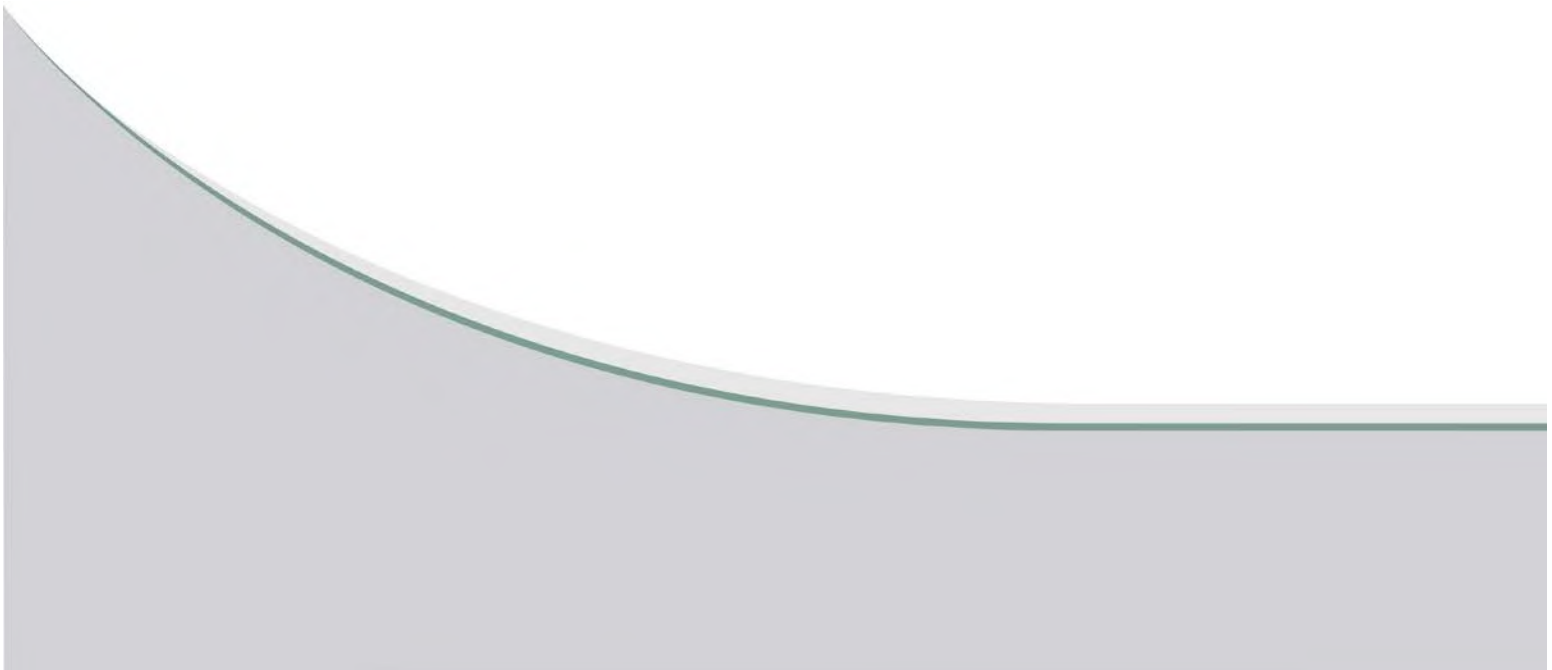
Period of operation	Type	Operation schedule	Gauge type
1923 - 1960	Level	Continuous	Manual
1961 - 2018	Level	Continuous	Recorder

Date modified:

2018-03-14

APPENDIX D3-D

MAY 2018 FIELD PROGRAM AND REPAIRS NEEDED



KGS Group
Lake Manitoba Sampling
May 28-30, 2018

Please see the following details for the groundwater and surface water monitoring program:

The sampling program for the Lake Manitoba Outlet Channel occurred during the week of May 28, 2018. The call log and contact list was used to notify landowners and note any special access requirements. KGS Group Job Safety Analysis (JSA) sheets were updated for the project, and reviewed daily on-site.

Dan Leitch, Environmental Scientist was the field lead on the project with Luke McAllister, E.I.T. The work completed was as follows:

- Groundwater monitoring at all installations on Route D, except BH-D107 due to lack of access permission.
- Groundwater sampling at 6 wells on Route D, plus one field blank and one duplicate
- Surface water sampling at 9 locations on Route D, plus one field blank and one duplicate
- Download of logger at TH-ED-01W (#B10576), with real-time-readings before and after sampling. As noted last year, replacing the logger cable with a longer cable during the next stage of the project is recommended to get accurate temperature measurements.
- Download of barometric logger now at TH-ED-01-PP1 (#A10260)
- Download of logger at 15-RD-PW1 (#C11866)
- Re-installed foam inserts in all artesian monitoring (without packers) to facilitate transfer for next stage of the project.
- Download of loggers at Reed Lake D3 and Clear Lake D4
 - D3: Aqua troll Logger (owned by KGS Group) did not connect. Instrument was installed there since 2016 when initial MI owned Heron did not connect. Instrument was scheduled to be removed and replaced with MI owned Heron logger (#10580) and a cable. Replacement was done. The removed Aqua troll logger subsequently worked once back in the office however data did not record beyond Nov 11, 2017.
 - D4: Heron logger (#10577) would not connect. The cable and outer protective sleeve appeared to have been chewed through by an animal. The logger and cable removed and replaced with new Heron logger (#10584) (without attached cable). A new Heron cable is required to be installed with an animal proof protective sleeve to allow logger download without removal from the water. KGS Group will send the unit to the manufacturer to try to recover the data.
 - The two Herons that were used as replacements were purchased previously by MI as part of the drilling and instrumentation program.
- Transducer downloads did not occur at Route C. One of the two Route C wells was last downloaded in August 2017, while the other was last downloaded in May 2017.
- Data from the May 2018 field program will be added to the summary project tables in preparation for Deliverable D3, due July 1, 2018.
- Abnormal items/needing repair:

- TH-GD-05 – The metal casing is loose, with a 30 cm crack down one edge. PVC standpipe also moved up 4 mm during sampling. PVC standpipe and metal casing should be secured with bentonite. Very hard to get casing lid past the PVC standpipe.
- 15-RD-05 – PVC standpipe is bent inward 25cm below top, preventing removal of foam insert and sampling. Depending on depth of damage, top of PVC standpipe can be cut and a new stickup installed. Monitoring data was not able to be collected.
- 15-RD-02 – water is leaking from within the casing and pooling at the base. Repair of the casing is required.
- 15-RD-01 – top of PVC standpipe had broken off (reduced top of casing by 4.25 cm). An obstruction at 1.497 m from top of casing made it very difficult to place foam insert back in standpipe), but it was replaced. Repair of the casing would be required.
- BH-D109: Ice on bottom of 35cm of foam insert. The foam was left out for a day in attempt to allow it to thaw but it remained frozen at 2.510m, preventing depth to bottom reading; water above ice at 2.450m.
- Staff gauge boards at both D3 and D4 have shifted (possibly due to ice); should be re-secured and surveyed in.



Figure 1: Logger cable at D4, broken apart, with animal chew marks visible.



Figure 2: TH-GD-05 with a crack in the metal casing visible in the middle of the picture. Water leaked through after the PVC standpipe was opened, but stopped leaking after the PVC standpipe was re-sealed.



Figure 3: 15-RD-05, showing damaged lower standpipe. The foam insert could not be removed further due to damage to standpipe below.



Figure 4: 15-RD-02, showing leaking casing and wet ground around well.



Figure 5: 15-RD-01, showing broken standpipe; obstruction also present at 1.497 m.

APPENDIX D3-E

DRILLING LOGS (2016)

15-RD-04A

15-RD-04B

15-RD-PW-1

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT ASSINIBOINE RIVER & LAKE MB FLOOD STUDY

SITE 2 km north of steep rock junction

LOCATION 5 m south of 15-RD-PW1

DRILLING METHOD Mud Rotary

JOB NO. 12-0300-011

GROUND ELEV. 251.76 m

TOP OF PVC ELEV. 252.62 m

WATER ELEV. 253.75 m

DATE DRILLED 7/30/2015

UTM (m) N 5,699,450

E 531,894

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★	Cu TORVANE (kPa) ◆
251	1			SILTY CLAY TILL - Light brown.								
250	2	5										
249	3	10										
248	4											
247	5	15										
246	6	20										
245.7	6	20		GRANITE BOULDERS								
244.9	7			TILL - Light grey/tan.								
244	8	25										
243	9	30										
242												

SAMPLE TYPE

CONTRACTOR
 Maple Leaf Enterprises

INSPECTOR
 A. SINCLAIR

APPROVED
 KDT

DATE
 1/6/16

G:\PROJECTS\2012\12-0300-011\DESIGN\ENV\LOGS\MIT_12-0300-011_LOGS.GPJ

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★	Cu TORVANE (kPa) ◆
241	35											
	11											
240	40											
	12											
239	45		- Dense, with cobbles below 12.50 m.									
	13											
238	50											
	14											
237.1	55		CLAY TILL - Medium dense.									
237	60											
	15											
236	65											
	16											
235.5	70		LIMESTONE - White with yellow streaks.									
235	75											
	17											
234	80											
	18											
233	85		- Softer below 18.29 m.									
	19											
232.6	90		END OF HOLE AT 19.20 m.									
232	95		Notes: 1. Installed 50 mm diameter PVC casing with 0.86 m stickup and protective steel casing. 2. Installed pressure gauge at top of casing. 3. Flowing artesian conditions observed during drilling.									
	20											
231	100											
	21											
230	105											

SAMPLE TYPE

CONTRACTOR

Maple Leaf Enterprises

INSPECTOR

A. SINCLAIR

APPROVED

KDT

DATE

1/6/16

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT ASSINIBOINE RIVER & LAKE MB FLOOD STUDY

SITE 2 km north of steep rock junction

LOCATION 100 m south of 15-RD-PW1

DRILLING METHOD Mud Rotary

JOB NO. 12-0300-011

GROUND ELEV. 251.76 m

TOP OF PVC ELEV. 252.60 m

WATER ELEV. 573.78 m

DATE DRILLED 7/31/2015

UTM (m) N 5,699,354

E 531,943

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★	Cu TORVANE (kPa) ◆
251	1	5		TILL - Light brown, dry.									
250	2	10											
249	3	15											
248	4	20											
247	5	25											
246.6	6	30		CLAY TILL - Grey/brown.									
246	7	35											
245	8	40											
244	9	45		COBBLES									
243.5	10	50											
243	11	55		TILL - Grey/brown.									
242.3	12	60		SAND - Fine grained.									
242	13	65											

SAMPLE TYPE

CONTRACTOR
Maple Leaf Enterprises

INSPECTOR
A. SINCLAIR

APPROVED
KDT

DATE
1/6/16

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★	Cu TORVANE (kPa) ◆
241.7			SAND/SILT - Very fine grained sand.									
241	35											
240.8	11		SAND - Fine to medium grained.									
240												
239.9												
239.6	12		TILL - Grey/brown.									
239	40		CLAY - Light grey.									
238.3	13											
238	45		CLAY TILL - Medium dense.									
237	14											
236.5	15		LIMESTONE - White.		14.6							
236	50				14.9							
235	55		- Fractures at 16.61 m.		16.2							
234	17		- Softer below 17.37 m. - Fractures at 17.53 m.		17.1							
233.5	18		- Fractures at 18.14 m.		18.3							
233	60		END OF DRILLING 18.29 m.									
232	19		Notes: 1. Installed 50 mm diameter PVC casing with 0.84 m stickup. 2. Installed pressure gauge at top of casing. 3. Flowing artesian conditions observed during drilling.									
231	65											
230	70											

SAMPLE TYPE

CONTRACTOR

Maple Leaf Enterprises

INSPECTOR

A. SINCLAIR

APPROVED

KDT

DATE

1/6/16

CLIENT MANITOBA INFRASTRUCTURE AND TRANSPORTATION
PROJECT ASSINIBOINE RIVER & LAKE MB FLOOD STUDY
SITE 2 km north of steep rock junction
LOCATION 5 m west of 15-RD-04
DRILLING METHOD Mud Rotary

JOB NO. 12-0300-011
GROUND ELEV. 251.76 m
TOP OF PVC ELEV. 252.67 m
WATER ELEV. 253.68 m
DATE DRILLED 7/30/2015
UTM (m) N 5,699,447
E 531,897

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★	Cu TORVANE (kPa) ◆
										20 40 60 80	PL MC LL % 20 40 60 80
251	1		SILTY CLAY TILL - Light brown.		0.3						
250	5										
249	2										
248	3										
247	10										
246	4										
245	15		- Densd below 4.57 m.								
244	5										
243	20										
242	6										
241	7										
240	25		- Light grey/brown below 7.62 m.								
239	8										
238	9										
237	30										
236			SAND - Fine to medium grained sand.								

SAMPLE TYPE

CONTRACTOR
Maple Leaf Enterprises

INSPECTOR
A. SINCLAIR

APPROVED
KDT

DATE
1/6/16

GEOTECHNICAL SOIL LOG P:\PROJECTS\2012\12-0300-01\DESIGN\ENV\LOGS\MIT_12-0300-01_1 LOGS.GPJ

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★	Cu TORVANE (kPa) ◆
241	11		TILL - Light grey/brown.									
240.8												
240	12		- Dense below 11.89 m.									
239	13											
238	14											
237	15											
236	16				15.7							
235.5			LIMESTONE - White, hard.		16.0							
235	17				16.8							
234	18		- Yellow, soft below 17.98 m.									
233	19		- White below 18.14 m.									
232	20		- Red shale and limestone between 18.44 and 21.34 m.									
231	21											
230			- Softer limestone at 19.81 m.									

SAMPLE TYPE

CONTRACTOR

Maple Leaf Enterprises

INSPECTOR

A. SINCLAIR

APPROVED

KDT

DATE

1/6/16

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★	Cu TORVANE (kPa) ◆
22			END OF HOLE AT 23.16 m. Note: 1. Installed 125 mm diameter PVC casing with 0.94 m stickup and protective steel casing. 2. Flowing artesian conditions observed during drilling.		23.2							
229	75											
228.6												
228												
227	80											
226												
226	85											
225												
224	90											
223												
222	95											
221												
220	100											
219												
218	105											
217												
216	110											

SAMPLE TYPE

CONTRACTOR

Maple Leaf Enterprises

INSPECTOR

A. SINCLAIR

APPROVED

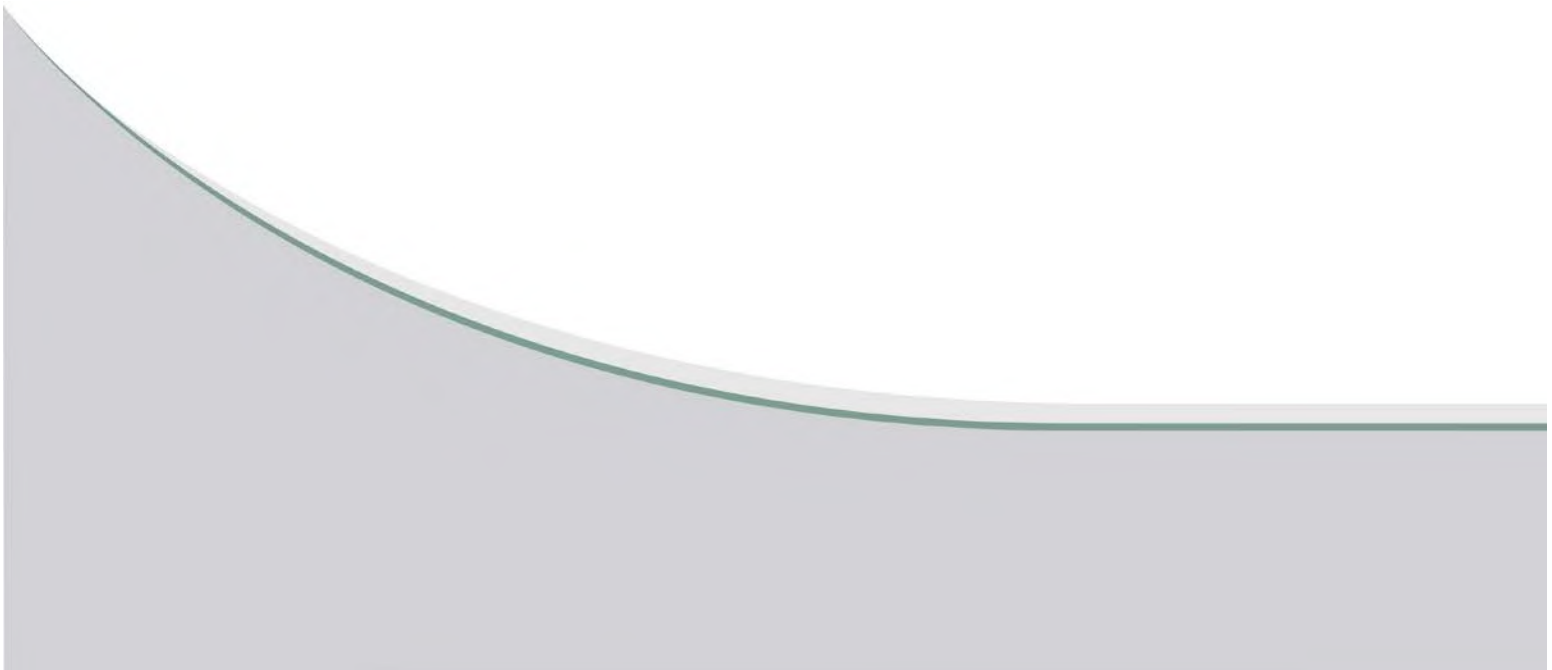
KDT

DATE

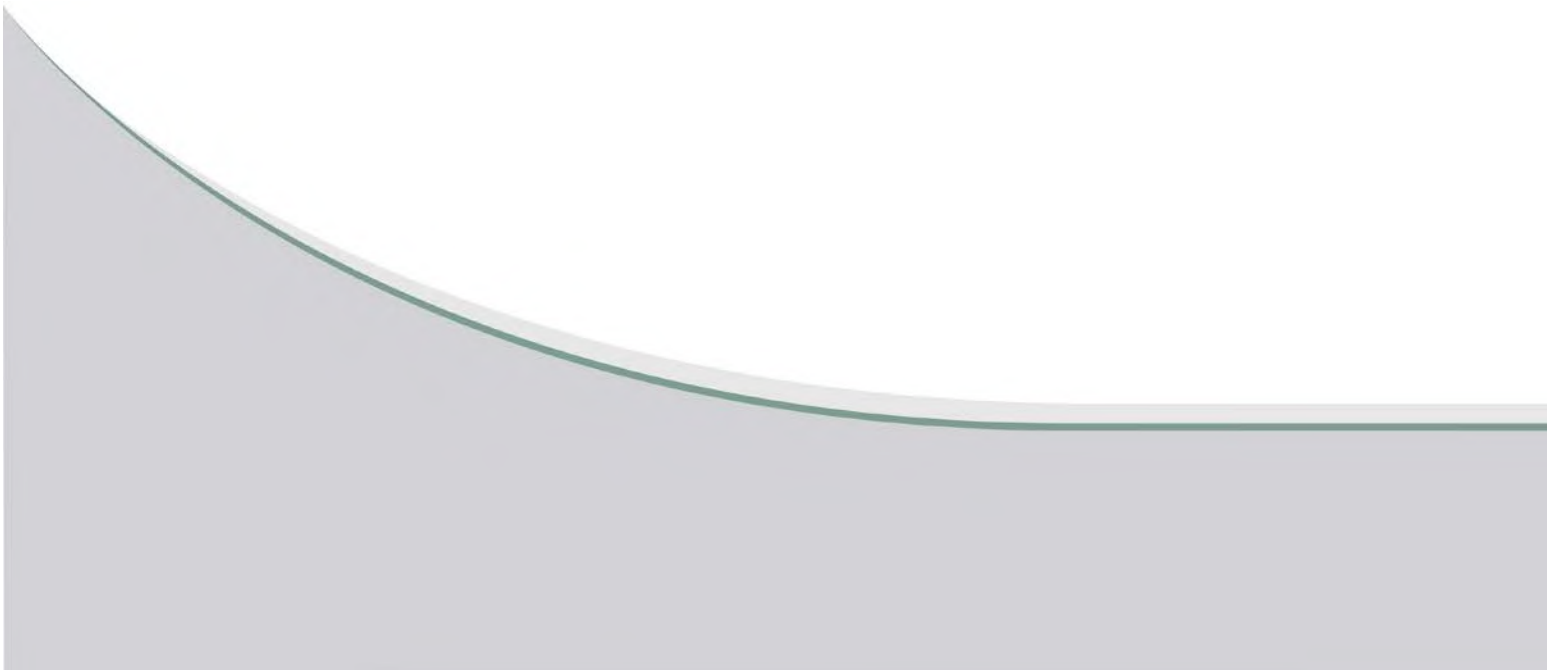
1/6/16

APPENDIX D3-F

LABORATORY REPORTS ROUTE D



D3-F-1 MAY 2017





KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-1
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-1
Matrix: SW

PAGE 1 of 34

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	222		mg/L			29-MAY-17
Carbonate (CO ₃)	6.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.010		mg/L	10		29-MAY-17
pH						
pH	8.50		pH units			26-MAY-17
Turbidity						
*Turbidity	2.50		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.0299		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	0.00027		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00159		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0409		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.090		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	43.6		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00053		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.025		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0315		mg/L			29-MAY-17
Magnesium (Mg)-Total	34.2		mg/L			29-MAY-17
Manganese (Mn)-Total	0.00461		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	0.00186		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	9.26		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00320		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	4.18		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	106		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.234		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00108		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-1
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-1
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00164		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00119		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	532		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	82.7		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	250	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.148		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	886		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	141		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	193		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.0054		mg/L			01-JUN-17
Phosphorus (P)-Total	0.022		mg/L			29-MAY-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Total Kjeldahl Nitrogen	0.87		mg/L			02-JUN-17
Total Nitrogen	0.87		mg/L			02-JUN-17
Total Suspended Solids	3.8		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	74		MPN/100mL	0		26-MAY-17
Escherichia Coli	<1		MPN/100mL	0		26-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-1
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-1
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
Approved by Judy Dalmajer Account Manager	<original signed by>					
5-JUL-2018 Revised report - Full metals scan reporting						

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-2
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-2
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	332		mg/L			29-MAY-17
Carbonate (CO ₃)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.010		mg/L	10		29-MAY-17
pH						
pH	7.82		pH units			26-MAY-17
Turbidity						
*Turbidity	1.20		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.0200		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00065		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0246		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.054		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	47.5		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00027		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.037		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0145		mg/L			29-MAY-17
Magnesium (Mg)-Total	51.0		mg/L			29-MAY-17
Manganese (Mn)-Total	0.0446		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	0.00024		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	10.2		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00473		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	2.50		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	11.5		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.117		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00067		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-2
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-2
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00069		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00027		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	426		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	129		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	329	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.221		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	561		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	13.3		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	272		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.037		mg/L			29-MAY-17
Phosphorus (P)-Total	0.046		mg/L			29-MAY-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Total Kjeldahl Nitrogen	1.51		mg/L			06-JUN-17
Total Nitrogen	1.51		mg/L			06-JUN-17
Total Suspended Solids	<2.0		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	1990		MPN/100mL	0		26-MAY-17
Escherichia Coli	20		MPN/100mL	0		26-MAY-17

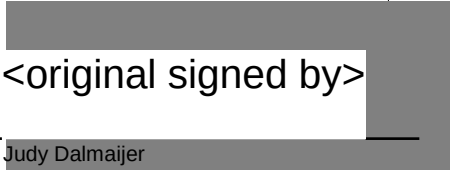
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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-2
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-2
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
Approved by  Judy Dalmajer Account Manager						
5-JUL-2018 Revised report - Full metals scan reporting						

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-3
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	292		mg/L			29-MAY-17
Carbonate (CO ₃)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	7.98		pH units			26-MAY-17
Turbidity						
*Turbidity	2.00		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.0203		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00054		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0194		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.051		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	37.0		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00023		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.025		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0134		mg/L			29-MAY-17
Magnesium (Mg)-Total	48.3		mg/L			29-MAY-17
Manganese (Mn)-Total	0.0146		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	0.00037		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	8.56		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00399		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	2.78		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	9.88		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.0861		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00073		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-3
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00077		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00030		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	318		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	66.2		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	291	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.109		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	508		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	4.32		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	239		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.020		mg/L			29-MAY-17
Phosphorus (P)-Total	0.042		mg/L			29-MAY-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Total Kjeldahl Nitrogen	1.54		mg/L			06-JUN-17
Total Nitrogen	1.54		mg/L			06-JUN-17
Total Suspended Solids	3.8		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	236		MPN/100mL	0		26-MAY-17
Escherichia Coli	33		MPN/100mL	0		26-MAY-17

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PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-3
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
Approved by  Judy Dalmajer Account Manager						
5-JUL-2018 Revised report - Full metals scan reporting						

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PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-4
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-4
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	393		mg/L			29-MAY-17
Carbonate (CO3)	8.88		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	8.45		pH units			26-MAY-17
Turbidity						
*Turbidity	0.90		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.0269		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00074		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0263		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.036		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	45.2		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00117		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.021		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0189		mg/L			29-MAY-17
Magnesium (Mg)-Total	74.0		mg/L			29-MAY-17
Manganese (Mn)-Total	0.00546		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	0.00052		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	3.27		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00199		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	2.10		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	13.4		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.141		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00086		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-4
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-4
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00423		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00115		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	419		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	74.0		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	418	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.171		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	645		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	6.83		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	337		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.020		mg/L			29-MAY-17
Phosphorus (P)-Total	0.028		mg/L			29-MAY-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Total Kjeldahl Nitrogen	1.15		mg/L			02-JUN-17
Total Nitrogen	1.15		mg/L			02-JUN-17
Total Suspended Solids	<2.0		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	42		MPN/100mL	0		26-MAY-17
Escherichia Coli	2		MPN/100mL	0		26-MAY-17

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Winnipeg MB R3T 5P4
ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-5
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	448		mg/L			29-MAY-17
Carbonate (CO3)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	0.0346		mg/L	10		29-MAY-17
pH						
pH	8.27		pH units			26-MAY-17
Turbidity						
*Turbidity	2.93		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.0850		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00079		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0335		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.065		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	63.2		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00057		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.116		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0125		mg/L			29-MAY-17
Magnesium (Mg)-Total	52.7		mg/L			29-MAY-17
Manganese (Mn)-Total	0.0318		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	0.00027		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	2.26		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00219		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	4.10		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	5.77		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.127		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00358		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-5
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00146		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00083		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	364		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	18.1		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	0.0051		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	0.0295		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	375	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.244		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	585		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	0.78		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	368		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.021		mg/L			29-MAY-17
Phosphorus (P)-Total	0.030		mg/L			29-MAY-17
Ammonia, Total (as N)	0.050		mg/L			26-MAY-17
Total Kjeldahl Nitrogen	0.89		mg/L			06-JUN-17
Total Nitrogen	0.92		mg/L			06-JUN-17
Total Suspended Solids	4.0		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	2420		MPN/100mL	0		26-MAY-17
Escherichia Coli	49		MPN/100mL	0		26-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-5
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective. <original signed by> Approved by <u>Judy Dalmajer</u> Account Manager 5-JUL-2018 Revised report - Full metals scan reporting						

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-6
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	508		mg/L			29-MAY-17
Carbonate (CO3)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	0.011		mg/L	10		29-MAY-17
pH						
pH	8.22		pH units			26-MAY-17
Turbidity						
*Turbidity	2.39		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.0514		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00083		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0370		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.078		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	74.2		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00034		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.073		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0232		mg/L			29-MAY-17
Magnesium (Mg)-Total	82.7		mg/L			29-MAY-17
Manganese (Mn)-Total	0.0308		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	0.00043		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	6.66		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00337		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	3.79		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	16.3		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.221		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00247		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-6
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00262		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00050		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	549		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	110		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	0.011	DLM	mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	526	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.246		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	810		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	9.25		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	416		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.0102		mg/L			01-JUN-17
Phosphorus (P)-Total	0.0162		mg/L			01-JUN-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Phosphorus (P)-Total Particulate	0.0060		mg/L			01-JUN-17
Total Kjeldahl Nitrogen	1.34		mg/L			02-JUN-17
Total Nitrogen	1.36		mg/L			02-JUN-17
Total Suspended Solids	2.4		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	1730		MPN/100mL	0		26-MAY-17
Escherichia Coli	185		MPN/100mL	0		26-MAY-17

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ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-7
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	370		mg/L			29-MAY-17
Carbonate (CO3)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	7.99		pH units			26-MAY-17
Turbidity						
*Turbidity	0.79		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.0208		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00085		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0241		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.017		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	46.7		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00036		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.084		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0115		mg/L			29-MAY-17
Magnesium (Mg)-Total	47.2		mg/L			29-MAY-17
Manganese (Mn)-Total	0.0407		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	<0.00020		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	4.70		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00162		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	3.95		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	6.06		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.0821		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00067		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-7
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00068		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00038		mg/L			29-MAY-17
Zinc (Zn)-Total	0.0023		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	308		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	20.7		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	311	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.080		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	511		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	0.80		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	303		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.040		mg/L			29-MAY-17
Phosphorus (P)-Total	0.043		mg/L			29-MAY-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Total Kjeldahl Nitrogen	1.29		mg/L			02-JUN-17
Total Nitrogen	1.29		mg/L			02-JUN-17
Total Suspended Solids	<2.0		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	1550		MPN/100mL	0		26-MAY-17
Escherichia Coli	68		MPN/100mL	0		26-MAY-17

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WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-7
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
 <original signed by> Approved by _____ Judy Dalmajer Account Manager						
5-JUL-2018 Revised report - Full metals scan reporting						

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-8
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	455		mg/L			29-MAY-17
Carbonate (CO3)	13.4		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	8.49		pH units			26-MAY-17
Turbidity						
*Turbidity	3.43		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.112		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00093		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0355		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.074		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	70.8		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00065		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.110		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0199		mg/L			29-MAY-17
Magnesium (Mg)-Total	73.7		mg/L			29-MAY-17
Manganese (Mn)-Total	0.0438		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	0.00043		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	5.33		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00306		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	2.90		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	13.2		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.185		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00477		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-8
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00255		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00096		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	485		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	78.1		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	480	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.243		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	720		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	6.82		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	396		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.0134		mg/L			01-JUN-17
Phosphorus (P)-Total	0.029		mg/L			29-MAY-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Total Kjeldahl Nitrogen	1.30		mg/L			06-JUN-17
Total Nitrogen	1.30		mg/L			06-JUN-17
Total Suspended Solids	3.2		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	1990		MPN/100mL	0		26-MAY-17
Escherichia Coli	39		MPN/100mL	0		26-MAY-17

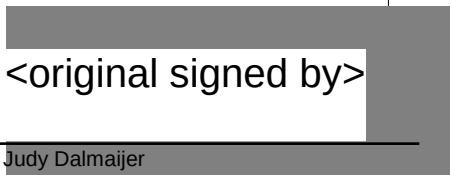
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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-8
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
 <original signed by> Approved by _____ Judy Dalmajer Account Manager 5-JUL-2018 Revised report - Full metals scan reporting						

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-9
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-9
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	253		mg/L			29-MAY-17
Carbonate (CO ₃)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	0.011		mg/L	10		29-MAY-17
pH						
pH	8.24		pH units			26-MAY-17
Turbidity						
*Turbidity	2.41		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.0360		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00132		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0391		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.083		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	48.6		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00048		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.031		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0262		mg/L			29-MAY-17
Magnesium (Mg)-Total	36.2		mg/L			29-MAY-17
Manganese (Mn)-Total	0.00518		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	0.00156		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	8.57		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00344		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	3.77		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	108		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.229		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00105		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-9
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-9
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00143		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00099		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	532		mg/L		500	30-MAY-17
Sulfate in Water by IC						
Sulfate (SO4)	64.0		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	0.011	DLM	mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	270	HTC	mg/L		500	30-MAY-17
Fluoride in Water by IC						
Fluoride (F)	0.125		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	864		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	142		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	208		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.0096		mg/L			01-JUN-17
Phosphorus (P)-Total	0.027		mg/L			29-MAY-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Total Kjeldahl Nitrogen	0.81		mg/L			02-JUN-17
Total Nitrogen	0.82		mg/L			02-JUN-17
Total Suspended Solids	3.6		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	387		MPN/100mL	0		26-MAY-17
Escherichia Coli	1		MPN/100mL	0		26-MAY-17

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PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: D-9
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-9
Matrix: SW

PAGE 27 of 34

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by <u>Judy Dalmajer</u> Account Manager						
5-JUL-2018 Revised report - Full metals scan reporting						

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PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: S-100
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-10
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	393		mg/L			29-MAY-17
Carbonate (CO3)	9.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	8.46		pH units			26-MAY-17
Turbidity						
*Turbidity	0.90		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	0.0148		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	0.00069		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	0.0263		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	0.036		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	44.8		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	0.00053		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	0.014		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	0.0185		mg/L			29-MAY-17
Magnesium (Mg)-Total	71.2		mg/L			29-MAY-17
Manganese (Mn)-Total	0.00514		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	0.00049		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	3.23		mg/L			29-MAY-17
Rubidium (Rb)-Total	0.00210		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	2.09		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	13.0		mg/L		200	29-MAY-17
Strontium (Sr)-Total	0.136		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	0.00056		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: S-100
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-10
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	0.00411		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	0.00110		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	416		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	73.9		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	405	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.178		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	642		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	6.81		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	338		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	0.020		mg/L			29-MAY-17
Phosphorus (P)-Total	0.027		mg/L			29-MAY-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Total Kjeldahl Nitrogen	1.39		mg/L			06-JUN-17
Total Nitrogen	1.39		mg/L			06-JUN-17
Total Suspended Solids	<2.0		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	38		MPN/100mL	0		26-MAY-17
Escherichia Coli	1		MPN/100mL	0		26-MAY-17

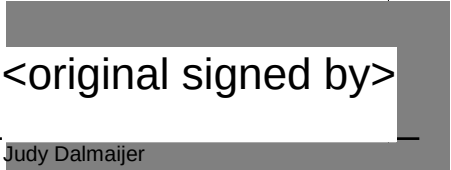
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KGS Group Consultants (Winnipeg)
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ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: S-100
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-10
Matrix: SW

PAGE 30 of 34

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
Approved by  Judy Dalmajer Account Manager						
5-JUL-2018 Revised report - Full metals scan reporting						

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: FB
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-11
Matrix: SW

PAGE 31 of 34

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	1.3		mg/L			29-MAY-17
Carbonate (CO3)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	6.27		pH units			26-MAY-17
Turbidity						
*Turbidity	<0.10		NTU			26-MAY-17
Total Metals by ICP-MS						
Aluminum (Al)-Total	<0.0050		mg/L		0.1	29-MAY-17
Antimony (Sb)-Total	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Total	<0.00020		mg/L	0.01		29-MAY-17
Barium (Ba)-Total	<0.00020		mg/L	1		29-MAY-17
Beryllium (Be)-Total	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Total	<0.00020		mg/L			29-MAY-17
Boron (B)-Total	<0.010		mg/L	5		29-MAY-17
Cadmium (Cd)-Total	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Total	<0.10		mg/L			29-MAY-17
Cesium (Cs)-Total	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Total	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Total	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Total	<0.00020		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Total	<0.010		mg/L		0.3	29-MAY-17
Lead (Pb)-Total	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Total	<0.0020		mg/L			29-MAY-17
Magnesium (Mg)-Total	<0.010		mg/L			29-MAY-17
Manganese (Mn)-Total	<0.00030		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Total	<0.00020		mg/L			29-MAY-17
Nickel (Ni)-Total	<0.0020		mg/L			29-MAY-17
Phosphorus (P)-Total	<0.10		mg/L			29-MAY-17
Potassium (K)-Total	<0.020		mg/L			29-MAY-17
Rubidium (Rb)-Total	<0.00020		mg/L			29-MAY-17
Selenium (Se)-Total	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Total	<0.10		mg/L			29-MAY-17
Silver (Ag)-Total	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Total	<0.030		mg/L		200	29-MAY-17
Strontium (Sr)-Total	<0.00010		mg/L			29-MAY-17
Tellurium (Te)-Total	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Total	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Total	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Total	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Total	<0.00050		mg/L			29-MAY-17
Tungsten (W)-Total	<0.00010		mg/L			29-MAY-17

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: FB
Sampled By: DL/ES
Date Collected: 25-MAY-17
Lab Sample ID: L1931744-11
Matrix: SW

PAGE 32 of 34

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals by ICP-MS						
Uranium (U)-Total	<0.00010		mg/L	0.02		29-MAY-17
Vanadium (V)-Total	<0.00020		mg/L			29-MAY-17
Zinc (Zn)-Total	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Total	<0.00040		mg/L			29-MAY-17
TDS calculated						
TDS (Calculated)	<5.0		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	<0.30		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	<0.25	HTC	mg/L		500	05-JUL-18
Fluoride in Water by IC						
Fluoride (F)	<0.020		mg/L	1.5		26-MAY-17
Conductivity						
Conductivity	1.0		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	<0.10		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	1.1		mg/L			26-MAY-17
Phosphorus (P)-Total Dissolved	<0.0010		mg/L			01-JUN-17
Phosphorus (P)-Total	<0.0010		mg/L			01-JUN-17
Ammonia, Total (as N)	<0.010		mg/L			26-MAY-17
Phosphorus (P)-Total Particulate	<0.0028		mg/L			01-JUN-17
Total Kjeldahl Nitrogen	<0.20		mg/L			06-JUN-17
Total Nitrogen	<0.20		mg/L			06-JUN-17
Total Suspended Solids	<2.0		mg/L			29-MAY-17
Total and E. coli to endpoint by QT97						
Total Coliforms	<1		MPN/100mL	0		26-MAY-17
Escherichia Coli	<1		MPN/100mL	0		26-MAY-17

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ATTN: STEVE OFFMAN

Date: 05-JUL-18
PO No.:
WO No.: L1931744
Project Ref: 16-0300-006
Sample ID: FB
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Date Collected: 25-MAY-17
Lab Sample ID: L1931744-11
Matrix: SW

