



## Ymir Water System

# 2020 Quartz Creek Flow and Water Quality Monitoring Report

<b>Date of Report:</b>	February 11, 2021
<b>Reporting Period:</b>	2020 Year End Report October 16, 2020 to January 07, 2021
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## Contents

1.	Quartz Creek Flow Monitoring .....	3
1.1	Flow Monitoring Weir .....	3
1.2	Reporting Period Data Quality.....	3
1.3	Flow Graphs .....	3
2.	Quartz Creek Water Quality Monitoring .....	6
2.1	Raw Water Turbidity.....	6
2.2	pH .....	6
2.3	Treated Water Bacteriological.....	7
2.4	Raw Water Bacteriological .....	8
2.5	Raw Water Full Comprehensive .....	9
2.6	Treated Water THM & HAA .....	10

Appendix A      Quartz Creek Flow Monitoring Weir Formula

Excel File      Flow Monitoring Data

# 1. Quartz Creek Flow Monitoring

## 1.1 Flow Monitoring Weir

In 2019 a flow monitoring weir was installed on Quartz Creek at the intake for the Ymir water system with funding provided by BC Timber Sale and the water service.

The Kindsvater-Carter Formula was adopted to calculate flow through the sharp crested aluminum weir installed in the concrete water system intake weir. Flow depth through the aluminum flow monitoring weir is measured by an ultrasonic level transmitter. The aluminum weir will measure flows up to about 560 mm or 742 L/s. Above this level the concrete intake weir will overtop.

Wing plates were added to the ends of the concrete weir in spring 2020. The wing plate opening was later widened in August 2020 to accommodate higher peak flows of up to 710 mm or 1,515 L/s.

## 1.2 Reporting Period Data Quality

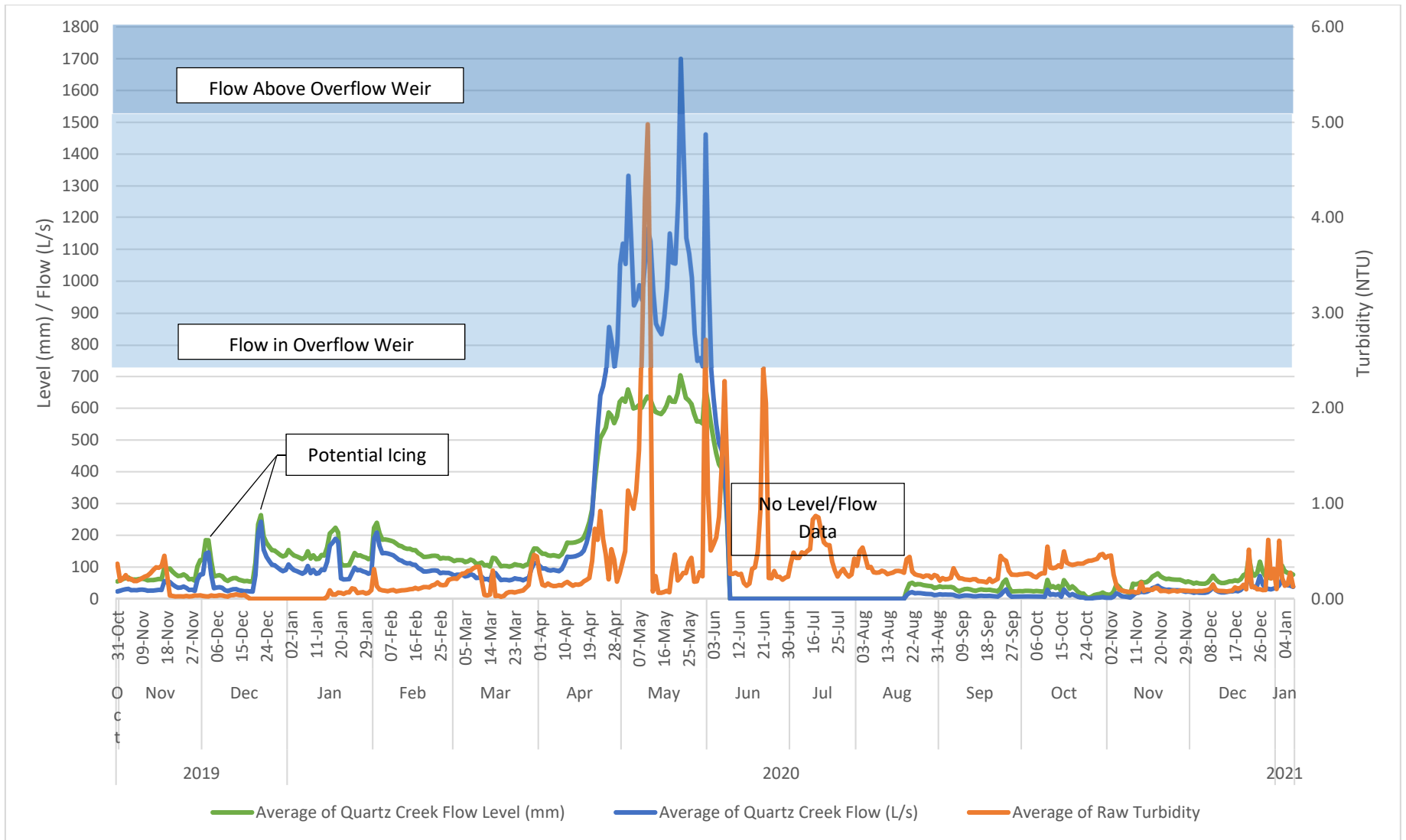
The level transmitter failed on June 8, 2020 and was replaced on August 20, 2020. The level and flow data during this period is considered incorrect. A third quarter 2020 report was drafted but not issued since there was no flow data for much of the reporting period.