PAGE 33 of 34

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
Approved by Judy Dalmajer Account Manager	<original signed by>					
5-JUL-2018 Revised report - Full metals scan reporting						

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Guidelines & Objectives

Sample Parameter Qualifier key listed:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO3-1
Carbonate	See Alkalinity. Reported at the anion CO3-2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure or capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness).The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic	
Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1931744

Report Date: 05-JUL-18

Page 1 of 8

Client: KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4

Contact: STEVE OFFMAN

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP		Water						
Batch	R3733144							
WG2536090-19	LCS							
Alkalinity, Total (as CaCO ₃)			103.5		%		85-115	26-MAY-17
WG2536090-16	MB							
Alkalinity, Total (as CaCO ₃)			<1.0		mg/L		1	26-MAY-17
CL-L-IC-N-WP		Water						
Batch	R3733105							
WG2535719-6	LCS							
Chloride (Cl)			99.3		%		90-110	26-MAY-17
WG2535719-5	MB							
Chloride (Cl)			<0.10		mg/L		0.1	26-MAY-17
EC-WP		Water						
Batch	R3733144							
WG2536090-18	LCS							
Conductivity			99.1		%		90-110	26-MAY-17
WG2536090-16	MB							
Conductivity			<1.0		umhos/cm		1	26-MAY-17
F-IC-N-WP		Water						
Batch	R3733105							
WG2535719-6	LCS							
Fluoride (F)			100.5		%		90-110	26-MAY-17
WG2535719-5	MB							
Fluoride (F)			<0.020		mg/L		0.02	26-MAY-17
MET-T-L-MS-WP		Water						
Batch	R3735288							
WG2536780-2	LCS							
Aluminum (Al)-Total			103.2		%		80-120	29-MAY-17
Antimony (Sb)-Total			95.2		%		80-120	29-MAY-17
Arsenic (As)-Total			98.0		%		80-120	29-MAY-17
Barium (Ba)-Total			100.1		%		80-120	29-MAY-17
Beryllium (Be)-Total			100.9		%		80-120	29-MAY-17
Bismuth (Bi)-Total			99.9		%		80-120	29-MAY-17
Boron (B)-Total			102.6		%		80-120	29-MAY-17
Cadmium (Cd)-Total			98.5		%		80-120	29-MAY-17
Calcium (Ca)-Total			98.3		%		80-120	29-MAY-17
Cesium (Cs)-Total			99.7		%		80-120	29-MAY-17
Chromium (Cr)-Total			99.4		%		80-120	29-MAY-17



Quality Control Report

Workorder: L1931744

Report Date: 05-JUL-18

Page 2 of 8

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	Water							
Batch	R3735288							
WG2536780-2	LCS							
Cobalt (Co)-Total			98.4		%		80-120	29-MAY-17
Copper (Cu)-Total			98.1		%		80-120	29-MAY-17
Iron (Fe)-Total			97.1		%		80-120	29-MAY-17
Lead (Pb)-Total			101.1		%		80-120	29-MAY-17
Lithium (Li)-Total			103.6		%		80-120	29-MAY-17
Magnesium (Mg)-Total			103.8		%		80-120	29-MAY-17
Manganese (Mn)-Total			101.8		%		80-120	29-MAY-17
Molybdenum (Mo)-Total			96.8		%		80-120	29-MAY-17
Nickel (Ni)-Total			98.0		%		80-120	29-MAY-17
Phosphorus (P)-Total			99.7		%		80-120	29-MAY-17
Potassium (K)-Total			101.5		%		80-120	29-MAY-17
Rubidium (Rb)-Total			96.2		%		80-120	29-MAY-17
Selenium (Se)-Total			93.0		%		80-120	29-MAY-17
Silicon (Si)-Total			106.8		%		80-120	29-MAY-17
Silver (Ag)-Total			101.4		%		80-120	29-MAY-17
Sodium (Na)-Total			103.8		%		80-120	29-MAY-17
Strontium (Sr)-Total			108.5		%		80-120	29-MAY-17
Tellurium (Te)-Total			91.5		%		80-120	29-MAY-17
Thallium (Tl)-Total			98.7		%		80-120	29-MAY-17
Thorium (Th)-Total			102.4		%		80-120	29-MAY-17
Tin (Sn)-Total			99.7		%		80-120	29-MAY-17
Titanium (Ti)-Total			97.8		%		80-120	29-MAY-17
Tungsten (W)-Total			103.5		%		80-120	29-MAY-17
Uranium (U)-Total			105.5		%		80-120	29-MAY-17
Vanadium (V)-Total			102.5		%		80-120	29-MAY-17
Zinc (Zn)-Total			95.2		%		80-120	29-MAY-17
Zirconium (Zr)-Total			99.2		%		80-120	29-MAY-17
WG2536780-1	MB							
Aluminum (Al)-Total			<0.0050		mg/L		0.005	29-MAY-17
Antimony (Sb)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Arsenic (As)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Barium (Ba)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Beryllium (Be)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Bismuth (Bi)-Total			<0.00020		mg/L		0.0002	29-MAY-17



Quality Control Report

Workorder: L1931744

Report Date: 05-JUL-18

Page 3 of 8

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-L-MS-WP	Water							
Batch	R3735288							
WG2536780-1 MB								
Boron (B)-Total			<0.010		mg/L		0.01	29-MAY-17
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	29-MAY-17
Calcium (Ca)-Total			<0.10		mg/L		0.1	29-MAY-17
Cesium (Cs)-Total			<0.00010		mg/L		0.0001	29-MAY-17
Chromium (Cr)-Total			<0.0010		mg/L		0.001	29-MAY-17
Cobalt (Co)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Copper (Cu)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Iron (Fe)-Total			<0.010		mg/L		0.01	29-MAY-17
Lead (Pb)-Total			<0.000090		mg/L		0.00009	29-MAY-17
Lithium (Li)-Total			<0.0020		mg/L		0.002	29-MAY-17
Magnesium (Mg)-Total			<0.010		mg/L		0.01	29-MAY-17
Manganese (Mn)-Total			<0.00030		mg/L		0.0003	29-MAY-17
Molybdenum (Mo)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Nickel (Ni)-Total			<0.0020		mg/L		0.002	29-MAY-17
Phosphorus (P)-Total			<0.10		mg/L		0.1	29-MAY-17
Potassium (K)-Total			<0.020		mg/L		0.02	29-MAY-17
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Selenium (Se)-Total			<0.0010		mg/L		0.001	29-MAY-17
Silicon (Si)-Total			<0.10		mg/L		0.1	29-MAY-17
Silver (Ag)-Total			<0.00010		mg/L		0.0001	29-MAY-17
Sodium (Na)-Total			<0.030		mg/L		0.03	29-MAY-17
Strontium (Sr)-Total			<0.00010		mg/L		0.0001	29-MAY-17
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Thallium (Tl)-Total			<0.00010		mg/L		0.0001	29-MAY-17
Thorium (Th)-Total			<0.00010		mg/L		0.0001	29-MAY-17
Tin (Sn)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Titanium (Ti)-Total			<0.00050		mg/L		0.0005	29-MAY-17
Tungsten (W)-Total			<0.00010		mg/L		0.0001	29-MAY-17
Uranium (U)-Total			<0.00010		mg/L		0.0001	29-MAY-17
Vanadium (V)-Total			<0.00020		mg/L		0.0002	29-MAY-17
Zinc (Zn)-Total			<0.0020		mg/L		0.002	29-MAY-17
Zirconium (Zr)-Total			<0.00040		mg/L		0.0004	29-MAY-17
N-TOTKJ-WP	Water							



Quality Control Report

Workorder: L1931744

Report Date: 05-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
N-TOTKJ-WP								
Batch R3738838								
WG2537915-10 LCS								
Total Kjeldahl Nitrogen			98.0		%		75-125	02-JUN-17
WG2537915-9 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	02-JUN-17
Batch R3740973								
WG2541328-14 LCS								
Total Kjeldahl Nitrogen			90.7		%		75-125	06-JUN-17
WG2541328-13 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	06-JUN-17
NH3-COL-WP								
Batch R3732779								
WG2535542-6 LCS								
Ammonia, Total (as N)			99.6		%		85-115	26-MAY-17
WG2535542-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	26-MAY-17
NO2-L-IC-N-WP								
Batch R3733105								
WG2535719-6 LCS								
Nitrite (as N)			99.2		%		90-110	26-MAY-17
WG2535719-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	26-MAY-17
NO3-L-IC-N-WP								
Batch R3733105								
WG2535719-6 LCS								
Nitrate (as N)			100.1		%		90-110	26-MAY-17
WG2535719-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	26-MAY-17
P-T-COL-WP								
Batch R3733584								
WG2536383-10 LCS								
Phosphorus (P)-Total			98.8		%		80-120	29-MAY-17
WG2536383-6 LCS								
Phosphorus (P)-Total			96.2		%		80-120	29-MAY-17
WG2536383-5 MB								
Phosphorus (P)-Total			<0.010		mg/L		0.01	29-MAY-17
WG2536383-9 MB								
Phosphorus (P)-Total			<0.010		mg/L		0.01	29-MAY-17
WG2536383-12		L1931744-1						



Quality Control Report

Workorder: L1931744

Report Date: 05-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WP	Water							
Batch R3733584								
WG2536383-12 MS		L1931744-1						
Phosphorus (P)-Total			91.7		%		70-130	29-MAY-17
P-T-L-COL-WP	Water							
Batch R3737171								
WG2539132-2 LCS								
Phosphorus (P)-Total			103.1		%		80-120	01-JUN-17
WG2539132-1 MB								
Phosphorus (P)-Total			<0.0010		mg/L		0.001	01-JUN-17
P-TD-COL-WP	Water							
Batch R3733584								
WG2536381-2 LCS								
Phosphorus (P)-Total Dissolved			96.0		%		80-120	29-MAY-17
WG2536381-1 MB								
Phosphorus (P)-Total Dissolved			<0.010		mg/L		0.01	29-MAY-17
P-TD-L-COL-WP	Water							
Batch R3737171								
WG2539130-2 LCS								
Phosphorus (P)-Total Dissolved			106.5		%		80-120	01-JUN-17
WG2539130-1 MB								
Phosphorus (P)-Total Dissolved			<0.0010		mg/L		0.001	01-JUN-17
PH-WP	Water							
Batch R3733144								
WG2536090-17 LCS								
pH			7.42		pH units		7.3-7.5	26-MAY-17
SO4-IC-N-WP	Water							
Batch R3733105								
WG2535719-6 LCS								
Sulfate (SO4)			99.5		%		90-110	26-MAY-17
WG2535719-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	26-MAY-17
SOLIDS-TOTSUS-LR-WP	Water							
Batch R3735321								
WG2536438-2 LCS								
Total Suspended Solids			91.3		%		85-115	29-MAY-17
WG2536438-1 MB								



Quality Control Report

Workorder: L1931744

Report Date: 05-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-LR-WP Water								
Batch	R3735321							
WG2536438-1	MB							
Total Suspended Solids			<2.0		mg/L		2	29-MAY-17
TC,EC-QT97-ENDPT-WP Water								
Batch	R3732730							
WG2535527-1	DUP	L1931744-1						
Total Coliforms		74	60		MPN/100mL	20	65	26-MAY-17
Escherichia Coli		<1	<1	RPD-NA	MPN/100mL	N/A	65	26-MAY-17
WG2535527-2	MB							
Total Coliforms			<1		MPN/100mL		1	26-MAY-17
Escherichia Coli			<1		MPN/100mL		1	26-MAY-17
TURBIDITY-WP Water								
Batch	R3735486							
WG2535465-2	LCS							
Turbidity			100.0		%		85-115	26-MAY-17
WG2535465-1	MB							
Turbidity			<0.10		NTU		0.1	26-MAY-17

Quality Control Report

Workorder: L1931744

Report Date: 05-JUL-18

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1931744

Report Date: 05-JUL-18

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	25-MAY-17 08:00	26-MAY-17 12:00	0.25	28	hours	EHTR-FM
	2	25-MAY-17 08:30	26-MAY-17 12:00	0.25	28	hours	EHTR-FM
	3	25-MAY-17 09:45	26-MAY-17 12:00	0.25	26	hours	EHTR-FM
	4	25-MAY-17 11:45	26-MAY-17 12:00	0.25	24	hours	EHTR-FM
	5	25-MAY-17 16:15	26-MAY-17 12:00	0.25	20	hours	EHTR-FM
	6	25-MAY-17 15:50	26-MAY-17 12:00	0.25	20	hours	EHTR-FM
	7	25-MAY-17 15:20	26-MAY-17 12:00	0.25	21	hours	EHTR-FM
	8	25-MAY-17 13:55	26-MAY-17 12:00	0.25	22	hours	EHTR-FM
	9	25-MAY-17 14:40	26-MAY-17 12:00	0.25	21	hours	EHTR-FM
	10	25-MAY-17 12:00	26-MAY-17 12:00	0.25	24	hours	EHTR-FM
	11	25-MAY-17 15:20	26-MAY-17 12:00	0.25	21	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

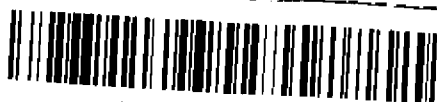
Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1931744 were received on 26-MAY-17 08:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



L1931744-COFC

10-232386

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Report To			Report Format / Distribution			Service Request: (Rush subject to availability - Contact ALS to confirm TAT)									
Company: <u>KGS Group</u>			Standard: ☒ Other (specify):			☒ Regular (Standard Turnaround Times - Business Days)									
Contact: <u>Steve Hoffman</u>			Select: PDF ☒ Excel ☒ Digital ☒ Fax			Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT									
Address: <u>865 Waverly St</u>			Email 1: <u>mtham@ksgroup.com</u>			Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT									
<u>Winnipeg, MB</u>			Email 2: <u>soffman@ksgroup.com</u>			Same Day or Weekend Emergency - Contact ALS to confirm TAT									
Phone: <u>204-896-1209</u> Fax:															
Invoice To Same as Report? (circle) ☒ Yes or No (if No, provide details)			Client / Project Information			Analysis Request									
Copy of Invoice with Report? (circle) ☒ Yes or No			Job #: <u>16-0300-021</u>			(Indicate Filtered or Preserved, F/P)									
Company:			PO / AFE:												
Contact:			LSD:												
Address:			Quote #: <u>58103</u>												
Phone:			ALS Contact: <u>Judy / Craig</u>												
Fax:			Sampler: <u>DL / ES</u>												
Lab Work Order # (lab use only)															
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type									Number of Containers	
1	D-1		25-MAY-17	08:00	SW	ROU4W-T-L-WP	N-TOTKS-WP	NH3-COL-WP	P-T-COL-WP	ETL-N-TOT-ANY-WP	P-TD-COL-WP	SOLIDS-TOTALS-LR-WP	TL-EL-QT97-EMPT-WP		7
2	D-2		↓	08:30											7
3	D-3			09:45											7
4	D-4			11:45											7
5	D-5			16:15											7
6	D-6			15:50											7
7	D-7			15:20											7
8	D-8			13:55											7
9	D-9			14:40											7
10	S-100			12:00											7
11	FB				15:20										
Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details															
For P-TD lab should filter and preserve															
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.															
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.															
SHIPMENT RELEASE (client use)				SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)							
Released by: <original signed by>		Date:	Time:	Receive		Date:	Time:	Temperature:	Verified by:		Date:	Time:	Observations: Yes / No ? If Yes add SIF		
		25-MAY-17	19:30			MAY 26 2017		8 °C							



KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: TH-ED-01W
Sampled By: ES/DL
Date Collected: 23-MAY-17
Lab Sample ID: L1931757-1
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	400		mg/L			29-MAY-17
Carbonate (CO3)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	7.71		pH units			26-MAY-17
TDS calculated						
TDS (Calculated)	514		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	142		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	398		mg/L		500	05-JUL-18
Dissolved Metals by ICP-MS						
Aluminum (Al)-Dissolved	<0.0020		mg/L		0.1	29-MAY-17
Antimony (Sb)-Dissolved	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Dissolved	0.00043		mg/L	0.01		29-MAY-17
Barium (Ba)-Dissolved	0.0136		mg/L	1		29-MAY-17
Beryllium (Be)-Dissolved	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Dissolved	<0.00020		mg/L			29-MAY-17
Boron (B)-Dissolved	0.614		mg/L	5		29-MAY-17
Cadmium (Cd)-Dissolved	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Dissolved	81.5		mg/L			29-MAY-17
Cesium (Cs)-Dissolved	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Dissolved	0.00020		mg/L			29-MAY-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	29-MAY-17
Lead (Pb)-Dissolved	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Dissolved	0.0367		mg/L			29-MAY-17
Magnesium (Mg)-Dissolved	47.2		mg/L			29-MAY-17
Manganese (Mn)-Dissolved	0.00923		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Dissolved	0.00028		mg/L			29-MAY-17
Nickel (Ni)-Dissolved	<0.0010		mg/L			29-MAY-17

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals by ICP-MS						
Phosphorus (P)-Dissolved	<0.030		mg/L			29-MAY-17
Potassium (K)-Dissolved	9.65		mg/L			29-MAY-17
Rubidium (Rb)-Dissolved	0.00643		mg/L			29-MAY-17
Selenium (Se)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Dissolved	5.28		mg/L			29-MAY-17
Silver (Ag)-Dissolved	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Dissolved	31.5		mg/L		200	29-MAY-17
Strontium (Sr)-Dissolved	0.542		mg/L			29-MAY-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Dissolved	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Dissolved	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Dissolved	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Dissolved	<0.00050		mg/L			29-MAY-17
Tungsten (W)-Dissolved	<0.00010		mg/L			29-MAY-17
Uranium (U)-Dissolved	0.00121		mg/L	0.02		29-MAY-17
Vanadium (V)-Dissolved	<0.00020		mg/L			29-MAY-17
Zinc (Zn)-Dissolved	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Dissolved	<0.00040		mg/L			29-MAY-17
Conductivity						
Conductivity	768		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.76		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	328		mg/L			26-MAY-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
Approved by	<original signed by> Shannon Sawatzky Account Manager					
5-JUL-2018 Revised report - Full metals scan reporting						

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ATTN: Marci Friedman Hamm

Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: TH-ED-01P
Sampled By: ES/DL
Date Collected: 23-MAY-17
Lab Sample ID: L1931757-2
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	390		mg/L			29-MAY-17
Carbonate (CO3)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	7.71		pH units			26-MAY-17
TDS calculated						
TDS (Calculated)	518		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	148		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	390		mg/L		500	05-JUL-18
Dissolved Metals by ICP-MS						
Aluminum (Al)-Dissolved	<0.0020		mg/L		0.1	29-MAY-17
Antimony (Sb)-Dissolved	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Dissolved	0.00046		mg/L	0.01		29-MAY-17
Barium (Ba)-Dissolved	0.0142		mg/L	1		29-MAY-17
Beryllium (Be)-Dissolved	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Dissolved	<0.00020		mg/L			29-MAY-17
Boron (B)-Dissolved	0.652		mg/L	5		29-MAY-17
Cadmium (Cd)-Dissolved	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Dissolved	79.5		mg/L			29-MAY-17
Cesium (Cs)-Dissolved	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Dissolved	0.00023		mg/L			29-MAY-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	29-MAY-17
Lead (Pb)-Dissolved	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Dissolved	0.0355		mg/L			29-MAY-17
Magnesium (Mg)-Dissolved	46.5		mg/L			29-MAY-17
Manganese (Mn)-Dissolved	0.0137		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Dissolved	0.00028		mg/L			29-MAY-17
Nickel (Ni)-Dissolved	<0.0010		mg/L			29-MAY-17

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Matrix: WATER

PAGE 4 of 13

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals by ICP-MS						
Phosphorus (P)-Dissolved	<0.030		mg/L			29-MAY-17
Potassium (K)-Dissolved	9.82		mg/L			29-MAY-17
Rubidium (Rb)-Dissolved	0.00633		mg/L			29-MAY-17
Selenium (Se)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Dissolved	5.43		mg/L			29-MAY-17
Silver (Ag)-Dissolved	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Dissolved	36.0		mg/L		200	29-MAY-17
Strontium (Sr)-Dissolved	0.535		mg/L			29-MAY-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Dissolved	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Dissolved	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Dissolved	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Dissolved	<0.00050		mg/L			29-MAY-17
Tungsten (W)-Dissolved	<0.00010		mg/L			29-MAY-17
Uranium (U)-Dissolved	0.00120		mg/L	0.02		29-MAY-17
Vanadium (V)-Dissolved	<0.00020		mg/L			29-MAY-17
Zinc (Zn)-Dissolved	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Dissolved	<0.00040		mg/L			29-MAY-17
Conductivity						
Conductivity	771		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	6.12		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	319		mg/L			26-MAY-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
Approved by	<original signed by> Shannon Sawatzky Account Manager					
5-JUL-2018 Revised report - Full metals scan reporting						

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865 Waverly Street - 3rd Floor
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ATTN: Marci Friedman Hamm

Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: TH-GD-02
Sampled By: ES/DL
Date Collected: 23-MAY-17
Lab Sample ID: L1931757-3
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	336		mg/L			29-MAY-17
Carbonate (CO3)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	7.84		pH units			26-MAY-17
TDS calculated						
TDS (Calculated)	496		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	156		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	359		mg/L		500	05-JUL-18
Dissolved Metals by ICP-MS						
Aluminum (Al)-Dissolved	<0.0020		mg/L		0.1	29-MAY-17
Antimony (Sb)-Dissolved	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Dissolved	<0.00020		mg/L	0.01		29-MAY-17
Barium (Ba)-Dissolved	0.0201		mg/L	1		29-MAY-17
Beryllium (Be)-Dissolved	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Dissolved	<0.00020		mg/L			29-MAY-17
Boron (B)-Dissolved	0.692		mg/L	5		29-MAY-17
Cadmium (Cd)-Dissolved	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Dissolved	68.0		mg/L			29-MAY-17
Cesium (Cs)-Dissolved	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Dissolved	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	29-MAY-17
Lead (Pb)-Dissolved	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Dissolved	0.0402		mg/L			29-MAY-17
Magnesium (Mg)-Dissolved	45.9		mg/L			29-MAY-17
Manganese (Mn)-Dissolved	0.0120		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Dissolved	0.00044		mg/L			29-MAY-17
Nickel (Ni)-Dissolved	<0.0010		mg/L			29-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: TH-GD-02
Sampled By: ES/DL
Date Collected: 23-MAY-17
Lab Sample ID: L1931757-3
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals by ICP-MS						
Phosphorus (P)-Dissolved	<0.030		mg/L			29-MAY-17
Potassium (K)-Dissolved	9.88		mg/L			29-MAY-17
Rubidium (Rb)-Dissolved	0.00683		mg/L			29-MAY-17
Selenium (Se)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Dissolved	4.62		mg/L			29-MAY-17
Silver (Ag)-Dissolved	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Dissolved	37.5		mg/L		200	29-MAY-17
Strontium (Sr)-Dissolved	0.527		mg/L			29-MAY-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Dissolved	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Dissolved	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Dissolved	0.00022		mg/L			29-MAY-17
Titanium (Ti)-Dissolved	<0.00050		mg/L			29-MAY-17
Tungsten (W)-Dissolved	<0.00010		mg/L			29-MAY-17
Uranium (U)-Dissolved	0.00159		mg/L	0.02		29-MAY-17
Vanadium (V)-Dissolved	<0.00020		mg/L			29-MAY-17
Zinc (Zn)-Dissolved	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Dissolved	<0.00040		mg/L			29-MAY-17
Conductivity						
Conductivity	744		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	12.9		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	276		mg/L			26-MAY-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
Approved by	<original signed by> Shannon Sawatzky Account Manager					
5-JUL-2018 Revised report - Full metals scan reporting						

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Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: TH-GD-07
Sampled By: ES/DL
Date Collected: 23-MAY-17
Lab Sample ID: L1931757-4
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	407		mg/L			29-MAY-17
Carbonate (CO3)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	7.74		pH units			26-MAY-17
TDS calculated						
TDS (Calculated)	487		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	117		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	384		mg/L		500	05-JUL-18
Dissolved Metals by ICP-MS						
Aluminum (Al)-Dissolved	<0.0020		mg/L		0.1	29-MAY-17
Antimony (Sb)-Dissolved	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Dissolved	<0.00020		mg/L	0.01		29-MAY-17
Barium (Ba)-Dissolved	0.0187		mg/L	1		29-MAY-17
Beryllium (Be)-Dissolved	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Dissolved	<0.00020		mg/L			29-MAY-17
Boron (B)-Dissolved	0.566		mg/L	5		29-MAY-17
Cadmium (Cd)-Dissolved	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Dissolved	75.2		mg/L			29-MAY-17
Cesium (Cs)-Dissolved	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Dissolved	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	29-MAY-17
Lead (Pb)-Dissolved	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Dissolved	0.0350		mg/L			29-MAY-17
Magnesium (Mg)-Dissolved	47.8		mg/L			29-MAY-17
Manganese (Mn)-Dissolved	0.00768		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Dissolved	0.00023		mg/L			29-MAY-17
Nickel (Ni)-Dissolved	<0.0010		mg/L			29-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: TH-GD-07
Sampled By: ES/DL
Date Collected: 23-MAY-17
Lab Sample ID: L1931757-4
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals by ICP-MS						
Phosphorus (P)-Dissolved	<0.030		mg/L			29-MAY-17
Potassium (K)-Dissolved	10.2		mg/L			29-MAY-17
Rubidium (Rb)-Dissolved	0.00590		mg/L			29-MAY-17
Selenium (Se)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Dissolved	5.28		mg/L			29-MAY-17
Silver (Ag)-Dissolved	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Dissolved	31.4		mg/L		200	29-MAY-17
Strontium (Sr)-Dissolved	0.536		mg/L			29-MAY-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Dissolved	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Dissolved	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Dissolved	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Dissolved	<0.00050		mg/L			29-MAY-17
Tungsten (W)-Dissolved	<0.00010		mg/L			29-MAY-17
Uranium (U)-Dissolved	0.00066		mg/L	0.02		29-MAY-17
Vanadium (V)-Dissolved	<0.00020		mg/L			29-MAY-17
Zinc (Zn)-Dissolved	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Dissolved	<0.00040		mg/L			29-MAY-17
Conductivity						
Conductivity	739		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.30		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	334		mg/L			26-MAY-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
Approved by	<original signed by> Shannon Sawatzky Account Manager					
5-JUL-2018 Revised report - Full metals scan reporting						

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Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: 15-RD-PW1
Sampled By: ES/DL
Date Collected: 23-MAY-17
Lab Sample ID: L1931757-5
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	414		mg/L			29-MAY-17
Carbonate (CO3)	<0.60		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	7.75		pH units			26-MAY-17
TDS calculated						
TDS (Calculated)	483		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	115		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	371		mg/L		500	05-JUL-18
Dissolved Metals by ICP-MS						
Aluminum (Al)-Dissolved	<0.0020		mg/L		0.1	29-MAY-17
Antimony (Sb)-Dissolved	<0.00020		mg/L	0.006		29-MAY-17
Arsenic (As)-Dissolved	<0.00020		mg/L	0.01		29-MAY-17
Barium (Ba)-Dissolved	0.0183		mg/L	1		29-MAY-17
Beryllium (Be)-Dissolved	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Dissolved	<0.00020		mg/L			29-MAY-17
Boron (B)-Dissolved	0.550		mg/L	5		29-MAY-17
Cadmium (Cd)-Dissolved	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Dissolved	70.9		mg/L			29-MAY-17
Cesium (Cs)-Dissolved	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Dissolved	<0.00020		mg/L			29-MAY-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	29-MAY-17
Lead (Pb)-Dissolved	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Dissolved	0.0351		mg/L			29-MAY-17
Magnesium (Mg)-Dissolved	47.2		mg/L			29-MAY-17
Manganese (Mn)-Dissolved	0.00871		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Dissolved	0.00017		mg/L			29-MAY-17
Nickel (Ni)-Dissolved	<0.0010		mg/L			29-MAY-17

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Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: 15-RD-PW1
Sampled By: ES/DL
Date Collected: 23-MAY-17
Lab Sample ID: L1931757-5
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals by ICP-MS						
Phosphorus (P)-Dissolved	<0.030		mg/L			29-MAY-17
Potassium (K)-Dissolved	10.0		mg/L			29-MAY-17
Rubidium (Rb)-Dissolved	0.00544		mg/L			29-MAY-17
Selenium (Se)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Dissolved	5.51		mg/L			29-MAY-17
Silver (Ag)-Dissolved	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Dissolved	30.3		mg/L		200	29-MAY-17
Strontium (Sr)-Dissolved	0.521		mg/L			29-MAY-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Dissolved	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Dissolved	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Dissolved	<0.00020		mg/L			29-MAY-17
Titanium (Ti)-Dissolved	<0.00050		mg/L			29-MAY-17
Tungsten (W)-Dissolved	<0.00010		mg/L			29-MAY-17
Uranium (U)-Dissolved	0.00103		mg/L	0.02		29-MAY-17
Vanadium (V)-Dissolved	<0.00020		mg/L			29-MAY-17
Zinc (Zn)-Dissolved	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Dissolved	<0.00040		mg/L			29-MAY-17
Conductivity						
Conductivity	736		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.29		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	339		mg/L			26-MAY-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
Approved by	<original signed by> Shannon Sawatzky Account Manager					
5-JUL-2018 Revised report - Full metals scan reporting						

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Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: TH-ED-03 (LIMITED SAMPLE-WELL DRY)
Sampled By: ES/DL
Date Collected: 25-MAY-17
Lab Sample ID: L1931757-6
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	399		mg/L			29-MAY-17
Carbonate (CO3)	2.88		mg/L			29-MAY-17
Hydroxide (OH)	<0.34		mg/L			29-MAY-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		29-MAY-17
pH						
pH	8.34		pH units			26-MAY-17
TDS calculated						
TDS (Calculated)	372		mg/L		500	05-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	43.2		mg/L		500	26-MAY-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		26-MAY-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		26-MAY-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	162		mg/L		500	05-JUL-18
Dissolved Metals by ICP-MS						
Aluminum (Al)-Dissolved	0.0072		mg/L		0.1	29-MAY-17
Antimony (Sb)-Dissolved	0.00074		mg/L	0.006		29-MAY-17
Arsenic (As)-Dissolved	0.00061		mg/L	0.01		29-MAY-17
Barium (Ba)-Dissolved	0.0223		mg/L	1		29-MAY-17
Beryllium (Be)-Dissolved	<0.00020		mg/L			29-MAY-17
Bismuth (Bi)-Dissolved	<0.00020		mg/L			29-MAY-17
Boron (B)-Dissolved	0.174		mg/L	5		29-MAY-17
Cadmium (Cd)-Dissolved	<0.000010		mg/L	0.005		29-MAY-17
Calcium (Ca)-Dissolved	20.8		mg/L			29-MAY-17
Cesium (Cs)-Dissolved	<0.00010		mg/L			29-MAY-17
Chromium (Cr)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Cobalt (Co)-Dissolved	0.00035		mg/L			29-MAY-17
Copper (Cu)-Dissolved	0.00084		mg/L	2.0	1.0	29-MAY-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	29-MAY-17
Lead (Pb)-Dissolved	<0.000090		mg/L	0.01		29-MAY-17
Lithium (Li)-Dissolved	0.0146		mg/L			29-MAY-17
Magnesium (Mg)-Dissolved	26.8		mg/L			29-MAY-17
Manganese (Mn)-Dissolved	0.0482		mg/L		0.05	29-MAY-17
Molybdenum (Mo)-Dissolved	0.0315		mg/L			29-MAY-17
Nickel (Ni)-Dissolved	0.0029		mg/L			29-MAY-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 05-JUL-18
PO No.:
WO No.: L1931757
Project Ref: 16-0300-006
Sample ID: TH-ED-03 (LIMITED SAMPLE-WELL DRY)
Sampled By: ES/DL
Date Collected: 25-MAY-17
Lab Sample ID: L1931757-6
Matrix: WATER

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals by ICP-MS						
Phosphorus (P)-Dissolved	<0.030		mg/L			29-MAY-17
Potassium (K)-Dissolved	2.43		mg/L			29-MAY-17
Rubidium (Rb)-Dissolved	0.00118		mg/L			29-MAY-17
Selenium (Se)-Dissolved	<0.0010		mg/L	0.05		29-MAY-17
Silicon (Si)-Dissolved	3.14		mg/L			29-MAY-17
Silver (Ag)-Dissolved	<0.00010		mg/L			29-MAY-17
Sodium (Na)-Dissolved	62.1		mg/L		200	29-MAY-17
Strontium (Sr)-Dissolved	0.105		mg/L			29-MAY-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			29-MAY-17
Thallium (Tl)-Dissolved	<0.00010		mg/L			29-MAY-17
Thorium (Th)-Dissolved	<0.00010		mg/L			29-MAY-17
Tin (Sn)-Dissolved	0.00040		mg/L			29-MAY-17
Titanium (Ti)-Dissolved	<0.00050		mg/L			29-MAY-17
Tungsten (W)-Dissolved	0.00148		mg/L			29-MAY-17
Uranium (U)-Dissolved	0.00490		mg/L	0.02		29-MAY-17
Vanadium (V)-Dissolved	0.00290		mg/L			29-MAY-17
Zinc (Zn)-Dissolved	<0.0020		mg/L		5.0	29-MAY-17
Zirconium (Zr)-Dissolved	<0.00040		mg/L			29-MAY-17
Conductivity						
Conductivity	514		umhos/cm			26-MAY-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	17.0		mg/L		250	26-MAY-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	332		mg/L			26-MAY-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
Approved by	<original signed by> Shannon Sawatzky Account Manager					
5-JUL-2018 Revised report - Full metals scan reporting						

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Guidelines & Objectives

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO ₃ -1
Carbonate	See Alkalinity. Reported at the anion CO ₃ -2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure or capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness). The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic	
Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1931757

Report Date: 05-JUL-18

Page 1 of 6

Client: KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4

Contact: Marci Friedman Hamm

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP		Water						
Batch	R3733144							
WG2536090-24	LCS							
Alkalinity, Total (as CaCO ₃)			103.1		%		85-115	26-MAY-17
WG2536090-21	MB							
Alkalinity, Total (as CaCO ₃)			<1.0		mg/L		1	26-MAY-17
CL-L-IC-N-WP		Water						
Batch	R3733105							
WG2535719-10	LCS							
Chloride (Cl)			99.5		%		90-110	26-MAY-17
WG2535719-6	LCS							
Chloride (Cl)			99.3		%		90-110	26-MAY-17
WG2535719-5	MB							
Chloride (Cl)			<0.10		mg/L		0.1	26-MAY-17
WG2535719-9	MB							
Chloride (Cl)			<0.10		mg/L		0.1	26-MAY-17
EC-WP		Water						
Batch	R3733144							
WG2536090-23	LCS							
Conductivity			99.4		%		90-110	26-MAY-17
WG2536090-21	MB							
Conductivity			<1.0		umhos/cm		1	26-MAY-17
MET-D-L-MS-WP		Water						
Batch	R3735288							
WG2536740-2	LCS							
Aluminum (Al)-Dissolved			102.5		%		80-120	29-MAY-17
Antimony (Sb)-Dissolved			96.6		%		80-120	29-MAY-17
Arsenic (As)-Dissolved			99.8		%		80-120	29-MAY-17
Barium (Ba)-Dissolved			100.9		%		80-120	29-MAY-17
Beryllium (Be)-Dissolved			104.3		%		80-120	29-MAY-17
Bismuth (Bi)-Dissolved			100.5		%		80-120	29-MAY-17
Boron (B)-Dissolved			104.6		%		80-120	29-MAY-17
Cadmium (Cd)-Dissolved			100.9		%		80-120	29-MAY-17
Calcium (Ca)-Dissolved			100.9		%		80-120	29-MAY-17
Cesium (Cs)-Dissolved			103.1		%		80-120	29-MAY-17
Chromium (Cr)-Dissolved			99.5		%		80-120	29-MAY-17
Cobalt (Co)-Dissolved			99.0		%		80-120	29-MAY-17
Copper (Cu)-Dissolved			97.3		%		80-120	29-MAY-17



Quality Control Report

Workorder: L1931757

Report Date: 05-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-L-MS-WP		Water						
Batch	R3735288							
WG2536740-2	LCS							
Iron (Fe)-Dissolved			97.3		%		80-120	29-MAY-17
Lead (Pb)-Dissolved			101.3		%		80-120	29-MAY-17
Lithium (Li)-Dissolved			106.7		%		80-120	29-MAY-17
Magnesium (Mg)-Dissolved			101.6		%		80-120	29-MAY-17
Manganese (Mn)-Dissolved			100.3		%		80-120	29-MAY-17
Molybdenum (Mo)-Dissolved			98.8		%		80-120	29-MAY-17
Nickel (Ni)-Dissolved			98.4		%		80-120	29-MAY-17
Phosphorus (P)-Dissolved			100.7		%		80-120	29-MAY-17
Potassium (K)-Dissolved			101.3		%		80-120	29-MAY-17
Rubidium (Rb)-Dissolved			100.4		%		80-120	29-MAY-17
Selenium (Se)-Dissolved			97.0		%		80-120	29-MAY-17
Silicon (Si)-Dissolved			107.7		%		80-120	29-MAY-17
Silver (Ag)-Dissolved			105.1		%		80-120	29-MAY-17
Sodium (Na)-Dissolved			100.9		%		80-120	29-MAY-17
Strontium (Sr)-Dissolved			107.4		%		80-120	29-MAY-17
Tellurium (Te)-Dissolved			100.2		%		80-120	29-MAY-17
Thallium (Tl)-Dissolved			97.8		%		80-120	29-MAY-17
Thorium (Th)-Dissolved			100.0		%		80-120	29-MAY-17
Tin (Sn)-Dissolved			100.6		%		80-120	29-MAY-17
Titanium (Ti)-Dissolved			98.6		%		80-120	29-MAY-17
Tungsten (W)-Dissolved			103.7		%		80-120	29-MAY-17
Uranium (U)-Dissolved			105.9		%		80-120	29-MAY-17
Vanadium (V)-Dissolved			101.1		%		80-120	29-MAY-17
Zinc (Zn)-Dissolved			94.8		%		80-120	29-MAY-17
Zirconium (Zr)-Dissolved			101.1		%		80-120	29-MAY-17
WG2536740-1	MB							
Aluminum (Al)-Dissolved			<0.0020		mg/L		0.002	29-MAY-17
Antimony (Sb)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Arsenic (As)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Barium (Ba)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Beryllium (Be)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Bismuth (Bi)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Boron (B)-Dissolved			<0.010		mg/L		0.01	29-MAY-17
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	29-MAY-17

Quality Control Report

Workorder: L1931757

Report Date: 05-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-L-MS-WP	Water							
Batch	R3735288							
WG2536740-1 MB								
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	29-MAY-17
Cesium (Cs)-Dissolved			<0.00010		mg/L		0.0001	29-MAY-17
Chromium (Cr)-Dissolved			<0.0010		mg/L		0.001	29-MAY-17
Cobalt (Co)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	29-MAY-17
Lead (Pb)-Dissolved			<0.000090		mg/L		0.00009	29-MAY-17
Lithium (Li)-Dissolved			<0.0020		mg/L		0.002	29-MAY-17
Magnesium (Mg)-Dissolved			<0.010		mg/L		0.01	29-MAY-17
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	29-MAY-17
Molybdenum (Mo)-Dissolved			<0.00010		mg/L		0.0001	29-MAY-17
Nickel (Ni)-Dissolved			<0.0010		mg/L		0.001	29-MAY-17
Phosphorus (P)-Dissolved			<0.030		mg/L		0.03	29-MAY-17
Potassium (K)-Dissolved			<0.020		mg/L		0.02	29-MAY-17
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Selenium (Se)-Dissolved			<0.0010		mg/L		0.001	29-MAY-17
Silicon (Si)-Dissolved			<0.10		mg/L		0.1	29-MAY-17
Silver (Ag)-Dissolved			<0.00010		mg/L		0.0001	29-MAY-17
Sodium (Na)-Dissolved			<0.020		mg/L		0.02	29-MAY-17
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	29-MAY-17
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Thallium (Tl)-Dissolved			<0.00010		mg/L		0.0001	29-MAY-17
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	29-MAY-17
Tin (Sn)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Titanium (Ti)-Dissolved			<0.00050		mg/L		0.0005	29-MAY-17
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	29-MAY-17
Uranium (U)-Dissolved			<0.00010		mg/L		0.0001	29-MAY-17
Vanadium (V)-Dissolved			<0.00020		mg/L		0.0002	29-MAY-17
Zinc (Zn)-Dissolved			<0.0020		mg/L		0.002	29-MAY-17
Zirconium (Zr)-Dissolved			<0.00040		mg/L		0.0004	29-MAY-17
NO2-L-IC-N-WP	Water							

Quality Control Report

Workorder: L1931757

Report Date: 05-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-WP		Water						
Batch	R3733105							
WG2535719-10	LCS							
Nitrite (as N)			100.8		%		90-110	26-MAY-17
WG2535719-6	LCS							
Nitrite (as N)			99.2		%		90-110	26-MAY-17
WG2535719-5	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	26-MAY-17
WG2535719-9	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	26-MAY-17
NO3-L-IC-N-WP		Water						
Batch	R3733105							
WG2535719-10	LCS							
Nitrate (as N)			100.4		%		90-110	26-MAY-17
WG2535719-6	LCS							
Nitrate (as N)			100.1		%		90-110	26-MAY-17
WG2535719-5	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	26-MAY-17
WG2535719-9	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	26-MAY-17
PH-WP		Water						
Batch	R3733144							
WG2536090-22	LCS							
pH			7.42		pH units		7.3-7.5	26-MAY-17
SO4-IC-N-WP		Water						
Batch	R3733105							
WG2535719-10	LCS							
Sulfate (SO4)			100.6		%		90-110	26-MAY-17
WG2535719-6	LCS							
Sulfate (SO4)			99.5		%		90-110	26-MAY-17
WG2535719-5	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	26-MAY-17
WG2535719-9	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	26-MAY-17

Quality Control Report

Workorder: L1931757

Report Date: 05-JUL-18

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Quality Control Report

Workorder: L1931757

Report Date: 05-JUL-18

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	23-MAY-17 14:45	26-MAY-17 12:00	0.25	69	hours	EHTR-FM
	2	23-MAY-17 15:30	26-MAY-17 12:00	0.25	68	hours	EHTR-FM
	3	23-MAY-17 08:47	26-MAY-17 12:00	0.25	75	hours	EHTR-FM
	4	23-MAY-17 15:25	26-MAY-17 12:00	0.25	69	hours	EHTR-FM
	5	23-MAY-17 16:45	26-MAY-17 12:00	0.25	67	hours	EHTR-FM
	6	25-MAY-17 13:15	26-MAY-17 12:00	0.25	23	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1931757 were received on 26-MAY-17 08:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Environmental



L1931757-COFC

10- 232384

Page 1 of 1

[illegible]

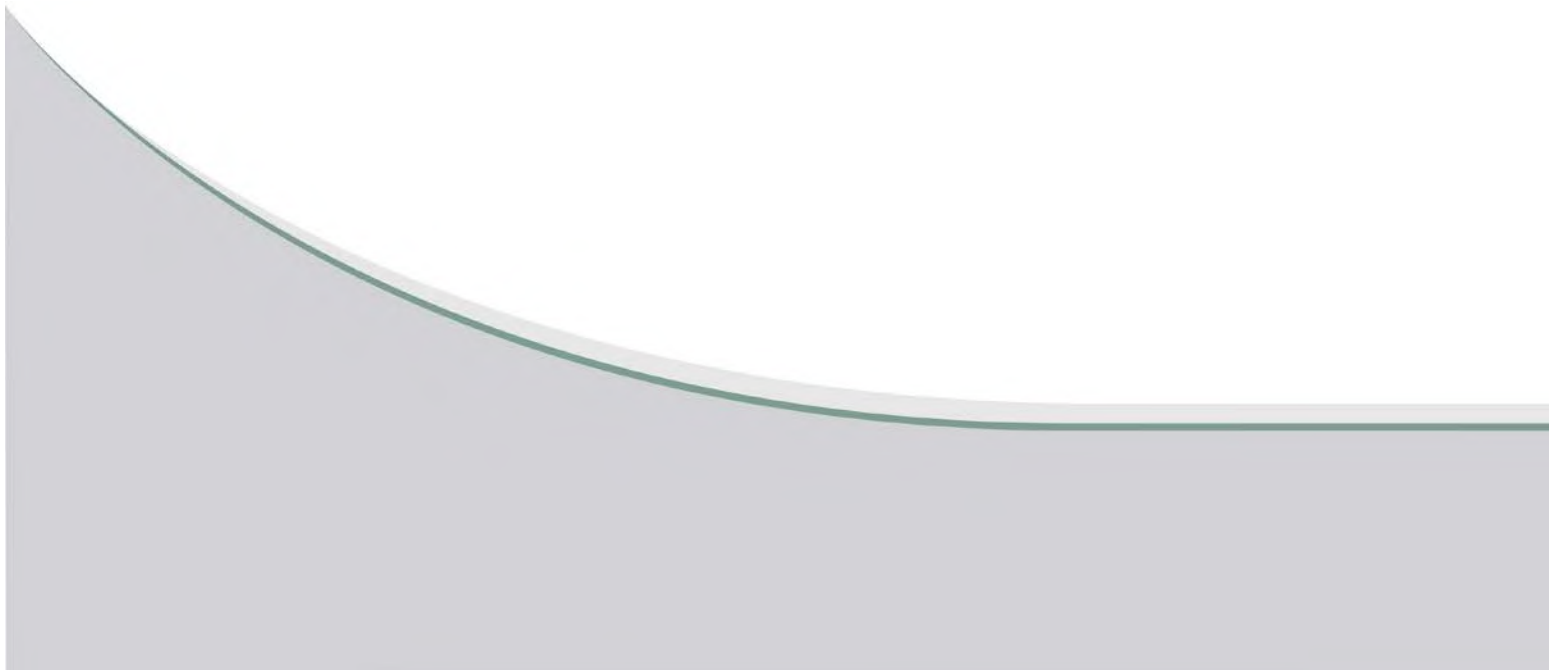
REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY

YELLOW - CLIENT COPY

GENF 18.01 Front

D3-F2 AUGUST 2017





KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D1
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-1
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	213		mg/L			09-AUG-17
Carbonate (CO ₃)	12.1		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.010		mg/L	10		10-AUG-17
pH						
pH	8.62		pH units			05-AUG-17
Turbidity						
*Turbidity	7.96		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0747		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00033		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00213		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0437		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.100		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	0.0000053		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	43.4		mg/L			09-AUG-17
Cesium (Cs)-Total	0.000012		mg/L			09-AUG-17
Chromium (Cr)-Total	0.00019		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	0.00011		mg/L			09-AUG-17
Copper (Cu)-Total	0.00064		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	0.083		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	0.000164		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0328		mg/L			09-AUG-17
Magnesium (Mg)-Total	34.2		mg/L			09-AUG-17
Manganese (Mn)-Total	0.0110		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.00187		mg/L			09-AUG-17
Nickel (Ni)-Total	0.00082		mg/L			09-AUG-17
Potassium (K)-Total	9.30		mg/L			09-AUG-17
Phosphorus (P)-Total	<0.050		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00371		mg/L			09-AUG-17
Selenium (Se)-Total	0.000100		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	5.44		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	92.8		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.237		mg/L			09-AUG-17
Sulfur (S)-Total	30.1		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	0.00358		mg/L			09-AUG-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D1
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-1
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.00159		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	0.00154		mg/L			09-AUG-17
Zinc (Zn)-Total	0.0049		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	0.000113		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	511		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	80.6		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	249	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.153		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	864		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	134		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	195		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.0069		mg/L			14-AUG-17
Phosphorus (P)-Total	0.027		mg/L			09-AUG-17
Ammonia, Total (as N)	0.021		mg/L			11-AUG-17
Escherichia Coli	6		MPN/100mL	0		04-AUG-17
Total Coliforms	5380		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	1.13		mg/L			10-AUG-17
Total Nitrogen	1.13		mg/L			13-AUG-17
Total Suspended Solids	13.8		mg/L			10-AUG-17

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Matrix: SW

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D2
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-2
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	326		mg/L			09-AUG-17
Carbonate (CO3)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	7.56		pH units			05-AUG-17
Turbidity						
*Turbidity	1.10		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0057		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00025		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00076		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0325		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.079		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	45.8		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	<0.00010		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	0.00012		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	0.070		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0168		mg/L			09-AUG-17
Magnesium (Mg)-Total	48.9		mg/L			09-AUG-17
Manganese (Mn)-Total	0.815		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.000079		mg/L			09-AUG-17
Nickel (Ni)-Total	<0.00050		mg/L			09-AUG-17
Potassium (K)-Total	9.43		mg/L			09-AUG-17
Phosphorus (P)-Total	0.063		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00517		mg/L			09-AUG-17
Selenium (Se)-Total	0.000088		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	10.9		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	10.6		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.127		mg/L			09-AUG-17
Sulfur (S)-Total	28.9		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	0.00030		mg/L			09-AUG-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D2
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-2
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.000127		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	<0.00050		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	<0.000060		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	358		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	76.8		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	316	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.129		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	579		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.75		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	267		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.058		mg/L			09-AUG-17
Phosphorus (P)-Total	0.067		mg/L			09-AUG-17
Ammonia, Total (as N)	0.036		mg/L			11-AUG-17
Escherichia Coli	51		MPN/100mL	0		04-AUG-17
Total Coliforms	2410		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	2.12		mg/L			10-AUG-17
Total Nitrogen	2.12		mg/L			13-AUG-17
Total Suspended Solids	4.0		mg/L			10-AUG-17

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Matrix: SW

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D3
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	221		mg/L			09-AUG-17
Carbonate (CO ₃)	19.0		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	8.84		pH units			05-AUG-17
Turbidity						
*Turbidity	1.50		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	<0.0030		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00023		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00070		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0130		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.072		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	21.7		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	<0.00010		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	<0.00010		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	<0.010		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0154		mg/L			09-AUG-17
Magnesium (Mg)-Total	46.5		mg/L			09-AUG-17
Manganese (Mn)-Total	0.0306		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.000194		mg/L			09-AUG-17
Nickel (Ni)-Total	<0.00050		mg/L			09-AUG-17
Potassium (K)-Total	9.45		mg/L			09-AUG-17
Phosphorus (P)-Total	<0.050		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00449		mg/L			09-AUG-17
Selenium (Se)-Total	0.000068		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	2.15		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	9.33		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.0453		mg/L			09-AUG-17
Sulfur (S)-Total	24.7		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	<0.00030		mg/L			09-AUG-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D3
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.000373		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	<0.00050		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	<0.000060		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	284		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	64.8		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	245	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.128		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	435		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	4.10		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	213		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.0113		mg/L			14-AUG-17
Phosphorus (P)-Total	0.024		mg/L			09-AUG-17
Ammonia, Total (as N)	0.027		mg/L			11-AUG-17
Escherichia Coli	19		MPN/100mL	0		04-AUG-17
Total Coliforms	3270		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	1.81		mg/L			10-AUG-17
Total Nitrogen	1.81		mg/L			13-AUG-17
Total Suspended Solids	6.8		mg/L			10-AUG-17

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KGS Group Consultants (Winnipeg)
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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D3
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 11-JUL-2018 AMENDED REPORT - Re-issued with complete total metal scan results						

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D4
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-4
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	349		mg/L			09-AUG-17
Carbonate (CO ₃)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	8.28		pH units			05-AUG-17
Turbidity						
*Turbidity	0.91		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0035		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00028		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00094		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0307		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.085		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	44.3		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	0.00012		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	<0.00010		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	0.022		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0193		mg/L			09-AUG-17
Magnesium (Mg)-Total	53.9		mg/L			09-AUG-17
Manganese (Mn)-Total	0.0167		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.000378		mg/L			09-AUG-17
Nickel (Ni)-Total	0.00076		mg/L			09-AUG-17
Potassium (K)-Total	6.46		mg/L			09-AUG-17
Phosphorus (P)-Total	<0.050		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00437		mg/L			09-AUG-17
Selenium (Se)-Total	0.000183		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	4.41		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	11.1		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.128		mg/L			09-AUG-17
Sulfur (S)-Total	24.8		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	<0.00030		mg/L			09-AUG-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D4
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-4
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.00131		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	<0.00050		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	0.000844		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	363		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	66.9		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	333	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.215		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	589		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	8.84		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	286		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.020		mg/L			09-AUG-17
Phosphorus (P)-Total	0.029		mg/L			09-AUG-17
Ammonia, Total (as N)	0.024		mg/L			11-AUG-17
Escherichia Coli	1		MPN/100mL	0		04-AUG-17
Total Coliforms	472		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	1.77		mg/L			10-AUG-17
Total Nitrogen	1.77		mg/L			13-AUG-17
Total Suspended Solids	<2.0		mg/L			10-AUG-17

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Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D4
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-4
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 11-JUL-2018 AMENDED REPORT - Re-issued with complete total metal scan results						

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Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D5
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	478		mg/L			09-AUG-17
Carbonate (CO3)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	7.94		pH units			05-AUG-17
Turbidity						
*Turbidity	1.02		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0170		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00027		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00139		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0390		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.086		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	0.0000097		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	70.3		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	0.00016		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	0.00015		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	0.154		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0139		mg/L			09-AUG-17
Magnesium (Mg)-Total	53.1		mg/L			09-AUG-17
Manganese (Mn)-Total	0.0542		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.000196		mg/L			09-AUG-17
Nickel (Ni)-Total	0.00086		mg/L			09-AUG-17
Potassium (K)-Total	1.67		mg/L			09-AUG-17
Phosphorus (P)-Total	<0.050		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00208		mg/L			09-AUG-17
Selenium (Se)-Total	0.000186		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	11.2		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	4.67		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.147		mg/L			09-AUG-17
Sulfur (S)-Total	2.68		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	0.00082		mg/L			09-AUG-17

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Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D5
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.000702		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	<0.00050		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	0.000179		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	370		mg/L		500	10-AUG-17
Sulfate in Water by IC						
Sulfate (SO4)	4.62		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	394	HTC	mg/L		500	10-AUG-17
Fluoride in Water by IC						
Fluoride (F)	0.279		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	615		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	0.62		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	392		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.034		mg/L			09-AUG-17
Phosphorus (P)-Total	0.038		mg/L			09-AUG-17
Ammonia, Total (as N)	0.029		mg/L			11-AUG-17
Escherichia Coli	64		MPN/100mL	0		04-AUG-17
Total Coliforms	4480		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	1.80		mg/L			10-AUG-17
Total Nitrogen	1.80		mg/L			13-AUG-17
Total Suspended Solids	<2.0		mg/L			10-AUG-17

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PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D5
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 11-JUL-2018 AMENDED REPORT - Re-issued with complete total metal scan results						

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Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D6
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	419		mg/L			09-AUG-17
Carbonate (CO ₃)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	8.00		pH units			05-AUG-17
Turbidity						
*Turbidity	0.95		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0179		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00026		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00088		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0368		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.119		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	58.9		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	0.00010		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	<0.00010		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	0.036		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0251		mg/L			09-AUG-17
Magnesium (Mg)-Total	72.8		mg/L			09-AUG-17
Manganese (Mn)-Total	0.0166		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.000181		mg/L			09-AUG-17
Nickel (Ni)-Total	<0.00050		mg/L			09-AUG-17
Potassium (K)-Total	4.67		mg/L			09-AUG-17
Phosphorus (P)-Total	<0.050		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00257		mg/L			09-AUG-17
Selenium (Se)-Total	0.000116		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	17.4		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	12.8		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.204		mg/L			09-AUG-17
Sulfur (S)-Total	52.6		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	0.00071		mg/L			09-AUG-17

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Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D6
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.000457		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	<0.00050		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	0.000071		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	502		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	141		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	447	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.272		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	764		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.87		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	343		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.033		mg/L			09-AUG-17
Phosphorus (P)-Total	0.033		mg/L			09-AUG-17
Ammonia, Total (as N)	0.023		mg/L			11-AUG-17
Escherichia Coli	11		MPN/100mL	0		04-AUG-17
Total Coliforms	2420		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	2.55		mg/L			10-AUG-17
Total Nitrogen	2.55		mg/L			13-AUG-17
Total Suspended Solids	<2.0		mg/L			10-AUG-17

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WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D6
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 11-JUL-2018 AMENDED REPORT - Re-issued with complete total metal scan results						

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WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D7
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	441		mg/L			09-AUG-17
Carbonate (CO ₃)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	8.07		pH units			05-AUG-17
Turbidity						
*Turbidity	0.91		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0145		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00024		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00154		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0240		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.012		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	52.0		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	0.00019		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	0.00018		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	0.053		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0225		mg/L			09-AUG-17
Magnesium (Mg)-Total	65.1		mg/L			09-AUG-17
Manganese (Mn)-Total	0.0297		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.000240		mg/L			09-AUG-17
Nickel (Ni)-Total	0.00104		mg/L			09-AUG-17
Potassium (K)-Total	2.49		mg/L			09-AUG-17
Phosphorus (P)-Total	0.062		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00140		mg/L			09-AUG-17
Selenium (Se)-Total	0.000174		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	6.27		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	8.89		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.131		mg/L			09-AUG-17
Sulfur (S)-Total	18.1		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	0.00065		mg/L			09-AUG-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D7
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.00127		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	0.00058		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	0.000194		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	391		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	45.6		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	398	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.136		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	628		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	0.45		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	361		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.048		mg/L			09-AUG-17
Phosphorus (P)-Total	0.052		mg/L			09-AUG-17
Ammonia, Total (as N)	0.081		mg/L			11-AUG-17
Escherichia Coli	122		MPN/100mL	0		04-AUG-17
Total Coliforms	2130		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	2.39		mg/L			10-AUG-17
Total Nitrogen	2.39		mg/L			13-AUG-17
Total Suspended Solids	<2.0		mg/L			10-AUG-17

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Matrix: SW

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D8
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	429		mg/L			09-AUG-17
Carbonate (CO ₃)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	8.17		pH units			05-AUG-17
Turbidity						
*Turbidity	1.57		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0342		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00027		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00111		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0385		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.121		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	61.5		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	0.00012		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	0.00013		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	0.069		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0240		mg/L			09-AUG-17
Magnesium (Mg)-Total	71.6		mg/L			09-AUG-17
Manganese (Mn)-Total	0.0142		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.000247		mg/L			09-AUG-17
Nickel (Ni)-Total	0.00058		mg/L			09-AUG-17
Potassium (K)-Total	4.41		mg/L			09-AUG-17
Phosphorus (P)-Total	<0.050		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00258		mg/L			09-AUG-17
Selenium (Se)-Total	0.000147		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	14.6		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	12.2		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.193		mg/L			09-AUG-17
Sulfur (S)-Total	43.5		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	0.00142		mg/L			09-AUG-17

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D8
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.000821		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	0.00050		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	0.000134		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	484		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	117		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	448	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.269		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	737		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.70		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	352		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.038		mg/L			09-AUG-17
Phosphorus (P)-Total	0.043		mg/L			09-AUG-17
Ammonia, Total (as N)	0.032		mg/L			11-AUG-17
Escherichia Coli	41		MPN/100mL	0		04-AUG-17
Total Coliforms	2420		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	2.19		mg/L			10-AUG-17
Total Nitrogen	2.19		mg/L			13-AUG-17
Total Suspended Solids	<2.0		mg/L			10-AUG-17

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D8
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated	MAY 2018					
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						
11-JUL-2018 AMENDED REPORT - Re-issued with complete total metal scan results						

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D9
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-9
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	207		mg/L			09-AUG-17
Carbonate (CO ₃)	11.3		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.010		mg/L	10		10-AUG-17
pH						
pH	8.61		pH units			05-AUG-17
Turbidity						
*Turbidity	3.60		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0356		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00033		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00187		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0424		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.096		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	0.0000101		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	46.6		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	<0.00010		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	<0.00010		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	0.036		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	0.000091		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0311		mg/L			09-AUG-17
Magnesium (Mg)-Total	31.7		mg/L			09-AUG-17
Manganese (Mn)-Total	0.0106		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.00177		mg/L			09-AUG-17
Nickel (Ni)-Total	0.00069		mg/L			09-AUG-17
Potassium (K)-Total	8.63		mg/L			09-AUG-17
Phosphorus (P)-Total	<0.050		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00382		mg/L			09-AUG-17
Selenium (Se)-Total	0.000084		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	5.18		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	101		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.243		mg/L			09-AUG-17
Sulfur (S)-Total	26.1		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	0.00149		mg/L			09-AUG-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: D9
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-9
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.00141		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	0.00115		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	<0.000060		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	519		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	69.1		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	247	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.148		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	874		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	148		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	189		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.0057		mg/L			14-AUG-17
Phosphorus (P)-Total	0.020		mg/L			09-AUG-17
Ammonia, Total (as N)	0.030		mg/L			11-AUG-17
Escherichia Coli	29		MPN/100mL	0		04-AUG-17
Total Coliforms	1550		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	2.18		mg/L			10-AUG-17
Total Nitrogen	2.18		mg/L			13-AUG-17
Total Suspended Solids	6.6		mg/L			10-AUG-17

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Matrix: SW

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: SW100
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-10
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	354		mg/L			09-AUG-17
Carbonate (CO ₃)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	8.27		pH units			05-AUG-17
Turbidity						
*Turbidity	1.06		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0036		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00027		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	0.00101		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	0.0311		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	0.089		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	42.3		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	0.00011		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	<0.00010		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	0.019		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	0.0202		mg/L			09-AUG-17
Magnesium (Mg)-Total	56.3		mg/L			09-AUG-17
Manganese (Mn)-Total	0.0171		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	0.000394		mg/L			09-AUG-17
Nickel (Ni)-Total	0.00074		mg/L			09-AUG-17
Potassium (K)-Total	6.64		mg/L			09-AUG-17
Phosphorus (P)-Total	<0.050		mg/L			09-AUG-17
Rubidium (Rb)-Total	0.00454		mg/L			09-AUG-17
Selenium (Se)-Total	0.000140		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	4.54		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	11.4		mg/L		200	09-AUG-17
Strontium (Sr)-Total	0.130		mg/L			09-AUG-17
Sulfur (S)-Total	25.7		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	<0.00030		mg/L			09-AUG-17

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Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: SW100
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-10
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	0.00129		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	<0.00050		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	0.000125		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	367		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	67.0		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	338	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.215		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	590		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	8.88		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	290		mg/L			05-AUG-17
Phosphorus (P)-Total Dissolved	0.021		mg/L			09-AUG-17
Phosphorus (P)-Total	0.028		mg/L			09-AUG-17
Ammonia, Total (as N)	0.026		mg/L			11-AUG-17
Escherichia Coli	4		MPN/100mL	0		04-AUG-17
Total Coliforms	1410		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	1.89		mg/L			10-AUG-17
Total Nitrogen	1.89		mg/L			13-AUG-17
Total Suspended Solids	<2.0		mg/L			10-AUG-17

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Matrix: SW

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: FIELD BLANK
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-11
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	4.4		mg/L			11-AUG-17
Carbonate (CO ₃)	<0.60		mg/L			11-AUG-17
Hydroxide (OH)	<0.34		mg/L			11-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	6.70		pH units			10-AUG-17
Turbidity						
*Turbidity	<0.10		NTU			04-AUG-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	<0.0030		mg/L		0.1	09-AUG-17
Antimony (Sb)-Total	0.00018		mg/L	0.006		09-AUG-17
Arsenic (As)-Total	<0.00010		mg/L	0.01		09-AUG-17
Barium (Ba)-Total	<0.00010		mg/L	1		09-AUG-17
Beryllium (Be)-Total	<0.00010		mg/L			09-AUG-17
Bismuth (Bi)-Total	<0.000050		mg/L			09-AUG-17
Boron (B)-Total	<0.010		mg/L	5		09-AUG-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		09-AUG-17
Calcium (Ca)-Total	0.096		mg/L			09-AUG-17
Cesium (Cs)-Total	<0.000010		mg/L			09-AUG-17
Chromium (Cr)-Total	<0.00010		mg/L	0.05		09-AUG-17
Cobalt (Co)-Total	<0.00010		mg/L			09-AUG-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	09-AUG-17
Iron (Fe)-Total	<0.010		mg/L		0.3	09-AUG-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		09-AUG-17
Lithium (Li)-Total	<0.0010		mg/L			09-AUG-17
Magnesium (Mg)-Total	0.0068		mg/L			09-AUG-17
Manganese (Mn)-Total	0.00013		mg/L		0.05	09-AUG-17
Molybdenum (Mo)-Total	<0.000050		mg/L			09-AUG-17
Nickel (Ni)-Total	<0.00050		mg/L			09-AUG-17
Potassium (K)-Total	<0.050		mg/L			09-AUG-17
Phosphorus (P)-Total	<0.050		mg/L			09-AUG-17
Rubidium (Rb)-Total	<0.00020		mg/L			09-AUG-17
Selenium (Se)-Total	<0.000050		mg/L	0.05		09-AUG-17
Silicon (Si)-Total	<0.10		mg/L			09-AUG-17
Silver (Ag)-Total	<0.000010		mg/L			09-AUG-17
Sodium (Na)-Total	<0.050		mg/L		200	09-AUG-17
Strontium (Sr)-Total	<0.00020		mg/L			09-AUG-17
Sulfur (S)-Total	<0.50		mg/L			09-AUG-17
Tellurium (Te)-Total	<0.00020		mg/L			09-AUG-17
Thallium (Tl)-Total	<0.000010		mg/L			09-AUG-17
Thorium (Th)-Total	<0.00010		mg/L			09-AUG-17
Tin (Sn)-Total	<0.00010		mg/L			09-AUG-17
Titanium (Ti)-Total	<0.00030		mg/L			09-AUG-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L1969989
Project Ref: 16-0300-006.1200.06
Sample ID: FIELD BLANK
Sampled By: DL+ATM
Date Collected: 03-AUG-17
Lab Sample ID: L1969989-11
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			09-AUG-17
Uranium (U)-Total	<0.000010		mg/L	0.02		09-AUG-17
Vanadium (V)-Total	<0.00050		mg/L			09-AUG-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	09-AUG-17
Zirconium (Zr)-Total	<0.000060		mg/L			09-AUG-17
TDS calculated						
TDS (Calculated)	<5.0		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	<0.30		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	0.27	HTC	mg/L		500	06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	<0.020		mg/L	1.5		04-AUG-17
Conductivity						
Conductivity	1.0		umhos/cm			10-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	<0.10		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	3.6		mg/L			10-AUG-17
Phosphorus (P)-Total Dissolved	<0.0010		mg/L			14-AUG-17
Phosphorus (P)-Total	<0.0010		mg/L			14-AUG-17
Ammonia, Total (as N)	<0.010		mg/L			12-AUG-17
Escherichia Coli	<1		MPN/100mL	0		04-AUG-17
Total Coliforms	<1		MPN/100mL	0		04-AUG-17
Total Kjeldahl Nitrogen	<0.20		mg/L			10-AUG-17
Total Nitrogen	<0.20		mg/L			13-AUG-17
Total Suspended Solids	<2.0		mg/L			10-AUG-17

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Matrix: SW

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Guidelines & Objectives

Sample Parameter Qualifier key listed:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO ₃ -1
Carbonate	See Alkalinity. Reported at the anion CO ₃ -2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure or capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness).The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic	
Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1969989

Report Date: 11-JUL-18

Page 1 of 10

Client: KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4

Contact: Marci Friedman Hamm

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP		Water						
Batch	R3793923							
WG2587737-10 DUP		L1969989-1						
Alkalinity, Total (as CaCO ₃)		195	194		mg/L	0.7	20	05-AUG-17
WG2587737-4 LCS								
Alkalinity, Total (as CaCO ₃)			107.4		%		85-115	05-AUG-17
WG2587737-9 LCS								
Alkalinity, Total (as CaCO ₃)			108.2		%		85-115	05-AUG-17
WG2587737-1 MB								
Alkalinity, Total (as CaCO ₃)			1.7	B	mg/L		1	05-AUG-17
WG2587737-6 MB								
Alkalinity, Total (as CaCO ₃)			1.6	B	mg/L		1	05-AUG-17
Batch	R3795479							
WG2589854-4 LCS								
Alkalinity, Total (as CaCO ₃)			104.4		%		85-115	10-AUG-17
WG2589854-1 MB								
Alkalinity, Total (as CaCO ₃)			<1.0		mg/L		1	10-AUG-17
CL-L-IC-N-WP		Water						
Batch	R3794128							
WG2585475-10 LCS								
Chloride (Cl)			98.8		%		90-110	04-AUG-17
WG2585475-6 LCS								
Chloride (Cl)			98.8		%		90-110	04-AUG-17
WG2585475-5 MB								
Chloride (Cl)			<0.10		mg/L		0.1	04-AUG-17
WG2585475-9 MB								
Chloride (Cl)			<0.10		mg/L		0.1	04-AUG-17
EC-QT97-ENDPT-WP		Water						
Batch	R3793439							
WG2587842-2 DUP		L1969989-1						
Escherichia Coli		6	5		MPN/100mL	19	65	04-AUG-17
WG2587842-1 MB								
Escherichia Coli			<1		MPN/100mL		1	04-AUG-17
EC-WP		Water						
Batch	R3793923							
WG2587737-10 DUP		L1969989-1						
Conductivity		864	860		umhos/cm	0.5	10	05-AUG-17
WG2587737-3 LCS								
Conductivity			100.6		%		90-110	05-AUG-17
WG2587737-8 LCS								



Quality Control Report

Workorder: L1969989

Report Date: 11-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WP		Water						
Batch	R3793923							
WG2587737-8	LCS							
Conductivity			100.1		%		90-110	05-AUG-17
WG2587737-1	MB							
Conductivity			<1.0		umhos/cm		1	05-AUG-17
WG2587737-6	MB							
Conductivity			<1.0		umhos/cm		1	05-AUG-17
Batch	R3795479							
WG2589854-3	LCS							
Conductivity			99.8		%		90-110	10-AUG-17
WG2589854-1	MB							
Conductivity			<1.0		umhos/cm		1	10-AUG-17
F-IC-N-WP		Water						
Batch	R3794128							
WG2585475-10	LCS							
Fluoride (F)			102.8		%		90-110	04-AUG-17
WG2585475-6	LCS							
Fluoride (F)			99.3		%		90-110	04-AUG-17
WG2585475-5	MB							
Fluoride (F)			<0.020		mg/L		0.02	04-AUG-17
WG2585475-9	MB							
Fluoride (F)			<0.020		mg/L		0.02	04-AUG-17
MET-T-CCMS-WP		Water						
Batch	R3794465							
WG2588114-2	LCS							
Aluminum (Al)-Total			104.1		%		80-120	09-AUG-17
Antimony (Sb)-Total			104.8		%		80-120	09-AUG-17
Arsenic (As)-Total			106.3		%		80-120	09-AUG-17
Barium (Ba)-Total			103.8		%		80-120	09-AUG-17
Beryllium (Be)-Total			101.5		%		80-120	09-AUG-17
Bismuth (Bi)-Total			102.8		%		80-120	09-AUG-17
Boron (B)-Total			104.6		%		80-120	09-AUG-17
Cadmium (Cd)-Total			101.2		%		80-120	09-AUG-17
Calcium (Ca)-Total			103.6		%		80-120	09-AUG-17
Cesium (Cs)-Total			102.3		%		80-120	09-AUG-17
Chromium (Cr)-Total			102.4		%		80-120	09-AUG-17
Cobalt (Co)-Total			102.8		%		80-120	09-AUG-17
Copper (Cu)-Total			102.5		%		80-120	09-AUG-17

Quality Control Report

Workorder: L1969989

Report Date: 11-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R3794465							
WG2588114-2	LCS							
Iron (Fe)-Total			99.3		%		80-120	09-AUG-17
Lead (Pb)-Total			106.1		%		80-120	09-AUG-17
Lithium (Li)-Total			104.9		%		80-120	09-AUG-17
Magnesium (Mg)-Total			103.3		%		80-120	09-AUG-17
Manganese (Mn)-Total			104.8		%		80-120	09-AUG-17
Molybdenum (Mo)-Total			103.9		%		80-120	09-AUG-17
Nickel (Ni)-Total			103.9		%		80-120	09-AUG-17
Potassium (K)-Total			105.2		%		80-120	09-AUG-17
Phosphorus (P)-Total			102.9		%		80-120	09-AUG-17
Rubidium (Rb)-Total			108.4		%		80-120	09-AUG-17
Selenium (Se)-Total			95.1		%		80-120	09-AUG-17
Silicon (Si)-Total			103.2		%		80-120	09-AUG-17
Silver (Ag)-Total			104.3		%		80-120	09-AUG-17
Sodium (Na)-Total			102.3		%		80-120	09-AUG-17
Strontium (Sr)-Total			102.8		%		80-120	09-AUG-17
Sulfur (S)-Total			98.1		%		80-120	09-AUG-17
Tellurium (Te)-Total			96.4		%		80-120	09-AUG-17
Thallium (Tl)-Total			101.3		%		80-120	09-AUG-17
Thorium (Th)-Total			107.6		%		80-120	09-AUG-17
Tin (Sn)-Total			103.5		%		80-120	09-AUG-17
Titanium (Ti)-Total			104.4		%		80-120	09-AUG-17
Tungsten (W)-Total			107.6		%		80-120	09-AUG-17
Uranium (U)-Total			109.0		%		80-120	09-AUG-17
Vanadium (V)-Total			104.3		%		80-120	09-AUG-17
Zinc (Zn)-Total			97.9		%		80-120	09-AUG-17
Zirconium (Zr)-Total			101.2		%		80-120	09-AUG-17
WG2588114-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	09-AUG-17
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	09-AUG-17
Arsenic (As)-Total			<0.00010		mg/L		0.0001	09-AUG-17
Barium (Ba)-Total			<0.000050		mg/L		0.00005	09-AUG-17
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	09-AUG-17
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	09-AUG-17
Boron (B)-Total			<0.010		mg/L		0.01	09-AUG-17



Workorder: L1969989

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R3794465							
WG2588114-1 MB								
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	09-AUG-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	09-AUG-17
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	09-AUG-17
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	09-AUG-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	09-AUG-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	09-AUG-17
Iron (Fe)-Total			<0.010		mg/L		0.01	09-AUG-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	09-AUG-17
Lithium (Li)-Total			<0.0010		mg/L		0.001	09-AUG-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	09-AUG-17
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	09-AUG-17
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	09-AUG-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	09-AUG-17
Potassium (K)-Total			<0.050		mg/L		0.05	09-AUG-17
Phosphorus (P)-Total			<0.050		mg/L		0.05	09-AUG-17
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	09-AUG-17
Selenium (Se)-Total			<0.000050		mg/L		0.00005	09-AUG-17
Silicon (Si)-Total			<0.10		mg/L		0.1	09-AUG-17
Silver (Ag)-Total			<0.000010		mg/L		0.00001	09-AUG-17
Sodium (Na)-Total			<0.050		mg/L		0.05	09-AUG-17
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	09-AUG-17
Sulfur (S)-Total			<0.50		mg/L		0.5	09-AUG-17
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	09-AUG-17
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	09-AUG-17
Thorium (Th)-Total			<0.00010		mg/L		0.0001	09-AUG-17
Tin (Sn)-Total			<0.00010		mg/L		0.0001	09-AUG-17
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	09-AUG-17
Tungsten (W)-Total			<0.00010		mg/L		0.0001	09-AUG-17
Uranium (U)-Total			<0.000010		mg/L		0.00001	09-AUG-17
Vanadium (V)-Total			<0.00050		mg/L		0.0005	09-AUG-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	09-AUG-17
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	09-AUG-17
N-TOTKJ-WP		Water						