It appears that during winter, periodic pond and intake weir icing might be interfering with water level readings. Unfortunately these icing periods might be corresponding with low creek flow periods.

During update of the Kindsvater-Carter Formula for the overflow weir widening, a calculation error was noted in the prior second 2020 reporting period for flows in the overflow weir (>560mm or >742 L/s). The Kindsvater-Carter Formula was updated to provide a revised calculation for overflows from spring 2020 to August 2020, and a new formula has been provided for overflows after August 2020. See attached Ymir Water System Quartz Creek Flow Monitoring Weir Formula, revised 31 August 2020 for widened Overflow.

## 1.3 Flow Graphs

The Quartz Creek level and flow data is provided in 15 minute intervals, which is too much data to chart. The digital flow data is provided in a separate Excel file. An Excel pivot table was used to present the follow daily average weir flow level, creek flows and turbidity data.



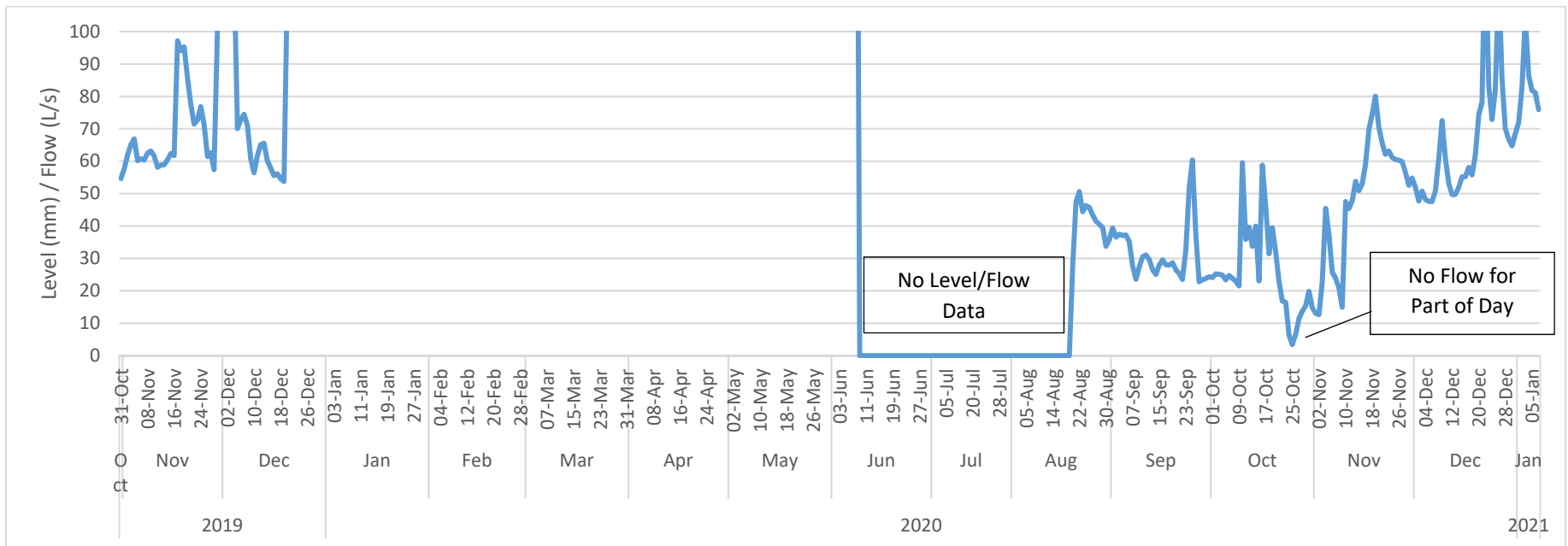
The following table provides the minimum and maximum average daily weir flow level and creek flows measured to date.