Workorder: L1969989

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-WP		Water						
Batch	R3794128							
WG2585475-10	LCS							
Nitrate (as N)			99.3		%		90-110	04-AUG-17
WG2585475-6	LCS							
Nitrate (as N)			99.3		%		90-110	04-AUG-17
WG2585475-5	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	04-AUG-17
WG2585475-9	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	04-AUG-17
P-T-COL-WP		Water						
Batch	R3793726							
WG2585919-14	LCS							
Phosphorus (P)-Total			96.4		%		80-120	09-AUG-17
WG2585919-13	MB							
Phosphorus (P)-Total			<0.010		mg/L		0.01	09-AUG-17
P-T-L-COL-WP		Water						
Batch	R3799924							
WG2592186-10	LCS							
Phosphorus (P)-Total			99.1		%		80-120	14-AUG-17
WG2592186-9	MB							
Phosphorus (P)-Total			<0.0010		mg/L		0.001	14-AUG-17
P-TD-COL-WP		Water						
Batch	R3793774							
WG2587348-10	LCS							
Phosphorus (P)-Total	Dissolved		96.4		%		80-120	09-AUG-17
WG2587348-6	LCS							
Phosphorus (P)-Total	Dissolved		95.6		%		80-120	09-AUG-17
WG2587348-5	MB							
Phosphorus (P)-Total	Dissolved		<0.010		mg/L		0.01	09-AUG-17
WG2587348-9	MB							
Phosphorus (P)-Total	Dissolved		<0.010		mg/L		0.01	09-AUG-17
P-TD-L-COL-WP		Water						
Batch	R3799924							
WG2592176-18	LCS							
Phosphorus (P)-Total	Dissolved		97.1		%		80-120	14-AUG-17
WG2592176-17	MB							
Phosphorus (P)-Total	Dissolved		<0.0010		mg/L		0.001	14-AUG-17
PH-WP		Water						



Workorder: L1969989

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed				
PH-WP		Water										
Batch	R3793923											
WG2587737-10	DUP	L1969989-1	8.62	J	pH units	0.00	0.2	05-AUG-17				
pH												
WG2587737-2	LCS								7.41	pH units	7.3-7.5	05-AUG-17
pH												
WG2587737-7	LCS											
pH		7.41	pH units	7.3-7.5	05-AUG-17							
Batch	R3795479											
WG2589854-2	LCS		7.41		pH units		7.3-7.5	10-AUG-17				
pH												
SO4-IC-N-WP		Water										
Batch	R3794128											
WG2585475-10	LCS		99.9		%		90-110	04-AUG-17				
Sulfate (SO4)												
WG2585475-6	LCS											
Sulfate (SO4)		99.9							%	90-110	04-AUG-17	
WG2585475-5	MB											
Sulfate (SO4)		<0.30	mg/L	0.3	04-AUG-17							
WG2585475-9	MB		<0.30		mg/L		0.3	04-AUG-17				
Sulfate (SO4)												
SOLIDS-TOTSUS-LR-WP		Water										
Batch	R3795407											
WG2588769-2	LCS		92.0		%		85-115	10-AUG-17				
Total Suspended Solids												
WG2588769-1	MB		<2.0		mg/L		2	10-AUG-17				
Total Suspended Solids												
TC-QT97-ENDPT-WP		Water										
Batch	R3793438											
WG2585778-4	DUP	L1969989-1	5380	4350	MPN/100mL	21	65	04-AUG-17				
Total Coliforms												
WG2585778-3	MB		<1		MPN/100mL		1	04-AUG-17				
Total Coliforms												
TURBIDITY-WP		Water										
Batch	R3795278											
WG2585635-6	DUP	L1969989-5	1.02	1.05	NTU	2.9	15	04-AUG-17				
Turbidity												
WG2585635-2	LCS											



Quality Control Report

Workorder: L1969989

Report Date: 11-JUL-18

Page 8 of 10

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-WP		Water						
Batch	R3795278							
WG2585635-2	LCS							
Turbidity			101.0		%		85-115	04-AUG-17
WG2585635-5	LCS							
Turbidity			101.0		%		85-115	04-AUG-17
WG2585635-1	MB							
Turbidity			<0.10		NTU		0.1	04-AUG-17
WG2585635-4	MB							
Turbidity			<0.10		NTU		0.1	04-AUG-17

Quality Control Report

Workorder: L1969989

Report Date: 11-JUL-18

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1969989

Report Date: 11-JUL-18

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	03-AUG-17 14:25	05-AUG-17 12:00	0.25	46	hours	EHTR-FM
	2	03-AUG-17 13:50	05-AUG-17 12:00	0.25	46	hours	EHTR-FM
	3	03-AUG-17 12:45	05-AUG-17 12:00	0.25	47	hours	EHTR-FM
	4	03-AUG-17 11:45	05-AUG-17 12:00	0.25	48	hours	EHTR-FM
	5	03-AUG-17 10:45	05-AUG-17 12:00	0.25	49	hours	EHTR-FM
	6	03-AUG-17 10:25	05-AUG-17 12:00	0.25	50	hours	EHTR-FM
	7	03-AUG-17 10:10	05-AUG-17 12:00	0.25	50	hours	EHTR-FM
	8	03-AUG-17 09:40	05-AUG-17 12:00	0.25	50	hours	EHTR-FM
	9	03-AUG-17 09:00	05-AUG-17 12:00	0.25	51	hours	EHTR-FM
	10	03-AUG-17 11:45	05-AUG-17 12:00	0.25	48	hours	EHTR-FM
	11	03-AUG-17 09:00	10-AUG-17 12:00	0.25	171	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1969989 were received on 04-AUG-17 08:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L1969989

Page ____ of ____

Report To			Report Format / Distribution			Service Request: (Rush subject to availability - Contact ALS to confirm TAT)												
Company: <u>KES Group</u>			Standard: ☒ Other (specify):			☒ Regular (Standard)												
Contact: <u>Marci Friedman Hamm</u>			Select: PDF ☒ Excel ☒ Digital ☒ Fax			Priority (2-4 B)												
Address: <u>865 Waverley St.</u>			Email 1: <u>MFHamm@KESGroup.com</u>			Emergency ()												
<u>Winnipeg, MB</u>			Email 2: <u>DLentch@KESGroup.com</u>			Same Day or												
Phone: <u>204-846-1209</u> Fax:			<u>AMclvin@KESGroup.com</u>															
Invoice To Same as Report? (circle) <u>Yes</u> or No (if No, provide details)			Client / Project Information															
Copy of Invoice with Report? (circle) <u>Yes</u> or No			Job #: <u>16-0300-006</u>															
Company:			PO / AFE:															
Contact:			LSD:															
Address:			Quote #: <u>58403</u>															
Phone: Fax:			ALS Contact: <u>Judy</u>			Sampler: <u>DL + ATM</u>									Number of Containers			
Lab Work Order # (lab use only)																		
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	ROU4W-T-L-WP	N-TOTKJ-WP	P-T-COL-WP	NH3-COL-WP	ETL-N-TOT-AM-WP	P-TD-COL-WP	SUL10S-TOT-SUS-LR-WP	TC, EC-AT-97-ENOF-P						
D1		03-AUG-17	14:25	SW														
D2			13:50															
D3			12:45															
D4			11:45															
D5			10:45															
D6			10:25															
D7			10:10															
D8			9:40															
D9			9:00															
SW 200			11:45															
Field Blank			9:00															
Special Instructions / Regulation with water or land use (CCME - Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details																		
For P-TD, lab should filter and preserve																		
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																		
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.																		
SHIPMENT RELEASE (client use)					SHIPMENT RECEPTION (lab use only)					SHIPMENT VERIFICATION (lab use only)								
Released by:		Date:	Time:		Received by:		Date:	Time:	Temperature:	Verified by:		Date:	Time:	Observations:				
<original signed by>		<u>Aug</u>	<u>7:59</u>		<original signed by>		<u>4-8-17</u>	<u>8:00</u>	<u>8.6 °C</u>					Yes / No ? If Yes add SIF				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY

YELLOW - CLIENT COPY

GENF 18.01 Front



KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-ED03 [AUG 2]
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-1
Matrix: GW

PAGE 1 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	270		mg/L			09-AUG-17
Carbonate (CO3)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	0.0139		mg/L	10		10-AUG-17
pH						
pH	8.23		pH units			05-AUG-17
TDS calculated						
TDS (Calculated)	320		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	53.6		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	0.0139		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	134		mg/L		500	06-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					08-AUG-17
Filtration Location						
Aluminum (Al)-Dissolved	0.0128		mg/L		0.1	08-AUG-17
Antimony (Sb)-Dissolved	0.00046		mg/L	0.006		08-AUG-17
Arsenic (As)-Dissolved	0.00066		mg/L	0.01		08-AUG-17
Barium (Ba)-Dissolved	0.0192		mg/L	1		08-AUG-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			08-AUG-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			08-AUG-17
Boron (B)-Dissolved	0.187		mg/L	5		08-AUG-17
Cadmium (Cd)-Dissolved	0.0000123		mg/L	0.005		08-AUG-17
Calcium (Ca)-Dissolved	18.0		mg/L			08-AUG-17
Cesium (Cs)-Dissolved	0.000012		mg/L			08-AUG-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		08-AUG-17
Cobalt (Co)-Dissolved	0.00049		mg/L			08-AUG-17
Copper (Cu)-Dissolved	0.00097		mg/L	2.0	1.0	08-AUG-17
Iron (Fe)-Dissolved	0.010		mg/L		0.3	08-AUG-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		08-AUG-17
Lithium (Li)-Dissolved	0.0104		mg/L			08-AUG-17
Magnesium (Mg)-Dissolved	21.7		mg/L			08-AUG-17
Manganese (Mn)-Dissolved	0.103		mg/L		0.05	08-AUG-17
Molybdenum (Mo)-Dissolved	0.0392		mg/L			08-AUG-17

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-ED03 [AUG 2]
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-1
Matrix: GW

PAGE 2 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	0.00454		mg/L			08-AUG-17
Phosphorus (P)-Dissolved	<0.050		mg/L			08-AUG-17
Potassium (K)-Dissolved	2.17		mg/L			08-AUG-17
Rubidium (Rb)-Dissolved	0.00086		mg/L			08-AUG-17
Selenium (Se)-Dissolved	0.000167		mg/L	0.05		08-AUG-17
Silicon (Si)-Dissolved	4.12		mg/L			08-AUG-17
Silver (Ag)-Dissolved	<0.000010		mg/L			08-AUG-17
Sodium (Na)-Dissolved	74.1		mg/L		200	08-AUG-17
Strontium (Sr)-Dissolved	0.0800		mg/L			08-AUG-17
Sulfur (S)-Dissolved	19.6		mg/L			08-AUG-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			08-AUG-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			08-AUG-17
Thorium (Th)-Dissolved	<0.00010		mg/L			08-AUG-17
Tin (Sn)-Dissolved	0.00089		mg/L			08-AUG-17
Titanium (Ti)-Dissolved	0.00143		mg/L			08-AUG-17
Tungsten (W)-Dissolved	0.0130		mg/L			08-AUG-17
Uranium (U)-Dissolved	0.00474		mg/L	0.02		08-AUG-17
Vanadium (V)-Dissolved	0.00244		mg/L			08-AUG-17
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	08-AUG-17
Zirconium (Zr)-Dissolved	0.000129		mg/L			08-AUG-17
Conductivity						
Conductivity	520		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	17.6		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	221		mg/L			05-AUG-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
Approved by	 Hua Wo Account Manager					

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ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-ED03 [AUG 2]
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-1
Matrix: GW

PAGE 3 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued	with complete dissolved metals results					

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ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-GD-07
Sampled By: DL+AIM
Date Collected: 01-AUG-17
Lab Sample ID: L1970036-2
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO ₃)	404		mg/L			09-AUG-17
Carbonate (CO ₃)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	7.63		pH units			05-AUG-17
TDS calculated						
TDS (Calculated)	482		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO ₄)	116		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO ₃)	379		mg/L		500	06-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					08-AUG-17
Filtration Location						
Aluminum (Al)-Dissolved	0.0015		mg/L		0.1	08-AUG-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		08-AUG-17
Arsenic (As)-Dissolved	0.00013		mg/L	0.01		08-AUG-17
Barium (Ba)-Dissolved	0.0195		mg/L	1		08-AUG-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			08-AUG-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			08-AUG-17
Boron (B)-Dissolved	0.481		mg/L	5		08-AUG-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		08-AUG-17
Calcium (Ca)-Dissolved	70.8		mg/L			08-AUG-17
Cesium (Cs)-Dissolved	0.000036		mg/L			08-AUG-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		08-AUG-17
Cobalt (Co)-Dissolved	<0.00010		mg/L			08-AUG-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	08-AUG-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	08-AUG-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		08-AUG-17
Lithium (Li)-Dissolved	0.0296		mg/L			08-AUG-17
Magnesium (Mg)-Dissolved	49.2		mg/L			08-AUG-17
Manganese (Mn)-Dissolved	0.0100		mg/L		0.05	08-AUG-17
Molybdenum (Mo)-	0.000273		mg/L			08-AUG-17

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ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-GD-07
Sampled By: DL+AIM
Date Collected: 01-AUG-17
Lab Sample ID: L1970036-2
Matrix: GW

PAGE 5 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			08-AUG-17
Phosphorus (P)-Dissolved	<0.050		mg/L			08-AUG-17
Potassium (K)-Dissolved	10.2		mg/L			08-AUG-17
Rubidium (Rb)-Dissolved	0.00594		mg/L			08-AUG-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		08-AUG-17
Silicon (Si)-Dissolved	5.03		mg/L			08-AUG-17
Silver (Ag)-Dissolved	<0.000010		mg/L			08-AUG-17
Sodium (Na)-Dissolved	31.7		mg/L		200	08-AUG-17
Strontium (Sr)-Dissolved	0.510		mg/L			08-AUG-17
Sulfur (S)-Dissolved	41.4		mg/L			08-AUG-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			08-AUG-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			08-AUG-17
Thorium (Th)-Dissolved	<0.00010		mg/L			08-AUG-17
Tin (Sn)-Dissolved	<0.00010		mg/L			08-AUG-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			08-AUG-17
Tungsten (W)-Dissolved	<0.00010		mg/L			08-AUG-17
Uranium (U)-Dissolved	0.000610		mg/L	0.02		08-AUG-17
Vanadium (V)-Dissolved	<0.00050		mg/L			08-AUG-17
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	08-AUG-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			08-AUG-17
Conductivity						
Conductivity	747		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.30		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	332		mg/L			05-AUG-17
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-GD-07
Sampled By: DL+AIM
Date Collected: 01-AUG-17
Lab Sample ID: L1970036-2
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued	with complete dissolved metals results					

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Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: 15-PW-1
Sampled By: DL+AIM
Date Collected: 01-AUG-17
Lab Sample ID: L1970036-3
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	413		mg/L			09-AUG-17
Carbonate (CO3)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	7.65		pH units			05-AUG-17
TDS calculated						
TDS (Calculated)	489		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	118		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	383		mg/L		500	06-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					08-AUG-17
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	08-AUG-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		08-AUG-17
Arsenic (As)-Dissolved	0.00020		mg/L	0.01		08-AUG-17
Barium (Ba)-Dissolved	0.0207		mg/L	1		08-AUG-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			08-AUG-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			08-AUG-17
Boron (B)-Dissolved	0.486		mg/L	5		08-AUG-17
Cadmium (Cd)-Dissolved	0.0000066		mg/L	0.005		08-AUG-17
Calcium (Ca)-Dissolved	69.5		mg/L			08-AUG-17
Cesium (Cs)-Dissolved	0.000047		mg/L			08-AUG-17
Chromium (Cr)-Dissolved	0.00069		mg/L	0.05		08-AUG-17
Cobalt (Co)-Dissolved	<0.00010		mg/L			08-AUG-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	08-AUG-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	08-AUG-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		08-AUG-17
Lithium (Li)-Dissolved	0.0299		mg/L			08-AUG-17
Magnesium (Mg)-Dissolved	51.0		mg/L			08-AUG-17
Manganese (Mn)-Dissolved	0.00413		mg/L		0.05	08-AUG-17
Molybdenum (Mo)-	0.000203		mg/L			08-AUG-17

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Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: 15-PW-1
Sampled By: DL+AIM
Date Collected: 01-AUG-17
Lab Sample ID: L1970036-3
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			08-AUG-17
Phosphorus (P)-Dissolved	<0.050		mg/L			08-AUG-17
Potassium (K)-Dissolved	10.3		mg/L			08-AUG-17
Rubidium (Rb)-Dissolved	0.00579		mg/L			08-AUG-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		08-AUG-17
Silicon (Si)-Dissolved	5.12		mg/L			08-AUG-17
Silver (Ag)-Dissolved	<0.000010		mg/L			08-AUG-17
Sodium (Na)-Dissolved	32.1		mg/L		200	08-AUG-17
Strontium (Sr)-Dissolved	0.508		mg/L			08-AUG-17
Sulfur (S)-Dissolved	42.7		mg/L			08-AUG-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			08-AUG-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			08-AUG-17
Thorium (Th)-Dissolved	<0.00010		mg/L			08-AUG-17
Tin (Sn)-Dissolved	<0.00010		mg/L			08-AUG-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			08-AUG-17
Tungsten (W)-Dissolved	<0.00010		mg/L			08-AUG-17
Uranium (U)-Dissolved	0.000819		mg/L	0.02		08-AUG-17
Vanadium (V)-Dissolved	<0.00050		mg/L			08-AUG-17
Zinc (Zn)-Dissolved	0.0012		mg/L		5.0	08-AUG-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			08-AUG-17
Conductivity						
Conductivity	773		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.39		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	338		mg/L			05-AUG-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by Hua Wo Account Manager						

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Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: 15-PW-1
Sampled By: DL+AIM
Date Collected: 01-AUG-17
Lab Sample ID: L1970036-3
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued	with complete dissolved metals results					

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Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-ED-01W
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-4
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO ₃)	392		mg/L			09-AUG-17
Carbonate (CO ₃)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	7.61		pH units			05-AUG-17
TDS calculated						
TDS (Calculated)	511		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO ₄)	143		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO ₃)	397		mg/L		500	06-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					08-AUG-17
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	08-AUG-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		08-AUG-17
Arsenic (As)-Dissolved	0.00043		mg/L	0.01		08-AUG-17
Barium (Ba)-Dissolved	0.0139		mg/L	1		08-AUG-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			08-AUG-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			08-AUG-17
Boron (B)-Dissolved	0.547		mg/L	5		08-AUG-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		08-AUG-17
Calcium (Ca)-Dissolved	78.6		mg/L			08-AUG-17
Cesium (Cs)-Dissolved	0.000047		mg/L			08-AUG-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		08-AUG-17
Cobalt (Co)-Dissolved	0.00016		mg/L			08-AUG-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	08-AUG-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	08-AUG-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		08-AUG-17
Lithium (Li)-Dissolved	0.0307		mg/L			08-AUG-17
Magnesium (Mg)-Dissolved	48.7		mg/L			08-AUG-17
Manganese (Mn)-Dissolved	0.00908		mg/L		0.05	08-AUG-17
Molybdenum (Mo)-	0.000243		mg/L			08-AUG-17

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Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-ED-01W
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-4
Matrix: GW

PAGE 11 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	0.00070		mg/L			08-AUG-17
Phosphorus (P)-Dissolved	<0.050		mg/L			08-AUG-17
Potassium (K)-Dissolved	9.77		mg/L			08-AUG-17
Rubidium (Rb)-Dissolved	0.00681		mg/L			08-AUG-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		08-AUG-17
Silicon (Si)-Dissolved	4.99		mg/L			08-AUG-17
Silver (Ag)-Dissolved	<0.000010		mg/L			08-AUG-17
Sodium (Na)-Dissolved	31.6		mg/L		200	08-AUG-17
Strontium (Sr)-Dissolved	0.538		mg/L			08-AUG-17
Sulfur (S)-Dissolved	50.7		mg/L			08-AUG-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			08-AUG-17
Thallium (Tl)-Dissolved	0.000020		mg/L			08-AUG-17
Thorium (Th)-Dissolved	<0.00010		mg/L			08-AUG-17
Tin (Sn)-Dissolved	<0.00010		mg/L			08-AUG-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			08-AUG-17
Tungsten (W)-Dissolved	<0.00010		mg/L			08-AUG-17
Uranium (U)-Dissolved	0.00118		mg/L	0.02		08-AUG-17
Vanadium (V)-Dissolved	<0.00050		mg/L			08-AUG-17
Zinc (Zn)-Dissolved	0.0017		mg/L		5.0	08-AUG-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			08-AUG-17
Conductivity						
Conductivity	783		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.84		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	321		mg/L			05-AUG-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-ED-01W
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-4
Matrix: GW

PAGE 12 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued	with complete dissolved metals results					

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Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-ED-01P
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-5
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	384		mg/L			09-AUG-17
Carbonate (CO3)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	7.62		pH units			05-AUG-17
TDS calculated						
TDS (Calculated)	515		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	149		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	392		mg/L		500	06-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					08-AUG-17
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	08-AUG-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		08-AUG-17
Arsenic (As)-Dissolved	0.00050		mg/L	0.01		08-AUG-17
Barium (Ba)-Dissolved	0.0145		mg/L	1		08-AUG-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			08-AUG-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			08-AUG-17
Boron (B)-Dissolved	0.559		mg/L	5		08-AUG-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		08-AUG-17
Calcium (Ca)-Dissolved	78.0		mg/L			08-AUG-17
Cesium (Cs)-Dissolved	0.000042		mg/L			08-AUG-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		08-AUG-17
Cobalt (Co)-Dissolved	0.00025		mg/L			08-AUG-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	08-AUG-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	08-AUG-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		08-AUG-17
Lithium (Li)-Dissolved	0.0301		mg/L			08-AUG-17
Magnesium (Mg)-Dissolved	47.8		mg/L			08-AUG-17
Manganese (Mn)-Dissolved	0.0141		mg/L		0.05	08-AUG-17
Molybdenum (Mo)-	0.000262		mg/L			08-AUG-17

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PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-ED-01P
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-5
Matrix: GW

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Sample ID: TH-ED-01P
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-5
Matrix: GW

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PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-GD-02
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-6
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	330		mg/L			09-AUG-17
Carbonate (CO3)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	7.78		pH units			05-AUG-17
TDS calculated						
TDS (Calculated)	494		mg/L		500	09-AUG-17
Sulfate in Water by IC						
Sulfate (SO4)	156		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	362		mg/L		500	09-AUG-17
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					08-AUG-17
Filtration Location						
Aluminum (Al)-Dissolved	0.0011		mg/L		0.1	08-AUG-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		08-AUG-17
Arsenic (As)-Dissolved	<0.00010		mg/L	0.01		08-AUG-17
Barium (Ba)-Dissolved	0.0204		mg/L	1		08-AUG-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			08-AUG-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			08-AUG-17
Boron (B)-Dissolved	0.606		mg/L	5		08-AUG-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		08-AUG-17
Calcium (Ca)-Dissolved	66.9		mg/L			08-AUG-17
Cesium (Cs)-Dissolved	0.000035		mg/L			08-AUG-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		08-AUG-17
Cobalt (Co)-Dissolved	<0.00010		mg/L			08-AUG-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	08-AUG-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	08-AUG-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		08-AUG-17
Lithium (Li)-Dissolved	0.0345		mg/L			08-AUG-17
Magnesium (Mg)-Dissolved	47.2		mg/L			08-AUG-17
Manganese (Mn)-Dissolved	0.0122		mg/L		0.05	08-AUG-17
Molybdenum (Mo)-	0.000300		mg/L			08-AUG-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-GD-02
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-6
Matrix: GW

PAGE 17 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			08-AUG-17
Phosphorus (P)-Dissolved	<0.050		mg/L			08-AUG-17
Potassium (K)-Dissolved	9.85		mg/L			08-AUG-17
Rubidium (Rb)-Dissolved	0.00705		mg/L			08-AUG-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		08-AUG-17
Silicon (Si)-Dissolved	4.52		mg/L			08-AUG-17
Silver (Ag)-Dissolved	<0.000010		mg/L			08-AUG-17
Sodium (Na)-Dissolved	38.0		mg/L		200	08-AUG-17
Strontium (Sr)-Dissolved	0.519		mg/L			08-AUG-17
Sulfur (S)-Dissolved	56.4		mg/L			08-AUG-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			08-AUG-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			08-AUG-17
Thorium (Th)-Dissolved	<0.00010		mg/L			08-AUG-17
Tin (Sn)-Dissolved	<0.00010		mg/L			08-AUG-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			08-AUG-17
Tungsten (W)-Dissolved	<0.00010		mg/L			08-AUG-17
Uranium (U)-Dissolved	0.00153		mg/L	0.02		08-AUG-17
Vanadium (V)-Dissolved	<0.00050		mg/L			08-AUG-17
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	08-AUG-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			08-AUG-17
Conductivity						
Conductivity	758		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	13.0		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	271		mg/L			05-AUG-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by>						
Approved by _____ Hua Wo Account Manager						

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: TH-GD-02
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-6
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued	with complete dissolved metals results					

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: MW100
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-7
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	402		mg/L			09-AUG-17
Carbonate (CO3)	<0.60		mg/L			09-AUG-17
Hydroxide (OH)	<0.34		mg/L			09-AUG-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		10-AUG-17
pH						
pH	7.68		pH units			05-AUG-17
TDS calculated						
TDS (Calculated)	480		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	116		mg/L		500	04-AUG-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		04-AUG-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		04-AUG-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	379		mg/L		500	06-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					08-AUG-17
Filtration Location						
Aluminum (Al)-Dissolved	0.0013		mg/L		0.1	08-AUG-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		08-AUG-17
Arsenic (As)-Dissolved	0.00013		mg/L	0.01		08-AUG-17
Barium (Ba)-Dissolved	0.0195		mg/L	1		08-AUG-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			08-AUG-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			08-AUG-17
Boron (B)-Dissolved	0.485		mg/L	5		08-AUG-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		08-AUG-17
Calcium (Ca)-Dissolved	71.4		mg/L			08-AUG-17
Cesium (Cs)-Dissolved	0.000034		mg/L			08-AUG-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		08-AUG-17
Cobalt (Co)-Dissolved	<0.00010		mg/L			08-AUG-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	08-AUG-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	08-AUG-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		08-AUG-17
Lithium (Li)-Dissolved	0.0294		mg/L			08-AUG-17
Magnesium (Mg)-Dissolved	48.8		mg/L			08-AUG-17
Manganese (Mn)-Dissolved	0.0101		mg/L		0.05	08-AUG-17
Molybdenum (Mo)-	0.000209		mg/L			08-AUG-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: MW100
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-7
Matrix: GW

PAGE 20 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			08-AUG-17
Phosphorus (P)-Dissolved	<0.050		mg/L			08-AUG-17
Potassium (K)-Dissolved	10.0		mg/L			08-AUG-17
Rubidium (Rb)-Dissolved	0.00606		mg/L			08-AUG-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		08-AUG-17
Silicon (Si)-Dissolved	5.06		mg/L			08-AUG-17
Silver (Ag)-Dissolved	<0.000010		mg/L			08-AUG-17
Sodium (Na)-Dissolved	31.1		mg/L		200	08-AUG-17
Strontium (Sr)-Dissolved	0.512		mg/L			08-AUG-17
Sulfur (S)-Dissolved	41.1		mg/L			08-AUG-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			08-AUG-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			08-AUG-17
Thorium (Th)-Dissolved	<0.00010		mg/L			08-AUG-17
Tin (Sn)-Dissolved	<0.00010		mg/L			08-AUG-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			08-AUG-17
Tungsten (W)-Dissolved	<0.00010		mg/L			08-AUG-17
Uranium (U)-Dissolved	0.000631		mg/L	0.02		08-AUG-17
Vanadium (V)-Dissolved	<0.00050		mg/L			08-AUG-17
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	08-AUG-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			08-AUG-17
Conductivity						
Conductivity	746		umhos/cm			05-AUG-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.28		mg/L		250	04-AUG-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	330		mg/L			05-AUG-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.: LBM
WO No.: L1970036
Project Ref: 16-0300-006.1200.05
Sample ID: MW100
Sampled By: DL+AIM
Date Collected: 02-AUG-17
Lab Sample ID: L1970036-7
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued	with complete dissolved metals results					

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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Guidelines & Objectives

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO ₃ -1
Carbonate	See Alkalinity. Reported at the anion CO ₃ -2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure or capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness). The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic	
Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1970036

Report Date: 11-JUL-18

Page 1 of 6

Client: KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4

Contact: Marci Friedman Hamm

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP		Water						
Batch	R3793923							
WG2587737-4	LCS							
Alkalinity, Total (as CaCO ₃)			107.4		%		85-115	05-AUG-17
WG2587737-9	LCS							
Alkalinity, Total (as CaCO ₃)			108.2		%		85-115	05-AUG-17
WG2587737-1	MB							
Alkalinity, Total (as CaCO ₃)			1.7	B	mg/L		1	05-AUG-17
WG2587737-6	MB							
Alkalinity, Total (as CaCO ₃)			1.6	B	mg/L		1	05-AUG-17
CL-L-IC-N-WP		Water						
Batch	R3794128							
WG2585475-10	LCS							
Chloride (Cl)			98.8		%		90-110	04-AUG-17
WG2585475-9	MB							
Chloride (Cl)			<0.10		mg/L		0.1	04-AUG-17
EC-WP		Water						
Batch	R3793923							
WG2587737-3	LCS							
Conductivity			100.6		%		90-110	05-AUG-17
WG2587737-8	LCS							
Conductivity			100.1		%		90-110	05-AUG-17
WG2587737-1	MB							
Conductivity			<1.0		umhos/cm		1	05-AUG-17
WG2587737-6	MB							
Conductivity			<1.0		umhos/cm		1	05-AUG-17
MET-D-CCMS-WP		Water						
Batch	R3793344							
WG2587171-2	LCS							
Aluminum (Al)-Dissolved			105.0		%		80-120	08-AUG-17
Antimony (Sb)-Dissolved			98.5		%		80-120	08-AUG-17
Arsenic (As)-Dissolved			103.8		%		80-120	08-AUG-17
Barium (Ba)-Dissolved			107.8		%		80-120	08-AUG-17
Beryllium (Be)-Dissolved			97.5		%		80-120	08-AUG-17
Bismuth (Bi)-Dissolved			101.2		%		80-120	08-AUG-17
Boron (B)-Dissolved			97.9		%		80-120	08-AUG-17
Cadmium (Cd)-Dissolved			102.7		%		80-120	08-AUG-17
Calcium (Ca)-Dissolved			99.9		%		80-120	08-AUG-17
Cesium (Cs)-Dissolved			101.6		%		80-120	08-AUG-17



Quality Control Report

Workorder: L1970036

Report Date: 11-JUL-18

Page 2 of 6

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WP		Water						
Batch	R3793344							
WG2587171-2		LCS						
Chromium (Cr)-Dissolved			103.0		%		80-120	08-AUG-17
Cobalt (Co)-Dissolved			102.1		%		80-120	08-AUG-17
Copper (Cu)-Dissolved			101.4		%		80-120	08-AUG-17
Iron (Fe)-Dissolved			97.5		%		80-120	08-AUG-17
Lead (Pb)-Dissolved			100.9		%		80-120	08-AUG-17
Lithium (Li)-Dissolved			95.2		%		80-120	08-AUG-17
Magnesium (Mg)-Dissolved			106.2		%		80-120	08-AUG-17
Manganese (Mn)-Dissolved			104.3		%		80-120	08-AUG-17
Molybdenum (Mo)-Dissolved			103.4		%		80-120	08-AUG-17
Nickel (Ni)-Dissolved			102.8		%		80-120	08-AUG-17
Phosphorus (P)-Dissolved			103.4		%		80-120	08-AUG-17
Potassium (K)-Dissolved			103.9		%		80-120	08-AUG-17
Rubidium (Rb)-Dissolved			104.8		%		80-120	08-AUG-17
Selenium (Se)-Dissolved			97.6		%		80-120	08-AUG-17
Silicon (Si)-Dissolved			101.3		%		80-120	08-AUG-17
Silver (Ag)-Dissolved			103.9		%		80-120	08-AUG-17
Sodium (Na)-Dissolved			100.2		%		80-120	08-AUG-17
Strontium (Sr)-Dissolved			99.6		%		80-120	08-AUG-17
Sulfur (S)-Dissolved			100.5		%		80-120	08-AUG-17
Tellurium (Te)-Dissolved			101.6		%		80-120	08-AUG-17
Thallium (Tl)-Dissolved			101.6		%		80-120	08-AUG-17
Thorium (Th)-Dissolved			101.2		%		80-120	08-AUG-17
Tin (Sn)-Dissolved			103.6		%		80-120	08-AUG-17
Titanium (Ti)-Dissolved			100.3		%		80-120	08-AUG-17
Tungsten (W)-Dissolved			104.2		%		80-120	08-AUG-17
Uranium (U)-Dissolved			104.8		%		80-120	08-AUG-17
Vanadium (V)-Dissolved			103.7		%		80-120	08-AUG-17
Zinc (Zn)-Dissolved			97.5		%		80-120	08-AUG-17
Zirconium (Zr)-Dissolved			100.9		%		80-120	08-AUG-17
WG2587171-1		MB						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	08-AUG-17
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	08-AUG-17

Quality Control Report

Workorder: L1970036

Report Date: 11-JUL-18

Page 3 of 6

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WP		Water						
Batch	R3793344							
WG2587171-1 MB								
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	08-AUG-17
Boron (B)-Dissolved			<0.010		mg/L		0.01	08-AUG-17
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	08-AUG-17
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	08-AUG-17
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	08-AUG-17
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	08-AUG-17
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	08-AUG-17
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	08-AUG-17
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	08-AUG-17
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	08-AUG-17
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	08-AUG-17
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	08-AUG-17
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	08-AUG-17
Potassium (K)-Dissolved			<0.050		mg/L		0.05	08-AUG-17
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	08-AUG-17
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	08-AUG-17
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	08-AUG-17
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	08-AUG-17
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	08-AUG-17
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	08-AUG-17
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	08-AUG-17
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	08-AUG-17
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	08-AUG-17
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	08-AUG-17
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	08-AUG-17
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	08-AUG-17
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	08-AUG-17

Quality Control Report

Workorder: L1970036

Report Date: 11-JUL-18

Page 4 of 6

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WP	Water							
Batch	R3793344							
WG2587171-1 MB								
Zirconium (Zr)-Dissolved			<0.000060		mg/L		0.00006	08-AUG-17
NO2-L-IC-N-WP	Water							
Batch	R3794128							
WG2585475-10 LCS								
Nitrite (as N)			98.5		%		90-110	04-AUG-17
WG2585475-9 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	04-AUG-17
NO3-L-IC-N-WP	Water							
Batch	R3794128							
WG2585475-10 LCS								
Nitrate (as N)			99.3		%		90-110	04-AUG-17
WG2585475-9 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	04-AUG-17
PH-WP	Water							
Batch	R3793923							
WG2587737-2 LCS								
pH			7.41		pH units		7.3-7.5	05-AUG-17
WG2587737-7 LCS								
pH			7.41		pH units		7.3-7.5	05-AUG-17
SO4-IC-N-WP	Water							
Batch	R3794128							
WG2585475-10 LCS								
Sulfate (SO4)			99.9		%		90-110	04-AUG-17
WG2585475-9 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	04-AUG-17

Quality Control Report

Workorder: L1970036

Report Date: 11-JUL-18

Page 5 of 6

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

Quality Control Report

Workorder: L1970036

Report Date: 11-JUL-18

Page 6 of 6

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	02-AUG-17 16:00	05-AUG-17 12:00	0.25	68	hours	EHTR-FM
	2	01-AUG-17 12:55	05-AUG-17 12:00	0.25	95	hours	EHTR-FM
	3	01-AUG-17 14:15	05-AUG-17 12:00	0.25	94	hours	EHTR-FM
	4	02-AUG-17 08:55	05-AUG-17 12:00	0.25	75	hours	EHTR-FM
	5	02-AUG-17 09:15	05-AUG-17 12:00	0.25	75	hours	EHTR-FM
	6	02-AUG-17 11:50	05-AUG-17 12:00	0.25	72	hours	EHTR-FM
	7	02-AUG-17 12:00	05-AUG-17 12:00	0.25	72	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1970036 were received on 04-AUG-17 08:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

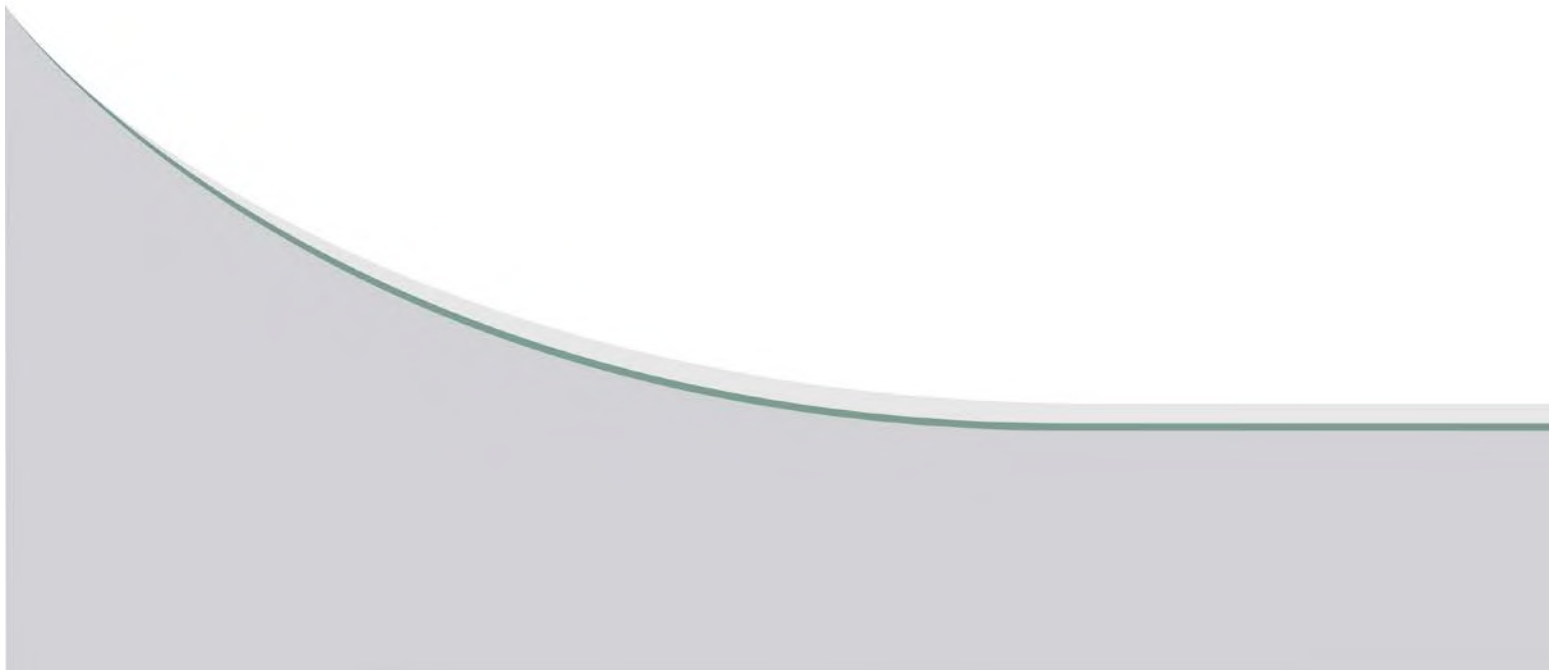
Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

~~496~~ 4970031

Page 1 of 1

Report To						Service Request:(Rush subject to availability - Contact ALS to confirm TAT)																					
Company: KGS Group						Standard: X Other (specify):																					
Contact: Marci Fikeman Hamm						Select: PDF X Excel X Digital X Fax																					
Address: 805 Waverley Street West MB L3T9W4						Email 1: MFHamm@KgsGroup.com																					
						Email 2: Dleitch@KgsGroup.com Amelvin@KgsGroup.com																					
Phone: 204-896-1204 Fax: 896-0754						Emergency (1 hr) Same Day or Next Business Day:																					
Invoice To Same as Report? (circle) Yes or No (if No, provide details)						Client / Project Information																					
Copy of Invoice with Report? (circle) Yes or No						Job #: 16-0300-006																					
Company:						PO/A/E: LBM																					
Contact:						LSD: Lake Manitoba																					
Address:																											
Phone: Fax:						Quote #: Q58403																					
Lab Work Order # (lab use only)						ALS Contact: Soly Sampler: DL + Air																					
Sample #	Sample Identification (This description will appear on the report)					Date (dd-mm-yy)	Time (hh:mm)	Sample Type																			
	TH ED-03					02-Aug-17	16:00	GW	X																		
	TH-GD-07					01-Aug-17	12:55	GW	X																		
	15-PW-1					01-Aug-17	14:15	GW	X																		
	TH ED-01W					02-Aug-17	8:55	GW	X																		
	TH-ED-01 P					02-Aug-17	9:15	GW	X																		
	TH-GD-02					02-Aug-17	11:50	GW	X																		
	MW 100					02-Aug-17	12:00	GW	X																		
	TH-EDQ3					01-Aug-17	11:00	GW	X																		
Special Instructions / Regulation with water or land-use (CCME-Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/etc.) / Hazardous Details																											
Times on COC are correct do not use time on bottles TH-ED-03 on Aug 3 is to be held(very silty)																											
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.																											
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white-report copy.																											
SHIPMENT RELEASE (client use)						SHIPMENT RECEPTION (lab use only)						SHIPMENT VERIFICATION (lab use only)															
Released by: <original signed by>						Date: Aug 3/17		Time: 7:59		Received by: <original signed by>		Date: 4-8-17		Time: 8:00		Temperature: 8.6 °C		Verified by:			Date:		Time:		Observations: Yes / No ? If Yes add SIF		

D3-F3 OCTOBER 2017





KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-ED-03
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-1
Matrix: GW

PAGE 1 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	301		mg/L			11-OCT-17
Carbonate (CO3)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	8.07		pH units			06-OCT-17
TDS calculated						
TDS (Calculated)	338		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	57.4		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	138		mg/L		500	10-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					11-OCT-17
Filtration Location						
Aluminum (Al)-Dissolved	0.0043		mg/L		0.1	11-OCT-17
Antimony (Sb)-Dissolved	0.00024		mg/L	0.006		11-OCT-17
Arsenic (As)-Dissolved	0.00103		mg/L	0.01		11-OCT-17
Barium (Ba)-Dissolved	0.0179		mg/L	1		11-OCT-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			11-OCT-17
Boron (B)-Dissolved	0.199		mg/L	5		11-OCT-17
Cadmium (Cd)-Dissolved	0.0000058		mg/L	0.005		11-OCT-17
Calcium (Ca)-Dissolved	17.9		mg/L			11-OCT-17
Cesium (Cs)-Dissolved	<0.000010		mg/L			11-OCT-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Dissolved	0.00030		mg/L			11-OCT-17
Copper (Cu)-Dissolved	0.00039		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	11-OCT-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Dissolved	0.0103		mg/L			11-OCT-17
Magnesium (Mg)-Dissolved	22.5		mg/L			11-OCT-17
Manganese (Mn)-Dissolved	0.0813		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Dissolved	0.0271		mg/L			11-OCT-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-ED-03
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-1
Matrix: GW

PAGE 2 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	0.00236		mg/L			11-OCT-17
Phosphorus (P)-Dissolved	<0.050		mg/L			11-OCT-17
Potassium (K)-Dissolved	1.83		mg/L			11-OCT-17
Rubidium (Rb)-Dissolved	0.00048		mg/L			11-OCT-17
Selenium (Se)-Dissolved	0.000124		mg/L	0.05		11-OCT-17
Silicon (Si)-Dissolved	4.66		mg/L			11-OCT-17
Silver (Ag)-Dissolved	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Dissolved	72.7		mg/L		200	11-OCT-17
Strontium (Sr)-Dissolved	0.0928		mg/L			11-OCT-17
Sulfur (S)-Dissolved	21.0		mg/L			11-OCT-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Dissolved	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Dissolved	0.00126		mg/L			11-OCT-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			11-OCT-17
Tungsten (W)-Dissolved	0.00662		mg/L			11-OCT-17
Uranium (U)-Dissolved	0.00238		mg/L	0.02		11-OCT-17
Vanadium (V)-Dissolved	0.00220		mg/L			11-OCT-17
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Dissolved	0.000109		mg/L			11-OCT-17
Conductivity						
Conductivity	508		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	17.8		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	247		mg/L			06-OCT-17
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-ED-03
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-1
Matrix: GW

PAGE 3 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued	with complete dissolved metals scan results					

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-GD-07
Sampled By: DL/ATM
Date Collected: 03-OCT-17
Lab Sample ID: L2003340-2
Matrix: GW

PAGE 4 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	401		mg/L			11-OCT-17
Carbonate (CO3)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	7.59		pH units			06-OCT-17
TDS calculated						
TDS (Calculated)	481		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	115		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	387		mg/L		500	10-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					11-OCT-17
Filtration Location						
Aluminum (Al)-Dissolved	0.0019		mg/L		0.1	11-OCT-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Dissolved	0.00013		mg/L	0.01		11-OCT-17
Barium (Ba)-Dissolved	0.0193		mg/L	1		11-OCT-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			11-OCT-17
Boron (B)-Dissolved	0.548		mg/L	5		11-OCT-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Dissolved	73.1		mg/L			11-OCT-17
Cesium (Cs)-Dissolved	0.000030		mg/L			11-OCT-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Dissolved	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	11-OCT-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Dissolved	0.0336		mg/L			11-OCT-17
Magnesium (Mg)-Dissolved	49.7		mg/L			11-OCT-17
Manganese (Mn)-Dissolved	0.00963		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-	0.000259		mg/L			11-OCT-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-GD-07
Sampled By: DL/ATM
Date Collected: 03-OCT-17
Lab Sample ID: L2003340-2
Matrix: GW

PAGE 5 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			11-OCT-17
Phosphorus (P)-Dissolved	<0.050		mg/L			11-OCT-17
Potassium (K)-Dissolved	10.1		mg/L			11-OCT-17
Rubidium (Rb)-Dissolved	0.00604		mg/L			11-OCT-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		11-OCT-17
Silicon (Si)-Dissolved	5.07		mg/L			11-OCT-17
Silver (Ag)-Dissolved	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Dissolved	30.3		mg/L		200	11-OCT-17
Strontium (Sr)-Dissolved	0.553		mg/L			11-OCT-17
Sulfur (S)-Dissolved	42.9		mg/L			11-OCT-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Dissolved	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Dissolved	0.00013		mg/L			11-OCT-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			11-OCT-17
Tungsten (W)-Dissolved	<0.00010		mg/L			11-OCT-17
Uranium (U)-Dissolved	0.000593		mg/L	0.02		11-OCT-17
Vanadium (V)-Dissolved	<0.00050		mg/L			11-OCT-17
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			11-OCT-17
Conductivity						
Conductivity	719		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.35		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	329		mg/L			06-OCT-17
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-GD-07
Sampled By: DL/ATM
Date Collected: 03-OCT-17
Lab Sample ID: L2003340-2
Matrix: GW

PAGE 6 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued with complete dissolved metals scan results						

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: 15-PW-1
Sampled By: DL/ATM
Date Collected: 03-OCT-17
Lab Sample ID: L2003340-3
Matrix: GW

PAGE 7 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	396		mg/L			11-OCT-17
Carbonate (CO3)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	7.53		pH units			06-OCT-17
TDS calculated						
TDS (Calculated)	482		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	118		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	388					06-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					11-OCT-17
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	11-OCT-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Dissolved	0.00010		mg/L	0.01		11-OCT-17
Barium (Ba)-Dissolved	0.0195		mg/L	1		11-OCT-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			11-OCT-17
Boron (B)-Dissolved	0.568		mg/L	5		11-OCT-17
Cadmium (Cd)-Dissolved	0.0000061		mg/L	0.005		11-OCT-17
Calcium (Ca)-Dissolved	73.1		mg/L			11-OCT-17
Cesium (Cs)-Dissolved	0.000036		mg/L			11-OCT-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Dissolved	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	11-OCT-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Dissolved	0.0345		mg/L			11-OCT-17
Magnesium (Mg)-Dissolved	50.0		mg/L			11-OCT-17
Manganese (Mn)-Dissolved	0.00511		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-	0.000232		mg/L			11-OCT-17

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: 15-PW-1
Sampled By: DL/ATM
Date Collected: 03-OCT-17
Lab Sample ID: L2003340-3
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	0.00180		mg/L			11-OCT-17
Phosphorus (P)-Dissolved	<0.050		mg/L			11-OCT-17
Potassium (K)-Dissolved	10.1		mg/L			11-OCT-17
Rubidium (Rb)-Dissolved	0.00559		mg/L			11-OCT-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		11-OCT-17
Silicon (Si)-Dissolved	5.07		mg/L			11-OCT-17
Silver (Ag)-Dissolved	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Dissolved	30.9		mg/L		200	11-OCT-17
Strontium (Sr)-Dissolved	0.547		mg/L			11-OCT-17
Sulfur (S)-Dissolved	43.6		mg/L			11-OCT-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Dissolved	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Dissolved	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			11-OCT-17
Tungsten (W)-Dissolved	<0.00010		mg/L			11-OCT-17
Uranium (U)-Dissolved	0.000764		mg/L	0.02		11-OCT-17
Vanadium (V)-Dissolved	<0.00050		mg/L			11-OCT-17
Zinc (Zn)-Dissolved	0.0054		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			11-OCT-17
Conductivity						
Conductivity	723		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.44		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	324		mg/L			06-OCT-17
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: 15-PW-1
Sampled By: DL/ATM
Date Collected: 03-OCT-17
Lab Sample ID: L2003340-3
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued with complete dissolved metals scan results						

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Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-ED-01W
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-4
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO ₃)	386		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	7.53		pH units			06-OCT-17
TDS calculated						
TDS (Calculated)	508		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO ₄)	143		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO ₃)	402					06-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					11-OCT-17
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	11-OCT-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Dissolved	0.00039		mg/L	0.01		11-OCT-17
Barium (Ba)-Dissolved	0.0138		mg/L	1		11-OCT-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			11-OCT-17
Boron (B)-Dissolved	0.623		mg/L	5		11-OCT-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Dissolved	79.8		mg/L			11-OCT-17
Cesium (Cs)-Dissolved	0.000043		mg/L			11-OCT-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Dissolved	0.00018		mg/L			11-OCT-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	11-OCT-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Dissolved	0.0344		mg/L			11-OCT-17
Magnesium (Mg)-Dissolved	49.3		mg/L			11-OCT-17
Manganese (Mn)-Dissolved	0.00873		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-	0.000307		mg/L			11-OCT-17

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Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-ED-01W
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-4
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			11-OCT-17
Phosphorus (P)-Dissolved	<0.050		mg/L			11-OCT-17
Potassium (K)-Dissolved	9.57		mg/L			11-OCT-17
Rubidium (Rb)-Dissolved	0.00663		mg/L			11-OCT-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		11-OCT-17
Silicon (Si)-Dissolved	5.01		mg/L			11-OCT-17
Silver (Ag)-Dissolved	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Dissolved	31.5		mg/L		200	11-OCT-17
Strontium (Sr)-Dissolved	0.580		mg/L			11-OCT-17
Sulfur (S)-Dissolved	52.2		mg/L			11-OCT-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Dissolved	0.000021		mg/L			11-OCT-17
Thorium (Th)-Dissolved	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Dissolved	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			11-OCT-17
Tungsten (W)-Dissolved	<0.00010		mg/L			11-OCT-17
Uranium (U)-Dissolved	0.00123		mg/L	0.02		11-OCT-17
Vanadium (V)-Dissolved	<0.00050		mg/L			11-OCT-17
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			11-OCT-17
Conductivity						
Conductivity	754		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.80		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	316		mg/L			06-OCT-17
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-ED-01W
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-4
Matrix: GW

PAGE 12 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued with complete dissolved metals scan results						

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Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-ED-01P
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-5
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	385		mg/L			11-OCT-17
Carbonate (CO3)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	7.54		pH units			06-OCT-17
TDS calculated						
TDS (Calculated)	517		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	149		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	396		mg/L		500	10-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					11-OCT-17
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	11-OCT-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Dissolved	0.00044		mg/L	0.01		11-OCT-17
Barium (Ba)-Dissolved	0.0145		mg/L	1		11-OCT-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			11-OCT-17
Boron (B)-Dissolved	0.675		mg/L	5		11-OCT-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Dissolved	78.5		mg/L			11-OCT-17
Cesium (Cs)-Dissolved	0.000041		mg/L			11-OCT-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Dissolved	0.00023		mg/L			11-OCT-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	11-OCT-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Dissolved	0.0348		mg/L			11-OCT-17
Magnesium (Mg)-Dissolved	48.6		mg/L			11-OCT-17
Manganese (Mn)-Dissolved	0.0141		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-	0.000294		mg/L			11-OCT-17

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Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-ED-01P
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-5
Matrix: GW

PAGE 14 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	0.00066		mg/L			11-OCT-17
Phosphorus (P)-Dissolved	<0.050		mg/L			11-OCT-17
Potassium (K)-Dissolved	9.52		mg/L			11-OCT-17
Rubidium (Rb)-Dissolved	0.00638		mg/L			11-OCT-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		11-OCT-17
Silicon (Si)-Dissolved	5.30		mg/L			11-OCT-17
Silver (Ag)-Dissolved	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Dissolved	35.7		mg/L		200	11-OCT-17
Strontium (Sr)-Dissolved	0.566		mg/L			11-OCT-17
Sulfur (S)-Dissolved	54.7		mg/L			11-OCT-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Dissolved	0.000021		mg/L			11-OCT-17
Thorium (Th)-Dissolved	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Dissolved	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			11-OCT-17
Tungsten (W)-Dissolved	<0.00010		mg/L			11-OCT-17
Uranium (U)-Dissolved	0.00118		mg/L	0.02		11-OCT-17
Vanadium (V)-Dissolved	<0.00050		mg/L			11-OCT-17
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			11-OCT-17
Conductivity						
Conductivity	809		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	6.21		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	316		mg/L			06-OCT-17
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-ED-01P
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-5
Matrix: GW

PAGE 15 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued with complete dissolved metals scan results						

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Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-GD-02
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-6
Matrix: GW

PAGE 16 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	331		mg/L			11-OCT-17
Carbonate (CO3)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	7.72		pH units			06-OCT-17
TDS calculated						
TDS (Calculated)	494		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	156		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	362		mg/L		500	10-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					11-OCT-17
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	11-OCT-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Dissolved	<0.00010		mg/L	0.01		11-OCT-17
Barium (Ba)-Dissolved	0.0204		mg/L	1		11-OCT-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			11-OCT-17
Boron (B)-Dissolved	0.732		mg/L	5		11-OCT-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Dissolved	67.3		mg/L			11-OCT-17
Cesium (Cs)-Dissolved	0.000032		mg/L			11-OCT-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Dissolved	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	11-OCT-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Dissolved	0.0406		mg/L			11-OCT-17
Magnesium (Mg)-Dissolved	47.0		mg/L			11-OCT-17
Manganese (Mn)-Dissolved	0.0123		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-	0.000324		mg/L			11-OCT-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: TH-GD-02
Sampled By: DL/ATM
Date Collected: 04-OCT-17
Lab Sample ID: L2003340-6
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			11-OCT-17
Phosphorus (P)-Dissolved	<0.050		mg/L			11-OCT-17
Potassium (K)-Dissolved	9.92		mg/L			11-OCT-17
Rubidium (Rb)-Dissolved	0.00697		mg/L			11-OCT-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		11-OCT-17
Silicon (Si)-Dissolved	4.50		mg/L			11-OCT-17
Silver (Ag)-Dissolved	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Dissolved	37.8		mg/L		200	11-OCT-17
Strontium (Sr)-Dissolved	0.547		mg/L			11-OCT-17
Sulfur (S)-Dissolved	56.9		mg/L			11-OCT-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Dissolved	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Dissolved	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			11-OCT-17
Tungsten (W)-Dissolved	<0.00010		mg/L			11-OCT-17
Uranium (U)-Dissolved	0.00157		mg/L	0.02		11-OCT-17
Vanadium (V)-Dissolved	<0.00050		mg/L			11-OCT-17
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			11-OCT-17
Conductivity						
Conductivity	749		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	13.1		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	272		mg/L			06-OCT-17
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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Matrix: GW

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: MW100
Sampled By: DL/ATM
Date Collected: 03-OCT-17
Lab Sample ID: L2003340-7
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	405		mg/L			11-OCT-17
Carbonate (CO3)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	7.63		pH units			06-OCT-17
TDS calculated						
TDS (Calculated)	485		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	115		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	390					06-JUL-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					11-OCT-17
Filtration Location						
Aluminum (Al)-Dissolved	0.0021		mg/L		0.1	11-OCT-17
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Dissolved	0.00013		mg/L	0.01		11-OCT-17
Barium (Ba)-Dissolved	0.0203		mg/L	1		11-OCT-17
Beryllium (Be)-Dissolved	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Dissolved	<0.000050		mg/L			11-OCT-17
Boron (B)-Dissolved	0.585		mg/L	5		11-OCT-17
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Dissolved	74.2		mg/L			11-OCT-17
Cesium (Cs)-Dissolved	0.000030		mg/L			11-OCT-17
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Dissolved	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	11-OCT-17
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Dissolved	0.0341		mg/L			11-OCT-17
Magnesium (Mg)-Dissolved	49.8		mg/L			11-OCT-17
Manganese (Mn)-Dissolved	0.00939		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-	0.000263		mg/L			11-OCT-17

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: MW100
Sampled By: DL/ATM
Date Collected: 03-OCT-17
Lab Sample ID: L2003340-7
Matrix: GW

PAGE 20 of 22

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			11-OCT-17
Phosphorus (P)-Dissolved	<0.050		mg/L			11-OCT-17
Potassium (K)-Dissolved	10.2		mg/L			11-OCT-17
Rubidium (Rb)-Dissolved	0.00605		mg/L			11-OCT-17
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		11-OCT-17
Silicon (Si)-Dissolved	5.11		mg/L			11-OCT-17
Silver (Ag)-Dissolved	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Dissolved	30.8		mg/L		200	11-OCT-17
Strontium (Sr)-Dissolved	0.563		mg/L			11-OCT-17
Sulfur (S)-Dissolved	41.9		mg/L			11-OCT-17
Tellurium (Te)-Dissolved	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Dissolved	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Dissolved	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Dissolved	0.00021		mg/L			11-OCT-17
Titanium (Ti)-Dissolved	<0.00030		mg/L			11-OCT-17
Tungsten (W)-Dissolved	<0.00010		mg/L			11-OCT-17
Uranium (U)-Dissolved	0.000618		mg/L	0.02		11-OCT-17
Vanadium (V)-Dissolved	<0.00050		mg/L			11-OCT-17
Zinc (Zn)-Dissolved	0.0018		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Dissolved	<0.000060		mg/L			11-OCT-17
Conductivity						
Conductivity	733		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.31		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	332		mg/L			06-OCT-17
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
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ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003340
Project Ref: 16-0300-006
Sample ID: MW100
Sampled By: DL/ATM
Date Collected: 03-OCT-17
Lab Sample ID: L2003340-7
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
11-JUL-2018 AMENDED REPORT - Report re-issued	with complete dissolved metals scan results					

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Guidelines & Objectives

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO ₃ -1
Carbonate	See Alkalinity. Reported at the anion CO ₃ -2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure or capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness). The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic	
Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2003340

Report Date: 11-JUL-18

Page 2 of 7

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WP		Water						
Batch	R3852486							
WG2636703-2	LCS							
Aluminum (Al)-Dissolved			100.5		%		80-120	11-OCT-17
Antimony (Sb)-Dissolved			103.7		%		80-120	11-OCT-17
Arsenic (As)-Dissolved			103.7		%		80-120	11-OCT-17
Barium (Ba)-Dissolved			102.3		%		80-120	11-OCT-17
Beryllium (Be)-Dissolved			104.7		%		80-120	11-OCT-17
Bismuth (Bi)-Dissolved			99.0		%		80-120	11-OCT-17
Boron (B)-Dissolved			111.3		%		80-120	11-OCT-17
Cadmium (Cd)-Dissolved			101.4		%		80-120	11-OCT-17
Calcium (Ca)-Dissolved			103.6		%		80-120	11-OCT-17
Cesium (Cs)-Dissolved			102.5		%		80-120	11-OCT-17
Chromium (Cr)-Dissolved			99.6		%		80-120	11-OCT-17
Cobalt (Co)-Dissolved			100.1		%		80-120	11-OCT-17
Copper (Cu)-Dissolved			99.7		%		80-120	11-OCT-17
Iron (Fe)-Dissolved			98.0		%		80-120	11-OCT-17
Lead (Pb)-Dissolved			100.9		%		80-120	11-OCT-17
Lithium (Li)-Dissolved			106.3		%		80-120	11-OCT-17
Magnesium (Mg)-Dissolved			108.1		%		80-120	11-OCT-17
Manganese (Mn)-Dissolved			101.1		%		80-120	11-OCT-17
Molybdenum (Mo)-Dissolved			103.7		%		80-120	11-OCT-17
Nickel (Ni)-Dissolved			100.3		%		80-120	11-OCT-17
Phosphorus (P)-Dissolved			102.4		%		80-120	11-OCT-17
Potassium (K)-Dissolved			99.8		%		80-120	11-OCT-17
Rubidium (Rb)-Dissolved			98.4		%		80-120	11-OCT-17
Selenium (Se)-Dissolved			99.4		%		80-120	11-OCT-17
Silicon (Si)-Dissolved			100.9		%		80-120	11-OCT-17
Silver (Ag)-Dissolved			102.4		%		80-120	11-OCT-17
Sodium (Na)-Dissolved			101.9		%		80-120	11-OCT-17
Strontium (Sr)-Dissolved			101.5		%		80-120	11-OCT-17
Sulfur (S)-Dissolved			105.5		%		80-120	11-OCT-17
Tellurium (Te)-Dissolved			105.0		%		80-120	11-OCT-17
Thallium (Tl)-Dissolved			98.1		%		80-120	11-OCT-17
Thorium (Th)-Dissolved			100.9		%		80-120	11-OCT-17
Tin (Sn)-Dissolved			102.5		%		80-120	11-OCT-17
Titanium (Ti)-Dissolved			98.4		%		80-120	11-OCT-17

Quality Control Report

Workorder: L2003340

Report Date: 11-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WP	Water							
Batch	R3852486							
WG2636703-2 LCS								
Tungsten (W)-Dissolved			101.4		%		80-120	11-OCT-17
Uranium (U)-Dissolved			104.0		%		80-120	11-OCT-17
Vanadium (V)-Dissolved			102.0		%		80-120	11-OCT-17
Zinc (Zn)-Dissolved			96.5		%		80-120	11-OCT-17
Zirconium (Zr)-Dissolved			101.7		%		80-120	11-OCT-17
WG2636703-1 MB								
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	11-OCT-17
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	11-OCT-17
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	11-OCT-17
Boron (B)-Dissolved			<0.010		mg/L		0.01	11-OCT-17
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	11-OCT-17
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	11-OCT-17
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	11-OCT-17
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	11-OCT-17
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	11-OCT-17
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	11-OCT-17
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	11-OCT-17
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	11-OCT-17
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	11-OCT-17
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	11-OCT-17
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	11-OCT-17
Potassium (K)-Dissolved			<0.050		mg/L		0.05	11-OCT-17
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	11-OCT-17
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	11-OCT-17
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	11-OCT-17
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	11-OCT-17
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	11-OCT-17
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17

Quality Control Report

Workorder: L2003340

Report Date: 11-JUL-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WP		Water						
Batch	R3852486							
WG2636703-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	11-OCT-17
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	11-OCT-17
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	11-OCT-17
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	11-OCT-17
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	11-OCT-17
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	11-OCT-17
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	11-OCT-17
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	11-OCT-17
Zirconium (Zr)-Dissolved			<0.000060		mg/L		0.00006	11-OCT-17
NO2-L-IC-N-WP		Water						
Batch	R3851267							
WG2633920-7 DUP		L2003340-2						
Nitrite (as N)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	06-OCT-17
WG2633920-2 LCS								
Nitrite (as N)			99.5		%		90-110	06-OCT-17
WG2633920-6 LCS								
Nitrite (as N)			100.6		%		90-110	06-OCT-17
WG2633920-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	06-OCT-17
WG2633920-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	06-OCT-17
WG2633920-8 MS		L2003340-2						
Nitrite (as N)			99.3		%		75-125	06-OCT-17
NO3-L-IC-N-WP		Water						
Batch	R3851267							
WG2633920-7 DUP		L2003340-2						
Nitrate (as N)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	06-OCT-17
WG2633920-2 LCS								
Nitrate (as N)			100.7		%		90-110	06-OCT-17
WG2633920-6 LCS								
Nitrate (as N)			100.2		%		90-110	06-OCT-17
WG2633920-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	06-OCT-17
WG2633920-5 MB								

Quality Control Report

Workorder: L2003340

Report Date: 11-JUL-18

Page 5 of 7

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-L-IC-N-WP								
Batch R3851267								
WG2633920-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	06-OCT-17
WG2633920-8 MS		L2003340-2						
Nitrate (as N)			100.5		%		75-125	06-OCT-17
PH-WP								
Batch R3851699								
WG2634628-10 DUP		L2003340-1						
pH		8.07	8.08	J	pH units	0.01	0.2	06-OCT-17
WG2634628-12 LCS								
pH			7.41		pH units		7.3-7.5	06-OCT-17
WG2634628-7 LCS								
pH			7.41		pH units		7.3-7.5	06-OCT-17
SO4-IC-N-WP								
Batch R3851267								
WG2633920-7 DUP		L2003340-2						
Sulfate (SO4)		115	115		mg/L	0.0	20	06-OCT-17
WG2633920-2 LCS								
Sulfate (SO4)			99.5		%		90-110	06-OCT-17
WG2633920-6 LCS								
Sulfate (SO4)			100.3		%		90-110	06-OCT-17
WG2633920-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	06-OCT-17
WG2633920-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	06-OCT-17
WG2633920-8 MS		L2003340-2						
Sulfate (SO4)			N/A	MS-B	%		-	06-OCT-17

Quality Control Report

Workorder: L2003340

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L2003340

Report Date: 11-JUL-18

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	04-OCT-17 16:30	06-OCT-17 12:00	0.25	43	hours	EHTR-FM
	2	03-OCT-17 13:45	06-OCT-17 12:00	0.25	70	hours	EHTR-FM
	3	03-OCT-17 14:30	06-OCT-17 12:00	0.25	70	hours	EHTR-FM
	4	04-OCT-17 14:30	06-OCT-17 12:00	0.25	46	hours	EHTR-FM
	5	04-OCT-17 13:50	06-OCT-17 12:00	0.25	46	hours	EHTR-FM
	6	04-OCT-17 09:15	06-OCT-17 12:00	0.25	51	hours	EHTR-FM
	7	03-OCT-17 13:45	06-OCT-17 12:00	0.25	70	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2003340 were received on 06-OCT-17 08:00.

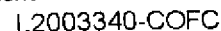
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Canada Toll Free: 1 800 668 9878



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REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

OCTOBER 2015 FROM

Failure to complete all portions of this form may delay analysis. Please fill in this information LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.



KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D1
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-1
Matrix: SW

PAGE 1 of 38

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	209		mg/L			11-OCT-17
Carbonate (CO ₃)	5.16		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.010		mg/L	10		11-OCT-17
pH						
pH	8.48		pH units			06-OCT-17
Turbidity						
*Turbidity	24.7		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0592		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	0.00014		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00195		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0423		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.101		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	42.1		mg/L			11-OCT-17
Cesium (Cs)-Total	0.000012		mg/L			11-OCT-17
Chromium (Cr)-Total	0.00015		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	0.00012		mg/L			11-OCT-17
Copper (Cu)-Total	0.00051		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.081		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	0.000242		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0319		mg/L			11-OCT-17
Magnesium (Mg)-Total	33.8		mg/L			11-OCT-17
Manganese (Mn)-Total	0.0103		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.00216		mg/L			11-OCT-17
Nickel (Ni)-Total	0.00077		mg/L			11-OCT-17
Potassium (K)-Total	8.27		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00346		mg/L			11-OCT-17
Selenium (Se)-Total	0.000076		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	5.87		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	99.4		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.248		mg/L			11-OCT-17
Sulfur (S)-Total	28.9		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	0.00248		mg/L			11-OCT-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D1
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-1
Matrix: SW

PAGE 2 of 38

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			11-OCT-17
Uranium (U)-Total	0.00165		mg/L	0.02		11-OCT-17
Vanadium (V)-Total	0.00174		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Total	0.000110		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	518		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	77.6		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	245					06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.143		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	862		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	149		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	180		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.0067		mg/L			16-OCT-17
Phosphorus (P)-Total	0.040		mg/L			13-OCT-17
Ammonia, Total (as N)	<0.010		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	1.23		mg/L			11-OCT-17
Total Nitrogen	1.23		mg/L			12-OCT-17
Total Suspended Solids	51.0		mg/L			12-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	1050		MPN/100mL	0		06-OCT-17
Escherichia Coli	114		MPN/100mL	0		06-OCT-17

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Matrix: SW

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D2
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-2
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	403		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	7.83		pH units			06-OCT-17
Turbidity						
*Turbidity	0.93		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0158		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00074		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0406		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.102		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	62.3		mg/L			11-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			11-OCT-17
Chromium (Cr)-Total	0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.023		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0329		mg/L			11-OCT-17
Magnesium (Mg)-Total	66.6		mg/L			11-OCT-17
Manganese (Mn)-Total	0.0288		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.000946		mg/L			11-OCT-17
Nickel (Ni)-Total	0.00071		mg/L			11-OCT-17
Potassium (K)-Total	7.17		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00386		mg/L			11-OCT-17
Selenium (Se)-Total	0.000087		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	6.99		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	21.1		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.196		mg/L			11-OCT-17
Sulfur (S)-Total	41.9		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	0.00085		mg/L			11-OCT-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D2
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-2
Matrix: SW

PAGE 5 of 38

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L	0.02	5.0	11-OCT-17
Uranium (U)-Total	0.00367		mg/L			11-OCT-17
Vanadium (V)-Total	0.00054		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L			11-OCT-17
Zirconium (Zr)-Total	0.000107		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	501		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	112		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	430					06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.261		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	766		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	32.8		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	331		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.026		mg/L			13-OCT-17
Phosphorus (P)-Total	0.032		mg/L			13-OCT-17
Ammonia, Total (as N)	0.024		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	1.22		mg/L			11-OCT-17
Total Nitrogen	1.22		mg/L			12-OCT-17
Total Suspended Solids	<2.0		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	2420		MPN/100mL	0		06-OCT-17
Escherichia Coli	37		MPN/100mL	0		06-OCT-17

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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Matrix: SW

PAGE 6 of 38

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D3
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	282		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	8.14		pH units			06-OCT-17
Turbidity						
*Turbidity	1.01		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	<0.0030		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00061		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0122		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.070		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	22.4		mg/L			11-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			11-OCT-17
Chromium (Cr)-Total	0.00034		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.010		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0171		mg/L			11-OCT-17
Magnesium (Mg)-Total	53.1		mg/L			11-OCT-17
Manganese (Mn)-Total	0.0185		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.000229		mg/L			11-OCT-17
Nickel (Ni)-Total	<0.00050		mg/L			11-OCT-17
Potassium (K)-Total	9.50		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00437		mg/L			11-OCT-17
Selenium (Se)-Total	0.000080		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	4.42		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	10.4		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.0506		mg/L			11-OCT-17
Sulfur (S)-Total	25.2		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	<0.00030		mg/L			11-OCT-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D3
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L	0.02	5.0	11-OCT-17
Uranium (U)-Total	0.000405		mg/L			11-OCT-17
Vanadium (V)-Total	<0.00050		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L			11-OCT-17
Zirconium (Zr)-Total	<0.000060		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	305		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	66.8		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	275					06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.142		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	448		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	4.52		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	231		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.0109		mg/L			16-OCT-17
Phosphorus (P)-Total	0.023		mg/L			13-OCT-17
Ammonia, Total (as N)	0.023		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	1.54		mg/L			11-OCT-17
Total Nitrogen	1.54		mg/L			12-OCT-17
Total Suspended Solids	<2.0		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	613		MPN/100mL	0		06-OCT-17
Escherichia Coli	23		MPN/100mL	0		06-OCT-17

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Matrix: SW

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D4
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-4
Matrix: SW

PAGE 10 of 38

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	406		mg/L			11-OCT-17
Carbonate (CO3)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	7.88		pH units			06-OCT-17
Turbidity						
*Turbidity	60.4		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.103		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00100		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0323		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.086		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	42.1		mg/L			11-OCT-17
Cesium (Cs)-Total	0.000018		mg/L			11-OCT-17
Chromium (Cr)-Total	0.00032		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	0.00013		mg/L			11-OCT-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.097		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	0.000165		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0234		mg/L			11-OCT-17
Magnesium (Mg)-Total	60.3		mg/L			11-OCT-17
Manganese (Mn)-Total	0.0256		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.000581		mg/L			11-OCT-17
Nickel (Ni)-Total	0.00073		mg/L			11-OCT-17
Potassium (K)-Total	7.05		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00394		mg/L			11-OCT-17
Selenium (Se)-Total	0.000134		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	2.91		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	13.0		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.129		mg/L			11-OCT-17
Sulfur (S)-Total	31.7		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	0.00011		mg/L			11-OCT-17
Titanium (Ti)-Total	0.00500		mg/L			11-OCT-17

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D4
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-4
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			11-OCT-17
Uranium (U)-Total	0.00232		mg/L	0.02		11-OCT-17
Vanadium (V)-Total	0.00069		mg/L			11-OCT-17
Zinc (Zn)-Total	0.0032		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Total	0.000152		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	407		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	73.5		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	353	HTC	mg/L		500	10-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.240		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	653		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	11.6		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	332		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.021		mg/L			13-OCT-17
Phosphorus (P)-Total	0.052		mg/L			13-OCT-17
Ammonia, Total (as N)	0.092		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	2.17		mg/L			11-OCT-17
Total Nitrogen	2.17		mg/L			12-OCT-17
Total Suspended Solids	120		mg/L			12-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	2420		MPN/100mL	0		06-OCT-17
Escherichia Coli	260		MPN/100mL	0		06-OCT-17

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Project Ref: 16-0300-006
Sample ID: D4
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-4
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
Approved by _____ Hua Wo Account Manager						
11-JUL-2018 AMENDED REPORT - Report re-issued with complete total metal scan results						

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ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D5
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	471		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	8.06		pH units			06-OCT-17
Turbidity						
*Turbidity	9.02		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0669		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00145		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0502		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.137		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	65.1		mg/L			11-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			11-OCT-17
Chromium (Cr)-Total	0.00020		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	0.00014		mg/L			11-OCT-17
Copper (Cu)-Total	0.00066		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.117		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	0.000105		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0169		mg/L			11-OCT-17
Magnesium (Mg)-Total	54.2		mg/L			11-OCT-17
Manganese (Mn)-Total	0.0501		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.000881		mg/L			11-OCT-17
Nickel (Ni)-Total	0.00123		mg/L			11-OCT-17
Potassium (K)-Total	5.02		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00228		mg/L			11-OCT-17
Selenium (Se)-Total	0.000160		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	3.79		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	7.16		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.186		mg/L			11-OCT-17
Sulfur (S)-Total	31.8		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	0.00222		mg/L			11-OCT-17

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Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D5
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L	0.02	5.0	11-OCT-17
Uranium (U)-Total	0.00250		mg/L			11-OCT-17
Vanadium (V)-Total	0.00099		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L			11-OCT-17
Zirconium (Zr)-Total	0.000249		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	439		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	72.9		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	386					06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.357		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	691		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	2.66		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	386		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.034		mg/L			13-OCT-17
Phosphorus (P)-Total	0.076		mg/L			13-OCT-17
Ammonia, Total (as N)	0.049		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	1.62		mg/L			11-OCT-17
Total Nitrogen	1.62		mg/L			12-OCT-17
Total Suspended Solids	10.4		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	2420		MPN/100mL	0		06-OCT-17
Escherichia Coli	18		MPN/100mL	0		06-OCT-17