	Quartz Creek Flow Level (mm)	Quartz Creek Flow (L/s)	Date
Min	22	Undetermined	
Max	703	1,699	22 May 2020

Note the flow was above the overflow weir on 22 May 2020 and the maximum flow recorded is not considered accurate.

It appears that low flows for Quartz Creek in 2020 occur in late October or early November. Due to intake pond and weir icing during the winter, it is difficult to determine minimum flows. The lowest daily average flow recorded, excluding the known level sensor failure period, was on 25 October 2020 at 0.8 L/s; however, there was a level of zero recorded for much of this day and icing is suspected. The average daily flow on 24 and 26 October was 1.3 L/s, which also could have been affected by icing.

The flow chart presented as follow has the vertical scale set for better clarity of low flow data.



## 2. Quartz Creek Water Quality Monitoring

The Regional District is monitoring the following water quality parameters in association with the Quartz Creek Flow and Water Quality Monitoring initiative.

Water Quality Monitoring Parameter	Description	Desired Frequency
Raw Water Turbidity	Online turbidity meter	15 minutes
pH	Manual testing	When Technician on Site
Treated Water Bacteriological	Total Coliforms, E.coli & Fecal Coliform	Weekly
Raw Water Bacteriological	Total Coliforms, E.coli & Fecal Coliform	Bi-weekly
Raw Water Full Comprehensive	Chemical and physical parameters based on Guidelines for Canadian Drinking Water Quality	Quarterly
Treated Water THM & HAA	Trihalomethanes (THMs) and haloacetic acids (HAAs)	Quarterly

### 2.1 Raw Water Turbidity

Raw water turbidity is monitored online in the treatment plant.

Raw water turbidity is presented on the flow charts in the previous section. The maximum daily average turbidity for 2020 was 4.98 NTU recorded on May 10, 2020.

### 2.2 pH

pH is hand measured when water technicians are onsite at the Ymir water treatment plant. The following table provides the pH test results for the monitoring period.

Test Date	pH
19-Aug-19	7.31
27-Aug-19	7.36
4-Sep-19	7.3
11-Sep-19	7.5
16-Sep-19	8.0
17-Sep-19	7.5
25-Sep-19	7.8
30-Sep-19	7.4
7-Oct-19	7.5
15-Oct-19	7.7
22-Oct-19	7.6
28-Oct-19	7.5
5-Nov-19	7.6
11-Nov-19	7.5
18-Nov-19	7.3
25-Nov-19	7.4
3-Dec-19	7.6
17-Dec-19	7.5
23-Dec-19	7.6
3-Jan-20	7.5
7-Jan-20	7.4
15-Jan-20	7.6
20-Jan-20	7.7
27-Jan-20	7.7
3-Feb-20	7.4

Test Date	pH
12-Feb-20	7.8
18-Feb-20	7.6
25-Feb-20	7.6
3-Mar-20	7.6
11-Mar-20	7.4
18-Mar-20	7.5
24-Mar-20	7.2
30-Mar-20	7.3
6-Apr-20	7.4
15-Apr-20	7.4
22-Apr-20	7.3
28-Apr-20	7.4
4-May-20	7.5
20-May-20	7.6
19-May-20	7.7
26-May-20	7.5
8-Jun-20	7.5
17-Jun-20	7.4
22-Jun-20	7.0
29-Jun-20	7.4
7-Jul-20	7.3
13-Jul-20	7.3
20-Jul-20	7.4
28-Jul-20	7.4
4-Aug-20	7.5

Test Date	pH
10-Aug-20	7.4
19-Aug-20	7.3
24-Aug-20	7.4
31-Aug-20	7.4
9-Sep-20	7.2
14-Sep-20	7.4
21-Sep-20	7.5
30-Sep-20	7.5
6-Oct-20	7.5
14-Oct-20	7.3
19-Oct-20	7.3
26-Oct-20	7.2
3-Nov-20	7.5
9-Nov-20	7.4
16-Nov-20	7.3
24-Nov-20	7.3
1-Dec-20	7.4
7-Dec-20	7.5
15-Dec-20	7.4
21-Dec-20	7.2
30-Dec-20	7.5
4-Jan-21	7.4
11-Jan-21	7.5
18-Jan-21	7.5

### 2.3 Treated Water Bacteriological

A treated water sample is taken weekly for Total Coliforms, and E.coli bacteria testing. Testing is provided by the BC Centre for Disease Control through Interior Health. Only adverse sample results are reported to the Regional District. There has been no adverse treated water sample results during the monitoring period.