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WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D5
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-5
Matrix: SW

PAGE 15 of 38

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 11-JUL-2018 AMENDED REPORT - Report re-issued with complete total metal scan results						

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Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D6
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	476		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.010		mg/L	10		11-OCT-17
pH						
pH	8.06		pH units			06-OCT-17
Turbidity						
*Turbidity	3.70		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0259		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00095		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0275		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.093		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	45.6		mg/L			11-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			11-OCT-17
Chromium (Cr)-Total	0.00037		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.047		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0290		mg/L			11-OCT-17
Magnesium (Mg)-Total	74.1		mg/L			11-OCT-17
Manganese (Mn)-Total	0.00705		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.000295		mg/L			11-OCT-17
Nickel (Ni)-Total	<0.00050		mg/L			11-OCT-17
Potassium (K)-Total	7.14		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00294		mg/L			11-OCT-17
Selenium (Se)-Total	0.000118		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	14.2		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	15.6		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.176		mg/L			11-OCT-17
Sulfur (S)-Total	71.7		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	0.00143		mg/L			11-OCT-17

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Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D6
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			11-OCT-17
Uranium (U)-Total	0.00107		mg/L	0.02		11-OCT-17
Vanadium (V)-Total	0.00058		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Total	0.000117		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	544		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	157		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	419					06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.239		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	817		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	10.1		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	390		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.026		mg/L			13-OCT-17
Phosphorus (P)-Total	0.030		mg/L			13-OCT-17
Ammonia, Total (as N)	0.018		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	1.93		mg/L			11-OCT-17
Total Nitrogen	1.93		mg/L			12-OCT-17
Total Suspended Solids	3.8		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	1050		MPN/100mL	0		06-OCT-17
Escherichia Coli	27		MPN/100mL	0		06-OCT-17

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Sample ID: D6
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
Approved by _____ Hua Wo Account Manager						
11-JUL-2018 AMENDED REPORT - Report re-issued with complete total metal scan results						

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D7
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	518		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.025		mg/L	10		11-OCT-17
pH						
pH	7.75		pH units			06-OCT-17
Turbidity						
*Turbidity	20.3		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.109		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00140		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0931		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.037		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	0.0000064		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	131		mg/L			11-OCT-17
Cesium (Cs)-Total	0.000019		mg/L			11-OCT-17
Chromium (Cr)-Total	0.00058		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	0.00034		mg/L			11-OCT-17
Copper (Cu)-Total	0.00164		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.201		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	0.000182		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0555		mg/L			11-OCT-17
Magnesium (Mg)-Total	176		mg/L			11-OCT-17
Manganese (Mn)-Total	0.756		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.00429		mg/L			11-OCT-17
Nickel (Ni)-Total	0.00156		mg/L			11-OCT-17
Potassium (K)-Total	9.76		mg/L			11-OCT-17
Phosphorus (P)-Total	0.155		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00367		mg/L			11-OCT-17
Selenium (Se)-Total	0.000143		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	10.1		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	23.9		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.346		mg/L			11-OCT-17
Sulfur (S)-Total	302		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	0.00628		mg/L			11-OCT-17

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ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D7
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			11-OCT-17
Uranium (U)-Total	0.0444		mg/L	0.02		11-OCT-17
Vanadium (V)-Total	0.00141		mg/L			11-OCT-17
Zinc (Zn)-Total	0.0082		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Total	0.000241		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	1330		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	724		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	0.0060		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.025	DLM	mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	1050					06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.24		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	1430		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	8.31		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	425		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.046		mg/L			13-OCT-17
Phosphorus (P)-Total	0.192		mg/L			13-OCT-17
Ammonia, Total (as N)	0.028		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	2.03		mg/L			11-OCT-17
Total Nitrogen	2.03		mg/L			12-OCT-17
Total Suspended Solids	76.6		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	231		MPN/100mL	0		06-OCT-17
Escherichia Coli	<1		MPN/100mL	0		06-OCT-17

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D8
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	466		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.010		mg/L	10		11-OCT-17
pH						
pH	8.20		pH units			06-OCT-17
Turbidity						
*Turbidity	7.50		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0522		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00103		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0290		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.099		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	48.0		mg/L			11-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			11-OCT-17
Chromium (Cr)-Total	0.00017		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	0.00011		mg/L			11-OCT-17
Copper (Cu)-Total	0.00052		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.085		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	0.000058		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0290		mg/L			11-OCT-17
Magnesium (Mg)-Total	75.1		mg/L			11-OCT-17
Manganese (Mn)-Total	0.00749		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.000381		mg/L			11-OCT-17
Nickel (Ni)-Total	0.00052		mg/L			11-OCT-17
Potassium (K)-Total	6.89		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00300		mg/L			11-OCT-17
Selenium (Se)-Total	0.000131		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	13.0		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	15.9		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.183		mg/L			11-OCT-17
Sulfur (S)-Total	71.1		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	0.00333		mg/L			11-OCT-17

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ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D8
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			11-OCT-17
Uranium (U)-Total	0.00157		mg/L	0.02		11-OCT-17
Vanadium (V)-Total	0.00086		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Total	0.000216		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	548		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	162		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	429					06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.244		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	814		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	10.3		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	382		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.029		mg/L			13-OCT-17
Phosphorus (P)-Total	0.039		mg/L			13-OCT-17
Ammonia, Total (as N)	0.025		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	2.14		mg/L			11-OCT-17
Total Nitrogen	2.14		mg/L			12-OCT-17
Total Suspended Solids	6.4		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	2420		MPN/100mL	0		06-OCT-17
Escherichia Coli	249		MPN/100mL	0		06-OCT-17

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Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D8
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager						
11-JUL-2018 AMENDED REPORT - Report re-issued with complete total metal scan results						

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Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D9
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-9
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	215		mg/L			11-OCT-17
Carbonate (CO ₃)	7.44		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.010		mg/L	10		11-OCT-17
pH						
pH	8.50		pH units			06-OCT-17
Turbidity						
*Turbidity	4.40		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0092		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	0.00013		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00167		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0335		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.099		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	34.1		mg/L			11-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			11-OCT-17
Chromium (Cr)-Total	<0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.011		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	0.000068		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0268		mg/L			11-OCT-17
Magnesium (Mg)-Total	26.9		mg/L			11-OCT-17
Manganese (Mn)-Total	0.00378		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.00193		mg/L			11-OCT-17
Nickel (Ni)-Total	0.00051		mg/L			11-OCT-17
Potassium (K)-Total	6.31		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00273		mg/L			11-OCT-17
Selenium (Se)-Total	0.000079		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	6.19		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	86.8		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.198		mg/L			11-OCT-17
Sulfur (S)-Total	30.1		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	<0.00030		mg/L			11-OCT-17

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Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: D9
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-9
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			11-OCT-17
Uranium (U)-Total	0.00131		mg/L	0.02		11-OCT-17
Vanadium (V)-Total	0.00125		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	11-OCT-17
Zirconium (Zr)-Total	<0.000060		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	488		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	69.4		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	196	HTC	mg/L		500	10-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.139		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	845		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	151		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	189		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.0052		mg/L			16-OCT-17
Phosphorus (P)-Total	0.024		mg/L			13-OCT-17
Ammonia, Total (as N)	0.017		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	0.98		mg/L			11-OCT-17
Total Nitrogen	0.98		mg/L			12-OCT-17
Total Suspended Solids	8.2		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	74		MPN/100mL	0		06-OCT-17
Escherichia Coli	20		MPN/100mL	0		06-OCT-17

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Project Ref: 16-0300-006
Sample ID: D9
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-9
Matrix: SW

PAGE 27 of 38

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 11-JUL-2018 AMENDED REPORT - Report re-issued with complete total metal scan results						

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ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: SW100
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-10
Matrix: SW

PAGE 28 of 38

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	409		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	7.91		pH units			06-OCT-17
Turbidity						
*Turbidity	32.0		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0336		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	0.00102		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	0.0304		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	0.089		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	38.6		mg/L			11-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			11-OCT-17
Chromium (Cr)-Total	0.00018		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	0.030		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	0.000060		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	0.0235		mg/L			11-OCT-17
Magnesium (Mg)-Total	59.0		mg/L			11-OCT-17
Manganese (Mn)-Total	0.0178		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	0.000578		mg/L			11-OCT-17
Nickel (Ni)-Total	0.00050		mg/L			11-OCT-17
Potassium (K)-Total	6.98		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	0.00363		mg/L			11-OCT-17
Selenium (Se)-Total	0.000113		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	2.77		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	12.7		mg/L		200	11-OCT-17
Strontium (Sr)-Total	0.131		mg/L			11-OCT-17
Sulfur (S)-Total	32.4		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	0.00120		mg/L			11-OCT-17

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: SW100
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-10
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L	0.02	5.0	11-OCT-17
Uranium (U)-Total	0.00231		mg/L			11-OCT-17
Vanadium (V)-Total	0.00052		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L			11-OCT-17
Zirconium (Zr)-Total	0.000113		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	403		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	73.4		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	339					06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	0.240		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	647		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	11.5		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	335		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	0.0163		mg/L			16-OCT-17
Phosphorus (P)-Total	0.062		mg/L			13-OCT-17
Ammonia, Total (as N)	0.107		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	2.19		mg/L			11-OCT-17
Total Nitrogen	2.19		mg/L			12-OCT-17
Total Suspended Solids	63.0		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	2420		MPN/100mL	0		06-OCT-17
Escherichia Coli	281		MPN/100mL	0		06-OCT-17

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PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: SW100
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-10
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 11-JUL-2018 AMENDED REPORT - Report re-issued with complete total metal scan results						

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Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: FIELD BLANK
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-11
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	<1.2		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	6.24		pH units			06-OCT-17
Turbidity						
*Turbidity	<0.10		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	<0.0030		mg/L		0.1	11-OCT-17
Aluminum (Al)-Total	<0.0030		mg/L		0.1	17-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		17-OCT-17
Arsenic (As)-Total	<0.00010		mg/L	0.01		17-OCT-17
Arsenic (As)-Total	<0.00010		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	<0.00010		mg/L	1		11-OCT-17
Barium (Ba)-Total	<0.00010		mg/L	1		17-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			17-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			17-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	<0.010		mg/L	5		11-OCT-17
Boron (B)-Total	<0.010		mg/L	5		17-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		17-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	0.069		mg/L			11-OCT-17
Calcium (Ca)-Total	<0.050		mg/L			17-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			11-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			17-OCT-17
Chromium (Cr)-Total	<0.00010		mg/L	0.05		11-OCT-17
Chromium (Cr)-Total	<0.00010		mg/L	0.05		17-OCT-17
Cobalt (Co)-Total	<0.00010		mg/L			17-OCT-17
Cobalt (Co)-Total	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	11-OCT-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	17-OCT-17
Iron (Fe)-Total	<0.010		mg/L		0.3	11-OCT-17
Iron (Fe)-Total	<0.010		mg/L		0.3	17-OCT-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		17-OCT-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	<0.0010		mg/L			17-OCT-17
Lithium (Li)-Total	<0.0010		mg/L			11-OCT-17
Magnesium (Mg)-Total	0.0065		mg/L			11-OCT-17

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Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: FIELD BLANK
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-11
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Magnesium (Mg)-Total	<0.0050		mg/L			17-OCT-17
Manganese (Mn)-Total	<0.00010		mg/L		0.05	11-OCT-17
Manganese (Mn)-Total	<0.00010		mg/L		0.05	17-OCT-17
Molybdenum (Mo)-Total	<0.000050		mg/L			17-OCT-17
Molybdenum (Mo)-Total	<0.000050		mg/L			11-OCT-17
Nickel (Ni)-Total	<0.00050		mg/L			17-OCT-17
Nickel (Ni)-Total	<0.00050		mg/L			11-OCT-17
Potassium (K)-Total	<0.050		mg/L			11-OCT-17
Potassium (K)-Total	<0.050		mg/L			17-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			17-OCT-17
Rubidium (Rb)-Total	<0.00020		mg/L			11-OCT-17
Rubidium (Rb)-Total	<0.00020		mg/L			17-OCT-17
Selenium (Se)-Total	<0.000050		mg/L	0.05		17-OCT-17
Selenium (Se)-Total	<0.000050		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	<0.10		mg/L			11-OCT-17
Silicon (Si)-Total	<0.10		mg/L			17-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			17-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	<0.050		mg/L		200	11-OCT-17
Sodium (Na)-Total	<0.050		mg/L		200	17-OCT-17
Strontium (Sr)-Total	<0.00020		mg/L			17-OCT-17
Strontium (Sr)-Total	<0.00020		mg/L			11-OCT-17
Sulfur (S)-Total	<0.50		mg/L			11-OCT-17
Sulfur (S)-Total	<0.50		mg/L			17-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			17-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			17-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			17-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			17-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	<0.00030		mg/L			17-OCT-17
Titanium (Ti)-Total	<0.00030		mg/L			11-OCT-17
Tungsten (W)-Total	<0.00010		mg/L			17-OCT-17
Tungsten (W)-Total	<0.00010		mg/L			11-OCT-17
Uranium (U)-Total	<0.000010		mg/L	0.02		17-OCT-17
Uranium (U)-Total	<0.000010		mg/L	0.02		11-OCT-17
Vanadium (V)-Total	<0.00050		mg/L			17-OCT-17
Vanadium (V)-Total	<0.00050		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L		5.0	17-OCT-17
Zirconium (Zr)-Total	<0.000060		mg/L			17-OCT-17

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: FIELD BLANK
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-11
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Zirconium (Zr)-Total	<0.000060		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	<5.0		mg/L		500	06-JUL-18
TDS (Calculated)	<5.0		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	<0.30		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	<0.20					18-OCT-17
Fluoride in Water by IC						
Fluoride (F)	<0.020		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	1.1		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	<0.10		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	<1.0		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	<0.0010		mg/L			16-OCT-17
Phosphorus (P)-Total	<0.0010		mg/L			16-OCT-17
Ammonia, Total (as N)	<0.010		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	<0.20		mg/L			11-OCT-17
Total Nitrogen	<0.20		mg/L			12-OCT-17
Total Suspended Solids	<2.0		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	<1		MPN/100mL	0		06-OCT-17
Escherichia Coli	<1		MPN/100mL	0		06-OCT-17

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Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-11
Matrix: SW

PAGE 34 of 38

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 11-JUL-2018 AMENDED REPORT - Report re-issued with complete total metal scan results						

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Date: 11-JUL-18
PO No.:
WO No.: L2003343
Project Ref: 16-0300-006
Sample ID: TRIP BLANK
Sampled By: DL/ATM
Date Collected: 05-OCT-17
Lab Sample ID: L2003343-12
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	<1.2		mg/L			11-OCT-17
Carbonate (CO ₃)	<0.60		mg/L			11-OCT-17
Hydroxide (OH)	<0.34		mg/L			11-OCT-17
*Nitrate and Nitrite as N	<0.0051		mg/L	10		11-OCT-17
pH						
pH	5.93		pH units			06-OCT-17
Turbidity						
*Turbidity	<0.10		NTU			06-OCT-17
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	<0.0030		mg/L		0.1	11-OCT-17
Antimony (Sb)-Total	<0.00010		mg/L	0.006		11-OCT-17
Arsenic (As)-Total	<0.00010		mg/L	0.01		11-OCT-17
Barium (Ba)-Total	<0.00010		mg/L	1		11-OCT-17
Beryllium (Be)-Total	<0.00010		mg/L			11-OCT-17
Bismuth (Bi)-Total	<0.000050		mg/L			11-OCT-17
Boron (B)-Total	<0.010		mg/L	5		11-OCT-17
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		11-OCT-17
Calcium (Ca)-Total	<0.050		mg/L			11-OCT-17
Cesium (Cs)-Total	<0.000010		mg/L			11-OCT-17
Chromium (Cr)-Total	<0.00010		mg/L	0.05		11-OCT-17
Cobalt (Co)-Total	<0.00010		mg/L			11-OCT-17
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	11-OCT-17
Iron (Fe)-Total	<0.010		mg/L		0.3	11-OCT-17
Lead (Pb)-Total	<0.000050		mg/L	0.01		11-OCT-17
Lithium (Li)-Total	<0.0010		mg/L			11-OCT-17
Magnesium (Mg)-Total	0.0091		mg/L			11-OCT-17
Manganese (Mn)-Total	0.00012		mg/L		0.05	11-OCT-17
Molybdenum (Mo)-Total	<0.000050		mg/L			11-OCT-17
Nickel (Ni)-Total	<0.00050		mg/L			11-OCT-17
Potassium (K)-Total	<0.050		mg/L			11-OCT-17
Phosphorus (P)-Total	<0.050		mg/L			11-OCT-17
Rubidium (Rb)-Total	<0.00020		mg/L			11-OCT-17
Selenium (Se)-Total	<0.000050		mg/L	0.05		11-OCT-17
Silicon (Si)-Total	<0.10		mg/L			11-OCT-17
Silver (Ag)-Total	<0.000010		mg/L			11-OCT-17
Sodium (Na)-Total	<0.050		mg/L		200	11-OCT-17
Strontium (Sr)-Total	<0.00020		mg/L			11-OCT-17
Sulfur (S)-Total	<0.50		mg/L			11-OCT-17
Tellurium (Te)-Total	<0.00020		mg/L			11-OCT-17
Thallium (Tl)-Total	<0.000010		mg/L			11-OCT-17
Thorium (Th)-Total	<0.00010		mg/L			11-OCT-17
Tin (Sn)-Total	<0.00010		mg/L			11-OCT-17
Titanium (Ti)-Total	<0.00030		mg/L			11-OCT-17

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Sample ID: TRIP BLANK
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Date Collected: 05-OCT-17
Lab Sample ID: L2003343-12
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L	0.02	5.0	11-OCT-17
Uranium (U)-Total	<0.000010		mg/L			11-OCT-17
Vanadium (V)-Total	<0.00050		mg/L			11-OCT-17
Zinc (Zn)-Total	<0.0030		mg/L			11-OCT-17
Zirconium (Zr)-Total	<0.000060		mg/L			11-OCT-17
TDS calculated						
TDS (Calculated)	<5.0		mg/L		500	06-JUL-18
Sulfate in Water by IC						
Sulfate (SO4)	<0.30		mg/L		500	06-OCT-17
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		06-OCT-17
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		06-OCT-17
Hardness Calculated						
Hardness (as CaCO3)	<0.20					06-JUL-18
Fluoride in Water by IC						
Fluoride (F)	<0.020		mg/L	1.5		06-OCT-17
Conductivity						
Conductivity	<1.0		umhos/cm			06-OCT-17
Chloride in Water by IC (Low Level)						
Chloride (Cl)	<0.10		mg/L		250	06-OCT-17
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	<1.0		mg/L			06-OCT-17
Phosphorus (P)-Total Dissolved	<0.0010		mg/L			16-OCT-17
Phosphorus (P)-Total	<0.0010		mg/L			16-OCT-17
Ammonia, Total (as N)	<0.010		mg/L			12-OCT-17
Total Kjeldahl Nitrogen	<0.20		mg/L			11-OCT-17
Total Nitrogen	<0.20		mg/L			12-OCT-17
Total Suspended Solids	<2.0		mg/L			11-OCT-17
Total and E. coli to endpoint by QT97						
Total Coliforms	<1		MPN/100mL	0		06-OCT-17
Escherichia Coli	<1		MPN/100mL	0		06-OCT-17

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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Matrix: SW

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Guidelines & Objectives

Sample Parameter Qualifier key listed:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO ₃ -1
Carbonate	See Alkalinity. Reported at the anion CO ₃ -2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure or capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness).The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic	
Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2003343

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Client: KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4

Contact: Marci Friedman Hamm

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP		Water						
Batch	R3851699							
WG2634628-14	LCS							
Alkalinity, Total (as CaCO ₃)			103.0		%		85-115	06-OCT-17
WG2634628-19	LCS							
Alkalinity, Total (as CaCO ₃)			104.8		%		85-115	06-OCT-17
WG2634628-11	MB							
Alkalinity, Total (as CaCO ₃)			<1.0		mg/L		1	06-OCT-17
WG2634628-16	MB							
Alkalinity, Total (as CaCO ₃)			<1.0		mg/L		1	06-OCT-17
CL-L-IC-N-WP		Water						
Batch	R3851267							
WG2633920-6	LCS							
Chloride (Cl)			99.6		%		90-110	06-OCT-17
WG2633920-5	MB							
Chloride (Cl)			<0.10		mg/L		0.1	06-OCT-17
EC-WP		Water						
Batch	R3851699							
WG2634628-13	LCS							
Conductivity			100.1		%		90-110	06-OCT-17
WG2634628-18	LCS							
Conductivity			95.7		%		90-110	06-OCT-17
WG2634628-11	MB							
Conductivity			<1.0		umhos/cm		1	06-OCT-17
WG2634628-16	MB							
Conductivity			<1.0		umhos/cm		1	06-OCT-17
F-IC-N-WP		Water						
Batch	R3851267							
WG2633920-6	LCS							
Fluoride (F)			101.2		%		90-110	06-OCT-17
WG2633920-5	MB							
Fluoride (F)			<0.020		mg/L		0.02	06-OCT-17
MET-T-CCMS-WP		Water						
Batch	R3852486							
WG2636319-2	LCS							
Aluminum (Al)-Total			104.7		%		80-120	11-OCT-17
Antimony (Sb)-Total			101.0		%		80-120	11-OCT-17
Arsenic (As)-Total			100.9		%		80-120	11-OCT-17
Barium (Ba)-Total			103.3		%		80-120	11-OCT-17



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP	Water							
Batch	R3852486							
WG2636319-2	LCS							
Beryllium (Be)-Total			108.9		%		80-120	11-OCT-17
Bismuth (Bi)-Total			99.0		%		80-120	11-OCT-17
Boron (B)-Total			109.3		%		80-120	11-OCT-17
Cadmium (Cd)-Total			100.1		%		80-120	11-OCT-17
Calcium (Ca)-Total			98.7		%		80-120	11-OCT-17
Cesium (Cs)-Total			102.4		%		80-120	11-OCT-17
Chromium (Cr)-Total			99.9		%		80-120	11-OCT-17
Cobalt (Co)-Total			100.4		%		80-120	11-OCT-17
Copper (Cu)-Total			97.9		%		80-120	11-OCT-17
Iron (Fe)-Total			97.5		%		80-120	11-OCT-17
Lead (Pb)-Total			101.0		%		80-120	11-OCT-17
Lithium (Li)-Total			106.6		%		80-120	11-OCT-17
Magnesium (Mg)-Total			107.0		%		80-120	11-OCT-17
Manganese (Mn)-Total			101.8		%		80-120	11-OCT-17
Molybdenum (Mo)-Total			102.5		%		80-120	11-OCT-17
Nickel (Ni)-Total			98.7		%		80-120	11-OCT-17
Potassium (K)-Total			100.5		%		80-120	11-OCT-17
Phosphorus (P)-Total			101.8		%		80-120	11-OCT-17
Rubidium (Rb)-Total			100.5		%		80-120	11-OCT-17
Selenium (Se)-Total			96.9		%		80-120	11-OCT-17
Silicon (Si)-Total			106.1		%		80-120	11-OCT-17
Silver (Ag)-Total			102.0		%		80-120	11-OCT-17
Sodium (Na)-Total			99.8		%		80-120	11-OCT-17
Strontium (Sr)-Total			103.0		%		80-120	11-OCT-17
Sulfur (S)-Total			105.0		%		80-120	11-OCT-17
Tellurium (Te)-Total			99.98		%		80-120	11-OCT-17
Thallium (Tl)-Total			99.3		%		80-120	11-OCT-17
Thorium (Th)-Total			103.5		%		80-120	11-OCT-17
Tin (Sn)-Total			103.4		%		80-120	11-OCT-17
Titanium (Ti)-Total			99.0		%		80-120	11-OCT-17
Tungsten (W)-Total			110.5		%		80-120	11-OCT-17
Uranium (U)-Total			104.6		%		80-120	11-OCT-17
Vanadium (V)-Total			103.0		%		80-120	11-OCT-17
Zinc (Zn)-Total			97.4		%		80-120	11-OCT-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R3852486							
WG2636319-2	LCS							
Zirconium (Zr)-Total			100.2		%		80-120	11-OCT-17
WG2636319-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	11-OCT-17
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	11-OCT-17
Arsenic (As)-Total			<0.00010		mg/L		0.0001	11-OCT-17
Barium (Ba)-Total			<0.000050		mg/L		0.00005	11-OCT-17
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	11-OCT-17
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	11-OCT-17
Boron (B)-Total			<0.010		mg/L		0.01	11-OCT-17
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	11-OCT-17
Calcium (Ca)-Total			<0.050		mg/L		0.05	11-OCT-17
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	11-OCT-17
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	11-OCT-17
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	11-OCT-17
Copper (Cu)-Total			<0.00050		mg/L		0.0005	11-OCT-17
Iron (Fe)-Total			<0.010		mg/L		0.01	11-OCT-17
Lead (Pb)-Total			<0.000050		mg/L		0.00005	11-OCT-17
Lithium (Li)-Total			<0.0010		mg/L		0.001	11-OCT-17
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	11-OCT-17
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	11-OCT-17
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	11-OCT-17
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	11-OCT-17
Potassium (K)-Total			<0.050		mg/L		0.05	11-OCT-17
Phosphorus (P)-Total			<0.050		mg/L		0.05	11-OCT-17
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	11-OCT-17
Selenium (Se)-Total			<0.000050		mg/L		0.00005	11-OCT-17
Silicon (Si)-Total			<0.10		mg/L		0.1	11-OCT-17
Silver (Ag)-Total			<0.000010		mg/L		0.00001	11-OCT-17
Sodium (Na)-Total			<0.050		mg/L		0.05	11-OCT-17
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	11-OCT-17
Sulfur (S)-Total			<0.50		mg/L		0.5	11-OCT-17
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	11-OCT-17
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	11-OCT-17
Thorium (Th)-Total			<0.00010		mg/L		0.0001	11-OCT-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R3852486							
WG2636319-1 MB								
Tin (Sn)-Total			<0.00010		mg/L		0.0001	11-OCT-17
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	11-OCT-17
Tungsten (W)-Total			<0.00010		mg/L		0.0001	11-OCT-17
Uranium (U)-Total			<0.000010		mg/L		0.00001	11-OCT-17
Vanadium (V)-Total			<0.00050		mg/L		0.0005	11-OCT-17
Zinc (Zn)-Total			<0.0030		mg/L		0.003	11-OCT-17
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	11-OCT-17
N-TOTKJ-WP		Water						
Batch	R3852506							
WG2635425-19 DUP		L2003343-4						
Total Kjeldahl Nitrogen		2.17	2.05		mg/L	5.5	20	11-OCT-17
WG2635425-14 LCS								
Total Kjeldahl Nitrogen			90.0		%		75-125	11-OCT-17
WG2635425-18 LCS								
Total Kjeldahl Nitrogen			87.8		%		75-125	11-OCT-17
WG2635425-13 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	11-OCT-17
WG2635425-17 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	11-OCT-17
WG2635425-20 MS		L2003343-4						
Total Kjeldahl Nitrogen			96.1		%		70-130	11-OCT-17
NH3-COL-WP		Water						
Batch	R3853744							
WG2638515-10 LCS								
Ammonia, Total (as N)			96.2		%		85-115	12-OCT-17
WG2638515-6 LCS								
Ammonia, Total (as N)			100.7		%		85-115	12-OCT-17
WG2638515-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	12-OCT-17
WG2638515-9 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	12-OCT-17
NO2-L-IC-N-WP		Water						
Batch	R3851267							
WG2633920-6 LCS								
Nitrite (as N)			100.6		%		90-110	06-OCT-17
WG2633920-5 MB								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-L-IC-N-WP Water								
Batch	R3851267							
WG2633920-5	MB							
Nitrite (as N)			<0.0010		mg/L		0.001	06-OCT-17
NO3-L-IC-N-WP Water								
Batch	R3851267							
WG2633920-6	LCS							
Nitrate (as N)			100.2		%		90-110	06-OCT-17
WG2633920-5	MB							
Nitrate (as N)			<0.0050		mg/L		0.005	06-OCT-17
P-T-COL-WP Water								
Batch	R3853472							
WG2634808-2	LCS							
Phosphorus (P)-Total			98.0		%		80-120	13-OCT-17
WG2634808-1	MB							
Phosphorus (P)-Total			<0.010		mg/L		0.01	13-OCT-17
P-T-L-COL-WP Water								
Batch	R3857548							
WG2640487-2	LCS							
Phosphorus (P)-Total			82.9		%		80-120	16-OCT-17
WG2640487-1	MB							
Phosphorus (P)-Total			<0.0010		mg/L		0.001	16-OCT-17
P-TD-COL-WP Water								
Batch	R3853477							
WG2634805-2	LCS							
Phosphorus (P)-Total Dissolved			97.0		%		80-120	13-OCT-17
WG2634805-6	LCS							
Phosphorus (P)-Total Dissolved			97.2		%		80-120	13-OCT-17
WG2634805-1	MB							
Phosphorus (P)-Total Dissolved			<0.010		mg/L		0.01	13-OCT-17
WG2634805-5	MB							
Phosphorus (P)-Total Dissolved			<0.010		mg/L		0.01	13-OCT-17
P-TD-L-COL-WP Water								
Batch	R3857548							
WG2640478-7	DUP	L2003343-12						
Phosphorus (P)-Total Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-OCT-17
WG2640478-2	LCS							
Phosphorus (P)-Total Dissolved			105.6		%		80-120	16-OCT-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-TD-L-COL-WP Water								
Batch	R3857548							
WG2640478-6	LCS							
Phosphorus (P)-Total	Dissolved		92.0		%		80-120	16-OCT-17
WG2640478-1	MB							
Phosphorus (P)-Total	Dissolved		<0.0010		mg/L		0.001	16-OCT-17
WG2640478-5	MB							
Phosphorus (P)-Total	Dissolved		<0.0010		mg/L		0.001	16-OCT-17
WG2640478-8	MS	L2003343-11						
Phosphorus (P)-Total	Dissolved		79.0		%		70-130	16-OCT-17
PH-WP Water								
Batch	R3851699							
WG2634628-12	LCS							
pH			7.41		pH units		7.3-7.5	06-OCT-17
WG2634628-17	LCS							
pH			7.41		pH units		7.3-7.5	06-OCT-17
SO4-IC-N-WP Water								
Batch	R3851267							
WG2633920-6	LCS							
Sulfate (SO4)			100.3		%		90-110	06-OCT-17
WG2633920-5	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	06-OCT-17
SOLIDS-TOTSUS-LR-WP Water								
Batch	R3853623							
WG2637638-2	LCS							
Total Suspended Solids			95.3		%		85-115	11-OCT-17
WG2637638-1	MB							
Total Suspended Solids			<2.0		mg/L		2	11-OCT-17
SOLIDS-TOTSUS-WP Water								
Batch	R3855787							
WG2638400-10	LCS							
Total Suspended Solids			98.0		%		85-115	12-OCT-17
WG2638400-9	MB							
Total Suspended Solids			<5.0		mg/L		5	12-OCT-17
TC,EC-QT97-ENDPT-WP Water								
Batch	R3849714							
WG2633776-2	DUP	L2003343-1						
Total Coliforms		1050	921		MPN/100mL	13	65	06-OCT-17
Escherichia Coli		114	88		MPN/100mL	25	65	06-OCT-17

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TC,EC-QT97-ENDPT-WP								
Water								
Batch	R3849714							
WG2633776-1	MB							
Total Coliforms			<1		MPN/100mL		1	06-OCT-17
Escherichia Coli			<1		MPN/100mL		1	06-OCT-17
TURBIDITY-WP								
Water								
Batch	R3850189							
WG2633758-12	DUP	L2003343-9						
Turbidity		4.40	4.45		NTU	1.1	15	06-OCT-17
WG2633758-2	LCS							
Turbidity			99.5		%		85-115	06-OCT-17
WG2633758-5	LCS							
Turbidity			98.5		%		85-115	06-OCT-17
WG2633758-1	MB							
Turbidity			<0.10		NTU		0.1	06-OCT-17
WG2633758-4	MB							
Turbidity			<0.10		NTU		0.1	06-OCT-17

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	05-OCT-17 15:30	06-OCT-17 12:00	0.25	20	hours	EHTR-FM
	2	05-OCT-17 15:10	06-OCT-17 12:00	0.25	21	hours	EHTR-FM
	3	05-OCT-17 14:00	06-OCT-17 12:00	0.25	22	hours	EHTR-FM
	4	05-OCT-17 12:30	06-OCT-17 12:00	0.25	24	hours	EHTR-FM
	5	05-OCT-17 11:30	06-OCT-17 12:00	0.25	24	hours	EHTR-FM
	6	05-OCT-17 11:15	06-OCT-17 12:00	0.25	25	hours	EHTR-FM
	7	05-OCT-17 11:00	06-OCT-17 12:00	0.25	25	hours	EHTR-FM
	8	05-OCT-17 10:30	06-OCT-17 12:00	0.25	25	hours	EHTR-FM
	9	05-OCT-17 09:45	06-OCT-17 12:00	0.25	26	hours	EHTR-FM
	10	05-OCT-17 12:30	06-OCT-17 12:00	0.25	24	hours	EHTR-FM
	11	05-OCT-17 09:40	06-OCT-17 12:00	0.25	26	hours	EHTR-FM
	12	05-OCT-17	06-OCT-17 12:00	0.25	24	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2003343 were received on 06-OCT-17 08:00.