## 2.4 Raw Water Bacteriological

A raw water sample is taken bi-weekly for Total Coliforms, E.coli and Fecal Coliform bacteria testing. Testing is conducted by Passmore Laboratory Ltd. Sample test results for the monitoring period are summarized in the following table.

Sample Date	Total Coliform (Colony Count per 100 ml)	E.coli (Colony Count per 100 ml)	Fecal Coliforms (Colony Count per 100 ml)
2019-08-14	92	Less than 1	Less than 1
2019-08-28	45	Less than 1	Less than 1
2019-09-11	101	Less than 1	Less than 1
2019-09-25	83	Less than 1	Less than 1
2019-10-08	10	Less than 1	Less than 1
2019-10-22	63	Less than 1	Less than 1
2019-11-05	06	Less than 1	Less than 1
2019-11-19	13	Less than 1	Less than 1
2019-12-03	10	Less than 1	Less than 1
2019-12-17	11	Less than 1	Less than 1
2020-01-07	07	Less than 1	Less than 1
2020-01-21	02	Less than 1	Less than 1
2020-02-04	9	1	1
2020-02-18	25	Less than 1	Less than 1
2020-03-03	3	1	1
2020-03-18	3	Less than 1	Less than 1
2020-04-01	17	Less than 1	Less than 1
2020-04-15	11	Less than 1	Less than 1
2020-04-28	1	Less than 1	Less than 1
2020-05-13	4	Less than 1	Less than 1
2020-05-26	7	1	1
2020-06-09	13	7	7
2020-06-24	15	Less than 1	Less than 1
2020-07-07	26	Less than 1	1
2020-07-20	98	Less than 1	Less than 1
2020-08-10	19	Less than 1	Less than 1



Sample Date	Total Coliform (Colony Count per 100 ml)	E.coli (Colony Count per 100 ml)	Fecal Coliforms (Colony Count per 100 ml)
2020-08-19	22	Less than 1	Less than 1
2020-08-31	19	Less than 1	Less than 1
2020-09-14	28	Less than 1	Less than 1
2020-09-30	37	Less than 1	Less than 1
2020-10-14	26	Less than 1	Less than 1
2020-10-26	9	Less than 1	Less than 1
2020-11-09	23	Less than 1	Less than 1
2020-11-24	6	Less than 1	Less than 1
2020-12-07	4	Less than 1	Less than 1
2021-01-04	17	Less than 1	Less than 1
2021-01-19	4	Less than 1	Less than 1
2021-02-01	2	Less than 1	Less than 1

## 2.5 Raw Water Full Comprehensive

Raw Water Full Comprehensive test results are summarized in the following table.

Sample Date	Comments
2019-07-26	Test results within Canadian Drinking Water Quality Guidelines.
2019-10-22	Total Coliform count of 11. All other test results within Canadian Drinking Water Quality Guidelines.
2019-12-09	Test results within Canadian Drinking Water Quality Guidelines.
2020-03-30	Test results within Canadian Drinking Water Quality Guidelines.
2020-07-28	Total Coliform count of 71. Test results within Canadian Drinking Water Quality Guidelines.
2020-10-19	Test results within Canadian Drinking Water Quality Guidelines.

## 2.6 Treated Water THM & HAA

Some studies have identified a potential link between disinfection byproducts, primarily trihalomethanes (THMs) and haloacetic acids (HAAs) and certain forms of cancer. Disinfection byproducts can be formed when chlorine reacts with source water that has higher levels of organic material.

Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Trihalomethanes, April 2009 addendum, identifies the maximum acceptable concentration (MAC) for trihalomethanes (THMs) in drinking water as 0.100 mg/L (100 µg/L) based on a locational running annual average of a minimum of quarterly samples taken at the point in the distribution system with the highest potential THM levels. The maximum acceptable concentration (MAC) for bromodichloromethane (BDCM) in drinking water is 0.016 mg/L (16 µg/L) monitored at the point in the distribution system with the highest potential THM levels.

Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Haloacetic Acids, 2008 identifies the maximum acceptable concentration (MAC) for total haloacetic acids in drinking water at 0.08 mg/L (80 µg/L) based on a locational running annual average of a minimum of quarterly samples taken in the distribution system.

Sample test results for the monitoring period are summarized in the following table.

Sample Date	Total Trihalomethanes (mg/L)	Bromodichloromethane (mg/L)	Total Haloacetic Acids (mg/L)
2019-01-28	0.0109	< 0.0010	0.00774
2019-07-17	0.0207	< 0.0010	0.0145
2020-06-18	0.0227	< 0.0010	0.0205
2020-09-21	0.0118	< 0.0010	0.0106
2021-01-04	0.0188	< 0.0010	0.0130

## **Appendix A**

# **Quartz Creek Flow Monitoring Weir Formula**