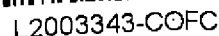
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Canada Toll Free: 1 800 668 9878



COC Number: 15 - 551102

Page 7 of 7

Report To Contact and company name below will appear on the final report		Report Format / Distribution Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL) Quality Control (QC) Report with Report ☒ YES ☐ NO ☐ Compare Results to Criteria on Report - provide details below if box checked Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX		Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply Regular [R] ☒ Standard TAT if received by 3 pm - business days - no surcharges apply 4 day [P4] ☒ 3 day [P3] ☐ 2 day [P2] ☐ 1 Business day [E1] ☐ Same Day, Weekend or Statutory holiday [E0] ☐ Date and Time Required for all E&P TATs: _____ For tests that can not be performed according to the service level selected, you will be contacted.	
Company: KGS Group Contact: Marci Friedman Hamr Phone: 204-846-1209 Company address below will appear on the final report Street: 865 Waverley St. City/Province: Winnipeg, MB Postal Code: R3T 5P4		Email 1 or Fax: mthamm@kgsgrp.com Email 2: amelun@kgsgrp.com Email 3: dleitch@kgsgrp.com		Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below P P P P P-TOLKJ-WP P-T-COL-WP NH3-COL-WP ETL-N-TOT-ANY-WP P-TD-COL-WP SOLIOS-TOTSUR-LR-WP TK, EC-QT97-ENOP-WP Number of Containers	
Invoice To Same as Report To ☒ YES ☐ NO Copy of Invoice with Report ☒ YES ☐ NO Company: Contact:		Invoice Distribution Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX Email 1 or Fax: Accounts Payable Email 2: wmarric@kgsgrp.com Oil and Gas Required Fields (client use) AFE/Cost Center: PO# Major/Minor Code: Routing Code: Requisitioner: Location:			
Project Information ALS Account # / Quote #: Q58703 Job #: 16-03W-006 PO / AFE: LSD:		ALS Lab Work Order # (lab use only) L2003343 ALS Contact: Judy Sampler: DL + ATM			
ALS Sample # (lab use only)		Sample Identification and/or Coordinates (This description will appear on the report)		Date (dd-mm-yy)	
Time (hh:mm)		Sample Type			
1 D1		05-OCT-17		15:30	
2 D2				15:10	
3 D3				14:00	
4 D4				12:30	
5 D5				11:30	
6 D6				11:15	
7 D7				11:00	
8 D8				10:30	
9 D9				7:45	
10 SW 100				12:30	
11 Field Blank		↓		9:40	
12 Trip Blank				↓	
Drinking Water (DW) Samples (client use) Are samples taken from a Regulated DW System? ☐ YES ☐ NO Are samples for human drinking water use? ☐ YES ☐ NO		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only) For P-TD lab should filter and preserve		SAMPLE CONDITION AS RECEIVED (lab use only) Frozen ☐ SIF Observations Yes ☐ No ☐ Ice Packs ☐ Ice Cubes ☐ Custody seal intact Yes ☐ No ☐ Cooling Initiated ☐ INITIAL COOLER TEMPERATURES °C 6.3 FINAL COOLER TEMPERATURES °C	
SHIPMENT RELEASE (client use) Released by (original signed by) Oct 5/17 Date: 19:15		INITIAL SHIPMENT RECEPTION (lab use only) Received by (original signed by) 06/10/17 Date: 8:30		FINAL SHIPMENT RECEPTION (lab use only) Received by: Date: Time:	

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

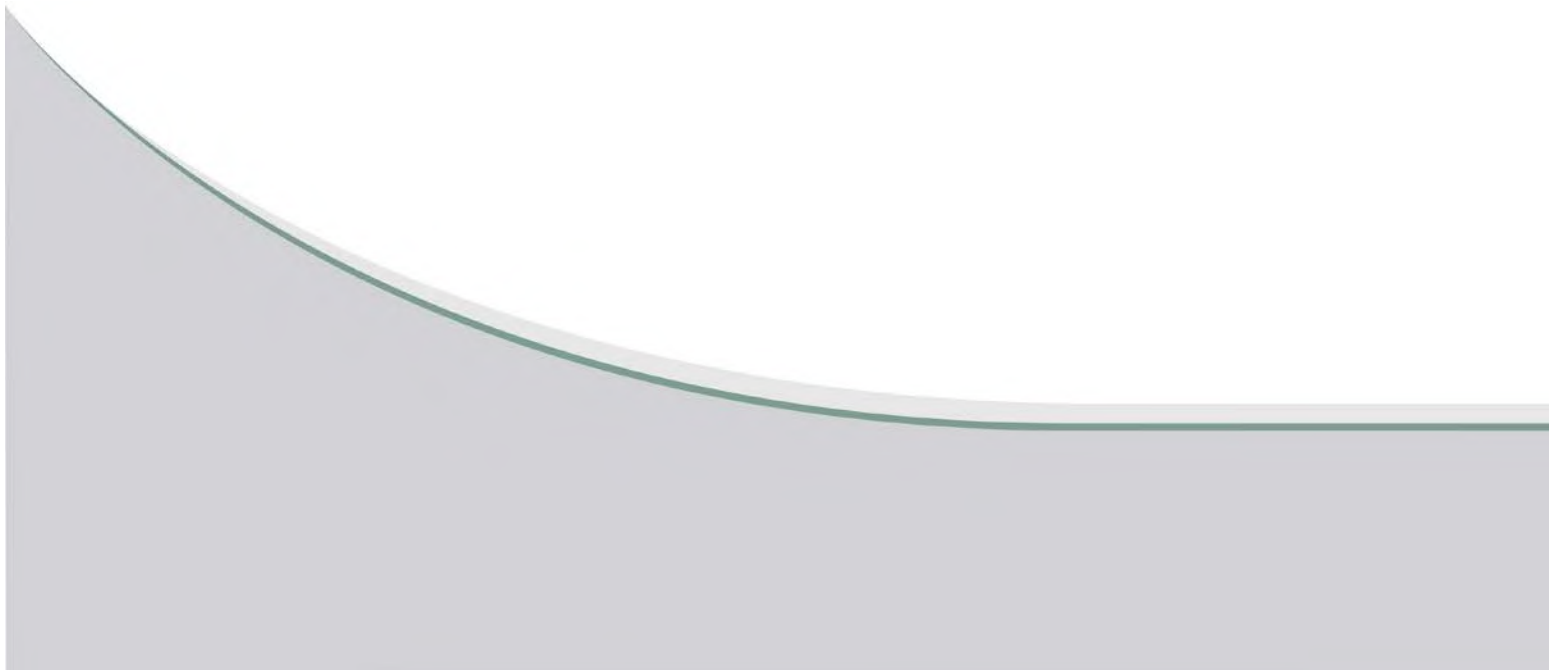
OCTOBER 2015 FROM

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

D3-F4

MAY 2018





KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: TH-ED-03
Sampled By: DL + LM
Date Collected: 28-MAY-18
Lab Sample ID: L2103324-1
Matrix: GW

PAGE 1 of 25

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO ₃)	253		mg/L			01-JUN-18
Carbonate (CO ₃)	6.00		mg/L			01-JUN-18
Hydroxide (OH)	<0.34		mg/L			01-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	8.46		pH units			31-MAY-18
TDS calculated						
TDS (Calculated)	295		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO ₄)	33.7		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO ₃)	125		mg/L		500	19-JUN-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					01-JUN-18
Filtration Location						
Aluminum (Al)-Dissolved	0.0189		mg/L		0.1	01-JUN-18
Antimony (Sb)-Dissolved	0.00029		mg/L	0.006		01-JUN-18
Arsenic (As)-Dissolved	0.00072		mg/L	0.01		01-JUN-18
Barium (Ba)-Dissolved	0.0230		mg/L	1		01-JUN-18
Beryllium (Be)-Dissolved	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Dissolved	<0.000050		mg/L			01-JUN-18
Boron (B)-Dissolved	0.168		mg/L	5		01-JUN-18
Cadmium (Cd)-Dissolved	0.0000056		mg/L	0.005		01-JUN-18
Calcium (Ca)-Dissolved	16.5		mg/L			01-JUN-18
Cesium (Cs)-Dissolved	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Dissolved	0.00022		mg/L			01-JUN-18
Copper (Cu)-Dissolved	0.00046		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Dissolved	0.012		mg/L		0.3	01-JUN-18
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Dissolved	0.0112		mg/L			01-JUN-18
Magnesium (Mg)-Dissolved	20.3		mg/L			01-JUN-18
Manganese (Mn)-Dissolved	0.0421		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-	0.0224		mg/L			01-JUN-18

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: TH-ED-03
Sampled By: DL + LM
Date Collected: 28-MAY-18
Lab Sample ID: L2103324-1
Matrix: GW

PAGE 2 of 25

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	0.00224		mg/L			01-JUN-18
Phosphorus (P)-Dissolved	<0.050		mg/L			01-JUN-18
Potassium (K)-Dissolved	2.64		mg/L			01-JUN-18
Rubidium (Rb)-Dissolved	0.00082		mg/L			01-JUN-18
Selenium (Se)-Dissolved	0.000061		mg/L	0.05		01-JUN-18
Silicon (Si)-Dissolved	3.35		mg/L			01-JUN-18
Silver (Ag)-Dissolved	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Dissolved	73.0		mg/L		200	01-JUN-18
Strontium (Sr)-Dissolved	0.103		mg/L			01-JUN-18
Sulfur (S)-Dissolved	13.5		mg/L			01-JUN-18
Tellurium (Te)-Dissolved	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Dissolved	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Dissolved	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Dissolved	0.00064		mg/L			01-JUN-18
Titanium (Ti)-Dissolved	0.00118		mg/L			01-JUN-18
Tungsten (W)-Dissolved	0.00117		mg/L			01-JUN-18
Uranium (U)-Dissolved	0.00322		mg/L	0.02		01-JUN-18
Vanadium (V)-Dissolved	0.00411		mg/L			01-JUN-18
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Dissolved	0.000158		mg/L			01-JUN-18
Conductivity						
Conductivity	489		umhos/cm			31-MAY-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	17.7		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	218		mg/L			31-MAY-18
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by>						
Approved by						
Hua Wo						
Account Manager						

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Matrix: GW

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: TH-GD-07
Sampled By: DL + LM
Date Collected: 28-MAY-18
Lab Sample ID: L2103324-2
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	408		mg/L			01-JUN-18
Carbonate (CO3)	<0.60		mg/L			01-JUN-18
Hydroxide (OH)	<0.34		mg/L			01-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	7.93		pH units			31-MAY-18
TDS calculated						
TDS (Calculated)	493		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	117		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	397		mg/L		500	19-JUN-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					01-JUN-18
Filtration Location						
Aluminum (Al)-Dissolved	0.0018		mg/L		0.1	01-JUN-18
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Dissolved	0.00010		mg/L	0.01		01-JUN-18
Barium (Ba)-Dissolved	0.0199		mg/L	1		01-JUN-18
Beryllium (Be)-Dissolved	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Dissolved	<0.000050		mg/L			01-JUN-18
Boron (B)-Dissolved	0.548		mg/L	5		01-JUN-18
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Dissolved	76.6		mg/L			01-JUN-18
Cesium (Cs)-Dissolved	0.000032		mg/L			01-JUN-18
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Dissolved	<0.00010		mg/L			01-JUN-18
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	01-JUN-18
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Dissolved	0.0371		mg/L			01-JUN-18
Magnesium (Mg)-Dissolved	50.1		mg/L			01-JUN-18
Manganese (Mn)-Dissolved	0.00962		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-	0.000263		mg/L			01-JUN-18

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Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: TH-GD-07
Sampled By: DL + LM
Date Collected: 28-MAY-18
Lab Sample ID: L2103324-2
Matrix: GW

PAGE 5 of 25

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			01-JUN-18
Phosphorus (P)-Dissolved	<0.050		mg/L			01-JUN-18
Potassium (K)-Dissolved	10.6		mg/L			01-JUN-18
Rubidium (Rb)-Dissolved	0.00625		mg/L			01-JUN-18
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		01-JUN-18
Silicon (Si)-Dissolved	5.27		mg/L			01-JUN-18
Silver (Ag)-Dissolved	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Dissolved	33.3		mg/L		200	01-JUN-18
Strontium (Sr)-Dissolved	0.561		mg/L			01-JUN-18
Sulfur (S)-Dissolved	45.6		mg/L			01-JUN-18
Tellurium (Te)-Dissolved	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Dissolved	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Dissolved	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Dissolved	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Dissolved	<0.00030		mg/L			01-JUN-18
Tungsten (W)-Dissolved	<0.00010		mg/L			01-JUN-18
Uranium (U)-Dissolved	0.000656		mg/L	0.02		01-JUN-18
Vanadium (V)-Dissolved	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Dissolved	<0.000060		mg/L			01-JUN-18
Conductivity						
Conductivity	782		umhos/cm			31-MAY-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.34		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	335		mg/L			31-MAY-18
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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Matrix: GW

PAGE 6 of 25

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: 15-RD-PW01
Sampled By: DL + LM
Date Collected: 28-MAY-18
Lab Sample ID: L2103324-3
Matrix: GW

PAGE 7 of 25

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	407		mg/L			01-JUN-18
Carbonate (CO3)	<0.60		mg/L			01-JUN-18
Hydroxide (OH)	<0.34		mg/L			01-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	7.84		pH units			31-MAY-18
TDS calculated						
TDS (Calculated)	490		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	118		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	389		mg/L		500	19-JUN-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					01-JUN-18
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	01-JUN-18
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Dissolved	<0.00010		mg/L	0.01		01-JUN-18
Barium (Ba)-Dissolved	0.0178		mg/L	1		01-JUN-18
Beryllium (Be)-Dissolved	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Dissolved	<0.000050		mg/L			01-JUN-18
Boron (B)-Dissolved	0.573		mg/L	5		01-JUN-18
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Dissolved	77.4		mg/L			01-JUN-18
Cesium (Cs)-Dissolved	0.000034		mg/L			01-JUN-18
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Dissolved	<0.00010		mg/L			01-JUN-18
Copper (Cu)-Dissolved	0.00027		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	01-JUN-18
Lead (Pb)-Dissolved	0.000093		mg/L	0.01		01-JUN-18
Lithium (Li)-Dissolved	0.0380		mg/L			01-JUN-18
Magnesium (Mg)-Dissolved	47.4		mg/L			01-JUN-18
Manganese (Mn)-Dissolved	0.00873		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-	0.000181		mg/L			01-JUN-18

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PAGE 8 of 25

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	0.00082		mg/L			01-JUN-18
Phosphorus (P)-Dissolved	<0.050		mg/L			01-JUN-18
Potassium (K)-Dissolved	10.2		mg/L			01-JUN-18
Rubidium (Rb)-Dissolved	0.00574		mg/L			01-JUN-18
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		01-JUN-18
Silicon (Si)-Dissolved	5.15		mg/L			01-JUN-18
Silver (Ag)-Dissolved	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Dissolved	31.9		mg/L		200	01-JUN-18
Strontium (Sr)-Dissolved	0.562		mg/L			01-JUN-18
Sulfur (S)-Dissolved	44.8		mg/L			01-JUN-18
Tellurium (Te)-Dissolved	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Dissolved	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Dissolved	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Dissolved	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Dissolved	<0.00030		mg/L			01-JUN-18
Tungsten (W)-Dissolved	<0.00010		mg/L			01-JUN-18
Uranium (U)-Dissolved	0.000904		mg/L	0.02		01-JUN-18
Vanadium (V)-Dissolved	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Dissolved	0.0049		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Dissolved	<0.000060		mg/L			01-JUN-18
Conductivity						
Conductivity	788		umhos/cm			31-MAY-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.38		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	334		mg/L			31-MAY-18
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: TH-ED-01W
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-4
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	395		mg/L			01-JUN-18
Carbonate (CO3)	<0.60		mg/L			01-JUN-18
Hydroxide (OH)	<0.34		mg/L			01-JUN-18
*Nitrate and Nitrite as N	<0.010		mg/L	10		04-JUN-18
pH						
pH	7.86		pH units			31-MAY-18
TDS calculated						
TDS (Calculated)	528		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	147		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	420		mg/L		500	19-JUN-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					01-JUN-18
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	01-JUN-18
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Dissolved	0.00033		mg/L	0.01		01-JUN-18
Barium (Ba)-Dissolved	0.0144		mg/L	1		01-JUN-18
Beryllium (Be)-Dissolved	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Dissolved	<0.000050		mg/L			01-JUN-18
Boron (B)-Dissolved	0.639		mg/L	5		01-JUN-18
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Dissolved	86.3		mg/L			01-JUN-18
Cesium (Cs)-Dissolved	0.000045		mg/L			01-JUN-18
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Dissolved	0.00019		mg/L			01-JUN-18
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	01-JUN-18
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Dissolved	0.0380		mg/L			01-JUN-18
Magnesium (Mg)-Dissolved	49.7		mg/L			01-JUN-18
Manganese (Mn)-Dissolved	0.00927		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-	0.000257		mg/L			01-JUN-18

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Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: TH-ED-01W
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-4
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	0.00063		mg/L			01-JUN-18
Phosphorus (P)-Dissolved	<0.050		mg/L			01-JUN-18
Potassium (K)-Dissolved	11.0		mg/L			01-JUN-18
Rubidium (Rb)-Dissolved	0.00705		mg/L			01-JUN-18
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		01-JUN-18
Silicon (Si)-Dissolved	5.29		mg/L			01-JUN-18
Silver (Ag)-Dissolved	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Dissolved	33.9		mg/L		200	01-JUN-18
Strontium (Sr)-Dissolved	0.587		mg/L			01-JUN-18
Sulfur (S)-Dissolved	57.5		mg/L			01-JUN-18
Tellurium (Te)-Dissolved	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Dissolved	0.000024		mg/L			01-JUN-18
Thorium (Th)-Dissolved	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Dissolved	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Dissolved	<0.00030		mg/L			01-JUN-18
Tungsten (W)-Dissolved	<0.00010		mg/L			01-JUN-18
Uranium (U)-Dissolved	0.00135		mg/L	0.02		01-JUN-18
Vanadium (V)-Dissolved	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Dissolved	<0.000060		mg/L			01-JUN-18
Conductivity						
Conductivity	820		umhos/cm			31-MAY-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.98		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	323		mg/L			31-MAY-18
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: TH-ED-01W
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-4
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
19-JUN-2018 AMENDED REPORT - Complete ICP-MS Scan results reported for Dissolved Metals.						

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Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: TH-ED-01P
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-5
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO ₃)	384		mg/L			04-JUN-18
Carbonate (CO ₃)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.010		mg/L	10		04-JUN-18
pH						
pH	7.59		pH units			01-JUN-18
TDS calculated						
TDS (Calculated)	532		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO ₄)	153		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO ₃)	414		mg/L		500	19-JUN-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					01-JUN-18
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	01-JUN-18
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Dissolved	0.00049		mg/L	0.01		01-JUN-18
Barium (Ba)-Dissolved	0.0154		mg/L	1		01-JUN-18
Beryllium (Be)-Dissolved	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Dissolved	<0.000050		mg/L			01-JUN-18
Boron (B)-Dissolved	0.668		mg/L	5		01-JUN-18
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Dissolved	83.2		mg/L			01-JUN-18
Cesium (Cs)-Dissolved	0.000035		mg/L			01-JUN-18
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Dissolved	0.00024		mg/L			01-JUN-18
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	01-JUN-18
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Dissolved	0.0379		mg/L			01-JUN-18
Magnesium (Mg)-Dissolved	50.1		mg/L			01-JUN-18
Manganese (Mn)-Dissolved	0.0150		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-	0.000282		mg/L			01-JUN-18

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Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: TH-ED-01P
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-5
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	0.00074		mg/L			01-JUN-18
Phosphorus (P)-Dissolved	<0.050		mg/L			01-JUN-18
Potassium (K)-Dissolved	10.4		mg/L			01-JUN-18
Rubidium (Rb)-Dissolved	0.00674		mg/L			01-JUN-18
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		01-JUN-18
Silicon (Si)-Dissolved	5.48		mg/L			01-JUN-18
Silver (Ag)-Dissolved	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Dissolved	39.8		mg/L		200	01-JUN-18
Strontium (Sr)-Dissolved	0.577		mg/L			01-JUN-18
Sulfur (S)-Dissolved	58.6		mg/L			01-JUN-18
Tellurium (Te)-Dissolved	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Dissolved	0.000020		mg/L			01-JUN-18
Thorium (Th)-Dissolved	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Dissolved	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Dissolved	<0.00030		mg/L			01-JUN-18
Tungsten (W)-Dissolved	<0.00010		mg/L			01-JUN-18
Uranium (U)-Dissolved	0.00127		mg/L	0.02		01-JUN-18
Vanadium (V)-Dissolved	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Dissolved	0.0013		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Dissolved	<0.000060		mg/L			01-JUN-18
Conductivity						
Conductivity	827		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	6.33		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	315		mg/L			01-JUN-18
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by>						
Approved by _____ Hua Wo Account Manager						

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Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: THGD-02
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-6
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	334		mg/L			04-JUN-18
Carbonate (CO3)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	7.70		pH units			01-JUN-18
TDS calculated						
TDS (Calculated)	502		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	157		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	369		mg/L		500	19-JUN-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					01-JUN-18
Filtration Location						
Aluminum (Al)-Dissolved	0.0019		mg/L		0.1	01-JUN-18
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Dissolved	<0.00010		mg/L	0.01		01-JUN-18
Barium (Ba)-Dissolved	0.0202		mg/L	1		01-JUN-18
Beryllium (Be)-Dissolved	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Dissolved	<0.000050		mg/L			01-JUN-18
Boron (B)-Dissolved	0.700		mg/L	5		01-JUN-18
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Dissolved	70.5		mg/L			01-JUN-18
Cesium (Cs)-Dissolved	0.000034		mg/L			01-JUN-18
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Dissolved	<0.00010		mg/L			01-JUN-18
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	01-JUN-18
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Dissolved	0.0435		mg/L			01-JUN-18
Magnesium (Mg)-Dissolved	46.9		mg/L			01-JUN-18
Manganese (Mn)-Dissolved	0.0118		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-	0.000307		mg/L			01-JUN-18

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PO No.:
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Project Ref: 16-0300-006
Sample ID: THGD-02
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-6
Matrix: GW

PAGE 17 of 25

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			01-JUN-18
Phosphorus (P)-Dissolved	<0.050		mg/L			01-JUN-18
Potassium (K)-Dissolved	9.86		mg/L			01-JUN-18
Rubidium (Rb)-Dissolved	0.00678		mg/L			01-JUN-18
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		01-JUN-18
Silicon (Si)-Dissolved	4.56		mg/L			01-JUN-18
Silver (Ag)-Dissolved	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Dissolved	39.7		mg/L		200	01-JUN-18
Strontium (Sr)-Dissolved	0.546		mg/L			01-JUN-18
Sulfur (S)-Dissolved	60.1		mg/L			01-JUN-18
Tellurium (Te)-Dissolved	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Dissolved	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Dissolved	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Dissolved	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Dissolved	<0.00030		mg/L			01-JUN-18
Tungsten (W)-Dissolved	<0.00010		mg/L			01-JUN-18
Uranium (U)-Dissolved	0.00168		mg/L	0.02		01-JUN-18
Vanadium (V)-Dissolved	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Dissolved	<0.000060		mg/L			01-JUN-18
Conductivity						
Conductivity	799		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	13.0		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	274		mg/L			01-JUN-18
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: FIELD BLANK
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-7
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO3)	<1.2		mg/L			04-JUN-18
Carbonate (CO3)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	5.71		pH units			01-JUN-18
TDS calculated						
TDS (Calculated)	<5.0		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	<0.30		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Hardness Calculated						
Hardness (as CaCO3)	<0.20		mg/L		500	19-JUN-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					01-JUN-18
Filtration Location						
Aluminum (Al)-Dissolved	<0.0010		mg/L		0.1	01-JUN-18
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Dissolved	<0.00010		mg/L	0.01		01-JUN-18
Barium (Ba)-Dissolved	<0.00010		mg/L	1		01-JUN-18
Beryllium (Be)-Dissolved	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Dissolved	<0.000050		mg/L			01-JUN-18
Boron (B)-Dissolved	<0.010		mg/L	5		01-JUN-18
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Dissolved	<0.050		mg/L			01-JUN-18
Cesium (Cs)-Dissolved	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Dissolved	<0.00010		mg/L			01-JUN-18
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	01-JUN-18
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Dissolved	<0.0010		mg/L			01-JUN-18
Magnesium (Mg)-Dissolved	<0.0050		mg/L			01-JUN-18
Manganese (Mn)-Dissolved	<0.00010		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Dissolved	<0.000050		mg/L			01-JUN-18

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: FIELD BLANK
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-7
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Nickel (Ni)-Dissolved	<0.00050					01-JUN-18
Phosphorus (P)-Dissolved	<0.050		mg/L			01-JUN-18
Potassium (K)-Dissolved	<0.050		mg/L			01-JUN-18
Rubidium (Rb)-Dissolved	<0.00020		mg/L			01-JUN-18
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		01-JUN-18
Silicon (Si)-Dissolved	<0.050		mg/L			01-JUN-18
Silver (Ag)-Dissolved	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Dissolved	<0.050		mg/L		200	01-JUN-18
Strontium (Sr)-Dissolved	<0.00010		mg/L			01-JUN-18
Sulfur (S)-Dissolved	<0.50		mg/L			01-JUN-18
Tellurium (Te)-Dissolved	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Dissolved	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Dissolved	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Dissolved	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Dissolved	<0.00030		mg/L			01-JUN-18
Tungsten (W)-Dissolved	<0.00010		mg/L			01-JUN-18
Uranium (U)-Dissolved	<0.000010		mg/L	0.02		01-JUN-18
Vanadium (V)-Dissolved	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Dissolved	<0.000060		mg/L			01-JUN-18
Conductivity						
Conductivity	<1.0		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	<0.10		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	<1.0		mg/L			01-JUN-18
CDWQG = Health Canada Guideline Limits updated MAY 2018						
* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: FIELD BLANK
Sampled By: DL + LM
Date Collected: 29-MAY-18
Lab Sample ID: L2103324-7
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
19-JUN-2018 AMENDED REPORT - Complete ICP-MS Scan results reported for Dissolved Metals.						

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: S-100
Sampled By: DL + LM
Date Collected: 28-MAY-18
Lab Sample ID: L2103324-8
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Bicarbonate (HCO ₃)	405		mg/L			04-JUN-18
Carbonate (CO ₃)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	7.69		pH units			01-JUN-18
TDS calculated						
TDS (Calculated)	494		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO ₄)	116		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO ₃)	403		mg/L		500	19-JUN-18
Dissolved Metals in Water by CRC ICPMS						
Dissolved Metals	LAB					01-JUN-18
Filtration Location						
Aluminum (Al)-Dissolved	0.0013		mg/L		0.1	01-JUN-18
Antimony (Sb)-Dissolved	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Dissolved	<0.00010		mg/L	0.01		01-JUN-18
Barium (Ba)-Dissolved	0.0197		mg/L	1		01-JUN-18
Beryllium (Be)-Dissolved	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Dissolved	<0.000050		mg/L			01-JUN-18
Boron (B)-Dissolved	0.553		mg/L	5		01-JUN-18
Cadmium (Cd)-Dissolved	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Dissolved	78.2		mg/L			01-JUN-18
Cesium (Cs)-Dissolved	0.000027		mg/L			01-JUN-18
Chromium (Cr)-Dissolved	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Dissolved	<0.00010		mg/L			01-JUN-18
Copper (Cu)-Dissolved	<0.00020		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Dissolved	<0.010		mg/L		0.3	01-JUN-18
Lead (Pb)-Dissolved	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Dissolved	0.0367		mg/L			01-JUN-18
Magnesium (Mg)-Dissolved	50.5		mg/L			01-JUN-18
Manganese (Mn)-Dissolved	0.00930		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-	0.000195		mg/L			01-JUN-18

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Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: S-100
Sampled By: DL + LM
Date Collected: 28-MAY-18
Lab Sample ID: L2103324-8
Matrix: GW

PAGE 23 of 25

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU1W Dissolved Low Range						
Dissolved Metals in Water by CRC ICPMS						
Dissolved						
Nickel (Ni)-Dissolved	<0.00050		mg/L			01-JUN-18
Phosphorus (P)-Dissolved	<0.050		mg/L			01-JUN-18
Potassium (K)-Dissolved	11.1		mg/L			01-JUN-18
Rubidium (Rb)-Dissolved	0.00619		mg/L			01-JUN-18
Selenium (Se)-Dissolved	<0.000050		mg/L	0.05		01-JUN-18
Silicon (Si)-Dissolved	5.33		mg/L			01-JUN-18
Silver (Ag)-Dissolved	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Dissolved	33.1		mg/L		200	01-JUN-18
Strontium (Sr)-Dissolved	0.566		mg/L			01-JUN-18
Sulfur (S)-Dissolved	46.5		mg/L			01-JUN-18
Tellurium (Te)-Dissolved	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Dissolved	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Dissolved	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Dissolved	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Dissolved	<0.00030		mg/L			01-JUN-18
Tungsten (W)-Dissolved	<0.00010		mg/L			01-JUN-18
Uranium (U)-Dissolved	0.000654		mg/L	0.02		01-JUN-18
Vanadium (V)-Dissolved	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Dissolved	<0.0010		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Dissolved	<0.000060		mg/L			01-JUN-18
Conductivity						
Conductivity	788		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	5.33		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	332		mg/L			01-JUN-18
CDWQG = Health Canada Guideline Limits updated MAY 2018 * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.						
<original signed by> Approved by _____ Hua Wo Account Manager						

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Date: 19-JUN-18
PO No.:
WO No.: L2103324
Project Ref: 16-0300-006
Sample ID: S-100
Sampled By: DL + LM
Date Collected: 28-MAY-18
Lab Sample ID: L2103324-8
Matrix: GW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
19-JUN-2018 AMENDED REPORT - Complete ICP-MS Scan results reported for Dissolved Metals.						

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Guidelines & Objectives

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO ₃ -1
Carbonate	See Alkalinity. Reported at the anion CO ₃ -2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure or capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness).The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic	
Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2103324

Report Date: 19-JUN-18

Page 1 of 7

Client: KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4

Contact: Marci Friedman Hamm

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP								
Water								
Batch	R4063723							
WG2786145-24	LCS							
Alkalinity, Total (as CaCO ₃)			100.9		%		85-115	31-MAY-18
WG2786145-21	MB							
Alkalinity, Total (as CaCO ₃)			<1.0		mg/L		1	31-MAY-18
Batch	R4066127							
WG2787670-5	DUP	L2103324-5						
Alkalinity, Total (as CaCO ₃)		315	313		mg/L	0.5	20	01-JUN-18
WG2787670-4	LCS							
Alkalinity, Total (as CaCO ₃)			100.3		%		85-115	01-JUN-18
WG2787670-1	MB							
Alkalinity, Total (as CaCO ₃)			<1.0		mg/L		1	01-JUN-18
CL-L-IC-N-WP								
Water								
Batch	R4066989							
WG2785417-2	LCS							
Chloride (Cl)			99.4		%		90-110	31-MAY-18
WG2785417-6	LCS							
Chloride (Cl)			99.1		%		90-110	31-MAY-18
WG2785417-1	MB							
Chloride (Cl)			<0.10		mg/L		0.1	31-MAY-18
WG2785417-5	MB							
Chloride (Cl)			<0.10		mg/L		0.1	31-MAY-18
EC-WP								
Water								
Batch	R4063723							
WG2786145-23	LCS							
Conductivity			97.4		%		90-110	31-MAY-18
WG2786145-21	MB							
Conductivity			<1.0		umhos/cm		1	31-MAY-18
Batch	R4066127							
WG2787670-5	DUP	L2103324-5						
Conductivity		827	829		umhos/cm	0.2	10	01-JUN-18
WG2787670-3	LCS							
Conductivity			97.9		%		90-110	01-JUN-18
WG2787670-1	MB							
Conductivity			<1.0		umhos/cm		1	01-JUN-18
MET-D-CCMS-WP								
Water								



Quality Control Report

Workorder: L2103324

Report Date: 19-JUN-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WP		Water						
Batch	R4066027							
WG2786344-2	LCS							
Aluminum (Al)-Dissolved			103.5		%		80-120	01-JUN-18
Antimony (Sb)-Dissolved			103.5		%		80-120	01-JUN-18
Arsenic (As)-Dissolved			107.1		%		80-120	01-JUN-18
Barium (Ba)-Dissolved			109.1		%		80-120	01-JUN-18
Beryllium (Be)-Dissolved			105.0		%		80-120	01-JUN-18
Bismuth (Bi)-Dissolved			100.3		%		80-120	01-JUN-18
Boron (B)-Dissolved			102.5		%		80-120	01-JUN-18
Cadmium (Cd)-Dissolved			103.7		%		80-120	01-JUN-18
Calcium (Ca)-Dissolved			104.4		%		80-120	01-JUN-18
Cesium (Cs)-Dissolved			101.8		%		80-120	01-JUN-18
Chromium (Cr)-Dissolved			98.6		%		80-120	01-JUN-18
Cobalt (Co)-Dissolved			103.1		%		80-120	01-JUN-18
Copper (Cu)-Dissolved			106.6		%		80-120	01-JUN-18
Iron (Fe)-Dissolved			97.9		%		80-120	01-JUN-18
Lead (Pb)-Dissolved			103.1		%		80-120	01-JUN-18
Lithium (Li)-Dissolved			106.7		%		80-120	01-JUN-18
Magnesium (Mg)-Dissolved			103.0		%		80-120	01-JUN-18
Manganese (Mn)-Dissolved			102.0		%		80-120	01-JUN-18
Molybdenum (Mo)-Dissolved			103.8		%		80-120	01-JUN-18
Nickel (Ni)-Dissolved			106.2		%		80-120	01-JUN-18
Phosphorus (P)-Dissolved			116.1		%		80-120	01-JUN-18
Potassium (K)-Dissolved			106.7		%		80-120	01-JUN-18
Rubidium (Rb)-Dissolved			112.1		%		80-120	01-JUN-18
Selenium (Se)-Dissolved			104.0		%		80-120	01-JUN-18
Silicon (Si)-Dissolved			106.0		%		80-120	01-JUN-18
Silver (Ag)-Dissolved			106.6		%		80-120	01-JUN-18
Sodium (Na)-Dissolved			105.7		%		80-120	01-JUN-18
Strontium (Sr)-Dissolved			101.8		%		80-120	01-JUN-18
Sulfur (S)-Dissolved			104.4		%		80-120	01-JUN-18
Tellurium (Te)-Dissolved			101.2		%		80-120	01-JUN-18
Thallium (Tl)-Dissolved			101.7		%		80-120	01-JUN-18
Thorium (Th)-Dissolved			100.3		%		80-120	01-JUN-18
Tin (Sn)-Dissolved			102.7		%		80-120	01-JUN-18
Titanium (Ti)-Dissolved			105.6		%		80-120	01-JUN-18

Quality Control Report

Workorder: L2103324

Report Date: 19-JUN-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WP		Water						
Batch	R4066027							
WG2786344-2		LCS						
Tungsten (W)-Dissolved			101.3		%		80-120	01-JUN-18
Uranium (U)-Dissolved			105.0		%		80-120	01-JUN-18
Vanadium (V)-Dissolved			106.9		%		80-120	01-JUN-18
Zinc (Zn)-Dissolved			101.3		%		80-120	01-JUN-18
Zirconium (Zr)-Dissolved			102.2		%		80-120	01-JUN-18
WG2786344-1		MB						
Aluminum (Al)-Dissolved			<0.0010		mg/L		0.001	01-JUN-18
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Bismuth (Bi)-Dissolved			<0.000050		mg/L		0.00005	01-JUN-18
Boron (B)-Dissolved			<0.010		mg/L		0.01	01-JUN-18
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	01-JUN-18
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	01-JUN-18
Cesium (Cs)-Dissolved			<0.000010		mg/L		0.00001	01-JUN-18
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	01-JUN-18
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	01-JUN-18
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	01-JUN-18
Lithium (Li)-Dissolved			<0.0010		mg/L		0.001	01-JUN-18
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	01-JUN-18
Manganese (Mn)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	01-JUN-18
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	01-JUN-18
Phosphorus (P)-Dissolved			<0.050		mg/L		0.05	01-JUN-18
Potassium (K)-Dissolved			<0.050		mg/L		0.05	01-JUN-18
Rubidium (Rb)-Dissolved			<0.00020		mg/L		0.0002	01-JUN-18
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	01-JUN-18
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	01-JUN-18
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	01-JUN-18
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	01-JUN-18
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18

Quality Control Report

Workorder: L2103324

Report Date: 19-JUN-18

Page 4 of 7

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WP		Water						
Batch R4066027								
WG2786344-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	01-JUN-18
Tellurium (Te)-Dissolved			<0.00020		mg/L		0.0002	01-JUN-18
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	01-JUN-18
Thorium (Th)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Titanium (Ti)-Dissolved			<0.00030		mg/L		0.0003	01-JUN-18
Tungsten (W)-Dissolved			<0.00010		mg/L		0.0001	01-JUN-18
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	01-JUN-18
Vanadium (V)-Dissolved			<0.00050		mg/L		0.0005	01-JUN-18
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	01-JUN-18
Zirconium (Zr)-Dissolved			<0.000060		mg/L		0.00006	01-JUN-18
NO2-L-IC-N-WP		Water						
Batch R4066989								
WG2785417-2 LCS								
Nitrite (as N)			100.8		%		90-110	31-MAY-18
WG2785417-6 LCS								
Nitrite (as N)			100.2		%		90-110	31-MAY-18
WG2785417-1 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	31-MAY-18
WG2785417-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	31-MAY-18
NO3-L-IC-N-WP		Water						
Batch R4066989								
WG2785417-2 LCS								
Nitrate (as N)			99.8		%		90-110	31-MAY-18
WG2785417-6 LCS								
Nitrate (as N)			99.2		%		90-110	31-MAY-18
WG2785417-1 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	31-MAY-18
WG2785417-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	31-MAY-18
PH-WP		Water						
Batch R4063723								
WG2786145-22 LCS								
pH			7.41		pH units		7.3-7.5	31-MAY-18

Quality Control Report

Workorder: L2103324

Report Date: 19-JUN-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WP		Water						
Batch	R4066127							
WG2787670-5	DUP	L2103324-5						
pH		7.59	7.61	J	pH units	0.02	0.2	01-JUN-18
WG2787670-2	LCS							
pH			7.41		pH units		7.3-7.5	01-JUN-18
SO4-IC-N-WP		Water						
Batch	R4066989							
WG2785417-2	LCS							
Sulfate (SO4)			100.8		%		90-110	31-MAY-18
WG2785417-6	LCS							
Sulfate (SO4)			100.6		%		90-110	31-MAY-18
WG2785417-1	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	31-MAY-18
WG2785417-5	MB							
Sulfate (SO4)			<0.30		mg/L		0.3	31-MAY-18

Quality Control Report

Workorder: L2103324

Report Date: 19-JUN-18

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Quality Control Report

Workorder: L2103324

Report Date: 19-JUN-18

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH							
	1	28-MAY-18 12:00	31-MAY-18 12:00	0.25	72	hours	EHTR-FM
	2	28-MAY-18 14:50	31-MAY-18 12:00	0.25	69	hours	EHTR-FM
	3	28-MAY-18 15:17	31-MAY-18 12:00	0.25	69	hours	EHTR-FM
	4	29-MAY-18 11:40	31-MAY-18 12:00	0.25	48	hours	EHTR-FM
	5	29-MAY-18 12:00	01-JUN-18 12:00	0.25	72	hours	EHTR-FM
	6	29-MAY-18 15:47	01-JUN-18 12:00	0.25	68	hours	EHTR-FM
	7	29-MAY-18 16:15	01-JUN-18 12:00	0.25	68	hours	EHTR-FM
	8	28-MAY-18 18:00	01-JUN-18 12:00	0.25	90	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.

Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2103324 were received on 31-MAY-18 07:45.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



L2103324-COFC

COC Number: 14 - 450657

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)									
Company: <u>KGS Group</u>		Select Report Format: ☒ PDF ☒ EXCEL ☐ EDD (DIGITAL)		R ☒ Regular (Standard TAT if received by 3pm)									
Contact: <u>Marc Friedmann Hamm</u>		Quality Control (QC) Report with Report ☒ Yes ☐ No		P ☐ Priority (2-4 business days if received by 3pm)									
Address: <u>885 Waverley St, Winnipeg, MB R2T 5P4</u>		☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 business days if received by 3pm)									
Phone: <u>204-896-1209</u>		Select Distribution: ☒ EMAIL ☐ MAIL ☐ FAX		E2 ☐ Same day or weekend emergency if received by 10am - contact ALS for surcharge.									
		Email 1 or Fax: <u>mthamm@kgs-group.com</u>		Specify Date Required for E2, E or P:									
		Email 2: <u>aleitch@kgs-group.com</u>		Analysis Request: <u>1001 W-D-L-WP</u>									
Invoice To		Invoice Distribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below									
Same as Report To ☒ Yes ☐ No		Select Invoice Distribution: ☒ EMAIL ☐ MAIL ☐ FAX											
Copy of Invoice with Report ☒ Yes ☐ No		Email 1 or Fax: <u>Accounts Payable</u>											
Company:		Email 2: <u>wmacquarrie@kgs-group.com</u>											
Contact:		Oil and Gas Required Fields (client use)											
Project Information		Approver ID:		Cost Center:								Number of Containers	
ALS Quote #: <u>058403</u>		GL Account:		Routing Code:									
Job #: <u>16-0300-006</u>		Activity Code:											
PO / AFE:		Location:											
LSD:		ALS Contact: <u>Judy</u>		Sampler: <u>DL+LM</u>									
ALS Lab Work Order # (lab use only)													
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-yy)	Time (hh:mm)	Sample Type									
	TH-ED-03	28-MAY-18	12:00	GW	x								2
	TH-GD-07	28-MAY-18	14:50	GW	x								2
	IS-PW-01	28-MAY-18	15:17	GW	x								2
	TH-ED-01W	29-MAY-18	11:40	GW	x								2
	TH-ED-01P	29-MAY-18	12:00	GW	x								2
	TH-GD-02	29-MAY-18	15:47	GW	x								2
	Field Blank	29-MAY-18	16:15	GW	x								2
	S-100	28-MAY-18	18:00	GW	x								2
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report (client use)		SAMPLE CONDITION AS RECEIVED (lab use only)									
Are samples taken from a Regulated DW System?				Frozen: ☐ SIF Observations: Yes ☐ No ☐									
☐ Yes ☐ No				Ice packs: Yes ☐ No ☐ Custody seal intact: Yes ☐ No ☐									
Are samples for human drinking water use?				Cooling Initiated: ☐									
☐ Yes ☐ No				INITIAL COOLER TEMPERATURES °C: FINAL COOLER TEMPERATURES °C: <u>5</u>									
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)		FINAL SHIPMENT RECEPTION (lab use only)									
Released by: <u><original signed by></u>		Received by: <u>MAY 31 2018 JHS</u>		Received by: _____									
Date: <u>MAY 21 18</u>		Time: <u>20:15</u>		Date: _____ Time: _____									

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-1460326a v06 From 03 October 2013



KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D1
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-1
Matrix: SW

PAGE 1 of 34

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	200		mg/L			04-JUN-18
Carbonate (CO ₃)	4.80		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.010		mg/L	10		04-JUN-18
pH						
pH	8.45		pH units			01-JUN-18
Turbidity						
*Turbidity	2.55		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0236		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	0.00015		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00179		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0451		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.090		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	40.6		mg/L			01-JUN-18
Cesium (Cs)-Total	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Total	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	<0.00010		mg/L			01-JUN-18
Copper (Cu)-Total	0.00056		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.025		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	0.000059		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0315		mg/L			01-JUN-18
Magnesium (Mg)-Total	30.9		mg/L			01-JUN-18
Manganese (Mn)-Total	0.00509		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.00183		mg/L			01-JUN-18
Nickel (Ni)-Total	0.00072		mg/L			01-JUN-18
Potassium (K)-Total	8.02		mg/L			01-JUN-18
Phosphorus (P)-Total	<0.050		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00301		mg/L			01-JUN-18
Selenium (Se)-Total	0.000077		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	4.03		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	92.1		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.239		mg/L			01-JUN-18
Sulfur (S)-Total	33.6		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	0.00092		mg/L			01-JUN-18

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D1
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-1
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	0.00146		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	0.00125		mg/L			01-JUN-18
Zinc (Zn)-Total	<0.0030		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	0.000061		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	494		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	85.1		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	229	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.149		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	840		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	134		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	172		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0037		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0123		mg/L			04-JUN-18
Ammonia, Total (as N)	<0.010		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	1.01		mg/L			04-JUN-18
Total Nitrogen	1.01		mg/L			04-JUN-18
Total Suspended Solids	2.9		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	365		MPN/100mL	0		31-MAY-18
Escherichia Coli	7		MPN/100mL	0		31-MAY-18

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721
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Matrix: SW

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ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company



KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D2
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-2
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	514		mg/L			04-JUN-18
Carbonate (CO ₃)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.010		mg/L	10		04-JUN-18
pH						
pH	8.22		pH units			01-JUN-18
Turbidity						
*Turbidity	1.03		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0283		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	0.00012		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00139		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0394		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.114		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	66.5		mg/L			01-JUN-18
Cesium (Cs)-Total	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Total	0.00020		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	0.00021		mg/L			01-JUN-18
Copper (Cu)-Total	0.00069		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.111		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0352		mg/L			01-JUN-18
Magnesium (Mg)-Total	75.2		mg/L			01-JUN-18
Manganese (Mn)-Total	0.0323		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.000222		mg/L			01-JUN-18
Nickel (Ni)-Total	0.00131		mg/L			01-JUN-18
Potassium (K)-Total	6.46		mg/L			01-JUN-18
Phosphorus (P)-Total	0.089		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00363		mg/L			01-JUN-18
Selenium (Se)-Total	0.000171		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	3.27		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	25.0		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.222		mg/L			01-JUN-18
Sulfur (S)-Total	29.2		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	0.00125		mg/L			01-JUN-18

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D2
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-2
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	0.00176		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	0.00096		mg/L			01-JUN-18
Zinc (Zn)-Total	0.0049		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	0.000248		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	511		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	62.0		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	0.0020		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	476	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.286		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	841		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	23.5		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	421		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0588		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0717		mg/L			04-JUN-18
Ammonia, Total (as N)	0.023		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	1.75		mg/L			04-JUN-18
Total Nitrogen	1.75		mg/L			04-JUN-18
Total Suspended Solids	2.4		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	1730		MPN/100mL	0		31-MAY-18
Escherichia Coli	70		MPN/100mL	0		31-MAY-18

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PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D2
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-2
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 19-JUN-2018 AMENDED REPORT - Complete ICP-MS Scan results reported for Total Metals						

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Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D3
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	316		mg/L			04-JUN-18
Carbonate (CO ₃)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	7.93		pH units			01-JUN-18
Turbidity						
*Turbidity	0.99		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0097		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00070		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0209		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.082		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	36.6		mg/L			01-JUN-18
Cesium (Cs)-Total	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Total	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	<0.00010		mg/L			01-JUN-18
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.016		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0183		mg/L			01-JUN-18
Magnesium (Mg)-Total	49.9		mg/L			01-JUN-18
Manganese (Mn)-Total	0.0522		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.000176		mg/L			01-JUN-18
Nickel (Ni)-Total	<0.00050		mg/L			01-JUN-18
Potassium (K)-Total	8.92		mg/L			01-JUN-18
Phosphorus (P)-Total	<0.050		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00410		mg/L			01-JUN-18
Selenium (Se)-Total	0.000064		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	3.01		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	9.96		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.0855		mg/L			01-JUN-18
Sulfur (S)-Total	26.6		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	<0.00030		mg/L			01-JUN-18

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Project Ref: 16-0300-006
Sample ID: D3
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	0.000316		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Total	<0.0030		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	<0.000060		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	326		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	60.3		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	297	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.133		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	562		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	4.81		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	259		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0055		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0222		mg/L			04-JUN-18
Ammonia, Total (as N)	0.076		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	1.99		mg/L			04-JUN-18
Total Nitrogen	1.99		mg/L			04-JUN-18
Total Suspended Solids	<2.0		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	866		MPN/100mL	0		31-MAY-18
Escherichia Coli	31		MPN/100mL	0		31-MAY-18

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PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D3
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-3
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 19-JUN-2018 AMENDED REPORT - Complete ICP-MS Scan results reported for Total Metals						

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Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D4
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-4
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	444		mg/L			04-JUN-18
Carbonate (CO ₃)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	7.94		pH units			01-JUN-18
Turbidity						
*Turbidity	1.96		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0461		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	0.00011		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00133		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0452		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.168		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	62.4		mg/L			01-JUN-18
Cesium (Cs)-Total	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Total	0.00025		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	0.00013		mg/L			01-JUN-18
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.049		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	0.000078		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0269		mg/L			01-JUN-18
Magnesium (Mg)-Total	67.2		mg/L			01-JUN-18
Manganese (Mn)-Total	0.0726		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.000481		mg/L			01-JUN-18
Nickel (Ni)-Total	0.00082		mg/L			01-JUN-18
Potassium (K)-Total	12.1		mg/L			01-JUN-18
Phosphorus (P)-Total	<0.050		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00586		mg/L			01-JUN-18
Selenium (Se)-Total	0.000169		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	5.31		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	15.5		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.202		mg/L			01-JUN-18
Sulfur (S)-Total	34.7		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	0.00166		mg/L			01-JUN-18

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PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D4
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-4
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	0.00118		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Total	<0.0030		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	0.000144		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	467		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	76.8		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	0.0013		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	433	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.309		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	782		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	14.4		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	364		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0230		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0334		mg/L			04-JUN-18
Ammonia, Total (as N)	0.261		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	2.56		mg/L			04-JUN-18
Total Nitrogen	2.56		mg/L			04-JUN-18
Total Suspended Solids	<2.0		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	411		MPN/100mL	0		31-MAY-18
Escherichia Coli	172		MPN/100mL	0		31-MAY-18

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Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D5
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	520		mg/L			04-JUN-18
Carbonate (CO ₃)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	8.00		pH units			01-JUN-18
Turbidity						
*Turbidity	1.05		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0146		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	0.00011		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00236		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0472		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.112		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	0.0000070		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	89.0		mg/L			01-JUN-18
Cesium (Cs)-Total	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Total	0.00044		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	0.00035		mg/L			01-JUN-18
Copper (Cu)-Total	0.00072		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.200		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0177		mg/L			01-JUN-18
Magnesium (Mg)-Total	58.3		mg/L			01-JUN-18
Manganese (Mn)-Total	0.137		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.000517		mg/L			01-JUN-18
Nickel (Ni)-Total	0.00182		mg/L			01-JUN-18
Potassium (K)-Total	3.37		mg/L			01-JUN-18
Phosphorus (P)-Total	<0.050		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00353		mg/L			01-JUN-18
Selenium (Se)-Total	0.000280		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	8.98		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	6.97		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.183		mg/L			01-JUN-18
Sulfur (S)-Total	14.1		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	0.00099		mg/L			01-JUN-18

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Lab Sample ID: L2103336-5
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	0.00173		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	0.00068		mg/L			01-JUN-18
Zinc (Zn)-Total	0.0059		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	0.000426		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	445		mg/L		500	04-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	30.2		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	462	HTC	mg/L		500	04-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.374		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	740		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	1.39		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	426		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0225		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0331		mg/L			04-JUN-18
Ammonia, Total (as N)	0.019		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	2.11		mg/L			04-JUN-18
Total Nitrogen	2.11		mg/L			04-JUN-18
Total Suspended Solids	<2.0		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	1020		MPN/100mL	0		31-MAY-18
Escherichia Coli	18		MPN/100mL	0		31-MAY-18

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Matrix: SW

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D6
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	472		mg/L			04-JUN-18
Carbonate (CO3)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.010		mg/L	10		04-JUN-18
pH						
pH	8.08		pH units			01-JUN-18
Turbidity						
*Turbidity	2.89		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0951		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00125		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0441		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.124		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	74.1		mg/L			01-JUN-18
Cesium (Cs)-Total	0.000011		mg/L			01-JUN-18
Chromium (Cr)-Total	0.00030		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	0.00017		mg/L			01-JUN-18
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.135		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	0.000075		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0280		mg/L			01-JUN-18
Magnesium (Mg)-Total	76.6		mg/L			01-JUN-18
Manganese (Mn)-Total	0.114		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.000419		mg/L			01-JUN-18
Nickel (Ni)-Total	0.00074		mg/L			01-JUN-18
Potassium (K)-Total	7.94		mg/L			01-JUN-18
Phosphorus (P)-Total	<0.050		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00429		mg/L			01-JUN-18
Selenium (Se)-Total	0.000165		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	9.87		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	14.8		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.229		mg/L			01-JUN-18
Sulfur (S)-Total	51.7		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	0.00411		mg/L			01-JUN-18

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D6
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-6
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	0.00136		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	0.00080		mg/L			01-JUN-18
Zinc (Zn)-Total	<0.0030		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	0.000193		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	534		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	117		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	500	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.323		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	857		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	11.4		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	387		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0301		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0437		mg/L			04-JUN-18
Ammonia, Total (as N)	0.035		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	1.94		mg/L			04-JUN-18
Total Nitrogen	1.94		mg/L			04-JUN-18
Total Suspended Solids	<2.0		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	1990		MPN/100mL	0		31-MAY-18
Escherichia Coli	52		MPN/100mL	0		31-MAY-18

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D7
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	411		mg/L			04-JUN-18
Carbonate (CO ₃)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	7.77		pH units			01-JUN-18
Turbidity						
*Turbidity	1.63		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0097		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00194		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0330		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.024		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	50.8		mg/L			01-JUN-18
Cesium (Cs)-Total	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Total	0.00015		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	0.00023		mg/L			01-JUN-18
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.088		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0307		mg/L			01-JUN-18
Magnesium (Mg)-Total	71.2		mg/L			01-JUN-18
Manganese (Mn)-Total	0.167		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.00161		mg/L			01-JUN-18
Nickel (Ni)-Total	0.00128		mg/L			01-JUN-18
Potassium (K)-Total	4.61		mg/L			01-JUN-18
Phosphorus (P)-Total	0.059		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00184		mg/L			01-JUN-18
Selenium (Se)-Total	0.000184		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	3.75		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	10.8		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.137		mg/L			01-JUN-18
Sulfur (S)-Total	42.3		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	0.00058		mg/L			01-JUN-18

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Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D7
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	0.00823		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	0.00062		mg/L			01-JUN-18
Zinc (Zn)-Total	<0.0030		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	0.000173		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	439		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	98.3		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	420	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.158		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	726		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	0.98		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	337		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0386		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0475		mg/L			04-JUN-18
Ammonia, Total (as N)	0.018		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	1.88		mg/L			04-JUN-18
Total Nitrogen	1.88		mg/L			04-JUN-18
Total Suspended Solids	<2.0		mg/L			04-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	960		MPN/100mL	0		31-MAY-18
Escherichia Coli	4		MPN/100mL	0		31-MAY-18

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Winnipeg MB R3T 5P4
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Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D7
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-7
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 19-JUN-2018 AMENDED REPORT - Complete ICP-MS Scan results reported for Total Metals						

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ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D8
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	476		mg/L			04-JUN-18
Carbonate (CO ₃)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.010		mg/L	10		04-JUN-18
pH						
pH	8.29		pH units			01-JUN-18
Turbidity						
*Turbidity	10.8		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.283		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00162		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0425		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.126		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	77.8		mg/L			01-JUN-18
Cesium (Cs)-Total	0.000030		mg/L			01-JUN-18
Chromium (Cr)-Total	0.00070		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	0.00031		mg/L			01-JUN-18
Copper (Cu)-Total	0.00084		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.305		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	0.000176		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0251		mg/L			01-JUN-18
Magnesium (Mg)-Total	69.7		mg/L			01-JUN-18
Manganese (Mn)-Total	0.0688		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.000455		mg/L			01-JUN-18
Nickel (Ni)-Total	0.00127		mg/L			01-JUN-18
Potassium (K)-Total	6.45		mg/L			01-JUN-18
Phosphorus (P)-Total	0.086		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00410		mg/L			01-JUN-18
Selenium (Se)-Total	0.000184		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	5.30		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	11.6		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.223		mg/L			01-JUN-18
Sulfur (S)-Total	39.0		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	0.0113		mg/L			01-JUN-18

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Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D8
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-8
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	0.00188		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	0.00181		mg/L			01-JUN-18
Zinc (Zn)-Total	<0.0030		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	0.000450		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	498		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	90.2		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	481	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.315		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	802		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	8.12		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	390		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0502		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0725		mg/L			04-JUN-18
Ammonia, Total (as N)	0.037		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	2.26		mg/L			04-JUN-18
Total Nitrogen	2.26		mg/L			04-JUN-18
Total Suspended Solids	15.1		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	230		MPN/100mL	0		31-MAY-18
Escherichia Coli	49		MPN/100mL	0		31-MAY-18

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Matrix: SW

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KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D9
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-9
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	212		mg/L			04-JUN-18
Carbonate (CO3)	3.96		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.010		mg/L	10		04-JUN-18
pH						
pH	8.41		pH units			01-JUN-18
Turbidity						
*Turbidity	9.37		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.167		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	0.00014		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00169		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0425		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.102		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	47.4		mg/L			01-JUN-18
Cesium (Cs)-Total	0.000020		mg/L			01-JUN-18
Chromium (Cr)-Total	0.00041		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	0.00014		mg/L			01-JUN-18
Copper (Cu)-Total	0.00072		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.169		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	0.000153		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0333		mg/L			01-JUN-18
Magnesium (Mg)-Total	30.5		mg/L			01-JUN-18
Manganese (Mn)-Total	0.00804		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.00187		mg/L			01-JUN-18
Nickel (Ni)-Total	0.00100		mg/L			01-JUN-18
Potassium (K)-Total	7.97		mg/L			01-JUN-18
Phosphorus (P)-Total	<0.050		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00362		mg/L			01-JUN-18
Selenium (Se)-Total	0.000077		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	4.54		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	97.5		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.255		mg/L			01-JUN-18
Sulfur (S)-Total	34.4		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	0.00735		mg/L			01-JUN-18

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: D9
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-9
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L	0.02	5.0	01-JUN-18
Uranium (U)-Total	0.00151		mg/L			01-JUN-18
Vanadium (V)-Total	0.00156		mg/L			01-JUN-18
Zinc (Zn)-Total	<0.0030		mg/L			01-JUN-18
Zirconium (Zr)-Total	0.000152		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	516		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	77.6		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0020	DLM	mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.010	DLM	mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	244	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.146		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	917		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	147		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	180		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0031		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0136		mg/L			04-JUN-18
Ammonia, Total (as N)	0.010		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	0.82		mg/L			04-JUN-18
Total Nitrogen	0.82		mg/L			04-JUN-18
Total Suspended Solids	10.4		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	1990		MPN/100mL	0		31-MAY-18
Escherichia Coli	613		MPN/100mL	0		31-MAY-18

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: FIELD BLANK 2
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-10
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO ₃)	<1.2		mg/L			04-JUN-18
Carbonate (CO ₃)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	6.08		pH units			01-JUN-18
Turbidity						
*Turbidity	<0.10		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	<0.0030		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	<0.00010		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	<0.00010		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	<0.00010		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	<0.010		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	<0.050		mg/L			01-JUN-18
Cesium (Cs)-Total	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Total	<0.00010		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	<0.00010		mg/L			01-JUN-18
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	<0.010		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	<0.000050		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	<0.0010		mg/L			01-JUN-18
Magnesium (Mg)-Total	<0.0050		mg/L			01-JUN-18
Manganese (Mn)-Total	<0.00010		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	<0.000050		mg/L			01-JUN-18
Nickel (Ni)-Total	<0.00050		mg/L			01-JUN-18
Potassium (K)-Total	<0.050		mg/L			01-JUN-18
Phosphorus (P)-Total	<0.050		mg/L			01-JUN-18
Rubidium (Rb)-Total	<0.00020		mg/L			01-JUN-18
Selenium (Se)-Total	<0.000050		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	<0.10		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	<0.050		mg/L		200	01-JUN-18
Strontium (Sr)-Total	<0.00020		mg/L			01-JUN-18
Sulfur (S)-Total	<0.50		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	<0.00030		mg/L			01-JUN-18

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865 Waverly Street - 3rd Floor
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ATTN: Marci Friedman Hamm

Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: FIELD BLANK 2
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-10
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	<0.000010		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Total	<0.0030		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	<0.000060		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	<5.0		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	<0.30		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	<0.0010		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Hardness Calculated						
Hardness (as CaCO3)	<0.20	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	<0.020		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	<1.0		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	<0.10		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	<1.0		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	<0.0010		mg/L			06-JUN-18
Phosphorus (P)-Total	<0.0010		mg/L			05-JUN-18
Ammonia, Total (as N)	<0.010		mg/L			01-JUN-18
Total Kjeldahl Nitrogen	<0.20		mg/L			04-JUN-18
Total Nitrogen	<0.20		mg/L			04-JUN-18
Total Suspended Solids	<2.0		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	<1		MPN/100mL	0		31-MAY-18
Escherichia Coli	<1		MPN/100mL	0		31-MAY-18

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Sample ID: FIELD BLANK 2
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-10
Matrix: SW

PAGE 30 of 34

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
CDWQG = Health Canada Guideline Limits updated * CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit. * Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality - A blank entry designates no known limit. - A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.	MAY 2018					
<original signed by> Approved by _____ Hua Wo Account Manager 19-JUN-2018 AMENDED REPORT - Complete ICP-MS Scan results reported for Total Metals						

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Date: 19-JUN-18
PO No.:
WO No.: L2103336
Project Ref: 16-0300-006
Sample ID: SW-100
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-11
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Bicarbonate (HCO3)	449		mg/L			04-JUN-18
Carbonate (CO3)	<0.60		mg/L			04-JUN-18
Hydroxide (OH)	<0.34		mg/L			04-JUN-18
*Nitrate and Nitrite as N	<0.0051		mg/L	10		04-JUN-18
pH						
pH	7.99		pH units			01-JUN-18
Turbidity						
*Turbidity	1.87		NTU			31-MAY-18
Total Metals in Water by CRC ICPMS						
Aluminum (Al)-Total	0.0433		mg/L		0.1	01-JUN-18
Antimony (Sb)-Total	0.00011		mg/L	0.006		01-JUN-18
Arsenic (As)-Total	0.00125		mg/L	0.01		01-JUN-18
Barium (Ba)-Total	0.0464		mg/L	1		01-JUN-18
Beryllium (Be)-Total	<0.00010		mg/L			01-JUN-18
Bismuth (Bi)-Total	<0.000050		mg/L			01-JUN-18
Boron (B)-Total	0.171		mg/L	5		01-JUN-18
Cadmium (Cd)-Total	<0.0000050		mg/L	0.005		01-JUN-18
Calcium (Ca)-Total	66.8		mg/L			01-JUN-18
Cesium (Cs)-Total	<0.000010		mg/L			01-JUN-18
Chromium (Cr)-Total	0.00030		mg/L	0.05		01-JUN-18
Cobalt (Co)-Total	0.00013		mg/L			01-JUN-18
Copper (Cu)-Total	<0.00050		mg/L	2.0	1.0	01-JUN-18
Iron (Fe)-Total	0.051		mg/L		0.3	01-JUN-18
Lead (Pb)-Total	0.000080		mg/L	0.01		01-JUN-18
Lithium (Li)-Total	0.0271		mg/L			01-JUN-18
Magnesium (Mg)-Total	65.9		mg/L			01-JUN-18
Manganese (Mn)-Total	0.0734		mg/L		0.05	01-JUN-18
Molybdenum (Mo)-Total	0.000486		mg/L			01-JUN-18
Nickel (Ni)-Total	0.00081		mg/L			01-JUN-18
Potassium (K)-Total	12.3		mg/L			01-JUN-18
Phosphorus (P)-Total	<0.050		mg/L			01-JUN-18
Rubidium (Rb)-Total	0.00581		mg/L			01-JUN-18
Selenium (Se)-Total	0.000160		mg/L	0.05		01-JUN-18
Silicon (Si)-Total	5.65		mg/L			01-JUN-18
Silver (Ag)-Total	<0.000010		mg/L			01-JUN-18
Sodium (Na)-Total	15.4		mg/L		200	01-JUN-18
Strontium (Sr)-Total	0.199		mg/L			01-JUN-18
Sulfur (S)-Total	35.9		mg/L			01-JUN-18
Tellurium (Te)-Total	<0.00020		mg/L			01-JUN-18
Thallium (Tl)-Total	<0.000010		mg/L			01-JUN-18
Thorium (Th)-Total	<0.00010		mg/L			01-JUN-18
Tin (Sn)-Total	<0.00010		mg/L			01-JUN-18
Titanium (Ti)-Total	0.00179		mg/L			01-JUN-18

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Sample ID: SW-100
Sampled By: DZ & LM
Date Collected: 30-MAY-18
Lab Sample ID: L2103336-11
Matrix: SW

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Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
ROU4W total low range						
Total Metals in Water by CRC ICPMS						
Tungsten (W)-Total	<0.00010		mg/L			01-JUN-18
Uranium (U)-Total	0.00120		mg/L	0.02		01-JUN-18
Vanadium (V)-Total	<0.00050		mg/L			01-JUN-18
Zinc (Zn)-Total	<0.0030		mg/L		5.0	01-JUN-18
Zirconium (Zr)-Total	0.000131		mg/L			01-JUN-18
TDS calculated						
TDS (Calculated)	473		mg/L		500	19-JUN-18
Sulfate in Water by IC						
Sulfate (SO4)	76.8		mg/L		500	31-MAY-18
Nitrite in Water by IC (Low Level)						
*Nitrite (as N)	0.0011		mg/L	1		31-MAY-18
Nitrate in Water by IC (Low Level)						
*Nitrate (as N)	<0.0050		mg/L	10		31-MAY-18
Ion Balance Calculation						
Hardness Calculated						
Hardness (as CaCO3)	438	HTC	mg/L		500	19-JUN-18
Fluoride in Water by IC						
Fluoride (F)	0.312		mg/L	1.5		31-MAY-18
Conductivity						
Conductivity	782		umhos/cm			01-JUN-18
Chloride in Water by IC (Low Level)						
Chloride (Cl)	14.4		mg/L		250	31-MAY-18
Alkalinity, Total (as CaCO3)						
Alkalinity, Total (as CaCO3)	368		mg/L			01-JUN-18
Phosphorus (P)-Total Dissolved	0.0226		mg/L			06-JUN-18
Phosphorus (P)-Total	0.0321		mg/L			04-JUN-18
Ammonia, Total (as N)	0.262		mg/L			31-MAY-18
Total Kjeldahl Nitrogen	2.62		mg/L			04-JUN-18
Total Nitrogen	2.62		mg/L			04-JUN-18
Total Suspended Solids	<2.0		mg/L			01-JUN-18
Total and E. coli to endpoint by QT97						
Total Coliforms	461		MPN/100mL	0		31-MAY-18
Escherichia Coli	178		MPN/100mL	0		31-MAY-18

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Matrix: SW

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Guidelines & Objectives

Sample Parameter Qualifier key listed:

Qualifier	Description
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO ₃ -1
Carbonate	See Alkalinity. Reported at the anion CO ₃ -2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure of capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness).The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic	
Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg ww - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L2103336

Report Date: 19-JUN-18

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Client: KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4

Contact: Marci Friedman Hamm

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-TITR-WP		Water						
Batch	R4066127							
WG2787670-4	LCS							
Alkalinity, Total (as CaCO ₃)			100.3		%		85-115	01-JUN-18
WG2787670-1	MB							
Alkalinity, Total (as CaCO ₃)			<1.0		mg/L		1	01-JUN-18
CL-L-IC-N-WP		Water						
Batch	R4066989							
WG2785417-6	LCS							
Chloride (Cl)			99.1		%		90-110	31-MAY-18
WG2785417-5	MB							
Chloride (Cl)			<0.10		mg/L		0.1	31-MAY-18
EC-WP		Water						
Batch	R4066127							
WG2787670-3	LCS							
Conductivity			97.9		%		90-110	01-JUN-18
WG2787670-1	MB							
Conductivity			<1.0		umhos/cm		1	01-JUN-18
F-IC-N-WP		Water						
Batch	R4066989							
WG2785417-6	LCS							
Fluoride (F)			102.0		%		90-110	31-MAY-18
WG2785417-5	MB							
Fluoride (F)			<0.020		mg/L		0.02	31-MAY-18
MET-T-CCMS-WP		Water						
Batch	R4066027							
WG2786218-2	LCS							
Aluminum (Al)-Total			93.4		%		80-120	01-JUN-18
Antimony (Sb)-Total			102.3		%		80-120	01-JUN-18
Arsenic (As)-Total			98.5		%		80-120	01-JUN-18
Barium (Ba)-Total			97.8		%		80-120	01-JUN-18
Beryllium (Be)-Total			105.1		%		80-120	01-JUN-18
Bismuth (Bi)-Total			101.0		%		80-120	01-JUN-18
Boron (B)-Total			107.6		%		80-120	01-JUN-18
Cadmium (Cd)-Total			98.8		%		80-120	01-JUN-18
Calcium (Ca)-Total			98.5		%		80-120	01-JUN-18
Cesium (Cs)-Total			98.8		%		80-120	01-JUN-18
Chromium (Cr)-Total			97.9		%		80-120	01-JUN-18



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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch	R4066027							
WG2786218-2	LCS							
Cobalt (Co)-Total			94.9		%		80-120	01-JUN-18
Copper (Cu)-Total			97.5		%		80-120	01-JUN-18
Iron (Fe)-Total			97.4		%		80-120	01-JUN-18
Lead (Pb)-Total			102.6		%		80-120	01-JUN-18
Lithium (Li)-Total			104.9		%		80-120	01-JUN-18
Magnesium (Mg)-Total			97.2		%		80-120	01-JUN-18
Manganese (Mn)-Total			97.6		%		80-120	01-JUN-18
Molybdenum (Mo)-Total			103.6		%		80-120	01-JUN-18
Nickel (Ni)-Total			95.7		%		80-120	01-JUN-18
Potassium (K)-Total			94.8		%		80-120	01-JUN-18
Phosphorus (P)-Total			96.5		%		80-120	01-JUN-18
Rubidium (Rb)-Total			102.8		%		80-120	01-JUN-18
Selenium (Se)-Total			98.5		%		80-120	01-JUN-18
Silicon (Si)-Total			98.8		%		80-120	01-JUN-18
Silver (Ag)-Total			102.3		%		80-120	01-JUN-18
Sodium (Na)-Total			98.2		%		80-120	01-JUN-18
Strontium (Sr)-Total			102.7		%		80-120	01-JUN-18
Sulfur (S)-Total			97.8		%		80-120	01-JUN-18
Tellurium (Te)-Total			99.3		%		80-120	01-JUN-18
Thallium (Tl)-Total			98.9		%		80-120	01-JUN-18
Thorium (Th)-Total			99.1		%		80-120	01-JUN-18
Tin (Sn)-Total			97.3		%		80-120	01-JUN-18
Titanium (Ti)-Total			89.9		%		80-120	01-JUN-18
Tungsten (W)-Total			100.6		%		80-120	01-JUN-18
Uranium (U)-Total			98.2		%		80-120	01-JUN-18
Vanadium (V)-Total			99.5		%		80-120	01-JUN-18
Zinc (Zn)-Total			95.8		%		80-120	01-JUN-18
Zirconium (Zr)-Total			96.4		%		80-120	01-JUN-18
WG2786218-1	MB							
Aluminum (Al)-Total			<0.0030		mg/L		0.003	01-JUN-18
Antimony (Sb)-Total			<0.00010		mg/L		0.0001	01-JUN-18
Arsenic (As)-Total			<0.00010		mg/L		0.0001	01-JUN-18
Barium (Ba)-Total			<0.00010		mg/L		0.0001	01-JUN-18
Beryllium (Be)-Total			<0.00010		mg/L		0.0001	01-JUN-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WP		Water						
Batch R4066027								
WG2786218-1 MB								
Bismuth (Bi)-Total			<0.000050		mg/L		0.00005	01-JUN-18
Boron (B)-Total			<0.010		mg/L		0.01	01-JUN-18
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	01-JUN-18
Calcium (Ca)-Total			<0.050		mg/L		0.05	01-JUN-18
Cesium (Cs)-Total			<0.000010		mg/L		0.00001	01-JUN-18
Chromium (Cr)-Total			<0.00010		mg/L		0.0001	01-JUN-18
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	01-JUN-18
Copper (Cu)-Total			<0.00050		mg/L		0.0005	01-JUN-18
Iron (Fe)-Total			<0.010		mg/L		0.01	01-JUN-18
Lead (Pb)-Total			<0.000050		mg/L		0.00005	01-JUN-18
Lithium (Li)-Total			<0.0010		mg/L		0.001	01-JUN-18
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	01-JUN-18
Manganese (Mn)-Total			<0.00010		mg/L		0.0001	01-JUN-18
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	01-JUN-18
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	01-JUN-18
Potassium (K)-Total			<0.050		mg/L		0.05	01-JUN-18
Phosphorus (P)-Total			<0.050		mg/L		0.05	01-JUN-18
Rubidium (Rb)-Total			<0.00020		mg/L		0.0002	01-JUN-18
Selenium (Se)-Total			<0.000050		mg/L		0.00005	01-JUN-18
Silicon (Si)-Total			<0.10		mg/L		0.1	01-JUN-18
Silver (Ag)-Total			<0.000010		mg/L		0.00001	01-JUN-18
Sodium (Na)-Total			<0.050		mg/L		0.05	01-JUN-18
Strontium (Sr)-Total			<0.00020		mg/L		0.0002	01-JUN-18
Sulfur (S)-Total			<0.50		mg/L		0.5	01-JUN-18
Tellurium (Te)-Total			<0.00020		mg/L		0.0002	01-JUN-18
Thallium (Tl)-Total			<0.000010		mg/L		0.00001	01-JUN-18
Thorium (Th)-Total			<0.00010		mg/L		0.0001	01-JUN-18
Tin (Sn)-Total			<0.00010		mg/L		0.0001	01-JUN-18
Titanium (Ti)-Total			<0.00030		mg/L		0.0003	01-JUN-18
Tungsten (W)-Total			<0.00010		mg/L		0.0001	01-JUN-18
Uranium (U)-Total			<0.000010		mg/L		0.00001	01-JUN-18
Vanadium (V)-Total			<0.00050		mg/L		0.0005	01-JUN-18
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-JUN-18
Zirconium (Zr)-Total			<0.000060		mg/L		0.00006	01-JUN-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
N-TOTKJ-WP								
Batch R4067372								
WG2784609-15 DUP		L2103336-9						
Total Kjeldahl Nitrogen		0.82	0.87		mg/L	5.4	20	04-JUN-18
WG2784609-10 LCS								
Total Kjeldahl Nitrogen			85.8		%		75-125	04-JUN-18
WG2784609-14 LCS								
Total Kjeldahl Nitrogen			99.3		%		75-125	04-JUN-18
WG2784609-13 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	04-JUN-18
WG2784609-9 MB								
Total Kjeldahl Nitrogen			<0.20		mg/L		0.2	04-JUN-18
WG2784609-16 MS		L2103336-9						
Total Kjeldahl Nitrogen			108.5		%		70-130	04-JUN-18
NH3-COL-WP								
Batch R4063901								
WG2786268-2 LCS								
Ammonia, Total (as N)			101.1		%		85-115	31-MAY-18
WG2786268-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	31-MAY-18
Batch R4065200								
WG2787276-2 LCS								
Ammonia, Total (as N)			107.3		%		85-115	01-JUN-18
WG2787276-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	01-JUN-18
NO2-L-IC-N-WP								
Batch R4066989								
WG2785417-6 LCS								
Nitrite (as N)			100.2		%		90-110	31-MAY-18
WG2785417-5 MB								
Nitrite (as N)			<0.0010		mg/L		0.001	31-MAY-18
NO3-L-IC-N-WP								
Batch R4066989								
WG2785417-6 LCS								
Nitrate (as N)			99.2		%		90-110	31-MAY-18
WG2785417-5 MB								
Nitrate (as N)			<0.0050		mg/L		0.005	31-MAY-18
P-T-L-COL-WP								
Water								

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-L-COL-WP		Water						
Batch	R4067214							
WG2787705-11 DUP		L2103336-6						
Phosphorus (P)-Total		0.0437	0.0419		mg/L	4.3	20	04-JUN-18
WG2787705-10 LCS								
Phosphorus (P)-Total			95.8		%		80-120	04-JUN-18
WG2787705-6 LCS								
Phosphorus (P)-Total			95.3		%		80-120	04-JUN-18
WG2787705-5 MB								
Phosphorus (P)-Total			<0.0010		mg/L		0.001	04-JUN-18
WG2787705-9 MB								
Phosphorus (P)-Total			<0.0010		mg/L		0.001	04-JUN-18
WG2787705-12 MS		L2103336-7						
Phosphorus (P)-Total			99.1		%		70-130	04-JUN-18
P-TD-L-COL-WP		Water						
Batch	R4075179							
WG2789730-14 LCS								
Phosphorus (P)-Total Dissolved			96.0		%		80-120	06-JUN-18
WG2789730-13 MB								
Phosphorus (P)-Total Dissolved			<0.0010		mg/L		0.001	06-JUN-18
PH-WP		Water						
Batch	R4066127							
WG2787670-2 LCS								
pH			7.41		pH units		7.3-7.5	01-JUN-18
SO4-IC-N-WP		Water						
Batch	R4066989							
WG2785417-6 LCS								
Sulfate (SO4)			100.6		%		90-110	31-MAY-18
WG2785417-5 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	31-MAY-18
SOLIDS-TOTSUS-WP		Water						
Batch	R4067113							
WG2786137-10 LCS								
Total Suspended Solids			100.3		%		85-115	01-JUN-18
WG2786137-9 MB								
Total Suspended Solids			<2.0		mg/L		2	01-JUN-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TOTSUS-WP								
Batch R4069870								
WG2787669-10 LCS								
Total Suspended Solids			90.9		%		85-115	04-JUN-18
WG2787669-9 MB								
Total Suspended Solids			<2.0		mg/L		2	04-JUN-18
TC,EC-QT97-ENDPT-WP								
Batch R4064349								
WG2785370-2 DUP		L2103336-1						
Total Coliforms		365	248		MPN/100mL	38	65	31-MAY-18
Escherichia Coli		7	4		MPN/100mL	56	65	31-MAY-18
WG2785370-1 MB								
Total Coliforms			<1		MPN/100mL		1	31-MAY-18
Escherichia Coli			<1		MPN/100mL		1	31-MAY-18
TURBIDITY-WP								
Batch R4063711								
WG2786143-2 LCS								
Turbidity			105.0		%		85-115	31-MAY-18
WG2786143-5 LCS								
Turbidity			103.5		%		85-115	31-MAY-18
WG2786143-1 MB								
Turbidity			<0.10		NTU		0.1	31-MAY-18
WG2786143-4 MB								
Turbidity			<0.10		NTU		0.1	31-MAY-18

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Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

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Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
pH	1	30-MAY-18 17:10	01-JUN-18 12:00	0.25	43	hours	EHTR-FM
	2	30-MAY-18 16:30	01-JUN-18 12:00	0.25	43	hours	EHTR-FM
	3	30-MAY-18 15:40	01-JUN-18 12:00	0.25	44	hours	EHTR-FM
	4	30-MAY-18 15:15	01-JUN-18 12:00	0.25	45	hours	EHTR-FM
	5	30-MAY-18 10:30	01-JUN-18 12:00	0.25	49	hours	EHTR-FM
	6	30-MAY-18 10:10	01-JUN-18 12:00	0.25	50	hours	EHTR-FM
	7	30-MAY-18 09:50	01-JUN-18 12:00	0.25	50	hours	EHTR-FM
	8	30-MAY-18 09:20	01-JUN-18 12:00	0.25	51	hours	EHTR-FM
	9	30-MAY-18 08:40	01-JUN-18 12:00	0.25	51	hours	EHTR-FM
	10	30-MAY-18 16:30	01-JUN-18 12:00	0.25	43	hours	EHTR-FM
	11	30-MAY-18 13:15	01-JUN-18 12:00	0.25	47	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR: Exceeded ALS recommended hold time prior to sample receipt.
EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT: Exceeded ALS recommended hold time prior to analysis.
Rec. HT: ALS recommended hold time (see units).

Notes*:

Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L2103336 were received on 31-MAY-18 07:45.

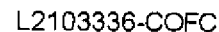
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Canada Toll Free: 1 800 668 9878



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REFER TO BACK PAGE FOR AIS LOCATIONS AND SAMPLING INFORMATION

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

NA-EM-0326e x00 Exp0103 October 2013

